This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Generational Accounting around the World

Volume Author/Editor: Alan J. Auerbach, Laurence J. Kotlikoff and Willi Leibfritz, editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-03213-2

Volume URL: http://www.nber.org/books/auer99-1

Publication Date: January 1999

Chapter Title: Generational Accounts for the United States: An Update

Chapter Author: Jagadeesh Gokhale, Benjamin R. Page, John Sturrock

Chapter URL: http://www.nber.org/chapters/c6703

Chapter pages in book: (p. 489 - 518)

21 Generational Accounts for the United States: An Update

Jagadeesh Gokhale, Benjamin R. Page,
and John R. Sturrock

To pay for all the goods and services that a government ever buys, someone of some generation must pay at some time. If one generation pays less, another must pay more. If the government does not pay for what it purchases with current taxes, it must raise them later—either to retire the ensuing debt or to pay interest forever. Sooner or later, someone pays.

This idea underlies the intertemporal government budget constraint, which states that the present value of prospective government purchases must be financed from the sum of three sources: the current net wealth of government, the present value of the prospective net taxes of current generations (people now alive), and the present value of the prospective net taxes of future generations (people not yet born).[1] Thus the constraint reveals the way in which government purchases involve a fiscal burden that someone must bear.

For the prospective purchases implied by a given fiscal policy, generational accounting estimates how much of that total burden will fall on current versus future generations.[2] The analysis begins by calculating the present value of prospective purchases for a given policy. The first source of financing (the government's current net wealth) is given. The second source (the present value of current generations' net taxes) is obtained by estimating the per capita net taxes that each living generation will pay during its remaining lifetime, actuarially discounting the payments back to the present, and summing over the dis-

Jagadeesh Gokhale is an economic advisor at the Federal Reserve Bank of Cleveland. Benjamin R. Page and John R. Sturrock are economic analysts at the Congressional Budget Office.

The authors thank Robert Kilpatrick and Laurence Kotlikoff for helpful discussions. The views reflected herein are those of the authors and not necessarily those of the Federal Reserve Bank of Cleveland, the Federal Reserve System, or the Congressional Budget Office.

1. Net taxes are taxes minus transfers.

2. The technique of generational accounting was developed in Auerbach, Gokhale, and Kotlikoff (1991). See also Auerbach, Gokhale, and Kotlikoff (1994).

counted values to obtain a generational account for each generation.[3] Those respective generational accounts are then added over everyone currently alive to find their combined contribution to prospective purchases. Having calculated the present value of prospective purchases and the first two sources of financing, the third source (the present value of unborn generations' net taxes) can be computed as a residual. This residual expresses the fiscal burden that must be placed on unborn generations for the government to remain solvent forever.

Finally, generational accounting compares all living generations on a lifetime basis by estimating the effective rate at which each pays net taxes over its *entire* life—its lifetime net tax rate. The method estimates past and prospective net taxes and labor income that each living generation earns over its life. The lifetime net tax rate is then stated as a percentage, namely, the present value, at birth, of a generation's lifetime net taxes as a share of the present value, at birth, of its lifetime labor income.

As an illustrative device, generational accounting further supposes that future generations share the residual burden equally (with an adjustment for economic growth). This implies that males and females born in each future year will face the same lifetime net tax rate. Thus the method compares all generations on the same basis—the effective rate at which they pay net taxes over their entire lives.

Generational accounts help us judge whether fiscal policy is generationally balanced, that is, whether future generations will pay, on average, the same lifetime net tax rate as current newborns (people born in the base year). A generationally balanced policy is *sustainable,* meaning that it can be followed forever without changing its scheduled effective rates for taxes, transfers, and spending. Conversely, a policy is imbalanced (or unsustainable) if it implies that future generations must pay a different net tax rate than current newborns.

An imbalance implies that to pay for prospective purchases, the scheduled rates of effective net taxes must change—if not for current generations, then for future ones. If an imbalance implies that the future rate will be higher than the current rate, the rate must eventually rise. If the imbalance is large, then the rate for some living or future generations will have to increase substantially and may harm their incentives to work, save, and invest. Hence, the finding of a large generational imbalance points to the potential for weaker future economic performance. Conversely, if an imbalance implies that the future rate will be lower than the current one, someone must pay less to keep the government's net wealth from growing so big that government owns all of the nation's assets. Generational accounting can estimate the sizes of policy changes that would restore sustainability and generational balance.

3. An actuarial calculation allows for the fact that the current number of people in a generation will later be decreased by death or increased by immigration.

Section 21.1 reports generational accounts and the associated lifetime net tax rates for the United States. The results suggest that U.S. fiscal policy is generationally imbalanced. If living generations pay net taxes as scheduled, future generations will have to pay a lifetime net tax rate far exceeding that of current newborns—49.2 versus 28.6 percent, an arithmetic difference of 20.6 percentage points.

Ordinarily, generational accounting does not estimate by age who benefits from prospective purchases, only who pays for them with their net taxes. In this study, however, we also calculate an alternative set of accounts that assign to each living generation the benefit from its share of government spending on education. The recalculated accounts show a similar arithmetic difference in lifetime net tax rates.

These results depend on a "reference" scenario for fiscal policy, the economy, and the population. The reference policy used here cuts the deficit, splitting the reduction evenly between Medicare and discretionary spending and balancing the budget in the years from 2002 through 2007. After that, however, it allows the deficit to widen, reflecting an aging population, slowing labor force growth, and rising per capita medical costs. Through 2070, the reference scenario depends on three factors: the federal tax and spending schedule, the "no-feedback" economic projection of the Congressional Budget Office (CBO), and the Social Security Administration's (SSA's) intermediate population projection (SSA 1997; CBO 1997b; 1997c, chap. 1). Beyond 2070, the reference scenario extends those fiscal, economic, and demographic projections by the methods described below.

The reference scenario does not include the recent budget reconciliation package (the Balanced Budget Act of 1997 and the Taxpayer Relief Act of 1997) because long-term projections under that package are not yet available. Other things equal, the results under the reference scenario should roughly correspond to those under the reconciliation package because both policies cut base spending on health care and other (non–social security) programs in about the same proportions. However, the most recent budget projections yield more than just midterm budget balance; they show a small surplus in 2002, which rises to about 0.7 percent of GDP in 2007 (CBO 1997a). Therefore, the current fiscal stance is likely to produce a smaller generational imbalance than the one we report based on the reference policy. Even so, in contrast to the accounts reported earlier, the reference scenario implies a sharp decline in the degree of generational imbalance.[4]

Section 21.2 details the reasons for that decline, which occurred largely because per capita costs for medical programs have recently grown more slowly than expected. Section 21.3 reports the amounts by which generational accounts change when we alter the assumptions for population growth, govern-

4. The results here update those in Auerbach, Gokhale, and Kotlikoff (1995).

ment spending, and economic growth or discount rates. Generational accounts move into or near balance under some of these assumptions but remain imbalanced under most.

Section 21.4 considers *hypothetical* policy actions that achieve generational balance by changing the reference policy's schedule for purchases or for the net taxes that living generations will pay. The required size of such a change depends on whether it cuts prospective purchases or raises prospective net taxes for current generations. For instance, under the reference assumptions, balance could now be restored by proportional cuts of 15.4 percent in purchases or 18.5 percent in transfers, or by an increase of 8.9 percent in taxes. (The changes differ because the programs involve different initial dollar amounts, and the effects of the changes depend on both how fast the programs expand and which generations are most affected.) Although we examine these policies only as examples of the magnitude of the imbalance, it is clear that the longer the status quo persists, the more difficult it will be to restore generational balance. Section 21.5 concludes the paper.

21.1 The Generational Stance of U.S. Fiscal Policy

21.1.1 Intertemporal Government Budget Constraint

The intertemporal government budget constraint is expressed as

$$\text{PVG}_t = \text{NWG}_t - \text{PVL}_t + \text{PVF}_t, \tag{1}$$

where PVG_t is the present value of government purchases, NWG_t is the current value of government financial net wealth, PVL_t is the total present value of net taxes that living generations will pay over the rest of their lives, and PVF_t is the residual fiscal burden that future generations must bear.[5]

To calculate those values for a base case, we assume the following: (1) The real discount rate is 6 percent. (2) Labor productivity growth through 2070 is given by the reference scenario; beyond 2070, it is assumed to be 1.2 percent per year (its average annual growth rate for most of the reference scenario). (3) Aggregate taxes, transfers, and purchases through 2070 are given by the reference projection; beyond 2070, they are assumed to grow at a rate consistent with per capita growth at the same rate as labor productivity. (4) The population through 2070 is the SSA's intermediate projection; from 2070 through

5. The constraint includes all debt, taxes, transfers, and purchases at every level of government. Unlike the National Income and Product Accounts, generational accounting treats spending on medical, disability, and retirement benefits for veterans and government workers as purchases (payment for past services), rather than as transfers. For an explanation of how generational accounts treat taxes, transfers, and purchases, see Auerbach, Gokhale, and Kotlikoff (1991).

