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The Finnish generational accounting revisited

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ABSTRAKTI

Abstrakti: Kasvuvauhdin ja työllisyyden suhteellisen suuret vaihtelut ovat Suomen taloudelle ominaisia piirteitä. Toinen ominainen piirre on, että suuri osa julkisesta varallisuudesta on sijoitettu koti- ja ulkomaisille rahoitusmarkkinoille. Näiden piirteiden merkitystä sukupolvitilinpidon kannalta tarkastellaan. Julkisen talouden tasapaino yli ajan on kohentunut huomattavasti sukupolvitilinpidon mukaan vuodesta 1995 vuoteen 2000. Tasapainottuminen johtuu suotuisasta kokonaistaloudellisesta kehityksestä ja finanssipoliittisista päätöksistä. Osa tasapainottumisesta johtuu kuitenkin voimakkaasti kohonneista varallisuuskohteiden hinnoista, yritysten tuloksista ja pääomatuloveroista. Tässä yhteydessä pohditaan sitä, miten voimakkaasti vaihtelevia suureita tulisi käsitellä sukupolvitilinpidossa.

Abstract: One of the special features of the Finnish economy has turned out to be a high real growth rate and employment volatility. Another special feature is that a large share of public wealth is invested in domestic and foreign financial markets. The consequences of these features for generational accounting are shown and discussed. The intertemporal balance has improved remarkably according to generational accounting results of the year 2000 compared to the results of the year 1995. The improvement is due to favourable macroeconomic development as well as ambitious fiscal policy. However, part of the improvement is based on the soared market values of assets, firm profits and capital income taxes. The paper raises the question how to handle highly volatile variables in generational accounting.
JEL Classification: E6, H6, H82, J1

CONTENTS

THE FINNISH GENERATIONAL ACCOUNTING REVISITED

Generational accounting is one of the most comprehensive approaches to evaluating the fiscal stance. Until now many aggregate and annual indicators derived from the basic generational accounting calculations have been presented. Their information content is much wider than that of annual deficits or surpluses, as also all the traditional monetary indicators of fiscal stance can be calculated on the basis of generational accounting raw data. Welfare indicators are lacking, but they go into such depth that they cannot be dealt with in fiscal policy discussion.

INTRODUCTION

The development of the Finnish economy has been the most fluctuating among the present EU countries in terms of real growth and employment during the last 15 years. Foreign and domestic demand and technological change have been the underlying driving forces. In the late 1980s inflation and real income expectations maintained domestic demand and private agents were running into debt. Due to, e.g., the policy of the Bank of Finland, the inflation expectations were never met, and the inconsistency of the plans turned out in the early 1990s. The debt crisis was strengthened by declining foreign demand. On the other hand, technological restructuring was rapid, and due to high unemployment, wages have risen slower than productivity since the mid 1990s.

The minimum of annual real economic growth rate was –6.3 per cent in 1993. The maximum, +6.3 per cent, was reached in 1997. The maximum of unemployment, 16 per cent, was reached in 1994, and the minimum of 3 per cent is from the year 1989. In a Nordic type welfare economy with high tax rates and large transfer schemes, the high unemployment rate variation resulted in a roller coaster pattern also in public sector revenue and expenditure aggregates. The minimum of primary balance, -8 per cent of the GDP, was reached in 1993. The recent maximum was +6,4 per cent in 2000. The primary balance definition here does not include neither interest on public debt nor returns on public financial assets.

In addition to small open economy and Nordic welfare state properties, there are some other institutional features which complicate assessing the state of current policy and public economy in the long run in Finland. The Finnish public pension system includes also the so called second pillar of pension scheme categories. Thus, the main part of public pension benefits are earnings-related and there are no ceilings for the benefits. The national pension benefits are means-tested against the earnings-related pensions and the scheme is of the pay-as-you-go type.

The earnings-related pensions are partly funded, the average funding rate being approximately 25 per cent (Risku, 2001). The schemes for private sector employees and self-employed persons are run by private mutual pension insurance companies, industry-wide or company pension funds. The total value of their assets is nearly 60 per cent of the annual GDP. Domestic and foreign government bonds form 40 per cent and shares quoted on the exchange 30 per cent of the market value of the assets. The rest is invested in real estates, loans and money market instruments. All pension institutions as well as contributions and benefits are included in the general government sector in the national accounts.

The Finnish central government owns quoted stocks as well as pension institutions. However, the gross debt of the central government is approximately of the same size as the value of its assets, and the net financial wealth of the general government is almost equal to the wealth of pension institutions. Volatility of assets prices is another important point when assessing the state of the Finnish public economy.

In an EU-wide project a research group produced generational accounts and related indicators for the member countries (EU, 1999 and Raffelhüschen, 1999a). The indicators showed a large intergenerational imbalance in Finland. The base-year of the report was 1995, and as the above stylized facts indicate, the Finnish economy has changed a lot since then. Policy changes have taken place as well. The former standard of national accounts has been replaced with the European System of Accounts (ESA95). Nowadays it is also a common view that increasing longevity should be assumed to continue for a rather long period.

