Generational accounts for the Netherlands: an update

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Abstract

This article extends the standard methodology for generational accounting. Moreover, it updates Dutch generational accounts that were constructed two years ago. The new results indicate that the generational imbalance has become somewhat smaller compared to that found previously. This is due mainly to new demographic projections, which indicate that the population will age less than expected earlier. As a direct consequence of the smaller generational imbalance, the changes in fiscal policy that are required to establish sustainable public sector arrangements are also somewhat smaller. However, the Dutch government will still have to run sizable fiscal surpluses in the coming decades in order to create the budgetary room for the higher future age-related expenditures.

Introduction

Two years ago, Ter Rele (1997a, b) employed generational accounting to explore the intergenerational effects and the sustainability of public sector arrangements in the Netherlands. The first purpose of this article is to update Ter Rele's calculations.[1] In particular, it employs more recent demographic projections and updated estimates for the stock of public capital. Furthermore, it uses 2000 instead of 1998 as the base year for the extrapolation of fiscal trends. A second purpose of this article is to outline three extensions to the standard methodology of generational accounting developed by Auerbach, Gokhale and Kotlikoff (1991).

We first briefly describe the standard methodology for generational accounting and apply this methodology to the public finances in the Netherlands. We then present three extensions to the standard methodology. These extensions are, first, the incorporation of prospective changes in the economic environment; second, the assignment of the benefits of government purchases to generations; and, third, the translation of the generational accounts into government budgets. Subsequently, we explore various policy reforms aimed at establishing generational balance, and investigate how sensitive the results are with respect to some important assumptions.

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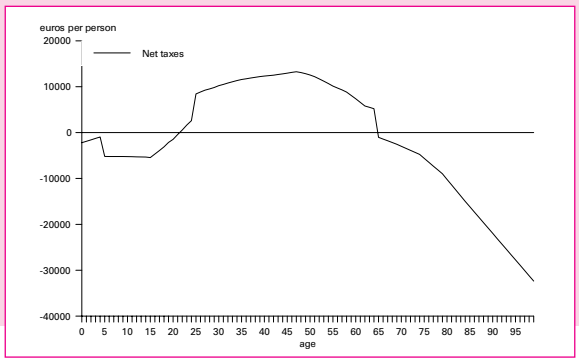
Applying the standard method

Generational accounts are calculated in two steps.[2] The first step involves the calculation of the fiscal burdens on current generations (i.e. the generations that are currently alive). This is done on the basis of current fiscal rules. In the second step, the fiscal burdens on the future generations (i.e. the generations that are not yet born) are computed as a residual from the intertemporal budget constraint. This ensures that the present value of future net tax payments (from present and future generations combined) equals the governments present net liabilities. Whereas the fiscal burdens on current generations are thus entirely based on current fiscal rules, the government budget constraint determines the fiscal burdens on future generations. Hence, future generations are assumed to absorb the entire adjustment that is required to make the claims of various generations consistent with the intertemporal budget constraint. Current generations, in contrast, fully escape this adjustment.

Current generations

In calculating the fiscal burden facing currently living generations on the basis of current fiscal rules, one extrapolates the age profile of net contributions (i.e. taxes minus public transfers (including public expenditures on health and education, which are imputed to age groups)) into the future. The shape of the age profile for each spending and revenue category, which is determined for the base year, is assumed to remain constant in the future. Figure 1 shows the age profile of the net contribution to the government budget. Overall, the young and the elderly benefit from the public finances, while the middle-aged are net contributors.

Figure 1 Age profile of net taxes, 2000



The age profiles can be combined with projections for the aggregates of each spending and tax component to determine the fiscal benefits and burden for each age category. For the period from 1998 to 2000, we adopt the realised and projected figures for the various aggregate budget items contained in CPB (1999). For the projections

beyond 2000, we extrapolate net fiscal benefits on the assumption that age-specific net fiscal benefits grow at the same rate as productivity, which is assumed to be 2 percent (in real terms). This is in line with the standard generational accounting methodology. According to this methodology, unless detailed government forecasts for aggregate taxes and transfers are available, the fiscal benefits and burdens for each age group are assumed to grow at the rate of productivity growth. This extrapolation is considered to be a reasonable approximation of present public arrangements.

