The long-term sustainability of public finance – an analysis based on generational accounting

In the wake of the low birth rate and rising life expectancy, the share of older people in the German population will grow strongly, especially from the middle of the next decade onwards. Elder persons receive benefits that are largely financed by working generations, particularly under the statutory pension insurance scheme. Based on present benefit entitlements, this growing share of older people will push up the government financing requirement in relation to GDP. The resulting long-term budgetary problems are hardly captured at all by conventional fiscal indicators such as the budget balance or the level of government debt. The following article therefore employs the instrument of generational accounting to analyse the trend in the long-term sustainability of public finance during recent years. It reveals a "sustainability gap" which has not been closed by the measures taken so far at the political level. The generational accounting approach can also be used to analyse shifts in the respective burden on different generations resulting from changes in tax and transfer legislation. This is illustrated by the example of the pension reform 2001.

The concept of generational accounting[1]

Shortcomings of conventional indicators

Conventional indicators of fiscal policy such as current deficits and government debt say little about the long-term sustainability of public finance, particularly when society is undergoing a demographic change. The same applies to the scale of the intergenerational redistribution of burdens brought about by government activity. As conventional indicators take little or no account of future payment commitments of the state, the sustainability and intergenerational redistribution may change owing to fiscal and social policy measures or other factors even if the deficit ratio is kept constant. For example, the introduction of additional benefits under the statutory nursing insurance scheme has had hardly any impact on the current fiscal balance because this new government expenditure is being financed by additional contribution receipts. This expansion of government transfers nevertheless entails a shift in the respective burden to be borne by people born in different years (cohorts) as the expenditure of this new social security scheme primarily benefits today's older individuals who, however, are scarcely involved in financing it. The level of government debt is likewise not a very suitable indicator of real long-term burdens since it solely comprises explicit debt but not implicit liabilities – such as future claims on the statutory pension insurance scheme.

Intertemporal budget constraint as the starting point

Owing to these shortcomings of conventional fiscal policy yardsticks, the technique of generational accounting was developed in the early 1990s.[2] The basic idea of this concept consists in combining the fiscal conditions of a base year with the likely evolution of the population. This fiscal status quo is represented by the average payment streams observed in the base year between the state and people born in individual years. The starting point of generational accounting is the requirement that all future government expenditure must be covered by future revenue (the intertemporal budget constraint on the state). Put another way, the present value of government revenue must equal the present value of its expenditure (excluding interest payments) plus the government debt.

The first step in the generational accounting approach is to examine how the various categories of government revenue and expenditure are distributed across individual birth-years. For example, the average level of social security contributions paid by a 30 year-old person or the amount of social assistance benefits received by a 40 year-old is computed. Government revenue or expenditure which cannot be readily assigned to individual

1 This article builds on a previous article (see Deutsche Bundesbank, The fiscal burden on future generations – an analysis using generational accounting, Monthly Report, November 1997, page 17 ff. and S. Boll (1996), Intergenerational redistribution through the public sector – Methodology of generational accounting and its empirical application to Germany, Discussion paper 6/96, Economic Research Group of the Deutsche Bundesbank). It is largely based on B. Manzke, Long-term sustainability of public finance in Germany – an analysis based on generational accounting, Discussion paper of the Economic Research Centre of the Deutsche Bundesbank (due to appear in spring 2002).

2 Some examples from the already extensive literature on this subject are: A. H. Auerbach, J. Gokhale and L. J. Kotlikoff (1994), Generational Accounting: A Meaningful Way to Evaluate Fiscal Policy, Journal of Economic Perspectives, vol. 8, pages 73–94, B. Raffelhüschen (1999), Generational Accounting: Method, Data and Limitations, in: European Commission (ed.), Generational Accounting in Europe, European Economy – Reports and Studies No. 6, and H. Bonin (2001), Generational Accounting, Theory and Application, Berlin et al.

cohorts is distributed in this study evenly across the general population.[3]

Generational accounts

In a second step these age-specific amounts are extrapolated forward based on the assumption that the values computed in the base year will continue to hold in the future for people of the same age. They are increased annually by the rate of productivity growth in order to take account of technical progress and concurrently discounted to the base year of the study. It is then possible to compute in a third step the expected average present value of the net payments to the state from an individual of a given age over his/her remaining lifetime, i.e. tax and social security contributions less benefits received from the state. From this net position vis-à-vis the state (the "generational account") it is possible to tell to what extent individual age categories will be financially affected by government activity – positively or negatively – in their remaining life span.

