WHAT CAN WE LEARN ABOUT PENSION REFORM FROM GENERATIONAL ACCOUNTS FOR THE UK?

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Abstract

This paper considers the relevance of a set of generational accounts in informing policy debate in the UK. With regard to transparency, Generational Accounts can, under sensible assumptions, provide a useful summary statistic to supplement our analysis of government policy. Interpreting differences in the accounts across groups as measures of the incidence or redistributiveness of existing or proposed policies is more problematic. With respect to UK pension reform, within-cohort differences raise important issues. Finally we argue that past pension reforms have been characterised by inaccurate forecasts as opposed to a lack of understanding of the generational incidence of proposed policy.

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Executive Summary

Generational Accounts are becoming an increasingly popular tool for the analysis of fiscal policy. They show how much in total both current and future generations can expect to pay on average in net taxes over their remaining lifetimes. Comparing the net payments of future generations with that of a new-born reveals a generational imbalance in long term government fiscal policy and this is interpreted as a measure of the incidence and sustainability of fiscal policy. This paper discusses this interpretation and point out a number of *caveats*. Firstly, because the accounts are based on the assumption that current policy doesn't change, they cannot necessarily be taken as a reliable estimate of the expected net tax burden of current and future generations. Secondly, we argue that a generational imbalance and macroeconomic sustainability are not necessarily the same thing. Sustainability depends on a numbers of factors including the ability of an economy to continue to borrow from future generations, and the ability to borrow abroad. We also point out that there are problems if the accounts are interpreted as being related to the incidence of government policy.

The plausibility of the underlying assumptions is one issue that arises as a result of the computations that are necessary to construct the accounts, although they can be constructed under different assumptions to address this. One important issue is that the accounts are based on relative age-profiles so that taxes and transfers can be allocated across age groups and these profiles for both employment and earnings are typically obtained from cross sectional data with an allowance for growth. These profiles may be a misleading indicator of the true lifetime experiences of households. We show, using data from the Family Expenditure Survey, that cross sectional data with 1% growth is a fairly good description of the lifetime profile of male earnings but a poor description for females. The opposite is true for employment – the cross sectional data is a good representation of lifetime female employment whereas for males it is poor. We also show that there can be differences in life-time profiles within generations and these are not typically captured by generational accounts. These within generation differences may contain important information on which to base policy analysis especially in the context of redistribution from rich to poor. Also, it is not clear when aggregating households into cohorts, that calculating net tax payments of a cohort at an average profile leads to the same result as when calculating the average of each individual's net tax payment. These last two points are particularly important in the context of pension policy.

Despite this, generational accounts can be important in highlighting the dependence of policy analysis on intertemporal issues and the fact that as our economies age, something (either policy or something else) has to change. We argue however, that generational accounts do little to aid us in analysing what has to change and by how much – to do this a more structural analysis is required.

I. Introduction

Generational Accounts, as first outlined by Auerbach, Gokhale and Kotlikoff (1991), have now been computed for a number of countries and have recently been prepared, for the first time, for the UK (see Cardarelli, Sefton and Kotlikoff, 1998). The accounts are designed to provide two related insights into fiscal policy.[1] First, they show how much, in total, *current* generations should expect to pay on average in net taxes over the remainder of their collective lifetimes given the spending commitments of the government. This can be broken down across groups, defined for example by age in any particular year (i.e. generation) or by gender. Secondly, Generational Accounts use the government's intertemporal budget constraint to compute how much *future* generations will have to pay in net taxes. The constraint states that the present value of all future government spending must equal the present value of future net tax payments plus the present value of net government wealth. The calculation for future generations takes taxes paid by current generations and assumes any shortfall in net payments in meeting the constraint will ultimately be met by those not yet born (future generations). Comparing the net tax payment of a future generation to that of a just-born generation yields what is referred to as the 'generational imbalance' in long term government fiscal policy.

Auerbach, Gokhale and Kotlikoff (1991) argue that, when the government uses fiscal policy to redistribute income between population groups, the policy it undertakes must be financially sustainable, and that a measure of the 'sustainability' of fiscal policy is given by the generational imbalance in the accounts. The budget deficit, on the other hand, simply shows cash flows in the current period and does not take into account the government's longer-term commitments. Put simply, many government policies may not impact on the government finances until some time in the future, and such impacts ought to be measured at the point they are implemented or debated prior to their implementation.[2]

This paper considers the relevance of a set of UK Generational Accounts in informing policy debate in the UK, and is structured as follows. The next section briefly outlines the methods used in constructing a set of Generational Accounts, and discusses some problems associated with interpreting the accounts in an economic context. Following this we focus on a specific issue — pension reform — and consider the use of Generational Accounts in this context. Section 3 looks at differences over the last twenty years between cross-section and life-time income and employment profiles since these will be crucial in driving individuals' profiles for pension contributions and receipts which are vital to the accounts, as well as their private saving decisions. Section 4 considers past and current issues in pension reform in the UK and asks what could be added to the debate by analysis of a set of UK generational accounts. Section 5 concludes.

II. The use of generational accounts in the analysis of fiscal policy

To facilitate the discussion that follows, we provide a brief description of the calculations underpinning a set of Generational Accounts, and the economic assumptions that are implicit in interpreting the accounting exercise for policy reasons. Detailed analyses of many of the issues below can be found in a number of papers, including Haveman (1994) and Fehr and Kotlikoff (1995).

Constructing Generational Accounts

The government's intertemporal budget constraint is given by the following equation

present value of remaining net tax payments of existing generations	+	*present value of net tax payments of future generations*	=	*present value of all future government consumption*	–	*government net wealth*

This constraint underlies the construction of generational accounts. The terms on the right hand side and the first term on the left hand side are calculated and the residual is the present value of net tax payments of future generations. Hence, the calculations that underpin a set of generational accounts have a number of components. The first is a set of projections of the future tax revenues and spending implied by current government policy. Since the accounts will need to be calculated for at least the entire life span of the youngest individual currently alive, these projections need to extend over a very long period. In the short to medium term these projections are usually provided in government forecasts. Beyond that, assumptions are usually made relating tax revenues, benefit expenditures and government consumption to output (per worker) which can then be forecast to change in line with productivity forecasts.

Subsequent projections of revenues and spending will therefore require forecasts of productivity growth, population growth and interest rates over the same period — around the next hundred years. In addition, discount rate assumptions are required to bring the stream of future revenues and expenditures into present value terms. Finally, knowing the current level of government debt allows one to assemble a complete picture of the government's intertemporal liabilities. Once projections of government consumption and an estimate of government net wealth are obtained, the inequality of future net tax payments and future government consumption plus government net wealth can be calculated to obtain the tax burden on those generations not yet born.

