Risto Vaittinen and Reijo Vanne

Government Finances by Age in Finland

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ABSTRACT

In this study we evaluate generational incidence of fiscal policy. We do this using the method of generational accounts that has during the last decade gained popularity in assessing long-term aspects of public finances. Looking at the gross-section of the year 2004 we demonstrate that generations younger than 23 and older than 61 years are net recipients of public transfers. These generations receive, either as public services or transfers, resources more than they pay as taxes or social security contributions. Looking across all generations net taxes are positive, which implies surplus in public finances. Despite this fact, public finances are not in long term balance. According to our estimate, the present fiscal stance would imply accumulation of intertemporal net liabilities with 120 per cent compared to the current GDP. Overall tax rate should be increased about five per cent relative to GDP in the baseline projection to meet the long term balance.

JEL Classification: *H6, E6*

Keywords: *generational accounting, fiscal sustainability, public finances, taxes, public transfers*

ABSTRAKTI

Tässä tutkimuksessa arvioidaan finanssipolitiikan sukupolvittaista kohtaantoa. Arvioimme sitä sukupolvitilinpidon menetelmin. Tämä menetelmä on viimeisen vuosikymmenen aikana kasvattanut suosiotaan julkisen talouden pitkän aikavälin kysymyksien arvioinnissa. Tutkimuksesta käy ilmi, että alle 23-vuotiset tai yli 61-vuotiset ikäluokat ovat julkisen tulonjakojärjestelmän nettohyötyjiä. Nämä sukupolvet kuluttavat resursseja joko julkisina tulonsiirtoina tai palveluina enemmän kuin mitä ne maksavat veroina tai sosialiturvamaksuina. Yli sukupolvien tarkasteltuna nettoverotus on positiivista, eli julkinen talous kokonaisuudessaan on ylijäämäinen. Ylijäämästä huolimatta nykyinen politiikka ei ole kestävää pitkällä aikavälillä, vaan se johtaa arviomme mukaan yli ajan julkiseen nettovelkaan, joka on suuruudeltaan 120 prosenttia suhteessa nykyiseen BKT:n. Suhteessa BKT:n veroasteen tulisi nousta viisi prosenttia, jotta julkinen talous olisi pitkän aikavälin tasapainossa.

JEL luokitus: *H6, E6*

Asiasanat: *fiskaalinen kestävyys, julkistalous, sukupolvitilinpito,tulonsiirrot, verot*

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1 Introduction

In this study we evaluate generational incidence of fiscal policy. We do this using the method of generational accounts that has during the last decade gained popularity in assessing long-term aspects of public finances.

Looking at the gross-section of the year 2004 we demonstrate that generations younger than 23 and older than 61 years are net recipients of public transfers. These generations receive, either as public services or transfers, resources more than they pay as taxes or social security contributions. Looking across all generations net taxes are positive, which implies surplus in public finances. In this study we, evaluate whether this situation is maintainable in the future or not. It turns out that the current fiscal stance would imply accumulation of net liabilities with 120 per cent compared to the current GDP.

Fiscal balance has deteriorated since the year 2000. Mainly two factors have contributed to this. In the revised population forecast used in the current study, longevity is increasing life expectancy more than was assumed in earlier assessment of fiscal sustainability (Vanne 2002). General level of taxation has also decreased significantly relative to that year. As a point of reference the year 2000 was exceptional with GDP growth of 5 per cent a year, which generated abnormally high tax revenues.

Our baseline projection does not take into account the pension reform in 2005. In order to cope with the reform effects, we make use of the projections with the actuarial simulation model of the pension system (Biström et al. 2005). The pension reform is expected to lower the share of pensioners in certain age-groups, and increase employment rate and labour income in the same age-groups. We estimate that the pension reform approximately halves the future net liability implied by the current fiscal policy.

In the introduction we shortly motivate our approach and present some reservations on our approach to the subject. In Chapter 2 we outline the fairly well-known method of generational accounts. In Chapter 3 we review the data we use in constructing the generational accounts. The results are presented and discussed in Chapter 4, and concluding remarks are made in Chapter 5.

Fiscal policy distributes resources among generations. Public debt implies that the government has been borrowing to reduce payments by current generations to finance expenditures or cutting taxes. In the future, when interest on this borrowing is repaid, some of the beneficiaries will not be around and the bill is passed to future generations. Fiscal policies may, also, have implicit obligations that do not show up in the current public debt or deficit. For example, today's debt does not reflect how much it will cost to pay pension benefits under current legislation when the post-war generations retire.

Traditional fiscal indicators on current debt and deficits are not able to track how maintaining the current fiscal stance will affect particular generations, nor can they account for the effects of changing demographic structures. Generational accounting, developed by Auerbach, Gokhale and Kotlikoff (1991), is a method that addresses these questions. It projects the lifetime net tax burden on different age groups and provides information on anticipated

tensions in future public finances by taking into account expected changes in future expenses due to changes in demography. By accommodating these changes it provides an informative tool for assessing the lifetime impact of government policy on different age groups.

The key concept of generational accounts is the government's intertemporal budget constraint, which states that the government must be able to pay its bills by either taxing current or future generations:

The present value of remaining net tax payments by living generations
+ The present value of net tax payments by all future generations
=
The present value of future government consumption
+ Government net wealth.

The zero-sum constraint says that someone must, ultimately, pay for all that the government ever spends. Public consumption that past and current generations do not pay for in taxes must be paid by future generations, with interest. The zero-sum constraint does not require that government debt is ever paid of, or that the government cannot borrow more. It says only that the government cannot borrow forever to pay interest. Current public debt is by definition future interest and principal payments converted to present value. If the government cannot borrow forever to pay interest, it must raise taxes or reduce spending at some time, either to retire debt or pay interest forever.

Generational imbalances should not be interpreted as macroeconomic measures of sustainability of public debt. Generational accounts serve only as an indicator, not a predictor or policy target. They do not say how policy will or should evolve. Generational accounts indicate how policy would distribute resources among generations as if prevailing policy were to continue without change for those now living.

The accounts set a standard by which prevailing policy may be judged and other policies compared. Generational accounts indicate that a policy is sustainable if scheduled rates of taxes and spending according to age need not change in order to satisfy the zero-sum constraint. Thus, a policy is sustainable if it implies no difference in the lifetime net tax rates of future generations and current newborns. In that case, each generation could pay net taxes at every age at the rates that are scheduled now and satisfy the zero-sum constraint. In that respect, they resemble other conceptual frameworks, like overlapping generations models that answer "as if" questions, rather than making predictions.

In assessing the usefulness of generational accounting one should keep in mind that fiscal policy is not the only means to intergenerational distribution. Generational accounting by concentrating only on the government budget constraint neglects the existence of private intergenerational links. Currently living generations transfer wealth to future generations, which consequently should be taken into account in a comprehensive evaluation of intergenerational burden-sharing.

Intergenerational transfers can be divided into inter vivo transfers that are between living people and bequests that occur at the death of the donor. Inter vivo transfers can be monetary or in-kind transfers to younger generations. Inter vivos are with certainty intended but it is the nature of bequests which is unclear. They can either be seen as intended altruistic gifts to descendants or unintended bequests related to life-cycle saving motives with uncertain life spans and imperfect annuity markets. Gale and Scholtz (1994) have estimated that in the US intended transfers and college expenses constitute over 30 per cent of household wealth and bequests another 30 per cent. Mason et al. (2005) have suggested a methodology of National Transfer Accounts system to provide a comprehensive approach of measuring all inter-age transfers at the aggregate level. It encompasses reallocations achieved through capital accumulation and transfers, distinguishing those mediated by public institutions from those relying on private institutions such as the family.

Private intergenerational links undermine the distributional implications of generational accounts. Barro (1974) formed an altruistic model, where behaviour of individuals is guided by utility that is increasing in own consumption and the utility achieved by one's offspring. Through this inter-linking chain, the current generation's decisions to consume and transfer resources to its children, is not only influenced by its concern for its own children but for all future generations. An important implication of Barro's model is that intergenerational transfers will neutralize fiscal policy. Expansionary fiscal policy finances increasing current spending by issuing debt. This policy is an effort to stimulate spending by transferring resources to current generations from future generations. In Barro's model, however, public policy is undone by altruistic households. They compensate future generations by increasing their saving and accumulating wealth.

