GENERATIONAL ACCOUNTING AROUND THE WORLD

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1 Introduction

During the 1990's, when concerns about the ageing of populations spread in many countries, the problem of long-term fiscal sustainability gained in importance. It is easy to predict that with the acceleration of the ageing trend, this issue will remain on the policy agenda; demographic trends will deteriorate in many industrial countries between 2010 and 2030, and countries have to prepare themselves now. Generational accounting helps to highlight the need for adjusting policies to these challenges. It has been developed as an alternative approach to traditional fiscal indicators such as the government budget deficit and the debt ratio. These have two main drawbacks. The first is that they provide no information about fiscal effects on income distribution between age cohorts, although this may affect the growth path of the economy; for example, if transfers to the elderly are increased and these transfers are financed by higher taxes on the younger population, the government deficit would not change. But this policy could reduce aggregate savings as income is redistributed to persons with a relatively low or a negative savings rate. If the fall in savings is not matched by higher capital imports domestic investment and economic growth will be reduced. The second drawback is that traditional indicators only include actual government spending but not claims by the private sector which lead to government spending in the future (contingent liabilities). Depending on the size of

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contingent liabilities deficit and debt ratios may, therefore, be poor indicators for assessing fiscal sustainability. This latter drawback can, however, be circumvented by long-term deficit and debt projections which include periods where contingent liabilities are supposed to become actual liabilities. The generational accounting approach is an attempt to remedy these shortcomings of the traditional fiscal indicators. It provides information about the effects of fiscal policies on intergenerational distribution and it also includes contingent liabilities, so that it is an appropriate indicator for assessing the long-term sustainability of fiscal policies.

The theoretical basis behind generational accounting is the so-called inter-temporal budget constraint (For the methodology see Box 1). This constraint requires that future net tax payments (taxes minus transfers) of currently living generations and of future generations be sufficient, in present value terms, to cover the present value of future government consumption and also service the currently existing government net debt This constraint does not assume that government debt is ever fully paid off. But it implies that the debt grows less quickly than the rate of discount, so that it does not explode; future deficits have to be smaller than the amount needed simply to service the level of outstanding debt[1]. With a given present value of government consumption, a reduction of the present value of net taxes of living generations requires an increase in net tax payments of future generations. Otherwise, the burden on future generations is all the heavier, the higher the existing net debt, the higher future public spending and the less living generations contribute to the financing (zero sum nature of intergenerational fiscal policy).

A generational account is the sum of net tax payments of an age cohort born in the same year (a generation) over the remaining lifetime; the accounts are absolute per capita amounts in present value terms, and they are growth-adjusted in order to be comparable over time (for the choice of the discount rate and the rate of productivity growth see Box 2). Government expenditure on health care and education is generally treated as transfers received from the government. But the value of other

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[1] See Auerbach and Kotlikoff, The Methodology of Generational Accounting, in: Auerbach, Kotlikoff and Leibfritz (1999).

government spending is not imputed to particular age groups as this is difficult and this spending is generally non age- specific. Generational accounts therefore do not reflect overall net costs or benefits from government activity. As the generational account of the new-born generation (generation born in the base year) is the sum of net tax payments over an entire lifetime, this account is directly comparable with the (average) account of future generations; these also reflect net tax payments over a full lifetime. An intergenerational fiscal imbalance exists if the average generational account of future generations is significantly higher or lower than that of the new-born generation. In the first case, fiscal policy is not sustainable and spending has to be cut or taxes have to be increased to restore sustainability. In the second case the net tax burden of living generations is too high, and taxes can be reduced or spending can be increased to restore fiscal balance between generations.

To produce generational accounts the following inputs are required: tax and transfer payments broken down by age groups, government expenditure, an initial value of government net debt (or net wealth), projections of demographics and assumptions of overall productivity growth and of the discount rate. The question is asked, how life-time net tax payments would develop if current policies were pursued indefinitely. Unchanged policies are typically modelled by assuming that non age-specific government purchases grow at the same rate as GDP, and that tax and transfer systems are not changed. It is clear that with these assumptions the ageing of a population can lead to unsustainable fiscal policies, in particular if the country has a large public pension and/or health care system; in this case transfers to the elderly increase rapidly with ageing while tax and social security contribution rates are kept unchanged, so that government debt can get out of control. The inter-temporal budget constraint will then shift all of the adjustment need to future generations so that their (average) life-time net tax payment (generational account) will be much higher than that of living generations as reflected in the account of new-borns. This indicates an intergenerational imbalance; such unsustainable policy may lead to a change in policy already during the life-time of living generations. Depending on the specific measures the burden of adjustment has then to be borne by the currently young, middle-aged and/or the elderly generations and some of the burden may still be left to future generations. This can be shown by analysing the sensitivity of the accounts of individual generations to policy simulations.

