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Carl E. Gjersem*

A presentation of Generational Accounting in Norway

The aim of this paper is to describe why generational accounting may be of special interest in evaluating the fiscal stance in a country like Norway, a small open economy with large public wealth. The paper describes how results from the exercise have changed over time, and discusses some items that have been incorporated in the calculations. Finally, it presents an alternative to the standard modelling approach for government purchases of goods and services (public consumption). While the importance of public consumption varies between countries, the paper shows that in a country where the level of public purchases is high, the sensitivity to alternative approaches is large. JEL Classification: E6, H4, H6, J1

Generational accounting is by now well known in both the literature and in politics. An introduction to and a comprehensive presentation of both the methodology of such accounts and a wide range of applications can be found in Auerbach, Kotlikoff and Leibfritz (1999) and in EU (1999). Generational accounts were first calculated and presented for Norway in 1993 (Auerbach et al., 1993). As issues of intergenerational redistribution even then were high on the political agenda, a presentation was included in the National Budget 1995.

The aim of this paper is to describe why

generational accounting may be of special interest in evaluating the fiscal stance in Norway and to review some of the issues from the presentation of generational accounting in Norway. The latter item shows how the methodology easily can be used for alternative approaches to the modelling of public consumption, and as such help in the examination of future government spending.

The paper starts with an introduction to public finances in Norway. An overview of the results presented in public documents and some special issues related to the Norwegian generational accounts follows, with a view to

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the development of the accounts from 1995 to 2001. Such repeated presentations raised issues of the relationship between generational accounts and the business cycle, and a section is devoted to a solution for such problems. Issues related to the sensitivity of the calculations are discussed next. In the following section, a closer look is taken at the modelling of public consumption and alternative assumptions are introduced. The last section sums up the presentation.

Introduction

Norway is a small country outside the EU, where GDP per capita is among the highest in the world. The current population is around 4.5 million, and with birth rates around 1.8 combined with positive net immigration, the total population is projected to roughly stabilise at that level over the next 50 years. Population ageing will take place and the ratio of people aged 60 or over to those aged 20-59 will grow from 37 per cent in 1995 to 44 per cent in 2015 and on to 59 per cent in 2035. Similarly measured, the share of those aged 75 or more - the oldest old - will increase from 13 per cent in 1995 to 23 per cent in 2025 and on to 26 per cent in 2035. The ageing process is driven mainly by falling mortality, and not so much by falling fertility. While strong, this pattern of ageing is thus not as severe as in many other countries.

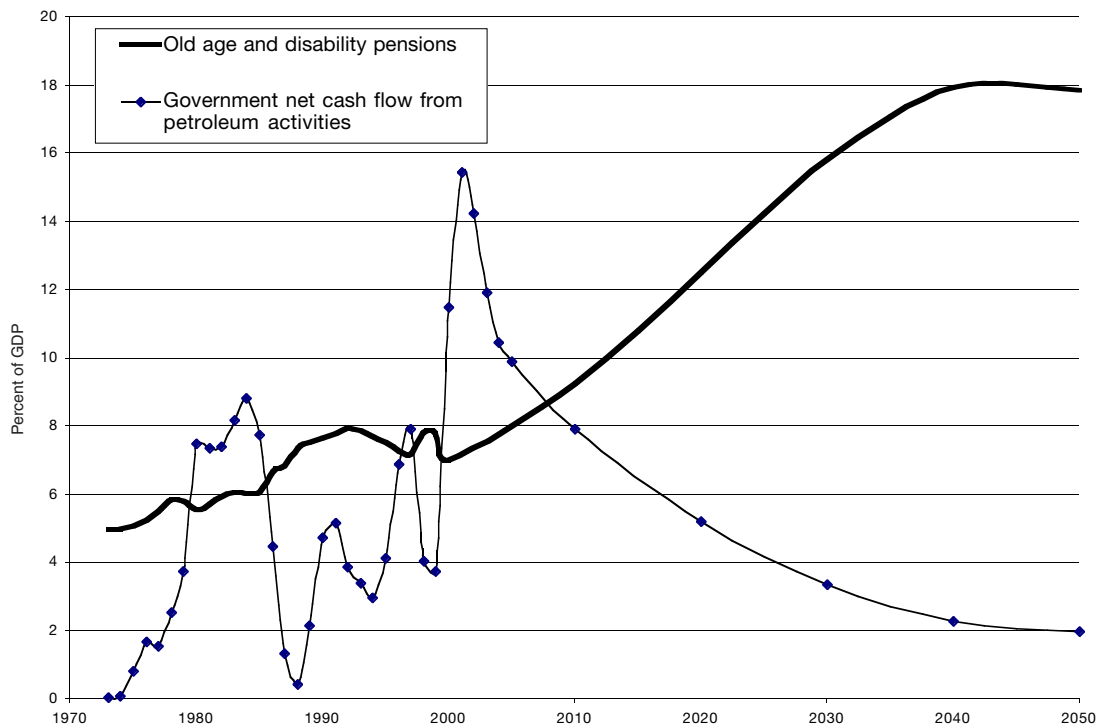
Population ageing will be combined with a maturing pension system, and together these two forces will lead to long term pressures on the Norwegian welfare system. Current

