

The Concept of Generational Accounts (GA) in Comparison with National Transfer Accounts (NTA)

The GA is defined as the present value of net tax payment (=tax paid minus benefit received from the government) for the remaining lifetime. The account evaluated at the year t for the cohort born at the year k is expressed as equation (1).

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

where $T_{s,k}$ stands for the projected average net tax payments to the government made in year s by the generation born in year k . The term $P_{s,k}$ stands for the number of surviving members of the cohort in year s who were born in year k . For the generations who are born in year k , where $k > t$, the summation begins in year k . A set of generational accounts is simply a set of values of $N_{t,k}$, one for each existing and future generation. When we report the GA, we usually show the per capita value rather than the aggregate net tax payment value for each generation.

The generational accounting (GA) is a framework to evaluate the sustainability of the current fiscal policies and the intergenerational redistribution by fiscal policies, which causes differing effects on the consumption, and the savings across generations. The theoretical background for the GA is the lifecycle income hypothesis: the consumption and saving are dependent upon total resource available for the remaining lifetime, not on the current cash flow (i.e. the timing of income realization). The GA takes a forward-looking approach, which implies that the GA does not take into account the taxes and government transfers of the past, because they do not affect the current decision making in lifecycle economy (see Equation (1)). Their effect is reflected in the current asset-holdings which is already included in the resource for the remaining lifetime.

The difference between the NTA and the GA are summarized as follows. First, the coverage is different. The NTA covers the private sector as well as the public sector, while the GA covers only the public sector.

Second, the GA's are stock values, reflecting the fact that in a lifecycle economy the economic behaviors are determined by the resource available for the remaining lifetime, not by the timing of the realization of income. On the other hand, at current stage, most of the NTA papers report the flow values, even though the NTA concept can be extended to the stock concept, once the NTA's are estimated for the past years and are projected to the future years. One example of this extension is Bommier et al. (2004). They compute the present value of net transfer from the government, defined as the transfer minus taxed paid for the lifetime of the cohorts born between 1850 and 2090. Their calculation is almost the same as the GA. A difference between Bommier et al. (2004) and the standard GA is that the GA takes a forward-looking approach, which implies that for non-0-age cohorts at the benchmark year, GA do not take into account the taxes and transfers before the age, while Bommier et al. (2004) compute the present value for all the cohorts for the whole lifetime.

Third, the NTA and the GA use different terminology for the taxes (including social insurance contributions) and government expenditure. The taxes and government expenditure in GA correspond to the public transfer inflows and public transfer outflows in NTA, respectively (see the worksheet 'Structure of flow' of the 'PublicReport NIPA.xls'¹ attached).

Fourth, the treatment of the government expenditure is different. The worksheet 'Structure of flow' shows that the NTA does not distinguish between the government transfer and government consumption: i.e. both of them are equally treated as public transfer inflows. The GA distinguishes the government transfers from the government consumption² as follows: The government transfers include the direct transfers in the form of cash or in-kind transfers, the incidence of the benefits of which is relatively clear. The government consumption includes the government expenditures to provide the public goods such as the general public service, the national defense, public order and safety, health service, educational service, welfare services, economic development, transportation and communication and others, the incidence of the benefit of which is not clear. Sometimes the division of public consumption and public transfers is not clear. A typical example is the educational expenditure. Many GA researchers report two separate GA's: (1) one assuming the educational expenditure as a public transfer; and (2) one assuming as public consumption. There can be also some complications of classification in the case of health service and welfare services. The difference in the treatment of the government consumption results in the difference in the incidence of the benefits of government expenditure. In the NTA, the benefits of the government consumption as well as the government transfers are allocated across age groups in per capita value. In the GA, the benefits of the government consumption are not counted in the transfer from the government (i.e. in the inflow from the government), because the incidence of the benefits of the government consumption is not clear. Therefore, the GA's across cohorts can be regarded as the fiscal burden, which is the net tax payment across cohorts, needed to finance the government consumption.

¹ This excel file is prepared by Andrew Mason and An-Chi Tung. This file can be downloaded from the NTA website.

