GENERATIONAL ACCOUNTING:
SOME REMARKS ON AN APPLICATION TO GERMANY

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1   Introduction[1]

Germany is among the industrial countries facing the most serious problems associated with demographic change. In view of existing legislation on benefits, the growing percentage of older people in the population as a result of the low birth rate and increasing life expectancy is leading to a sharp rise in expenditure on statutory old age pensions and other basic public services, the funding of which is threatening to overtax the paying capacity of those generations still in employment. This unfavourable outlook is receiving considerable attention both in academic and political circles. Generally speaking, however, the long-term repercussions are mostly being examined only for some areas of public finance and do not form part of a comprehensive analysis of the trends in the country's overall public finance. Generational accounting is a method which, despite all the shortcomings it still retains in specific areas, is capable of including in the general analysis of public sector budgets the long-term aspects more satisfactorily than traditional tools.

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This paper presents the main results obtained in a study conducted by the Bundesbank in 1997 for the base year 1996[2]. The following section briefly reviews the methodological framework of generational accounting as applied in this study. The third section hints at some limitations of this framework while in section four the findings are presented. Some conclusions are drawn in the last section.

2   The Methodology

In the assessment of a country's fiscal policy the various analytical forms of its financial balance and - as a supplementary indicator - the level of public debt usually play a major role. However, neither future burdens on public budgets (including the social security funds), which to some extent are caused by the fiscal decisions made, nor long-term effects of intergenerational redistribution can be identified in this way. These burdens can occur even when budgets are in balance because almost no future payment commitments of the state are included in common budgetary concepts. If, for example, an increase in payments from the pay-as-you-go pension insurance system were financed through an increase in contribution rates, the overall public sector deficit would not increase, although this would involve a shift in the burden from present to future generations. Those generations already in retirement would benefit from the increase in payments but would no longer be contributing to their funding. The level of public debt is not entirely satisfactory as an indicator of the actual long-term burdens either, because it covers only explicit securitised debt and not implicit liabilities such as future claims on statutory provision for old age. In fact, as Kotlikoff (1993) has demonstrated, not only can different fiscal policy measures affect the intergenerational distribution without changing the budget deficit or surplus, but also fiscal policies with identical macroeconomic effects can go along with different budget balances[3].

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[2]   See Bundesbank (1997). The methodology of the study is to a large extent based on Boll (1996), where a more detailed description is provided.

[3]   This result relies on the assumption that explicit and implicit liabilities are completely identical. From a policy perspective however, it might be easier to change the value of outstanding implicit liabilities than the amout of explicit debt.

The generational accounting concept has been developed during the nineties to make up for these shortcomings of traditional fiscal policy analysis[4]. This concept is based on allocating levies to the state, on the one hand, and government payments on the other, to the various age groups within the population. The aim of generational accounting is to gauge individual burdens resulting from fiscal policy and, in particular, to show the different burdens to be borne by living and future generations. This is done using generational accounts, which are calculated separately for men and women born in the same year who are alive today. The generational account describes the financial relationships between the government and an average member of a given age group over his remaining lifetime.

The first step in calculating the generational account is to determine the present value of all individually attributable taxes and social security contributions which a person will pay to the government during his remaining lifetime. The present value of transfers received from the government is then deducted from this amount, yielding the aggregate net present value of future net tax payments. This entails making certain assumptions concerning the discounting factor, the growth rates of government revenue and expenditure categories as well as demographic trends. The standard version of generational accounting proceeds from the assumption that the fiscal policy pursued in the base year will continue to apply to all economic agents born up to the end of that year for their remaining lifetime. To this end, the age-specific per capita amounts of the individual tax and transfer types obtaining in the base year are extrapolated into the future on the basis of a given growth rate of productivity.

As a rule the generational accounts calculated in this way show net payments to the government, at least for younger people of working age, since they do not contain general net government expenditure not

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[4]   Among the earlier publications were Auerbach, Gokhale and Kotlikoff (1991 and 1994).