Annual consolidation requirement as indicator

Finally, the amount of resources available to the state for debt servicing can be calculated by aggregating the generational accounts of all living and future residents. If this aggregate total does not suffice to service the government debt, the intertemporal budget constraint shows a financing shortfall which is also known as the sustainability gap. This denotes the present value of the fiscal consolidation requirement, i.e. the amount that needs to be generated from future government revenue increases or expenditure cuts. The absolute level of the sustainability gap is not all that meaningful, however, in that the government's ability to achieve the necessary consolidation partly depends on the country's future economic potential. In this study the sustainability gap is therefore related to the present value of future GDP.[4] This yields the percentage of GDP that must be covered immediately and for each future year by means of government revenue increases or expenditure decreases (referred to in the following as the annual consolidation requirement).

"Status quo scenario" and "policy scenario"

In the basic version ("status quo scenario") it is assumed that the fiscal conditions obtaining in the base year will continue to prevail in the future. Under this scenario the real need for fiscal policy action may differ from the annual consolidation requirement for various reasons. Thus measures may already have been agreed which will take (full) effect only in future years. For example, the further steps in the tax reform agreed last year will lead to substantial additional tax revenue shortfalls in the coming years. Moreover, the consolidation requirement may also be affected by "cohort effects" that are not directly related to government measures. Thus the level of new and future pensions of women is considerably higher than the benefits currently received by female pensioners, partly because the participation rate of women born in later years tends to be higher than that of women born in earlier years. To be able to better as-

3 Government expenditure which is not distributed according to age chiefly comprises spending on national and international security, public administration and government investment. The main corresponding items on the revenue side are government sales, especially fee income.

4 This is computed by distributing the GDP of the base year across the various age categories based on the age profile of employee compensation. These age-specific per capita variables are extrapolated in line with the productivity growth rate and aggregated on the basis of the population forecast.

sess the remaining need for action, therefore, the simple extrapolation of the age-specific payment profiles in the status quo scenario is supplemented in this study by a "policy scenario". The policy scenario captures both the effects of major measures already agreed but which will take effect only in the future and the aforementioned cohort effect.

It should be pointed out that the policy scenario likewise makes no allowance for the fact that the sustainability gap thus calculated does not necessarily have to be closed exclusively through additional government measures; future changes in other factors which affect the age-specific payment profiles may also play a role. For instance, a rising labour force participation rate might mean higher per capita tax payments and social security contributions in future than in the base year. To the extent that the sustainability gap is modified by such factors, the annual consolidation requirement as computed under the policy scenario is thus likewise not identical to the remaining real need for action.

Limitations of generational accounting

Not a forecasting tool

To avoid misinterpreting the empirical results, some important conceptual qualifications are necessary in respect of generational accounting. The simple extrapolation of the age-specific payment profiles in line with the rate of productivity growth shows that generational accounting is not a forecasting tool. Under the policy scenario, as under the status quo scenario, no attempt is made to predict the expected development based on present legislation. For example, the current legal regime prohibits credit financing by the main social security schemes. Instead, revenue levels are automatically aligned with the evolution of expenditure by adjusting the contribution rates. By definition, therefore, no sustainability gap can arise in these key fields of public finance. For this reason constant contribution rates are assumed in our study so that the future growing contribution burden can be captured. The average tax burden is likewise kept constant, with the result that additional receipts generated by the progressive nature of the tax scale are disregarded.

Macroeconomic repercussions and passed-on levies and transfers ignored

Changes in the macroeconomic setting resulting from demographic developments or reactions to political measures are likewise ignored. Moreover, it is generally assumed that no levies or transfers are passed on but that, rather, taxes and social security contributions burden the people who pay them and transfers benefit the people who receive them.[5] Trying to estimate the macroeconomic repercussions and the incidence of government measures would not only be a very onerous task, it would have the added disadvantage that the results would be harder to interpret as a result of the required additional assumptions.

Adjustment for exceptional factors

A further point to bear in mind is that extrapolating the age-specific payment profiles calculated for the base year projects all exceptional factors which applied in that year into

5 An important exception are the employer's contributions to the social security funds, which are allocated in full to employees. The principle is also departed from in the case of child benefit, which is disbursed to parents but allocated here to children.

the future. Cyclical influences on public finance and other temporary factors may therefore distort the outcome of generational accounting and may lead to considerable fluctuations in the consolidation requirement from year to year which are not due to the basic orientation of fiscal policy. This objection is met in this case by adjusting the payment profiles observed in each base year for cyclical factors. Other major influences which can clearly be identified as temporary effects are likewise not extrapolated into the future (such as the proceeds from the sale of the UMTS mobile phone licences in 2000). With regard to the persisting differences between western Germany and eastern Germany, it is assumed that the age-specific payment profiles of the various categories of levies and transfers in eastern Germany will match the level in western Germany by 2020.