To look at the tax burdens on generations currently alive requires allocating the net taxes and government consumption to households of different ages, which in turn requires estimates of the way in which tax payments and benefit receipts vary by age. These are typically taken from household surveys, and are summarised as 'relative' age-profiles, i.e. a statement of how much of each particular tax is paid by particular groups relative to a

reference group. Knowing the size of each group (from population projections) allows the payments to be allocated, and hence analysed, by gender and/or generation.

Generational accounts have now been computed for a number of countries, reported in Kotlikoff and Leibfritz (1998) (see Appendix A). What is common to all countries is that net payments of taxes are largest for those who have recently reached working age and become negative for those who are reaching retirement. This is because the accounts do not take into consideration any tax payments or transfers that have occurred in the past — a person of working age has a relatively large net payment as the benefits they received when young such as education are not considered but they have their entire working life left in which to pay taxes. On the other hand individuals reaching retirement tend to show up with net transfers (negative tax payments) because the taxes they have already paid over their working lifetime are ignored but they will receive transfers in the form of pensions and healthcare.

There are some difficulties with this approach — comparisons of the surpluses and deficits across ages of this form of the accounts conflate age (life-cycle) and cohort effects. In addition, policy analysis should take account of the life-time tax burdens on cohorts and past taxes paid are clearly an important input into this analysis. Finally, cross-country comparisons, either of particular generations, or of the overall shape across generations, ought to be affected by the life-time profiles of past policies and circumstances as well as the effects of economic, population and policy projections that Generational Accounts are designed to highlight.

An alternative way of presenting the accounts, therefore, is in terms of lifetime net tax rates where the calculated tax rate for each generation includes estimates of past taxes paid and benefits received. Although this is obviously more data intensive (requiring retrospective information back to the year of birth of the oldest living generation) it provides a more sensible tool for policy analysis. Companion tables, using this as a basis, are computed for the US by Auerbach, Gokhale and Kotlikoff (1994) or CBO (1995), but are not, however, available in Kotlikoff and Leibfritz (1998) for the seventeen countries in their comparative study. Such an analysis is desirable if Generational Accounts are to be used to inform the current UK debate — generations currently alive have experienced substantial cohort-specific net transfers in the past, and their experience has been shaped by prevailing economic conditions and their exposure to different government policies.

The overall burden of taxes that is not met by current generations must ultimately be met by generations not currently alive. Current new-borns provide a natural point for comparison with future generations since in both cohorts no lifetime net tax payments have been made. If future generations have a larger net tax payment than current newborns then there is a ‘generational imbalance’ in the sense of Auerbach, Gokhale and Kotlikoff (1991).

Thus, according to Kotlikoff and Leibfritz (1998) in the US, future generations would have to pay taxes that are over 50% higher than those paid by current newborns unless current generations pay higher taxes now. They argue that the imbalance is greatest in Japan where future generations face taxes that are projected to be 169% higher in the absence of a change in current fiscal policy. Other countries show imbalances, albeit of varying degrees. Indeed, this is true for fourteen of the seventeen countries summarised in the Kotlikoff and Leibfritz (1998) study.[3] This is the striking result of the international comparisons and the most important message that has come from the use of Generational Accounts as a methodology. We discuss *caveats* in its interpretation below.

Interpreting Generational Accounts

Various criticisms have been made in the past about generational accounts. Haveman (1994), for example, argues that although generational accounts may be useful, they should not replace traditional budget deficit measures. But it seems useful to distinguish between issues that arise with the principal of the accounts and those that arise simply as a result of the computational issues one needs to confront in computing a set of accounts. We discuss each set of issues in turn.

Problems in principal

Generational accounts are based on the assumption that current fiscal policy doesn't change. The first issue concerns the extent to which this is the relevant thought experiment to pursue. Taken at face value, what the accounts show is actually that policy, *or something else,* will have to change given the generational imbalance in the current system. Hence, they cannot necessarily be interpreted as a reliable estimate of the expected net tax burden of current and future generations. Equally important in the future may be the differences between current policies (both in place and announced) and a longer term fiscal 'stance'. A good example of this is the National Insurance Fund. In the UK the 'stance' is that the contribution rate is assumed to adjust such that the fund stays in balance. In the US, however, the contribution rate is fixed and the equivalent fund is therefore expected to go into surplus or deficit accordingly. Each approach has different implications for the construction of the accounts. Similarly, a fair reading of changes to the benefit system over the last fifteen years in the UK would show a steady erosion of contributory benefits and a movement away from social insurance towards means testing. The indexation changes to basic state pensions and SERPS, and changes to unemployment benefits are good examples of this. Given that the present government has confirmed its adherence to this trend with recently announced reforms to widows and disability benefits (DSS, 1998) a sensible policy projection should certainly consider taking this as a baseline 'stance' from which to assess policy options.

A second issue is the extent to which an intergenerational imbalance equates with conventional notions of 'sustainability'. We would argue that a measured generational imbalance is neither a necessary nor sufficient condition for government fiscal policy to be unsustainable. Conventional notions of sustainability — typically related to the golden rule — concern the optimal debt path of the economy, given intertemporal preferences and discount rates. This is not the same as evaluating the (absolute or relative) size of the residual in the government's budget constraint when one takes only the payments of living generations as given. As Samuelson, amongst others, has observed, social security and other government intergenerational policies are potential Ponzi games – the process of intergenerational redistribution is infinitely lived, even if none of the agents engaged in the process are. That is, one can always put off payment of an intergenerational imbalance until the next generation arrives. What is the appropriate long run fiscal stance in such circumstances is a pertinent question, but it is not the same as 'generational imbalance' in the sense used here. In addition, since the capacity of an economy to sustain any intertemporal path depends on a host of factors, including for example whether it can borrow from abroad, as well as the degree to which it can borrow from future generations, 'generational balance', as calculated in the generational accounting framework, should not necessarily be equated with sustainability in the macroeconomic sense. Having said this, the intertemporal liability in the public finances that generational accounts identify is still an important issue and one which is not captured by conventional budget deficit measures.

Finally, Generational Accounts are essentially an accounting exercise in the sense that there is no underlying model of reaction to changes in economic circumstances (although Fehr and Kotlikoff (1995) consider a simple extension of this form). Conventional generational accounts look only at who would pay taxes and collect benefit payments, given that the world remains broadly the same as it is today. This is not the whole story when one is analysing the incidence of government fiscal policy. In the first and most simple instance, accounting for the cash flow between individuals and government, both now and over the future, tells us very little about the object of interest for policy analysis, i.e. the current and future living standards of individuals or generations. For example, no sharing is assumed, hence men are observed to pay a lot of tax, and women are observed to receive a lot of benefits, when in reality these flows are likely to be shared by within-household transfers, both between adults and from adults to children.[4] In similar vein, intergenerational private transfers may adjust to discrepancies in the generational incidence of public tax and transfer programmes.