Box 1. Methodology of Generational Accounting[1)]

Generational accounts (GA's): $\sum_{K=t-A}^{t} N_{t,K} + (1+r)^{-(K-t)} \sum_{K=t-1}^{\infty} N_{t,K}$

of living generations (I) — of future generations (II)

equals

Outstanding debt (III) and future spending: (IV) $D_t^g + \sum_{s=t}^{\infty} G_s (1+r)^{-(s-t)}$ (III) (IV)

II = III + - I

Where: $N_{t,K}$ = account of the generation born in year K.

The index K in the first summation runs from t-A (those aged A, the maximum length of life in the base year 0) to t (those born in the base year 0). In the second summation it runs from t+1 (those born in the first year after the base year) to ∞ (those born later).

As each of these accounts is expressed in absolute amounts of the respective year, they must be discounted back to the base year.

$$N_{t,K} = \sum_{S=K}^{K+A} T_{S/K} P_{S,K} (1+r)^{-(S-K)}$$

where K = max (t,K) and $T_{S,K}$= projected average net tax payment (taxes minus transfers) made in year S by a member of the generation born in K. The term $P_{S,K}$ stands for the member of surviving members of the cohort in year S, who where born in year K. For generations who are born prior to year t, the summation begins in year t and is discounted to year t. For generations year K>t, the summation begins in year K and is discounted to that year. In order to make generational accounts comparable between generations they are adjusted for growth. Thus generational accounts are net tax payments of an age cohort over the remaining lifetime, per capita, in present values and adjusted for growth.

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1) *See Auerbach and Kotlikoff, The Methodology of Generational Accounting in: Auerbach, Kotlikoff, Leibfritz (1999).*

Box 2. Choice of discount rate and productivity growth

The choice of the discount rate for calculating the present value of future government revenues and expenditure depends on the assessment of their risk. If these flows were certain, a risk-free real interest rate could be used. This could be calculated from inflation-indexed government bonds, where these are available. Where these are not available one could deduct the (estimated expected) inflation rate from government bond yields. However countries' tax revenues and expenditure might be more uncertain in the long-term future and therefore a risk-adjusted discount rate should be used.[1)] As an appropriate approach for risk-adjustment is currently not available, the standard approach of generational accounting is to use a „plausible" base case assumption and to illustrate the sensitivity of the results for a range of discount rates. In the study as described here a real discount rate of 5 % was used for the base case (which is shown in the attached tables) and in addition results were presented for discount rates of 3 % and 7 %.

These is also much uncertainty about future productivity growth. This depends in particular on technical progress and capital formation for fixed and human capital. Productivity growth may also be affected by ageing of the population. The standard approach in generational accounting is to use a „plausible" rate of productivity growth for a base case and to illustrate the sensitivity of the results for a range of productivity growth rates. In the base case calculations of the study as presented here, productivity growth was set at 1.5 %. In addition rates of 1 % and 2 % were used in a sensitivity analysis.

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1) *For a more extensive discussion see Auerbach and Kotlikoff (1999).*

2 International comparison between 17 countries

In 1999 a comprehensive volume "Generational Accounting around the World" was published which provides an international comparison of generational accounts for 17 countries[2]. More than 30 experts of various countries carried out this study, using similar assumptions. In the following the main results of this study are discussed.