The aim of this paper is to show how sensitive generational accounts are to business cycles and discuss whether this sensitivity could be catched by the sensitivity analysis typically presented in association with baseline generational accounts. As a starting point we have the results of Feist et al. (1999)

published in the above mentioned EU-wide report. In the following the 1995 based study is called the EU study. The base-year of the calculations of the present paper is 2000.

In Chapter 2 we outline the rather well-known approach of generational accounts. In Chapter 3 we present the data. The results are presented and discussed in Chapter 4. The conclusions are drawn in Chapter 5.

GENERATIONAL ACCOUNTING

We follow generational accounting as presented in Raffelhüschen (1999b), and begin to determine generational accounts for current and future generations by calculating a set of figures as follows

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

In equation (1) $N_{t,k}$ denotes the net present value (NPV) of all the future net taxes paid by the generation born in year k under the policy considered and discounted to the beginning of the base-year t. Net tax is defined as taxes paid minus transfers received and the value of public services consumed. r is the assumed annual discount rate. In equation (1) NPVs for the future generations, i.e. generations born after the year t, are also discounted to the year t, and not to the birth-year of the generation. NPVs are calculated separately for both genders, though this is not denoted in the equations. For generations born in year t or later, the result is the NPV of their life-time net taxes, and for generations born before t, the result is the NPV of the net taxes of the remaining life-span.

$P_{s,k}$ stands for the number of members of a generation born in year *k* who survive until the year *s*. *D* represents the assumed maximum length of life-time, typically and also here 100 years. In practice, $P_{s,k}$ is drawn from population projections, which are typically produced by the so called cohort component method. We pass the explicit presentation and discussion of the method and assume increasing longevity until the year 2050. The assumption is implemented by decreasing mortality rates, i.e. increasing survival probabilities, for ages below 100 years, and assuming a certain death at the age of 100 years. Decreasing mortality has a significant impact on the length of retirement days, and thus on the NPV of the life-time net taxes, ceteris paribus. In a more general case, we could also consider probability changes of "softer" transitions. We could, e.g., model transitions between labour market positions. One of the most remarkable case is a rising effective retirement age. However, increasing longevity is the only type of transition we have assumed in this study.

$T_{s,k}$ denotes the average net tax paid in the year *s* by a representative member of the generation born in the year *k* , and all types of taxes, transfers and services are taken into account. $T_{s,k}$ includes, among other variables, also the collective public services, and in this study the depreciation of the fixed capital as part of the value of public services. In the original version of generational accounting neither individual nor collective public services were included in generational accounts. Public services were taken into account as a stream which should only be financed intertemporally by taxes (Auerbach, Gokhale and Kotlikoff, 1991).

It is assumed that current policy is prevailing indefinitely. $T_{s,k}$ is a sum of various types of taxes, transfers and services

(2) $$T_{s,k} = \sum_{i} h_{s,k,i} ,$$

where *i* denotes the type of tax, transfer of service. If $h_{s,k,i}$ >0, it is a tax, and if it is negative, it is a transfer of service. The difference *s-k* refers to the age of the generation in the year *s*. The future streams are first projected by age. Generally, projections based on sophisticated methods or expert knowledge may be available, but especially if that is not the case, projections are based on the assumed annual rate of productivity growth, *g* as follows

(3) $$h_{s,k,i} = z_{s,k,i} h_{t,t-(s-k),i} (1+g)^{s-t} .$$

Equation (3) assigns to each agent of age *s-k* in year s the same payment observed for agents of the same age in the year *t*, adjusted for productivity. The coefficients *z* are policy parameters to capture the changes that have taken place or are assumed to take place. Parameters may also be used as endogenous variables, which are solved in order to find an intertemporal balance.

The generational account in the year *t* of the cohort born in the year $k \le t$, is

(4) $$A_{t,k} = \frac{N_{t,k}}{P_{t,k}} .$$

The generational accounts for the future generations are defined as follows

(5) $$A_{k,k} = \frac{N_{k,k}}{P_{k,k}} .$$

$P_{k,k}$ is the number of children born in the year *k* and who are alive at the end of the year. According to equation (5) the generational accounts for future generations are NPVs of life-time net taxes in the birth-year.

If we compare the accounts of future generations to each other or to the account of the newly-born generation, we have to do the corresponding productivity adjustment, and when operating at the level of public economy, as in equation (1), we have to calculate the NPVs at the same moment.

We now define the basic indicator of generational imbalance or unsustainability of the policy. The uncovered intertemporal public liabilities (IPL) of the base-year *t,* L_t, are defined as

(6) $L_t = B_t - \sum_{k=t-D}^{\infty} N_{t,k}$.

