The Generation Game: All Gain No Pain? Ageing, Intergenerational Equity and Generational Accounts

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Working Paper No. 59 **April 2002**

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* The author gratefully acknowledges financial assistance from the Postgraduate Fellowship of the Economic and Social Research Institute, Dublin. This paper was written as a lecture to the Statistical and Social Inquiry Society of Ireland, Spring 2001 and also forms part of his PhD dissertation at the London School of Economics. The paper uses data from the 1994 *Living in Ireland Survey*, and the 1987 *Survey of Life-style and Usage of State Services* made available by the Economic and Social Research Institute, Dublin. The author is grateful to seminar participants at the London School of Economics at the Statistical and Social Inquiry Society of Ireland, as well as Luisa Corrado, Jane Falkingham and Celia Phillips for

Abstract

This paper tries to quantify the degree of intergenerational redistribution in Irish public expenditure. The development of a large public debt in the space of two decades, its rapid elimination and potential rise again in the next decades due to demographic changes is likely to result in an intergenerational transfer of resources. The paper utilises a database of public expenditure, together with the age incidence distribution of public expenditure to examine the generational net beneficiaries of public spending programs since the foundation of the state in 1921. Demographic and alternative economic scenarios are considered to estimate the lifetime net benefit from public expenditure. Finally the sustainability of current expenditure is examined through the creation of generational accounts.

Keywords: Public Expenditure, Intergenerational Redistribution.

JEL Classifications: H50, J18, N30.

1. Introduction

This paper tries to quantify the degree of intergenerational redistribution in Irish public expenditure. The motivation for this paper comes from a number of sources. Firstly the development of a large public debt in the space of two decades, together with the forecasted elimination of this debt over the next two decades (Department of Finance, 1998) will clearly result in an intergenerational transfer of resources; from those who pay for the public debt to those who consumed it. Secondly, the rapid ageing of the Irish population during the next century is expected to result in further deficits.

Whereas the development of the public debt in the late 20th century was largely driven by economic factors, this century's potential deficit will be driven by demographic factors. As populations age, the ratio of those of non-working ages to those of working ages, known as the dependency ratio, rises and thus increases the pressures on the public finances, also increasing the degree of intergenerational redistribution. The *Budget Strategy of Ageing Group* of the Department of Finance (DOF) find that the cost of ageing is set to rise by 7 percent of GNP over the next half-century (DOF, 1999).

These problems do not face Ireland alone. In fact in many countries the situation is worse. Population ageing in most OECD countries is expected to produce significant public expenditure problems as the cost of public transfers such as pensions, health care and long term care increase. For example OECD (1988) found that public pensions alone across the OECD would increase from 10 percent of GNP on average across the OECD in 1984 to over 20 percent on average in 2040.

Kessler (1996) argues that during "*the decades to come there will be much debate, criticism and questioning about the whole issue of intergenerational transfers*". If one generation gains significantly more than another, then there is potential for generational conflict. This is the case currently in the USA, where much coverage has been given to intergenerational tensions. Many of the younger generation in the USA find themselves

with falling real earnings, while their baby boom elders experience the fruits of the longest boom in American history. At the same time they are faced with financing the baby boom generation in retirement as the social security system reserves end in the next two decades: *"we fear for the future…our generation labors in the expanding shadow of a monstrous national debt….those in power have practised fiscal child abuse, mortgaging our future"* (Third Millennium, 1999). Furthermore intergenerational conflict also worsens not only from the cost of the ageing electorate but also due to the ageing of the electorate and the increased number of elderly voters, who have the incentive to vote to increase the share of resources going to them.

Before going on to consider the extent of intergenerational redistribution, we must first consider the notion of intergenerational equity. Clearly policy makers do not aim to have complete intergenerational equity, the idea that each generation is as well off as another. Assuming a constantly rising level of wealth, this would require huge transfers from future generations to earlier generations. Instead the most that redistributional policies aim for is that at any point in time intergenerational inequality is lessened. For example an objective of government policy has been to ensure that pensioners also benefit in terms of increased pension payments from economic growth. Pensioners in Ireland can thus expect to receive more than they put in. For example, Hughes (1985) found that the rate of return received by pensioners in Ireland was on average much higher than that received by investors. Each generation receiving more from the state than they put in is however not necessarily a problem for the public finances for as Samuelson (1958) pointed out that each generation can receive more than they contributed if economic growth outpaces population growth. However, if public net expenditure rises much faster than the rate of economic growth as happened in the 1980's and may happen this century, then public expenditure becomes unsustainable.

Because of the desire to look at the distribution of public expenditure between generations, one needs to look at the net gains of generations from the State over the entire lifetime. In order to do this, forecasts of public finances and demographic projections

over the next 100 years are necessary. Without question, one needs to take extreme caution in the interpretation of the results. Instead they should be seen as a *"dim light trying to pierce the impenetrable fog of the future. This light may help us perceive the hazy outlines of an iceberg, but will certainly not be able to discern detail with any reliability*" (Wolfson and Rowe, 1998).

This paper is broken up into a number of sections. The next section quantifies the extent of intergenerational redistribution between generations alive in the 1990's. This section uses the 1994 *Living in Ireland Survey* to measure the degree of redistribution in the categories of social welfare expenditure, health care, education and personal taxation and social contributions. Section 3 using a database of public expenditure and taxation in the Irish State, collected by the author, documents the evolution of public expenditure and taxation by type since the foundation of the state. Using age incidence assumptions, section 4 assigns each year's public expenditure across each cohort alive at the time. This allows one to estimate how much each cohort benefits from public expenditure over time. Thus for example, we examine the existence of welfare generations, receiving relatively high levels of social benefits, spending on education, health and receipt of taxes across generations. Lastly we look at net gains by generation since independence.

As the Irish State is still only about 80 years old, no generation has lived its entire life in the State. Therefore in order to measure the redistribution between generations, one needs to estimate in addition to past net gains, future net gains from public expenditure and taxation. The first step is to consider future demographic trends. Section 5 using assumptions made by the CSO, describes this trend. The next step is to examine the effect these demographic changes on the public finances. Section 6 looks at the future evolution of the public finances under a number of different scenarios. Firstly, taxes and expenditures per capita are assumed to increase at the rate of economic growth. Secondly, public finances are assumed to rise using assumptions used by the Department of Finance in a recent study on ageing and the public finances. Three other scenarios are also examined, the effect of a permanent tax cut, indexing social security benefits at the rate of

prices rather than the above inflation rates of increase made by the other scenarios and finally the impact of a recession on the forecasts.

Having generated demographic and public finance trajectories, we decompose this by generation to look in section 7 at the degree of intergenerational redistribution in 2025, 2050 and 2075. Section 8 looks at the net gain over the lifetime of each cohort alive in 1998. Section 9 examines the degree of fiscal sustainability currently within the system, using the method of generational accounts due to Auerbach et a. (1991). Section 10 looks at the degree of redistribution of public expenditure between generations. Section 11 concludes.

2. Intergenerational Redistribution and Outcomes

Changing demographic patterns combined with the age incidence of tax receipts and public expenditure drives the demographic *time-bomb* and generational imbalances. This section examines the age incidence rates of public expenditure and tax receipts. In this respect, we are limited by the availability of data, but also by the ambiguity as to the distribution of benefits of public goods such as the justice system, defence and the environmental protection. In addition the incidence of public transfers are often difficult to determine. For example are government subsidies/taxes on the corporate sector incident on shareholders, customers or even employees? In this respect the incidence may not even be on the national population.