If Generational Accounts are interpreted as an accounting identity, the no sharing rule is the relevant rule. On the other hand, if the interpretation placed on the Accounts relates to the incidence of government policy then the implicit assumption — that no economic agent,

neither individuals, firms nor government, responds to the changes in the economic environment, nor does the economic environment respond to the changes in the population structure or to government policy — becomes more worrying. General equilibrium effects will certainly be important. Many key variables in Generational Accounts will, in reality, be endogenously determined within the economy. These factors will affect the true incidence of government policy. Ultimately, productivity, and also the relative profiles that govern intergenerational allocations, will depend on both policy variables and market reactions to these policy variables.

A related, but less discussed effect is that the correlation in the ageing processes of many countries may mean that even variables that are exogenous to a small open economy (such as the UK) may behave as if they were endogenous (since they are certainly endogenous at the world level). One example of this is the 'asset meltdown' scenario — even if the UK interest rate is not determined endogenously (since we are, arguably, a small open economy), it may still fall as the population ages since the ageing of all economies in aggregate will mean that there may be an oversupply of assets as increasingly large groups of workers retire and annuitise their accumulated pension wealth. This scenario would be similar to the UK interest rate being determined endogenously with population ageing and an absence of international capital flows.

Such criticisms are well known. Fehr and Kotlikoff (1995) consider these issues in detail using a version of the Auerbach-Kotlikoff (1987) model, and find that the Generational Accounts provide better results, unsurprisingly, for small policy changes measured with respect to relatively short horizons (i.e. on current generations). Buiter (1995) also considers the problem, arriving at slightly less positive conclusions but recognising the role for a set of accounts that carry the label 'handle with great care'.

Problems in practice

In calculating a set of Generational Accounts projected tax revenues and benefit receipts are allocated to age groups on the basis of relative age profiles. A substantive issue to bear in mind when interpreting sets of accounts therefore concerns the plausibility of the age-profiles underlying the intergenerational allocations. In what sense does the age-profile capture the 'permanent' distribution of payments across age, and is such a thing likely to exist? In section 3 we provide some detailed discussion of this and evidence as to the potential magnitude of differences between various types of profiles. Given the potential size of these differences in the UK it is important to consider the sensitivity of the accounts to the shape of the age-profile underlying the intergenerational allocations.

Of crucial importance in interpreting Generational Accounts is the plausibility of, and sensitivity to, the forecasts for the future economic environment. Haveman (1994) points out

that the predictions of such key factors as future population and economic growth that generational accounts incorporate have not been reliable in the past and emphasises that the choice of the discount rate is also important for the results of the accounts. As with the life-time profiles, accounts can be prepared under a range of scenarios to address this problem.

It is not just the headline forecasts on which the Accounts will depend, however, and sensitivity to deeper assumptions about forecasts needs to be addressed. In particular, the resulting calculations will almost certainly be sensitive to the assumption that the household structure of the population, conditional on age, remains constant. In the UK, recent forecasts are that there will be 5 million more households by the year 2016, an increase of over one fifth. Since we usually assume there are economies of scale in household consumption, and often think about household choices (such as labour supply) being taken jointly, it seems implausible to assume that there would be no effects of changing household structures on relative age-profiles. But these changes will have implications for tax payments and receipts of government spending as well as the aggregate forecasts for tax revenues and components of spending.

An internal consistency issue arises, related to the points made above. Benefit expenditure forecasts will almost surely build in these predicted effects, certainly in the short to medium term. Yet, by using relative age-profiles from current data and holding them fixed there is an implicit assumption that changes in the structure of the household population will not affect the shape of tax payments and benefit receipts of individuals within those households.

A similar argument applies to life-expectancy (see Lee and Skinner (1999) for a discussion). Sensitivity to assumptions about increases in life-expectancy, trends in (differential) mortality will be important components of the projections. But equally important, particularly on the future costs side, will be assumptions about whether the increased life-expectancy is healthy or unhealthy. In one case this would imply more tax revenues as households age. In the other it would imply higher health costs looming on the horizon.

A number of other issues relating to the construction of Generational Accounts have been raised in the literature. These include the concern that the calculations do not take into consideration the additional benefit from government purchases such as roads and defence, so in computing net tax payments only parts of the transfers are included. Auerbach, Gokhale and Kotlikoff (1994) argue, however, that the presentation of accounts will mean that there will be more consideration as to who should receive the benefits precisely because they highlight who pays for them. This is an important point and, subject to the issues described above, represents an important role for Generational Accounts.

Another concern, as mentioned previously, is that the effect of bequests is not considered in the construction of the accounts. Private intergenerational transfers may offset government redistribution and so affect the well being of future generations compared to current. But the degree to which these bequests occur has been questioned (Auerbach, Gokhale and Kotlikoff (1994)) and proponents of the accounts have pointed out that in any case, if we wish to find out how much the private sector neutralises the government's attempts at intergenerational redistribution then firstly, we need to measure the latter.

III. Life-time profiles: examples from a time-series of UK cross-sections

At the heart of the exercise of allocating tax payments and government spending across generations lies a dependence on relative age profiles for both employment and earnings, defining the way in which payments change as households age. These age profiles are typically recovered from cross-sectional survey data, such as the *Family Expenditure Survey* (FES) or the *General Household Survey* in the UK. Each generation of households is assumed to follow the same age profile, and that age profile is assumed to be that observed in the cross-section data, with an allowance for growth. This is the approach taken by Cardarelli, Sefton and Kotlikoff (1998) for the UK. This raises two issues. Firstly, it is not clear that any generation of households currently alive will have that age profile. Second, future generations will not necessarily have the same age profiles as their predecessors. We examine the potential importance of these issues are in turn below.

There are two reasons why observed cross-sectional profiles for tax payments or benefit receipts are misleading indicators of the lifetime experiences of households. Firstly the use of a single cross-section to estimate payments or receipts assumes there are no transitory shocks or measurement errors — all incomes in the sample are assumed to be drawn from the permanent distribution. Secondly, comparing age groups in a single year confuses age and cohort effects. Older generations will, other things being equal, have lower productivity than those that follow them, as a result of economic growth. On the other hand, they may have worked for a different length of lifetime – men typically longer, women for a shorter period in the past. As is well known, this can result in cross-sectional earnings profiles turning down after middle age when each cohort's lifetime profile is permanently increasing, but employment profiles that are flat when cohort profiles are declining after middle age.

Each generation's lifetime profile for tax payments and benefit receipts will depend crucially on its income and employment experiences. Hence we illustrate the potential importance of these effects on the income and employment profiles utilised in these calculations. Using successive years of FES data it is possible to follow the actual income and employment outcomes for members of a cohort as they age.[5] These can be compared to those

implied by the cross-sectional profile from the first year of the sample, with varying degrees of assumed productivity growth, i.e. the profiles that underlie forecasting exercises such as Generational Accounts.