Incomplete data base

It should further be remembered that, in particular, the derivation of separate age-specific payment profiles for different sections of the population and the calculation of the effects of policy changes which have been agreed but which will come into effect only at a future date entail many estimates. Similarly, the task of gauging the distribution of the individual government revenue and expenditure components across the age groups largely relies on sampling. Consequently, the computation results are subject to considerable margins of uncertainty.

Underlying assumptions

Population development

The calculations under the generational accounting approach necessitate assumptions about future population developments, the discounting factor and the rate of productivity growth. The forecast for the demographic trend up to 2050 is largely based on the assumptions of variant 1 of the ninth coordinated population forecast for Germany.[6] According to that projection, the overall birth rate will remain steady at around 1.4 children per woman, the long-term annual migration surplus will amount to 100,000 people and life expectancy will increase by approximately four years by 2050. No further increase is assumed for the subsequent years. The combined result of these developments is an accelerated decrease in the total population from 82 million at the beginning of 1999 to 65 million by 2050. This contraction will be accompanied by a growing ageing of the population. The dependency ratio, defined here as the ratio of the number of people aged 60 or more to the number of people aged between 20 and 59, will double by the middle of the century to around 80 % and will decrease only slightly thereafter.

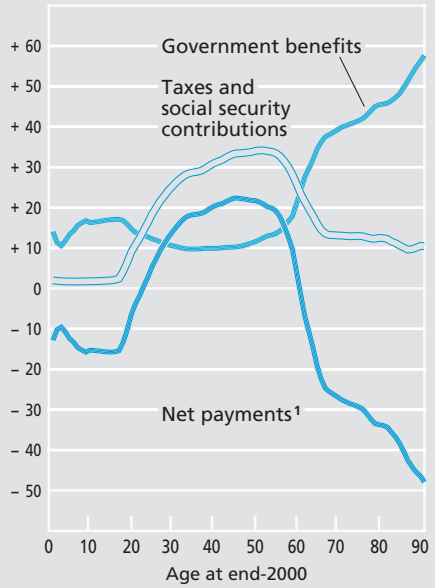
Other parameters

The discounting rate and the productivity growth rate were set at the respective average values over the past decades for the real interest rate (4 %) and real per capita income growth (2 %).

6 See B. Sommer (2001), Entwicklung der Bevölkerung bis 2050, Ergebnisse der 9. koordinierten Bevölkerungsvorausberechnung des Bundes und der Länder, Wirtschaft und Statistik, pages 22–29.

Distribution of levies to and benefits from government across individual age cohorts

DM thousand per year and inhabitant



1 Levies less government benefits.

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The age-related burden resulting from government activity

Net burden strongly age-related

As shown in the chart above, the individual burden caused by government activity varies significantly with age.[7] Children and young people receive considerable benefits from the state in the form of child benefit and education but contribute little or nothing towards financing them.[8] Once they enter working life, their tax payments and social security contributions increase sharply, with the result that net payments to the state become positive. During their working life, levy payments closely follow the pattern of income. When they retire at around 60, transfers from the state – which are comparatively constant until then – shoot up, whereas payments to the state drop significantly. Consequently, the state becomes a net payer again. Above all, the rising transfers from the statutory nursing and health insurance schemes as residual life expectancy decreases means that the government's net payments increase continuously with old age.

From this age profile of the net payments to the state the generational accounts of the various age cohorts can be calculated as explained above. Keeping the same fiscal conditions which prevailed in 2000 and taking account of measures which have already been agreed but which will not come into effect until a future date, newly born individuals would receive on average marginally more benefits from the state during the course of their life than they contribute to it (see chart on page 35). Their generational accounts are particularly informative as theirs is the sole age cohort that reflects levies to and transfers from government over their entire life span. As the generational accounts of all other age cohorts only give the net position for their remaining lifetime, they are not directly comparable with one another.

7 The results given in this article are not directly comparable with those presented in the 1997 Monthly Report owing to a number of methodological changes and the more recent data base used. In particular, in 1997 government expenditure items which could not be directly attributed by age were not distributed across the population, no convergence of eastern Germany towards west German levels was assumed, government fixed assets were treated differently and a different population development was forecast.

8 The age-specific payment profiles for the individual levy and transfer types were taken predominantly from the 1998 sample survey of income and consumption, the socio-economic panel advised by the German Institute for Economic Research (DIW) in Berlin and statistics provided by the statutory social security schemes. It was ensured that the payment profiles are consistent with the national accounts data.