In this section, we only focus on welfare expenditure and taxation on the household sector. In this we use a survey collected by the *Economic and Social Research Institute*, the 1994 "*Living in Ireland Survey"*. It is a large scale household survey conducted on the Irish population and contains information on income, labour market and demographic characteristics. There are a number of methodological difficulties in measuring the incidence of these instruments. Firstly payments targeted on children are paid to their

parents. In this study, we assume that child and orphans' benefits are incident on children, but that the child components of income replacement benefits such as unemployment assistance are incident on their parents.

The joint taxation of income may result in a lower taxation for married couples than for two singles. It may therefore be more appropriate to assign the full tax rate on the main earner with the tax reduction seen as a tax expenditure on the lower income spouse. However as spouses are typically of similar generations and because this study focuses on intergenerational transfers this point is ignored. In this study, spending is only allocated to those on whom it is spent. Therefore education is targeted only at younger cohorts. However this does not account for returns to education, whereby an increase in the level of education in an economy may lead to positive externalities in the whole economy. This is also relevant to Buiter's (1995) criticisms of the approach for ignoring general equilibrium responses.

Similarly, children may spend less on parents because of the existence of pensions. Another issue relates to the cost of services to be provided. We take the cost to be that incurred by the state, even where this may be below the market value as in the case of health expenditures.

2.1 Tax and Social Welfare

Table 1 outlines the average tax payments (including income tax and employee social insurance contributions), average benefit receipts and average gross income from market activities per month per person by age band in 1994. However, the actual model uses disaggregated information at the tax and benefit instrument level. We notice that the average benefit per person increases with age. Average benefits are lowest for children because child benefits although universal are relatively lower in value than income replacement benefits. Those of working age, receive about the average payment per

person. Average benefits rise for older age groups with the very oldest least likely to have other sources of income.

Table 1: Age Incidence of Benefits and Taxes in Ireland 1994

Age Group	0	10	20	30	40	50	60	70	80	Total
Average per person										
Benefit pp	20.2	25.5	75.9	84.9	83.9	81.2	169.0	237.8	263.7	78.2
Tax pp	0.0	4.0	118.2	180.2	187.2	138.8	34.1	4.1	0.3	79.6
Net Gain pp	20.2	21.5	-42.4	-95.2	-103.3	-57.6	134.9	233.7	263.3	-1.5
Gross Income	0.0	11.3	155.8	211.5	210.6	168.9	69.7	25.4	16.7	100
Distribution across populations										
Population	16.7	20.2	14.1	13.3	12.4	8.9	7.2	5.4	2.0	100
Benefits	4.3	6.6	13.7	14.4	13.3	9.2	15.5	16.4	6.6	100
Taxes	0.0	1.0	20.9	30.0	29.2	15.5	3.1	0.3	0.0	100
Gross Income	0.0	2.3	21.9	28.0	26.1	14.9	5.0	1.4	0.4	100

Source: Living in Ireland Survey 1994.

Taxes on the other hand peak for those of prime working age, between 30-50, with those in their 20´s and 50´s paying on average relatively less due to lower earnings and lower participation rates respectively. Combining the taxes and benefits, we find the typical U-shape curve with the young and old being net beneficiaries and those of working ages being net contributors. In this section incidence of taxes and benefits by age is examined. A previous study in Ireland, Rottman *et al.* (1982) has examined the incidence by the 10 stages as they define it of the family life cycle. They too find a similar conclusion that redistribution in the Irish tax-benefit system tends to shift resources towards families during the child rearing stages and in retirement from families at other stages.

The first part of Table 1 details the average payment per person in each age band. Combining this with the distribution of the population, we get the distribution of taxes and benefits across the age distribution. In the data, the population peaks in the teenage age-band, with the youngest cohort exhibiting the reduction in fertility over the last decade. For reasons expressed earlier, we note the relatively smaller size of the older

cohorts. This results in a much more even spread of expenditure across the age cohorts. As taxation is concentrated in the working age groups, the effect is similar to the age incidence distribution. We note however, the impact of the smaller cohort size of those in their fifties, who although paying more per capita, pay in total less than 80 per cent of that paid by the 20´s cohort and receive less than 70 per cent of benefits despite on average receiving more than twice as much per capita.

2.2 Other Expenditure

Like social welfare payments we measure the incidence of education expenditure on a per capita basis, compared with the typical method of reporting education expenditures on a per student basis. We make the simplifying assumption that primary education expenditure is divided amongst the 4 to 12 age group, secondary expenditure amongst the 12 to 18 age group and use the distribution of individuals in higher education to find the tertiary education expenditure per capita. In terms of health expenditure we take figures from Nolan (1991) which indicate a ratio of 12.8:1.0:18.0:131.5 for the ages <5, <25, 25-64 and >=65 respectively. All other expenditure was assigned equally amongst all persons.

We must differentiate between redistribution between generations at one point in time as we have highlighted in Table 1 and redistribution between generations over the lifetime. Much redistribution at one point in time say from working ages to the elderly, is actually negated when one considers that current pensioners themselves will have paid taxes during their working lives and thus the degree of redistribution will be much less. This study primarily focuses on the distribution between generations on the basis of their lifetime income. In order to estimate the intergenerational distribution of taxes and transfers over time, one needs to know the age incidence of these instruments over the period of this study from 1921 to 2100. Unfortunately, data is limited and assumptions have to be made.

Hills (1995) for example, made two assumptions about health care expenditure, a "high" variation assumption and "low" variation assumption. Income taxes were allocated equally across age groups. Auerbach *et al.* (1991) assumed that recent distributions of taxes and benefits applied in the past. Although it would be useful to investigate the age incidence of taxes and benefits using historic micro datasets such as the 1955, 1973, 1980 and 1987 *Household Budget Surveys*, this is beyond the current study. In this paper we follow the Auerbach *et al.* approach and use the current distribution applied to historic and projected total expenditures. In the case of social security we disaggregate the numbers given above into individual benefits such as Unemployment Benefit, Child Benefit etc and apply actual expenditures in each year to produce new distributions. Education expenditure is distributed across the relevant age groups by type of schooling. Taxes are disaggregated into income taxes and social insurance contributions. Other taxes are assumed to be distributed according to the distribution of disposable income, while other expenditures are distributed on a per capita basis.

2.3 Outcomes

Describing the incidence of public expenditure by age is one side of the coin. Given this distribution, how does this affect the lifestyle outcomes of people of different ages? In Table 2, we focus on an outcome measure, the numbers of different age groups in relative poverty, the standard of living of households with individuals from different age groups and the distribution of incomes for households of these types. Again the *Living in Ireland Survey* of 1994 is used. The definition of poverty used is a percentage of median equivalised disposable income, where the square root of household size is the equivalence scale, with individual weighting. Because the numbers in poverty are quite sensitive to the method use, we describe poverty rates using 3 different percentages of median income, 50 percent, 60 percent and 70 percent.

We notice that regardless of the poverty line used, children and elderly are most likely to be in poverty. This corresponds with Rottman *et al.'s* (1982) conclusion based on data

from the 1970's that redistribution was not sufficient in relation to either dependency or low income. When one focuses on the 50 percent line, we notice the concentration in poverty of the 25-44 age group. This feature, however, relates to the presence of children in their households. These results are confirmed in Callan *et al.* (1996) who find that poverty rates rose for children and elderly since the previous survey was carried out in 1987. This indicates that despite the distribution of public expenditure that is targeted particularly at children and the elderly, these groups are still disadvantaged relative to the rest of the population.

Examining average incomes, we find again that families with children and especially elderly have below average standards of living as measured by the mean equivalised household disposable income. The reason for this is that although benefits do exist for children, they are not sufficient to maintain living standards at a level of those families without children. For the elderly, the reason is because they are reliant on savings or benefits, which will tend to be lower than market labour income.