Generational Accounts of living generations

During a life-time, net tax payments of a person show a specific pattern: when people are young, they receive transfers (e.g., child benefits or education allowances) and pay consumption taxes. During their working lives, people continue to pay consumption taxes but also pay taxes on their labour and capital income (personal income tax, social security contributions). When people retire they receive public pensions and continue to pay taxes (consumption tax and personal income tax on capital income and perhaps on pensions). The present value of a generation's remaining life-time net tax payments – its generational account – exhibits a humped-shaped pattern with respect to age (Table 1). It is typically highest for generations at the beginning of their work span (between ages 20 and 30), as it does not include child and educational benefits (negative taxes) received in youth. When workers reach older ages, the sum of future net tax payments tends to decline as future transfer receipts (in particular pensions but also health care benefits) gain in importance compared with future tax payments. Between ages 50 and 60, future transfer receipts generally start to exceed future tax payments so that the generational accounts become negative (net transfers). The absolute amount of net transfers (in present value terms) declines during retirement as the remaining life-time shortens. Although the accounts all rise and then fall with age, the absolute levels of the accounts vary considerably across countries. This reflects the size of the government sector; less-developed countries such as Brazil, Argentina and Thailand

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[2] Generational Accounting around the World, edited by Alan J. Auerbach, Laurence J. Kotlikoff, and Willi Leibfritz, The University of Chicago Press, Chicago and London 1999.

Table 1. Generational Accounts, 1995 (thousands of 1995 U.S. dollars)

	United States		Japan		Germany		Italy	
Generation's age in 1995	A	B	A	B	A	B	A	B
0	86.3	28.5	143.4	73.0	165.0	97.1	114.2	68.4
5	102.0	35.3	169.3	90.9	194.3	123.6	132.9	80.3
10	121.7	71.4	200.1	135.4	233.8	179.0	154.1	112.4
15	144.6	115.0	235.9	187.4	287.9	252.2	178.4	158.9
20	168.7	159.3	278.1	257.4	333.6	313.6	193.5	186.6
25	175.4	172.7	295.2	295.2	309.7	303.4	184.4	183.7
30	170.0	168.7	297.8	297.8	271.8	271.8	155.2	155.2
35	157.5	156.9	287.4	287.4	224.4	224.4	113.5	113.5
40	135.7	135.6	263.8	263.8	160.1	160.1	63.4	63.4
45	101.3	101.3	227.7	227.7	94.0	94.0	10.7	10.7
50	56.4	56.4	173.1	173.1	-4.2	-4.2	-46.8	-46.8
55	4.0	4.0	99.0	99.0	-98.9	-98.9	-103.1	-103.1
60	–51.7	–51.7	11.9	11.9	-183.6	-183.6	-142.0	-142.0
65	–96.0	–96.0	–47.7	–47.7	-206.7	-206.7	-138.3	-138.3
70	–104.6	–104.6	–44.8	–44.8	-180.7	-180.7	-117.5	-117.5
75	–101.9	–101.9	–36.0	–36.0	-150.2	-150.2	-94.7	-94.7
80	–89.5	–89.5	–26.7	–26.7	-109.6	-109.6	-72.2	-72.2
85	–74.4	–74.4	–18.2	–18.2	-68.0	-68.0	-52.7	-52.7
90	–56.7	–56.7	–9.7	–9.7	-3.2	-3.2	-7.4	-7.4
Future generations	130.4	73.9	386.2	319.4	316.8	248.8	264.8	209.9
Generational imbalance:								
Absolute	44.1	45.3	242.8	246.4	151.8	151.7	150.6	145.1
In percent	51.1	159.0	169.3	337.8	92.0	156.1	131.8	223.8

Note: A: Educational expenditure treated as government consumption. B: Educational expenditure treated as government transfers and distributed by age groups.
Source: Auerbach, Kotlikoff, Leibfritz (1999).

Table 1 (continued). Generational Accounts, 1995 (thousands of 1995 U.S. dollars)