2 Indicators, models and former Finnish applications

2.1 Intertemporal public budget and aggregate indicators

Let us assume that we consider the intertemporal public budget at a point in time denoted by t. Let us also assume that we know the market value of the net public debt (net of public financial assets) B_t at t. Let us further assume that we know the flows of total public expenditure and revenues (taxes), denoted E_s and R_s respectively on an annual basis, from time t on, and that the future annual interest rate on public debt or return on financial wealth is r. In this case we can write the intertemporal public budget from time t to infinity as follows

$$(1) \qquad L_t = B_t + \sum_{s=t}^{\infty} (1+r)^{t-s} (E_s - R_s)$$

Differences E_s–R_s are the annual primary balances in terms of deficits after t. In this case we do not yet balance the budget by demanding it being equal to zero. Depending on the actual values of the variables, this approach may hide, e.g., a Ponzi game assumption.

We now study the initial net debt B_t more closely. By definition, it is equal to the infinite sum of the future interest payment flows of servicing the debt under the prevailing interest rate r. On the other hand, B_t is also the finite sum of the past (before t) primary balances corrected by compounding interest rates. If the period in question includes historical years, statistics on the primary balances and the respective interest payments and interest rates may be available.

However, the components of net debt meet market value changes all the time, e.g. market interest rate and stock price movements. Due to these changes the past annual statistics on interest rates or investment returns is not very valuable if it does not include market value changes. With reference to these difficulties, we define a past internal rate of return r* that makes

$$(2) \qquad B_t = \sum_{s=0}^{t-1} (1+r^*)^{t-s} * (E_s - R_s)$$

Primary balance history starts at year 0 denoting the year when the general government was founded.

In the spirit of generational accounting both past and future primary balances can be disaggregated according to age and gender of the beneficiaries and taxpayers. In the following notation we separate only generations by birth year k but not genders. The primary balances can be expressed as sums of public transfers received and services used as well as sums of taxes paid by citizens by age. The age of the generation born in k is s-k in year s. If s-k is negative, the generation will be born after year s. We denote the number of persons born in year k and alive in year s by $n_{s\text{-}k,s}$ and their public benefits and taxes per capita by $b_{s\text{-}k,s}$ and

$a_{s-k,s}$ respectively. Though we assume the general government to exist forever, we assume that generations have a limited lifetime so that we can sum the data of the last ages at age D. We use 100 years as the value of D.

The intertemporal public budget at t can then be written

$$(3)\quad L_t = \sum_{s=0}^{t-1}(1+r^*)^{t-s} * \sum_{k=s-D}^{s} n_{s-k,s}(b_{s-k,s} - a_{s-k,s}) + \sum_{s=t}^{\infty}(1+r)^{t-s} * \sum_{k=s-D}^{s} n_{s-k,s}(b_{s-k,s} - a_{s-k,s})$$

Equation (3) is based on cross-section observations or projections by age (s-k) in calendar years s. We can now rearrange the terms in the intertemporal budget in order to express it in terms of generational sub-budgets. We also separate four net contribution terms of the public budget by generation and period: the life-cycle of past generations, the past of the life-cycle of present generations, the future of the life-cycle of present generations and the life-cycle of future generations, and get respectively

$$\begin{aligned}(4)\quad L_t = & \sum_{k=-D}^{t-D-1}\sum_{s=\max(0;k)}^{\max(0;k+D)}(1+r^*)^{t-s} n_{s-k,s}(b_{s-k,s} - a_{s-k,s}) \\ & + \sum_{k=t-D}^{t-1}\sum_{s=k}^{\min(k+D;t-1)}(1+r^*)^{t-s} n_{s-k,s}(b_{s-k,s} - a_{s-k,s}) \\ & + \sum_{k=t-D}^{t-1}\sum_{s=t}^{k+D}(1+r)^{t-s} n_{s-k,s}(b_{s-k,s} - a_{s-k,s}) \\ & + \sum_{k=t}^{\infty}\sum_{s=\max(k;t)}^{k+D}(1+r)^{t-s} n_{s-k,s}(b_{s-k,s} - a_{s-k,s})\end{aligned}$$

In equation (4) we have changed the summing operations to pick up life-cycles of the generations out of the successive cross-sections by age.

In the above equations benefits and taxes are described as scalar variables for a given age and time. In practice the age profiles of different types of benefits and taxes differ a lot from each other, and the statistics on them is also in different sources. Our first task is to find out the initial age profiles of different types of benefits and taxes. The initial age profiles are an observation from a certain year in history, in our case from 2004. In the present application the end of the year 2004 will be the time denoted by t above.

In projecting the future (the time after 2004) in the baseline case we follow generational accounting as presented, e.g., in Raffelhüschen (1999), and adjust the benefit and tax age profiles for growth as follows

$$(5)\quad a_{s-k,s} = (1+g)^{s-2004} * a_{s-k,2004}; b_{s-k,s} = (1+g)^{s-2004} * b_{s-k,2004}$$

where g stands for annual productivity growth rate. Using the observed age profiles as a basis for the future is reflecting the assumption of prevailing current policy. The last term in

equation (4) is an infinite sum, but with ordinary assumptions about the interest and growth rates as well as with baseline population projections, the series would converge and the sum of it is a finite number.

After having done this we have enough data for our first indicator, intertemporal public net liabilities L_{2004} by using equations (1)–(3). If L_t is not zero, there is an infinite amount of solutions to balance the budget by amending future (after t) taxes or benefits. However, we define our second indicator, sustainable taxes or benefits, by solving the coefficient for taxes or benefits with which the future values of them should be multiplied in order to get L_t=0.

Equation (5) is the basic approach of generational accounting (Auerbach et al.1991; Raffelhüschen 1999) in order to project future public revenues and expenditures by age and gender per capita. If decisions have been made which change future tax and benefit values compared to the "business as usual" values of equation (5), it is reasonable to take the transition period values as well as values in the steady state into account.

In this study we have calculated the indicators based on two alternative sets of statutory earnings-related pension benefit and contribution projections. The first set follows equation (5), and the second set is derived from the actuarial simulation model of the Finnish Centre for Pensions (Biström et al. 2005).

The tax and benefit projections could also be taken out of a computable overlapping generations (OLG) model, in which case also the so-called equilibrium effects of the changed rules enter the values.

Every change of tax or benefit legislation has an effect on Lt as well as at least some of the L_t values of age-specific taxes and benefits after the change has come into force. Out of age-specific tax and benefit differences we can calculate the generational effects of a reform. The differences can be based on either a projection model or a computable OLG model.

2.2 Life-cycle budgets of generations and intergenerational indicators

We define a set of accounts by age for every generation ever lived, living or to be lived in the economy as follows

(6)
$$L^{+}_{k,s-k}(i) = \sum_{j=s-k}^{s-k+D} (1+i)^{j-s+k} n_{j,s} b_{j,s}$$

$$L^{-}_{k,s-k}(i) = \sum_{j=s-k}^{s-k+D} (1+i)^{j-s+k} n_{j,s} a_{j,s}$$

$$L_{k,s-k}(i) = L^{+}_{k,s-k}(i) - L^{-}_{k,s-k}(i),$$

$$where\ s \geq k,\ and$$

$$i = r^{*},\ if\ s < t,$$

$$i = r,\ otherwise$$

These accounts express the net present value of net taxes (taxes minus public services and transfers) at age s-k that generation k has paid or is going to pay on its remaining life-cycle at age s-k and after. The most important account is the one at s=k, i.e. at birth. The account value at birth $L_{k,0}$ tells the net contribution of the public budget to the life-cycle budget of generation k. The corresponding accounts per capita are

$$(7) \quad l_{k,s-k}(i) = \frac{L_{k,s-k}(i)}{n_{k,s-k}}$$

We can use aggregate or per capita accounts in equations (6) and (7) to calculate lifetime net benefit or net tax rates by dividing the accounts at birth by the net present value of lifetime factor income at birth, and compare the lifetime net tax ratios of different generations. The same technique may be used also in the case of changes of legislation.

The next intergenerational indicators available are the so called actuarity rates. The actuarity rate with the discounting rate *i* is defined in Equation (8):

$$(8) \quad c_k(i) = \frac{L^+_{k,0}(i)}{L^-_{k,0}(i)}$$

The next intergenerational indicator available is to calculate the so-called actuarity rates. The actuarity rate for a generation is the lifetime net present value of its benefits at birth divided by the corresponding value of taxes. The higher the actuarity rate, the more the public budget is in favour of that generation. If the actuarity rate is equal to 1, the public budget is in balance with respect to the particular generation. The value of one in the actuarity rate is equivalent to zero lifetime net tax rate.

We can find one more indicator for intergenerational comparisons. An internal rate of return for generation k could be calculated by setting $L_{k,0} = 0$ in equation (6) and solving it for discounting rate i. In the original form we used the real interest rate on government bonds or more generally the real rate of return on net financial wealth of the general government. The higher the internal rate of return, the more favourable is the position of the generation with respect to the public budget.