The final column of Table 2 reports the Gini inequality measure for household equivalised disposable income by age groups. The higher the value of the Gini the higher is the income inequality. We see that inequality is greater at the extremes of the age distribution. Inequality is lowest for the 20-24 group, the group with the highest standard of living. This is because at the start of ones career there is less differentiation in earnings and people in this group will be less likely to have dependants. In the 20-55 age groups, inequality increases to about 0.32, partially due to the fact that some households will have children and some not. We also see the impact of children as the average standard of living falls for these groups, to a low for the 35-44 age group, before increasing again for the 45-54 age group.

Table 2: Percentage of Age Group Living in Households in Poverty, 1994

Age Group	Poverty Line (M50)	Poverty Line (M60)	Poverty Line (M70)	Average Income	Gini Coefficient
0-4	14.1	19.4	26.8	91.2	0.324
5-9	13.8	21.1	30.3	83.9	0.306
10-14	11.4	18.1	24.4	86.5	0.305
15-19	8.5	15.8	22.8	98.2	0.326
20-24	3.3	7.5	13.5	119.9	0.300
25-34	9.1	13.7	18.4	117.1	0.319
35-44	9.6	15.2	22.5	101.9	0.320
45-54	5.9	11.0	16.8	118.0	0.319
55-64	11.2	18.4	26.3	106.7	0.343
65-74	17.1	36.6	47.0	72.9	0.294
75-	14.3	35.4	48.9	77.0	0.348
Total	10.3	17.7	25.0	100.0	0.335

Note: Definition of Poverty Line of M(N), as N percent of Median Equivalised Household Disposable Income, using Square Root of Household Size as the Equivalence Scale and weighted by the number of people.

Source: Living in Ireland Survey, 1994.

Inequality levels are low for children aged 5-14, but higher for children younger and older than this. However, the average standard of living is low for the households with children in the 5-14 age group, even though this below average income is more evenly spread. Inequality is higher for other children because families with children in these age groups will have fewer children than families with children in the middle age groups. This is as a result of the fact that with young children some families will just have started to have children and for older children, children will start to leave home. For the 55-65 age group, the average standard of living although above average because of the existence of market incomes, falls. This is due to the fact that people will start to early retire in this age group and hence one sees income inequality rise significantly. Once most individuals have retired at the age of 65, household standard of living falls to the lowest amount and inequality also falls to the lowest level. Interestingly for the oldest pensioners, the standard of living rises. Although benefit levels increase slightly, the higher average income is a result of (a) differential mortality where richer individuals are likely to live

longer and (b) the fact that the over 75's once their spouse dies, may often move in with working age relatives and hence we see that inequality rises to the highest amount.

3. The Evolution Public Expenditure 1921-1998

This section details the patterns in public spending and taxation since Irish independence in 1921. Although typical redistribution studies focus on the welfare state or simply the tax-benefit system, when comparing across generations and over time it is important to look at all public expenditure. This is because of the changing relative importance of different forms of expenditure. Direct taxes and social benefits are currently very important, however like many developing countries at present, in the early years of the Irish State, public expenditure was primarily focused on non-cash benefits and the means of collecting revenue was primarily through expenditure and property taxes. Also as local government expenditure was historically an important expenditure and revenue source, we include both state and local expenditure in the analysis.[1]

3.1 Discount Rate

In order to be able to compare incomes at different points in time, Economists use a concept known as a discount rate to compare incomes. We need to discount future net benefits as economic theory suggests that income received earlier is worth more than received later. Individuals prefer to have £100 now to £100 next year because one could invest £100 now and receive more than £100 next year. A multiplicative factor that would equalise the two figures is known as the discount rate. There is a problem here if one uses interest rates as they vary substantially over time and can go negative. To avoid this problem, Hills uses the GDP per capita deflator to combine the effect of interest rates and inflation. This is a reasonable assumption to make as a measure of the average rate of return in an economy over time.

Future income streams are not known however with the same certainty as past income streams. One should therefore incorporate the riskiness of these incomes when calculating the discount rate. For future income, it should be higher than the growth rate assumed. This assumption is also necessary in order to be able to calculate the net present value. Therefore, in this study we assume a discount rate of the growth rate in GNP for historical values and for future values a discount rate of GNP growth plus 2 percent per annum to account for the greater risk associated with unknown income streams.

3.2 Measuring Costs and Benefits of Public Expenditure

Typical methods used for tracking public expenditure include the budget deficit. However, ter Rele (1997) points out that the budget deficit is not a good measure for assigning costs and benefits across time. In this study the net-benefit concept used is slightly different to that of the budget deficit. The reason for this is that in comparing net benefits of generations, one needs to take account of when individuals received the benefit of public expenditure. For example in the case of capital expenditure, all the benefits do not occur during the year of the expenditure, but rather until the asset purchased has depreciated to zero value.

Another problem with the deficit as an indicator of the strength of the public finances is that it does not include the cost of unfunded future pension liabilities.[2] This can be quite severe as witnessed by the recent concern in Ireland about both state pension liabilities and the occupational pension liabilities of pension sector workers, which will both have to be funded out of future revenue streams as no fund has been accumulated. Another issue relates to debt interest. If debt interest paid each year, although a component of public expenditure, is included in the net benefit concept, then financing current expenditure with debt will result in higher *benefits* for the generations financing the benefits for an earlier generation. Rather, the benefits result from the original net expenditures and should be apportioned to the generations alive at the time of the expenditure.

Profits of the Central Bank should be regarded as a private commercial transaction and not included in our incidence analysis. These intergenerational transfers, which should be regarded as private transfers, may affect the results of our intergenerational analysis. However, as little information is known about their incidence and because Ireland is an open economy such transfers may introduce an international dimension to the analysis, we ignore these effects.

Instead of using actual capital and interest expenditures in the annual net benefit concept, we instead incorporate measures that more accurately indicate where the benefit of these expenditures accrues. In the case of capital expenditure, *gross physical capital formation (*GPCF), we transform this expenditure into an imputed income stream of depreciation and rate of return, spreading the benefits over the generations who use the assets. Depreciation is estimated at 1.4 per cent of the value of net physical assets per annum[3] and the rate of return equivalent to imputed rent from the holding of assets, assumed to be equal the long run growth rate in the economy, 2 per cent. The value of the asset base used is a combination of annual public sector GPCF and a value for the initial public-sector capital stock. The original capital stock in Ireland in 1921 is based on an estimate for 1950 in Henry (1989) and the level of public sector capital formation 1921-1950.

Turning to debt interest, we ignore previous debt interest in the calculation of the benefit concept. This allows us to measure net benefits as the difference between total benefits and total receipts. Total accumulated debt is however a liability for the future and as such reduces potential future consumption relative to future taxes. With regard to future debt or savings, we assume that the interest rate is equal to the discount rate used and therefore firstly the discounted value of current accumulated debt remains constant, and secondly future debt (savings) is simply the sum of future net benefits (costs).[4]

Figure 1 describes the trend of costs and benefits of public expenditure from independence until 1998 as a percentage of GNP. By costs to the population we include taxes and contributions. Benefits cover a wider term than simply social welfare benefits but include

all current public expenditures, depreciation and imputed rent. The dotted line signifies the more conventional method of total expenditures, containing debt interest and capital expenditures.

The figure draws on a dataset created by the author from official statistics that contains details by disaggregated sub-heading of taxes and expenditures during this period. We notice that benefits to the population from public expenditure exceed costs in terms of taxation for almost the whole period. The difference between benefits to the population and costs narrows dramatically with the fiscal contraction of the late 1980´s/early 1990´s. With costs exceeding benefits at this stage. We notice that the benefit and expenditure lines do not coincide.