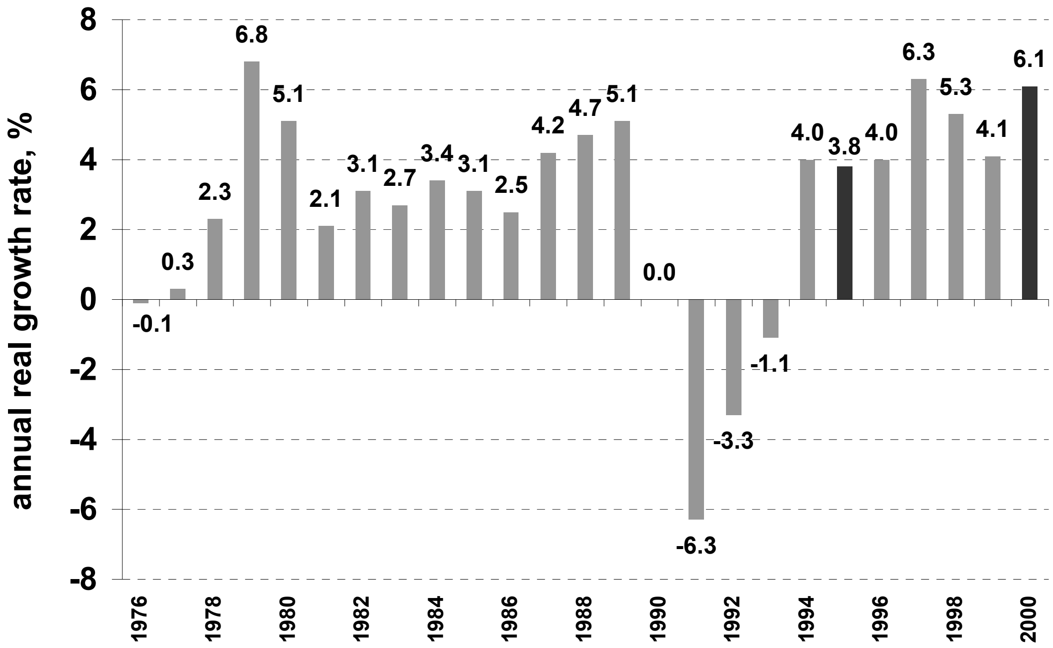
B_t is the net public debt at the beginning of the year *t*, and the *N*-values are defined in equation (1). Due to comparability across countries or the same country at different points of time, L_t should be related to, e.g., the GDP of the year *t*. If L_t is unequal to zero, the policy considered is not sustainable. In case L_t is positive, taxes should be raised or transfers and services cut. In case L_t is negative, taxes are allowed to be lowered or benefits raised.

The only indicators we consider here are L_t and a tax change in terms of the parameter $z_{s,tax}$ which would make L_t zero.

DATA

The population forecast is basically that of Eurostat published in 1997. We have slightly modified the Eurostat baseline projection, and also continued the projections until the year 2100. Eurostat has published a new revision in 2000 (EU, 2000), but the differences between the new and old versions are not remarkable. We assumed a total fertility rate of 1.75, net immigration of 5000 persons annually and an increasing life expectancy until the year 2050, and constant mortality thereafter. The increase of life expectancy was approximately one year in a decade. The assumed annual net immigration figure is relatively small compared to the original population, only 0.1 per cent. We have not applied any separate immigrant population modelling (Bonin, Raffelhüschen and Walliser, 1999).

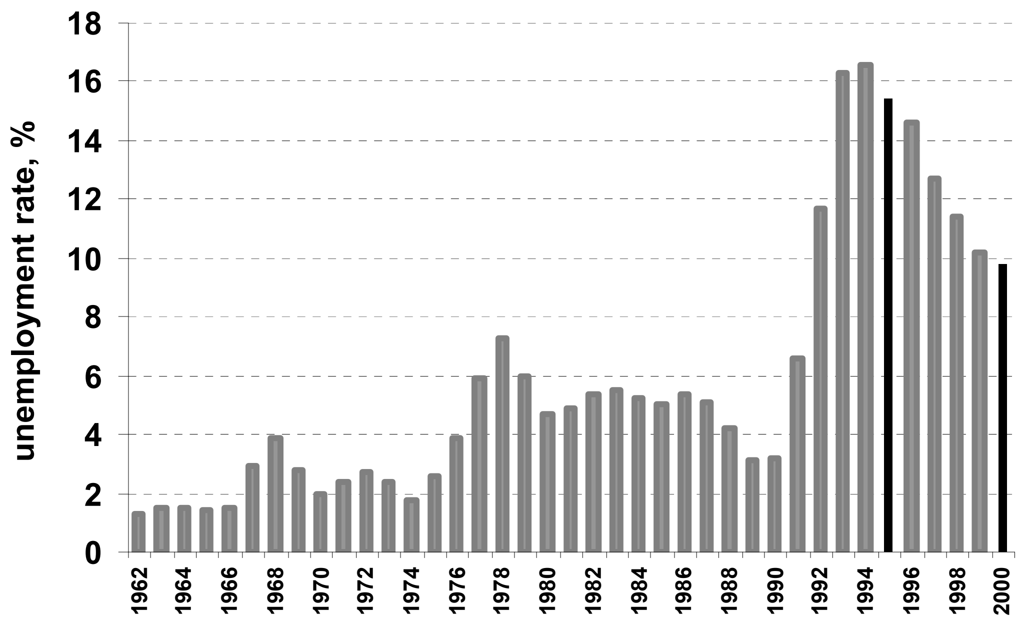
The growth rate of the Finnish economy has varied a lot during the last 15 years. Annual real growth rates of the output are presented in Figure 1. Growth rate variability is naturally reflected in the unemployment rates of Figure 2. Further, in a Nordic type welfare society economic fluctuations have a strong impact on public expenditures and revenues. The development of primary balance related to GDP is shown in Figure 3. Further, primary balances accumulate or decrease public net financial wealth, which was one of the key variables when calculating the IPL in equation (6).