For each current generation, the figures for age-specific net taxation can be aggregated over the rest of the life into a single present-value figure. Doing so, we arrive at the figures contained in the 'base-case' column in table 1, which are based on a real discount rate (or real interest rate) of 4 percent. These figures reflect the age profile of net taxes in figure 1. In present-value terms, young current generations contribute to the government budget, while the older generations enjoy net benefits during the rest of their life.

Future generations

Given the aggregate net fiscal burden for current generations, the intertemporal government budget constraint determines the aggregate net discounted payments required of future generations. This aggregate burden is distributed over all future generations under the assumption that the per capita lifetime net tax payment of members of successive generations rises at the rate of productivity growth. Hence, the ratio of lifetime payment to lifetime income is the same for all future generations.

Measure I: The level of the tax burden

Generational accounting yields three important measures. The first one is the level of the net tax burden (the tax burden minus public transfers) on future generations. As described above, it is found residually from the intertemporal government budget constraint and the net taxes that are imposed on currently living generations under present public arrangements. The level of the net tax burden on future generations is highly sensitive to the level of government purchases because generational accounts do not assign the incidence of these public purchases to generations. Moreover, the level measure is rather sensitive to the allocation of benefits over the life cycle, which is sometimes rather arbitrary.[3]

Measure II: The difference in tax burdens between the newly born and future generations

The second measure is the difference between the lifetime tax burden on current newborns (the so-called 'newly born,' who are the youngest members of the current generations) and the lifetime tax burden on future generations. The tax burdens on these two generations are comparable because they both apply to an entire lifetime. Furthermore, the difference between these two lifetime tax burdens measures the sustainability of public arrangements (see box *sustainability of public arrangements*).[4]

In the base case (see the 'base-case' column of table 1), current policies are not sustainable because future generations bear a lifetime tax burden (of € 189,400) that exceeds the lifetime tax burden faced by the newly born (of € 108,400). The difference in the lifetime tax burden between newly born and future generations amounts to 11.9% of the present value of an average person's lifetime income.

Sustainability of public arrangements

If the net lifetime burden of the newly born (which depends on current arrangements unconstrained by the government budget constraint) coincides with the net lifetime burden on future generations (which is determined residually from the government budget constraint), the net tax burden implied by current arrangements (as measured by the net burden on the newly born) is consistent with the net tax burden required by the intertemporal budget constraint of the government (as measured by the net burden on future generations). Hence, public arrangements are sustainable. However, if the newly born face a smaller net tax burden than future generations do, then current arrangements impose a net contribution that is smaller than the amount that would be required for sustainability. Accordingly, public arrangements are too 'generous' and will have to be adjusted in the future to meet the government budget constraint. The longer this adjustment is delayed, the larger will be the required additional net tax burden on future generations.

Measure III: The required immediate adjustment of policy

Another way to measure the sustainability of the public arrangements is to determine the permanent and immediate change in some tax or transfer instrument that is required to make arrangements sustainable (i.e. to equalise the net fiscal burdens facing the newly born and future generations). The advantage of this measure is that it does not employ the unrealistic assumption that current generations fully escape the required adjustment of an unsustainable policy. Indeed, depending on the specific policy measure adopted, the burden will be shared between current and future generations. In view of this advantage, this paper focuses mainly on this third measure. In doing so, we employ indirect taxes as the policy instrument that is adjusted. According to this measure, an immediate tax increase of 4.2% of GDP is required to arrive at a sustainable fiscal policy (see table 1).