Table 3: Components of Public Expenditure as a Percentage of GNP 1921-1998

Year	Social Welfare	Education	Health	Capital	Other	Benefits	Costs	Net Benefit
1921	3.9	2.9	0.4	13.1	22.3	42.6	27.5	15.1
1925	3.4	2.7	0.5	12.1	22.4	41.1	25.2	15.8
1930	3.4	2.8	0.9	10.5	19.1	36.6	24.3	12.3
1935	4.2	3.0	1.3	10.9	24.9	44.2	31.4	12.8
1940	5.0	2.6	0.7	12.5	26.6	47.3	29.8	17.5
1945	4.3	2.0	1.1	10.1	23.3	40.7	26.8	13.9
1950	3.9	2.4	1.2	9.7	32.2	49.3	33.8	15.5
1955	5.2	2.1	1.4	7.9	28.1	44.7	31.5	13.2
1960	4.8	2.2	1.2	6.7	24.8	39.6	29.8	9.8
1965	5.4	3.0	1.6	6.0	27.9	43.9	34.2	9.7
1970	6.8	4.1	2.7	5.4	32.4	51.4	37.3	14.1
1975	10.0	4.8	5.6	5.2	36.1	61.7	36.4	25.4
1980	9.4	5.5	7.3	4.7	32.7	59.5	42.0	17.6
1985	14.4	5.5	7.1	4.9	33.7	65.6	57.4	8.2
1990	11.4	4.9	5.7	3.9	22.3	48.2	53.0	-4.7
1995	11.3	5.3	6.7	3.5	24.9	51.8	54.2	-2.4
1998	10.2	4.8	6.1	3.0	28.3	52.3	58.5	-6.2

Note: Expenditure = Benefits – Imputed Capital Benefits + Capital Investment + Interest Payments.

Source: CSO Statistical Abstract various years and Imputation by Author.

Benefits are initially higher than expenditures and cross about in 1960. The reason for this is that the latter contains debt interest payments that are more heavily weighted towards the end of the period, while the benefit of public capital infrastructures was proportionally higher during the early years of the state. For example many of the roads and drains that exist in the country were constructed before independence.

Table 3 breaks the trend of public expenditure into components. Before 1965, we notice a relatively insignificant welfare state, where with the exception of health expenditures, social welfare and education expenditures largely keep track with economic growth at about 3.5-5% and 2.5-3.5% of GNP respectively. Public health expenditure sees a gradual rise from 0.4% in 1921 to 1.7% in 1960. From 1960 to 1985, we see a large expansion in the welfare state with social welfare, education trebling and health expenditure increasing by a factor of 5 as a proportion of GNP. Benefits from capital expenditure (depreciation and imputed rent) fall over entire the period due to a diminishing public sector fixed capital stock as a percentage of GNP over time (see Henry, 1989). The fiscal contraction post 1985 saw a fall particularly in other and social welfare expenditure, but also to some extent education and health expenditure as a percentage of GNP.

4. Inter-Generational Expenditure

So far we have described our assumptions about the incidence of public expenditure and taxation across different age groups and detailed the trend in aggregate benefits and costs of public expenditure programs from 1921 to 1998. In this section, we apply the incidence assumptions to this trend to decompose public expenditure by age cohort. The benefits and the costs described in Table 3 are allocated year on year to the cohorts alive during that period. Then the average lifetime totals for each cohort are found by summing over each cohorts yearly total. Figures 2a-2e present this decomposition over the lifetimes of individual cohorts. Each line represents the cumulative gain or loss per survivor of the instrument being described in the graphic from birth until the cohort's age

in 1998. Therefore, those born in the first year of the state in 1921 the cumulative sum of 78 years is described, while for the cohort born in 1998 only the gain of the first year of life is described.

In Figure 2a we describe education spending over the lifetime of 9 cohorts. We notice that education spending is zero for the first years of each cohort, rises from school entry age until university leaving age and then levels out into a plateau as education spending diminishes to very low amounts to cover those in adult education and mature students. In terms of between-cohort variation, we notice the trend of increasing education expenditure per cohort member per cohort. Although there was little difference between the cohorts born in 1921 and 1931, each birth cohort from 1931 to 1971 experienced higher average spending. This is a product of two factors, increasing expenditure per student and rising student numbers. Although those born in 1981 had not in general reached the end of their education, it seems unlikely that the trend will be reversed for this generation. We must remember here that spending reported has been discounted using GNP per capita growth rates rather than real expenditure. So although expenditure per student may have increased and student numbers may have increased as proportion of GNP, education expenditure fell during this cohorts school going period because real education expenditure did not increase in line with GNP.

Figure 2b describes the trend in social welfare expenditure over these cohorts' lifetimes. Here the trend is towards higher expenditure later in life as the curve for each cohort in convex. This highlights the importance of pension expenditures in the social welfare system, which accounted for nearly 40 percent of social welfare spending in 1998. We must remember however that the results reported relate only the average amount per *survivor*. Therefore, in terms of total expenditure one should place more weight on, expenditures going to younger ages of each cohort than for the older ages, as the latter group will have decreased in size due to emigration and mortality. We notice the effect of the expanding welfare state in that each succeeding cohort has a higher spend than the previous generation.

The expanding welfare state had different stages. In particular looking at younger ages, we notice the effect of the introduction of Child Benefits in the late 1940´s so that the cohort who were children before this period, those born in 1921 have next to no child related transfers until gradually in 1951, child related transfers reached a steady state. Subsequent transfers to the under 18´s remained relatively constant. The next effect we notice is the increasing generosity and coverage of social welfare transfers to the working age population from the early 1960´s until the late 1990´s. This expansion partially related to increased generosity of payments, but also mainly due to the expansion in client groups such as the unemployed, the sick and lone parents. Although partially unnoticed, transfers to older people expanded for some of the earlier cohorts as social insurance pensions were introduced in 1960 and as a result, total pension payments rose ahead of economic growth until the late-1980´s.

Figure 2c describes the trend in average health expenditure over the lifetimes of cohort members. We notice two trends. Firstly, the age incidence of health care spending which is significantly skewed towards the elderly and secondly the rising proportion of health expenditures for each successive cohort. Health care expenditure rose particularly quickly between 1969 to 1975 from 2 percent of GNP to 6 percent. This represents a major change in health care provision, therefore the longer a cohort lived after this change, the higher the health expenditure on the cohort. Before this period, health expenditure as a percentage of GNP had been fairly constant, and as a result the pre –1971 cohorts had relatively similar levels of spending while young. The 1971 cohort represents a transition cohort as the young received health care during the expansion of the health care system and thus have higher expenditure than the earlier cohorts, but less than the later cohorts, who were born after the reforms and thus had similar levels of health expenditure.

The expansion the tax system occurred over a longer period. There was a gradual rise until 1965 and then quite a rapid expansion until a peak in the mid-1980's, before falling back over the remainder of the century. As a result like benefits, later cohorts will pay

successively higher taxes (see Figure 2d). For the cohorts who have reached middle age and retirement in 1998, the effect of the reversal in the trend will not have been enough to reduce cumulative average tax rates below that of earlier cohorts. However later cohorts if current trends continue, will pay less tax relative to their income than earlier cohorts.

Figure 2e draws the results of each of the components of benefit and cost of public expenditure together. The effect of aggregating costs and benefits is that we get the familiar N shape found by Hills (1995) for the UK. Initially the effect of increased education and health expenditures for young people is most noticeable as later cohorts have higher net benefits. Once cohorts leave education and enter the work force the impact of the tax system dominates, for as we noticed above, public expenditure tends to be focused on early and late in life. As result, for this part of cohort's lives, cumulative net benefits fall. However, later expansions of the welfare state and corresponding rise in the tax rate benefited earlier cohorts to a relatively greater extent. This is because they paid relatively tax during earlier low tax periods, but benefited later and in retirement from increased expenditure levels. As a result, cumulative net benefits fall to a lesser extent for earlier cohorts over their working years and thus around the age of 20 the cumulative net benefit curves cross. For the cohorts who were older than 30 in 1998, the position the cohorts had in terms of early years cumulative net benefit is completely reversed. In fact for the 1921 cohort, they hardly reach a point of average cumulative net loss at any point during their lifetime. Other cohorts go substantially negative before the end of the working age, when the trend reverses again due to retirement benefits, increased expenditure and lower taxes.