Source: Statistics Finland, National Accounts

Figure 1. Annual real growth rates of GDP in 1976-2000 in Finland, per cent.

The real output was contracting for three years, in 1991-1993, and the record decline was 6.3 per cent in 1991. On the other hand, the growth rates observed since 1994 have also been exceptionally high. The nominal value of GDP was 95 billion euro in 1995 and 132 billion euro in 2000.

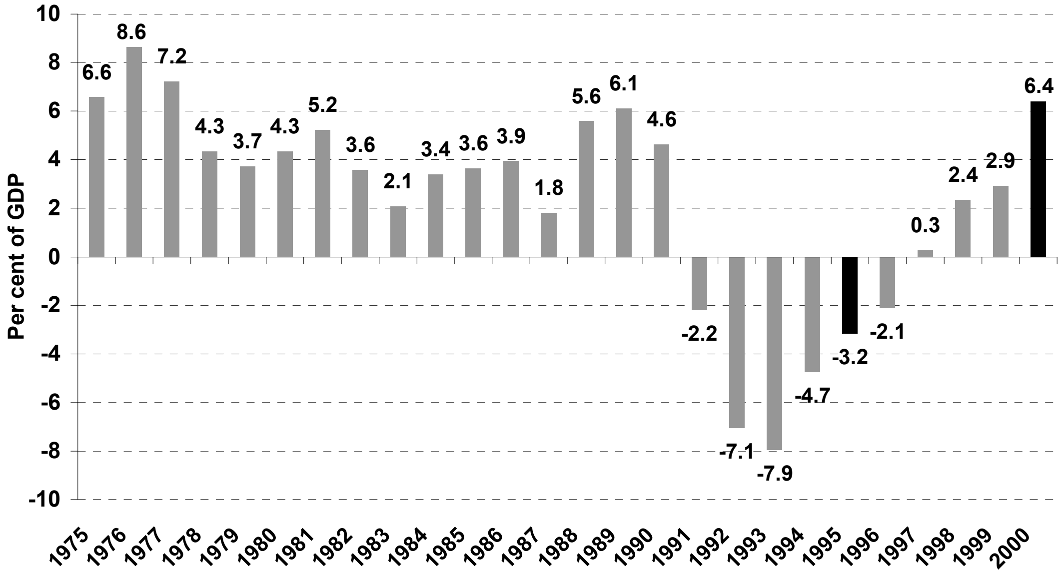


Source: Statistics Finland, Labour Force Survey

Figure 2. Unemployment rates in 1962-2000 in Finland, per cent of labour force.

Unemployment rates were rising rapidly in 1991-1994, but they have declined rather slowly since then despite the rapid real growth. This is due to both rising participation rates and high productivity growth. The unemployment rate was 15.4 per cent in 1995, in the base-year of the EU study, and in 2000 the rate was 9.8 per cent of the labour force.

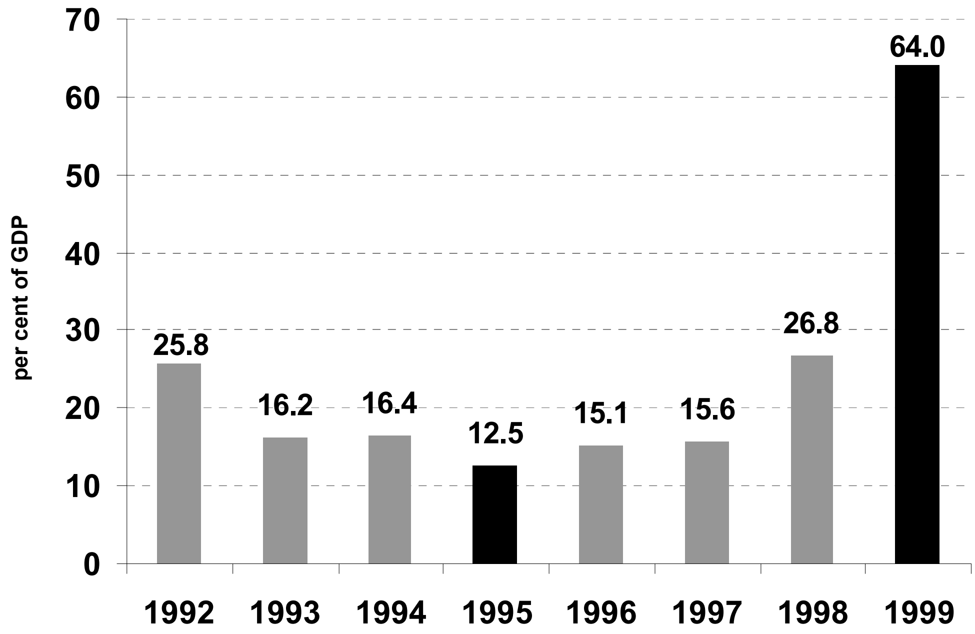
High growth rate and unemployment variations have resulted in high variation of primary surpluses and deficits as shown in Figure 3. Primary balance is calculated here without taking into account either the returns on public financial capital or public interest expenditures. Depreciation of the public fixed capital is included in the expenditure, and thus net formation of fixed capital is not taken into account.