2.3 Generational accounts and generational models

Intergenerational redistribution is a situation where fiscal policy expands the consumption opportunities of one generation at the expense of some other generation. Generational accounting measures relative fiscal burdens falling upon different generations. Interpretation of public debt as a device of intergenerational redistribution requires a framework for measuring the distributional stance of fiscal policy. Generational accounting formulates the intertemporal budget net deficit as the aggregate of the present value of current and future primary net deficits, associated with present fiscal policy decisions made by the government. The advantage

of this benchmark is that it matches the intertemporal perspective of economic agents as life-cycle planners.

Generational accounting sacrifices general equilibrium aspects of the problem in order to gain applicability and focuses strictly on the demographic impact on the public budget. Generational accounts indicate counterfactual lifetime tax burdens conditional on perpetuation of current fiscal policy parameters. Particularly, it maintains the original age and gender incidence of tax payments and transfers receipts and projects it into the future using demographic forecasts. The evolution of the government budget in each future year is extrapolated and the extent to which it meets the intertemporal budget constraint.

It has been emphasized (Bonin and Patxot 2004) that it is important to acknowledge the indicator quality of net tax burdens measured by generational accounts. The method deliberately avoids a decision, by any means arbitrary, about when and how decision-makers would react to fiscal imbalances. Generational accounts indicate the overall long-term imbalance in fiscal policy but make no forecast of future adjustments to that policy.

While keeping some of the dynamic developments in the economy, generational accounting ignores the possible response of agents to economic evolution and government policy. Generational accounting assumes that taxes on labour income are ultimately paid by workers, taxes on capital income are paid by suppliers of capital, and that sales excise and value-added taxes are paid by consumers. It also assumes that the recipient of social security benefits or any other transfers gains fully the economic benefits of these transfers. Generational accounting takes pre-tax factor returns as given. It ignores policy-induced changes in factor prices that can change the ultimate incidence of fiscal policies and simply adds together taxes paid by a particular generation and subtracts the transfer payments received.

Figure 1 a. *Tax incidence when supply and demand are elastic.*

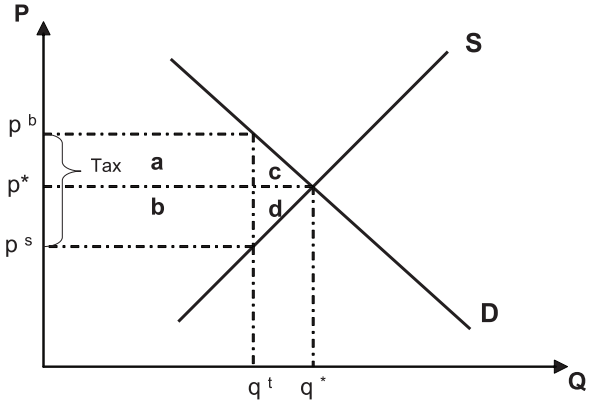


Figure 1 b. *Tax incidence when supply is inelastic.*

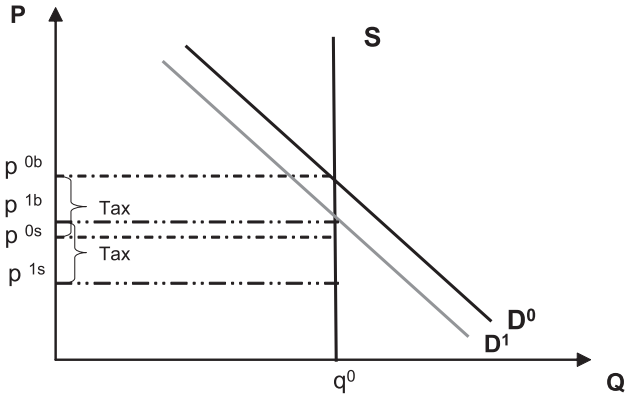
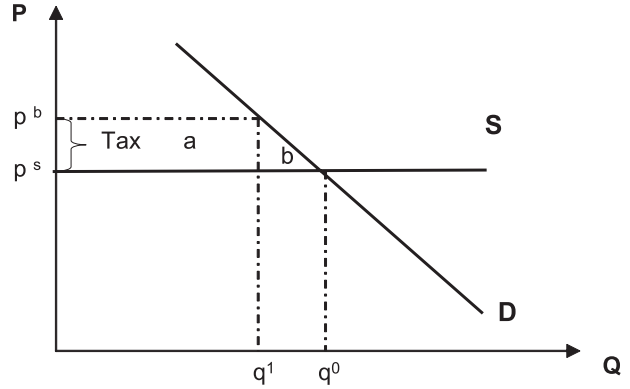


Figure 1 c. *Tax incidence when supply is perfectly elastic.*



The difference between modelling and accounting practices can be illustrated using a simple supply – demand diagram like in figure 1a. Tax creates a wedge between seller's price (p^s) and buyer's price (p^b). The incidence of a wage tax in generational accounts is the area $(p^b - p^s) \times q^t$, which is tax wedge times the labour supply (q^t), which are described by areas *a* and *b* in figure 1a. It ignores the price-induced effects that are described by areas *c* and *d* in the figure. Labour supply is assumed to be unresponsive across all cohorts to changes in taxation and it thus bears all the burden of taxes. This set-up is characterized in figure 1b, which has a vertical labour supply curve. However, taxes on labour decrease incomes of those generations who do most of the savings according to the life-cycle theory. This is reflected as diminished capital stock, which at given prices means lower demand for labour. This is illustrated in figure 1b where the demand curve shifts downwards. This depresses the final factor price proportionally, and the true cost for labour is $(p^{0b} - p^{1s}) \times q^0$ that is far larger than the impact effect. If labour supply is assumed responsive to wage changes, we would get a third effect, which Fehr and Kotlikoff (1996) call tax avoidance effect. This has not been included in the example for expositional clarity.

Another important incidence assumption in generational accounting relates to consumption taxes. It is assumed that the purchaser bears the entire burden. Effectively this means that

supply is assumed to be perfectly flexible as in figure 1c. The tax burden specified to purchasers is equal to area *a* in the figure. The efficiency loss in consumption represented by area *b* is not taken into account. In this respect, the OLG models do not make any difference, since they are typically one-commodity models where efficiency losses of taxes cannot be studied.

Figure 1c is useful in illustrating the incidence of corporate taxation. If one assumes a small open economy where the required rate of return is given, all adjustment is on domestic firms. They have to adjust their capital stock to make the return on capital meet this exogenous rate of return. Higher taxes imply lower capital stock ($q^0 \rightarrow q^1$) which implies a decrease in labour productivity and lower wages. The burden of corporate tax is ultimately sifted into labour.

An appropriate tool to take into account the behavioural responses when analyzing dynamic incidence of fiscal policies is computable overlapping generations (OLG) models. There are only few studies that have compared the implications of generational accounting and overlapping generations models on intergenerational burden-sharing. Fehr and Kotlikoff (1996) do several stylized fiscal policy exercises to assess whether generational accounts serve as a good first-order approximation for OLG models.

In analyzing changes in fiscal policies generational accounts recognize only changes in intergenerational net transfers. Fehr and Kotlikoff (1996) decompose policy-induced changes in generational utilities into three components: 1) changes in generational accounts 2) changes in factor income and 3) changes in economic behaviour which they call net tax avoidance. They conclude that generational accounts do well in capturing the sign pattern and magnitudes of most of the reforms they study. The approximations are better for current generations and they become worse for policies that involve significant changes in tax progression and for economies with sizeable capital adjustment cost. Large capital costs refer to a significant policy-induced component in capital gains that cannot be reflected in generational accounts. Finally they notice that generational accounts need to be adjusted in the case of small open economies where the incidence of corporate taxation is likely to fall on labour.

One should acknowledge that the conclusions of Fehr and Kotlikoff are justified up to the point that the overlapping generations model they use characterizes reasonably the generational decision-making problem. Buiter (1997) has pointed out that the usefulness of generational accounts as a summary of the fiscal policy implications on the intergenerational distribution of private consumption and on aggregate saving lives or dies with the validity of the life-cycle model of consumption. Generational accounts are uninformative about these, when consumers' decisions are longer than the characteristics of the life-cycle model e.g., when there is an operative Ricardian bequest motive[1], or when decisions horizons are shorter than those postulated by the life-cycle model because, say, of capital market imperfections and liquidity constraints.

[1] Barro (1974) has argued that if families act as infinitely lived dynasties because of intergenerational altruism, the government's bond-financed deficits at the time of current generations will be offset by bequests to children, which are large enough to pay the higher taxes for future generations. Higher taxes that are implied by the original debt on the grounds that somebody has to ultimately pay the bond-financed deficit.