² The government consumption here includes the government investment as well as the government consumption: i.e. the government consumption includes all the government primary expenditure excluding the government transfers, which is given directly given to the individuals and the household. GA researchers are not confident about the classification between government consumption and government investment. The government investment provides benefits to the future generations. But, the distribution of its incidence, across generations, is not clear. Therefore, in the standard presentation, GA treats the government investment as a part of government consumption. For the purpose of the evaluation of the fiscal sustainability, this way does not cause any problem. However, when we are interested in the incidence of the benefits from the government investment, we need to impute the consumption flow from the government capital. However, the incidence of the imputed rent of the government capital is still an open question.

Fifth, the classification of the taxes is different: the NTA follows the classification of the NIPA, while the GA classifies the taxes according to the tax bases. Recently, Andrew Mason and An-Chi Tung reclassified the taxes according to the tax bases. The worksheet 'Outflow Reclassification' of the file 'PublicReport NIPA.xls' illustrates a table named 'Reclassification of Public Outflow Source (SNA classification)': the classification of its rows follows that of the NTA, while that of its columns is based on the tax bases, which is basically the same as the GA. There are some difference in the classification of the columns in the table and that in GA. The social insurance contributions can be treated separately in GA, however, they can also be regarded as labor income taxes if it is raised entirely from the payroll. The classification of the columns treats the taxes from the rest of the world as a separate item. In GA, they are treated as taxes on consumption and other tax bases. In many cases the taxes from the rest of the world consist mainly of tariff and import taxes, therefore, the taxes are regarded as consumption taxes. The Table does not include the seigniorage, which is the government revenue through printing money. In most of the developed countries, its magnitude is very small, but, in some less developed countries, it could be an important source of the government revenue.

In summary, the GA is the set of the present values of the net outflow to the government, i.e. the outflow to the government minus the inflow from the government, across cohorts for their remaining lifetime, to finance the government consumption of the present and future. And, the classification of taxes in GA is based on the tax bases (inflow from the government), because this classification facilitates the estimation of their incidence.

Procedure of GA calculation

The computation of the GA's starts with the following intertemporal budget of the government.

$$(2) \quad \sum_{s=0}^D N_{t,t-s} + \sum_{s=t}^{\infty} N_{t,t+s} = \sum_{s=t}^{\infty} G_s (1+r)^{-(s-t)} - W_t^g$$

The first summation on the left-hand side of (2) adds together the GA's of existing generations. The term $N_{t,t-s}$ stands for the account of the generation born in year $t-s$, defined in Equation (1). The index s in this summation runs from age 0 to age D , the maximum length of life. The second summation on the left-hand side of (2) adds together the present value of remaining net payments of future generations, with s representing the number of years after year t that each future generation is born. The first term on the right-hand side of (2) is the present value of government consumption. In this summation the values of government consumption, G_s in year s , are discounted by the pre-tax real interest rate, r . The remaining term on the right-hand side, W_t^g , denotes the government's net wealth in year t – its assets minus its explicit debt. The budget constraints requires that the future net tax payments of current and future generations be sufficient, in present value, to cover the present value of future government consumption as well as service the government's initial net debt.

Equation (2) indicates the zero sum nature of intergenerational fiscal policy. Holding the present value of government consumption fixed, a reduction in the present value of net taxes extracted from current generations (a decline in the first summation on the left side of (2)) necessitates an increase in the present value of net tax payment of future generations.

Except for equation (2), there is no restriction for GA calculation, therefore, there can be a lot of ways to report GA. The GA for the existing generations and future generation can be expressed in different ways, depending on the timing of fiscal reforms to restore long-term budgetary balance and the methods employed (e.g. raising taxes or reducing benefits).

The standard way of reporting the GA is employed to evaluate the fiscal sustainability. The standard way takes two steps. The first step involves calculation of the net tax payments of current generations (the first term on the left-hand-side of equation (2)). This is done on the basis of current fiscal rules without being constrained by the intertemporal budget constraint of the government. In the second step, given the right-hand-side of equation (2) and the first term on the left-hand-side of equation (2), we determine, as a residual, the value of the second term on the left-hand side of equation (2), which is the collective payment, measured as a time- t present value, required of future generations. Accordingly, whereas the fiscal burdens for current generations are based entirely on current fiscal rules, the government budget constraint fully determines the fiscal burdens for future generations.