official projections, as for example the Government's recent Long Term Programme 2002-2005, includes projections where central government expenditure on the National Insurance Scheme's old-age and disability pensions is estimated to increase from about 8 per cent of GDP in 2000 to more than 18 per cent of GDP in 2050. These estimates do not include the cost of the pay-go Civil Servant's occupational pension scheme or the direct cost and implicit subsidies to widespread Contractual Early Retirement Schemes. At the same time, the growth in the number of oldest old will require increased resources for nursing and care services. The Norwegian pension expenditure growth up to and level in 2050 are both among the highest in the world.¹ For the EU-countries, a comparable presentation of long term projections is given in EU (2000), and OECD (2001) includes even more countries.

Still, when evaluating the future challenges to fiscal policy, it must be taken into account that public finances in Norway differ rather markedly from most other countries. The National Budget for 2001 is made up with a surplus of 12,5 per cent of GDP for Norway, compared to the fiscal prudence criteria defined as deficits below 3 per cent of GDP in the Stability and Growth Pact of the EMU countries. Substantial future petroleum revenues imply that this position is sustainable for several more years, putting Norway in a better position than most other countries to address the challenges associated with an ageing population. Already, substantial financial resources are invested by the

1. This must be seen in connection to the current extraction of non-renewable petroleum resources, which adds strongly to GDP today. The gradual decline in petroleum extraction will give negative growth impulses in the long term, as labour and capital are allocated to less profitable production. Thus, the petroleum extraction means that GDP will grow less in Norway than in other countries even with the same productivity and labour force growth.

Figure 1.
Central elements of public finances in the long term in Norway



Sources: Statistics Norway and Ministry of Finance

Government's Petroleum Fund. Total public net financial assets were estimated at 47 per cent of GDP by the end of 2000. In addition, the present value of the central government's expected future net cash flow from the petroleum activities is estimated at nearly twice GDP.

The expected paths of oil revenues and of public pensions are strikingly illustrated in figure 1. As a result of the expected increases in expenditure on public pensions and the

decline in revenues from petroleum activities, fiscal policy will be facing considerable challenges in the long run. Thus, the evaluation of fiscal policy must not be based on the fact that public finances in Norway currently differ from other countries, but take into account the very large future obligations in the universal National Insurance Pension Scheme. These growing obligations do not show up explicitly in the current Fiscal Budget.² It would seem necessary to set aside

2. One should note that other organisational choices for the pension system, such as specific funded schemes as in Iceland or Finland, would have introduced a large premium into the Fiscal Budget, as well as reduced interest income. In fact, calculations presented in the National Budget 2001 suggested that the huge surplus would be turned into a small deficit if this premium were included. It is thus disturbing to note that from then on, projections show that premiums should rise while oil revenues gradually will fall.

considerable capital in periods of high petroleum revenues in order to avoid a severe tightening of general government budgets later on. Deciding on an appropriate level of saving requires a tool for balancing current and future public and private consumption, transfers and taxes. Generational accounting promises to be such a tool.