	Canada		Thailand		Australia		Denmark	
Generation's age in 1995	A	B	A	B	A	B	A	B
0	113.8	56.3	8.3	5.9	79.6	49.4	84	-18
5	130.1	66.4	9.6	6.8	95.3	60.1	134	14
10	152.0	99.0	10.9	8.9	112.8	85.4	178	79
15	176.9	138.5	12.3	11.3	134.3	115.8	211	143
20	199.0	177.0	13.6	13.2	148.4	138.3	243	209
25	183.7	193.1	14.2	14.1	147.7	141.9	251	232
30	189.1	183.3	14.1	14.1	138.5	134.2	238	225
35	165.2	161.1	13.3	13.3	128.2	124.4	214	202
40	137.3	134.5	11.8	11.8	111.9	108.5	166	157
45	98.9	97.1	10.0	10.0	87.4	84.5	99	91
50	51.8	50.8	8.1	8.1	57.4	55.1	14	9
55	5.8	5.5	6.2	6.2	25.9	24.2	-61	-64
60	–45.3	–44.8	4.8	4.8	1.5	1.5	-143	-143
65	–84.7	–83.6	3.7	3.7	–12.7	–12.7	-172	-172
70	–89.1	–87.9	2.8	2.8	–17.6	–17.6	-186	-186
75	–85.6	–84.4	2.1	2.1	–16.1	–16.1	-194	-194
80	–80.9	–79.8	1.5	1.5	–13.8	–13.8	-202	-202
85	–69.4	–68.5	1.0	1.0	–11.3	–11.3	-202	-202
90	–11.0	–10.9	0.5	0.5	–9.4	–9.4	-49	-49
Future generations	114.0	58.0	1.0	–1.5	105.2	73.4	124	26
Generational imbalance:								
Absolute	0.2	2.7	–7.3	–7.4	25.6	24.0	40	44
In percent	0.0	3.1	–88.0	–125.4	32.2	48.6	46.9	--

Note: A: Educational expenditure treated as government consumption. B: Educational expenditure treated as government transfers and distributed by age groups.
Source: Auerbach, Kotlikoff, Leibfritz (1999).

Table 1 (continued). Generational Accounts, 1995 (thousands of 1995 U.S. dollars)

	Netherlands		New Zealand		France		Norway	
Generation's age in 1995	A	B	A	B	A	B	A	B
0	110.0	49.4	57.3	18.0	151.5	82.2	106.3	1.4
5	139.8	68.9	68.2	26.4	191.7	125.4	112.3	-7.5
10	171.0	113.8	74.4	39.0	229.4	175.4	123.7	14.7
15	205.0	164.0	82.8	57.9	264.8	222.2	135.3	58.4
20	231.7	209.9	91.9	78.7	304.4	284.8	140.8	106.3
25	237.3	237.3	104.2	95.3	321.9	318.7	143.2	127.1
30	220.0	222.0	102.9	95.9	293.7	293.7	138.1	129.6
35	196.7	196.7	94.1	88.7	242.7	242.7	120.9	116.2
40	161.2	161.2	79.0	75.1	166.8	166.8	93.1	90.3
45	116.3	116.3	57.9	55.6	77.5	77.5	40.5	38.9
50	62.2	62.2	31.3	30.3	–12.5	–12.5	–22.0	–22.3
55	5.5	5.5	2.5	2.4	–134.7	–134.7	–73.0	–73.0
60	-46.5	-46.5	-26.3	-26.3	–197.0	–197.0	–135.0	–135.3
65	-91.4	-91.4	-50.2	-50.2	–199.9	–199.9	–170.6	–170.6
70	-103.4	-103.4	-55.8	-55.8	–151.5	–151.5	–179.8	–179.6
75	-113.0	-113.0	-53.7	-53.7	–162.1	–162.1	–170.0	–170.0
80	-118.8	-118.0	-47.1	-47.1	–93.9	–93.9	–155.1	–155.1
85	-116.6	-116.6	-44.5	-44.5	–102.9	–102.9	–139.4	–139.4
90	-110.9	-110.9	-36.3	-36.3	–94.4	–94.4	–122.6	–122.6
Future generations	193.8	137.0	55.3	16.0	222.8	161.4	–173.5	57.3
Generational imbalance:								
Absolute	83.7	87.6	-2.0	-2.0	71.3	79.2	67.2	55.9
In percent	76.0	177.7	-3.4	-10.8	47.1	96.3	63.2	4091.8

Note: A: Educational expenditure treated as government consumption. B: Educational expenditure treated as government transfers and distributed by age groups.
Source: Auerbach, Kotlikoff, Leibfritz (1999).