Source: Statistics Finland, National Accounts

Figure 3. Primary balances in 1975-2000 in Finland, per cent of GDP.

There are two exceptional features in the Finnish public economy compared to the majority of the European countries. The Finnish public pension system is partially funded, and the pension institutions own stocks and other financial assets. Also the central government owns a remarkably high amount of financial assets in addition to a loan portfolio. The volatility of stock prices strengthens the business cycle effects on the IPLs. In Figure 4 we present the development of the public net financial wealth in the 1990s.



Source: Statistics Finland, Financial Accounts

Figure 4. Net financial wealth of the general government in 1992-1999 in Finland, per cent of GDP.

Due to the partially pre-funded pensions, the public economy has typically run surpluses, as can be seen in Figure 3. In 1995 the net wealth was 12 per cent of GDP according to the new financial statistics. The share was 8 per cent according to the former standard, and that value was used in the EU study. At the end of 1999 the figure was as high as 64 per cent of GDP, and we assumed that the value of net assets was the same in the beginning of 2000. The ratio of net assets to the GDP of the year 2000 is 59 per cent, which figure was used as the initial net wealth.

The main part of assets are covering the liabilities of the statutory earnings-related pension schemes, which are mainly run by private mutual insurance companies. The portfolios are managed as private investors manage their portfolios, but there are rather sophisticated rules for the part of total liabilities, which should be covered, as well as for a proper risk management. The pension funds ran surpluses also during the recession, and the gross debt was accumulated with the central government.

In Tables 1 and 2 we disaggregate public revenues and expenditures in 1995 and in 2000. The statistics standard has changed also here, and we follow the new standard also as to the year 1995. The aggregates are slightly different from those used in the EU study. The main statistical improvement from the point of generational accounting is that collective public services are separated from the individual public services.

Table 1. Public revenue and expenditure aggregates in 1995 and 2000 in Finland, per cent of GDP.

Revenue	1995	2000
Income taxes	17.4	21.0
VAT and other indirect taxes	13.7	13.3
Employers' social insurance contributions	10.1	8.8
Insured persons' social insurance contributions	4.5	3.3
Total = tax rate	45.7	46.4

Source: Statistics Finland, National Accounts

Revenues and expenditures are here organized so that the revenue side includes only taxes, because rest of income is deducted from the residual of expenditures. The tax-rate has risen slightly from 1995 to 2000, which is due to higher employment, higher profits and thus higher income taxes. In fact, the nominal tax rates have been lowered. Lowering of taxes is also the expressed policy of the present cabinet which took office in spring in 1999. Social insurance contributions have declined, because the unemployment benefits can be financed by lower rates.

Table 2. Public expenditure aggregates in 1995 and 2000 in Finland, per cent of GDP.

Expenditure	1995	2000
Pensions	13.1	10.8
Unemployment	3.7	2.0
Family policy (transfers related to children)	2.6	1.7
Other social transfers	2.8	2.0
Subsidies	2.8	1.5
Individual public services	14.5	12.9
Collective public services	8.3	7.6
Other expenditures minus other revenues	1.1	1.5
Total	48.9	40.0
Primary surplus (+) or deficit (-)	-3.2	6.4

Source: Statistics Finland, National Accounts

The policy of the present government is that the expenditure of the central government, including the interest payments, should be kept constant in nominal terms. The policy has not completely succeeded, but it is reflected in the above expenditure figures. It should be noted that only one fifth of the total pension expenditure is in the books of the central government. On the other hand, unemployment benefit expenditure has declined remarkably since 1995, and has made the cutting job easier for the government. The total pension expenditure was 10.8 per cent of GDP in 2000, compared to 13.1 per cent in 1995.

As age-profiles of the base-year taxes, transfers and services we use the profiles of the EU study. For pensions we use a profile from the year 1999 (Central Pension Security Institute, 2000), as well as for health insurance benefits (Social Insurance Institution, 2000). For social and health services we use a profile from the year 1998 (Ministry of Social Affairs and Health, 2001). All the profiles are adjusted for the year 2000 so that the corresponding aggregates of national accounts are fulfilled. In Figures 5 and 6 we present the age-profiles of net taxes in 1995 and in 2000 for both genders.

