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Willi Leibfritz\*

# Generational Accounting: an International Comparison

*With rapidly rising government debt and ageing populations implying high contingent liabilities in public pension systems, the issue of longer-term fiscal developments is gaining importance. The question arises whether, and to what extent, future generations will be burdened by current policies. Generational accounting is a new approach to examining such issues and it is used more and more in the policy debate.<sup>1</sup>*

In contrast to the usual current budget indicators, generational accounting is a long-term forward-looking approach which takes into account the net present value of, for example, future public pension obligations. Furthermore generational accounting indicates that policy measures which have only marginal, or even zero, effect on current deficit positions may have significant effects on inter-generational equity. For example, an immediate and permanent increase in pension benefits financed by an increase in social security contributions does not affect the deficit although older living generations gain from this measure while younger and future generations lose.

This article compares results for five countries for which such accounts are available on a comparable basis, namely the United States, Germany, Italy, Sweden and Norway. It first describes the methodological framework, then presents the results, discusses the meaningfulness of generational accounts as compared to other approaches and finally draws the conclusions.

## The Methodological Framework

"Generational accounts indicate, in present value, what the typical member of each generation can expect to pay, now and in the future, in net taxes (taxes paid net of transfer payments received). Generational accounting indicates not only what existing generations will pay, but also what future generations must pay, given current policy and the government's intertemporal budget constraint. This constraint requires that those government bills not

paid by current generations must ultimately be paid by future generations."<sup>2</sup> As the intertemporal budget constraint is expressed in present value terms the current level of debt may still remain positive and rise, but its rate of increase must be lower than the discount rate so that its present value approaches zero.

The comparison of generational accounts between the various generations (i.e. annual birth cohorts) indicates the effect of current policies on different generations. Generational accounting can also be used as a tool to measure the effects of alternative policies on different generations. If current policies are "present-oriented", i.e. have a bias against future generations, this analytical framework may help to follow a more generationally-balanced approach.

The inter-temporal budget constraint implies that the government's current net wealth plus all future taxes paid to the government minus all future transfers paid by the government (future net taxes) must cover all future government spending on goods and services.<sup>3</sup> The sum of future net taxes is split into an amount paid by all existing generations (annual cohorts of the current population) from the base year onwards to the end of their lives and the remaining

<sup>1</sup> See, for example, A. J. Auerbach, J. Gokhale and L. J. Kotlikoff: Generational accounts – a meaningful alternative to deficit accounting, NBER Working Paper, No. 3589, 1991; J. Gokhale, B. Raffenhüschen and J. Walliser: The burden of German unification: a generational accounting approach, Federal Reserve Bank of Cleveland Working Paper, No. 9412, 1994; D. Franco, J. Gokhale, L. Guiso, L. J. Kotlikoff and N. Sartor: Generational accounting: the case of Italy, Banca d'Italia, Temi di discussione, No. 171, 1992; Office of Management and Budget: Budget of the United States Government: analytical perspectives, fiscal year 1995, U. S. Government Printing Office, Washington, D. C. 1994.

<sup>2</sup> A. J. Auerbach, J. Gokhale and L. J. Kotlikoff: Generational accounts – a meaningful alternative to deficit accounting, in: The Journal of Economic Perspectives, Volume 8, No. 1, Winter 1994.

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amount which has to be paid by all future generations during their lives. Hence:

|   |   |   |
|---|---|---|
| Present value<br>of all future<br>government<br>consumption | = | Stock of current<br>government<br>net wealth                                    |
|   | + | present value of<br>all future net tax<br>payments of all<br>living generations |
|   | + | present value of<br>all net tax payments<br>of all future generations           |

or in algebraic form:

$$\sum_{s=t}^{\infty} G_s(1+r)^{t-s} = W_t^G + \sum_{s=0}^D N_{t,t-s} + \sum_{s=l}^{\infty} N_{t,t+s}$$

