Generational Accounting
Econ 311
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Introduction

Generational accounting is a way to measure the future net taxes that different birth cohorts will pay to the government over their remaining lifetimes. A birth cohort is all the people born in a given year. Between today and the year they die, a *typical* cohort member will pay taxes to the government (income taxes, FICA taxes, property taxes, etc.) and receive transfer payments from the government (Social Security, Medicare, unemployment benefits, food stamps, etc.). Obviously, not every cohort member will pay the same amount in taxes, nor receive the same amount of taxes. Thus, the generational accounts are birth cohort *averages*.

For instance, say a *typical* cohort member pays \$2000 in income taxes today, pays \$1000 in property taxes, receives \$1000 in Medical benefits, and receives \$500 in food stamps. That means her net payment this year is \$1500 (=2000+1000-1000-500). We can then add up her discounted net payments over her remaining lifetime to calculate her generational account.

Generational accounting was developed to measure the net fiscal burden on a birth cohort (see Auerbach, Gokhale, and Kotlikoff, 1991, and 1994 and Kotlikoff, 1999). The generational account is the present discounted value of remaining net taxes that the *average* member of a birth cohort can expect to pay to all levels of government over his remaining lifetime. If the year of death is D and the discount rate is r, then the generational account of someone in year t is

$$GenerationalAccount_t = NetTax_t + \frac{NetTax_{t+1}}{(1+r)} + \frac{NetTax_{t+2}}{(1+r)^2} + ... + \frac{NetTax_D}{(1+r)^{D-t}}$$

where net taxes are taxes paid minus transfers received. [1] Note that generational accounts are forward looking in the sense that past net taxes are not included.

Generational accounting assumes a long run government budget constraint that balances the present value of government consumption against government net wealth and the present value of net tax payments by current and future generations (see Auerbach and Kotlikoff, 1999).[2] When calculating generational accounts, fiscal policy is assumed to remain constant for living

[1] Taxes include income, capital, property, payroll, excise, and other taxes. Transfers include social security, medical payments, welfare, unemployment benefits, education expenditures, and other transfers.
[2] The government's long-run budget constraint is

$$P.V.Gov.Consumption = Gov.NetWealth + P.V.\sum_{living} G.A. + P.V.\sum_{future} G.A.$$

where G.A. is the generational account. This simply says that in the long run, the government must pay for consumption out of net wealth or through taxing living and future generations.

generations. Future generations therefore are assumed to absorb the full impact of policy changes that are needed in order to balance the long run budget constraint.[3]

Example

As a simple example, consider an overlapping-generations model where every generation has a constant population of one and lives for two periods. In any given year, there are two living generations. The first line of Table 1 shows that the young in year zero were born in year zero while the elderly were born in year (-1). If the government does not collect taxes or make transfer payments in year zero, then net taxes paid by the young and old are each zero. The elderly are in the last year of life and the generational account of those born in year (-1) is zero. If no future taxes or transfers are anticipated, then the generational accounts are also zero for those born in year zero. To simplify, assume that government net wealth is zero, no government consumption is expected in the future, and the discount rate is zero. Then the government's long-run budget constraint says that the sum of generational account of living generations must be equal to the negative of the sum of generational accounts of future generations. Since the sum of generational accounts of living generations is zero, the sum of generational accounts of future generations must also be zero.

[3] This assumption creates the largest imbalance between future and current generations. However, it is likely that current generations will bear some of the fiscal burden of adhering to the long run government budget constraint.

TABLE 1

Effect on Cohort Generational Accounts and Lifetime Net Taxes
of a Tax and Transfer Program Created in Year 1

	Cohort Birth Year		Net Taxes		Generational Account		
Year	young	old	young	old	young	old	sum of future
0	year 0	year -1	$0	$0	$0	$0	$0
1	year 1	year 0	T	-T	0 (= T-T)	-T	T
2	year 2	year 1	T	-T	0 (= T-T)	-T	T

Cohort Birth Year	Lifetime Net Taxes
year -1	0
year 0	-T
year 1	0
.	.
.	.
.	.
future	T

Notes: Each generation lives for two periods and has population one.
See text for further assumptions.
The generational account is the sum of remaining lifetime cohort net taxes.
In year 1, the government begins a permanent program of taxing the current young by $T in order to pay benefits of -$T to the current elderly.
This permanently raises generational accounts of future generations, raises the generational imbalance, and creates an initial "winning" generation of elderly.