Box: Calculation of Generational Accounts

Age-specific per capita amounts of the individual tax and transfer types z obtaining in the base year are extrapolated into the future on the basis of a given growth rate of productivity (g). A person at age a in year $t+1$ must therefore expect an amount that is higher by the factor $1+g$ than a person aged a in year t:

$$h_{a,z,s}^{i} = h_{a,z,t}^{i}(1+g)^{s-t} \quad \forall z; \quad i=m,f; \quad a=0,...,D; \quad s>t .$$

s: time index

Generational account of a member of a particular age group alive today:

$$GK_{t,k}^{i} = \frac{\sum_{s=t}^{k+D}\sum_{z} h_{s-k,z,s}^{i} P_{s,k}^{i} \dfrac{1}{(1+r)^{s-t}}}{P_{t,k}^{i}} \quad \forall i,k .$$

$GK_{t,k}^{i}$: generational accounts

   t: base year of the study

   k: year of birth

   i: sex of the economic agent ($i=m,f$)

   r: discounting factor

$h_{a,z,t}^{i}$: real amount of payment type z (taxes have a positive sign and transfers a negative sign) which an average economic agent aged a may expect in year t; the age a of generations alive today has a value between 0 and $D=90$.

$P_{s,k}^{i}$: number of members of the generation born in k still alive in year s.

attributed to individual persons[5]. But as this general "government consumption" also creates utility, the net burden as recorded in the generational account shows the position of an average member of a generation vis-à-vis the government too negatively. Usually this "government consumption" is financed largely out of the sum of the generational accounts of all age groups. Changes in the generational accounts resulting from fiscal policy measures are interpreted as approximations for changes in welfare and therefore allow inferences to be drawn regarding their intergenerational redistribution effects.

Generational accounts can be constructed also for future generations, i.e. for all birth-years subsequent to the chosen base year (in this case 1996). The starting point is the requirement that the present value of all future government expenditure must equal the present value of all future government revenue plus government net assets (intertemporal budget constraint of the government). The present value of all present and future government net revenue is formed by aggregating the generational accounts of all living and future economic agents. The government can only temporarily incur or reduce its debt to achieve a desired expenditure path in the course of an infinitely long time horizon, but in the end it cannot incur additional debt or create assets. The size of the burdens to be borne by future generations may thus be calculated as a residual by deducting the sum of the generational accounts of living generations and government net assets from the sum of discounted current and future "government consumption". The generational accounts of future generations are obtained by redistributing this total burden so that every person born in the future will bear an equal burden (adjusted for growth effects) at the time of their birth.

The extent of the intergenerational redistribution resulting from fiscal policy can be illustrated by means of several indicators[6]. The

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5   Government expenditure which is not individually attributed includes, for example, expenditure on the legal system and national defence. Although it may be presumed that such government expenditure also has a varying utility for different generations, no attempt was made to attribute this utility precisely owing to the associated methodological problems. Educational expenditure is generally treated as government transfer and distributed by age groups (case A), but in a variant is treated as government consumption (case B).

6   Recently some new indicators have been developed that avoid some of the drawbacks of the indicators used here. See e.g. Raffelhüschen (1996 and 1999).

measure of comparative intergenerational burdens (burden ratio) is defined as the ratio (adjusted for productivity growth) of the burdens of future-born generations to those born in the base year 1996. It is calculated by dividing the generational account of future generations by the growth-adjusted generational account of newly born individuals who constitute the last generation to which the fiscal policy regime of the base year applies[7]. One caveat which applies to interpreting this ratio – and indeed to generational accounting as a whole – is that macroeconomic repercussions are disregarded. Hence no account is taken of possible changes in the behaviour of economic agents triggered by a change in the ratio of burdens.

The "lifetime tax rate" of an average member of a given generation is obtained as the ratio of the absolute level of net tax payments over his lifetime to his lifetime income – taking the present value in each case. A comparison of the lifetime tax rates of newly born and future generations indicates the extent to which the government may be compelled in the future to draw more heavily on households' incomes. These lifetime tax rates should not be confused with the government levy ratio, however, especially as the former – unlike the latter – are the net balance of tax and social security payments and transfers received from the government and because the payments relate to an individual's lifetime and not to the people alive in a particular calendar year.

