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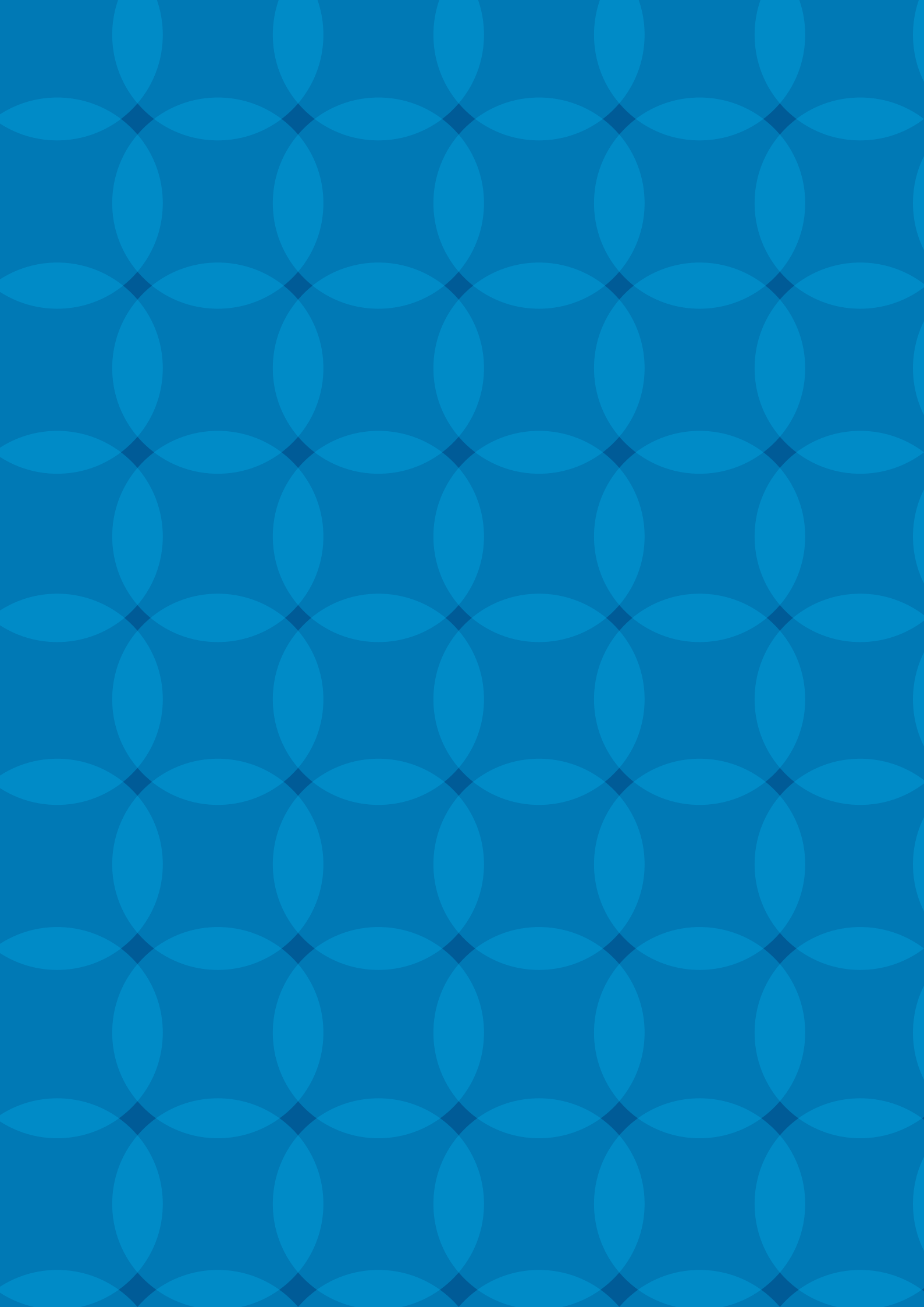
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ABSTRACT

In this paper, we evaluate generational incidence and sustainability of fiscal policy using the method of generational accounting (GA). Our attention is in the relative importance of earnings related pension on sustainability of public finances.