Based on the collective amount required of future generations, we determine the average present value of lifetime net tax payments for each member of each future generation under the assumption that the average lifetime tax payments of successive generations rise at the economy's rate of productivity growth. Leaving out this growth adjustment, the lifetime net tax payments of future generations are directly comparable with those of current newborns, since the generational accounts of both newborns and future generations take into account net tax payments over these generations' entire lifetimes. Measuring the generational imbalance as the difference between two lifetime tax burdens provides a measure for the sustainability of the public finances. If future generations bear a heavier tax burden than the newly born do, current fiscal rules will have to be adjusted in the future to meet the budget constraint.

In addition to this standard way, we can present GA's in many different ways, depending on the research topic. Instead of treating the future generations as one generation, we can divide the future generations into different cohorts, indexed as the year of birth, and report different accounts across cohorts (e.g. Auerbach et al. (2005), Kotlikoff et al. (1996), Chun (2007)). Instead of assuming that the accounts for the existing generations are determined by the current fiscal policy rules, they can be computed reflecting the effects of the future fiscal policy revisions on the current generations (e.g. Auerbach et al. (2005), Chun (2007)).

The standard procedure can be summarized as follow³.

1. Population projection
 - project the population by age*sex overtime
2. Estimation of age profiles
 - Taxes:

Taxes are usually classified as 'wage income tax', 'capital income tax', consumption tax, Seigniorage (inflation tax), property tax, social insurance contribution. The counterpart of social insurance contribution in the NTA is the 'outflow' of social insurance programs, e.g. public health (outflow), public pension (outflow). For the classification of taxes in the NTA, refer to the NTA website.
 - Transfers:

Government transfers in the GA include the transfer from government in the form of in-kind or cash, such as the benefits of public pension, public health insurance, unemployment insurance, public aid to low-income household, the disabled (e.g. OASDI, HI, AFDC (TANF), SSI, Food Stamps in the US). The counterparts in the NTA are public pension inflow, public health care inflow, public transfer other in-kind inflow, public transfer other cash inflow, etc.
3. Projection of aggregate value of taxes, transfers, and government consumption overtime.

³ The computation procedure of GA is explained in the "Manual of GA Excel file" and the GA Excel file illustrates the computation procedure with the example of the Korean case.

For the projection, the taxes, transfer, and government consumption are classified into: (1) age-specific; and (2) non-age-specific. The group (2) includes the government programs whose expenditure is highly dependent upon demographic structure, such as pension benefits, public health care, educational expenditure and social welfare services to the elderly, women, and children.

4. Allocate the aggregate values of taxes and transfers among age-sex group overtime.
5. Compute the present value of each cohort's (per capita) net payment to the government for her remaining lifetime (in standard presentation of GA).
 - Net payment to the government = taxes – transfer from the government.
 - The PV's of net payment of the current generations is computed on the basis of current fiscal rules without being constrained by the intertemporal budget constraint of the government.
 - The PV of net payment of the future generations (i.e. the generations that are not yet born as of the benchmark year) is computed as a residual from the intertemporal budget constraint.

✕ Government's intertemporal budget constraint:

PV of net payment of current generation + PV of net payment of future generation
 + net wealth of government
 = PV of Government consumption of the present and the future period

- Based on the collective amount required of future generations, we determine the average present value of lifetime net tax payments for each member of each future generation under the assumption that the average lifetime tax payment of successive generations rises at the economy's rate of productivity growth.
6. Evaluate the fiscal sustainability of current policies (in standard presentation of GA)
 - Index for fiscal sustainability: Generational Imbalance (GI)

$$GI = \frac{\text{PV of net payment of future generation} - \text{PV of net payment of age-0 cohort at the benchmark year}}{\text{PV of net payment of age-0 cohort at the benchmark year}}$$

GI > 0: the lifetime net payment of the future generation (needed to maintain the long-term budgetary balance) is larger than that of current generation (on the bases of current fiscal policies rules). This implies that the current fiscal policy is not sustainable and that to restore the long-term budgetary balance tax burden should be raised sometime in the future.

References

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