Evolution of the sustainability of public finance since 1996

Under the status quo scenario the annual consolidation requirement has decreased over time

Under the status quo scenario and without adjusting for cyclical and other temporary effects, there was still a high annual consolidation requirement of 6.1 % of GDP in 1996 (see table on page 36). It decreased continuously and fairly steadily to 3.5 % by 1999 and then dropped sharply in 2000 to only 0.3 %. However, that change was predominantly due to including in the extrapolation the one-off proceeds from auctioning the UMTS mobile phone licences. Disregarding this exceptional factor, the annual consolidation requirement would have declined less sharply vis-à-vis the previous year.

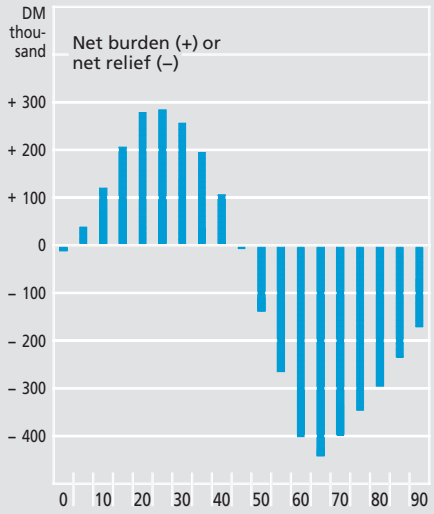
Cyclical and other temporary effects of major importance only in 2000

Cyclical and other temporary effects have had only a limited influence on public finance since 1996.[9] They had a strong impact solely in 2000, when they amounted to 2.4 % of GDP. Even so, the adjusted figures give a somewhat different picture over time than the unadjusted development. Instead of a fairly steady decrease, the adjusted path shows a steep fall in the annual consolidation requirement (by almost 1½ percentage points) in 1997, in the wake of very tight government spending, with moderate declines subsequently.

Annual consolidation requirement much smaller under policy scenario

A very different picture is obtained if the effects of measures which have already been agreed but have not yet (fully) entered into force are included in the calculations. In 1996 the annual consolidation requirement was already 0.9 percentage point lower under this policy scenario than under the adjusted status quo scenario. This was mainly due to the future lowering of pension payments in connection with early retirement announced in the Growth and Employment Promotion Act. The consequences of this change far outweigh the rising pension payments for women caused by the aforementioned cohort effect. In the following years the difference between the respective annual consolidation requirement under the two scenarios widened further, chiefly because of additional benefit curbs in the statutory pension insurance schemes due to come into effect at a later date. However, in 2000 the gap between the

Generational accounts* in 2000 (policy scenario)



* Average expected present value of the net payments to the state by a person of a given age during his/her remaining lifetime (taxes and social security contributions less government benefits).

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9 A non-cyclical temporary effect taken into account for 1999 was the one-off surplus of just under DM 9 billion required to top up the fluctuation reserves in the statutory pension insurance fund. For 2000 adjustments were made for the UMTS proceeds of around DM 100 billion and the cost of indemnification payments to wartime forced labourers (DM 4½ billion).

Development of the annual consolidation requirement under different scenarios

as % of respective GDP

Year	Status quo scenario [1]	Adjusted status quo scenario [2]	Policy scenario [3]	Difference vis-à-vis adjusted status quo scenario on account of policy changes	
				Excluding benefits side of the statutory pension insurance scheme	Benefits side of the statutory pension insurance scheme [3]
1996	6.1	6.0	5.1	– 0.3	– 0.6
1997	5.2	4.6	2.6	– 0.3	– 1.7
1998	4.4	4.1	2.4	0.0	– 1.7
1999	3.5	3.7	1.2	– 0.6	– 1.9
2000	0.3	2.7	2.1	1.3	– 1.8
2000 [4]	0.3	2.7	2.8	1.7	– 1.6

1 In 2000 including UMTS proceeds. — **2** Adjusted for cyclical influences and other temporary effects. — **3** Including cohort effects on pension payments to women. — **4** Policy scenario including key elements of the pension reform 2001 (reduction of pension adjustments due to the factoring in of notional contributions to and government promotion of supplementary private pension plans and the cancellation of the demographic factor).

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annual consolidation requirement under the policy scenario and the adjusted status quo scenario narrowed again.