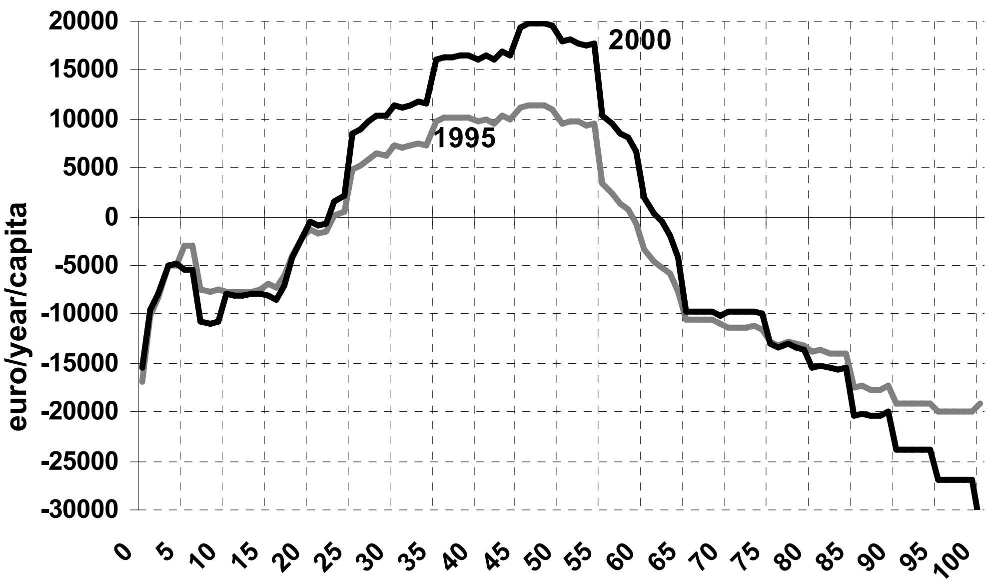


Figure 5. Age profiles of net taxes of males in 1995 and 2000 in Finland.

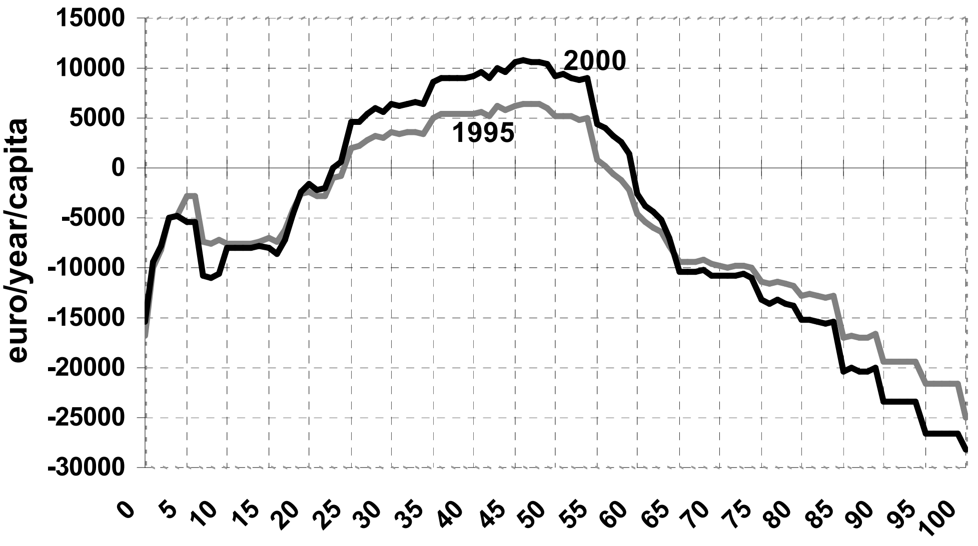


Figure 6. Age profiles of net taxes of females in 1995 and 2000 in Finland.

The profiles in the Figures 5 and 6 are non-deflated. Increasing prices, wages and indexed transfers have a positive impact on the net taxes where they are originally positive, and a negative impact where net taxes are originally negative. However, the higher age where net taxes are equal to zero, has shifted 3 years forward for both genders. The crucial age was 59 years for women and 61 years for men in 2000. Also positive net taxes have changed more than negative net taxes, especially at the prime ages from 30 to 55 years. Rising employment rates are the underlying reason. Naturally, these changes are no surprise given the aggregate changes reported in Tables 1 and 2. Rising employment rates are observed also at higher ages of labour force, and in fact, the effective retirement age has risen from 1995 to 2000.

RESULTS

The generational accounts of current generations defined in equation (4) are presented in Figure 7. Also the account for the generation to be born in 2001 is presented as defined in equation (5). The other curve in Figure 7 describes the accounts given that the IPLs are reset to zero by a sustainable tax rate change assumed to come in force in 2001.