The Ricardian equivalence holds exactly only under very stringent conditions and it is rejected by empirical research in its pure form. Some studies have found, anyway, Ricardian effects in saving behaviour (Briotti 2005). However, the underlying intuition of the Ricardian equivalence is that individual action can unravel government policy, and that generational policies can have unintended consequences. Generational accounting is a framework that is unable to address these issues and has probably never intended to do so.

2.4 Finnish generational accounting applications

The first Finnish generational accounting application was included in the report of the working group for intergenerational income distribution (1994). The original method of Auerbach et al. (1991) was used in the report. The main difference compared to later applications is that non-age-related expenditure was treated as an aggregate term in the intertemporal public budget, and not as a constant per capita amount allocated to all citizens.

The earliest comprehensive Finnish report on public expenditure and revenue by age was Parkkinen et al. (1996). The base year of the data was 1993, the year when the Finnish economy was shrinking fastest after the war-time. The data sources were partially different from those of later applications. E.g., a microsimulation model was used in order to estimate some of the age profiles of taxes.

The next generational accounting application making use of the age profiles of Parkkinen et al. (1996) was Vanne (1998). It also included estimates of the changes of lifetime tax rates, if the public intertemporal budget is balanced by future generations only.

The next report on both age profiles and generational accounts was Feist et al. (1999). The base year in the report was 1995. Feist et al. also included the first report on public intertemporal public net liability (IPL, L in the formulas above) in Finland. The primary deficit was at an all-time high in 1995, and consequently the IPL was strikingly high, 2.53 times the annual GDP. The figure was the highest of the member countries of the EU.

Feist et al. (1999) also included scenarios of potential policies to balance the intertemporal budget. With the most balancing policy, including, e.g., a five-year rise in the retirement age and a remarkable increase in employment rate, the net liability was removed, and changed into a public net intertemporal wealth of 0.1 times GDP.

The most radical scenario of Feist et al. referred to above was not much compared to what seemed to happen in reality, and partly for different reasons than was outlined in the scenario. According to Vanne (2002), the IPL in 2000 was -0.9 times the annual GDP. In five years from 1995 to 2000 the record-high primary deficit had turned into a record-high primary surplus.

The improvement from 1995 to 2000 was due to business cycles and policy. From the point of view of the public budget, population ageing started approximately in 1995 in Finland. Since then demographic transition has worked in favour of higher deficits in Finland. The observation was then that variation in basic economic variables may have a major effect on the IPL, though it is an indicator including the infinite future. From, e.g., Alho (1998), it was known that estimates of demographic variables include remarkable uncertainty in the long term.

The uncertainty embedded in basic economic and demographic variables from the point of view of the IPL was studied in Alho and Vanne (2006a and 2006b). The method is described also in Alho and Spencer (2005). The age profiles of the year 2000 (Vanne 2002) were used in the study, and 2000 was the base year as well. The approach was to find the distribution of the IPL, when the basic economic and demographic variables were stochastic. The result was that the median of the IPL distribution was -0.18 times the annual GDP, i.e. a small intertemporal public net wealth was the median result of the simulations.

2.5 Finnish OLG applications

The overlapping generations model has been used to analyze generational implications of fiscal policies in Finland by various studies of Lassila and Valkonen. Their studies (Lassila and Valkonen 1999, 2000, 2002 and 2006) cover e.g. parametric changes in the pension system, implications of alternative financing arrangements and means to take into consideration uncertainties related especially to population forecasts.

Their latest study analyses the reform in the Finnish private-sector earnings-related pension scheme which took effect at the beginning of 2005. The model they use is an open economy version of the Auerbach–Kotlikoff (1987) model where the population is divided into three educational categories. Institutional features, such as partial funding and diverse arrangements in private and public-sector pensions, are incorporated in the model.

The main aims of the pension reform were to reward continued participation in working life and postpone the average retirement age, and to take increasing life expectancy into account. Lassila and Valkonen (2006) decompose their simulation results into impacts of 1) changes in accrual rates, moving from the current model to the "career model" and the changes in indexation, 2) longevity adjustment of pension benefits, 3) effects of the reform that come in the form of postponed retirement, either due to the limited eligibility for and abolishment of some early pension schemes, and 4) temporary increase in funding in 2003–2013 and pre-funding of the excess contributions of employees older than 52 years.

Lassila and Valkonen report their simulations up to the year 2050. It turns out that from the macroeconomic point of view all other components of the reform are of second-order importance except those effects of the reform that are related to postponed retirement. This particular part of the reform implies several percentage point deviations from the baseline in simulated effects on employment, output, investment or consumption, whereas the impacts of any other components show up only in decimals of percentage points. However, generational impacts measured by changes in actuarity rates, have significant intergenerational effects.

The actuarity rate measures the gains and losses of various generations by changes in lifetime pension benefits and contributions. Lassila and Valkonen calculate these for three educational groups. This is equivalent to the definition in equation (8), but it is specified in their case only to a sub-group of benefits and taxes, namely the pension component of payroll taxes and received pension benefits. Future generations and the youngest current workers mainly lose from part one of the reform. Higher accruals mean higher pensions but also

higher contributions. Part one, the "career model", expands mostly the pay-as-you-go system, and the gain of the initial winners is paid by future cohorts.

The effects of the longevity adjustment are rather clear-cut. Current working cohorts, whose pensions will be cut by the adjustment, lose because they do not have time to benefit from the decline in contributions in the long term. The losses are largest for those born in the 1960s, 1970s and 1980s. Generations born after the year 2010 will benefit from this part of the reform.

The actuarity losses due to part three of the reform are larger for those with only basic schooling. Their retirement is postponed more than that of other groups. The less educated typically used more of the early retirement pathways which were abolished or restricted.

Part four hits hardest those who pay contributions when funding is increased and benefits those who pay contributions during the 2030s. Observing the overall actuarity effects the winners seem to be old workers especially with high educations, and generations of future workers. The losers are current workers with only a basic or medium-level education.

3 Cross-section data for generations in 2004

In calculating generational accounts a set of projected tax and benefit receipts are allocated to age groups on the basis of relative age profiles. These age profiles are typically, and also in our study, collected from various cross-sectional survey data sets. Each generation of households is assumed to follow the same age profile, and that age profile is assumed to be that observed in the cross-section data, allowing for annual growth that shifts the entire distribution. This section describes the data sources used in the construction of the 2004 generational accounts.

3.1 Public budget aggregates and net wealth

In Tables 1 and 2 we present a summary of the items of the primary balance in 2004 both in absolute terms and as percentages of GDP. GDP was 151 billion euros. Non-age-related taxes, transfers or services refer to flows where the taxpayer or the recipient is not recognizable by age. The reason may be the character of the flow or lacking statistics.

Table 1. *Public revenue aggregates in Finland in 2004, per cent of GDP.*

Item	m EUR	% of GDP
VAT and other indirect taxes	20 953	13.8
Taxes on labour and transfer income		
Income tax	19 263	12.7
Insured persons' social insurance contributions	4 529	3.0
Employers' social insurance contributions	13 462	8.9
Taxes on capital income, capital and profits		
Profit and dividend tax	5 357	3.5
Other capital income taxes	1 326	0.9
Capital taxes	861	0.6
Non-age related taxes	330	0.2
Total and tax rate	66 082	43.6

Sources: Statistics Finland, ETLA Database 7/5/2006.

Table 2. *Public expenditure aggregates in Finland in 2004, per cent of GDP.*

Item	m EUR	% of GDP
Transfers		
Pensions	16 919	11.1
Unemployment benefits	2 884	1.9
Health insurance daily allowance	670	0.4
Family policy (transfers related to children)	2 355	1.6
Other age-related transfers	1 183	0.8
Non-age-related transfers	6 384	4.2
Individual public services		
Education	7 078	4.7
Culture and recreational services	983	0.6
Health services	6 349	4.2
Health insurance and rehabilitation	1 831	1.2
Social services	4 624	3.0
Non-age-related individual public services	890	0.6
Collective public services	11 492	7.6
Total	63 642	41.9

Sources: Statistics Finland, ETLA Database 7/5/2006.

The total of taxes collected was 66.1 billion euros or 43.6 per cent of GDP in 2004. The primary balance is the difference of revenues and expenditures, 2.44 billion euros or 2.6 per cent of GDP. For rounding reasons the difference 43.6 minus 41.9 is 2.5 per cent and not 2.6 per cent of GDP. The net financial wealth of the general government was 71.0 billion euros or 46.7 per cent of GDP at the end of the year 2004 (Statistics Finland, Financial Accounts 1998–2004).