Significant relief in 1997 from pension reform and tight budget management

Looking at the impact on the annual consolidation requirement since 1996 of measures which will have an impact only at a future date, relief amounting to 0.3 percentage point vis-à-vis the adjusted status quo scenario arose in 1997 from interventions outside the statutory pension insurance scheme. Tax relief, stemming mainly from the lowering of the solidarity surcharge from 7.5 % to 5.5 % on 1 January 1998, was more than offset by additional revenue from raising turnover tax by 1 percentage point on 1 April 1998 and by a future drop in expenditure following the coal subsidy compromise. [10] Of far greater importance were the economising measures in the pension insurance schemes, the scope of which was expanded significantly in the Pension Reform Act 1999 which was adopted at the end of 1997. The introduction of the demographic factor would on its own have cut the annual consolidation requirement by around 0.8 percentage point. In addition, the abolition from 2013 of the option of taking early retirement before 62 years of age led to a further improvement in the sustainability of public finance owing to non-actuarial deductions. Compared with 1996, the overall relief afforded by legislated measures taking effect in the future increased significantly. As under the adjusted status quo scenario, too, the annual consolidation requirement fell signifi-

10 The abolition of trade capital tax was not taken into account because it was counterfinanced by curbing the option to set up provisions.

cantly vis-à-vis 1996 owing to tight budget management, the annual consolidation requirement under the policy scenario decreased by 2 ½ percentage points.

Hardly any further consolidation in 1998

In 1998 enacted future measures (excluding benefit reductions in the statutory pension insurance scheme) taken into account in the policy scenario did not change the annual consolidation requirement on balance vis-à-vis the adjusted status quo scenario. At the end of that year measures were adopted which led to significant additional burdens on government. These comprised the increase in child benefit and the lowering of the bottom rate of income tax from the start of 1999 introduced in the 1999 Tax Relief Act and the decrease in the contribution rate to the statutory pension insurance scheme from 20.3 % to 19.5 % from 1 April 1999. However, these steps were offset by the fact that the rise in turnover tax in 1998 did not have a full impact in that year, so that the policy scenario for 1998 contains additional receipts compared with the status quo scenario. Further relief was provided by the future reductions in subsidies to the coal industry. The relief from measures taking effect in the future declined somewhat compared with 1997 also after including benefits payable under the statutory pension insurance funds. Consequently, only a slight improvement was recorded in the policy scenario vis-à-vis 1997, whereas the annual consolidation requirement under the adjusted status quo scenario fell by ½ percentage point.

Relief in 1999

In 1999 (including the political measures outside the statutory pension insurance scheme adopted up to the end of the year), the annual consolidation requirement narrowed by 0.6 percentage point vis-à-vis the adjusted status quo scenario. The main reasons for this were the graduated increase in mineral oil tax and the (new) electricity tax introduced with the ecological tax reform.[11] This was only partly offset by several cuts in levies (primarily introduced by the 1999/2000/2001 Tax Relief Act) and a further increase in child benefit at the beginning of 2000. In the statutory pension insurance scheme further cuts were adopted by limiting the increase in pension benefits in 2000 and 2001 to the inflation rate obtaining in the previous year. Compared with 1998 the measures due to come into effect in the future brought about significantly higher relief for government budgets. While the annual consolidation requirement under the adjusted status quo scenario decreased by 0.4 percentage point vis-à-vis 1998, there was a corresponding improvement under the policy scenario of 1.2 percentage points.

Deterioration of sustainability in 2000 due to the tax reform

In 2000 the political changes due to come into effect at a later date (excluding the curbing of benefits under the statutory pension insurance scheme) significantly worsened the sustainability of public finance vis-à-vis the adjusted status quo scenario. This was principally due to the extensive tax relief measures adopted under the tax reform. Thus the Tax Reduction Act – which comprised corporate tax reforms, the bringing forward of the third stage of the Tax Relief Act to 2001 and further income tax cuts in two stages up to

11 The corresponding decreases in the contribution rate to the statutory pension insurance scheme in future years are disregarded here.

Annual consolidation requirement according to different assumptions concerning economic development *

Increase in productivity in %	Discounting rate in %		
	3	4	5
	As % of respective GDP		
1.5	2.6	2.1	1.7
2.0	2.8	2.1	1.7
2.5	3.2	2.2	1.7

* Basis: policy scenario in 2000 excluding pension reform.

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2005 – alone will entail additional tax shortfalls of DM 63 billion in the final year. The reduction of the contribution rate to the statutory pension insurance scheme by 0.2 percentage point as of 1 January 2001 was of far less importance.[12] The impact of the measures on the benefits side of the statutory pension insurance scheme remained almost unchanged in comparison with the previous year. In total, the policy changes due to enter into force at a later time brought far less relief than in 1999. Although the annual consolidation requirement under the adjusted status quo scenario fell by 1 percentage point vis-à-vis 1999, it increased under the policy scenario from 1.2 % to 2.1% of GDP.