Where:

$$N_{t,k} = \sum_{s=\max(t,k)}^{k+D} T_{s,k} P_{s,k} (1+r)^{t-s}$$

$G_s$  = government consumption in period  $s$   
 $W_t^G$  = government net wealth in the base year  $t$   
 (minus in the case of net debt)  
 $N_{t,k}$  = present value in the base year  $t$  of all  
 future net tax payments of the generation  
 born in year  $k$   
 $T_{s,k}$  = average per capita net tax payments in  
 year  $s$  of the cohort born in year  $k$   
 $P_{s,k}$  = number of surviving members in year  $s$   
 of the cohort born in year  $k$   
 $r$  = real interest rate.

The term on the left-hand side of the equation is the discounted sum of government spending on goods and services for every future period  $s$ , starting in the base year  $t$ . The right-hand side describes the three ways of financing such spending: government's net wealth in the base year, the present value of future net tax payments of all generations alive in the base year ( $N_{t,t-s}$ , where  $D$  denotes their maximum age) and the sum of the present value of net tax payments by generations born after the base year ( $N_{t,t+s}$ ). If net wealth is negative, i.e. if the government is in a net debt position, all future net tax payments must be equal to current net debt plus all future government consumption. The inter-temporal budget constraint

implies that if government consumption increases without a corresponding increase in net taxes of existing generations (or if net taxes of existing generations are reduced without a corresponding reduction in government consumption) net taxes of future generations have to increase in order to keep the government budget on a sustainable path.

In order to calculate such accounts for the annual cohorts of the population, the different effects of government receipts and outlays on different age-groups have to be taken into account. For example, labour income taxes and social security contributions are paid during working years and pensions are received during retirement. Generational accounting models attempt to consider all age-specific differences in households' tax payments (labour income taxes, capital income taxes, social security contributions, indirect taxes) and transfer receipts (pensions, welfare) or other government spending (health, education). For all other government revenues and spending (for example, defence) uniform effects on age-groups are assumed. While in principle the method is straightforward, in practice numerous simplifying assumptions have to be made. In particular, the age-specific distribution of tax payments and government spending is often difficult to estimate in practice. Sometimes only taxes and current transfers are allocated by age (and sex) but none of government purchases. As it is also difficult to assess the real value of non-marketable government assets, the wealth variable is generally proxied by net government financial assets (or if negative net debt).

As the remaining lifetime net tax payments ( $N_{t,k}$ ) of living generations depend on the current age of the generation (annual birth cohort) they cannot be directly compared among living generations and with future generations. There are two possibilities to overcome this problem, namely to measure, for all living generations, full lifetime net tax payments by including retrospective calculations of net tax payments, although this could be quite difficult empirically.<sup>4</sup> Second, to compare future net tax

<sup>3</sup> The methodology is described in detail in A. J. Auerbach, J. Gokhale and L. J. Kotlikoff: Generational accounts – a meaningful alternative to deficit accounting, NBER Working Paper, No. 3589, 1991 and in A. J. Auerbach, J. Gokhale and L. J. Kotlikoff: Generational accounts – a meaningful alternative to deficit accounting, in: The Journal of Economic Perspectives,, Volume 8, No. 1, Winter 1994.

<sup>4</sup> A. J. Auerbach, J. Gokhale and L. J. Kotlikoff: Generational accounts – a meaningful alternative to deficit accounting, in: The Journal of Economic Perspectives, Volume 8, No. 1, Winter 1994, present such a retrospective calculation for the United States.

payments only between the current new-born generation and the future generations as both reflect full lifetime net payments. This second approach is adopted here.

### International Comparison

This international comparison of generational accounts is based on the latest calculations for countries where such models have been constructed. In the context of an OECD study on the effects of ageing populations on government budgets,<sup>5</sup> calculations of generational accounts were carried out by J. Gokhale, L. J. Kotlikoff and Walliser (for the United States and Germany), N. Sartor (for Italy), C. John (for Sweden) and C. Gjersem (for Norway). Apart from already legislated policy measures, it is assumed that no further measures are taken.