In the figures that follow we use FES data[6] over the period January 1978 to December 1996, the period for which data are available where it is possible to split households into groups according to their years of education. The resulting sample contains 248,837 individuals. Fifteen cohorts are defined according to the date of birth of the head of household, using five-year bands beginning in 1900–1904 and ending with 1975–79. The earliest and latest cohorts are obviously not present in significant numbers in later and earlier years of the sample respectively. We use individual income classifications according to definitions in the Households Below Average Income series — the official statistics on changes in the income distribution. Nominal values are deflated to September 1997 prices using the all items Retail Price Index.

Figure 1 shows cross-sectional and life-time income profiles for three cohorts — clockwise from top left, those born 1955-59, 1945-49 and 1935-39. The two solid lines are the cross-sectional profiles from the 1978 survey that would have been used in a Generational Accounts calculation had it been made at the time. The lower of the two is the unadjusted cross-sectional profile, the upper assumes 1% annual productivity. Finally, the highlighted profile represents the observed incomes for each cohort over the nineteen year period 1978–1996. Figure 2 presents the same analysis for women.

For men, the assumption that relative income profiles remain fixed, assuming 1% productivity growth, appears to have been, on average, a fairly adequate description of the experiences of the three cohorts in the figure. There is some evidence of differences for the oldest cohort in the figure – those approaching retirement. This is consistent with rapidly changing employment rates for this group (see figures 3 and 5 below). This divergence between augmented cross-sectional profiles and the ‘true’ cohort outcomes is even stronger for the two immediately older cohorts.

Figure 1: Cross-sectional and life-time profiles

Male income, 1978–96, Cohorts born 1955-59, 1945-49 & 1935-39

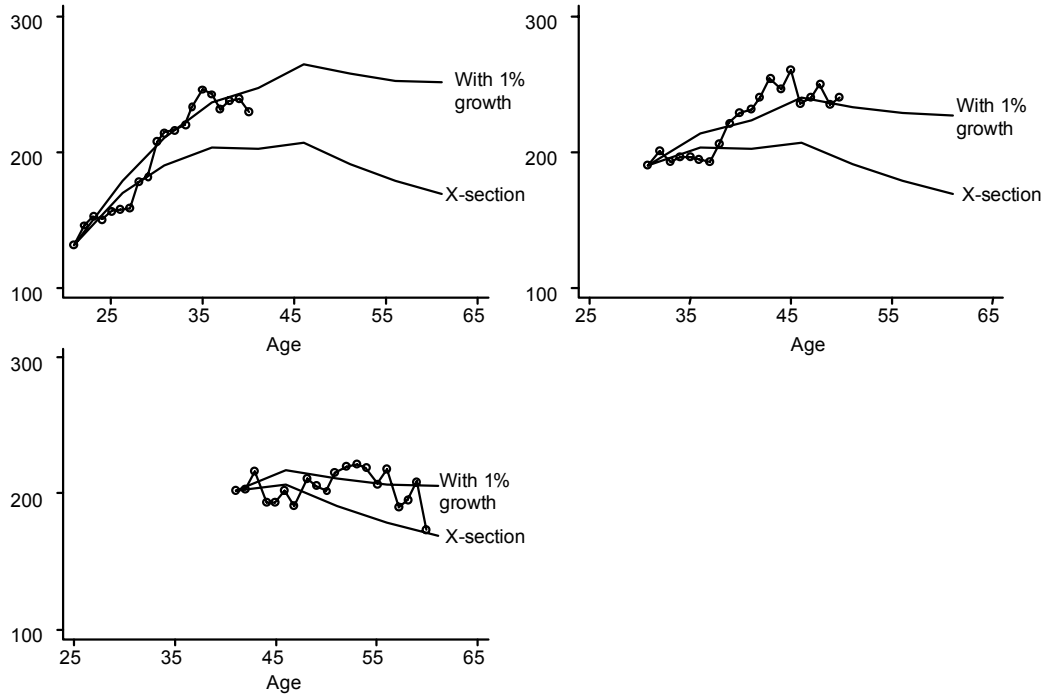
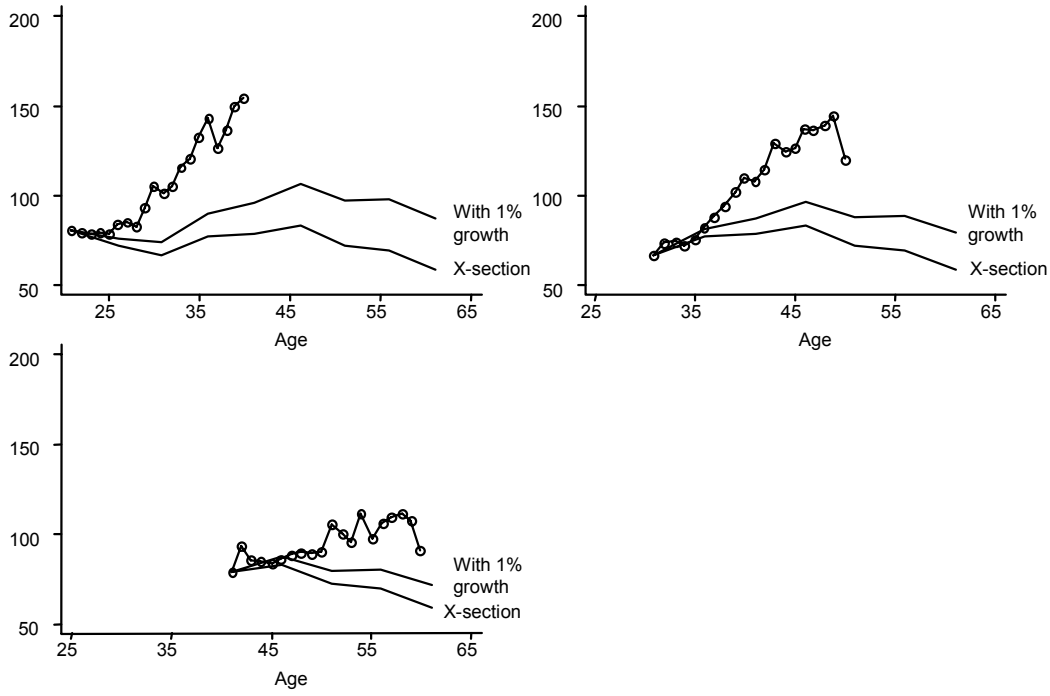