In themselves, the extensive tax cuts should improve the conditions for growth. At the same time, they constitute an ongoing burden for the sustainability of public finance because (at least until now) they are being only partly counterfinanced by corresponding savings in government expenditure.[13]

Causes of the sustainability gap

Using the results for 2000, it is possible to pinpoint the factors that are responsible for the consolidation requirement. Had there not been a cumulative gross public debt of DM 2.4 trillion at the end of 1999, the annual consolidation requirement under the policy scenario would have been only 0.7 % of GDP instead of 2.1%. The fiscal differences still existing between eastern and western Germany in 2000 likewise accounted for a significant part of the large adjustment requirement. If the convergence process in eastern Germany had already been completed by 2000, the consolidation requirement would have been only 1.2 % of GDP. However, demographic ageing had by far the greatest influence. If the age structure of the population could be kept constant, a significant surplus position would actually be achieved.

Sensitivity of results

The sensitivity of the results to changes in the underlying economic assumptions can also be illustrated by the policy scenario figures for 2000. In this connection the assumed period of time until the completion of the intra-German convergence process has the greatest weight (see box on page 40). The an-

12 Owing to the future effect of measures adopted in previous years, the Tax Relief Act 1999/2000/2002 continued to burden public budgets beyond 2000, whereas the further stages of the ecological tax reform and the coal subsidy compromise relieved government balances.
13 This reveals the aforementioned shortcomings of the concept, which does not take account of the "second-round effects" of adopted measures.

nual consolidation requirement varies by as much as 3.7 percentage points between the extremes of immediate convergence and no further convergence. As shown in the table on page 38, changes in the productivity growth rate and the discounting rate also have a noticeable influence on the results.

The pension reform 2001 in the light of generational accounting

Impact of the pension reform on sustainability

At the beginning of this year a pension reform was adopted the centrepiece of which is the complementation of the current pay-as-you-go system by a private, funded component.[14] How far the annual consolidation requirement at the end of 2000 has been changed on balance by this reform depends on many different measures in various areas which in some cases apply only at a later juncture or to specific cohorts (e. g. new rules governing disability pensions, greater offsetting of surviving dependants' pensions against other income or the change in the pension scheme after 2010). Solely the implications for pension adjustments of the notional contributions to supplementary private pension plans and the tax revenue shortfalls caused by government promotion measures are taken into account here.[15]

The savings expected from curbing the annual pension adjustment between 2003 and 2010 will reduce the annual consolidation requirement by 0.6 percentage point. However, this improvement in the long-term sustainability of public finance will be considerably dampened by the government promotion of supplementary private pension plans adopted with the Act Promoting Private Pension Plans. If the official estimates of the tax revenue shortfalls resulting from government grants or the tax deductibility of private pension contributions are extrapolated into the future, the consolidation requirement increases by around 0.4 percentage point.[16] On balance, therefore, the aforementioned measures improve the sustainability of public finance only marginally. If it is further taken into account that, in accordance with the legislation approved at the end of 2000, the demographic factor would have come into effect in 2002 but that this measure has been annulled, the annual consolidation requirement actually increases vis-à-vis the policy scenario excluding the components of the pension reform taken into account here.

Intergenerational redistribution in favour of younger cohorts

Using generational accounting, it is also possible to estimate the intergenerational redistribution effects of the introduction of supplementary private pension plans as part of the 2001 pension reform. These can be computed from the difference between the generational accounts of the individual age cohorts under the reference scenario (policy scenario in 2000 excluding the demographic factor) and the scenario taking account of the measures. The chart on page 41 shows that the curbing of

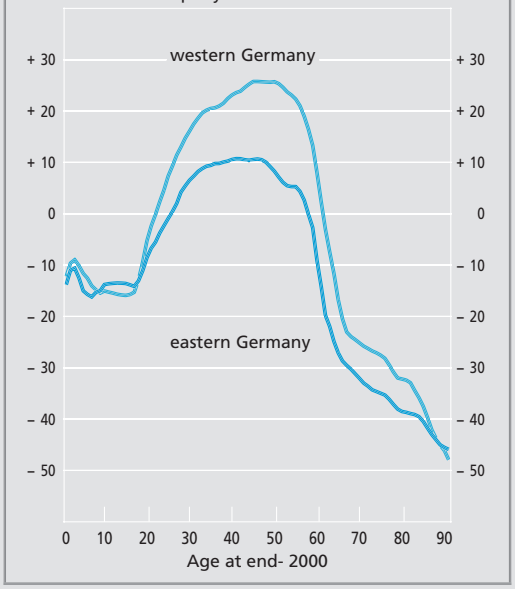
14 For the details of the reform see Sondergutachten des Sozialbeirats, Bundestag-Drucksache 14/5394.
15 The implications of various reforms concerning the statutory pension insurance scheme for the sustainability of public finance and intergenerational redistribution are presented in: C. Borgmann, P. Krimmer and B. Raffelhüschen (2001), Rentenreformen 1998–2001: Eine (vorläufige) Bestandsaufnahme, Perspektiven der Wirtschaftspolitik, 2, pages 319–334.
16 The (not very significant) additional revenue from the subsequent taxation of benefits paid out under private pension plans is disregarded.