Table 1 (continued). Generational Accounts, 1995 (thousands of 1995 U.S. dollars)

	Portugal		Sweden		Argentina		Belgium		Brazil	
Generation's age in 1995	A	B	A	B	A	B	A	B	A	B
0	61.8	43.5	184.3	121.8	22.7	13.9	93.5	43.3	14.3	10.2
5	67.1	45.5	203.4	140.8	25.3	15.7	132.4	76.2	17.1	12.3
10	73.0	50.9	226.4	162.9	28.7	20.3	170.1	116.0	20.9	17.1
15	79.6	65.3	253.5	211.3	32.6	26.3	210.5	172.3	25.0	22.6
20	86.0	82.7	281.2	265.1	34.0	30.8	242.3	232.9	28.9	27.0
25	85.1	84.5	295.2	284.2	33.5	31.6	272.5	270.8	31.2	30.1
30	75.0	75.0	283.7	278.9	29.8	28.2	278.6	278.6	31.5	31.3
35	60.0	60.0	261.9	258.3	22.8	21.6	259.3	259.3	28.0	28.0
40	39.7	39.7	228.5	226.5	13.6	12.6	215.5	215.5	19.7	19.7
45	15.9	15.9	177.2	175.8	2.1	1.5	149.3	149.3	6.9	6.9
50	-10.6	-10.6	105.3	104.6	–11.0	–11.3	65.1	65.1	–6.3	–6.3
55	-33.9	-33.9	16.5	16.1	–25.2	–25.2	–34.6	–34.6	–18.1	–18-1
60	-47.1	-47.1	–66.3	–66.4	–39.9	–39.9	–130.6	–130.6	–28.0	–28.0
65	-49.4	-49.4	–110.8	–110.9	–42.9	–42.9	–165.7	–165.7	–33.3	–33.3
70	-42.7	-42.7	–97.8	–97.8	–43.0	–43.0	–172.4	–172.4	–32.9	–32.9
75	-33.3	-33.3	–79.7	–79.7	–41.2	–41.2	–163.7	–163.7	–22.1	–22.1
80	-24.8	-24.8	–58.1	–58.1	–34.3	–34.3	–153.1	–153.1	–14.1	–14.1
85	-15.4	-15.4	–33.2	–33.2	–32.5	–32.5	–138.6	–138.6	–9.6	–9.6
90	-4.1	-4.1	–6.5	–6.5	–7.1	–7.1	–119.0	–119.0	–2.7	–2.7
Future generations	98.7	73.2	143.5	83.8	36.1	24.3	147.8	89.5	27.0	22.1
Generational imbalance:										
Absolute	36.9	29.7	–40.9	–38.0	13.4	10.4	54.2	46.3	12.7	11.9
In percent	59.7	68.3	–22.2	–31.2	58.6	74.8	58.0	107.0	88.8	116.7

Note: A: Educational expenditure treated as government consumption. B: Educational expenditure treated as government transfers and distributed by age groups.
Source: Auerbach, Kotlikoff, Leibfritz (1999).

have a smaller government sector than industrial countries, but there are also differences between industrial countries. The absolute amount of generational accounts also reflects the generosity of transfer systems. In countries with generous public pension systems, generational accounts turn negative earlier (at 50 in Germany, Italy, France, Norway, Portugal, Argentina and Brazil) than in countries with less generous pension systems (e.g. in Australia generational accounts turn negative only at the age of 65 and in Thailand where no pay-as-you-go pension system exists they remain positive). The absolute amount of generational accounts also depends on the treatment of educational spending. If this spending is treated as government purchases (as it is in the National Accounts Statistics), generational accounts are higher (column A in Table 1) while treating this spending as transfers received by the young from the government reduces generational accounts (column B in Table 1).

Intergenerational Imbalances

The comparison of the generational account of new-borns with that of future generations (row „Age 0“ and row „Future generations“ in Table 1) indicates the degree of intergenerational imbalance in fiscal policy. The last two rows in Table 1 show the imbalance in both absolute and percentage terms. The country with the largest imbalance is Japan. While a new-born Japanese has to pay over his life-time as net taxes a present value amount of 73,000 US dollars (1995 dollars), future Japanese have to pay, on average, an amount of 319,000 Dollars or 246,000 more. Generational imbalances are also very large in Germany (152,000 dollars), Italy (145,000 dollars), and somewhat less in the Netherlands, France, Norway, Belgium, USA, and Denmark (between 88,000 and 44,000 dollars). At the other end of the scale are Sweden, Thailand and New-Zealand, where future generations have to pay less net taxes than current new-borns. In Canada there exists only a very small difference between net tax payments of current and future generations (Table 2).

Generational imbalances can also be expressed in percent. In Japan if policies were not changed, future generations would have to face 338% higher net taxes than current generations. In Italy net tax rates would have to rise by 224%, in the Netherlands by 178% and in Germany by 156%. In countries where the accounts of new-borns are very small or negative, as in Norway and in Denmark, it is, however, not meaningful or

possible to express imbalances as a percentage between accounts of future generations and the new-born generation.