NWG_t excludes the value of tangible government assets, and PVG_t excludes the service flows of those assets. If NWG_t included the assets, PVG_t would have to include the service flows. Because (in equilibrium) the assets and their service flows are equal in present value, they would cancel each other if they were both included in eq. (1).

2200, we extend that projection by assuming that fertility, mortality, and net immigration rates remain at their 2070 values; beyond 2200, we assume that the size and the age composition of the population remain fixed.

Under the reference policy and the assumptions mentioned earlier, PVG_t equals \$29.4 trillion, and NWG_t (calculated as the algebraic sum of past real government surpluses) amounts to −\$2.1 trillion. Loosely, NWG_t is the negative of net public debt, NDG_t. PVL_t equals \$22.1 trillion, and PVF_t is \$9.4 trillion.[6]

It is PVF_t, rather than NDG_t, that more meaningfully reflects the fiscal burden that the reference policy imposes on future generations. NDG_t includes only the explicit legal obligations of U.S. governments, not their implicit obligations. For example, the current debt ignores the unfunded liabilities of Medicare, social security, and government retirement programs. Outlays for these programs will accelerate in the future as the baby boom generations retire and as the costs of health care programs mount. In contrast to the debt, PVF_t includes all prospective government liabilities, implicit as well as explicit. We calculate that PVF_t is more than four times as large as NDG_t: \$9.4 trillion versus \$2.1 trillion.

21.1.2 Generational Accounts

A generational account is the present value of the per capita net taxes that a generation will pay for the rest of its life under the assumed fiscal policy. (Generational accounting defines a generation by sex and year of birth.) To obtain each generation's prospective per capita values through 2070, generational accounting first distributes among the generations the reference projections for aggregate taxes and transfers. The distribution assumes that the current ratios of per capita taxes and transfers by age and sex remain fixed. For instance, in a given year, 50-year-old women always pay 38 percent as much in per capita payroll taxes as do 40-year-old men.[7] Beyond 2070, generational accounting assumes that the per capita amount of each type of tax or transfer by age or sex grows at the same rate as labor productivity. The resulting streams of per capita net taxes are actuarially discounted to the base year in order to calculate the generational account for each living generation. (The base year in this case is 1995, the latest year for which we have the ratios of per capita taxes and transfers by age and sex.)

As tables 21.1 and 21.2 show, generational accounts follow a life cycle pattern. Young generations at or near working age will pay a significant amount

6. All dollar figures are reported in constant 1995 dollars.

7. The ratios are estimated from official survey data. For details of the procedure, see Auerbach et al. (1991); for a description of the respective ratios of per capita net payments by age and sex, see CBO (1995, 7–8).

For social security and government retirement programs, the generational accounts shown here reflect the way in which productivity growth feeds gradually into benefits under current schedules. Thus the ratios of per capita benefits by age and sex for these programs need not remain fixed. See CBO (1997b).

Table 21.1 Composition of Male Generational Accounts under Reference Assumptions (present value in thousands of 1995 dollars)

		Tax Payments				Transfer Receipts		
Generation's Age in 1995	Net Tax Payment	Labor Income	Capital Income	Payroll	Other[a]	OASDI	Health	Other
0	77.4	33.5	9.0	34.3	31.5	7.2	19.6	4.2
5	95.7	41.6	11.2	42.8	36.6	8.8	22.5	5.2
10	119.5	52.1	14.3	53.9	42.5	10.6	26.3	6.5
15	149.1	65.1	18.1	67.8	48.6	12.1	30.4	8.1
20	182.2	79.5	23.5	83.6	53.4	13.7	34.4	9.7
25	196.2	86.0	27.9	90.6	53.5	16.4	35.4	10.1
30	196.8	86.3	33.7	90.2	52.7	19.9	36.4	9.8
35	189.0	82.9	40.7	86.0	51.4	24.6	38.2	9.2
40	171.2	76.0	46.6	78.6	50.4	30.8	40.9	8.7
45	139.2	65.1	50.2	67.4	47.7	38.8	44.3	8.1
50	93.7	50.8	51.3	52.9	43.7	49.3	48.0	7.6
55	37.5	34.6	49.7	36.3	38.7	62.8	52.0	7.0
60	−25.5	18.6	46.3	19.5	32.9	80.1	56.5	6.3
65	−77.7	7.4	41.2	7.5	27.5	91.8	63.8	5.7
70	−89.2	3.2	33.0	3.3	22.2	85.0	60.9	5.1
75	−87.9	1.6	22.4	1.7	16.9	71.7	54.5	4.2
80	−77.2	0.9	11.2	1.0	11.9	54.8	44.4	3.1
85	−68.3	0.7	0.0	0.7	8.0	42.6	32.9	2.1
90	−53.8	0.5	0.0	0.5	6.3	33.7	25.9	1.7
Future generations	134.6							
Percentage difference	71.9							

Source: Authors' calculations.

Note: Future generations are those born in 1996 and thereafter. The net tax payment represents a present value as of 1996. The percentage difference between the net tax payments of future generations and current newborns is calculated after adjustment for growth (see text).

[a] Includes excise and other indirect taxes, property taxes, and other taxes.

Table 21.2 **Composition of Female Generational Accounts under Reference Assumptions (present value in thousands of 1995 dollars)**

		Tax Payments				Transfer Receipts		
Generation's Age in 1995	Net Tax Payment	Labor Income	Capital Income	Payroll	Other[a]	OASDI	Health	Other
0	51.9	19.4	9.5	20.9	30.4	6.8	14.8	6.8
5	63.4	24.1	11.9	26.1	35.2	8.3	16.9	8.5
10	78.1	30.2	15.1	32.9	40.5	10.0	19.9	10.6
15	95.7	37.7	19.3	41.3	45.6	11.3	23.4	13.5
20	115.0	45.7	24.8	50.7	49.8	12.7	26.6	16.8
25	122.6	48.1	30.3	53.7	50.4	15.3	28.9	15.7
30	120.7	46.2	36.2	51.6	50.1	18.6	31.7	13.2
35	113.8	42.8	42.3	47.9	49.8	23.0	35.2	10.8
40	99.0	38.2	46.3	43.0	48.6	28.8	39.6	8.7
45	72.8	31.6	47.7	35.7	46.2	36.5	45.0	7.0
50	37.4	23.6	46.8	26.9	42.3	46.9	49.5	5.6
55	−5.2	15.0	44.8	17.2	37.6	60.6	54.5	4.8
60	−52.0	7.6	41.6	8.7	32.4	78.6	59.5	4.2
65	−91.2	2.7	35.6	3.1	27.1	89.3	66.5	3.8
70	−101.0	1.0	25.3	1.2	22.2	83.4	63.9	3.4
75	−101.0	0.5	14.1	0.6	16.9	71.6	58.5	2.9
80	−90.2	0.3	5.3	0.3	12.4	57.2	48.8	2.4
85	−73.5	0.1	0.0	0.1	9.4	43.5	37.8	1.9
90	−55.8	0.1	0.0	0.1	7.2	33.2	28.5	1.5
Future generations	90.2							

Source: Authors' calculations.

Note: Future generations are those born in 1996 and thereafter. The net tax payment represents a present value as of 1996.

[a]Includes excise and other indirect taxes, property taxes, and other taxes.

of taxes for several years before they retire and collect social security and Medicare benefits. Hence, their generational accounts are positive and high. By contrast, older generations in or near retirement will pay low taxes and receive high transfers for most of their remaining years. Thus their generational accounts are negative.

The generational accounts for women of any age are lower (or more negative) than those for men of the same age. On average, women pay lower taxes because they are less likely to work in the marketplace and earn less when they do. Moreover, they live longer and often receive payments as widows on their husbands' accounts. Therefore, relative to their earnings, they receive more in transfers, especially for medical care and social security.