Instead of assuming that it is only those born after the base year that guarantee the observance of the intertemporal budget constraint through an appropriate increase in their net payments to the state, it is also possible to examine the extent of the gap which arises between the present value of "government consumption" and the receipts and assets available to meet this expenditure if the conditions of the base year are retained for all future generations, too. In the latter case the intertemporal budget constraint is no longer equalised by changing the net burden on future generations but, instead, by means of a residual, the sustainability gap. This gap may be interpreted as the present value of all economy

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[7]   A direct comparison between the generational accounts of future generations and older living generations is not meaningful as only present-day and future burdens of persons alive today would be recorded but not the net payments which they have already made between their year of birth and the base year.

measures to be taken by the state in future or all future increases in receipts which are necessary to enable a shift from the fiscal policy obtaining in the base year to a policy which, on the assumptions made, meets the budget constraint, without further changes being necessary.

3   Limitations of Generational Accounting

In view of the broad time horizon and the inadequacy of the data available for processing, highly simplifying assumptions are necessary, including those applying to the behaviour of economic agents. To avoid false conclusions it is vitally important when interpreting empirical results that the basic assumptions and conceptual limitations of generational accounting as it is implemented here are observed.

Intergenerational burden calculations are based on the idea that economic agents have at least some notion of what their income will be during the rest of their life and that they gear their economic behaviour to this remaining income. This therefore rules out not only a mode of behaviour which is more in keeping with the extremely short-term income situation but also a very long-term perspective which includes, by way of legacies, the welfare of future generations. Consideration of inheritance motives, in particular, would greatly affect the way in which burden calculations could be interpreted.

One objection to this concept is that in most cases very simple incidence assumptions are being made for the various types of taxes and transfers. It is normally assumed that there is no shifting, that is to say, taxes and contributions are actually ascribed to those who pay them and transfers to those who receive them. This overlooks the fact that state intervention is often reflected not only in the figures applying to the economic agents directly affected but also impinges on their environment in a way that is difficult to determine empirically.

It must also be remembered that overall dynamic economic repercussions are ignored. In particular, the need to increase the lifetime tax burden to close the sustainability gap and the changes in behaviour

arising from this have an effect on economic growth. Consequently, there will probably not be steady productivity growth and a constant discounting rate. This has been a starting point for further and more comprehensive model analyses recently[8].

Regarding the interpretation of the results, consideration must still be given to the fact that the fiscal status quo, at least in the baseline of the calculations presented here, is very narrowly defined. If it is assumed that the fiscal policy of the base year is retained, that means that neither automatic changes inherent in the present fiscal system nor changes to the legal basis which have already been approved but which have not yet become effective in the base year are included in the calculations. In the case of Germany, for example, no account is taken either of the fact that under present legislation the contribution rate to the statutory pension insurance scheme is raised if the fluctuation reserve threatens to fall below the required minimum, that is the amount needed to meet a month's expenditure, or that restrictions on early retirement have already been approved.

It is important to remember that generational accounting as implemented here is not an instrument for forecasting as realistic a picture of long-term fiscal developments as possible. Instead, the aim of the concept is to obtain a yardstick for evaluating the course of current fiscal policy while taking into account the long-term effects of this policy. Except in the case of projecting population trends, only status quo conditions were used with the result that it is possible to obtain some idea of the interplay between the fiscal conditions of the base year and demographic trends. The results therefore provide an indication of the extent to which adjustments have to be made but are unable to specify the types of adjustment necessary or the time at which they should be applied. In some other applications of generational accounting a different approach has been chosen. There, the emphasis is not so much on the evaluation of current fiscal policies, but to a larger extent on a more realistic picture of what can be expected. Therefore, changes to the legal basis which have already been approved but which have not yet become effective in the base year are often included in the calculations.

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[8]   See e.g. Fehr and Kotlikoff (1997) and Raffelhüschen and Risa (1997).