5. Demographic Pressures

One of the motivations behind the interest in intergenerational equity is in the changing demographic picture. Ireland unlike many other countries in Western Europe currently still has a relatively young population, with about 50 per cent of the population aged

under 25 and only about 10 per cent of the population aged 65 or over. The proportion of elderly has remained relatively constant at about 10 per cent over the whole 20th century. Despite historically high birth rates, migration has tended to offset this effect to keep the population constant or in fact falling over the period.

Underlying the analysis of this paper is a forecast of the potential demographic situation in Ireland over the next century. However it must be noted that Irish demographic forecasts are notoriously poor. This is largely as a result of volatile cycles of migration and the unpredictable nature of fertility.

A number of assumptions need to be made. The mortality assumption is based on that made by CSO (1996), which assumes a gradual reduction in the mortality rate over time, increasing the life expectancy at birth in 1992 from 72.3 to 77.2 in 2027 for men and from 77.9 to 83.2 for females. Thereafter, life expectancy is assumed to be constant. We do not follow the birth rate assumptions made by the CSO as in both their prediction scenarios, they assumed a long term fall in the birth rates following the trend of the previous 25 years. However, in the years following this projection, the birth rate actually recovered somewhat up from 13.4 per 1000 in 1994 to 14.5 in 1998. Part of this recovery in the birth rate results from a rise in the number of women of childbearing age, however nevertheless the total fertility rate has in fact increased over the period.

Although little research exists on the topic, it may be no coincidence that the birth rate fell the most during the low growth years of the 1980's and has risen again during the second half of the 1990's, which experienced a period of high economic growth. Although not unprecedented, it is certainly unusual in Western Europe in recent times for such a reversal. We therefore make the assumption that Age Specific Fertility Rates remain constant over the forecast period. Migration forecasts too have been fraught with difficulty. Both projection scenarios of CSO (1996) assume net emigration per annum during the period 1996-2006. However, figures reported in Punch and Finneran (1999) highlight the rising net immigration in the period 1995-1998. In our forecast we assume a

continuation of the net immigration rate of 1998 through 2007, a period of expected continued growth, with no net migration during the rest of the forecast.

The result of these assumptions is that the population will gradually rise by nearly 25 percent between 1991 and 2025, declining afterwards. Although fertility rates are below the long-term replacement rate, the number of births will rise as the large birth cohorts of the 1970's and 1980's have children. Forecasted immigration levels will also increase the population. However after this period the population will fall due to the lower fertility rate. Unless behaviour changes, the projected population will fall to less than 75 percent of the peak level by the end of the century. One, however, must be very cautious about such long-term projects. Given the problems forecasting 10 years in the future which Irish demographers have had recently, future trends could be very different.

Figure 3 describes the distribution of the Irish population by age group for 1961, 1991 and forecasts for 2050 and 2100. The large dip in the 20-30 age group in 1961 deviating what one would expect to be a relatively concave curve reflects the very high emigration levels of the 1950's. In contrast to today, this gave Ireland the highest old age dependency ratio in Europe in 1960. The following generations were not greatly affected by emigration and in addition continued to have the high birth rates. In addition, Fahey and Fitzgerald (1997) point out that although significant improvements have been made in the child and young adult mortality rates, improvements in mortality amongst the elderly has not matched that in other countries and thus longevity has not had much of an impact on the demographic structure.

Over the short term the elderly dependency ratio looks very positive (see Figure 4). This is due to a number of factors. Firstly, large-scale emigration in the 1950's from the cohort born in the 1920/30's, means that the generation currently entering retirement will be small. Over the next 50 years however, the picture is expected to change, with the proportion of 65+ expected to double and the proportion of the very old (80+) expecting to treble. The reasons for this lie in factors that influence short-term trends and also due

to the rapid drop in fertility since 1980. The numbers retiring will naturally rise as a result of larger cohorts reaching retirement; both 20-year cohorts who succeeded the current retirement cohort born in the 1920's/30's are much larger. In addition this is coupled, with a dramatic reduction in birth rates since the 1970's. Since 1971, the total fertility rate has dropped about 4 to 1.8 in 1994 and it is unlikely that birth rates will return to the levels of the 1960's and early 70's again. If this pattern of low birth rates does in fact continue, then large retiring cohorts will be accompanied by small and decreasing working cohorts. In addition, increased education levels may through improvements in public health improve elderly mortality rates.

In order to reverse this process of long-term population decrease and short-term increased elderly dependency ratios, we have considered what changes in future fertility rates would be necessary. To ensure the long-term stability of the population, fertility levels would have to increase by 17%, not too large an increase given recent changes, only twice the increase which occurred between 1994 and 1998. However, even with this rise in fertility elderly dependency ratios would increase by a third by 2060, before levelling out. In order to maintain elderly dependency rates at the present level, fertility rates would have to rise by a third, resulting in a fast growing population, increasing by over 200% in 2100. Nevertheless because of the very low starting position, even the forecasted rise is likely to produce dependency rates that are lower than many European countries have today.

6. Demographic Ageing and Intergenerational Redistribution

Given the expected change in the demographic position, what will be the change in the distribution of public expenditure? Falling numbers of children coupled with an ageing population should result in a shift in expenditure up the age distribution. Figure 5 compares the degree of intergenerational redistribution in 1998 and 2050 in Irish Public Expenditure. It plots discounted net expenditures by age. Unlike the other analyses in this paper, we use the same discount rate and growth rate for comparative purposes.

This is so that we can isolate the effect of the ageing population.[5] As expected, we notice a movement upwards in the age expenditure distribution. Because much of the fall in the fertility rate happened before 1998, there is only a relatively low impact on child related expenditures. However, we notice a large increase in the net expenditures for the 20-30 age group as net taxes fall due to the fall in the size of this cohort by a third. The increase in the size of the 50-60 population will also increase the level of tax paid by this age group. However, the biggest effect is seen in the over 65 population which increases in size by over 125 percent.

7. Public Finances and Demographic Change

The focus of this paper is the degree of inter-generational redistribution of the Irish public finance system. So far we have only looked at the distribution of fiscal policy over the past. However, as the Irish state was only founded in 1921, no full cohort has lived its full life within the state. It is therefore necessary to attempt to forecast future public spending and taxation to complete the lifetime profiles for all currently alive generations.