Generational accounts compare on the same lifetime basis the net payments of current newborns (those born in 1995) and future generations (those born later). That is, the accounts show the present value of per capita net taxes that each group will pay over its entire life. How do their accounts compare? Under the reference policy, the generational account for a 1995 newborn is $77,400 for a male and $51,900 for a female. As mentioned earlier, the residual burden on future generations is $9.4 trillion, but there is no way to know how they would share that burden. To get around this problem, generational accounting assumes that future generations split the burden equally on a growth-adjusted basis. As noted, this assumption amounts to specifying that males and females born in each future year will pay combined lifetime net taxes at a uniform rate.[8] Given this assumption, the reference policy implies that males born in 1996 will pay an average of $134,600 (in present value as of 1996), while females will pay an average of $90,200. These payments are larger than the corresponding payments of current newborns, indicating that the reference policy is out of generational balance.

21.1.3 Lifetime Net Tax Rates

So far, it has been legitimate to compare directly only the generational accounts of current newborns and future generations. These accounts give each group's net payment over its *entire* life. Other generations, however, are at varying stages of their life cycles. Thus their accounts are not directly comparable because their net payments are stated only over their *remaining* lives. For instance, the generational account of a 40-year-old man is higher than that of a

8. The calculation assumes that labor productivity (and hence, eventually, per capita income) grows each year at rate g. In that case, an equal growth-adjusted share of the burden means that the per capita net payment of each future generation is $1 + g$ times that of its immediate predecessor. If males born in 1996 pay Y dollars each, then males born in 1997 pay $Y(1 + g)$ dollars each, males born in 1998 pay $Y(1 + g)^2$ dollars each, and so forth. (Generational accounting gives those per capita net payments in present value as of year of the generation's birth.) Similarly, if females born in 1996 pay X dollars each, then females born in 1997 pay $X(1 + g)$ dollars each, and so on. This procedure amounts to assuming that all future males pay lifetime net taxes at a uniform rate—their lifetime net taxes grow generation by generation at the same rate as their lifetime incomes. Future females also pay lifetime net taxes at a uniform rate, but it is lower than the rate for males.

Table 21.3 Lifetime Net Tax Rates for Living and Future Generations under Reference Assumptions

Generation's Year of Birth	Net Tax Rate	Components of Net Tax Rate: Gross Tax Rate	Components of Net Tax Rate: Gross Transfer Rate
1900	23.9	28.0	4.0
1910	27.5	33.4	6.0
1920	29.6	36.4	6.7
1930	31.3	38.4	7.1
1940	32.5	40.3	7.8
1950	33.4	43.0	9.5
1960	33.3	44.1	10.8
1970	32.4	44.3	11.9
1980	30.8	43.0	12.2
1990	29.3	42.1	12.8
1995	28.6	41.7	13.1
Future generations	49.2		

Source: Authors' calculations

Note: Future generations are those born in 1996 and thereafter. Numbers may not add up because of rounding.

50-year-old man because the 40-year-old has 10 more years of taxes to pay and is 10 years farther from receiving social security and Medicare benefits. But the accounts cannot say whether the 40-year-old paid net taxes in the past at the same effective rate as the 50-year-old when he was 40. Nor do the accounts state how a 60-year-old woman's current negative account compares with her past net taxes.

To compare everyone on the same basis, generational accounting calculates the effective rate at which each generation pays net taxes over its entire life—its lifetime net tax rate. The method first estimates each generation's past net taxes (in addition to its prospective net taxes) to find its per capita lifetime net taxes. Those per capita net taxes are then discounted to the year in which the generation was born in order to find its generational account at birth. Similarly, the procedure estimates each generation's per capita lifetime labor income and finds its present value at birth. The generational account at birth is then divided by the present value at birth of per capita lifetime labor income to yield the generation's lifetime net tax rate. A lifetime net tax rate compares all generations on the same basis—the effective share of labor income that its members will pay in net taxes over their entire lives.

As table 21.3 shows, the lifetime net tax rate for successive generations has both risen and fallen over the century. It started at 23.9 percent for people born in 1900, climbed to 33.4 percent for those born in 1950, then fell to 28.6 percent for those born in 1995.[9] The rise in the rate for successive generations

9. The rates are ratios of population-weighted net taxes to population-weighted labor incomes.

through 1950 coincided with a similar increase in the share of output devoted to government purchases. The decline in the rate for successive generations since 1950 stems mostly from three factors: longer life expectancies, a decline in the effective rate of excise taxes, and—most important—the rapid growth in per capita health care and social security transfers that began in the 1960s.[10]

The results shown in table 21.3 indicate that the reference policy is unsustainable. Either prospective purchases must fall or the effective schedule at which people pay net taxes must rise—if not for current generations, then for future ones. If current generations pay net taxes as scheduled by the reference policy, current newborns will pay lifetime net taxes of 28.6 percent, and future generations will pay 49.2 percent.[11]

We can use these lifetime net tax rates to quantify the notion of generational imbalance. The degree of such imbalance is given as a percentage, namely, the arithmetic difference between the lifetime net tax rates of future generations and current newborns as a fraction of the lifetime net tax rate of current newborns. Thus the degree of imbalance under the reference scenario is 72 percent (the difference between 49.2 and 28.6 as a percentage of 28.6). A degree of zero indicates generational balance while a negative degree indicates an imbalance in favor of the future.

21.1.4 Benefits of Government Spending on Education by Age and Sex

How would this outcome differ if the accounts assigned, by age, the benefits that living generations receive from government purchases? It is impossible to assign the benefits from many purchases, such as those for defense or administration, because they generate public services that apply equally to everyone.[12] Arguably, however, we can estimate by age the per capita benefits from one category of purchases—educational spending (now about one-fifth of total government purchases). Below, we recalculate the generational accounts by treating all prospective government spending for education as a transfer rather than a purchase, then distributing that spending by age.[13]

The recalculation substantially lowers the lifetime net taxes of those under age 25 (see tables 21.4 and 21.5), since they receive most of the benefits from

10. Excise taxes affect a generational account at birth more than do other taxes. Generational accounting prorates excise taxes among all family members, including children. Therefore, a decline in the excise tax lowers the estimated taxes that a child pays early in life. An earlier payment has a higher present value at birth than does the same payment at a later time. Hence, a cut in the excise tax lowers lifetime net tax rates by more than does a cut in another tax that reduces current revenue by the same amount.

11. These figures do not predict what *will* happen, only what *would* happen if the reference policy applied to current generations for the rest of their lives.

12. Beyond 2070 (the end of the reference projection), generational accounting prorates each year's per capita cost of such purchases to everyone alive in that year. However, the method is used only to estimate total prospective purchases, not to try to assign the benefits of those purchases by age.

13. Data used in the calculation are from the Department of Education (1997).

Table 21.4 **Composition of Male Generational Accounts under Reference Assumptions: Benefits of Educational Expenditure Distributed by Age and Sex (present value in thousands of 1995 dollars)**

		Tax Payments				Transfer Receipts			
Generation's Age in 1995	Net Tax Payment	Labor Income	Capital Income	Payroll	Other[a]	OASDI	Health	Other	Education
0	25.7	33.5	9.0	34.3	31.5	7.2	19.6	4.2	51.7
5	33.1	41.6	11.2	42.8	36.6	8.8	22.5	5.2	62.6
10	71.4	52.1	14.3	53.9	42.5	10.6	26.3	6.5	48.1
15	120.1	65.1	18.1	67.8	48.6	12.1	30.4	8.1	28.9
20	172.7	79.5	23.5	83.6	53.4	13.7	34.4	9.7	9.5
25	193.3	86.0	27.9	90.6	53.5	16.4	35.4	10.1	2.9
30	195.1	86.3	33.7	90.2	52.7	19.9	36.4	9.8	1.7
35	187.8	82.9	40.7	86.0	51.4	24.6	38.2	9.2	1.2
40	170.4	76.0	46.6	78.6	50.4	30.8	40.9	8.7	.7
45	138.7	65.1	50.2	67.4	47.7	38.8	44.3	8.1	.5
50	93.6	50.8	51.3	52.9	43.7	49.3	48.0	7.6	.2
55	37.3	34.6	49.7	36.3	38.7	62.8	52.0	7.0	.1
60	−25.6	18.6	46.3	19.5	32.9	80.1	56.5	6.3	.1
65	−77.7	7.4	41.2	7.5	27.5	91.8	63.8	5.7	.0
70	−89.2	3.2	33.0	3.3	22.2	85.0	60.9	5.1	.0
75	−87.9	1.6	22.4	1.7	16.9	71.7	54.5	4.2	.0
80	−77.3	.9	11.2	1.0	11.9	54.8	44.4	3.1	.0
85	−68.3	.7	.0	.7	8.0	42.6	32.9	2.1	.0
90	−53.8	.5	.0	.5	6.3	33.7	25.9	1.7	.0
Future generations	114.3								
Percentage difference	340.3								

Source: Authors' calculations.