Now suppose that the government begins a transfer program in year one, such as Social Security, that transfers resources from the young to old. The young pay T in taxes and the old pay -T in taxes (receive positive transfer payments, which are considered *negative* taxes). If the program is expected to continue in the future, then the current young expect to receive a transfer of T when they are elderly. Thus, the generational account of the young in year one is zero since their taxes are T in year one and are $-T$ in year two. The generational account of the old in year one is -T. Since the sum of generational accounts of living generations is $-T$, the sum of generational accounts of all future generations must be T.[4]

The creation of this transfer program will redistribute resources between birth cohorts. The old in year one receive an increase in lifetime resources since they receive a transfer but paid no taxes. This is shown in the bottom panel of Table 1, which lists total, as opposed to remaining,

[4] Generational accounting distributes these taxes to future generations such that taxes of each successive future generation are constant on a per capita growth-adjusted level. In the given example with a zero discount rate, the increase in net taxes to any individual future generation approaches zero. With a positive discount rate, however, the increase in net taxes to an individual future cohort may be substantial.

lifetime net taxes paid. The initial young, those born in year one, are unaffected by the creation of the transfer program since they expect to both pay taxes and receive transfers over their lifetime. The initial elderly are therefore a *winning* generation in the sense that they receive the transfer but paid no tax.

If the initial young do not pay for the transfers to the initial elderly, then some future generation must pay. The government's budget deficit is zero in every year, since it raises enough taxes, *T*, to pay for the transfers, -*T*.[5] However, the government's long-run budget constraint dictates that some future generation(s) must pay *T* in lifetime net taxes. Suppose, for example, that the government ends the program unexpectedly in year three. The young and old in year three pay no taxes and receive no transfers. Since no taxes or transfers are expected in the future, the generational accounts of the young, old, and sum of future generations is now zero. Lifetime net taxes of those born in year three remain zero. However, lifetime net taxes for those born in year two rise to *T*, since they paid taxes when they were young, in year two, but receive no transfers in old age. Thus, starting a transfer from young to old creates both explicit transfers to initial elderly *and* implicit tax obligations for future workers.[6]

The example in Table 1 shows that the creation or expansion of a program that creates a winning generation will increase the generational account of future generations.[7] In fact, the generational accounts of future generations will be greater in *every* year thereafter, since generational accounts do not take into account past net taxes. Table 1 shows that the generational accounts of the young, old, and sum of future cohorts is the same in year two as in year one. As long as the program is expected to continue, the elderly generational account in *any* year will be -*T*. Thus, the presence of large negative elderly generational accounts does not imply that *current* elderly were the initial winning generation. Generational accounts do not indicate which cohort received the greatest transfer in resources over its lifetime.

Generational Accounts in 1998

Table 1 shows the generational accounts for cohorts in 1998. Gokhale, Page, Potter, and Sturrock (2000) find that for a female who was ten years old in 1998 (born in 1988) her lifetime net payments (Generational Account) will be $82,000. That means that she will pay more in taxes than she will receive in transfers *in her remaining life*. Since Generational Accounts are forward looking (they don't include past taxes or transfers) they are generally positive for younger people and negative for older ages. This is because the elderly don't have many years of taxes ahead of them, and have lots of Social Security benefits yet to receive.

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[5] For this reason, Auerbach, Gokhale, and Kotlikoff (1991, 94) and Kotlikoff (1999) argue that current deficits are a poor measure of intergenerational policy.

[6] In contrast, consider the creation of a transfer scheme with an initial "losing" generation. Suppose that the government started a program, like education, that transferred *T* from the old to the young. The generational account of the young would be unaffected because they must pay an equal tax, *T*, when they are elderly. However, the initial elderly lose since they did not receive a benefit when they were young. In this example, the generational accounts of future generations will fall.

[7] Issuing debt has the same effect. Consider the case where government consumption is unchanged but the government issues debt equal to *T* in year 1. The new debt reduces government net wealth and requires an increase in the generational accounts of either living or future generations. If living generations are not taxed in order to retire debt, then future generations must be. The generational accounts of future generations will also rise, *ceteris paribus*, if the population or income growth rate declines.

Gokhale et al. (2000) also calculate lifetime net tax rates in Table 2. Consider the highlighted numbers under "Reference Projection." These rates are lifetime net taxes divided by lifetime income for the typical cohort member, averaged over men and women. For example, the typical person born in 1900 faces a lifetime net tax rate of 23.3 percent, while the typical person born in 1980 faces a tax rate of 28.1 percent.

Table 1: U.S. Generational Accounts (r = .06, g = .022)
Present Values in Thousands of 1998 Dollars

Age in 1998	Net Tax Payment	
	Male	Female
0	122.1	61.1
10	169.4	82.0
20	238.2	109.4
30	268.1	111.4
40	236.9	77.8
50	152.9	10.5
60	10.8	-95.6
70	-92.4	-135.9
80	-83.6	-112.3
90	-61.5	-74.3
FG[a]	142.5	71.3
Percentage Difference[b]	14.2	

[a] FG refers to future generations—those born in 1999 and later.
[b] The percentage difference is calculated as GA(FG)/[GA(0)*(1 + g)], where GA(0) is the generational account of 1998 newborns and g = 0.022.
Source: Authors' calculations.