Table 1 Present value of future net tax payment per capita

	Base case (standard)	Variant 1 (including increasing participation)	Variant 2* (including higher pension incomes)	Variant 3* (including three factors narrowing the tax base)	Benchmark* (assigning benefits)
	Thousands of euros (in present value)				
Net taxes paid by:					
80-year olds	–112.2	–112.2	–110.8	–110.9	–139.2
60-year olds	– 54.7	– 54.5	– 46.1	– 47.2	–114.1
40-year olds	147.4	164.8	174.0	166.1	59.5
20-year olds	243.0	277.1	284.2	274.4	123.4
newly born	108.4	135.0	140.1	135.3	– 43.2
future generations	189.4	159.0	146.6	156.6	– 29.0
Generational imbalance:					
in thousands of euros	81.1	24.0	6.5	21.4	14.3
as a percentage of lifetime income	11.9	3.5	1.0	3.2	2.1
required adjustment of indirect taxes (% GDP)	4.2	1.1	0.3	1.0	0.7

*The variants are cumulative. Hence, in addition to the changes in parenthesis, each variant includes also the changes included in the previous variant.

Extending the standard method

Accounting for changes in the economic environment

The standard method extrapolates the current age profile of net taxes contained in figure 1. Hence, it implicitly assumes that the currently observed rate of labour force participation remains constant in the future. This assumption is not appropriate for the Netherlands. Whereas this country has traditionally featured a low female participation rate, the participation rate of women has started to rise sharply over the last two decades. Indeed, this development is one of the main factors behind the relatively rapid growth of employment in the Netherlands. The female participation rate is expected to continue to increase further as those cohorts of women reach their prime earning years who enjoyed a better education and have a different view on their role in society than older women. Also the participation rate of older males is expected to increase in the future.

A higher participation rate strengthens the public finances by broadening the tax base. To account for this important effect, variant 1 assumes that taxes paid by a particular age group depend not only on labour productivity and the number of people in that group but also on the projected labour force participation rate of the age group involved. Table 2 contains CPB projections of these participation rates in 2020 for three alternative scenarios and compares these to the corresponding participation rates in 1995. The projections for the base case imply that the participation rate of those between 20 and 64 years of age will rise by about 6.4%-points between 1995 and 2020.

The higher participation rate reduces the generational imbalance substantially. The tax burden on future generations exceeds that on the newly born by only € 24,000 (compared to € 81,100 in the standard case). The required immediate increase in indirect taxes falls by 3.1%-points to only 1.1% of GDP (see table 1).

Table 2 Participation rates of various age groups in full-time equivalents, 1995 and 2020

	1995	2020* low	base	high
Participation				
20-34	73.1	76.6	75.8	77.2
35-49	72.0	79.2	84.1	86.2
50-64	37.7	43.7	55.3	60.5
Total	64.1	65.3	70.5	73.9

Source: CBS/CPB (1997)
* Adjusted for rise in part-time employment.

A second important factor requiring an adjustment of the age profile is an expected increase in private pension incomes. Public pension benefits in the Netherlands are flat (i.e. unrelated to income), so that the public benefit level is relatively low for middle- and high-income earners. For these income groups, collective labour agreements supplement the public benefits with compulsory occupational pension provisions. These provisions are financed by funded pensions funds, which have accumulated sizable financial assets. The occupational pension funds have not yet reached a steady state, but will mature during the coming decades. Hence, present rates of pension saving will result in higher pension incomes in the future than currently observed. This will broaden the tax base because retirement benefits are subject to the personal income tax and indirect taxes are levied on consumption out of these benefits.

Variant 2 (see table 1) reveals that the associated increase in tax payments alleviates the generational imbalance further; future generations now pay only € 6,500 more in taxes than the newly born do. The required immediate increase in indirect taxes drops further to only 0.3% of GDP.

Whereas the increase in labour force participation and the maturing of pension funds are expected to broaden the tax base, three other developments are projected to narrow the tax base.[5] These three factors are an expected rise of tax deductible pension premiums, an expected moderation of the rise of earnings with age, and an expected more moderate rise of revenues from corporate taxes than implicitly assumed in the standard generational accounting methodology.[6] Variant 3 accounts for these three developments, which reduce the improvement in the generational imbalance brought about by higher pension incomes and a higher participation rate. According to the policy adjustment measure, indirect taxes need to be raised by 1.0% of GDP in variant 3 to ensure that current fiscal policy is sustainable.