The importance of the intra-German convergence process

In 2000 the respective economic conditions in eastern and western Germany still differed considerably. Average GDP per inhabitant in eastern Germany was barely two-thirds of the level in western Germany. At the same time the unemployment rate, at 17.4 %, was more than double the figure in the West. This economic gap is also reflected in individuals' financial relations with government because the smaller economic capacity in the East means lower tax payments and social security contributions, on the one hand, and higher government transfers, on the other. The age-specific net payments of east Germans in 2000 therefore differed markedly from those of west Germans (see chart).[1]

Age-specific net payments
in eastern and western Germany

DM thousand per year and inhabitant



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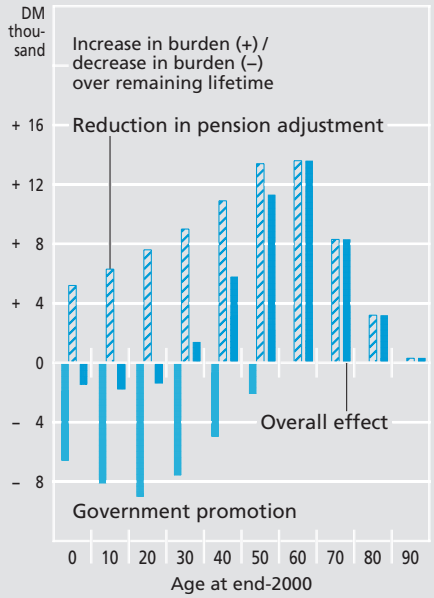
Although these net payments are still relatively similar in the case of children and young people, the net amount that individuals pay during their working life is noticeably lower in eastern Germany than in western Germany. This is chiefly due to the lower tax payments and social security contributions resulting from a lower per capita income level. Income tax payments have a particular impact in this connection because the progressive tax scale means that lower income earners pay disproportionately less income tax. Social security contributions vary less between eastern and western Germany because contributions are largely paid on a proportionate basis and also because the participation rate in the labour force of east German women is higher than that of their west German counterparts. Government transfers per person of working age are higher in eastern Germany than in western Germany owing to higher labour market-related transfers. After retirement, which on average begins around two years earlier for east Germans than for west Germans, government transfers per person and year are approximately equal in both regions. The reason why the net benefit for west Germans in these age brackets is somewhat lower is because they pay higher levies.

The assumed period of time required for the age-specific payment profiles in eastern Germany to match the west German level has a decisive influence on the results. In the basic variant, convergence is assumed by 2020. If the period of time assumed up to intra-German convergence were ten years longer (shorter), the annual consolidation requirement would increase (decrease) by around 0.4 percentage point. If no further convergence were to occur (which is very unlikely, however), the annual consolidation requirement would amount to no less than 4.9 % of GDP and be thus almost 3 percentage points higher than under the policy scenario based on convergence by 2020. The rising net tax payments of east Germans in the future projected under the assumed convergence scenario therefore make a significant contribution to financing the increase in expenditure brought about by demographic change.

1 The derivation of separate age-specific payment profiles for eastern and western Germany can only be approximated because the national accounts do not show a regional breakdown of the overall German government balance.

pension adjustments by deducting the notional contributions to supplementary private pension plans particularly disadvantages the age cohorts who are already retired or who will retire shortly. The additional burden on people aged 60 totals approximately DM 13,000 over their remaining lifetime. By contrast, the burden to be borne by younger cohorts is far smaller owing to the greater discounting. Government promotion of supplementary private pension plans will particularly benefit those cohorts who are at the start of their working life and who can therefore claim this promotion over a longer period of time. Thus persons aged 20 will make a net gain of around DM 9,000. This benefit accruing from the government promotion measures then declines with the remaining duration until retirement. The combined effect of smaller pension adjustments and government promotion of supplementary private pension plans places a substantial burden on existing pensioners and pre-retirees, whereas the burden on younger cohorts is actually alleviated slightly. Thus the pension reform will contribute towards a more even intergenerational redistribution of the demographic burdens.