Note: Future generations are those born in 1996 and thereafter. The net tax payment represents a present value as of 1996. The percentage difference between the net tax payments of future generations and current newborns is calculated after adjustment for growth (see text).

[a]Includes excise and other indirect taxes, property taxes, and other taxes.

Table 21.5 **Composition of Female Generational Accounts under Reference Assumptions: Benefits of Educational Expenditure Distributed by Age and Sex (present value in thousands of 1995 dollars)**

		Tax Payments				Transfer Receipts			
Generation's Age in 1995	Net Tax Payment	Labor Income	Capital Income	Payroll	Other[a]	OASDI	Health	Other	Education
0	.1	19.4	9.5	20.9	30.4	6.8	14.8	6.8	51.8
5	.8	24.1	11.9	26.1	35.2	8.3	16.9	8.5	62.6
10	29.9	30.2	15.1	32.9	40.5	10.0	19.9	10.6	48.2
15	66.8	37.7	19.3	41.3	45.6	11.3	23.4	13.5	28.9
20	105.5	45.7	24.8	50.7	49.8	12.7	26.6	16.8	9.5
25	119.7	48.1	30.3	53.7	50.4	15.3	28.9	15.7	3.0
30	119.0	46.2	36.2	51.6	50.1	18.6	31.7	13.2	1.7
35	112.6	42.8	42.3	47.9	49.8	23.0	35.2	10.8	1.2
40	98.3	38.2	46.3	43.0	48.6	28.8	39.6	8.7	.8
45	72.2	31.6	47.7	35.7	46.2	36.5	45.0	7.0	.6
50	37.3	23.6	46.8	26.9	42.3	46.9	49.5	5.6	.2
55	−5.3	15.0	44.8	17.2	37.6	60.6	54.5	4.8	.2
60	−52.1	7.6	41.6	8.7	32.4	78.6	59.5	4.2	.1
65	−91.2	2.7	35.6	3.1	27.1	89.3	66.5	3.8	.0
70	−101.1	1.0	25.3	1.2	22.2	83.4	63.9	3.4	.0
75	−101.0	.5	14.1	.6	16.9	71.6	58.5	2.9	.0
80	−90.2	.3	5.3	.3	12.4	57.2	48.8	2.4	.0
85	−73.6	.1	.0	.1	9.4	43.5	37.8	1.9	.0
90	−55.8	.1	.0	.1	7.2	33.2	28.5	1.5	.0
Future generations	0.3								

Source: Authors' calculations.

Note: Future generations are those born in 1996 and thereafter. The net tax payment represents a present value as of 1996. The percentage difference between the net tax payments of future generations and current newborns is calculated after adjustment for growth (see text).

[a]Includes excise and other indirect taxes, property taxes, and other taxes.

such spending. The recalculated generational account for males born in 1995 is only $25,700, and for females, only $100. Thus educational spending cancels much of the net taxes that the rest of the reference policy imposes on the youngest generations.

At the same time, the recalculation also lowers projected purchases (by classifying educational outlays as transfers) and thereby reduces the residual burden on future generations. Thus, at 19.8 percentage points, the arithmetic difference in the recalculated lifetime net tax rates of future generations and current newborns is nearly as large as when educational outlays are counted as purchases.

21.2 Recent Improvement in the Generational Stance of U.S. Fiscal Policy

In the past two years, the generational stance of U.S. fiscal policy has improved markedly from that reported in the accounts using 1993 as the base year (GA1993).[14] Given the economic outlook and policy schedule of two years ago, GA1993 estimated that future generations would pay a lifetime net tax rate of 84.4 percent. That rate falls to 49.2 percent under the reference scenario for the base year 1995 (GA1995).

What explains this improvement? Most of it stems from lower projected federal spending for medical care, which is now about 10 percent less than what was expected two or three years ago. As a result, projected transfer spending for health care is growing from a lower base and remains a smaller share of output (see fig. 21.1). The output shares of other projected taxes, transfers, and government purchases are also below levels seen two years ago. The reason for lower purchases growth is that projections for state and local government purchases are below GA1993 levels.

We examine the effects of moving from GA1993 to GA1995 by cumulatively updating their underlying assumptions. The change from base year 1993 to 1995 means that the accounts treat people born in 1994 and 1995 as current rather than as future generations. In GA1995, these two generations no longer assume a share of the accumulating residual burden that falls on future generations. Thus time and compound interest alone raise the lifetime net tax rate on future generations to 87.4 percent (see table 21.6). The updated projections for population, however, reduce that rate to 85.3 percent. As noted, the newer projections for transfers (especially for health care) decrease the rate much farther—more than 40 percentage points. The smaller transfers projected for

14. See Auerbach et al. (1995). The base calculation in 1993 used the Office of Management and Budget's economic and budget projections through 2030. Those projections were extended by assuming that per capita taxes, transfers, and purchases by age and sex grew at the same rate as labor productivity.

These calculations, and those that follow, treat government outlays for education as purchases.

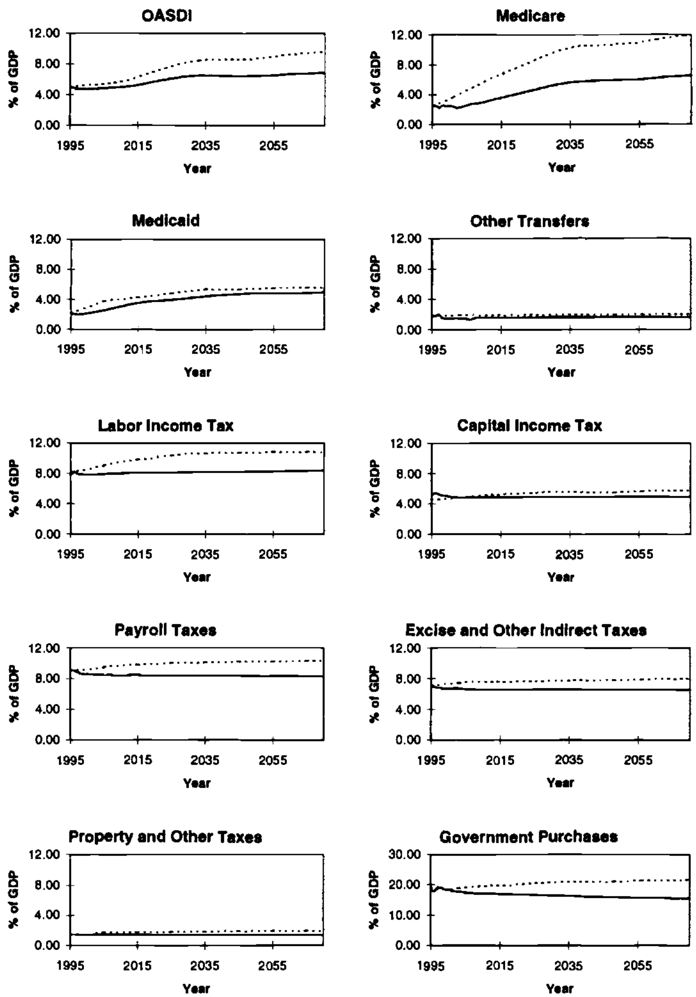

Fig. 21.1 Comparison of projected budget aggregates: GA1993 and GA1995
Source: Office of Management and Budget; Congressional Budget Office; authors' calculations.
Note: Dashed line is GA1993; solid line is GA1995. "Excise and other indirect taxes" excludes property taxes.

GA1995 entail higher net taxes on living generations and thus a lower residual burden on future ones. The more recent estimates of current government net wealth and projected purchases by state and local governments lighten that burden still more. By contrast, the lower revenue projections of GA1995 reduce the lifetime net tax rate on current newborns and raise that on future generations.

Table 21.6 **Generational Accounts, 1993 versus 1995: Cumulative Impact of Updating Demographic and Fiscal Projections**

	Lifetime Net Tax Rates		
	Newborns	Future Generations	Percentage Difference
1993 Accounts	34.2	84.4	147.1
Freeze 1993 policy for two years	34.1	87.4	156.0
Update demographic projections	33.6	85.3	154.1
Fiscal projections			
Transfers			
1. Social security	34.6	76.4	121.2
2. Medicare and Medicaid	36.9	46.9	27.1
3. Other	37.7	44.5	18.1
Government purchases			
1. Federal	37.7	46.0	22.0
2. State and local	37.7	21.5	−42.9
Government wealth	37.7	20.8	−44.8
Taxes			
1. Income (labor and capital)	33.6	32.5	−3.2
2. Payroll	31.1	40.5	30.5
3. Excise and other indirect	29.1	46.7	60.4
4. Property and other	28.7	49.3	71.9
Projected labor income	28.6	49.2	71.9
1995 Accounts	28.6	49.2	71.9

Source: Authors' calculations.