Generational accounting in Norway

The first generational accounts for Norway were presented during a conference at the Norwegian School of Economics and Business Administration in 1993 (Auerbach et al., 1993), a few weeks before the general election to Parliament. As in a number of other early presentations of generational accounts, these first results were summed up as percentages - how much more will future generations have to pay in net taxes as compared to current generations to balance the intertemporal budget constraint? The calculations took 1992 as base year, and showed a substantial generational imbalance as net lifetime taxes for future generations would exceed the taxes for current generations by about 130 per cent. These results provoked political concern and debate. The Minister of Finance decided that a discussion of intergenerational issues and generational accounts should be included in the next National Budget.

The annual budget documents in most countries consist of the Fiscal Budget, with the actual budget numbers, and a National Budget, which comprises analysis of selected issues. The National Budget for 1995, which was presented in 1994, included a short main text and an appendix on the methodology. It

was pointed out that a lot of numbers could be derived from such exercises. Presenting a lot of alternatives will typically be confusing in the political debate, so the Ministry looked for a single informative concept. The chosen indicator for the intergenerational fiscal stance is the required reduction in general government consumption to restore balance between generations. This variable can be related directly to the budget surplus (deficit).

The accounts, as presented in public documents, are based on projections of public expenditure and revenues from a base year. Currently, this base year is 1999. The calibration allows for extension to the budget year without change in base year, thus allowing for continuous comparison of the same generation of new-born and future generations. Also, the permanent reduction in public consumption that is necessary to achieve generational balance is calculated as starting in the budget year, and not from the base year. While being the obvious way to do it in this context, most papers on generational accounting use a (historic) base year only. Note that the use of a fixed growth rate in the calculations of growth-adjusted accounts introduces a small «projection bias» if actual growth in the extension period differ from the chosen rate.³ The stability of the age- and sex-dependent profiles over time is questionable, but repeated estimation has not changed them very much. Other sources of uncertainty are probably more important.

An important item in the Norwegian accounts is public petroleum revenues, which differs from other revenues as they are the result of extraction of non-renewable or depletable natural resources. Quite a lot about the future petroleum revenues is known,

3. For comparison, each generation's account is given by $\sum [Tt/\{(1+g)(1+r)\}]$, where Tt is net taxes, g is the wage growth and r the discount rate. Thus, the account is growth adjusted.

especially that they should fall early in this century as reserves are depleted. This temporary nature of the government's petroleum revenues can be handled by including an estimate of the net present value of future expected revenues in public wealth in the government's budget constraint. Non-renewable resources are thus viewed as equal to financial wealth. This is illustrated in Steigum and Gjersem (1999). Still, there are issues related to the handling of uncertainty in this context, which need to be clarified and quantified.

Repeated presentations and the business cycle

After the first broad presentation in the National Budget 1995, generational accounts were presented in the following Revised Budget and then on a regular basis in the in the annual budget documents. A brief overview related to these presentations is presented in table 1. Based on the 1995 budget figures, table 1 shows that a large generational deficit was presented in 1994, requiring a reduction of government consumption of between 2-4 per cent of GDP for intergenerational balance. The interval spans growth rates of $1\pm\frac{1}{4}$ per cent. The next year the required reduction was somewhat lower, and based on the 1997 National Budget the interval spanned zero. In 1998, a business cycle component (described below) was introduced and the interval still spanned zero, as it also did the next year. In the National Budget 2000, a need for cuts were back, due to both an extension of the business cycle adjustment to include local government and lower petroleum prices reducing petroleum revenues.