Moreover, some studies make use of forecasts and apply the productivity growth rate for extrapolation only from the end of the forecast horizon on instead of from the base-year on.

This might, on the one hand, mitigate the problem that the results are determined not least by the choice of the base year. If special factors play a substantial role here, these are assumed to continue to apply in the future, too, and this may lead to substantial distortions. Thus, the state of public finance in the base year 1996 used here was unfavourable as a result of the burdens which were still extensive following reunification and as a result of the high unemployment rate and poor economic conditions. This can be seen, for example, in the fact that the deficit was relatively high at 3.5% of GDP. On the other hand, incorporating forecast values in the calculations implies that the results become dependent on the quality of that forecast. If already approved changes to the legal basis are taken into account some policy change envisaged for the far future – which might or might not materialise – influences the results. There is a trade-off between a more realistic picture on the one side and the usefulness of the results as indicators of the long-run implications of the current fiscal frame on the other.

Finally, it must also be pointed out that ascribing state transactions to men and women separately and to specific age groups is particularly dependent on an extensive database, which in the case of Germany is largely available only on a sample basis and, moreover, must be augmented by a large number of estimates. This applies especially to the allocation of taxes and transfers within households. This has to be kept in mind when interpreting gender-specific differences.

In the light of these restrictions the results obtained have to be interpreted with care and can only be regarded as a rough indication of the intergenerational redistribution effects of fiscal conditions in the base year.

4   Intergenerational Redistribution of Public Finance in Germany

Data used for calculations

The main sources of data for the application of generational accounting to public finance in Germany in the base year 1996, presented below, were, in addition to national accounts data and statistics from the social security funds, the results of the income and consumption sample which was taken by the Federal Statistical Office in 1993 (and which became available in 1997) as well as the figures from the latest version of the socioeconomic panel produced under the auspices of the German Institute for Economic Research, Berlin[9]. To extrapolate the age-specific per capita amounts of various tax and transfer types, a productivity growth rate of 2% and a discounting factor of 4% were assumed as macroeconomic parameters in the baseline version. These values more or less correspond to the average figures recorded during the past few decades for the growth rate of real per capita income and for the real long-term interest rate, respectively, in Germany. In addition, calculations based on alternative assumptions were carried out. The demographic trend up to the year 2040 is taken from the eighth coordinated population forecast calculated by the Federal Statistical Office (medium variant). The further trend was modelled in such a way that the population in Germany will stabilise at approximately 57 million after 2100. To determine the level of government assets in the base year, financial assets and tangible fixed assets (at replacement values) were offset against debts.

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[9]   In principle, the calculation of the results is based on Bundesbank (1997) and a study by Stephan Boll (Boll 1996), which took 1994 as its base year and which appeared in the series of discussion papers published by the Economic Research Group of the Deutsche Bundesbank. However, some methodological changes have been made. In particular, educational expenditure is in general treated as government transfer and distributed by generations in this paper while it has been treated as "government consumption" in the Bundesbank study. Moreover, compared to Boll (1996), western German and eastern German data are no longer treated separately with the result that a direct comparison of the figures is not possible.

Age-dependent burden profiles

As far as the burden on the various age groups in the base year is concerned, the balance between the average payments of levies and transfers shows a pronounced age dependent pattern (see chart 1). The financial state of the public sector budgets is therefore considerably influenced by the growing proportion of elderly persons in the population. Children and young people receive a considerable amount of net payments from the state, with education expenditures and child benefits playing a particularly significant role. When they start working, the absolute payment profiles become positive, that is to say, the state becomes a net recipient. In mid-life, tax and contribution payments as well as net payments are largely in line with changes in income, the net annual burden on men being significantly greater than that on women. Transfer payments during this period remain more or less constant. Around the age of 60 and the approach of retirement net payments on the part of the state return. Although men receive larger net transfers than women, the difference between the sexes is not as pronounced as it is during the mid-life period because a large proportion of transfers is also being used for redistribution purposes and does not follow a pure form of the principle of equivalence.