Generational accounts (net tax payments) have a significant life-cycle pattern (see Table 1). While younger generations make positive net payments to the government over their remaining lifetimes, older generations receive net benefits. Present values of future net tax payments are higher for younger generations because the bulk of social benefits

(pensions and health care) are received when people are older. This means that today's 20 year olds, for example, will receive more or less the same future benefits as today's 40 year olds, but have 20 more years of paying taxes to take into account than the older generations. There are also significant differences in net payments estimated for existing generations across countries. For example, in Germany a 20-year old male is expected to pay the equivalent of about \$ 375 000 in present value terms over his remaining lifetime, compared with about \$ 260 000 in Sweden, about \$ 220 000 in the United States, about \$ 195 000 in Italy and less than \$ 180 000 in Norway. These differences reflect mainly the levels of spending on goods and services in different countries rather than differences in the overall size of the government sector, as high tax payments may be accompanied by high transfer receipts.

As mentioned above, these generational accounts do not include any past net tax payments and are entirely forward-looking. For existing generations, they do not represent net payments over the course of their lifetime, but only over their remaining years. However, full lifetime net payments can be calculated for the generation just born, and this "new-born" generation can be taken to represent the existing generations and meaningfully compared with future generations. Generational accounts are considered to be "balanced" if both the newborn generation and the (average) future generation have to pay similar per capita net taxes over their whole lives (in present value terms and adjusted for growth). In that case, the net tax ratio relative to lifetime income would remain constant over time.<sup>6</sup>

The model calculations indicate generational imbalances in favour of someone born today, at the expense of future generations, in all five countries considered.<sup>7</sup> But the size of the imbalance differs

**Table 1**  
**International Comparison of Generational Accounts**

(Present values of future net tax payments per capita (males))  
(in thousands of dollars)<sup>1</sup>

| Generation's age in 1993 | United States | Germany | Italy  | Norway | Sweden |
|--------------------------|---------------|---------|--------|--------|--------|
| 0                        | 121.1         | 197.4   | 64.9   | 110.2  | 155.9  |
| 5                        | 141.3         | 233.2   | 79.9   | 127.6  | 179.2  |
| 10                       | 164.3         | 274.2   | 109.1  | 145.2  | 204.6  |
| 15                       | 192.4         | 333.8   | 155.8  | 165.3  | 231.4  |
| 20                       | 218.3         | 374.3   | 195.9  | 176.7  | 259.3  |
| 25                       | 224.4         | 369.0   | 204.7  | 185.5  | 268.6  |
| 30                       | 214.7         | 333.6   | 186.9  | 179.4  | 277.7  |
| 35                       | 196.6         | 279.4   | 145.1  | 159.5  | 266.5  |
| 40                       | 168.1         | 202.7   | 88.3   | 133.9  | 252.6  |
| 45                       | 126.1         | 135.3   | 33.9   | 99.8   | 211.5  |
| 50                       | 72.1          | 26.7    | -31.2  | 55.4   | 161.0  |
| 55                       | 8.9           | -73.7   | -97.2  | 11.5   | 98.5   |
| 60                       | -58.4         | -150.5  | -148.1 | -29.2  | 20.9   |
| 65                       | -108.0        | -163.4  | -144.0 | -56.8  | -5.7   |
| 70                       | -111.9        | -132.4  | -131.4 | -57.9  | -38.7  |
| 75                       | -104.4        | -100.0  | -169.5 | -57.6  | -36.2  |
| 80                       | -89.4         | -67.8   | -115.0 | -43.4  | -29.3  |
| 85                       | -78.4         | -39.3   | -60.9  | -32.4  | -20.9  |
| 90                       | -60.4         | 1.6     | -8.5   | -23.1  | -3.8   |
| Future generations       | 242.7         | 250.4   | 354.4  | 170.9  | 204.2  |
| Percentage difference    | 100.4         | 26.8    | 446.1  | 52.7   | 31.0   |

<sup>1</sup> In constant prices, adjusted for income growth.