As a small open welfare state, Norway tends to experience strong business cycles. As it turned out, the introduction of generational accounts in Norway coincided with a strong

downturn in the economy. In the following years the automatic stabilisers secured increased revenues and reduced expenditures. It is quite obvious that generational accounting based on a single year, in a downturn will look negative and similarly during an upturn will exaggerate the positive prospects. There is obviously a need for business cycle adjustments.

Such adjustments could be based on estimating a trend through time series of budget items, perhaps by using a Hodrick-Prescott-filter. There are also reasons for using more information than just a time series of budget figures, as the relationship between the budget balance and the cyclical situation of the economy can be decomposed into several changes. When the rules for some item in the budget is changed, for example income tax rules, there is one effect from the tax rule, and one effect from the economy – and quite probably there are also effects from changes in the incentives that the economic agents are facing. The cyclical sensitivity of public budget balances and fiscal indicators in the Nordic countries is analysed in Braconier and Holden (1999).

The Ministry already extracts measures for the business cycle from other models used for budget work. It is natural to exploit existing cyclical corrections, which aims at correcting the budget for the impact of automatic stabilisers through adjustment of the tax bases, giving a «normal» or structural budget surplus. As these other models are used for generating the underlying budget figures used to calibrate the generational accounts, the figures are used in a consistent manner. There are also the practical matter that these estimates from the base model will be used in the presentation anyway. It is also a concern that the input figures for the accounts will arrive very late in the budgetary process, and that avoidance of multiple calculation

processes is appreciated in such situations.

Almost every year since 1995, estimates for public oil revenues have changed as prices vary in the near term and extraction plans change. There have also been other modifications, for example updated population projections. Also, there have been updates of the methodology. While the presentations have included descriptions of these changes, the results presented in the annual budgets must be said to be hard to compare. Gjersem (2000) shows that recalculation of the accounts for these years based on the information available later, turn out a much more stable and balanced picture. The general government accounts for 1995 turned out somewhat better than the budget with a related reduction in the required cuts. This was, among other things, due to reduced unemployment. During the following year, the calculated balance in fact turned slightly in favour of future generations, but at the same time the activity adjustment rose as real GDP growth turned out at 4.9 per cent in 1996 and 4.3 per cent in 1997. The total effect of these impulses was a recalculated required reduction in government consumption equal 0.5 per cent of GDP in 1996 and 0.3 per cent in 1997 to achieve generational balance.

During 1998, public expenditure and transfers rose after a change of government. Among other things, a special cash transfer to parents staying at home with their children (on top of the general family benefit) and a generous increase in the base pension was introduced. Total public expenditure rose from 44.2 per cent of GDP in 1997 to 46.5 per cent in 1998. At the same time real GDP growth was halved to 2.1 per cent and the

recalculated required reduction in government consumption increased to 1.7 per cent of GDP.

In 1999, real GDP growth turned out at just 0.9 per cent, and the required reduction in government consumption grew somewhat. For 2000, the generational balance without adjustment was projected to be slightly better than in 1999, but as the business cycle adjustment remained high the required reduction in government consumption still turned out to be 1.1 per cent of GDP. For the period 1995-2000, recalculated estimates for the required cuts have been approx. in a range around 1 per cent of GDP.

Recently, calculations of generational accounts based on the Government's budget proposal for 2001 presented in the National Budget 2001 indicates that the budget balance for the general government sector now is in the range required to avoid a higher net tax burden for future generations.