The generational accounts of the living are calculated on the basis of this age-dependent distribution of state levy and transfer payments by discounting to the base year - as mentioned above - the payments to be expected from the various age groups during their remaining lifetime (see table 1 for details). The accounts of those born in the base year are particularly informative here because these alone reflect the full extent of state levies and payments over the entire lifespan.

Men born in the base year have to pay state levies amounting to DM 908,000 (discounted) while they receive DM 562,000 in transfers; a net burden of DM 346,000 remains to finance the unattributed expenditure. If educational expenditure is treated as "government consumption" instead of being distributed by age group (case B), the net burden increases to DM 417,000. In terms of the lifetime income that can be expected this amounts to a lifetime tax rate of 23% (case B: 28%). Women pay levies amounting to just over one-half of the payments made

by men but receive transfers amounting to 80% of those received by men. The net burden they have to carry is therefore significantly less than that borne by men; their lifetime tax rate is 2% (16%)[10].

Shifts in burdens between present and future generations

As far as the intergenerational distribution as the primary analytical objective of generational accounting is concerned, the calculations confirm the assumption resulting from many independent analyses that the demographic changes with respect to the age structure as well as the unfavourable state of public sector budgets in the base year are creating a much greater burden for future generations. While - as mentioned above - a burden ratio of 1 would mean that the present fiscal policy can be retained without shifting burdens on to future generations, the actual value for the base year 1996 is 2.8, which means that, on the assumptions made, future generations will have to pay 180% more to the state in higher net taxes than those born in 1996[11]. The lifetime tax rate will rise to 66% for men and to 7% for women.

A moderate increase in the burden on future generations could be justified from the point of view of fair redistribution on the grounds that they will have larger incomes over their life as a whole. Consequently, larger net tax payments by future generations would be the result of an intertemporal progressive tax system, which takes account of the ability-to-pay principle. To that extent the financial burdens on public sector budgets could be more heavily "bequeathed" to future generations.

However, this argument is only valid if it is certain that the intertemporally greater burden will make it possible in future to enjoy a net increase - albeit a slower one - in lifetime income. If it is assumed that

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[10] In another study on Germany Raffelhüschen/Walliser (1999) arrive at more favourable results for the base year 1995. Differences in results are partly due to deviating methodological approaches – e.g. changes to the legal basis which have already been approved but which have not yet become effective in the base year are included in their study.

[11] This value applies equally to men and women because it has been assumed in calculating the net burden on future generations that there will be no changes as far as the intergenerational redistribution between the sexes is concerned. The usefulness of this indicator is negatively affected by the fact that female generational accounts are rather close to zero.

the greater burdens necessary to maintain the intertemporal budget constraint are evenly distributed over all future generations from the start, this condition could not be maintained in the event of the lifetime tax rate for future generations being raised - as mentioned above - to 66% for men and 7% for women. The net lifetime income of the next few generations would actually decline considerably at first, and it would not be until very much later generations that the level enjoyed by those born in 1996 would be regained (see chart 2 on the situation for men).

Instead of having a uniform lifetime tax rate for all future generations, it might therefore be possible to assume a gradual increase in burdens as an alternative which would ensure a constant increase in net lifetime income from one age group to another. Even on this assumption, however, the greater burden on future generations is hardly tenable either, because in this case the annual increase in net lifetime incomes would be reduced to half a percentage point. The increase in gross lifetime incomes resulting from the assumed 2% improvement in productivity would be vastly eroded by growing intervention by the state, which to a large extent would still be attributable to the financing of payments to present generations. This still does not take into account the fact that the likely changes in behaviour associated with the greater burden would have lasting negative repercussions for economic development.

Calculating the sustainability gap - the second indicator mentioned at the beginning of this paper - also shows that the fiscal conditions obtaining in 1996 imply a considerable increase in burdens in the future in view of demographic trends. According to this calculation, there was a gap of DM 9,700 billion, which was 2.7 times the value of gross domestic product, between the present values of state receipts and state expenditure in 1996.