Intergenerational redistribution effects of the introduction of supplementary private pension plans



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Conclusion

Owing to its forward-looking perspective, generational accounting is a better tool than traditional fiscal indicators for analysing the long-term sustainability of public sector budgets. In addition, it can provide pointers to the intergenerational redistribution effects of political measures. However, its conceptual limitations also need to be borne in mind when interpreting the results. In particular, the outcome must not be misinterpreted as a forecast but rather should be understood as an indicator of the orientation of fiscal policy in the base year. Furthermore, the results are dependent on the underlying assumptions concerning the economic and demographic conditions. This applies especially to the absolute level of the annual consolidation requirement but less to its change from year to year. Finally, it should be remembered that the limited data base – particularly regarding the implications of measures adopted in the future – necessitates the extensive use of estimations. Hence the results are subject to considerable uncertainty.

Despite these limitations, the results show that in 2000 Germany was still a long way from achieving a sustainable public finance

position. Of course, it needs to be borne in mind that the possible positive consequences of the tax reform on macroeconomic growth have not been taken into consideration and that the annual consolidation requirement does not have to be covered exclusively by political measures but, rather, a contribution may also be made by other factors such as a rising participation rate. Nevertheless, the results clearly show that at present there is no scope for deficit-raising additional tax cuts or improved benefits. In its recently published new Stability Programme, the German Federal Government in principle reaffirmed the objective of eliminating the general government fiscal deficit by 2004, despite the revenue losses ensuing from the tax reform. If this can be accomplished, Germany will move appreciably closer to the goal of a sustainable public finance position.

Annex

Calculating the sustainability gap

Under the intertemporal budget constraint on the state, government net debt ND has to be financed by future net payments from individuals to the state, as recorded in the generational accounts. If the present value of all generational accounts does not suffice to meet this budget constraint (given a continuation of the current fiscal conditions), the present value of the required additional revenue or reduced expenditure is indicated by the sustainability gap TF. If the sum of the generational accounts is subdivided into the contributions made by the generations now living, those born in the future and future immigrants, the intertemporal budget constraint may be represented as follows – taking into account the size of the respective cohorts:[17]

$$ND_t = \sum_{k=t-D}^{t} N_{t,k} + \sum_{y=t}^{\infty} \sum_{k=y-D}^{y} M_{y,k}\, GK^{M}_{y,k}\, (1+r)^{t-y} + \sum_{k=t+1}^{\infty} N_{k,k}\, (1+r)^{t-k} + TF_t$$

with

$$N_{t,k} = P_{t,k} * GK_{t,k}$$

The generational accounts reflect the average expected present value of net payments to the state by a person of a given age during his/her remaining lifetime. In order to compute them, the age-specific per capita amounts of the individual levy and transfer types z ascertained for the base year are extrapolated into the future by means of the assumed productivity growth rate g and are related to the base year using the discounting rate r. The likelihood $S_{s,k}$, that a person born in k and living in Germany in t will survive until period s also needs to be factored into the equation.

$$GK_{t,k} = \sum_{s=t}^{k+D} \sum_{z} h_{s-k,z,s} * S_{s,k}\, (1+r)^{t-s}$$

with:

$$h_{a,z,s} = h_{a,z,t}\, (1+g)^{s-t} \qquad a = 0,\ldots, D;\ s > t.$$

Relating the sustainability gap calculated in this way to the present value of future GDP gives the annual consolidation requirement (expressed as a percentage of respective GDP).

17 For simplicity, the population is not differentiated according to gender, region and nationality etc.

$$= \frac{TF_t}{\sum_{s=t+1}^{\infty} BIP_s \, (1 + r)^{t-s}}$$

Explanation of the symbols used:

- α Annual consolidation requirement (as % of GDP)
- a Index of a person's age
- D Highest age considered
- ND_t Government net debt at beginning of year t
- g Annual growth rate of productivity
- $GK_{t,k}$ Present value in t of all current and future net tax payments (generational account) of a person born in k
- $h_{a,z,s}$ Real amount of payment type z (tax: +; transfer –) of a person aged a in year s
- k Year of birth
- $M_{y,k}$ Number of immigrants born in k and settling in Germany in y
- $N_{t,k}$ Total burden (at present value in t) on the generation born in k
- $P_{t,k}$ Number of members of the generation born in k still living in year t
- r Discounting rate
- $S_{s,k}$ Likelihood that a person born in k and living in Germany survives until period s
- t Base year of study
- TF_t Sustainability gap in year t
- z Index of the payment types taken into account