Tax revenues

In 2004, the total tax revenue of the government was 35.8 billion euros, that of the municipalities 14.3 billion euros and that of the social security funds 17.3 billion euros. The most important source of government-levied taxes were the income and capital tax collecting 13.5 billion euros, and value-added tax collecting 13.7 billion euros. The amount of municipal income tax, which accounts for most of the tax revenue of the municipalities, was 13.6 billion euros. In addition to the income and capital tax and value-added tax, the Government received 4.5 billion euros in the form of various types of excise duties. The bulk of taxation in Finland is derived from taxes on income, profits and capital gains, on the one hand, and taxes on goods and services, on the other. They count for 70 per cent of tax revenues. In 2004, the former category accounted for 38.4 per cent of total taxation and the latter for 31.6 per cent.

A further major source of tax revenue was the social security contributions paid by employers to the Social Insurance Institution and payments to the pension funds or pension insurance companies. The Finnish pension system is based almost exclusively on statutory and compulsory pension schemes, which are a mixture of a basic public pension regime and employment-based pensions insurance. The earnings-related pension scheme received most of the pension contributions, totalling 13.9 billion euros. Employers also paid 1.4 billion euros in pension contributions to the national pension scheme administered by the Social

Insurance Institution. Other provisions for social security are made in the form of contributions to the national health insurance scheme and to the unemployment insurance scheme, totalling 2.0 and 1.4 billion euros respectively.

3.2 Taxes by age and gender

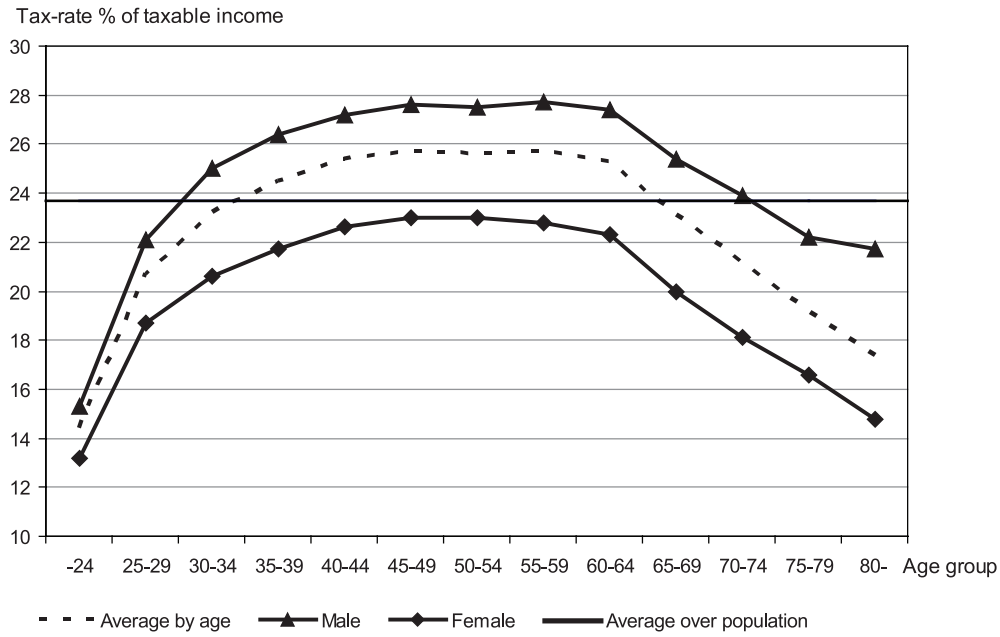
Income taxes

The major part of the taxes on income – 80 per cent – was paid by the household sector. Income taxes by age are taken from Statistics on income and property provided annually by Statistics Finland. The statistics on income and property describe the income subject to taxation, property and taxation of private persons. The key groups of data concern income subject to taxation by type of income, deductions, taxes, assets and debts. The statistics cover all persons who have received income subject to taxation or own property subject to taxation.

The basic data for the statistics are drawn from the Tax Administration's database and are based on total data. The data can be classified by income bracket, age, gender and type of family.

Statistics on income and property distinguishes capital income taxes paid by households and taxes paid by corporate bodies. Corporate taxes are allocated to age groups according to wage distribution. Here we follow the Fehr–Kotlikoff small open economy approach.

Figure 2. *Income tax-rates by age and gender in 2004.*



Source: Statistics on income and property 2004, Statistics Finland. Own calculations.

Figure 2 displays tax rates by age and gender. Tax rates are calculated as taxes collected over chargeable income in the state taxation. Health and pensions insurance are excluded from this tax rate.

The average tax rate over all cohorts is 23.7 per cent in 2004. Tax rates follow a hump-shaped pattern over the age distribution. This mirrors the wage pattern, which reflects the higher productivity of older workers because of accumulated human capital and work experience. Tax progression magnifies this pattern. A stricking fact is that the average tax rate in the female cohort is below average in all age groups. The tax rate difference, which reflects wage differences, is about two per cent in cohorts that are at the beginning of their careers, it reaches a stable level in the cohort aged 35–39 and starts to widen again in retired generations. In the older age groups earnings-related pensions have a minor impact on female income and the main source is from the national pension scheme, which guarantees a minimum income. This database is also a source for employee social security contributions. Employer contributions are imputed from age-specific wages using average payroll rates. It is assumed that employees pay the whole burden of these taxes.

Indirect taxes

Splitting indirect taxes, value-added and excise taxes, across generations is a much more challenging task. There are two main aspects that have to be considered in compiling this data. In the case of excise taxes, natural persons, as final consumers, do not always pay these taxes. Excise taxes may be a burden for producers in purchases of intermediate inputs, which is the case e.g. in energy. In value-added taxation exemption rules create a similar state of affairs. The other aspect of the problem is age-specific consumption patterns that have implications on the tax burden over the life-cycle. This is demonstrated in appendix figure 1, which displays consumption shares of commodities by use for broad age groups. Younger and middle-aged people tend to consume more alcohol, tobacco and goods related to transportation. These are heavily taxed by excise duties.

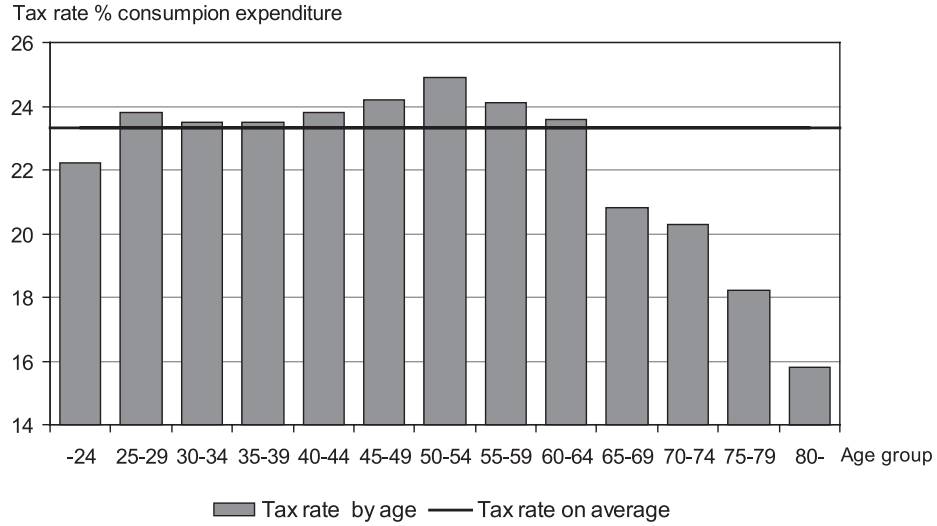
The first problem can be tackled by standard input-output methods (e.g. Dixon et al. 1992). Using the so-called Leontief's inverse one can allocate all output into final demand categories, and taxes in intermediate costs are shared accordingly. The distribution of indirect taxes across different expenditure categories are displayed in table A1 in the appendix. It turns out that most of the taxes that are not paid in final household consumption are energy taxes in exports and non-deductable value-added taxes in public demand of health care and education. We assume in the small open economy fashion that these taxes are ultimately a burden on labour and allocate them according to wage shares to different generations.

The question of age-related consumption is confronted by breaking down the consumption for age groups using household survey data. Statistics Finland's household budget survey produces data on changes in the consumption expenditure of households and on differences in consumption by population group. The survey is a sample survey whose survey population in 2001–2002 comprised approximately 5,500 households. The statistics contain data describing households' use of money for diverse purposes, such as food or health, during one year. Consumption expenditure is classified according to the national COICOP classification, which covers around 900 headings. The data is available by size and structure of household, income bracket classifications, and by socio-economic group and age of the reference person

in 5-year groupings. We use additional information on the age composition of households to get the distribution of consumption of each age group in households classified by the reference person's age.

Using diverse sources of data we encounter the problem of different classifications. The household survey uses the COICOP classification and the input-output data the CPA classification. We have used 6-digit COICOP and CPA mappings provided by Statistics Finland to construct a transformation matrix that makes these datasets compatible in a similar fashion to Ballard et al. (1985). Using the transformation matrix we can target taxes defined for production goods in the input-output data to goods in the household survey. By this procedure we get hold of the age profile for most of the taxes in production inputs.