Assigning the benefits from government purchases

The standard practice in generational accounting does not assign the benefits of government purchases to generations, and thus does not distinguish between public consumption and public investment. This section modifies this practice. In particular, we assume that all currently living generations enjoy the same (per capita) benefits from both government consumption and the public capital stock. Gross public investments are extrapolated in line with the growth of GDP. In our view, this variant best reflects the impact of future developments on the intergenerational stance of fiscal policy. We therefore call it the benchmark case.[7]

The alternative treatment of government purchases improves the generational imbalance (see the benchmark case in table 1). The main reason is that the current level of public investment exceeds the level required to keep the public capital-GDP ratio constant. Hence, this latter ratio rises over time so that future generations benefit more from public capital (relative to GDP) than present generations do.

With the assignment of the incidence of government purchases, the net lifetime tax burden on future generations measures the fiscal liabilities shifted to future generations. Table 1 (last column) reveals that future generations receive a net benefit of the government of € 29,000. The imbalance measure is reduced to € 14,300, and the increase of indirect taxation required to achieve generational balance falls to 0.7% of GDP. This policy adjustment for the benchmark is slightly smaller than the 1.0% of GDP that was found by Ter Rele (1997ab) for the corresponding case.

Transforming the generational accounts into government accounts

Transforming generational accounts into future government budgets is useful for a number of reasons. First, by making explicit the implied size of future budget items, it enhances the transparency of generational accounting exercises. Second, it provides a link with the more traditional tools for analysing fiscal policies, such as the budget deficit and government debt. This helps to transform policy objectives with respect to generational distribution into more concrete fiscal targets. Third, it allows policymakers to make explicit the trade-offs between generational distribution and other objectives of fiscal policy, such as meeting the EMU fiscal criteria or reducing the exposure of the budget to fluctuations in interest rates.

Table 3 shows the government budget for selected years if indirect taxes are raised immediately (by 0.7 % of GDP) to ensure sustainable public finances in the benchmark case. Ageing causes spending on public old-age pensions (AOW) and health care to rise substantially. Expressed as a percentage of GDP, public pension benefits rise from 5.2% in 1998 to 7.0% in 2020 and 9.4% in 2040. Health care expenditures increase from 8.7% in 1998 to 10.1% in 2020 and 12.8% in 2040.

Until 2020, increases in public spending are mitigated by the effect of the increase of labour participation on GDP. Moreover, the tax burden rises, due to the maturing of pension funds and the resulting increase of taxable pension incomes relative to the size of the economy. The early implementation of a sustainable policy implies that, until 2020, the tax burden rises more than expenditures do. This leads to a sharp reduction of government debt and interest payments, which helps to create the fiscal room for absorbing the increasing budgetary costs of the ageing of the population in later years. By first reducing government debt and interest payments in order to create room for the later rise of the age-related expenditures, policymakers would transfer some of the costs of the pop-

Table 3 Government accounts under a sustainable policy, 1998 - 2060

	1998	2000	2020	2040	2060
	%GDP				
Health	8.7	9.2	10.1	12.8	12.6
Old-age benefits	5.2	5.3	7.0	9.4	8.6
Other expenditures	31.1	31.3	30.2	31.5	31.1
Interest payments	4.8	4.3	0.9	–0.3	1.2
Total public expenditures	49.8	50.1	48.2	53.4	53.5
Total revenues	49.1	49.3	51.5	53.2	52.4
Fiscal deficit	0.7	0.8	–3.3	0.2	1.1

ulation ageing to present generations. After 2020, the costs of the old-age benefits and of health care outweigh the rise in revenues, causing the fiscal deficit to rise again.

Figure 2 shows how the fiscal deficit develops if present policies are continued in the benchmark case. This would lead to a fiscal surplus by 2006, but would eventually result in rising deficits when ageing causes expenditures to increase sharply. Figure 2 contains also the course of the fiscal deficit if indirect taxes are raised in 2000 to ensure fiscal sustainability. It shows that a surplus would have to be maintained for several decades in order to reduce the debt service so as to create sufficient budgetary room for covering the additional government spending when the ageing of the population occurs.