We perform two sustainability calculations. Assuming the current structure of public income and expenditure, the sustainability gap in public finances, measured as a need to increase the overall tax rate, is estimated to be 7.2 per cent of GDP, when future taxes and benefits are discounted by a 3.5 per cent interest rate. Due to the 2005 pension reform and recent labor market agreements, both contribution and benefit structures are changing. Using actuarial estimates of the impacts of the pension reform, the sustainability gap diminishes to 5.8 per cent of GDP. Using an alternative discount rate of 5 per cent, the respective figures would be 4.6 and 3.6 per cent.

The contribution of earnings-related pensions to the sustainability of public finances, assuming the current structure of benefits, is 1.1 per cent relative to GDP. Using actuarial estimates of pension expenditures, we find out that the pension system as a whole has a positive contribution to the sustainability of public finances, which is 0.3 per cent relative to GDP. A significant proportion of the difference compared to a status quo calculation is due to the automatic adjustment as a result of the life expectancy coefficient that is reflected only in actuarial calculations. The diminishing size of public sector pensions liabilities is another major reason.

ABSTRAKTI

Tässä tutkimuksessa arvioimme finanssipolitiikan kestävyyttä ja kohdentumista ikäryhmiin sukupolvitilinpidon menetelmällä. Erityinen mielenkiintomme kohdistuu työeläkejärjestelmän merkitykseen julkisen talouden kestävyydelle.

Teemme kaksi kestävyyslaskelmaa. Olettamalla nykyinen verojen ja tulonsiirtojen rakenne kestävyysvaje, mitattuna yleisenä veronkorotustarpeena, on tutkimuksessa arvioitu 7.2 prosentiksi suhteessa bkt:een kun tulevaisuuden etuuksien ja verojen nykyarvo on laskettu 3.5 prosentin diskonttokorolla. Vuoden 2005 työeläkeuudistuksen sekä viimeaikaisten työmarkkinasopimusten vuoksi sekä maksujen että etuuksien rakenne eläkejärjestelmässä muuttuu. Aktuaaristen arvioiden käyttäminen tulevien maksujen ja etuuksien tasosta työeläkejärjestelmässä alentaa arviota kestävyysvajeesta 5.8 prosenttiin bkt:sta. Vastaavat luvut ovat 4.6 ja 3.6 prosenttia, jos nykyarvojen laskennassa käytetään vaihtoehtoisen diskottotekijänä 5 prosentin korkoa.

Olettamalla nykyisen etuuksien rakenteen eläkejärjestelmän merkitys kestävyysvajeeseen olisi 1.1prosenttia bkt:sta. Käyttämällä aktuaarisia arvioita tulevista etuuksien ja maksujen tasosta osoittautuu että työeläkejärjestelmällä on positiivinen vaikutus julkisen talouden rahoitukselliseen kestävyyteen. Se on suuruudeltaan 0.3 prosenttia suhteutettuna bkt:een. Merkittävä osa erosta 'status quo' -laskelmaan selittyy elinaikakertoimella, joka automaattisesti vakauttaa eläkemenoja suhteessa eliniän kasvuun. Tämä on huomioitu vain aktuaarisessa laskelmassa. Toinen merkittävä tekijä on julkisen sektorin tulevien eläkevastuiden huomattava alenema.

CONTENTS

1   Introduction

A distinguishing feature of Finnish society is that the baby-boom generations are exceptionally large. Finland has already entered the stage of demographic transition where the share of the working-age population is declining because of the population ageing. This is expected to continue at an accelerating rate during the next two decades.