If this sum is converted into annual rates, servicing this economic debt requires a permanent cut in expenditure or an increase in receipts amounting to 6.0% of gross domestic product for all future years (that would have been approximately DM 210 billion in 1996)[12]. It must

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[12]   Given the conditions obtaining in 1996, the expenditure ratio of just over 50%, for example, would have to be reduced to 44%. In 1989, that is to say, prior to reunification, it had amounted to just under 46% after a lengthy period of consolidation; the ratio exceeded 44% for the first time in 1974.

be remembered, however, that this value is also dependent on the selected discounting rate and on the assumed productivity growth even if the differences arising from these factors are not very great. If, for example, the latter amounts to only 1.5% instead of 2.0%, the annual consolidation requirement declines from 6.0% to 5.8% of gross domestic product because the growth rate of per capita payments is assumed to be correspondingly lower (see the table 2 for the effects of various assumption combinations).

In contrast to the previous indicators of intergenerational redistribution, it is assumed here that there will be immediate consolidation which will entail for present generations, too, a fall in net lifetime income. The sustainability gap converted into regular annual payments will rise further for every year in which the calculated contribution to consolidation is not achieved. This makes it clear that any postponement of consolidation efforts leads inevitably to even greater efforts in later years.

What effects specific policy changes already approved but not yet applied in 1996 have on intergenerational distribution or what specific measures would be necessary to prevent an additional burden on future generations are illustrated by the following examples. It must be emphasised yet again that intergenerational burden calculations cannot provide information either on the extent or the form of a desirable change in intergenerational redistribution. This would require not only a standard for the intended redistribution among the various generations; the macroeconomic repercussions of the various measures chosen would also have to be taken into account. While it is assumed in intergenerational burden calculations that there is no difference between reductions in expenditure and increases in receipts owing to the use of net payments, the actual effects probably differ considerably. For example, it may be assumed in the event of a cut in transfers which affects the elderly and which has been announced well in advance that younger members of the population will increase their efforts to save. By contrast, higher taxes could be associated not only with a reduction in investment but could also lead to evasive action (such as resorting to a greater degree to the shadow economy).

Account must first be taken of the fact that the contribution rate to the statutory old-age pension scheme will not remain firmly fixed at the 1996 level but will be adjusted under existing legislation to allow for

the expected sharp rise in expenditure resulting mainly from demographic trends. It is assumed here that the contribution rate will be raised to 26.7% in 2040 in accordance with the more favourable variant of the forecast by Prognos (which does not include recently legislated cuts in pension payments)[13]. Compared with the baseline, this variant results in a significant reduction in the intergenerational imbalance to a burden ratio of 2.1; the additional burden on future generations is thereby reduced by 40% (see table 3). The relief that will be enjoyed by future generations is accompanied by greater net levies to be paid by present generations, with the additional financial burden being all the greater, the younger a person is. The lifetime tax rate for men (women) born in 1996 rises accordingly from approximately 23% (2%) to 28% (7%).

If the aim is to bring about an even distribution of the burdens between those born in the base year and future generations through tax increases, the tax burden existing in 1996 would have to be increased by 29%, that is to say, the tax ratio would have to rise from just over 23% of GDP to 30% of GDP. If consolidation were to be achieved by specific forms of expenditure, by contrast, a reduction of 36% in spending on old age pensions (including civil servants' pensions) - to take only one example - would be necessary. These examples already show that consolidation to that extent could not be restricted to single measures but would have to be broadly based.

What part of the intergenerational redistribution is attributable to demographic ageing and what part is a consequence of the fiscal conditions prevailing in 1996 can be seen by keeping the age structure of 1996 constant. Interestingly, in this case the intergenerational imbalance completely disappears. The fiscal policy obtaining in the base year would not result in any sizeable intergenerational redistribution if the age structure would remain unchanged. The additional burden on future generations and the consolidation requirement arising thereof are solely a cause of demographic ageing.

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[13]   See Prognos (1998). To simplify matters it has been assumed in our calculations that the contribution rate will rise lineally from the present level to 26.7% in the year 2040 and will then remain constant.