Note: Assumed real income growth (g) = 1.5 per cent; discount rate (r) = 5 per cent.

<sup>5</sup> See W. Leibfritz, D. Roseveare, D. Fore, E. Wurzel: Ageing populations, pensions systems and government budgets: how do they affect saving?, OECD Economics Department Working Paper, No. 156, 1995.

<sup>6</sup> While in Table 1 and Table 2, the lifetime net tax burden is expressed in present values and adjusted for growth it can also be expressed as a percent of lifetime income. See, for example, A. J. Auerbach, J. Gokhale, L. J. Kotlikoff: Restoring general balance in US fiscal policy: what will it take?, in: Economic Review, Volume 31, No. 1, Federal Reserve Bank of Cleveland, 1995.

<sup>7</sup> Generational accounts have been calculated separately for men and women to take account of factors such as participation rates, life expectancies, earnings and transfers, which can differ significantly between men and women. As females have generally lower participation rates and lower income as compared to men, their generational accounts (net tax payments) are lower although generational imbalances are similar.

# FISCAL POLICIES

**Table 2**  
**Generational Accounts**  
(in thousands of dollars)<sup>1</sup>

| Productivity growth (per cent)      | 1   |     |      | 1½  |     |     | 2    |     |     |
|-------------------------------------|-----|-----|------|-----|-----|-----|------|-----|-----|
| Discount rate (per cent)            | 3   | 5   | 7    | 3   | 5   | 7   | 3    | 5   | 7   |
| <b>United States</b>                |     |     |      |     |     |     |      |     |     |
| <b>Males</b>                        |     |     |      |     |     |     |      |     |     |
| Present generation <sup>2</sup>     | 191 | 105 | 58   | 217 | 121 | 66  | 245  | 139 | 76  |
| Future generations                  | 384 | 226 | 151  | 422 | 243 | 157 | 468  | 262 | 164 |
| Generational imbalance <sup>3</sup> | 102 | 115 | 161  | 95  | 100 | 137 | 91   | 89  | 117 |
| <b>Females</b>                      |     |     |      |     |     |     |      |     |     |
| Present generation                  | 92  | 64  | 39   | 95  | 72  | 43  | 92   | 79  | 49  |
| Future generations                  | 186 | 138 | 101  | 185 | 143 | 103 | 177  | 149 | 106 |
| Generational imbalance              | 102 | 115 | 161  | 95  | 100 | 137 | 91   | 89  | 117 |
| <b>Germany</b>                      |     |     |      |     |     |     |      |     |     |
| <b>Males</b>                        |     |     |      |     |     |     |      |     |     |
| Present generation                  | 311 | 168 | 91   | 362 | 197 | 107 | 419  | 231 | 126 |
| Future generations                  | 390 | 211 | 103  | 446 | 250 | 126 | 505  | 293 | 152 |
| Generational imbalance              | 25  | 26  | 13   | 23  | 27  | 18  | 20   | 27  | 22  |
| <b>Females</b>                      |     |     |      |     |     |     |      |     |     |
| Present generation                  | 133 | 78  | 44   | 150 | 90  | 51  | 166  | 104 | 60  |
| Future generations                  | 166 | 98  | 50   | 185 | 114 | 60  | 200  | 131 | 72  |
| Generational imbalance              | 26  | 26  | 13   | 23  | 27  | 18  | 20   | 27  | 22  |
| <b>Italy (Case A)<sup>4</sup></b>   |     |     |      |     |     |     |      |     |     |
| <b>Males</b>                        |     |     |      |     |     |     |      |     |     |
| Present generation                  | 102 | 54  | 22   | 114 | 65  | 29  | 122  | 77  | 36  |
| Future generations                  | 433 | 340 | 316  | 465 | 354 | 306 | 508  | 374 | 306 |