21.3 Sensitivity to Alternative Assumptions

21.3.1 Alternative Projections for Government Purchases and Health Care

The reported calculations depend on many uncertain or arguable economic and budgetary assumptions. For instance, the reference scenario assumes that real federal discretionary spending falls through 2007 at an average rate of 1.3 percent per year; after that, it grows at the same rate as output. By contrast, the Balanced Budget Act of 1997 limits discretionary spending only through 2002, although subsequent legislation may extend such limits even more.[15]

In the near term, both the budget act and the reference policy would intensify the post–Korean War period's secular decline in discretionary spending as a share of output. In the long run, however, it may be difficult to keep such a tight rein on discretionary spending (mostly purchases). For instance, federal nondefense purchases since the 1950s have varied little as a share of output. Moreover, the current replacement schedule for aging defense systems may strain prospective budgets.

15. The act itself extended the limits on discretionary spending set by the Omnibus Budget and Reconciliation Act of 1993.

Similar uncertainty besets projections of federal mandatory spending (mostly transfers), especially for health care. Through 2007, the reference scenario assumes that real per capita Medicare outlays by age outpace labor productivity by an average of 3.4 percentage points per year. That difference tapers to zero by 2020, after which Medicare spending is assumed to grow at the same rate as labor productivity. On average through 2020, per capita Medicare spending by age grows 2.4 percentage points per year faster than labor productivity.[16]

Projections for health care outlays are notoriously uncertain. For many years, analysts underpredicted per capita spending for these rapidly expanding programs. In the past several years, however, such outlays have increased much more slowly than expected. No one is entirely sure of the reasons behind this slowdown, and it is possible that rapid growth may resume. On the other hand, growth may continue at its slower pace or slacken even more, and budgetary pressures may require limits on the expansion of medical programs.

How much do the accounts change if we look at alternative budgetary assumptions in order to allow for uncertainty or ambiguity? To find out, we examine the effects of two optimistic policies that specify lower spending for purchases and health care.[17] The first holds real federal purchases constant after 2000; the second slows the growth rate of per capita Medicare outlays by age. Under the latter policy, per capita medical spending through 2003 grows at an average rate that is 2 percentage points per year slower than under the reference policy. After 2003, per capita outlays expand at the same rate as labor productivity.

These policies depart significantly from current conditions and from the reference policy. For example, federal purchases now represent 6.0 percent of output. In 2070, that share is 4.2 percent under the reference policy, but only 1.5 percent if real federal purchases stay constant after 2000. Total spending for Medicare is now equal to 2.7 percent of output. In 2070, it reaches 7.1 percent under the reference policy, but only 4.3 percent if that spending grows more slowly.

Given the other reference assumptions, these alternative policies reduce the generational imbalance but do not eliminate it. If real federal purchases remain constant after 2000, the lifetime net taxes of living generations remain unchanged. However, the policy lowers projected spending for purchases. That decrease leaves a smaller residual burden on future generations, reducing their lifetime net tax rate from 49.2 to 44.6 percent (see table 21.7). Unlike constant purchases, slow Medicare growth boosts the per capita net taxes of every living generation (because it lowers their projected transfers). Like constant purchases, however, slow Medicare growth lessens the burden that current genera-

16. The Health Care Financing Administration (1997) makes similar assumptions.

17. Projected federal purchases under this assumption serve as a proxy for federal discretionary outlays. Purchases now make up about 90 percent of federal discretionary spending, which in turn accounts for around 37 percent of noninterest federal outlays.

Table 21.7 **Lifetime Net Tax Rates under Alternative Health Care and Federal Purchases Assumptions**

Generation's Year of Birth	Reference	Slower Purchases Growth[a]	Slower Health Care Growth[b]	Slower Health Care and Purchases Growth
1900	23.9	23.9	23.9	23.9
1910	27.5	27.5	27.5	27.5
1920	29.6	29.6	29.7	29.7
1930	31.3	31.3	31.4	31.4
1940	32.5	32.5	32.9	32.9
1950	33.4	33.4	34.0	34.0
1960	33.3	33.3	34.1	34.1
1970	32.4	32.4	33.6	33.6
1980	30.8	30.8	32.4	32.4
1990	29.3	29.3	31.4	31.4
1995	28.6	28.6	30.9	30.9
Future generations	49.2	44.6	38.1	33.5

Source: Authors' calculations.

[a]Federal purchases are held constant in real terms after the year 2000.

[b]Per capita spending by age for health care grows 2 percentage points slower than under reference policy through 2003 and grows at the same rate as labor productivity thereafter.

tions leave for future generations, and their lifetime net tax rate falls to 38.1 percent. A policy of both constant real federal purchases and slow Medicare growth yields lifetime net tax rates of 33.5 percent for future generations and 30.9 percent for current newborns. Therefore, a small generational imbalance remains despite optimistic assumptions for federal purchases and Medicare outlays.

The response of lifetime net tax rates to slower Medicare growth may seem paradoxical. Slow growth raises the lifetime net tax rate for the oldest generation the least, although that generation receives the lower transfers now. By contrast, slow growth increases that rate for the youngest generation the most, although these individuals collect the lower benefits later. This pattern occurs in part because people over age 65 will receive the smaller benefits for fewer years until death, a fact that reduces its cumulative lifetime impact.

More fundamentally, the pattern occurs because slower growth makes a greater difference over a long time horizon. For instance, if per capita benefits rise 1 percentage point per year less, benefits at age 65 will be 1 percent lower for this year's 64-year-old, 2 percent lower for this year's 63-year-old, and so forth. Moreover, the decline in benefits at age 65 is discounted not to the base year but to the generation's year of birth. Thus slow Medicare growth cuts the present value of the newborn's benefit at age 65 by proportionately more than that of the one-year-old. Slower growth thus raises the lifetime net taxes (reduces the lifetime net transfers) of the current newborn by more than those of the one-year-old, boosts the net taxes of a one-year-old by more than those of a two-year-old, and so on.

21.3.2 Alternative Discount and Productivity Growth Rates

The accounts also depend on uncertain assumptions about the rates of discount and productivity growth. As noted, the reference case uses a real discount rate of 6 percent ($r = 0.06$) and assumes that labor productivity eventually increases 1.2 percent per year ($g = 0.012$).

A 6 percent discount rate is roughly equal to the historical real rate of return on equity, but there are arguments for using a lower or higher rate. For example, it may be reasonable to use a discount rate closer to the real rate of return on long-term government debt (2 or 3 percent), or to the real pretax rate of return on private capital (10 or 12 percent). That range reflects ambiguity about how to deal with such issues as risk, opportunity cost, and the equity-premium puzzle (see CBO 1995, 41–43).

In the same vein, the trend of labor productivity has varied significantly in the past, growing at an average annual rate of 1.3 percent from 1902 to 1929, 1.2 percent from 1929 to 1948, 2.8 percent from 1948 to 1966, and 0.9 percent from 1966 to 1996.[18] Moreover, productivity growth swung wildly during the 1929–48 period in response to the Depression, World War II, and demobilization. To examine how sensitive the results are to these assumptions, we next calculate generational accounts using alternative discount and productivity growth rates. The alternative assumptions are 3 and 9 percent for the discount rate and 0.7 and 1.7 percent for the productivity growth rate.

Given the reference policy, generational accounts remain imbalanced under all combinations of these growth rates, with the degree of imbalance ranging from 53 to 334 percent (see table 21.8). Given the alternative spending policies, some combinations of discount and productivity growth rates tip the generational scales in favor of the future. Most do not, however, and the degree of imbalance ranges from −4 to 155 percent (see table 21.9). Lifetime net tax rates on future generations fall below those on current newborns only at a low discount rate and a moderate or high growth rate.

The degree of imbalance responds more to the differences considered for the discount rate than to those for the productivity growth rate. A higher discount rate typically makes the residual burden accumulate faster and thereby raises the degree of imbalance.[19] On the other hand, higher productivity growth tends to boost income and output, and they in turn feed into higher values for

18. For consistent comparison, labor productivity is defined in this example as GDP per worker. The periods seem to define growth epochs, with the first three spanning nonsuccessive peaks in the annual business cycle. There was no peak in 1966, but economists generally agree that the trend in labor productivity growth changed about then. Neither was 1996 a peak year, but it is the most recent full year for which we have data and comes after a long (six-year) expansion.