Figure 2: Cross-sectional and life-time profiles

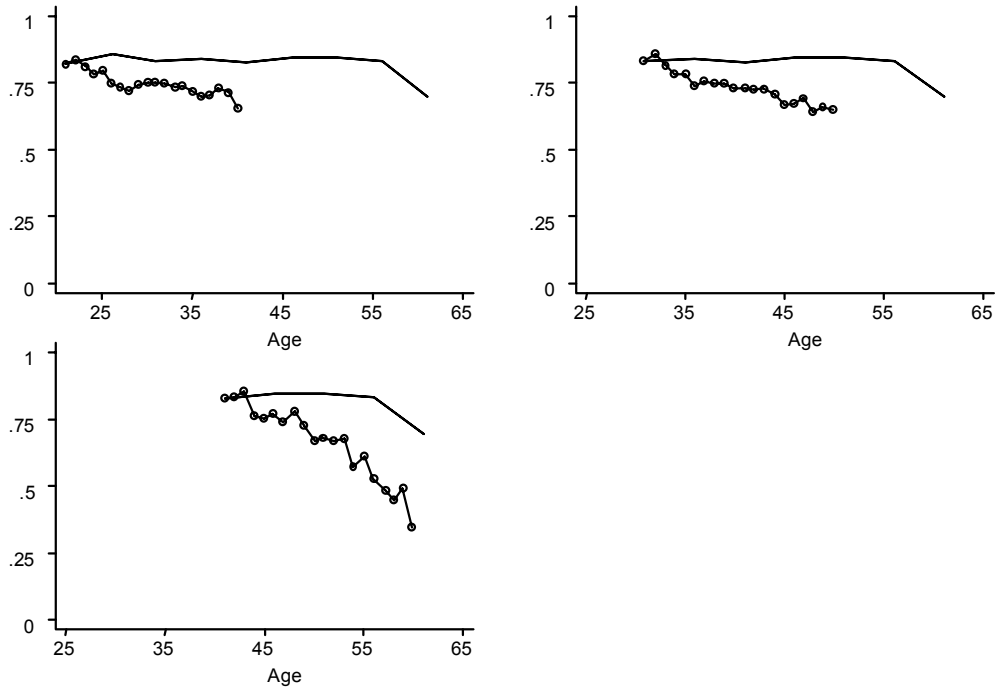
Female income, 1978–96, Cohorts born 1955-59, 1945-49 & 1935-39



For women, however, quite the opposite of this story is true. Figure 2 shows that women, and particularly younger women, experienced far greater increases in incomes than would have been predicted by the cross-sectional profile augmented by 1% annual growth. Consequently assuming the relative age profile to be fixed for this group would have been misleading. The fact that the 1978 cross-section profile for women's incomes was effectively flat reflected the low earnings of the generation of women who were middle aged in 1978, not the likely experiences of those generations that followed them.

Figure 3: Cross-sectional and life-time profiles,

Male employment rates, 1978–96, Cohorts born 1955-59, 1945-49 & 1935-39



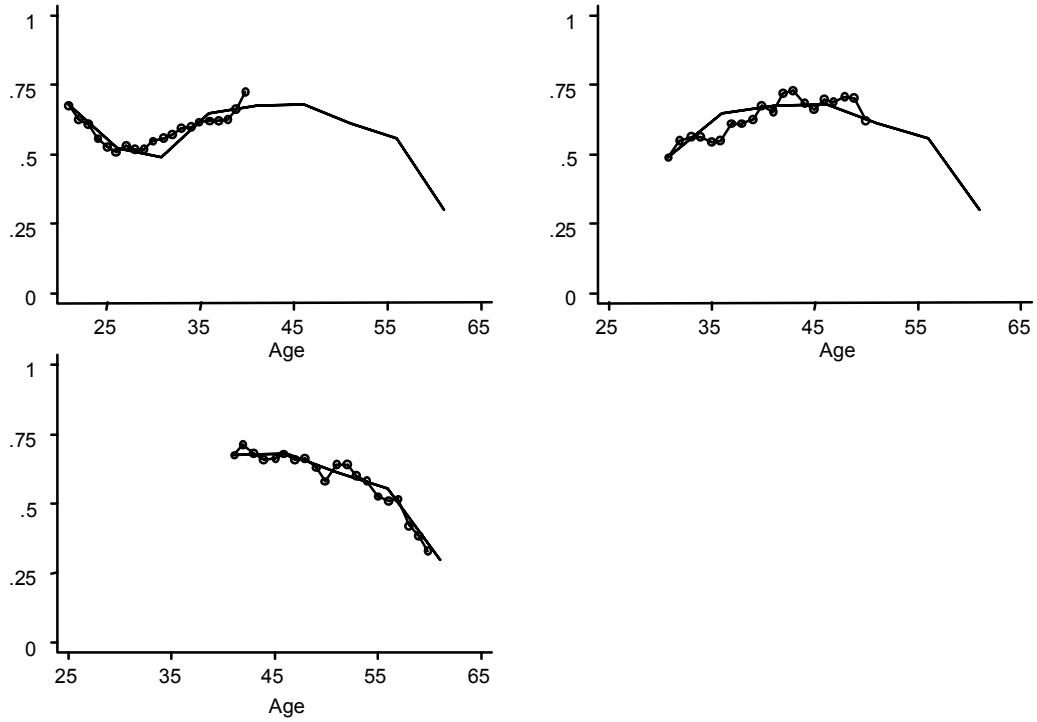
In Figure 3 we present corresponding profiles for male (full-time and part-time) employment rates. In this case there is only one cross-sectional profile and relative employment profiles are implicitly assumed fixed over time. Figure 3 illustrates what is well known – the substantial decline in male participation rates in all age groups over the last twenty years. The striking increase in labour market exits (whether into unemployment or early retirement) for the oldest cohorts means that the cohort profile for this group is very different from the cross-sectional prediction based on the 1978 data.

Once again the story is the other way round for women – cross-sectional profiles have been, on average, fairly good predictors of cohort employment rates. A couple of factors are worth mentioning here. Firstly, there may have been some switch from part-time to full-time work that is not captured in these figures since the profiles report the two rates in aggregate. Second, even the 1955-1959 cohort was already 19–23 at the beginning of our sample period

in 1978. Arguably the biggest changes in female labour market participation occurred for the generations coming immediately after. This is borne out looking at the youngest cohorts in our sample who have lower participation rates in their teens and early twenties (associated with increased participation in higher education) and higher participation rates during periods historically associated with child-bearing.