In the Long term programme 2002-2005 presented in 2001, the tax and transfer profiles were updated along with future petroleum revenues, and the generational accounts now turned out to be equal when calculated for interest rate 4 per cent and growth rate 1 per cent (c.f. table 2). The business cycle adjustment described above is included in these calculations. Thus, these presentations point to a balanced intergenerational stance of fiscal policy in Norway. In the National Budget 2002, the government introduced a fiscal rule for accelerated use of the State Petroleum Fund. This rule states that each year, 4 per cent of the initial balance in the State Petroleum Fund for that year should be «used»⁴. As the inflow into the State

4. Formally, the rule states that the budget should balance after transfers from the State Petroleum Fund when corrected for activity (that is, the business cycle influence) and for transfers from Norges Bank and financial income in excess of «normal levels». There are no specific constraints on how the additional funds should be used; the use can consist of reduced taxes, or increased transfers or consumption. The «use» is termed «phasing in of

Table 1.
Overview over results as presented in the National Budgets 1995–2001

National budget 1995	Reduction of Gov't Consumption of 2-4 per cent of GDP required for intergenerational balance
National budget 1996	Reduction of 1-3 per cent of GDP necessary
National budget 1997	Close to intergenerational balance
National budget 1998	Close to intergenerational balance
National budget 1999	In intergenerational balance
National budget 2000	Reduction of Gov't Consumption \approx 1 per cent of GDP required for intergenerational balance
National budget 2001	Intergenerational balance, continuation of temporary high taxes required

Source: Ministry of Finance, Norway

Petroleum Fund currently is even stronger, the fund will grow in the medium term and the annual «use» will increase accordingly. This rule will affect the generational accounts for Norway, but the rule itself is not implemented in the calculations and its intergenerational effects have not yet been analysed. The presentations in the National Budgets are thus based upon projections of the latest budget only and not on future accelerated transfers from the State Petroleum Fund.

The recent results presented in the National Budget 2002 were rather less impressive than the results from the previous budget. These results were based upon some methodological updates, the phasing out of some temporary high taxes and upon the application of the rule described above for a single year. All three of these contributed to move the projections away from the range required for balanced net tax burden for current and future generations. A measure for this imbalance is that government

consumption now needs to be reduced by 0-1.5 per cent of GDP to re-establish balance.

Interest rate and growth

A remaining issue in the calculation of generational accounts in Norway, is a strong sensitivity to discount rate and wage growth assumptions. In the first paper on generational accounting by Auerbach, Gokhale and Kotlikoff (1991), a growth rate of 0.75 per cent and a discount rate of 6 per cent were the «base case». For Norway, Auerbach et al. (1992) also used 0.75 per cent as growth rate but 4 per cent as discount rate. A wide span in assumptions is to be found in the by now wide literature on generational accounting.

In 1994, the Ministry decided to use approximately the same assumptions that were used in the first presentation for Norway. A separate argument was that they were also more or less in line with similar assumptions used for other purposes in public planning.

oil revenues», suggesting that one aims at establishing net taxes at a lower level in the medium term than projections based on current budgets suggest.

Table 2.
Sensitivity to the rate of growth. Interest rate 4 per cent

Rate of growth (per cent)	Adjusting Budget Surplus by Gov't Consumption Change	
3/4	Reduction of surplus	0.6 % of GDP
1	Balanced	—
1 1/4	Increase of surplus	0.7 % of GDP
1 1/2	Increase of surplus	1.4 % of GDP

Source: The Long Term Programme 2002-2005

Now, the annual presentation in the National Budget is based on 4 per cent discount rate and wage growth between 0.75 and 1.25 per cent. Results based on these assumptions are presented in table 2, showing that low growth implies an increase in public consumption, while higher growth implies the opposite.

First, it should be pointed out that these are somewhat different results from what similar exercises in other countries would yield. In Norway, the existence of large public net financial assets means that higher growth increases the «generational deficit», as future taxes and transfers grow while existing wealth stays the same. With debt, one would experience the opposite effects as existing debt is lower relative to future net transfers. This is the same sort of argument that leads to the ability to «grow out of debt», which is an altogether better situation than to grow out of assets. It is quite disturbing to note that even the small changes in assumptions shown in table 2 would change the results so much. This situation means that strong policy recommendations based on generational accounts alone are not warranted.