| Generational imbalance              | 326 | 533 | 1336 | 310 | 446 | 970 | 315  | 385 | 741 |
| <b>Females</b>                      |     |     |      |     |     |     |      |     |     |
| Present generation                  | 19  | 14  | 2    | 12  | 17  | 5   | -1   | 19  | 8   |
| Future generations                  | 79  | 88  | 26   | 51  | 93  | 50  | -5   | 94  | 65  |
| Generational imbalance              | 327 | 532 | 1333 | 310 | 446 | 976 | -325 | 385 | 737 |
| <b>Italy (Case B)<sup>5</sup></b>   |     |     |      |     |     |     |      |     |     |
| <b>Males</b>                        |     |     |      |     |     |     |      |     |     |
| Present generation                  | 122 | 59  | 24   | 144 | 72  | 31  | 166  | 88  | 39  |
| Future generations                  | 258 | 206 | 192  | 273 | 213 | 185 | 290  | 224 | 185 |
| Generational imbalance              | 111 | 249 | 709  | 90  | 195 | 500 | 74   | 155 | 369 |
| <b>Females</b>                      |     |     |      |     |     |     |      |     |     |
| Present generation                  | 37  | 19  | 3    | 40  | 24  | 7   | 39   | 29  | 10  |
| Future generations                  | 79  | 65  | 27   | 76  | 70  | 40  | 68   | 74  | 49  |
| Generational imbalance              | 111 | 248 | 703  | 92  | 195 | 499 | 74   | 155 | 368 |
| <b>Norway</b>                       |     |     |      |     |     |     |      |     |     |
| <b>Males</b>                        |     |     |      |     |     |     |      |     |     |
| Present generation                  | 181 | 97  | 54   | 207 | 110 | 61  | 235  | 126 | 69  |
| Future generations                  | 299 | 130 | 48   | 376 | 171 | 72  | 466  | 216 | 98  |
| Generational imbalance              | 64  | 34  | -13  | 79  | 53  | 16  | 94   | 68  | 39  |
| <b>Females</b>                      |     |     |      |     |     |     |      |     |     |
| Present generation                  | 42  | 35  | 25   | 38  | 37  | 26  | 28   | 38  | 26  |
| Future generations                  | 70  | 47  | 22   | 69  | 57  | 31  | 55   | 65  | 40  |
| Generational imbalance              | 66  | 35  | -12  | 82  | 55  | 17  | 98   | 72  | 53  |
| <b>Sweden</b>                       |     |     |      |     |     |     |      |     |     |
| <b>Males</b>                        |     |     |      |     |     |     |      |     |     |
| Present generation                  | 272 | 136 | 75   | 317 | 156 | 84  | 371  | 180 | 95  |
| Future generations                  | 333 | 185 | 116  | 372 | 204 | 123 | 414  | 277 | 132 |
| Generational imbalance              | 23  | 36  | 56   | 18  | 31  | 47  | 12   | 26  | 40  |
| <b>Females</b>                      |     |     |      |     |     |     |      |     |     |
| Present generation                  | 134 | 72  | 42   | 153 | 81  | 47  | 175  | 92  | 52  |
| Future generations                  | 165 | 98  | 66   | 180 | 107 | 69  | 196  | 116 | 73  |
| Generational imbalance              | 23  | 36  | 56   | 18  | 31  | 47  | 12   | 26  | 40  |

<sup>1</sup> In constant prices, adjusted for income growth, converted to US dollars using 1993 nominal exchange rates.

<sup>2</sup> Newborns in base year.

<sup>3</sup> Generational imbalance is calculated as the difference between life-time net payments for someone of the present generation and future generations (growth adjusted and in present value terms), expressed as a percentage of the net payments of the present generation. Generational imbalance in favour of the present generation is positive, generational balance corresponds to 0 and generational imbalance in favour of future generations would be negative.