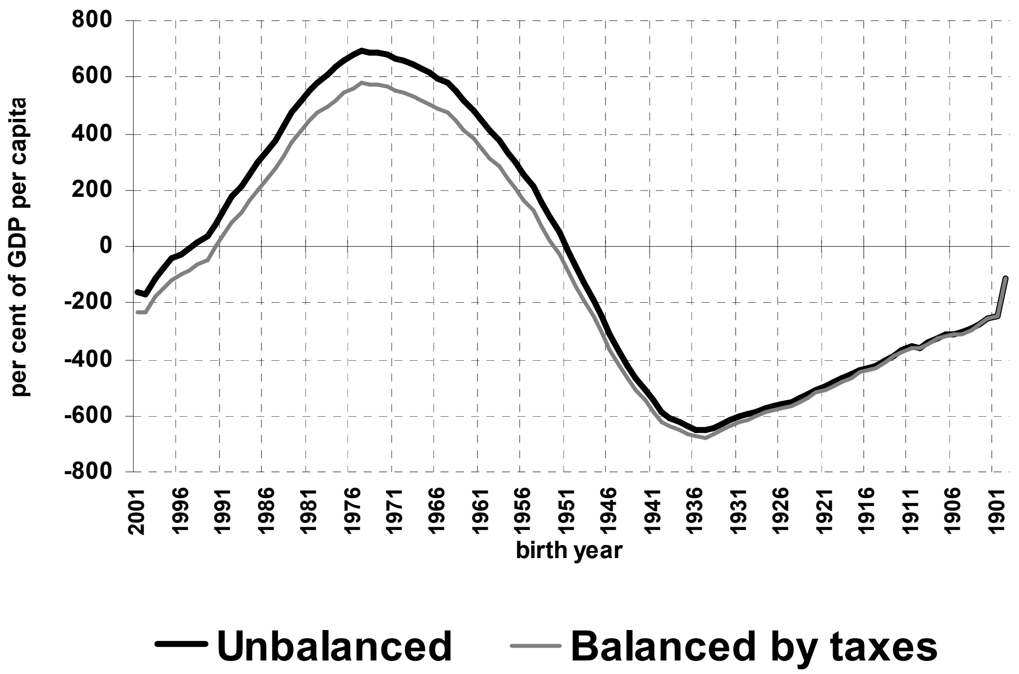


Figure 7. Generational accounts of the year 2000 for the generations born in 1900-2001, per cent of GDP per capita.

The two ages where the value of the generational account is zero, are 6 and 49 years in the unbalanced current policy path. Positive accounts, denoting positive NPVs of net taxes, appear in a 12 year wider age range than in 1995.

The lower age has declined and the higher age has risen by 6 years since 1995.

In Table 3 we present the IPLs and the respective required aggregate tax rate change to reset the IPL to zero at the baseline of this study and a comparison to the EU study baseline.

Table 3. Intertemporal public liabilities (IPLs) with its components and balanced tax rate changes required at the baseline in 1995 and 2000 in Finland, per cent of GDP.

Item	1995 EU study *g*=0.015 *r*=0.05	2000 Current study *g*=0.015 *r*=0.05
Intertemporal public liabilities, total	253	-90
Ageing	114	159
Explicit net debt	-8	-59
Macroeconomy and fiscal policy	147	-191
Balancing change of tax rate	8.8	-3.2

The generational balance has improved dramatically from 1995 to 2000. The IPL-indicator was 253 per cent of GDP in 1995, and with the same productivity growth and interest rate assumptions it was -90 per cent of GDP in 2000. In terms of a sustainable tax rate, instead of a requirement of raising the current tax rate by 8.8 percentages of GDP in 1995, the sustainable tax rate is now 3.2 percentages below the rate of the year 2000.

Following the approach of the EU study (growth of 1,5 per cent, interest rate at 5 per cent), we have separated the effect of population ageing on the IPLs. In 1995 it appeared to be 114 per cent of GDP, and until the year 2000 it has increased to 159 per cent of GDP. The reason is that the main part of the burden of ageing will materialise in the future also in 2000, but the burden will be met in a nearer future. However, in terms of primary surplus or deficit, population ageing started in 1995 in Finland. In order to find this out, we calculated the resulting primary deficit year by year in the 1990s using the 1995 age-profiles and the age structures of the particular years. It appeared that the pure ageing effect on the annual deficit started to rise in 1995. The difference between the 2000 and 1995 deficits was approximately 0.5 per cent of GDP.

Table 4 includes a sensitivity analysis with respect to productivity growth and interest rate. The sensitivity results are organised in a rising order by the difference between the interest rate and productivity growth rate.

Table 4. Sensitivity of intertemporal public liabilities and balanced tax rate changes to productivity growth rate and interest rate, base-year 2000, per cent of GDP.

	g=0.015 r=0.03	g=0.02 r=0.03	g=0.01 r=0.03	g=0.02 r=0.05	g=0.01 r=0.05
Intertemporal public liabilities, total	-19	+49	-53	-83	-95
Balanced change of tax rate	-0.3	0.6	-1.2	-2.5	-3.9

The IPLs are in the range of -49 and 95 per cent of GDP. The sustainable tax rate changes vary between 0.6 and -3.9 percentages of GDP. In long-run projections the annual productivity growth rate is typically assumed to be 1.5 – 2 per cent, and the real interest rate is assumed to be 3 – 4 per cent. If, e.g., a combination of 1,5 and 3 is chosen (Klaavo et al, 1999), the IPLs were 19 per cent of GDP and the sustainable tax rate change would be -0.3 per cent of GDP. If productivity would grow 2 per cent annually, taxes should be increased by 0.6 percentages of GDP for the balance. The deterioration of the balance with higher productivity rate (and constant interest rate) is due to the fact that also expenditures, not only revenues, per capita follow the growth of productivity.