5   Conclusions

Despite the mentioned conceptual shortcomings and implementation problems intergenerational burden calculations are useful as an extension of the normal set of analytical instruments in public finance. They allow a rough estimation of the intergenerational distribution of burdens and of the way it can be influenced by various fiscal policy measures. The application to Germany undertaken here shows that retaining the fiscal and socio-political conditions obtaining in 1996 would place oppressive burdens on future generations. Compared to those born in 1996 they will have to shoulder a lifetime tax rate that is 180% higher to close a sustainability gap of more than 2 ½ times the GDP of the base year. It has to be taken into account, however, that measures have already been taken to reduce this intergenerational redistribution which were not yet effective in the base year. For example, cuts in old age pension payments have been agreed that will have a large impact in the longer term.

Tab. 1a. Composition of generational accounts (Women)

Age at the end of 1991 1)	Levies (case A)	Transfers (case A)	Net burden (case A)	Net burden (case B)	Lifetime tax rate in (case A)	Lifetime tax rate in (case B)
			DM thousand			
0	482	469	13	89	2 %	16%
10	544	468	76	141		
20	612	442	170	190		
30	560	415	145	148		
40	457	415	42	43		
50	314	460	-146	-146		
60	158	472	-313	-313		
70	91	391	-300	-300		
80	55	294	-239	-239		
90 and over	8	51	-44	-44		
Future Generations			38	211	7 %	38%

Case A: Educational expenditure treated as government transfers and distributed by age group.
Case B: Educational expenditure treated as "government consumption".

1) Only the net burden of those born in 1996 can be compared with that of future generations.

2) If the lifetime tax rate of future generations is divided by the rate applying to those born in 1996, a burden ratio of 2,8 is obtained in case A and of 2,4 in case B.

Tab. 1b. Composition of generational accounts (Men)

Age at the end of 1991 1)	Levies (case A)	Transfers (case A)	Net burden (case A)	Net burden (case B)	Lifetime tax rate (case A)	Lifetime tax rate (case B)
			DM thousand			
0	908	562	346	417	23 %	28 %
10	996	551	445	506		
20	1,096	533	564	590		
30	916	485	430	439		
40	682	488	194	195		
50	404	536	-132	-131		
60	158	558	-401	-401		
70	91	427	-336	-336		
80	50	294	-244	-244		
90 and over	8	65	-58	-58		
Future Generations			974	988	66 %	67 %

Case A: Educational expenditure treated as government transfers and distributed by age group.

Case B: Educational expenditure treated as "government consumption".

1) Only the net burden of those born in 1996 can be compared with that of future generations.

2) If the lifetime tax rate of future generations is divided by the rate applying to those born in 1996, a burden ratio of 2,8 is obtained in case A and of 2,4 in case B.

Table 2: Effects of alternative assumptions about economic trends on the distribution of burdens among different generations

	Discounting factor in %		
Increase in productivity in %	*3%*	*4%*	*5%*
	Burden ratio 1)		
1.5%	2.9	2.8	2.8
2.0%	3.1	2.8	2.8
2.5%	3.6	2.9	2.8
	Annual consolidation requirement as a percentage of GDP		
1.5%	6.2	5.8	5.5
2.0%	6.5	6	5.6
2.5%	7	6.2	5.8

1) Lifetime tax rate applying to future generations in relation to that applying
to those born in 1996.

Table 3a. Effects of possible consolidation measures on the net burden (Women)

(in thousands of DM)

Age at the end of 1996	Net burden in the base case	Adjustment of contributions to the pension insurance scheme	Reduction of old age pension payments by 36%	Increase of 29% in taxes	No demographic change
		Difference from baseline			
0	13	25	56	89	88
10	76	21	64	98	86
20	170	15	73	107	126
30	145	9	80	101	23
40	42	4	89	85	27
50	-146	1	110	64	12
60	-313	0	127	36	65
70	-300	0	102	21	33
80	-239	0	70	13	-71
90 and over	-44	0	12	2	0
Future generations	38	41	32	64	61
Lifetime tax rate:					
Those born in 1996	2%	7%	13%	18%	18%
Future generations	7%	15%	13%	18%	18%
Burden ratio	2.8	2.1	1.0	1.0	1.0