<sup>4</sup> Case A: population projection by the World Bank which assumes a return of the fertility rate to replacement rate by 2030.

<sup>5</sup> Case B: more rapid return of fertility rate to replacement rate (by 2010) so that population falls less than in Case A.

considerably between the countries (Table 2). For example, assuming a discount rate of 5 per cent and income (or productivity) growth of 1.5 per cent, future generations in Italy would have to pay net taxes more than 400 per cent larger than the newborn generation (which clearly illustrates that the fiscal situation in Italy is not sustainable). In the United States and Norway, future generations would have to pay 100 per cent and about 50 per cent higher net taxes, respectively, than today's newborn generation, while in Germany and Sweden the imbalance is smaller, although with unchanged policies, their future generations would also have to bear an increase in the net tax burden of about 25 per cent and 30 per cent, respectively.

The results are sensitive to assumptions about productivity growth and the discount rate; for a given discount rate, an increase in productivity growth increases the absolute (growth-adjusted) amounts of net tax payments for both the existing and the future generations and for a given productivity growth, an increase in the discount rate reduces these amounts. The calculations use three different discount rate assumptions: 3 per cent, 5 per cent and 7 per cent. This range encompasses differing interpretations of the appropriate choice of discount rate and allows for sensitivity analysis of the discount rate assumption,<sup>8</sup> but for most of the discount rate/productivity growth combinations assumed here, the results show a significant generational imbalance against future generations.

The results are also sensitive to the assumptions about demographics as is illustrated for Italy. If the Italian fertility rate were to recover to the replacement rate over the next decade instead of by 2030 as

assumed in the World Bank's projection, the generational imbalance would be considerably smaller, although still relatively large. In most of the countries considered, future demographic changes are the major source of generational imbalances, as shown in Table 3. Generational imbalances would be much lower in all countries in the absence of demographic changes, and in Germany, imbalance would be reversed, in favour of future generations. Another source for generational imbalances is the cost of servicing of government debt, accumulated by past and present generations. This factor is particularly important in the case of Italy. As public debt levels are already high, if demographic factors turn out to be similar to the projections which underline the base case, generational imbalances can only be redressed by changes in policies that result in a strong improvement in fiscal positions. Cutting pension benefits, increasing social security contributions or more general spending cuts or tax increases would help to reduce generational imbalances. For example, the balance between newborns and future generations could be restored in full by immediate and permanent across-the-board public spending cuts that amounted to about 12 per cent of GDP in Italy, about 4 to 5 per cent of GDP in the United States, about 3 per cent in Norway, about 2 per cent in Sweden, and 1½ to 2 per cent of GDP in Germany.

### Comparison with Traditional Fiscal Accounting

The traditional fiscal accounting approach (based on annual budgeting, financial balances and outstanding government debt) has been criticised by generational accounting proponents for failing to properly measure the impacts of government budget decisions on private individuals and on the economy as a whole and producing arbitrary results that reflect accounting labels rather than economic relationships.

**Table 3**  
**Understanding the Source of Generational Imbalances**

**Generational imbalance of males**  
(in percent of net payments of the present generation)

|                            | Base case | No demographic change <sup>1</sup> | Zero debt |
|----------------------------|-----------|------------------------------------|-----------|
| United States              | 100       | 47                                 | 82        |
| Germany                    | 27        | -45                                | 2         |
| Italy (CaseA) <sup>2</sup> | 446       | 62                                 | 238       |
| (CaseB) <sup>3</sup>       | 195       | 62                                 | 64        |
| Norway                     | 53        | 8                                  | 66        |
| Sweden                     | 31        | 12                                 | 27        |

<sup>1</sup> The number of persons in each age-group is kept constant.

<sup>2</sup> Case A: population projection by the World Bank which assumes a return of the fertility rate to replacement rate by 2030.

<sup>3</sup> Case B: more rapid return of fertility rate to replacement rate (over the next decade) so that population falls less than in Case A.