The conclusion is that the public economy was quite near an intertemporal balance in Finland in 2000. As to fiscal stance in the years 2001 and 2002, the net effect on the primary balance is assessed to be a deterioration of approximately 4 per cent of GDP compared to the year 2000. In addition, the value of net assets has declined 12 per cent from the beginning of the year 2000. It is likely that there is no room for further tax cuts without corresponding expenditure cuts.

In the following we discuss whether the materialized situation in 2000 was included in the numerous sensitivity analysis scenarios of the EU study. A combined macroeconomic and fiscal policy scenario was presented in the EU study where IPLs appeared to be slightly negative as seems to be the case in the light of the 2000 data. The combined policy included the following elements: 1. halving the unemployment rate from the 1995 level until the year 2005, 2. raising the effective retirement age by five years until 2015, 3. raising the social insurance contribution rates as high as 1.5 times the current value until 2035, and 4. cutting all the public services by 20 per cent until 2010.

The unemployment rate has not yet been halved from the 1995 level, but it has declined more rapidly than in the halving path. The effective retirement age has naturally not increased by five years in the passed five years, but it is likely that the average age indicator has been near the combined policy path. Unfortunately, there is not any precise new statistics on this issue available. It is clear that in practice a five year increase in twenty years is a very ambitious target, and it cannot be reached by current policy. Ceteris paribus, the assumed rise of contribution rates would result in a 6 percentage rise of tax rate in 40 years, i.e. a 0.15 percentage rise annually. In table 1 we find that the tax rate has risen at the required pace in the passed five years. We find as well in Table 2 that public services have been cut approximately 10 per cent compared to the 1995 level in terms of GDP percentages.

Broadly speaking, the Finnish economy and fiscal policy have followed the best path from the point of view of intergenerational balance outlined in the EU study. However, the assumed phasing-in periods of the policy have not finished yet, and the assumed target values of the policy parameters have not yet been reached either, but it seems that intergenerational balance has already been achieved.

In fact, in addition to the policy outlined in the EU study, two other instruments have been used. First, social transfers and production subsidies have been cut. The decrease of social transfers is partly due to diminished unemployment, but especially transfers related to children or family policy have been decreased in relative terms. They are typically non-indexed, and adjustment decisions have not been made. Pension cuts have also been made but combined with earlier decisions and long transition periods, the overall result is that average pension benefits follow the productivity growth rate (Klaavo et al., 1999) as was assumed in the EU study. Another issue is that GDP share of pension expenditure has decreased due to the fact that factor income distribution has changed in favour of capital income.

The development of capital income leads us to the other reason underlying the favourable intertemporal public debt position of the Finnish economy compared to the most favourable scenario of the EU study. Both capital income tax revenues and the value of public financial wealth react to changes in the market values of stocks and real estates. Capital income tax revenues are partly dependent on capital gains and partly on profits. Both are heavily dependent on business cycles, and the assumption of productivity growth rate cannot capture these effects, even though a variable rate were assumed.

In the case of public asset values the effects could be captured, in terms of generational accounts, by a variable interest rate or a variable rate of return on investments, r_s or by separating the real interest rate of public gross debt and the real return on public financial assets. To manage these instruments in deterministic calculations, one should have an enlightened view on the rates of return in the near future. The interest rate of public debt is a much easier variable to predict. In the Finnish case the large public financial wealth is a special feature compared to other countries.

CONCLUSIONS

The intergenerational balance has improved dramatically in five years from 1995 to 2000 in Finland. The economy has grown rapidly due to reallocated resources and product innovations as well as the favourable international economic development. Fiscal policy has aimed at decreasing public gross debt, and the pension institutions have taken measures in order to raise the actual funding rate of the earnings-related pension schemes. The mainstream has been to improve the return on the investments of the funds.

In 1995 the Finnish public economy showed a severe unsustainability and intergenerational imbalance. In 2000 it is near balance, and probably, depending on the assumptions about the future, on the positive side.

When comparing the generational accounting results of the year 2000 to the results in the EU study 1995 as the base-year, we find that the development has been even better than the most favourable scenario presented in the 1995 study. The comparisons also raise the methodological question of dealing with the variables which are the most dependent on business cycles, capital income tax revenues being a good example.

There is a large public financial wealth in Finland. The wealth includes also risky assets, whose value is determined on the financial markets and the value is highly dependent on the business cycles. Stochastic approaches may be worth studying as to the management of high risk variables in generational accounting. The difference between returns on risky assets and on government bonds is an argument for separating them in generational accounting.

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