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 (GA), developed by Auerbach, Gokhale and Kotlikoff (1991), is a method that addresses these questions. It projects the net tax burdens of future years on different age groups and, consequently, on the remaining life cycle of present generations and on the life cycle of future generations. The method 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, the method provides an informative tool for assessing the lifetime impact of government policy on different age groups.

Unlike the case in most countries, the public sector in Finland has positive net financial wealth. This is because of partially-funded statutory employment pension insurance, compulsory for all employers and employees as well as for the self-employed. The market value of pension fund assets fell sharply due to the financial and economic crisis. It was around 77 per cent of GDP at the end of 2010 and 72 per cent in 2011.

In the generational accounts, we pay attention to the additional strain that the financial crisis imposes on the long-term sustainability of public finances. Our particular attention lies in the rapid deterioration of the old-age dependency ratio and the relative importance of earnings-related pensions for the sustainability of public finances.

This paper is structured in the following way: Section 2 presents the structure of public finances in Finland and discusses shortly the impact of the financial crisis on public wealth. Section 3 briefly introduces the Finnish pension system and its particular role in public finances. Section 4 outlines the fairly well-known method of generational accounts and reviews a recently introduced method to make business cycle adjustments to the revenue and expenditure levels. Section 5 presents population prospects and discusses their implications for the sustainability of public finances. In that section, we also study the separate impacts of earnings-related pensions relative to other net transfers of general government on the long-term sustainability of fiscal policy in Finland. Concluding remarks are made in section 6.

2   Structure of public finances in Finland

The public sector holds a substantial role in the intergenerational distribution in Finland. Table 1 presents the balance of expenditures and receipts of the general government in 2011[1]. The general government consists of the central government, local government units (municipalities) and social security funds. Age-related public consumption, consisting of education, health and social care, was more than 14 per cent of GDP. The responsibility for the provision of most of these services rests with the municipalities. They have the authority to collect taxes to fund the services, but they also receive state subsidies to enable them to arrange the services they are required to provide. Age profiles for education and health care are estimated based on the Household Budget Survey 2006 while the age profiles for social care are based on estimates made by the Ministry of Social Affairs and Health (2006). A large share of the customers of social care are people in institutions who are not included in the household surveys.

Table 1.
General government expenditures and receipts by type in 2011 (% of GDP).

Expenditure		Receipts	
Family policy cash transfers	1.6	Income taxes on wages, social security benefits and capital income	12.5
Sickness daily allowance	0.7	Contributions to the statutory earnings-related pension scheme	9.5
Unemployment insurance benefits	1.6	Contributions to other social insurance schemes	2.7
Statutory earnings-related pension benefits	10.7	Indirect taxes	14.0
Other pension benefits	1.6	Corporate taxes	2.6
Other individual cash transfers	1.4	Capital taxes	1.2
Subsidies	1.4	Other taxes	0.1
Other cash transfers (net)	2.9	Property income	6.2
Health care	5.9	Deficit	0.8
Education	4.6		
Social care	3.9		
Other individual, collective, or public consumption	10.0		
Property expenditure	3.6		
Total expenditures	**49.8**	**Total receipts**	**49.8**

Sources: Statistics Finland, Finnish Centre for Pensions, Social Insurance Institution of Finland, Financial Supervisory Authority.

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1 Based on data released on July 12, 2012.

The total volume of public cash transfers was about 22 per cent of GDP. About 85 per cent of these transfers could be assigned to specific ages. Public pension expenditure represented more than half of the total volume of public transfers. Other transfers with an age pattern are family-related benefits such as parenthood and child allowances, unemployment benefits, health insurance daily allowances, the student allowance, the housing allowance, and social assistance for poor households. The age profiles for these transfers are derived from Income distributions statistics 2009. The age distribution of public services and transfers by 5-year age groups are presented in the appended Table A1.

The total tax revenue in 2011 was 42.8 per cent of GDP. The central government receives more than half of the total tax revenues. Local governments (municipalities) and statutory pension insurance providers each collect one fifth of the tax revenues. The Social Insurance Institution of Finland and unemployment insurance funds are also minor tax collectors. The central government gives financial support to all other tax-collecting sectors.