Note: Assumed real income growth is 1.5 per cent; discount rate is 5 per cent.

<sup>8</sup> There are differing views about how to choose an appropriate discount rate for this analysis and there is a wide range of rates used in previous studies (from 2 1/2 per cent to 10 per cent). One option would be to use the real interest rate of government bonds, since this rate reflects the standard way of evaluating the tradeoff between taxation in two different periods and recording it in the government's balance-sheet. In effect, future deficits should be discounted by the cost of additional debt servicing and similarly future net tax payments should be discounted by the savings in debt servicing costs (through repayment of outstanding debt). However, to the extent that there are uncertainties and risks of future fiscal flows which are not covered by the government bond rate, the discount rate should be higher to account for such risks. An alternative option would be to use a discount rate based on the average real rate of return that could be earned by a private investor. But if the higher real return on capital reflects in part its particularly high volatility or risk, it may be inappropriate to discount these flows using such a high rate. A third option is to use the sum of the pure rate of time preference and per capita long-term growth adjusted for risk aversion. However, this value is not observable and must therefore be set by assumption.

There are, in fact, a number of differences which make a direct comparison between both approaches difficult but there are also some similarities.

### Purpose

Generational accounting attempts to measure net tax burdens of different generations while traditional budget accounting focuses on the overall flow of net resources to the government and financing questions: the annual net lending and debt position of the government. While generational accounts measure prospective net tax burdens during the remaining lifetimes of individuals, tax burdens measured within the traditional accounting framework generally refers to current (or expected) annual tax payments. Both generational accounting calculations and long-term fiscal projections, based on the traditional accounting framework may be applied to examine effects of demographic changes on government finances. However, both approaches depend on a number of assumptions about future economic and demographic developments which, by their very nature, are highly uncertain and this uncertainty increases with the time horizon.<sup>9</sup> Given these uncertainties and the likelihood of future policy changes both the calculations of generational accounts and of long-term fiscal projections of traditionally measured government deficits should be interpreted as illustrations of hypothetical long-term effects of current policies rather than as predictions of what might actually happen.

Generational accounting measures prospective net tax payments (in present values and adjusted for income growth) which affect current spending decisions of individuals under the assumptions of rational expectations with full foresight and no liquidity constraints (perfect capital markets). Under these circumstances only the present values of future net tax payments matter while the flow and timing of

tax payments does not. Individuals adjust their spending and saving in line with their expectations about the course of fiscal policy over their remaining lifetime, but it is assumed that current generations do not respond to the prospect of a tax increase for future generations by increasing their saving and bequests, i.e. that their behaviour is non-altruistic. By contrast current budget positions – annual deficits or annual net tax burdens as measured by the traditional accounting framework – may affect current private spending decisions if rationality and foresight are imperfect and if individuals are liquidity constrained, so that the timing of government deficits and of tax burdens matter. Net tax burdens measured by generational accounting as well as the traditional measures of the tax burden, however, take a simplistic view on tax incidence as those individuals upon whom taxes are levied are assumed to bear the ultimate burden; any shifting of taxes (i.e. to wages or prices) is excluded.

### Treatment of Government Activities

The "budget" as defined by the generational accounting framework (see the formula above) does not include government capital spending (government investment plus net capital transfer payments) nor does it include any benefits from the stock of public fixed or human capital (such as roads, education, public health facilities etc.). Hence, any gaps between costs and benefits of this spending which may affect generations are not considered in generational accounts as they are currently measured. On the

<sup>9</sup> Generational accounting calculations are extended over the very long-term future (generally about 200 years) in order to cover the full lifetimes of all the living and a number of future generations (annual birth cohorts). The „unchanged policy“ assumption is applied during the lifetime of all living generations and a change of policy to restore sustainability is applied during the lifetime of future generations. The time horizon of long-term fiscal projections which are also carried out under the „unchanged policy“ assumption in particular to examine the fiscal effects of ageing populations, is generally much shorter.