19. This statement is true as long as the sum of the current value of the net debt of government, NWG_t, plus the present value of prospective government purchases, PVG_t, exceeds the present value of prospective net taxes of living generations, PVL_t. The condition is easily satisfied for any reasonable values.

Table 21.8 **Percentage Difference in Lifetime Net Tax Rates of Future Generations and Current Newborns under Alternative Discount and Growth Rate Assumptions**

Discount Rate	Growth Rate 0.007	Growth Rate 0.012	Growth Rate 0.017
0.03	84	53	83
0.06	160	72	127
0.09	334	130	253

Source: Authors' calculations.

Table 21.9 **Percentage Difference in Lifetime Net Tax Rates of Future Generations and Current Newborns under Alternative Discount and Growth Rate Assumptions with Slower Health Care Growth and Constant Real Federal Purchases**

Discount Rate	Growth Rate 0.007	Growth Rate 0.012	Growth Rate 0.017
0.03	24	−4	10
0.06	85	8	53
0.09	126	45	155

Source: Authors' calculations.

purchases and the net taxes of living generations (see CBO 1997b). That phased-in response dilutes the impact of higher productivity growth on the lifetime net tax rates of all generations.[20]

21.3.3 Alternative Demographic Projections

Uncertainty about population growth also afflicts generational accounts (or any other long-run projection). As noted, the accounts use the SSA's intermediate projection for a base case (and extend it as described earlier). However, the SSA also projects high- and low-growth paths to try to describe a reasonable range of uncertainty about its estimates for the probable actuarial balance of

20. Seemingly paradoxical reversals sometimes occur. For example, suppose that the discount and productivity growth rates shown in table 21.8 move, respectively, from 3 to 6 percent and from 0.7 to 1.2 percent. The degree of imbalance then falls from 84 to 72 percent. However, it subsequently rises to 253 percent as the discount and productivity growth rates move higher, to 9 percent and 1.7 percent, respectively. Such reversals occur both because the degree of imbalance is a percentage ratio and because the discounting process can lead to the same kind of "reswitching" issues that arise in capital theory. A higher discount rate reduces the absolute present value in any year a tax is paid or a wage transfer is received. A higher productivity growth rate raises those absolute present values. Therefore, a lifetime net tax rate may go up or down if both the discount and productivity growth rates are higher. Moreover, people generally pay taxes in youth and middle age and receive transfers in old age. Other things equal, a higher discount rate reduces the present value of both taxes and transfers, so that the present value of net taxes (taxes less transfers) may rise or fall. A higher discount rate is more likely to raise the present value of net taxes in the

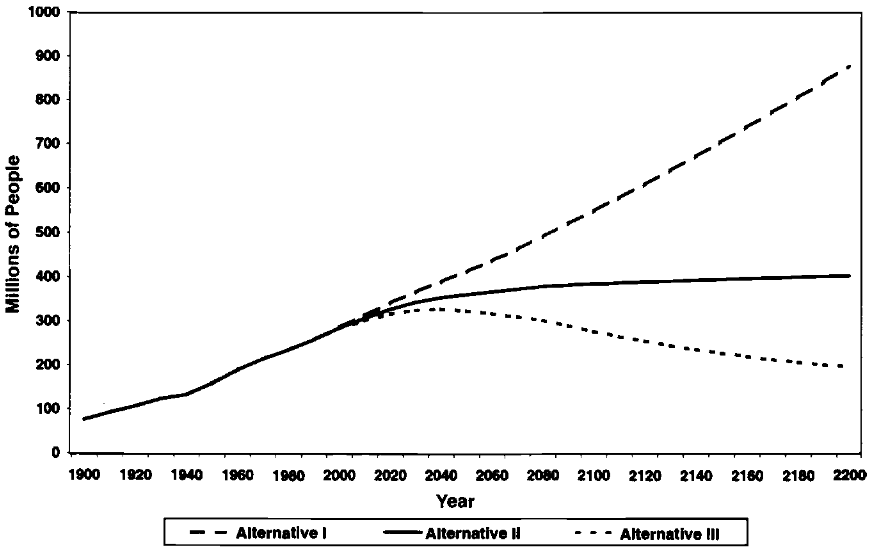

Fig. 21.2 Population 1900–1990 and projections 2000–2200

the social security trust fund. The three population projections represent low-cost (alternative I), mid-cost (alternative II), and high-cost (alternative III) outcomes.

The differences in populations depend on differences in their fertility, mortality, and net immigration rates. Alternative I assumes the highest rates for all of those demographic factors, and alternative III assumes the lowest. Higher rates imply more workers paying taxes and fewer retirees receiving transfers; lower rates imply the opposite. The population of alternative I grows to about twice that of alternative II, while the population of alternative III falls to about half the size (see fig. 21.2).[21]

All of the alternatives show a rise in the old-age dependency ratio—the population aged 65 or older as a share of the population aged 20 to 64. As the baby boom generations retire, that ratio increases during the years from about 2010 to 2035 (see fig. 21.3). The ratio for alternative II then levels off, with fertility and immigration rates largely offsetting its mortality rates to roughly stabilize the size and the age composition of the population. The ratio for alter-

following cases: the initial discount or productivity growth rate is higher, the recipient receives a given transfer at a later age, or the recipient gets a larger transfer at a given age (as in the earlier case of slow Medicare growth, when the newborn's benefit at age 65 was cut by proportionately more than that of the one-year-old).

21. Another way to compare these alternatives is to look at their populations in 2200 as ratios of the population in 1995. Under alternative I, the population increases by the year 2200 to more than 300 percent of its 1995 level; under alternative II, it rises to about 150 percent of its 1995 level; and under alternative III, it declines to about 70 percent of its 1995 level.

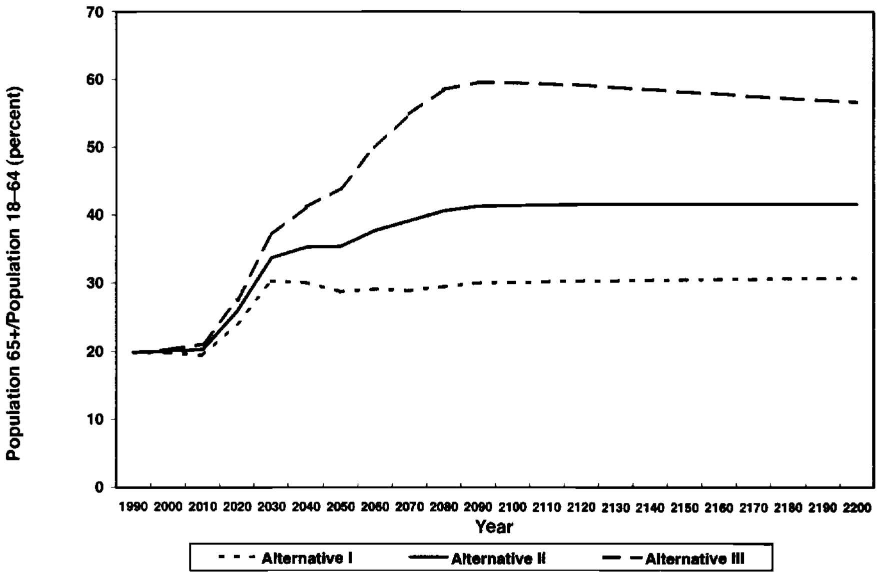

Fig. 21.3 Old-age dependency ratios under alternative population projections

native I falls, since higher mortality rates reduce the relative number of old people, and higher fertility and immigration rates expand the relative number of working-age people. The opposite occurs under alternative III.

For living generations, higher mortality and immigration rates usually imply higher generational accounts for the old and lower ones for the young (see table 21.10). For instance, the accounts of old generations are higher (less negative) under alternative I than under alternative II, while the accounts of very young generations are lower. The higher mortality rates associated with alternative I imply that fewer people of any age live to any given year in the future. People now old will receive less in transfers, and people now young will pay less in taxes (whose present value is greater than that of the later transfers that they would otherwise receive).

The pattern is not strictly consistent because net immigration boosts the later size of some young generations. For instance, the generational account for 20-year-old males is highest under alternative I. That apparent anomaly reflects the prospective U.S. net taxes of the current foreign 20-year-old males who will immigrate later. That is, the population count in the base year excludes their present numbers, but the generational account includes their prospective taxes and transfers. In effect, the accounts assign those prospective net taxes to the current population of 20-year-old U.S. males. That assignment raises the (per capita) generational account; a higher immigration rate increases it still more.