The next component of the analysis is the forecast of the trajectory of public finances. This section takes the assumptions underlying the Department of Finance's Long-term Issues Group predictions of future government receipts and expenditures (DoF, 1998). We also examine a number of alternative scenarios:

1. Growth
2. Department of Finance Assumptions
3. Tax Cut
4. Recession
5. Price Linked Social Security Increments

The first scenario assumes that expenditure and taxes per person increase at the same rate as GNP per capita. Per capita GNP growth rates are forecasted to average 6 percent until 2000, 4 percent until 2010 and 2 percent thereafter. The next scenario that is the basis of the other alternative scenarios is the Department of Finance assumptions as expressed in DoF (1998). In summary they assume that:

- Taxes increase at the rate of GNP.
- Social Insurance Contributions increase at 80 per cent of the rate of GNP while other revenues increase at the rate of prices. As a result revenues will tend to fall slightly relative to average income over time.
- Public Service Pay and Pensions are expected to rise at a rate of 2 per cent per annum above inflation.
- Social Welfare benefits per recipient will rise at 1 per cent above the rate of inflation. As this is below the growth rate, it will have the effect of a falling replacement rate over time and as a result will cause benefits to fall relative to earnings. This may not be realistic given the Irish government's commitment to reduce poverty rates significantly over time. The numbers of unemployed decreasing to 100,000 by 2050 and the numbers in receipt of lone parent, carers, disability and supplementary welfare increasing by 10, 10, 6 and 7 per cent respectively per annum until 2010.
- Health Expenditure, which has risen steadily over recent decades with a slight dip recently, is expected to rise to 10 percent of GNP in 2035 due to the age population and due to the greater expectations from a public health service.
- Although the number of children will fall, education expenditure is assumed to follow the rate of growth of GNP. Therefore either the expenditure per student will increase or the number of students will increase.
- EU expenditures are expected to rise to £300m and other non-capital expenditures to grow at 2 per cent above the rate of inflation. Capital expenditures meanwhile, are assumed to be maintained at 4.5 per cent of GNP. Also it is assumed that a

contingency fund of 2.4 per cent of GNP will be maintained over the course of the forecast.

The third scenario, assumes a once off cut in taxes in 1999 of 1 per cent of GNP. Over the remainder of the forecast, the DoF assumptions are followed. Scenario 4 takes the DoF assumptions but holds social welfare payments constant in real terms. The final scenario examines a less optimistic scenario. It assumes a 15 year downturn with similar rises in recession related welfare benefits such as unemployment, disability, lone parent etc to the rise during the period 1980-1995. In addition rather than following the DoF forecast we use the assumption that current spending patterns are otherwise maintained. Figure 6 compares the trend in the resulting annual budget position of each economic scenario. The Department of Finance projections forecast taxation rising at the rate of economic growth, while most expenditures rise at below the growth rate of the economy. Starting from a position of a budget surplus, in the absence of policy change, this assumption will result in an increasing budget surplus over time. Part of the reason also is a fall in the numbers of the groups with the highest usage of public services, the young and the elderly, combined with not only an increase in the working age population, but also an increase in the labour participation rate. However once the population starts ageing, the budget surplus diminishes.

If taxes and benefits rise at the rate of economic growth, then the picture is less rosy. Although the budget surplus initially rises, it peaks earlier and starts falling sooner. A once off tax cut will result in a trend parallel to the DoF trend, while price linking social security increments will result in a progressively better budget position than the DoF central forecast. All of these assumptions however assume a reasonable stable economic climate with falling and then moderate unemployment levels. In the final scenario, we assume that there is an economic downturn that lasts 15 years with a similar year on year change in the expenditures on recession related social expenditures as the economic downturn of the period 2010-2025. The effect of this recession would have quite a strong consequence on public expenditures coming in tandem with demographic changes.

8. Lifetime Redistribution Across Generations

The next step is to apply the economic and demographic projections with our age fiscal incidence assumptions. This will allow us to examine the differential lifetime redistributive impact on different generations. This allows us to identify which cohorts will do relatively better from the state over their lifetime. Figure 7 describes the cumulative net gain per survivor over the lifetime of 5 cohorts, born in 1921,1941, 1961, 1981 and 1998. This figure follows the Department of Finance projection. Here we see the continuation of the trend identified in Figure 2.e.

Amongst the cohorts born 1921-1961, there is a progressive worsening of their lifetime position as the each pay more taxes, while the earlier cohorts received higher public expenditure without the higher taxes. For the 1921 cohort, those living into their 70's will be net beneficiaries from public expenditure. For the 1941 and 1961 cohorts, we see that expenditure in retirement does not compensate for the high taxes paid during their working lives. It must be noted that these figures represent averages. Those who spent their lives in receipt of benefit will always be likely to be net beneficiaries regardless of their birth cohort.

Likewise the lifetime rich will tend to be net lifetime losers. In many ways therefore it is the intra-cohort position that is more interesting. For these cohorts, the trend is similar to that reported by Hills (1995) for the UK. However, at this stage, the pattern changes. Public expenditure levels fall, but so do, taxation levels. As a result the cumulative age distribution is flatter. Although cumulative gains are higher at the end of the education cycle, because of increased participation, the cumulative losses are lower for the 1981 and 1998 cohorts and in fact those who live into their eighties for these cohorts will under the DoF assumption be on average be net gainers from public expenditure and taxation.

In this figure we examined the average net gain *per survivor*. However with rising life expectancy over time, it can be expected that cohorts with higher survival rates will have over the whole cohort higher lifetime gains than those with lower survival rates. Bigger cohorts will also tend to have higher gains. We can see this effect in figure 12. Later cohorts have returns by the end of their lifetime more similar to that of the earlier cohorts. We also notice the fact that the 1961 and 1981 cohorts are larger than the 1998 cohort is. Total expenditures during the education cycle are higher and result in a higher net gain peak, while because of larger size combined with the higher average tax rates faced, the net losses are lower than we saw under the per survivor basis. Because benefits are similar in size and because life expectancies are not that different the relative size of the cohort is the most important factor determining their relative position into retirement and the end of their lifetime.

The basis of these analyses has used the Department of Finance central projections. We now examine the sensitivity of the results to different economic forecast assumptions in Table 4.

The values represent the average net lifetime gain of each cohort relative to the size of the cohort at birth as a proportion of GNP per capita in 1998. For each scenario, we observe a similar pattern. The oldest cohorts will have had the highest net gains, which will tend to fall for the next cohorts before going negative and then with the lowest point reached around the cohort born in 1951. Thus this cohort will face the highest burden of financing the relatively good position of the early. This is primarily that there prime work years were during the higher tax and spend 1980's, while their early and retirement years will have been during periods of lower expenditure. For the remaining cohorts alive in the 1998, the position looks relatively better, rising almost continuously by cohort until the 1990's. Because of the assumptions used, the later cohorts net benefits are as a result almost entirely from the projections made.

Table 4: Net Per Capita Gain by Generation (different forecast scenarios)

Year of Birth	DoF	Growth	Tax Cut	SW Index	Recession
1921	56810	57597	56824	56280	57617
1926	41878	43374	41902	40881	43442
1931	31570	34216	31616	29837	34387
1936	16483	20351	16635	14006	20670
1941	-511	4942	-223	-3689	5488
1946	-19066	-12382	-18597	-22979	-11466
1951	-34858	-26746	-34107	-39914	-24235
1956	-45521	-36562	-44443	-51563	-32459
1961	-51108	-41600	-49693	-57999	-35686
1966	-30853	-21727	-29261	-37855	-14647
1971	-26853	-17378	-25026	-34468	-8655
1976	-28023	-17792	-25978	-36448	-6950
1981	-22975	-11910	-20898	-31818	482
1986	-14202	-3808	-12382	-23037	9553
1991	-6637	1857	-5029	-15481	16366
1996	-6276	2242	-4831	-15130	17369
1998	-7038	2205	-5660	-15833	16674

Note: Department of Finance is the Department of Finance Central Projection (DoF, 1998). The other scenarios are described in the text.

Source: Author's Calculations

The earlier the cohort, (incidence assumptions aside) the more accurate the lifetime position because most of the net benefits will already have occurred. Amongst the economic scenarios, in terms of the net benefit of public expenditures, the one that provides the highest benefit for each cohort, is the one that assumes a continuation of current expenditure patterns, followed by a recession (Recession) around 2010. The constant spending pattern (Growth) is the next most beneficial, followed by the tax cut, the Department of Finance projection and lastly because of the gradually diminution of social welfare payments, price indexed social welfare (SW Index) is the least beneficial. Conversely, however, the assumptions that are most beneficial to current generations are least good for the public finances.