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other hand the traditional deficit measure includes fiscal costs of such spending as well as any subsequent direct and indirect effects on government revenues but does not consider intangible benefits; furthermore, government gross and net debt generally are only partial indicators of the government's overall balance sheet position.

### Fiscal Sustainability

The generational accounting approach treats fiscal policy as unsustainable if the tax burden rises significantly for future generations relative to new-borns, while the traditional approach treats a rapidly rising debt-GDP ratio (or a large required improvement in the primary balance to stabilise the debt-GDP ratio) as an indicator of an unsustainable current policy stance. The intertemporal budget constraint which underpins generational accounting postulates that the present value of government debt must approach zero in the very long run. A constant debt-GDP ratio each year could satisfy this intertemporal budget constraint of the generational accounting framework (because the future is discounted) and even a slightly rising debt-GDP ratio may be consistent with this constraint (if the discount rate is larger than the rate of growth of government debt). These sustainability requirements are somewhat weaker than the traditional approach. In the models of generational accounting presented here, it is assumed that the burden of restoring sustainability falls entirely on future generations: living generations are not bound by the intertemporal budget constraint and can choose any fiscal policy they want over their whole lifetime even if it is not sustainable after they have gone. In contrast, sustainability analysis based on the traditional year-by-year budgeting approach (projected forward in medium or longer term fiscal scenarios) can take account of debt dynamics, potential financing difficulties and provide a framework for examining different time paths for restoring sustainable positions. The latter approach better reflects policy concerns that unsustainable policies for any length of time may be very costly and a policy adjustment may be necessary within a time frame much shorter than a full lifetime. The effects of any consolidation measures

on individual living generations (and on future generations) can however be examined using the generational accounting framework, while such analysis is not possible with the traditional approach.

The calculations of generational accounts as presented here indicate that current fiscal policies are "present-oriented" as they benefit current generations while future generations have to bear higher burdens and in some cases current policies are clearly unsustainable since the imbalances are extremely high (in particular in Italy and in the United States). In fact, for the United States, Germany and Italy, where long-term fiscal scenarios are also available, present policy settings are judged unsustainable by both approaches. With the assumption of unchanged policies (as compared to legislated policies) debt-GDP ratios were projected to increase rapidly between 2000 and 2030 in most of the major OECD countries and this analysis confirms the above findings that future budgetary pressures stemming from ageing may be larger in Italy than for example in Germany where they may still be significant despite recent pension reforms.<sup>10</sup>

### Conclusion

Generational accounting helps to illustrate more clearly the longer-term implications of current fiscal policies. It can also be used to measure the effects of alternative policies on different (living and future) birth cohorts of the population so that it improves the basis for a discussion about the appropriate "burden sharing" of fiscal consolidation measures between the "young" and the "old". But this approach has various shortcomings which largely result from its long-term time horizon and the assumption that living generations face no budget constraint, while future generations have to carry the full burden of restoring balance. It should therefore not be seen as a substitute for the traditional fiscal accounting framework (as annual deficits and debt levels or longer-term scenarios of these indicators) but rather as a supplement that illustrates the generational aspects of policies under given assumptions.

Nevertheless, the results of both generational accounting analysis and long-term scenarios of government deficits and debt point to the need for more fiscal consolidation and for adjusting government budgets to the prospects of ageing populations. Generational accounting can play an important role in making these longer-term fiscal problems more transparent and to identify policies which could restore generational equity.

<sup>10</sup> See W. Leibfritz, D. Roseveare, D. Fore, E. Wurzel, *op. cit.* There, a rapid deterioration of fiscal positions caused by ageing populations was found for Japan, Italy, Germany, France and the United States while for the United Kingdom and for Canada, projections did not point to longer term sustainability problems. See also a similar scenario for the United States, in: A. J. Auerbach: The US fiscal problem: where we are, how we got here and where we're going, NBER Working Paper, No. 4709, 1994.