Figure 4: Cross-sectional and life-time profiles,

Female employment rates, 1978–96, Cohorts born 1955-59, 1945-49 & 1935-39

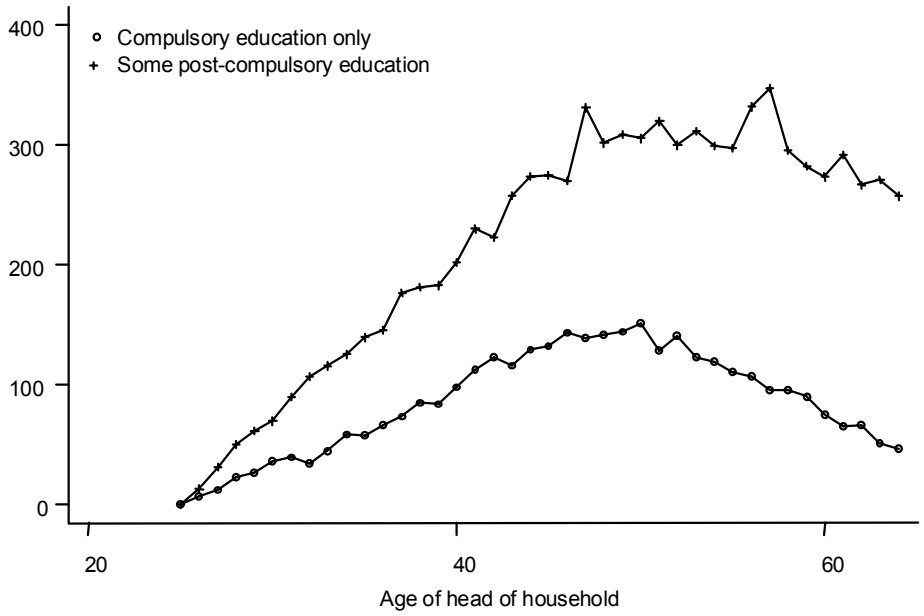


Even if one were to know with certainty the life-time profiles of the current population, however, forecasting the profiles of future generations is also problematic. The analysis above suggests that profiles are not likely to remain the same shape for successive generations as labour market conditions and household structures change. Attanasio and Banks (1998) confront this issue directly when thinking about the adequacy of saving rates for younger cohorts as they go through their life-cycles. They argue that the experiences of successive cohorts are sufficiently different that arguments relating to the future based on cohorts having the same shape profiles as their predecessors are misleading. They suggest a technique relating income, consumption and saving profiles for the successive cohorts to the profiles of 'forcing' variables such as the number of adults and children, male and female wages, participation in financial markets etc. They also suggest a technique of extrapolating life-time profiles for these forcing variables where information from cohorts that are closer in date-of-birth terms is given more weight. While such issues are no doubt important, however,

they are a long way from the spirit of the assumptions in Generational Accounts. Indeed, they are more in the spirit of approximate solutions to the type of micro-econometric simulation techniques that ultimately need to be embraced to do policy analysis effectively.

A final split of the FES data can illustrate one important dimension of differences in household life-time profiles that is typically not captured by Generational Accounts. This is a within-cohort split, in this case by education. In Figure 7 we present estimated relative age-profiles for household income, with households split by whether the head has any post-compulsory education.[7] While this split of household income by education of the head is clearly over-simplistic it serves to illustrate the main point that there can be substantial differences in life-time profiles *within* cohorts that are not captured by generational accounts.

Figure 7: Relative life-time profiles
Household income, by age and education of household head



The income profile for households with heads with post-compulsory education is not only higher than the profile for those with no post-compulsory education but it is also steeper and peaks later. There will also be differences in employment rates, particularly in early life and around retirement age. There are two important corollaries of these differences. The first is simply that there may well be important differences in tax payments and benefit receipts that are not picked up by simple generation and gender split. These may conceal important information on which to base policy analysis, particularly in the context of redistribution from rich to poor – a dimension in which policy is often analysed. We argue this in more detail with relation to pensions policy below.

Possibly more important, however, is the issue of aggregation that is raised by the fact that within cohorts there are differences in profiles. It has long been known that only under certain very restrictive conditions can one talk about a representative agent in economic models. This argument applies equally well to cohorts as to the economy as a whole. The tax and benefit system is inherently non-linear, with the result that the net tax payments of a generation (calculated at an 'average' profile) may differ substantially from the result obtained by computing the average of the net tax payments of each individual within the cohort. This argument is developed in more detail with particular reference to the UK pension system in the next section.

IV. Generational Accounts and social security reform in the UK

A key area in which generational accounts should provide conceptual clarity and a policy focus is that of pension reform. Kotlikoff (1992) has pointed to the confusions that have arisen concerning the status of the US Social Security Trust Fund, and in particular as to whether partial public 'pre-funding' of the programme effectively changes the burden of social security liabilities across generations. In this respect, the United Kingdom is an interesting case study. Its programme comprises a mixture of funded and unfunded provision, and of private and public provision. It has also seen a reform process from 1975 to 1995 which first constructed and then dismantled a comprehensive public pension programme, only to replace it by a largely funded private tier. Was this process motivated by a clear understanding of the generational incidence of the programme? Would some of the failures of the process have been ameliorated had a set of Generational Accounts been attached to each proposal? And has the public understood the implications of the shift from unfunded to funded pension provision (in particular, the so-called 'double burden' of financing the programme levied on transition generations)? This section examines these questions.

Pension provision in the UK can be succinctly described as a three tier programme comprising a tier of flat benefits financed by a payroll tax (earnings-related between a floor and a ceiling) levied on a PAYG basis; a second mandatory tier where individuals can choose between an additional earnings-related public benefit financed from the payroll tax (SERPS) or can choose various forms of funded, private, arrangements, and a third tier of discretionary saving. The programme therefore involves both intergenerational and intragenerational redistribution.

Measuring redistribution in the public pension programme

The capacity of the UK public pension programme to redistribute in several dimensions is illustrated by Table 2, taken from Disney and Whitehouse (1993a). The estimates, obtained

before the Social Security Act, 1995, which further curtailed prospective benefits for later cohorts, take account of variations in lifetime earnings within cohorts, differential mortality between and within generations, and the then-legislated differences in accrual rates between cohorts. Contributions are calculated by applying rate structures to past average earnings for each disaggregated group within the cohort and by applying future projected increases in the *average* contribution rate.

Table 2 shows clearly that later cohorts of men can expect lower (indeed, largely negative) returns from social security – this might be interpreted as a facet of *inter*-generational redistribution. In addition, the preponderance of flat benefits coupled with partially earnings-related contributions generates significant *intra*generational redistribution; however the progressivity of the benefit formula is undermined by the existence of differential mortality across occupation and industry groups.

Table 2: Rates of Return on UK public pensions, by cohort (men)

Date of birth cohort	Decile 2	Median	Mean	Decile 8
1935	0.5	0.0	1.0	2.2
1945	-0.1	0.1	0.2	0.5
1955	-1.0	-1.2	-0.9	-0.5
1960	-0.5	-0.9	-0.7	-0.8

Source: Disney and Whitehouse (1993a) Table 5.2.

Notes to table
1. 'Decile' represents decile of the calculated lifetime income distribution, using simulated lifetime earnings profiles disaggregated by occupation, industry and region, from successive Family Expenditure Surveys augmented by time dummies and productivity growth assumptions.
2. Contribution rates are based on past actual and future rates as projected by the Government Actuary's Department such as to maintain National Insurance Fund balance given projected benefit liabilities, assumed rates of 'contracting-out' of SERPS and average mortality assumptions.
3. Benefits are assumed to be price-indexed. The duration of benefits takes account of *current* occupation-specific mortality rates. Dependants' benefits are ignored.