Table 2. Generational Fiscal Imbalances

Imbalances in thousands of 1995 US dollars		In percent	
1	Japan (246)	1	Japan (338)
2	Germany (152)	2	Italy (224)
3	Italy (145)	3	Netherlands (178)
4	Netherlands (88)	4	USA (159)
5	France (79)	5	Germany (156)
6	Norway (56)	6	Brazil (117)
7	Belgium (46)	7	Belgium (107)
8	USA (45)	8	France (96)
9	Denmark (44)	9	Argentina (75)
10	Portugal (30)	10	Portugal (68)
11	Australia (24)	11	Australia (49)
12	Brazil (12)	12	Canada (3)
13	Argentina (10)	13	New Zealand (–11)
14	Canada (3)	14	Sweden (–31)
15	New Zealand (–2)	15	Thailand (–125)
16	Thailand (–7)		
17	Sweden (–38)		

Source: Auerbach, Kotlikoff, Leibfritz (1999).

Sensitivity of the results

Estimates of generational accounts are based on the assumption that except for demographic influences, no other fundamental changes in the economy occur. But with a given population, labour supply could increase if unemployment declines and if female labour participation increases; this would raise labour tax revenues and reduce transfers. Furthermore, if private saving increases (e.g. by a shift toward privately funded pension systems), receipts from capital income taxes would rise.

All this would reduce generational imbalances as well as if fertility rates and/or immigration of young workers were higher than assumed.

The results are also sensitive to assumptions about productivity growth and the discount rate[3]. But the basic message may still be the same for a particular country, although in some countries the results are more sensitive to these assumptions than in other countries[4].

Sources of generational imbalances

Table 3 asks how much of the generational imbalance can be traced to the country's future demographic change and how much can be traced to the current net debt. The demographic experiment considers how large the generational imbalance would be if demographics did not change in the future. The zero-debt experiment sets initial debt to zero and recalculates the generational imbalance. In most countries the future demographic change is the most important source of generational imbalances. The reason is that populations are ageing and the elderly are net beneficiaries of the tax-transfer systems. For example, Germany's large imbalance would be wiped out completely if there were no future demographic change, and in the case of Italy, zero demographic change would eliminate more then 90% of the imbalance, and in the case of Japan about three quarters. The importance of the projected trend of ageing for current intergenerational imbalances is also illustrated by Figure 1; countries with a higher degree of ageing tend to have higher intergenerational imbalances, i.e. they have not yet adjusted their policies to future demographic changes.

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[3] The results in Tables 1 and 2 refer to the base case with the assumptions of annual productivity growth of 1.5 % and a real discount rate of 5%. The sensitivity of the results to these assumptions is shown in Kotlikoff and Leibfritz (op cit. p.88-97).

[4] For Norway the choice of the discount rate is particularly critical. With the base case, 15% productivity growth rate and 5% discount rate, there exists a sizeable generational imbalance. But with a 7% discount rate and a 1.5% productivity growth rate, the country is roughly in balance.

Table 3. Sources of Generational Imbalance (percentage imbalance)

	Base Case		No Demographic Change		Zero Debt	
	A	B	A	B	A	B
United States	51.1	159.0	–2.9	21.6	30.5	96.5
Japan	169.3	337.8	42.2	77.2	154.5	308.6
Germany	92.0	156.1	–4.7	–7.6	47.5	80.6
Italy	131.8	223.8	12.9	18.0	60.2	97.6
Canada	0.0	3.1	–46.7	–57.8	–41.0	–51.6
Thailand	–88.0	–125.4	–143.4	–174.6	–190.4	–228.8
Australia	32.0	48.6	20.0	62.4	18.0	25.1
Denmark	46.9	a	–13.6	–168.4	12.7	b
Netherlands	76.0	177.0	7.0	14.0	42.0	100.0
New Zealand	–3.4	–10.8	–5.0	–5.2	–15.9	–15.9
France	47.1	96.3	4.0	6.0	20.0	39.0
Norway	61.0	4 378.6	–12.1	–91.8	69.3	5 000.2
Portugal	48.7	68.2	17.5	24.9	16.2	22.0
Sweden	–22.2	–31.2	–51.2	–66.9	–31.0	–44.6
Argentina	58.6	74.8	–0.8	1.7	37.9	41.0
Belgium	58.0	106.8	29.3	63.2	–92.0	–217.6
Brazil	88.8	116.7	41.8	64.1	76.2	99.0

Note A: Educational expenditure treated as government consumption.