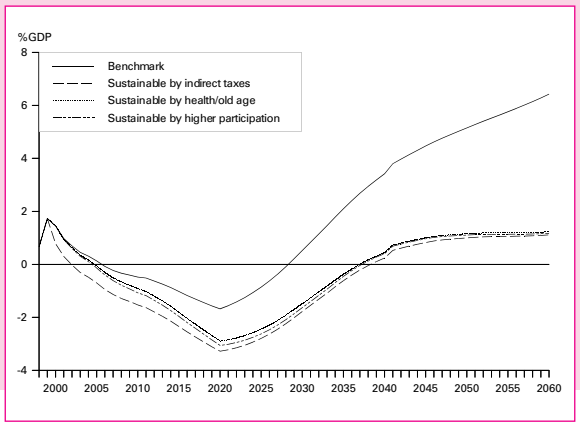
Apart from raising government saving by an immediate and permanent tax increase, sustainability can also be established in alternative ways, for instance by reducing the rise of age-related expenditures or by strengthening the tax base through higher labour participation. Figure 2 shows the course of the deficit if expenditures on old-age benefits and health care are curtailed so as to render the system sustainable. This requires that the growth rate of these expenditures be slowed down by 0.2% per year until 2020. Figure 2 also reveals the future deficits if an increase in labour participation exactly ensures sustainability. The implied future course of fiscal deficits is robust to the various alternatives.

Table 3 and Figure 2 contain the same message as their counterparts in Ter Rele (1997a, b). The main difference between the present estimates and those in Ter Rele (1997a, b) is that the present estimates imply a smaller rise of age-related costs because of less severe ageing of the population in the most recent demographic projections. Health and old-age benefits increase by 8.3%-points between 1998 and 2040 and by 7.3%-points between 1998 and 2060. The corresponding figures in Ter Rele (1997a, b) were 10.2%-points and 8.9%-points, respectively.

Establishing generational balance

Table 4 contains various policy adjustments that ensure sustainable public finances in the benchmark case.

Figure 2 Budget deficit, 1998 - 2060



All policy measures are permanent and implemented in 2000. The required policy adjustments are modest; an adjustment in one of these budget items of between 0.6% to 0.8% of GDP would suffice (see the second column of table 4). These figures are all about 0.3%-points lower than in *CPB Report* 1997/3.

The required policy adjustments for the various measures are of similar magnitude when expressed in terms of GDP - irrespective of the age profile of the various budget items. Table 4, however, shows that the various measures yield quite different effects on various generations. In particular, future generations benefit most from changes in budget items affecting the end of the life cycle, such as health and transfer payments. Changes in these budget items also have the smallest (negative) effect on the newly born because the effect of these measures is discounted more heavily. Hence, both the future generations and the newly born (the youngest of the current generations) are relatively well-off under these measures, as most of the burden is borne by the oldest of the current generations.

Table 4 Possible measures to ensure generational balance

	measure	Effect on net lifetime tax of: future generations	newly born	30-year olds	60-year olds
	%GDP	*thousands of euros*			
Defence, General government	– 0.8	– 7	7	5	2
Education	– 0.8	– 3	11	0	0
Health	– 0.6	– 10	5	5	6
Transfer payment net of taxes	– 0.7	– 9	5	6	5
Income tax	0.7	– 8	6	7	1
Indirect taxes	0.7	– 8	6	6	3

Sensitivity analysis

Labour-force participation

The benchmark case employs a base-case assumption for the expected growth of labour force participation. However, in view of the considerable uncertainty surrounding this variable, some sensitivity analysis is called for. CPB has constructed two alternative scenarios for the future development of the participation rate in the labour force (see table 2). All three scenarios involve an increase in participation. Whereas the 'low' case projects only accumulated 2% growth until 2020, the 'high' case involves an accumulated growth of 15 %. This compares to 10 % growth in the base case.