Probably, the wage growth should be somewhat stronger to get more in line with other presentations. Also, the value of 1 per cent now is slightly lower than the long-term growth as it is used in other public projections. The Government' recent Long term

programme uses approx. 1.5 per cent as growth in wages over the long term. Combining an interest rate of 4 per cent with this higher growth rate results in a required reduction in spending from 2001 equal to 1.4 per cent of GDP, cf. table 2.

Compared to the results in Steigum and Gjersem (1999), where the change in spending to equalise burdens was estimated at 1.9 per cent of GDP based on government accounts in 1995, growth of 1.5 per cent and a discount rate of 5 per cent, for the same assumptions the estimated change in spending in 2001 is 0.8 per cent of GDP. The updated estimate includes the business cycle adjustment. The change also reflects the increase in estimated petroleum wealth since the older paper.

Still, the calculation of generational accounts for Norway underscores that the expected high petroleum revenues the next few years should translate into considerable budget surpluses in order to secure generational balance and a long-term sustainable development path for the Norwegian economy. For reasonable assumptions, the accounts return an estimate of «how large» the annual surplus should be. The uncertainty associated with future petroleum revenues indicates, in isolation, that the budget balance should be strengthened further.

In cash or in kind

In the standard generational accounting procedure, public revenue and expenditure are split into one part allocated to the current population based on age and sex, while the remaining items – those which cannot be allocated to individuals either due to lack of information or because no intuitive distribution exist – are projected into the future based on the growth rate and the total population. Public expenditure may be divided into transfer payments and spending on goods and services. Transfer payments include pensions, but also items such as subsidies, where the age and sex distribution of final receivers may be very hard to chart. Spending on goods and services includes the value of inputs in public production, but also expenditure when government buys goods and services from the private sector. Examples span from bureaucrats pay to spending on roads. Such expenditures and incomes are usually aggregated into one net amount of public consumption, covering all non-age dependent items. Different countries have their own statistics, registers and surveys, resulting in different implementations among countries.

In the early papers on generational accounting, the net value of public consumption was not included in each generation's account. In a number of later papers, notably ter Rele and Bovenberg (1999), this component has been divided evenly on all inhabitants and included in the net tax measure in the accounts. With regard to the government intertemporal budget restriction,

which is the basis for generational accounting, the procedure results in deleting the present value of net government consumption and increasing the present value of all net taxes with the exact same amount. Thus, this extension does not influence the intertemporal public wealth.⁵

In the Norwegian generational accounts, the part of public production of health care expenditure that consists of operating costs is distributed according to existing statistics. These operating costs consist of wages and intermediate consumption. There is currently not enough information available regarding the existing capital stock, depreciation and net investment to distribute these items in a way consistent with the operating costs. Thus, due to ageing there is a shortcoming in the generational accounting procedure, which probably results in a too optimistic view. While this is the general practice in making generational accounts (see Auerbach, Kotlikoff and Leibfritz (2000)), ter Rele and Bovenberg (1999) presented results for the Netherlands based on an approach specifying the investment side of public consumption. The procedure used by ter Rele and Bovenberg shows that alternative modelling can have a quite large impact on the result.⁶

Currently, public consumption constitutes approx. 20 per cent of GDP in Norway. The definition of public consumption allows the expenditure to be split into wages, intermediate consumption and gross investment. Accordingly, the nominal growth over time can be separated into a price component and a volume

5. The main effect of including this measure in each generation's account is to increase the value of the average accounts with the same amount for all generations. Thus, the percentage difference between the absolute value of current and future generations' accounts is reduced and the implied change in accounts needed to attain intergenerational balance becomes a smaller percentage. This is especially useful when the unadjusted account is close to zero.

6. In ter Rele and Bovenberg (1999), the benefits from the existing capital stock were included as an imputed rent.

component. Table 3 shows that price growth in the period 1978–1994 was less than the growth in the consumption price index (CPI). Of course, this is the same general result as mentioned above: Productivity growth reduces the price of manufactured goods over time, allowing a constant volume to be supplied at falling cost. In the conventional treatment of public purchases in generational accounting, it is implicit that the total value of intermediate consumption grows with a rate equal to the sum of wage growth and population growth. From table 3, one may argue that this implies an increase in service volumes because of falling relative prices, and that adjustments should be introduced.