Figure 3. *Indirect tax rates by age in 2004.*

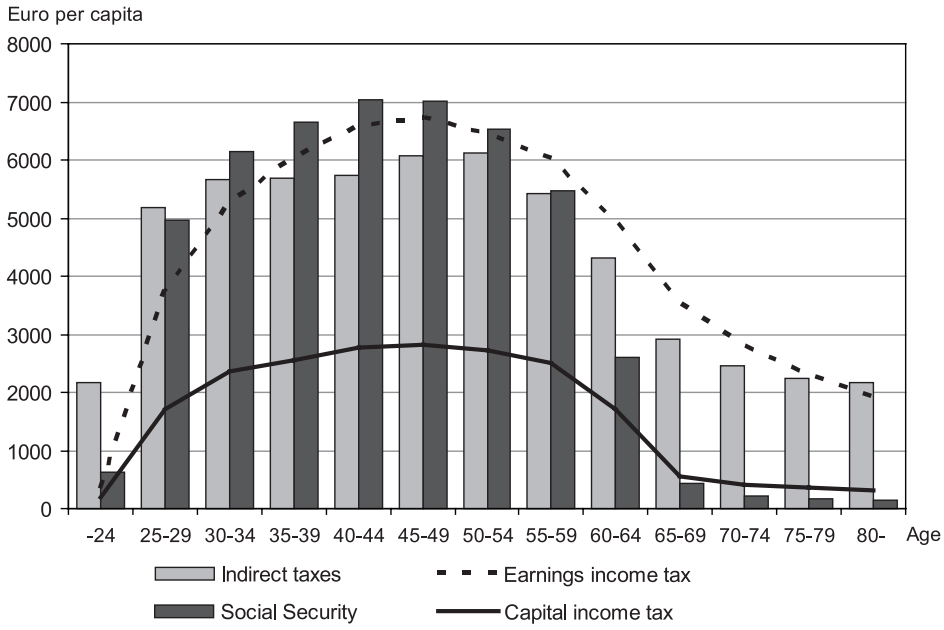


Sources: Household Expenditure Survey 2001–2002, Statistics Finland. Own calculations.

Age-specific indirect tax rates are displayed in figure 3. Taxes are calculated as paid taxes as a share of total consumption at purchaser prices. Consumption taxes are below the average of 23.3 per cent in the first lower-tail cohort, increases above it in the next cohort and moderately declines in the cohorts of child-rearing age. The tax rate that reflects the composition of consumption starts to rise again in the middle-aged cohorts, peaking for the age group 50–54 years, to significantly decline for the retired population.

In figure 4 the generational burden of the main tax categories is depicted. The tax burden in per capita terms is measured as tax revenue of the respective tax divided by the population in the given cohort. Indirect taxes and social security contributions are more significant contributors to the tax burden in the younger cohorts. Because of tax progression tax rates are lower in the early years of the career but social security payments are paid on a flat-rate basis. The relative importance of indirect taxes follows the life-cycle pattern of consumption. People tend to spend more than they earn at the beginning of their active life to smooth consumption. The life-cycle pattern is reflected also in the capital income taxes. Most taxes are paid by cohorts before the retirement age.

Figure 4. *Per capita burden of main tax categories in 2004.*



Sources: Household Expenditure Survey 2001–2002 and Statistics on Income and Property 2004, Statistics Finland. Own calculations.

3.3 Public expenditure by age and gender

Public consumption

The main aggregates of public consumption according to national accounts standard are collective public consumption and individual public consumption. We have assumed that the first main aggregate is evenly distributed to the whole population. We could have distributed the public traffic route construction by the private traffic consumption, but preferred to follow the national accounting definition of collective consumption.

Individual public consumption includes education, health, social, cultural and recreational and social security administration services. We have distributed all other individual services by age, but social security services, which are treated similarly to collective public services. The value of an individual public service is its production cost. All figures we present are in terms of per capita in a certain age-group, not in terms of per user of the service. The age-profiles were calibrated so that the corresponding aggregates from 2004 in the above table were fulfilled.

We distributed education services by the enrolment rates at different grades and the respective unit costs. The unit cost is the cost of a school-year per attendant. We used the data presented in Educational Institutions (Statistics Finland 2005).

The values of health and social services by age are described in the report the Direction of Social Security (Ministry of Health and Social Affairs 2006), and the data was supplied by the ministry. In addition to public production of the services, we also included the health insurance compensation for private health services paid and statistics published by the Social

Insurance Institution (2005a). The age-profiles of compensated rehabilitation costs of Social Insurance Institution are presented in Social Insurance Institution (2005b). The age-profile of refunding costs of occupational health was assumed to be the same as that of the two above mentioned benefits.

The age profile of cultural and recreational public services was derived by using the distribution of private consumption of these services. Private consumption by the age of the household head was taken out of the household expenditure survey and a transformation based on household structures and equivalence scales were used in order to distribute the services to all ages.

Transfers

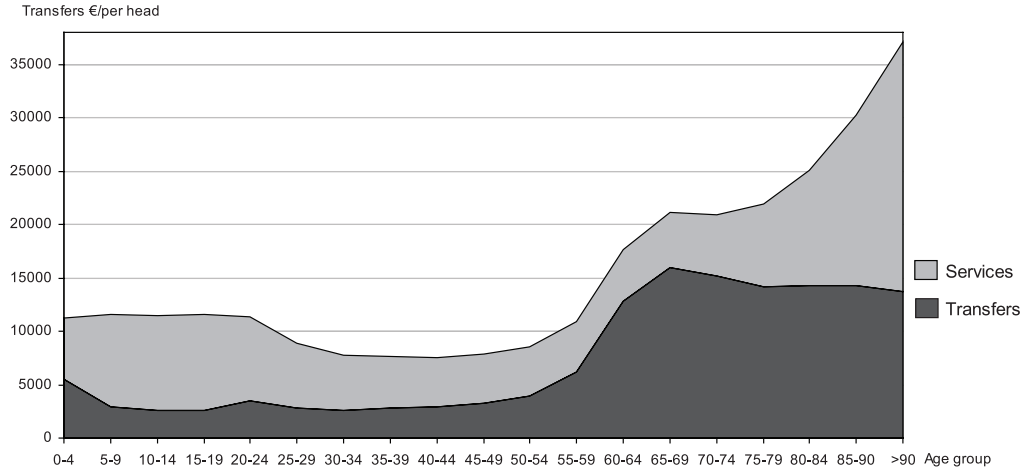
The main transfer types are pensions, unemployment allowances and transfers related to children, i.e. family policy transfers. There are also transfers to some industries or foreign countries, which cannot be distributed by age. In these cases we used a constant non-age-dependent figure for all citizens. Age-profiles of transfers were calibrated so that the corresponding aggregates from 2004 in the above table were fulfilled.

The age-profile for pensions is directly available in the Statistical Yearbook of Pensioners in Finland 2004 (Finnish Centre for Pensions and Pensions and the Social Insurance Institution 2005). The published distribution was completed by data supplied by the Finnish Centre for Pensions concerning some one-year age groups.

Unemployment insurance benefit statistics is provided by the Social Insurance Institution and Insurance Supervisory authority (2005c). Also family policy transfer age-profiles were based on the statistics of the Social Insurance Institution (2005d). Family policy transfers include parenthood allowance, child allowance, child day care subsidy and some minor benefits. Family policy benefits were allocated by the age of the child. Sickness allowance age-profile was derived from the data in Social Insurance Institution (2005a). The age-profile of general housing allowance is presented in Social Insurance Institution (2005e).

Figure 5 presents the aggregates of public services and transfers by age in 2004. The breakdown of age-profiles in the most important public services and transfers are presented in Appendix 2.