9. Fiscal Sustainability: Generational Accounting

So far we have examined the position of generations alive in 1998. The relative generosity of previous generations will have an effect on the net relative position of later *unborn* generations. Thus expenditure on current generations affects the fiscal sustainability of current government policy. Relatively generous provision will have the effect of placing a burden on future generations, while relatively cautious provision will have the effect of giving a bequest to later generations. In order to measure the fiscal sustainability we utilise a concept due to Auerbach, Gokhale and Kotlikoff (1991), known as *Generational Accounting*. Generational accounts have now been developed for many countries. Seventeen are included in Kotlikoff and Leibfritz's (1998) paper. Of these only three countries have negative imbalance and thus do not have substantial fiscal sustainability problems. This is a finding also found in a recent study of generational accounts for Ireland by McCarthy (1995).

Generational accounts compare the position of current generations in terms of future net government expenditure with the position of future generations. Under the generational accounting hypothesis, it is assumed that current public policy is continued for those currently alive. Thus the government's intertemporal budget constraint does not affect these generations. The constraint however is assumed to apply to future generations. The intertemporal budget constraint can therefore be regarded as a source of conflict between generations as fiscal policy that benefits current generations will place a burden on future generations or *vice versa*.

Within the generational accounting framework, two measures are typically used. The first, measures the inheritance of future generations due to fiscal policy applied to past and current generations. It is defined as current net government wealth minus the present value of the net benefit of current generations. Here, unlike in the last section, generational accounts only focus on future net expenditures. Past net expenditures are incorporated by the net wealth of the public sector currently. In any case, the cohorts

examined in the previous section consider only the generations born since the foundation of the Irish state. Many others from different generations lived part of their lives in the Irish state and thus make an impact on current net wealth.

This *level* measure is therefore a measure of the net future burden of current fiscal policy. The second measure typically used is a measure of the difference between the average net benefit obtained by current generations and that achieved by future generations. This *difference* measure therefore provides a measure of the fiscal sustainability of current government policy. If the net tax burden of newly born and future generations is equal, then current fiscal policy is sustainable. However if the net benefits of current generations are greater than that of future borns, then fiscal policy is unsustainable. Conversely if net benefits of the future born are higher, there may be cause for greater expenditure on current generations.

There are a number of concerns about generational accounts however. Firstly generational accounts typically compare the position of the newly born with future generations. Doing this they make the assumption that the treatment of the newly born is representative of all generations currently alive. This is a steady state assumption that is not justified by the analysis in the preceding section, where we have seen that fiscal policy most definitely has not been in a steady state for past generations. Banks *et al.* (1999) argue that rather than maintaining the assumption of a continuation of current policy, one should maintain the current longer-term *fiscal stance* in the projections. The projections should therefore incorporate announcements about future policy developments. They also argue that generational imbalance does not correspond with conventional measures of fiscal sustainability such as the Golden Rule. As Samuelson pointed out intergenerational redistribution can infinitely lived, with each generation gaining more than they put in.

Another criticism of the approach is the static nature of the analysis. In other words, generational accounting does not incorporate the fact that much of the information used

by the account is in fact endogenous. Buiter (1995) cites an example whereby a change to the tax structure that includes a lump sum transfer to the elderly, results in no impact on the generational account for any generation, but however the distortionary impact of the tax results in change lifetime private consumption. Therefore generational accounts should more properly be included in a general equilibrium framework. Thus the generational account does not incorporate the welfare changing second order effects to private welfare. He also notes that the equal sharing rule of unallocated public spending is not necessarily appropriate. Another empirical problem noted by Banks *et al.* (1999) relates to the fact the generational accounts typically are based on age-income profiles produced using cross-section data. Because of age and cohort effects, these may not represent the true permanent age-income distribution and thus may in fact bias the future projections on which the accounts are based. Nevertheless, despite these criticisms, generational accounts serve a useful illustrative tool; Buiter (1995) describes them as being useful but that should be *handled with great care*.

Our projections are described in Table 5. We divide the total into 2 groups, the total net present value of the generational account for each generation cited and the average generational account per member of the particular generation. Within these groups, we consider:

1. The generational account for all generations alive in 1998, bar those aged 0.
2. The generational account for the newly born generation in 1998.
3. The resulting generational account for those born in the future assuming a fixed intertemporal budget constraint.
4. The forecasted generational account for those born in the future assuming a continuation of the projection assumptions.

Table 5: Generational Balance (Discounted total expenditure per person)

Total in £ million	DoF	Growth	Tax Cut	SW Index	Recession
Current generations	-154714	-119720	-149597	-181629	-91100
Newly born generations	-378	118	-304	-850	895
Generation born in 1999	125092	89602	119901	152479	60206
Future generations forecast	-26506	-2137	-23344	-50503	35338
Per capita £					
Generations (aged 1-99)	-43907	-33976	-42455	-51545	-25854
Newly born generations)	-7038	2205	-5660	-15833	16674
Generation born in 1999	25651	18373	24587	31267	12346
Future generations forecast	-5435	-438	-4787	-10356	7246

Source: Author's calculations.

Result 3 when taken for all members of the generations is equal to the sum of result 2 plus 1 plus the net public sector wealth of £30 billion in 1998. Result 4 relates to the budget constraint of future generations if current policy is continued. The first consequence we notice is that the residual budget constraint for future generations for each scenario is positive. Therefore the result of each scenario is a bequest from current generations to future generations. The reason for this is that most of the later generations alive in 1998 are expected under the policies examined to be lifetime net losers from public expenditure. Price indexation of social welfare payments causes the biggest transfer of resources to future generations, thus resulting in a transfer from the poor to future generations. The next most generous transfer is on the basis of the Department of Finance assumptions. However a large component of this assumption is on the basis also of quite modest indexation of social welfare benefits and thus the direction of the transfers will be similar. At the other extreme are the scenarios based on current spending patterns, "Growth" and "Recession". Here the extent of the transfer is much less.

We now turn to the second measure, the difference of the average gain per member of each cohort examined. The amounts described here for result 2 are the same as the result reported in Table 4 for the 1998 generation. Here, we find that in every case, except for the Growth and Recession scenarios, on the basis of a revenue neutral budget constraint

that future generations have higher net benefits per capita than the newly born generation in 1998. Therefore under the relatively conservative DoF assumptions or with slight variation, fiscal policy is sustainable. However, unexpected shocks to the economy such as an economic recession or loose fiscal policy would reverse this finding. In each case however, because transfers to future generations are primarily being financed from older generations currently alive in 1998, that the average per capita net present value for these generations is substantially lower than that for the newly born and the future generations. The results may be sensitive to the assumption about the discount rate.

Table 6: Sensitivity Analysis using Department of Finance Forecast (Discounted total expenditure per person)

Total in £ million	GNP +2%	GNP +1%	GNP +3%
Current generations	-154714	-154478	-147073
Newly born generations	-378	-1256	348
Generation born in 1999 (revenue neutral)	125092	125734	116725
Future generations forecast	-26506	-115468	9662
Per capita £'s			
Current generations	-43907	-43840	-41739
Newly born generations	-7038	-23397	6488
Generation born in 1999 (revenue neutral)	25651	25900	23827
Future generations forecast	-5435	-23785	1972

Source: Author's Calculations

In Table 6, we examine the sensitivity of the Department of Finance projection to the discount rate assumed. Here we see that substantially the same conclusions can be drawn when using discount rates of either 1 percent or 3 percent higher than the growth rate. Although the direction of the results is broadly the same, the difference between the net present value is quite different.