In the generational accounting framework, it is possible to introduce a separate price level path for intermediate consumption and gross investments in public consumption. The effect is a series for total government consumption that grows somewhat slower than other expenditure. The net present value of government consumption is still well defined, but lower than previously calculated. The total effect of this change is to reduce the net present value of government consumption with NOK 1350 billion, equal to approx. 113 per cent of GDP for base year 1999. As the accounts were balanced in the base case, with an intertemporal public wealth close to zero, the full amount of this change now represents intertemporal public wealth.

As described earlier, the intertemporal public wealth may be transformed into an annual stream and compared to other items in the public budget. As such, the results from

this procedure equals a permanent reduction of all personal taxes by 2.9 per cent of GDP, an increase in all transfers by 2.6 per cent of GDP or a permanent increase in government consumption by 3.1 per cent of GDP.⁷ An interesting observation is that these results are close to being invariant to the applied rate of wage growth. The sensitivity discussed in an earlier section is now totally eliminated. To understand this result, it is necessary to note that in the government intertemporal restriction the initial large explicit public wealth for Norway now has a counter item in the net present value of this part government consumption, which now grows slower than the wage growth. While the standard treatment of government consumption would result in large changes in this item for alternative growth rates, now the value will stay constant whatever growth rate is applied. Thus, a major source for the reported sensitivity is eliminated.

Even though introducing this alternative rule for projecting intermediate consumption and gross investments in public consumption is quite intuitive, a closer look is necessary to evaluate its usefulness. It is well known that differences in growth rates will deliver substantial effects if allowed to continue over long periods of time, but also that such assumptions have been hard to corroborate in total cost statistics. The current rule may best be regarded as representing continuation of current policies, based on the view that policies is represented by the supply in kind of goods and services. An unchanged supply, or the same supply per capita, represents equal volume distribution and the fact that

7. The increase in government consumption has been calculated to be comparable with the amounts reported in table 1, so that the change is in the part of gross government consumption that increases by the growth rate over time. Still, one should note that this transformation only gives a series with the same net present value as the increase in net intertemporal wealth (or represents one way of spending that wealth) and do not represent a policy that will establish equal (growth-adjusted) generational accounts between generations.

Table 3.
Public consumption. Norway

	Shares of total public consumption, 2001. Per cent	Price growth in excess of CPI, 1978-1994. Per cent
Hourly wages	56	0.5
Intermediate consumption	26	-1.7
Social benefits in kind	5	NA
Gross investment	12	-1.7

Source: Statistics Norway and Ministry of Finance

productivity growth allows for it to be produced with fewer resources over time is not relevant. Instead, these continuous savings render an expanded supply available. Any such expansion, whether in qualitative or quantitative terms, should be viewed as a political decision and should not be modelled as automatic.

As above, the traditional treatment of such items in Norwegian long term modelling is to apply a price growth substantially lower than the CPI (see i.e. the recent Long term programme 2002-2005). This implies that a falling share of total resources is allocated to the needs represented by such items as the economy grows (implying that as the population grows richer, a decreasing share of annual GDP will be allocated to weaker groups). Accordingly, the steady state implications of this modelling approach are questionable. An interesting observation is that in recent work on long term macroeconomic projections, as presented in EU (2000), EU (2001) and OECD (2001), non-age dependent public purchases per capital are supposed to stay fixed as share of GDP. In the long run, this assumption is equal to the standard generational accounting treatment. In OECD (2001), Norway in fact seems to be the only country using another approach.