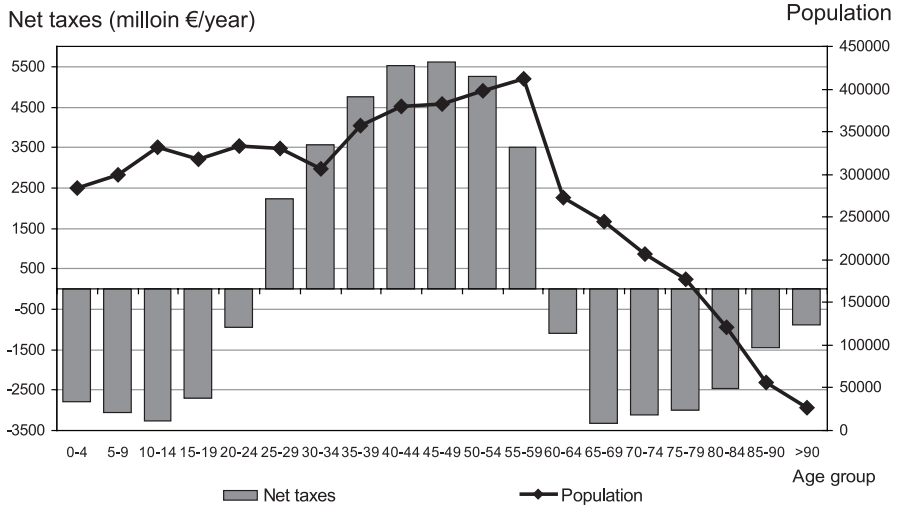
Figure 5. *All public services and transfers per capita by age in Finland in 2004, euro per year.*



Source: Finnish Centre for Pensions 2005; Statistics Finland; Social Insurance Institution (2005a–d). Own calculations.

Both the total volume of public benefits and the share of services vs. transfers varies a lot along the life-span. The highest amount of public resources per capita is needed at the very old age, when the total value of them exceeds 40,000 euro per year. The volume is below 10,000 euro between ages 25 and 55 years, and during some years before school also. The share of transfers is at its highest in the early old-age, at the age of 65. The share of transfers is high also after birth. The per capita figures hide the fact that the population at the very old age is very small. The primary balance of 2004 is shown by age in the figure 6. The net tax sums by age per cohort are nearly equal in the young and old ages. The net tax was positive approximately at the ages 25–65 years.

Figure 6. *Net taxes (taxes paid minus public services and transfers) and the size of population by age in 2004.*



Source: Household Expenditure Survey 2001–2002 and Statistics on income and property 2004, Statistics Finland; Finnish Centre for Pensions 2005; Social Insurance Institution (2005a–d). Own calculations.

4 Intertemporal projections and indicators

4.1 Population projection and economic parameters

We need a population projection, a productivity growth rate and the rate of return on public net financial wealth to apply the equations presented in Chapter 2. As the population projection until 2040 we use the latest baseline projection of Statistics Finland published in autumn 2004. An extension of this projection until 2100 was calculated and reported in Biström et al. (2005), and we use the same projection in the following.

In order to compare the results with earlier studies, we assume a rate of annual productivity growth of 1.5 per cent, and an annual real rate of return on public net financial wealth of 5 per cent. For sensitivity analysis of the difference between the rates of real return and productivity growth we use the value of 3.5 per cent of the annual real rate of return. To maintain the consistency of the assumptions and results, we assume a 1.75 per cent productivity growth rate in addition to the 3.5 per cent rate of return, when we make use of the values from the long-term pension system simulation model.

In the equations of Chapter 2 there are a few infinite sums. In these cases the figures for years after 2100 can be dealt as terms of a converging geometric series. With the chosen values of the parameters the series are converging, but convergence is not the general case (Alho and Vanne 2006b).

4.2 Intertemporal net wealth and earlier studies

In table 3 we present the values of L_t as defined in equations (1)–(5) in 1995, 2000 and 2004. The value for 2004 is based on the age profiles of taxes and benefits and other data collected during the present study as well as the macroeconomic assumptions presented in Chapter 4.1. The value of public net financial wealth B_t is called explicit net debt here, and its value has been negative at every point of time studied.

A negative value of explicit net debt means that the general government has net financial assets. The main part of the assets is managed by the providers of statutory earnings-related pension insurance. The market value of pension assets was 57.9 per cent of GDP in 2004.

In table 3 the future part of the right side of equation (1) is divided into an ageing component and into a fiscal stance and business cycle component. The ageing part of the liabilities based on the year 2004 was solved by assuming an infinitely stationary population identical to the population of 2004, and subtracting the resulting IPL from the IPL of the baseline. If the population were stationary from 2004 on, the IPL would be -96 per cent of the 2004 GDP instead of 121 per cent in the baseline.

We also present how large a tax reform is needed, if the intertemporal public budget were balanced. If the change came into force in 2008, the balancing change of tax rate would be 4.7 percentages of GDP. The required adjustment is based on the naïve projection of pension benefits according to equation (5).

Table 3. *Intertemporal public liabilities (IPLs) with its components and balanced tax rate changes required at the baseline in 1995, 2000 and 2004 in Finland, percentage of GDP.*

Item	2004	2000	1995
Intertemporal public net liabilities, total (L_t)	121	-90	253
Ageing	217	159	114
Explicit net debt (B_t)	-47	-59	-8
Macroeconomy and fiscal policy	-49	-191	147
Balancing change of tax rate, percentages of GDP	4.7	-3.2	8.8

The IPL as well as balancing tax rate indicators are quite sensitive to the assumed parameter values. The figures with base-years 1995, 2000 and 2004 are based on different population projections. The later year, the higher is the life-expectancy, which is reflected in the higher ageing component of the IPL.

The IPL is also sensitive to the productivity growth rate and the interest on net public wealth, i.e. the discounting rate, or more precisely, to their difference. If the discounting rate were 4 per cent annually, instead of 5 per cent, the 2004 based IPL would become 229 per cent of GDP. If we use the common combination of 3.5 per cent annual discounting rate and 1.75 per cent annual productivity growth rate, the IPL would be 409 per cent of GDP.

The tax rate reached its all-time-high value in 2000. Since then tax rates have been lowered and the business cycle was not as favourable in 2004. These facts are reflected in a higher value of the macroeconomic and fiscal policy component of IPL in 2004 than in 2000. The value of the component was still negative and diminishing the IPL in 2004, which means that some further preparing for population ageing was embedded in fiscal stance. However, together with the net explicit wealth the preparing is not strong enough to totally cancel the effect of ageing.

The above figures and discussion demonstrate the uncertainty embedded in the projections for future and indicators based on the projections. The uncertainty was studied in Alho and Vanne (2006a and 2006b) with stochastic demographic and economic parameters. The distributions of the parameters were estimated with empirical data and the distribution of IPL was studied. It turned out that with 2000 as the base-year, the median IPL was -18 per cent of the GDP, and the lower and upper quartile limits were -95 and 75 per cent of GDP respectively.

4.3 Intertemporal net wealth with pension reform 2005

The mechanical projection we used above does not take into account the pension reform in 2005. In order to cope with the reform effects, we make use of the projections with the actuarial simulation model of the pension system. The reform and the model are described in Biström et al (2005). The pension reform is expected to lower the share of pensioners in certain age-groups, and increase employment rate and labour income in the same age-groups. In addition to the pension reform 2005, the simulation model takes into account the long-term transition effects of earlier reforms as well.

The baseline of the pension model projection is based on the 3.5 per cent of annual real rate of return on investments and an annual productivity growth rate of 1.75 per cent. As mentioned earlier, the IPL would become 409 per cent with these parameters. The newest and earlier pension reforms have an effect on both pension expenditure and income tax revenues due to higher earnings income. The IPL decreases from 409 per cent to 175 per cent of 2004 GDP, if we assume that income changes have no effect on indirect taxes.

The IPL is probably exaggerated, because nearly all of the public net wealth is equity investments of the pension institutions, i.e. the gross public debt is nearly equal to amount of the fixed income instruments managed by the pension institutions plus the cash balances of the central government. This means that an assumption of 3.5 per cent, and probably also an assumption of 5 per cent real return on the explicit net wealth is too low.[2] The share of equity in the portfolios of pension institutions is expected to rise in the future due to a law proposal aimed at more risk and return oriented solvency rules for private sector pension insurance providers. The law is expected to change in 2007.

[2] If we assume an annual risk premium of 2.5 per cent of the equity investment and take also into account the real estate investments of pension institutions, we obtain IPL that is 130 per cent relative to GDP. The statistics of financial wealth does not include real estate property that is approximately 10 per cent of pension wealth.

5 Concluding remarks

In this study we have evaluated generational incidence of fiscal policy using the method of generational accounts. Currently middle aged generations are net payers of public transfers. People at late middle ages are at the most productive phase at their life-cycle. They earn and consume more in per capita terms than other cohorts and pay also proportionally larger share of taxes. People at this stage of life use relatively little public resources or transfers.

Also the volume of public benefits and the share of services or transfers varies a significantly along the life-span. Public resources are most intensively needed at the very old age. In per capita terms the total value of public transfers exceeds 40,000 euro per year. The volume is below 10,000 euro between ages 25 and 55 years, and during some years before the school. The share of transfers is at its highest in the early old-age, at the age of 65.