B: Educational expenditure treated as government transfers and distributed by age groups.

[a] *Percentage imbalance is not defined. Newborns' account is –$17,800 and future generations' account is $26,400.*

[b] *Percentage imbalance is not defined. Newborns' account is –$17,800 and future generations' account is –$2,300.*

Source: Auerbach, Kotlikoff, Leibfritz (1999).

How to restore intergenerational balance?

The large intergenerational imbalances in many countries indicate that current policies are unsustainable. It will be a major challenge to restore sustainability. If action is postponed, imbalances will worsen over time as more and more living generations benefit from relatively low net tax payments at the cost of future generations. Eliminating generational imbalances can be done in various ways or by a combination of them:

- The government can give incentives (or reduce disincentives) to increase the labour participation and the length of the working life (later retirement). Also immigration of young workers could be encouraged[5]. Such measures including the reduction of structural unemployment would increase net tax payments of living generations by increasing the tax base and reducing the transfer base.

- The government could increase general tax rates or social contribution rates. But this may have disincentive effects on the labour supply and reduce the tax base.

- The government could reduce general spending or transfer benefit rates. Table 4 shows that in many countries large cuts in spending or large increases in taxes are needed to restore sustainability.

3 Comparison with a recent study launched by the EU Commission

The EU Commission has launched a study on Generational Accounting. This study, "Generational Accounting In Europe", includes generational accounts for the EU member countries excluding Greece, Portugal and Luxembourg (Raffelhüschen, 1999). The results of this study are not strictly comparable with those presented here although the

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[5] Given the size of demographic change, immigration can, however, not solve the problem. It also leads to higher costs.

Table 4. Alternative Ways to Achieve Generational Balance

Country	Cut in Government Purchases		Cut in Government Transfers		Increase in All Taxes		Increase in Income Tax	
	A	B	A	B	A	B	A	B
United States	18.7	27.0	19.8	20.3	10.5	10.8	23.8	24.4
Japan	26.0	29.5	28.6	25.3	15.5	15.5	53.6	53.6
Germany	21.1	25.9	17.6	14.1	9.5	9.5	29.5	29.5
Italy	52.7	87.9	41.0	40.0	66.7	61.4	198.4	188.8
Canada	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.2
Thailand	–38.1	–47.7	–185.1	–114.2	–25.0	–25.0	–81.7	–81.8
Australia	8.8	10.2	12.1	9.1	5.1	4.8	8,5	8.1
Denmark	9.9	29.0	4.7	4.5	3.4	4.0	5.8	6.7
Netherlands	21.0	28.7	21.4	22.3	8.5	8.9	14.9	15,6
New Zealand	–1.0	–1.6	–0.8	–0.6	–0.4	–0.4	–0.8	–0.8
France	17.2	22.2	11.5	9.8	7.1	6.9	66.0	64.0
Norway	11.5	9.9	9.4	8.1	7.4	6.3	11.3	9.7
Portugal	7.6	9.8	9.6	7.5	4.2	4.2	13.3	13.3
Sweden	–7.6	–8.7	–7.7	–6.0	–3.4	–3.1	–9.3	–8.6
Argentina	24.6	29.1	16.8	11.0	10.7	8.4	97.1	75.7
Belgium	11.2	12.4	6.0	4.6	3.7	3.1	11.7	10.0
Brazil	23.8	26.2	21.3	17.9	12.4	11.7	78.9	74.0

Note *A: Educational expenditure treated as government consumption.*
B: Educational expenditure treated as government transfers and distributed by age groups.