10. Inter-Generational Redistribution

In this final section we try to gauge a measure of total redistribution between generations. The standard measure of redistribution is the Reynolds-Smolensky index. This index measures the difference in income variability for income after government intervention through taxes and public expenditure with income variability before this intervention, *ceteris paribus*. The more redistributive the system the less variable disposable income will be relative to pre intervention income. A problem exists however, when one examines income between generations due to the use of a discount rate. Discounting will tend to equalise the inter-generational pre-intervention income and may even reverse the direction of the standard of living. Therefore any measure of redistribution will strongly depend on the discount rate used.

In order to construct this index, we need to know both the pre (gross) and post (disposable) government intervention lifetime income of each generation. Like other static incidence studies, we assume that gross income is disposable income minus net government expenditure. So far we have derived measures of net government expenditure per generation under various assumptions. Unfortunately there are no household level national accounts available for Ireland. As a result it is not possible to impute generational gross income in the same manner as we have done in the rest of this paper. We do however know the level of GNP in Ireland for the period studied. Examining the relationship between gross household income and GNP in other countries (in the OECD national accounts for example), one notices a clear relationship between the two numbers, with household gross income consistently 75-80 percent of GNP. Utilising the method described above, we can impute a value for gross income by multiplying GNP by 0.775 and assigning gross income using the age incidence assumption for gross income described in Table 1 each year. Summing discounted gross income we can produce lifetime gross income.[6] Disposable income is net benefits plus gross income. Although the measure of gross income is quite crude, the Reynolds-Smolensky depends mainly on the distribution of net expenditure over the distribution.

We decompose the Reynolds-Smolensky index into a component that accounts for progressivity or in this case the transfer of income from rich to poor cohorts and horizontal redistribution, a measure of the change in ranking of generations of post intervention income relative to the ranking of pre-intervention income. The progressivity component is valued at 0.02, a slight degree of redistribution from rich to poor generations, while the horizontal redistribution component is -0.01, summing to total redistribution of 0.019. Using a higher discount rate reduces the degree of inequality across generations and in fact reverses the direction of the redistribution, with horizontal redistribution becoming more important than vertical redistribution. As the discount rate tends to 0, the degree of vertical redistribution from rich to poor increases to 0.027, with the degree of horizontal redistribution tending to zero. Therefore as we can see the degree of inter-generational redistribution is quite sensitive to decisions about the discount rate. Nevertheless if we compare the degree of redistribution between generations, we see that the effect is quite small relative to the impact of a tax-benefit system over a cross-section of the population where the Reynolds-Smolensky measure found in O'Donoghue (2001) was found to be 0.24 in 1994.

11. Conclusions

In this paper we attempted to examine the issue of intergenerational redistribution in Ireland. Comparing generations alive at one time, we found that there was redistribution from the core working ages to the elderly and the young. In addition to public intergenerational transfers, there exist private intergenerational transfers. For example bequests will tend to run in the opposite direction to public transfers, while private transfers will tend to be in the same direction. Seniority rules will tend to result in older workers being paid more relative to their marginal productivity than younger workers, resulting in a transfer to young working age to old working age. However with rapidly rising education levels of the young relative to the old and with much of the growth in the

Irish economy occurring in high technology sectors where seniority rules tend to be less important, then the impact of seniority on inter-generational transfers will become less important. Other intergenerational transfers include the care of dependants. These include the care of children and elderly relatives, which again move in the same direction as public transfers, but also in child care provision provided by grandparents, where transfers move in the opposite direction.

However, looking at transfers between generations at one point in time tells us nothing about true inter-generational redistribution. It may simply measure the level of redistribution over individual's life-courses rather than between generations. In order to compare the degree of redistribution between generations it is necessary to look at the government's effect over the lifetime as life-course redistribution may in fact balance out over the lifetime, to result in no net gain. In this paper, we have tried to generate measures of the net benefit from public expenditure over the lifetimes of different cohorts. Because no single cohort has spent an entire lifetime living in independent Ireland, it has been necessary to make projections. Doing this we can compare the net benefit of different generations alive in 1998, noting however, that results for the older generations alive at the time are more accurate due to a lower reliance on projected information.[7] Results are also dependent on our assumptions necessary to allocate aggregated information to individual cohorts. Nevertheless, there appears to be clear gaining generations; those born before the 1930's, who gained both from relatively low taxation during their working years, and from a modern welfare state in the latter part of their lives. Subsequent generations will tend to be net losers, with the generation born around 1950 being the generation with the largest net loss. These generations have worked during the period of the highest taxation and may have relatively lower welfare benefits in retirement, depending on the assumption followed. We also notice that periods of recession result in higher net gains from public expenditure. This highlights that positive intergenerational transfers may not necessarily result in gaining generations having higher welfare levels, as presumably an individuals welfare would be higher from being in work and pay taxes and thus than being unemployed and receiving benefits.

In order to examine the long-term sustainability of the system, we use a method known as generational accounts. The principle results are that the system is sustainable. This is a result that is different to many other countries. In Auerbach *et al's.* (1991) survey, only 3 of 17 were in a similar position. A second result is that under most projection assumptions unborn generations gain more that current generations, indicating a degree of intergenerational redistribution from the present to the future. However relative to the degree of redistribution between people in a particular year, intergenerational redistribution is relatively small.

One, however, must be cautious in interpreting these results. We must note that, following standard practice, relatively crude projections were used as a basis for this paper. Also projections are based on assumptions made in 1997. The paper's objective serves to highlight the method, rather than serve as a concrete numbers on which to base public policy. A proper analysis that could participate in the public policy reform process would require better information about the age incidence of public expenditures available in administrative data, which in turn would allow for more disaggregation to occur, would incorporate more up to date knowledge about the state of the economy and would employ more accurate forecasts of public expenditure.

Although it seems that public expenditure patterns that existed up to 1998 were sustainable, care needs to be taken if policy changes were introduced as a result of these positive indicators. It may seem that because of the negative generational imbalance, one can and should loosen the public finances substantially. However, such policy changes cannot be examined in isolation. Policy changes will themselves have impacts on the wider economy. Thus, the economic growth rates on which the projections are made may in fact change in response to these policy changes. In order, therefore, to examine the impact of policy changes on the sustainability and generational balance on public policy it is desirable to incorporate an economic model of the economy in the generational accounting model.

Despite these general equilibrium drawbacks and the problems described in earlier in the paper, it is argued that generational accounts are a useful policy tool for government fiscal policy. Auerbach *et al.* (1991) highlight that governments traditionally take the budget debt and their deficits as their primary indicators of fiscal policy. For example the EMU convergence criteria included an objective of maintaining budget deficits with 3 percent of GDP. Similarly the USA has instituted legislation that aims to balance budgets in the medium term. They argue that these objectives are not however concerned about generational balance, that fiscal policy is sustainable in the long term. Therefore, generational accounts should be incorporated, as a measure of fiscal sustainability by governments as is the case in Norway, Italy, Japan and New Zealand (Fehr and Kotlikoff, 1998).

Endnotes

1. Local expenditure since 1977 has been primarily financed out of transfers from central government due to the abolition of local property taxes.

2. However, recently there has been a Government initiative to create a dedicated fund to partially finance these future liabilities.

3. The depreciation rate is estimated as the average rate across the whole capital stock of Ireland as defined in the study of Henry (1989) over the period 1950-1989.

4. It must be remembered that if actual interest rates fall below the discount rate, then discounted debts will fall over time. This has occurred during a number of times in Irish history, when real interest rates went negative.

5. ther assumptions such as the changed levels of unemployment are maintained however.

6. In order to compare GNP in different years, we need to use a different discounting factor to the growth rate. Here we use the long-term growth rate for the economy of 2.5 percent.

7. However, age incidence assumptions based on current data may be much less reliable.

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