The economic approach to modelling should be based the optimal allocation of scarce resources. The obvious approach is to equate society's utility from increased public consumption with marginal utility from increased transfers or reduced taxes. Of course, while representing standard economic theory, this is not really operational as the intertemporal utility functions are unobservable. Still, it seems rather unusual to model long term expenditure on public consumption in the alternative way illustrated in this section, as this implies that such expenditure over time will get a reduced part of annual GDP as the population grows richer. On the other hand, neither is the standard procedure with a constant share of GDP per capita very attractive, as this implies that reallocation will not take place even if other needs should grow forth. Thus, neither seems to be a good representation of future economic policy, but rather to be opposite extremes.

Instead of arguing for one of the approaches, both having their basis in national and international applications, together they seem to show that a continuation of current supply of public consumption in Norway, there may be room for further policy enhancement in the long term even within in a balanced inter-

generational frame. The standard generational accounting approach puts focus on equal spending on each and all generations, while the alternative approach focuses on the volume of goods and services supplied by the government. The latter approach allocates identical services to all generations, while the first upholds the value of such services. Identical services may represent a floor for public consumption, while extensions above this floor are political decisions.

Conclusion

As a result of increasing expenditure on old-age and disability pensions while revenues from petroleum activity declines, it is clear that Norwegian fiscal policy will be facing considerable challenges in the long term. In the current period of high petroleum revenues it is necessary to set aside considerable capital in order to avoid a severe tightening of general government budgets later on. Formal economic models are needed to analyse the magnitude of future challenges and the policy changes needed today.

Presentation of results from generational accounting has for several years been an integral part of public policy documents such as the annual National Budget in Norway. Since the first presentation, the generational stance of the accounts has improved. These changes can be attributed to changes in public wealth due to changes in petroleum revenues, which is a special effect for Norway, to business cycle effects, and to real changes in government consumption, taxes and transfers. Updated results suggest that the intergenerational balance seems to be more equal in Norway than in most other countries.

Over time, it has been necessary to extend and supplement the methodology as repeated use has revealed shortcomings or unwanted

characteristics. Experiences seem to show that the Norwegian accounts are more sensitive to the assumptions and probably to business cycles than similar accounts in other countries.

In the base case with annual growth rate of 1 per cent and an interest rate of 4 per cent, the accounts of current and future new-borns were equal in 2001. Increased growth rates or lower interest rates will change the result, mainly due to the large fixed government wealth represented by public financial assets and future revenues from petroleum extraction. Alternative approaches to the projection of public consumption show that within the balanced accounts there are further room for the expansion of public services, alternatively for increased transfers or reduced taxes, even if the current supply of goods and services is held constant per capita in volume terms.

Still, a closer look shows clearly that in most countries, the value of public consumption has been on the increase for a long time, measured as share of GDP. The arguments in this section are hard to unite with this observation. The long-term differences resulting from the alternative approaches described here will depend on both the size of public consumption and on the share of intermediate consumption and investments in public consumption. Which approach one should use in long term modelling is not straightforward, but the difference between the two sets of results obviously tells a story about future expansion possibilities.

Long-term issues have for a many years been important in economic policy in Norway. Following the discovery of profitable petroleum resources in the North Sea in the late 1960s, a range of issues regarding wealth management, intertemporal distribution and stabilisation of economic activity were soon

raised in public discussion. In particular, disentangling the revenues from the petroleum sector from current transfers and consumption of goods and services has become a main priority for the formulation of economic policy. Thus, in a recent OECD publication (OECD, 1999) it is pointed out that among 28 members, only three beside Norway has a regular report on the long-term outlook for public finances. The idea of intergenerational allocation of public assets and the tax burden has long been established in Norway, especially as it for a long time has been obvious that the special profile of the petroleum revenues may give rise to high consumption now unless the future are given some weight. Generational accounting applied and presented with care has turned out to be a valuable tool with intuitive appeal to the general public, and supplemented by other models it illustrates the need for budget discipline now to avoid hardship on future generations. Especially, generational accounting seems to be able to handle and illustrate alternative assumptions and modelling approaches in an easy manner. The Norwegian public assets are large, but only long-term estimates will tell us whether they are large enough.

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