Source: Auerbach, Kotlikoff, Leibfritz (1999).

same base year (1995) and a similar discount rate (5%) and a similar productivity growth (1.5 %) have been assumed in the base case calculations. However, demographic projections were not taken from the World Bank as in the study described here but from national authorities. In the EU study the approach to calculating generational accounts also differs with respect to the formulation of the intertemporal budget constraint; it does not explicitly consider non-age specific government spending and is defined as: "government net debt = net tax payments of living generations and of future generations (in present value terms)". This difference should, however, not affect the results for the generational imbalances. The main message of "Generational Accounting In Europe" is similar to the study "Generational Accounting Around The World", namely that in many countries current policies are nor sustainable and countries should adjust their policies to future demographic changes. But there are some differences with respect to the size of adjustment needs in some countries. In the EU study generational imbalances are very large in Finland (absolute imbalance in 1000 Ecu about 155), followed by Austria (137), Sweden (135), Germany (118), Spain (74), Italy (66), United Kingdom (65), France (49), Denmark (42), Netherlands (40), Belgium (12) and Ireland (-2). Thus only in the case of Ireland is there no need for adjustment and there exists even a small imbalance in favour of future generations. But according to the EU study the size of the adjustment need seems to be somewhat smaller in Italy, the Netherlands and Belgium, but much larger in Sweden, than was found in the study "Generational Accounting Around The World". These differences could be caused by different assumptions about demographics, by a different interpretation of what is meant by "constant policies" or by a different consideration of new policy measures or by other differences.

4 Conclusions

The main messages from these studies are:

- Reducing deficit and debt levels before the ageing of the population occurs alleviates the adjustment. For example sustainability improved very much in Sweden during the second half of the 1990s as a result of fiscal consolidation; while in 1993

Table 5. Generational Imbalances in Europe
(EU study, in thousands of ECU)

1. Finland (155)
2. Austria (137)
3. Sweden (135)
4. Germany (118)
5. Spain (74)
6. Italy (66)
7. United Kingdom (65)
8. France (49)
9. Denmark (42)
10. Netherlands (40)
11. Belgium (12)
12. Ireland (–2)

Source: Generational Accounting in Europe, EU Commission 1999.

the deficit/GDP ratio was almost 12% and in 1995 almost 8%, since 1998 fiscal surpluses of around 2% of GDP have been recorded and this helped to reduce generational imbalances. But in Japan the weakness of the economy and expansionary fiscal measures led to an increase of the government deficit ratio to more then 7% in 1999; this recent deterioration of government finances increases the already high intergenerational imbalance even more than is shown in this study.

- In countries with very generous public pension systems (i.e. low retirement age, high replacement rates, wage indexation) and a high degree of ageing intergenerational imbalances tend to be large. This is the case in many EU countries. For example in

Finland the pension system is quite generous so that current pensions are around 10% of GDP, while in Ireland the pension system is less generous and pension payments are only around 3% of GDP. With old-age dependency ratios projected to rise in both countries Finland faces a major sustainability problem while the long-term fiscal development in Ireland is – according to the EU study – quite favourable and does not require additional consolidation measures.

- Postponing reforms of pension systems in countries where current systems are not sustainable, aggravates the adjustment problem. But the decision about a fundamental pension reform is often difficult for political reasons and may become even more difficult when the share of the elderly in the electorate increases. The ground for such policies must therefore be prepared carefully. Information and transparency about the issue of ageing and the appropriate policy response is a precondition for appropriate policies and Generational accounting could play an important role in this process. Governments could use this framework and publish the results regularly in order to illustrate the need for adjustment and the effects of alternative policies. Some governments, in particular the government of Norway are already applying generational accounting as a supplement to traditional fiscal analysis, and this should be an example for other governments to follow.

- The presentation of this relatively new approach to policy makers could be improved in various ways. For example it is obvious from the different studies that the initial fiscal position has a rather big effect on the results of intergenerational imbalances. It would therefore be preferable not to use the actual fiscal position in the base year as a starting point if this is affected by cyclical or other temporary factors. A better procedure would be to use instead the medium-term fiscal position as projected on the basis of current policies. The resulting intergenerational imbalance would then better reflect the required additional need for adjustment.

- In case new calculations of generational accounts for a country differ from previous calculations it would be helpful that the differences are explained to the reader. This would help to

disentangle the influences of the various assumptions and policies or methodological changes on the results.

- The understanding of generational accounting could also be improved if the results for the base case and for policy options would be presented together with a long-term projection of the net debt to GDP ratio, which is implied in the assumptions of the generational accounts. Thus the information on fiscal sustainability would be presented in two ways: with the new indicator of intergenerational imbalance and with the traditional debt indicator which familiar to policy makers. Also the additional information on intergenerational distribution which is provided by generational accounting would become clear.

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