Table 3b. Effects of possible consolidation measures on the net burden (Men)

(in thousands of DM)

Age at the end of 1996	Net burden in the base case	Adjustment of contributions to the pension insurance scheme	Reduction of old age pension payments by 36%	Increase of 29% in taxes	No demographic change
		Difference from baseline			
0	346	65	81	130	169
10	445	55	89	141	153
20	564	39	98	153	263
30	430	21	98	128	37
40	194	9	107	99	73
50	-132	3	130	66	95
60	-401	1	158	32	140
70	-336	0	120	20	73
80	-244	0	76	11	-95
90 and over	-58	0	15	2	0
Future generations	974	-111	-547	-497	-478
Lifetime tax rate:					
Those born in 1996	23%	28%	29%	32%	35%
Future generations	66%	58%	29%	32%	33%
Burden ratio	2.8	2.1	1.0	1.0	1.0

Chart 1. Distribution of net payments to the government among the various age groups

DM per year (y-axis): 60.000, 50.000, 40.000, 30.000, 20.000, 10.000, 0, -10.000, -20.000, -30.000, -40.000, -50.000

Age at the end of 1996 (x-axis): 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 and older

—— Men　—— Women

Chart 2a: Net lifetime income of men born in and after 1996 where lifetime tax rate remains constant
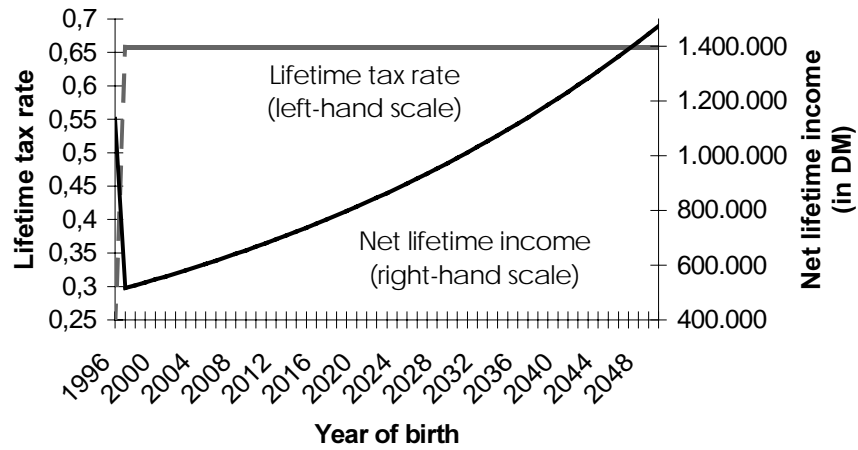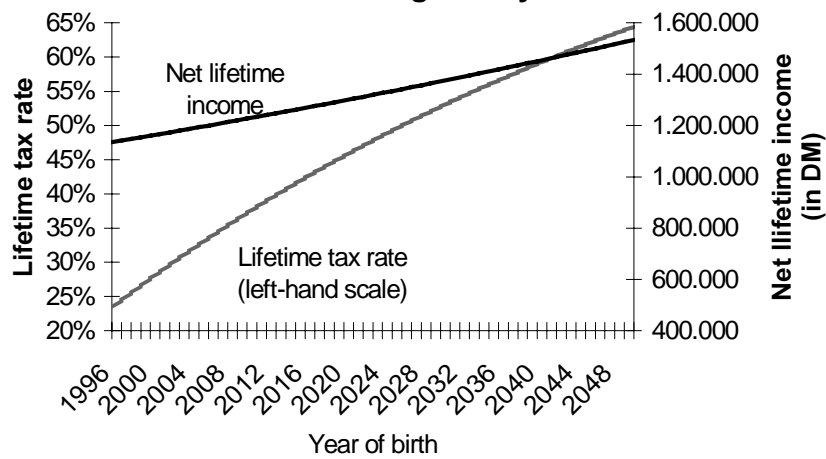

Chart 2b: Net lifetime income of men born in and after 1996 where lifetime tax rate gradually increases

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