Table 5 reveals that the generational imbalance is rather sensitive to labour supply. Indeed, in the scenario featuring the highest labour participation, the additional labour supply dominates the effect of ageing so that future generations actually contribute less to the government budget than the newly born do. This confirms that a high level of labour force participation is a crucial factor in ensuring sustainable public finances.

Demographic developments

In performing sensitivity analysis with respect to demographic developments, we employ alternative demographic scenarios provided by Statistics Netherlands. In particular, we construct two variants with rather extreme assumptions for the ageing of the population. To analyse the impact of substantial ageing, the first ('grey') variant combines the assumption of low birth rates with that of a high life expectancy. The other ('green') variant considers the other extreme case by assuming that high birth rates coincide with low life expectancy. Table 6 contains the effects of these alternative assumptions on the elderly dependency ratio. The two last columns of Table 7 show that the consequences of alternative demographic assumptions for the generational accounts are substantial. In the 'grey' variant (third column of table 7), indirect taxes must be raised by 2.4% of GDP to ensure sustainability. In the

Table 5 Sensitivity analysis: participation rate

	low participation	Benchmark	high participation
Next taxes paid by:			
newly born	– 55.2	– 43.2	– 30.5
future generations	– 12.2	– 29.0	– 46.9
Generational imbalance			
in thousands of euros	42.9	14.2	– 16.4
as a percentage of lifetime income	6.8	2.1	– 2.3
required adjustment of indirect taxes (%GDP)	2.1	0.7	– 0.7

Table 6 Elderly dependency ratios,* 1998-2060

	base case	alternative assumptions: low birth rate, high life expectancy	alternative assumptions: high birth rate, low life expectancy
1998	0.22	0.22	0.22
2020	0.32	0.35	0.29
2040	0.43	0.52	0.35
2060	0.39	0.52	0.29

* The number of 65+ as a percentage of the 20 - 64 year olds. Source: Statistics Netherlands

Table 7 Sensitivity analysis: demographics

	Benchmark (middle birth rate, middle life expectancy)	'grey' variant	'green' variant
		thousands of euros	
Net taxes paid by:			
newly born	– 43	– 61	– 24
future generations	– 29	1	– 38
Generational imbalance:			
in thousands of euros	14	62	– 14
as a percentage of lifetime income	2.1	9.2	–2.1
required adjustment of indirect taxes (%GDP)	0.7	2.4	–0.8

'green' variant (fourth column of Table 7), current fiscal policy is sustainable, as future generations benefit more from the public finances than the newly born do.

Conclusions

The analysis in this paper indicates that the ageing of the population, labour force participation rates, and funded private pension schemes are the main factors determining the intergenerational stance and sustainability of the Dutch public finances. Higher expected labour force participation (especially of women) and additional taxed benefits from private pension schemes help to offset the adverse effect of ageing on the public finances. As a result, a relatively small tax increase is sufficient to ensure that the Dutch public finances are sustainable in the benchmark case. However, since the rise in labour force participation precedes the bulk of the ageing, the government will have to run sizable fiscal surpluses in the next decades to create the budgetary room for higher age-related spending later on. Through the active use of public debt policy, some of the fiscal costs associated with ageing are transferred to the present. The sensitivity analyses revealed that the calculations are rather sensitive to future labour force participation. Indeed, the health of the public finances appears to depend heavily on a well functioning private sector.

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Notes

[1] This article draws heavily on Bovenberg and Ter Rele (1999) which provides more detail on the calculations.

[2] For a more elaborate exposition of the methodology, see Auerbach, Gokdale and Kotlikoff (1991), and Auerbach and Kotlikoff (1999).

[3] It is not clear, for example, whether child allowances should be allocated to the parents or the children.

[4] Another advantage of the *difference* measure compared to the *level* measure is that the difference measure is less sensitive to the level of government purchases and the allocation of net benefits over the life cycle, which is often rather arbitrary (see the previous footnote).

[5] Bovenberg and Ter Rele (1999) elaborate on these factors.

[6] In particular, these revenues are expected to rise in line with GDP rather than with Dutch shareholdership.

[7] Ter Rele (1997a) provides a more detailed description of the methodology and data employed in the benchmark case.