Table 2: Lifetime Net Tax Rates Under Alternative Federal Purchases and Income Tax Assumptions

Year of Birth	Reference Projection	Faster Growth in Federal Purchases[a]	Lower Income Tax/GDP Ratio[b]	Faster Purchases' Growth and Lower Income Tax/GDP Ratio	Maintain Off-Budget Surplus
1900	23.3	23.3	23.3	23.3	23.3
1910	26.5	26.5	26.5	26.5	26.5
1920	27.9	27.9	27.9	27.9	27.9
1930	29.2	29.2	29.2	29.2	29.2
1940	29.6	29.6	29.5	29.5	29.6
1950	29.9	29.9	29.5	29.5	29.9
1960	30.2	30.2	29.3	29.3	30.0
1970	29.7	29.7	28.2	28.2	29.2
1980	28.1	28.1	26.3	26.3	27.4
1990	26.4	26.4	24.6	24.6	25.7
1995	25.8	25.8	24.0	24.0	25.1
1998	25.6	25.6	23.8	23.8	24.9
FG[c]	29.2	46.0	35.9	52.7	32.3
Percentage Difference	14.2	79.9	50.9	121.6	29.9

[a] Federal purchases grow with population and productivity after 1998.
[b] Federal income tax/GDP ratio equals 10.3 percent.
[c] FG refers to future generations.
Source: Authors' calculations.

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Generational Imbalance

One measure of *generational imbalance* is the difference between the generational account of current newborns and future generations. Kotlikoff and Leibfritz (1999) report generational imbalance in both absolute and percent terms for seventeen countries in 1995. Their work is reproduced in Table 2.

TABLE 2

Absolute, Percent, and Scaled Generational Imbalance in 1995

		Absolute	Percent	Scaled
High	Japan	246	338%	308
	Italy	145	224%	209
	Netherlands	88	180%	119
	Belgium	87	86%	116
	France	79	96%	111
Moderate	Norway	56	5600%	66
	US	45	159%	45
	Denmark	44	-244%	53
	Portugal	30	68%	62
	Australia	23	46%	29
	Brazil	12	120%	50
	Argentina	10	71%	28
Low	Canada	2	3%	2
	New Zealand	-2	-11%	-3
	Thailand	-7	-125%	-30
	Sweden	-38	-31%	-51

Notes: Absolute generational imbalance is the difference between future and newborn generational accounts in thousands of 1995 U.S. dollars.
Percent generational imbalance is the absolute imbalance as a fraction of the newborn generational account.
Scaled generational imbalance is absolute imbalance multiplied by the ratio of U.S. per capita GDP to the country per capita GDP.
Source: Author's calculations using Kotlikoff and Leibfritz (1999) Table 4.7 and Summers, Heston, and Aten (2001).

The most imbalanced country is Japan, where the typical member of a future generation can expect to pay $246 thousand dollars, or 338 percent, more in lifetime net taxes than the typical newborn in 1995. In many countries, future generations can expect to pay more, both in absolute terms and in relative terms, than current newborns. However, Canada has no imbalance and future generations in New Zealand, Thailand, and Sweden can actually expect to pay less than

newborns.[8] The last column scales the absolute generational imbalance by the ratio of U.S. per capita GDP to the country per capita GDP.[9] For instance, Portugal's absolute imbalance is only thirty thousand U.S. dollars, but after adjusting for standard of living, the imbalance is equivalent to sixty-two thousand dollars. Japan remains the most imbalanced country at $308 thousand dollars. More than half of the countries have greater scaled generational accounts that the U.S. and six have a generational imbalance that is twice as large as that facing the U.S.

Eschker (2003)[10] shows that four variables influence generational imbalance in a way predicted by theory. Generational imbalance rises with the size of the elderly population, income inequality, income per capita growth, and falls with the percent of votes cast for the largest party. The data are consistent with the theory that the elderly and poor are effective rent seekers and able to transfer resources to themselves from future generations. In countries with greater expected income growth, society appears to be more willing to allow these transfers to take place. This may be because, as in Cukierman and Meltzer (1989), current generations want to share in the higher expected incomes of their children. Society's willingness to transfer resources grows even stronger when political parties are dispersed and must build coalition governments. Less centralized political power may imply, as in Persson and Tabellini (2000) that the largest political party will find it easy to blame other parties when raising taxes on future generations.

[8] The very large percentage imbalance for Norway is due to the fact that current newborns can expect to pay almost nothing over their lifetime (about one thousand dollars). Denmark's percentage imbalance is negative since current newborns can expect to pay negative net taxes over their lifetime while future generations can expect to pay positive net taxes.

[9] Per capita GDP is measured on a purchasing power parity basis in The Penn World Tables Version 6 from Heston, Summers, and Aten (2001).

[10] Eschker, Erick "The characteristics of countries with generational account imbalances," Journal of Comparative Policy Analysis, March 2003.