Despite the fact that net taxes across all generations are positive. Public sector is not in long term balance. Current policies are not viable in out projection with the expected population development. Overall tax rate should be increased about 5 per cent relative to GDP in the baseline projection to meet the long term balance. We have made a preliminary examination in evaluating the impact of 2005 pension reform on fiscal balance. It turns out that pension reform cuts in half the intertemporal public net liability of current fiscal policy. However, this exercise is not directly comparable with our other projections, since the underlying assumptions in the actuarial model we have used in deriving future benefit levels, deviates from our baseline. In comparative perspective the pension reform needs to be further studied.

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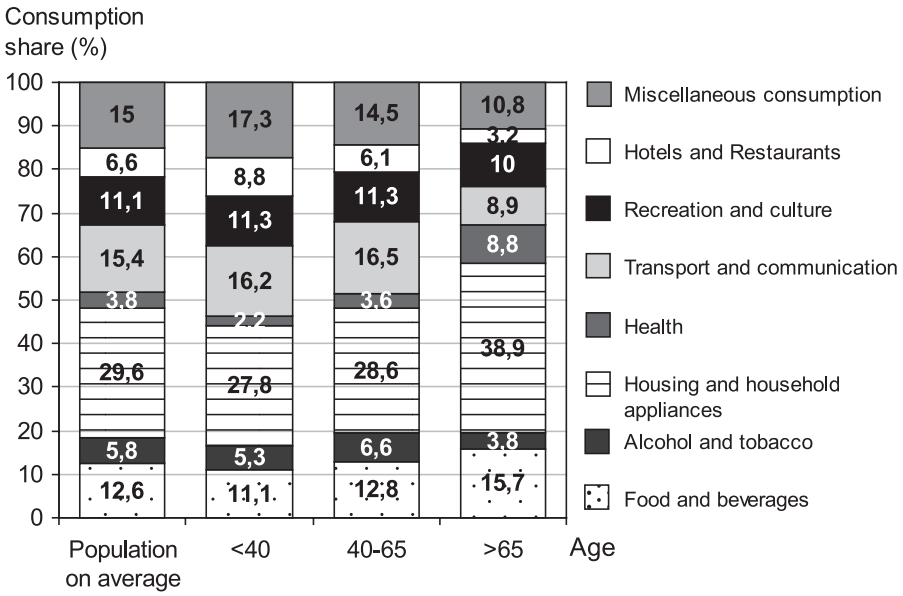
Appendices

Appendix 1. Taxes

Table A1. *Final incidence of commodity taxes in inputs.*

	VAT	Energy	Others
Household Consumption	34.1	38.9	37.5
Public Expenditure	47.0	13.1	17.0
Investments	12.3	10.6	11.9
Exports	6.6	37.4	33.7
Total	100.0	100.0	100.0

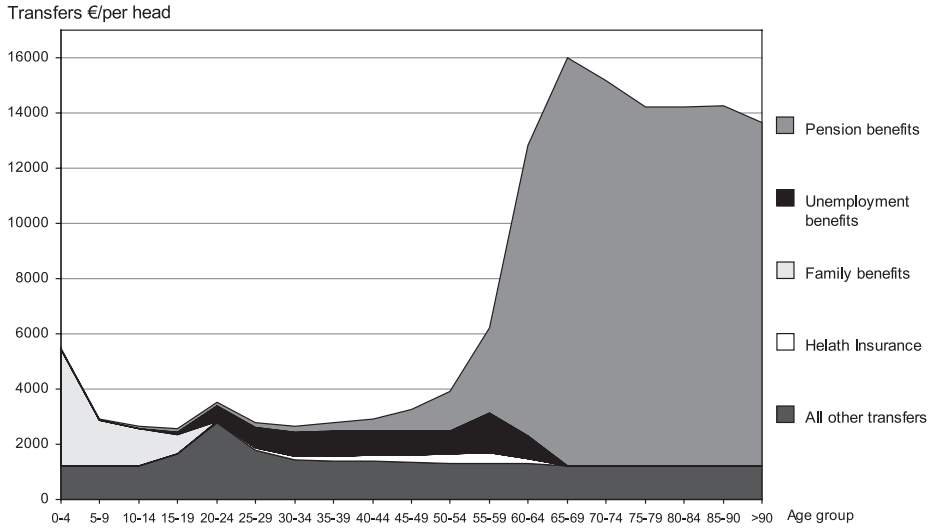
Figure A1. *Consumption shares by age.*



Sources: Household Expenditure Survey 2001–2002, Statistics Finland. Own calculations.

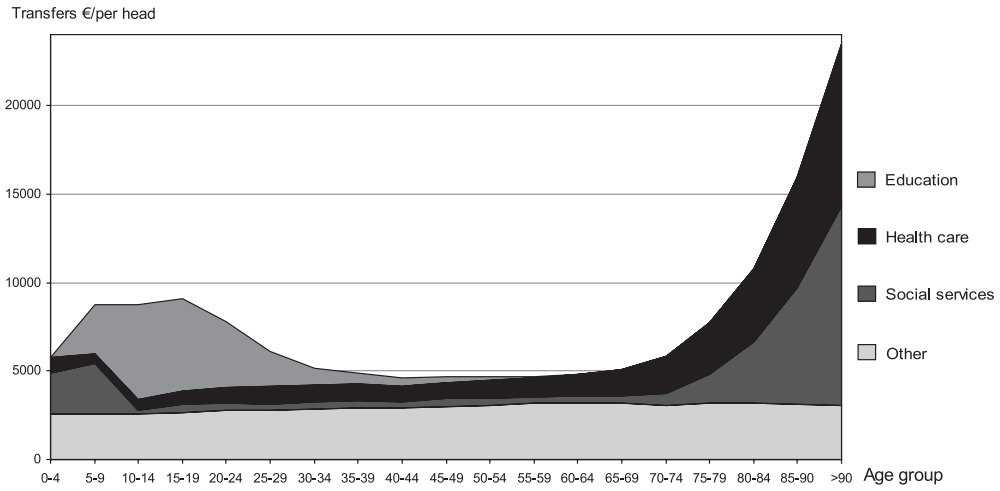
Appendix 2. Public Transfers and Services

Figure A2. *Main public transfer categories by age in 2004.*



Source: Statistics on income and property 2004, Statistics Finland; Social Insurance Institution (2005a–d). Own calculations.

Figure A3. *Main public service categories by age in 2004.*



Source: Finnish Centre for Pensions 2005; Statistics Finland; Social Insurance Institution (2005a–d). Own calculations.

Appendix 3. Generational account statistics

Table A3. *Generational account statistics in 2004 (million euros).*

Age	Taxes: Earnings income tax	Taxes: Capital income tax	Taxes: Social security contributions	Taxes: Indirect taxes	Transfers: Pension benefits	Transfers: Unemploy-ment benefits	Transfers: Health insurance daily allowance	Transfers: Family policy benefits	Transfers: Other transfers	Public Services: Education	Public Services: Health care	Public Services: Social services	Public Services: Other services	Net Transfers
0–4	0	2	0	397	16	0	0	1 196	346	0	241	663	726	-2 788
5–9	0	2	0	423	16	0	0	489	365	828	163	854	765	-3 056
10–14	0	2	0	534	18	0	0	453	404	1 777	206	77	848	-3 248
15–19	45	41	135	773	38	25	1	219	528	1 641	250	143	847	-2 698
20–24	497	239	830	1 271	34	193	14	0	928	1 249	280	140	931	-933
25–29	1 241	563	1 642	1 711	46	246	29	0	595	655	316	119	923	2 228
30–34	1 615	720	1 886	1 736	61	261	40	0	445	292	303	116	871	3 567
35–39	2 161	909	2 379	2 034	107	326	58	0	504	224	338	135	1 041	4 749
40–44	2 496	1 056	2 665	2 177	170	335	77	0	527	177	328	150	1 094	5 535
45–49	2 571	1 081	2 682	2 321	292	334	100	0	515	129	346	162	1 153	5 624
50–54	2 561	1 083	2 599	2 435	562	341	138	0	514	72	397	169	1 214	5 271
55–59	2 485	1 033	2 255	2 237	1 266	600	162	0	531	32	435	159	1 307	3 518
60–64	1 356	467	710	1 177	2 878	221	51	0	352	0	331	106	874	-1 104
65–69	864	134	103	712	3 605	0	0	0	298	0	377	97	774	-3 335
70–74	578	87	44	506	2 875	0	0	0	252	0	427	149	624	-3 112
75–79	404	63	31	397	2 300	0	0	0	216	0	512	290	564	-2 986
80–84	237	39	18	261	1 565	0	0	0	147	0	499	417	381	-2 454
85–90	104	17	8	123	731	0	0	0	68	0	351	370	173	-1 442
>90	47	7	3	58	337	0	0	0	33	0	246	305	83	-888
Total	19 263	7 544	17 991	21 284	16 917	2 884	670	2 356	7 566	7 078	6 347	4 621	15 195	2 447

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