The accounts of living generations typically vary by less than 2 percent in

Table 21.10 Generational Accounts under Alternative Demographic Assumptions (present value in thousands of 1995 dollars)

	Net Tax Payments under Alternatives					
	I		II		III	
Generation's Age in 1995	Male	Female	Male	Female	Male	Female
0	75.4	50.3	77.4	51.9	79.8	53.6
5	94.1	62.1	95.7	63.4	97.7	65.0
10	118.8	77.1	119.5	78.1	121.0	79.4
15	149.3	95.1	149.1	95.7	149.8	96.7
20	183.3	114.8	182.2	115.0	181.9	115.6
25	195.8	121.7	196.2	122.6	196.5	123.6
30	195.7	119.4	196.8	120.7	197.2	121.8
35	187.7	112.5	189.0	113.8	189.2	114.8
40	170.0	98.1	171.2	99.0	171.7	99.7
45	138.3	72.2	139.2	72.8	139.8	73.2
50	93.3	37.3	93.7	37.4	94.0	37.4
55	37.6	−4.8	37.5	−5.2	37.3	−5.7
60	−24.8	−51.0	−25.5	−52.0	−26.3	−53.0
65	−76.3	−89.4	−77.7	−91.2	−79.0	−92.8
70	−87.5	−98.8	−89.2	−101.0	−90.9	−103.1
75	−86.1	−98.6	−89.9	−101.0	−89.7	−103.2
80	−75.6	−88.1	−77.2	−90.2	−78.9	−92.2
85	−66.9	−72.0	−68.3	−73.5	−69.6	−75.1
90	−52.8	−54.8	−53.8	−55.8	−54.8	−56.8
Future generations	116.6	77.8	134.6	90.2	153.7	103.3
Percentage difference	52.1	52.1	71.9	71.9	89.5	89.5
Lifetime net tax rates[a] (%)						
Current newborns	26.8		28.6		30.3	
Future generations	40.9		49.2		57.6	

Source: Authors' calculations.

[a]Lifetime net tax rates are population-weighted averages across males and females.

response to population differences. The percentage differences tend to be greatest at the ages with the highest mortality rates—newborns and seniors. The alternative populations assume greater *differences* in their mortality rates and thus imply greater proportional differences in their generational accounts. Fertility rates affect only the population of future generations, not the accounts of current generations.

For future generations, fertility, mortality, and net immigration rates all play a role. The higher fertility rates of alternative I imply larger future generations to share the residual burden, thereby reducing their lifetime net tax rates. Higher mortality rates play a smaller and partly offsetting role. Fewer young people live to pay taxes in middle age, fewer middle-aged people live to collect benefits in old age, and fewer old people live to collect them for as long a period. Given the age pattern of net immigration, a higher immigration rate implies relatively more workers.

The lifetime net tax rates of future generations respond more to alternative populations than do those of current newborns. Even if differences in mortality produce a relatively small change in the account of any one current generation, their combined effect produces a relatively large change in the residual burden on future generations. Under the various population assumptions, the lifetime net tax rate for future generations ranges from about 41 percent under alternative I to about 58 percent under alternative III. The degree of generational imbalance ranges from 52 percent under alternative I to 90 percent under alternative III. Thus, even under optimistic assumptions about the population, the reference policy remains unsustainable.

21.4 Policies for Eliminating Generational Imbalance

21.4.1 Alternative Ways to Indicate the Extent of Generational Imbalance

So far, we have assumed that living generations pay net taxes as scheduled for the rest of their lives. The spending side of the fiscal schedules examined here have followed the reference policy or an alternative policy (either constant real federal purchases or slow growth in Medicare outlays, or both). We have further assumed that all future generations share the resulting residual burden proportionately by paying the same lifetime net tax rate. Given the other reference assumptions, each policy we have considered has been generationally imbalanced (i.e., future generations must pay a higher lifetime net tax rate than current newborns) and is thus unsustainable.

Some observers have criticized this way of analyzing the generational stance of fiscal policy, arguing that if a fiscal schedule is unsustainable, lawmakers will change it so that some or all living generations will pay higher net taxes, and future generations will pay less than they otherwise would have (see, e.g., Eisner 1994; Haveman 1994).[22] To address this concern, we now calculate policy changes that would equalize the lifetime net tax rates of current newborns and future generations. The policies we examine involve permanently raising particular taxes or cutting particular outlays by a policy-specific percentage starting in 1998, 2003, or 2016. The different policies result in different equalized lifetime net tax rates on current newborn and future generations and require different dollar amounts of tax increases or outlay cuts in the first year of their implementation.

22. Another criticism stems from the Ricardian equivalence proposition, which states that current generations, perceiving that higher current deficits entail higher net taxes on future generations, will respond by increasing their saving and bequests. However, formal tests fail to detect the altruistic behavior required for Ricardian equivalence to hold. See Altonji, Hayashi, and Kotlikoff (1992, 1997).

21.4.2 Percentage Changes Needed in Various Programs to Reach Balance

The first two rows of table 21.11 repeat the lifetime net tax rates on current newborns and future generations under the alternative assumptions. The remaining rows list alternative tax, transfer, or purchase policies that may be used to restore generational balance, while the columns indicate the assumptions (reference, constant real purchases, slow health care growth, and so on) underlying the calculations. Columns (1)–(4) show the required percentage change, and columns (5)–(8) indicate the equalized value of the lifetime net tax rate under each row-specific policy and column-specific assumption.[23]

Given the other reference assumptions, balance can be achieved in 1998 by permanently raising the schedules for all income taxes on current generations by 20.4 percent (panel A, row 1, col. [1]). That equalizes lifetime tax rates at 31.9 percent, raising the rate on current newborns from 28.6 percent and lowering the rate on future newborns from 49.2 percent (panel A, row 1, col. [5]). If real federal purchases remain constant after 2000, the required hike in income taxes is 15.8 percent, implying an equalized lifetime net tax rate of 31.1 percent (panel A, row 1, cols. [2] and [6]). If Medicare spending grows slowly, the income tax hike is even smaller (7.1 percent), but the equalized lifetime net tax rate rises (32.1 percent). With constant real federal purchases and a deceleration in Medicare outlays, the required tax increase is smaller yet (2.6 percent), and the equalized lifetime net tax rate is 31.3 percent.

Similarly, if we fix the other reference assumptions and change the various fiscal programs, balance can be reached via several alternative policies, including a hike in taxes of 8.9 percent, a cut in social security transfers of 47.5 percent, a cut in health care outlays of 36.8 percent, or a reduction in all purchases of 15.4 percent (col. [1]). These policies equalize the lifetime net tax rates of current newborns and future generations at values that differ by policy, namely, 32.3 percent for raising all taxes, 30.1 percent for cutting social security benefits, 31.3 percent for cutting all health care benefits, 31.0 percent for cutting all transfers, and 28.6 percent for cutting all purchases. (The reasons for these differences are explained below.)

21.4.3 Variation in Percentage Changes and Equalized Lifetime Net Tax Rates

Why do the percentage changes and the equalized lifetime net tax rates differ across each row and down each column of table 21.11? Moving across each row, the respective percentage changes are lower because the underlying assumptions involve progressively smaller degrees of initial imbalance. Hence, restoring balance requires progressively smaller percentage changes in a row-specific policy.

23. A table indicating the initial dollar amounts of revenue increases and transfer or purchase reductions for each of the policies considered in table 21.11 is available upon request from the authors.

Table 21.11 Policies for Equalizing the Lifetime Net Tax Rates of Newborn and Future Generations

	Percentage Change				Equalized Lifetime Net Tax Rate			
	Reference (1)	Slower Purchases Growth[a] (2)	Slower Health Care Growth[b] (3)	Slower Health Care and Purchases Growth (4)	Reference (5)	Slower Purchases Growth[a] (6)	Slower Health Care Growth[b] (7)	Slower Health Care and Purchases Growth (8)
No Change Lifetime Net Tax Rates								
Newborns					28.6	28.6	30.9	30.9
Future generations					49.2	44.6	38.1	33.5
			A. Policy Change in 1998					
Percentage tax increases								
Income tax[c]	20.4	15.8	7.1	2.6	31.9	31.1	32.1	31.3
Income tax (federal only)	24.9	19.4	8.7	3.1	31.9	31.1	32.1	31.3
Payroll tax	31.0	24.1	10.8	3.9	32.4	31.6	32.3	31.4
Other taxes[d]	39.7	30.8	13.9	5.0	33.3	32.2	32.6	31.5
All taxes	8.9	6.9	3.1	1.1	32.3	31.5	32.2	31.4
Percentage transfer cuts								
Social security	47.5	36.9	16.5	5.9	30.1	29.8	31.4	31.1
Health	36.8	28.6	16.8	6.0	31.3	30.7	31.8	31.2
All transfers	18.5	14.3	7.3	2.6	31.0	30.5	31.7	31.2
Percentage purchases cuts								
Entire government	15.4	12.3	5.3	2.0	28.6	28.6	30.9	30.9
Federal	38.7	31.1	13.5	5.0	28.6	28.6	30.9	30.9
			B. Policy Change in 2003					
Percentage tax increases								
Income tax[c]	25.3	19.7	8.8	3.2	32.6	31.7	32.3	31.4
Income tax (federal only)	31.0	24.1	10.8	3.9	32.6	31.7	32.3	31.4
Payroll tax	38.7	30.1	13.5	4.8	33.4	32.3	32.6	31.5
Other taxes[d]	50.8	39.5	17.7	6.4	34.0	32.8	32.8	31.6
All taxes	11.2	8.7	3.9	1.4	33.1	32.1	32.5	31.5