The social security programme introduces intragenerational redistribution across the income deciles *within* cohorts and, as the effective benefit formula varies across birth cohorts, the extent of intragenerational redistribution also varies *across* cohorts. A further complexity in measuring redistribution is that individuals can 'contract out' of part of the programme, and that such contracting-out is not 'neutral', in the sense that the implicit subsidy to do so is not 'neutral' across individuals within a generation and also across generations.[8] Consequently, the decision to contract-out, and therefore the fraction of any given cohort that contracts-out, is endogenous to expected rates of return and so, too is the contribution rate.

What is the point of Table 2 in the present context? First, and subject to this last *caveat,* calculating rates of return in this manner seems to be the most transparent way of

understanding differences in individual 'returns' to public pension programmes, where individuals differ in both the date of birth generation they belong to and where, on average, they lie in each generation's distribution of lifetime incomes. It is not apparent that a 'generational accounting' approach provides substantially greater transparency, not least since it conceals a substantial component of redistribution that actually takes place, namely the intragenerational component.

Second, implicit aggregation of variation in lifetime incomes within generations conceals a wide variety of outcomes that are identifiable *ex ante* (i.e. before stochastic mortality risk). Consequently the aggregate 'generational burden' may provide a misleading picture even of *inter*generational redistribution. As Hart (1976) writes:

> '… any forecast of the costs of pensions based merely on the average path, or even worse, merely on the average income in a cross-section, is likely severely to underestimate the future pension burden.'

Of course, the view that aggregation necessarily implies an *underestimate* of the average pension burden rests on assumptions concerning the dynamic process underlying lifetime earnings, and the structure of contributions and benefits. But the key point is that using an approach that calculates generation-specific net accruals from a 'representative agent' model of each generation is likely to provide severe and systematic errors in the implied generational transactions, as suggested in the previous section. This is apparent from Table 2, in that generalisation from the cohort-specific mean (or median) rate of return would give a highly misleading picture of the average 'return' to the generation as a whole. It *is* possible to provide reasonably accurate aggregate, generation-specific, measures of net returns to pension programmes, but only by suitable aggregation of individual estimates based on micro-simulation and micro-econometric methods.[9]

But the calculations in Table 2 should also not be interpreted as the 'last word' in calculating generational rates of return. They rely on a mixture of cross section and pseudo-panel methods, with some questionable assumptions, such as the use of cross-section mortality differences across occupations grafted onto average projected changes in mortality over time. No attempt is made to endogenise participation in the second tier of the public programme to the calculated cohort return, nor to calculate returns for women, where career histories introduce further complexities.[10] Finally, these calculations also ignore the important issue of lifetime earnings risk, with the aggregated average rate of return to a generation likely to be sensitive to the nature of the stochastic process governing the evolution of lifetime earnings that is assumed.

There are also key modelling assumptions where alternative strategies might be equally plausible. For example, in the calculations in Table 2, contribution levels are assigned to each individual in each year by applying the existing rate structures and projecting future

proportionate changes in rates in line with official actuarial projections of average rates. Other calculations by other authors have used constant contribution rates (on the plausible basis that future contribution increases have not been legislated) and yet another approach would allow the future cohort-specific accrual factor to adjust rather than the contribution rate so as to generate 'actuarial fairness' across generations.[11] As we point out above, if calculations of this kind, and 'generational accounts', are calculated on the basis of 'existing policy', then it is important to know what 'existing policy' means in this context. Does it mean holding contribution rates constant, or allowing either contribution rates or accrual rates to vary such as to maintain the financial balance of the system? Any choice is to some extent arbitrary.

The implications of UK Generational Accounts for UK pensions policy

An interesting feature of the past UK pension reform process is that the various changes have *not* been motivated by a set of generational accounts. It is interesting to speculate as to whether the numerous changes and policy reversals would have been avoided had each reform been required to provide a set of accounts which detailed the prospective consequences for particular generations. However, there is little evidence on which to base a conclusion.

One particular episode illustrates the possibilities. The introduction of the State Earnings Related Pension Scheme in the 1975 legislation is now seen to have been a major error in policy direction, although that was far from clear at the time.[12] However, the significant weakness of the official actuarial calculations underpinning the reform was their failure to project beyond the year 2008, before the baby-boom generation started retiring. Once some appropriate projections were made, the policy was quickly reversed (see Hemming and Kay, 1982), even though the generational 'incidence' of the burden of financing SERPS was never made explicit in those subsequent calculations.

Similarly, the introduction of Private Personal Pensions in the 1986 Pensions legislation was accompanied by a dramatic underestimate in the expected numbers joining the scheme in the early years. Initial Government Actuary projections were of the order of 500,000 individuals choosing to contracting out, although a contigency plan was drawn up for take up of 1,750,000. In reality, the number was closer to 5,000,000 by the end of the first five years (see Disney and Whitehouse, 1992).

This 'back door' (Disney and Johnson, 1998) switch from PAYG financing to funded pensions, which downgraded SERPS benefits and permitted for the first time defined contribution plans such as Personal Pensions to 'contract out' of SERPS, was largely accomplished because the generational incidence of the transition was far from clear. An increase in the proportion of the workforce that contracts out of the public component of the

scheme raises the current contribution rate while lowering it in the future when those generations reach pensionable age. Effectively the 1986 reform generated an increase in the current average National Insurance contribution rate of some 1½ to 2 percentage points, while reducing the rate of contribution at scheme maturity by a similar amount – a turnaround of some 3-4 percentage points.[13] It is arguable that, had this transition been explicit, behaviour would have been substantially affected, either in the level of the rebate offered to those who contracted out, or of popular perception of the reform process. This is not, of course, an argument against making such policy decisions more 'transparent' than they are at present in the UK.

These features of the way in which the UK's social security programme is financed nevertheless illustrate the general point that the absence of generational accounts neither precludes a radical cutback of social security nor hinders the subsequent process of 'privatisation' of social security commitments. However, there is one field where an absence of transparency hinders a rational discussion, and where it would be useful for an explicit statement of prospective commitments. This is in the area of the unfunded pension liabilities incurred in parts of the public sector, notably central government. Although figures for the prospective liabilities of unfunded pension programmes for government employees are available, they are not incorporated into the standard projections of official pension liabilities. This omission could easily be rectified, both in the Government Actuary's projections of future liabilities, and in Generational Accounts themselves.