(continued)

Table 21.11 (continued)

	Percentage Change				Equalized Lifetime Net Tax Rate			
	Reference (1)	Slower Purchases Growth[a] (2)	Slower Health Care Growth[b] (3)	Slower Health Care and Purchases Growth (4)	Reference (5)	Slower Purchases Growth[a] (6)	Slower Health Care Growth[b] (7)	Slower Health Care and Purchases Growth (8)
Percentage transfer cuts								
Social security	57.4	44.6	20.0	7.2	30.3	29.9	31.5	31.1
Health	42.2	32.8	20.2	7.3	31.6	31.0	31.9	31.3
All transfers	21.8	16.9	8.8	3.2	31.3	30.7	31.8	31.3
Percentage purchases cuts								
Entire government	19.5	15.8	6.8	2.5	28.6	28.6	30.9	30.9
Federal	50.1	40.6	17.4	6.5	28.6	28.6	30.9	30.9
C. Policy Change in 2016								
Percentage tax increases								
Income tax[c]	45.4	35.2	15.8	5.7	35.5	34.0	33.3	31.8
Income tax (federal only)	55.3	43.0	19.2	6.9	35.6	34.0	33.3	31.8
Payroll tax	70.3	54.6	24.5	8.8	36.9	35.0	33.8	32.0
Other taxes[d]	102.0	79.2	35.5	12.8	35.9	34.3	33.5	31.9
All taxes	20.6	16.0	7.2	2.6	35.9	34.3	33.5	31.8
Percentage transfer cuts								
Social security	94.9	73.8	33.0	11.9	30.8	30.3	31.7	31.2
Health	63.7	49.5	32.7	11.7	32.7	31.8	32.3	31.4
All transfers	34.6	26.9	14.6	5.2	32.4	31.5	32.2	31.4
Percentage purchases cuts								
Entire government	35.4	30.0	12.3	4.8	28.6	28.6	30.9	30.9
Federal	92.5	78.4	32.2	12.6	28.6	28.6	30.9	30.9

Source: Authors' calculations.

Note: Calculations incorporate projections by the Congressional Budget Office (CBO). "Newborn" refers to generations born in 1995; future generations are as of 1995.

[a]Federal purchases are held constant in real terms after the year 2000.

[b]Per capita spending by age on health care grows 2 percentage points slower than under reference policy through 2003 then grows at the same rate as labor productivity growth.

[c]Refers to federal, state, and local income taxes.

[d]Includes excise and other indirect taxes, property taxes, and other taxes.

Across each row, there is no general pattern for the *level* of the equalized lifetime net tax rate, but there is a pattern for the *change* in the lifetime net tax rate of current newborns. For a change in a given tax or transfer, the change in that lifetime rate is smaller as we move across each row. For example, an increase in the income tax that restores balance raises the lifetime net tax rate of current newborns by 3.3 percentage points under the reference policy (31.9 percent vs. 28.6 percent). But that lifetime rate rises by 2.5 percentage points when real purchases remain constant, by 1.2 percentage points when Medicare spending grows slowly, and by 0.4 percentage point when real purchases remain constant and Medicare spending grows slowly.

For a cut in purchases, the net taxes of all living generations remain unchanged, so the lifetime net tax rate of current newborns stays at its initial value as we move across each row. However, cutting purchases lowers the residual burden on future generations, and achieving balance requires that the cut be large enough to reduce the rate on future generations until it equals that on current newborns.

For a column-specific initial policy, the variation in the outcome depends largely on which generations are most affected by the row-specific change in policy. On average, older individuals pay more in taxes on capital income and receive more in transfers from social security, Medicare, and Medicaid. Thus, a change in the schedule for such a tax or transfer will make every living generation contribute more—the old now, the young later. By contrast, a change in the schedule for a program that primarily affects young individuals effectively reduces the number of generations that make additional contributions. Therefore, between two programs of the same initial size, an equalizing policy that affects the old more than the young will require both a smaller percentage change and a smaller increase in the lifetime net tax rate on current newborns. The aging of the population and the rapid rise in medical costs greatly magnifies these effects.

21.4.4 Costs of Waiting

Waiting for five years, until 2003, before undertaking such policies requires larger changes than acting sooner (compare columns [1]–[4] in panel B with those in panel A). Under the reference scenario, the delay in trimming purchases again leaves the equalized lifetime net tax rate at the same level as that for current newborns. However, the required percentage cut is larger than when action is taken sooner (19.5 vs. 15.4 percent). Acting later to raise taxes or to cut transfers results in a higher equalized lifetime net tax rate than does acting sooner. The delay implies that some living generations escape the higher taxes or lower transfers, meaning that living and future generations must each bear higher lifetime net tax rates.

Waiting until the year 2016—about the time the largest baby boom generations will retire—requires even greater changes (see panel C). Again, except for purchase cuts, the lifetime net tax rates in panel C are higher than their counterparts in panel B. Such a long delay in restoring balance will involve unrealistically high tax increases, benefit cuts, or purchase reductions. For example, it would involve defaulting on 95 percent of social security's implicit obligations to living generations.

21.5 Conclusion

Reasonable economic and demographic assumptions imply that the generational stance of U.S. fiscal policy remains seriously imbalanced. Although the degree of this imbalance has declined from two years ago, the reference scenario implies lifetime net tax rates of 49.2 percent for future generations and 28.6 percent for current newborns. The schedule of such a policy cannot persist. At some point, projected government purchases must fall or scheduled net tax rates must rise—if not for living generations, then for future ones. We have described the sizes of hypothetical policy changes that would restore generational balance. They appear large, but failure to act soon will require even bigger changes in the future.

References

Altonji, J., F. Hayashi, and L. J. Kotlikoff. 1992. Is the extended family altruistically linked? *American Economic Review* 82, no. 5 (December): 1177–98.

———. 1997. Parental altruism and inter-vivos transfers: Theory and evidence. *Journal of Political Economy* 105, no. 6 (December): 1121–66.

Auerbach, A. J., J. Gokhale, and L. J. Kotlikoff. 1991. Generational accounts: A meaningful alternative to deficit accounting. In *Tax policy and the economy,* vol. 5, ed. D. Bradford, 55–110. Cambridge, Mass.: MIT Press.

———. 1994. Generational accounting: A meaningful way to evaluate fiscal policy. *Journal of Economic Perspectives* 8, no. 1 (winter): 73–94.

———. 1995. Restoring generational balance in U.S. fiscal policy: What will it take? *Federal Reserve Bank of Cleveland Economic Review* 31, no. 1 (quarter 1): 2–12.

Congressional Budget Office (CBO). 1995. *Who pays and when: An assessment of generational accounting.* Washington, D.C.: Government Printing Office, November.

———. 1997a. *The economic and budget outlook: An update.* Washington, D.C.: Government Printing Office, September.

———. 1997b. *An economic model for long-run budget simulations.* Washington, D.C.: Government Printing Office.

———. 1997c. *Long-term budgetary pressures and policy options.* Washington, D.C.: Government Printing Office, March.

Department of Education. Office of Educational Research and Improvement. National Center for Education Statistics. 1997. *Digest of education statistics, 1995.* Washington, D.C.: Government Printing Office.

Eisner, R. 1994. The grandkids can relax. *Wall Street Journal,* 9 November.

Haveman, R. 1994. Should generational accounts replace public budgets and deficits? *Journal of Economic Perspectives* 8, no. 1 (winter): 95–111.

Health Care Financing Administration. 1997. *The annual report of the Board of Trustees of the Federal Hospital Insurance Trust Fund.* Washington, D.C.: Health Care Financing Administration.

Social Security Administration (SSA). 1997. *Annual report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Trust Funds.* Washington, D.C.: Social Security Administration.

This Page Intentionally Left Blank