V. Conclusions

Although we are critical of Generational Accounts in analysing issues such as pension reform, their strength as a tool is precisely the fact that they bring to the fore the dependence of policy analysis on intertemporal issues as well as behavioural and incidence assumptions. Generational accounts encourage policy makers and analysts to take a long term view of fiscal policy and government fiscal liabilities. The simplest message of the Generational Accounts that have been computed so far — that *something*, whether it be taxes, household behaviour or the prevailing economic conditions, has to change as our economies age — is an important one to understand. The more that this understanding is aided by Generational Accounts, and also the discussion that surrounds them, the better. But, understanding *what* needs to change, and by how much, requires a more structural analysis of the impacts of government policy on lifetime living standards and the transmission mechanisms between things like income, consumption and wealth.

In reality, a complete analysis of the effects of policy will depend on many factors, and generational accounts are at best a first order approximation of the object of interest –

contemporaneous and lifetime living standards. Given this, a doubt arises as to how far the ensuing numbers should be used as a basis for policy reform. In aggregate there will be endogenous behavioural responses and general equilibrium effects will almost certainly be important. It is therefore difficult to target policies on reducing the measured generational imbalance for particular groups. Reforms could lead to even more exaggerated effects; alternatively individuals may be already compensating by changing their behaviour (for example, young generations increasing their saving because they don't expect substantial pensions from future governments).

We have shown that when constructing underlying relative age-profiles for employment and income, and when looking at pension reforms in more detail, aggregation issues become important. Within-generation differences confound the calculations and lead to dimensions where policy matters but where Generational Accounts can say very little. Indeed, with the movement towards private funded provision for the upper and middle parts of the income distribution, current pensions policy reform in the UK (such as the replacement of SERPS with the Second State pension) is predominantly motivated by such within-cohort issues. Looking back at the two major pension reforms of the last twenty years, it seems fair to say that, despite the absence of a set of Generational Accounts, neither was characterised by a lack of understanding of the generational incidence. Instead, each experience starkly demonstrated the importance of the forecasting and understanding of individual's circumstances and decisions when computing the possible effects of policy interventions. Such issues will remain the key to informed policy analysis irrespective of the existence of a set of Generational Accounts.

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Appendix A

Here we present generational accounts for a selection of countries. For more details see Kotlikoff and Leibfritz, (1998).

1995 Generational Accounts, selected countries

$ 000's

Age in 1995	*United States*	*Japan*	*Germany*	*Italy*	*Nether-lands*	*France*
0	86.3	143.4	165.0	114.2	110.0	151.5
5	102.0	169.3	195.3	132.9	139.8	191.7
10	121.7	200.1	233.8	154.1	171.0	229.4
15	144.6	235.9	287.9	178.4	205.0	264.8
20	168.7	278.1	333.6	193.5	231.7	304.4
25	175.4	295.2	309.7	184.4	237.3	321.9
30	170.0	297.8	271.8	155.2	220.0	293.7
35	157.5	287.4	224.4	113.5	196.7	242.7
40	135.7	263.8	160.1	63.4	161.2	166.8
45	101.3	227.7	94.0	10.7	116.3	77.5
50	56.4	173.1	–4.2	–46.8	62.2	–12.5
55	4.0	99.0	–98.9	–103.1	5.5	–134.7
60	–51.7	11.9	–183.6	–142.0	–46.5	–197.0
65	–96.0	–47.7	–206.7	–138.3	–91.4	–199.9
70	–104.6	–44.8	–180.7	–117.5	–103.4	–151.5
75	–101.9	–36.0	–150.2	–94.7	–113.0	–162.1
80	–89.5	–26.7	–109.6	–72.2	–118.8	–93.9
85	–74.4	–18.2	–68.0	–52.7	–116.6	–102.9
90	–56.7	–9.7	–3.2	–7.4	–110.9	–94.4
Future generations	130.4	386.2	376.8	264.8	193.8	222.8
Generational imbalance (%)	51.1	169.3	92.0	131.8	76.0	47.1

Source: Kotlikoff and Leibfritz. (1998)

Notes

[1] There are a number of papers surveying the issues involved in the construction of Generational Accounts. Good examples are Auerbach, Gokhale and Kotlikoff (1994), Haveman (1994) or CBO (1995).

[2] Another obvious implication of the use of the current deficit is that the government's fiscal stance can appear to be 'improved' by redefining items appearing as tax and spending such that they appear in the future as opposed to the current accounts. For a survey of the extensive debate over the degree to which contemporaneous government deficits are meaningful indicators of government policy see, for example, Buiter (1990).

[3] The exceptions are New Zealand, Sweden and Thailand

[4] The potential importance of this issue could be considered by comparing the life-time profile of individual incomes with the life-time profile (for individuals) of household incomes divided equally amongst household members – the other extreme of the sharing rule – using a time series of cross-sections such as the FES data used below. But other allocation issues arise with, for example, capital taxes or inheritance taxes and alternative conventions could lead to very difference age profiles.

[5] This technique, now common, was developed by Deaton (1985) and has been used to construct lifetime profiles in many applications utilising FES data (for example, Blundell, Browning and Meghir (1994) Banks, Blundell and Preston (1994) or Attanasio and Banks (1998)). Under the assumption that each cross-sectional survey contains a random sample from the cohort the data can be treated as a genuine panel. This assumption breaks down if the data is split by variables that are under the households control (such as employment) or data is used on older households where wealth-related differential mortality may lead to misleading composition effects.

[6] Other data sets could be used, and may be more suitable for particular benefits or tax payments (e.g. the Family Resources Survey or the GHS). We use the FES in this paper as it was collected on a similar basis over a long period of time. The consistency over time of the FES data sets in comparison to other sources of information over this period is established in Banks and Johnson (1997).

[7] The profiles are estimated using data on all cohorts and assuming that time effects have zero mean over the sample and are orthogonal to a linear trend. This allows the separation of age, cohort and time effects from repeated cross section data (see Deaton (1997)).

[8] For further details, see Disney and Whitehouse (1992, 1993b) and also the discussion of the paper by Gustman and Steinmeier in Feldstein (1998).

[9] For an attempt to do this for *private* pension programmes in the UK, see Disney and Whitehouse (1996). That paper, however, provides only an overall aggregate, not aggregates by cohort.

[10] In Disney and Whitehouse (1996), calculation of women's occupational pension entitlements is incorporated, using extraneous, but cohort-specific, measures of job tenures. The modelling procedure therefore involves assigning cohort-specific tenure models to other cohorts.

[11] This is the approach that lies behind the recent Italian and Swedish reforms of their social security programmes.

[12] In criticising the so-called Meade Committee on the Structure and Reform of Direct Taxation, Prest (1979), then *doyen* of British public finance economists, wrote of the Committee's lukewarm response to SERPS: 'Whether one likes its provisions or not, there can be no doubt that it [the new state pension scheme] is the major legislation in the area for many years and is likely to set the pattern for a long time to come' (p.251).

[13] See Disney's comment on Budd and Campbell in Feldstein (1998).