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. Combined, they count for 71.3 per cent of tax revenues. In 2011, the former category accounted for 38.5 per cent of the total taxation and the latter for 32.8 per cent.

In 2011 total receipts collected by the general government got short of the expenditure and the public sector is running a deficit that was 0.8 per cent relative to GDP. In this respect, sub-sectors of the general government have different stances. During recent years, the central government has run deficits, local governments have been mainly in balance and earnings-related pension schemes have run surpluses.

Earnings-related taxes are strongly age-related. Taxes on wage earnings mirror the pattern that reflects the higher productivity of older workers because of accumulated human capital and work experience. Lower participation rates in the young and the old spectrum of the working-age population also have an impact on the age dependency of income taxes (see Vaittinen and Vanne 2006).

The main consumption tax is the value-added tax. Also excise taxes are levied on alcoholic beverages, tobacco, energy products, and cars. Age-specific consumption patterns have implications for the tax burden over different generations. Younger and middle-aged people tend to consume more alcohol, tobacco, and transport-related goods than do older people. These items are heavily taxed by excise duties. In addition, the relative amount of the consumption of goods that are taxed at lower-than-average value-added rates, such as food and health care, increases with age. The age pattern of consumption taxes has been estimated based on the Household Budget Survey 2006 (see Vaittinen - Vanne, 2006 and 2010).

A further major source of tax revenue was the social security contributions paid by employers to the Social Insurance Institution of Finland 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 scheme and employment-based pension insurance. Tax revenues by main tax categories in 5-year age groups are presented in the appended Table A1.

Based on these several national data sources figure 1 gives an aggregate overview of taxes and benefits by age. Pensions are presented as a separate item in addition to all benefits. Currently, mid-aged generations are net payers of public transfers. People in their mid-ages are at the most productive phase of their life-cycle. They earn and consume more in per capita terms than do other cohorts and also pay a proportionally larger share of taxes. People at this stage of life use relatively little public resources or transfers.

Figure 1.
Per capita taxes and public transfers and services by age in 2011.
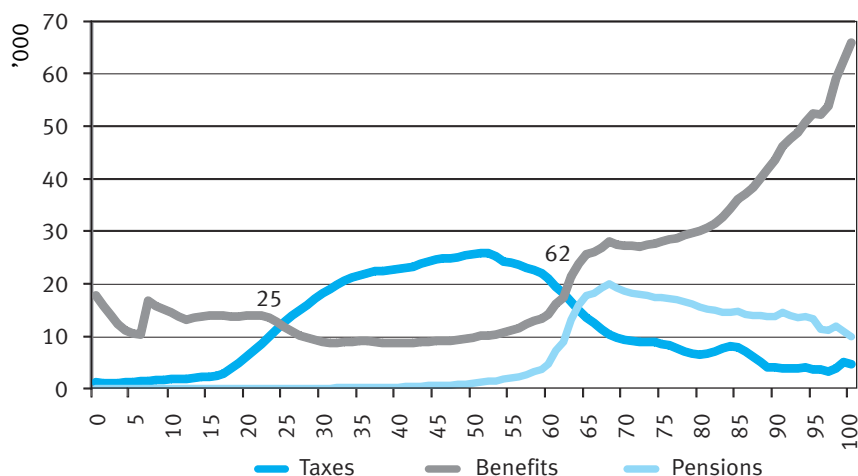
Looking at the gross-section of taxes and benefits by age in year 2011, generations younger than 25 and older than 62 years are net recipients of public transfers. These generations receive more resources, either as public services or transfers, than they pay in taxes or social security contributions.

The volume of public benefits and the share of services or transfers vary significantly along the life-span. Public resources are most intensively needed at very old ages. In per capita terms, the total value of public transfers exceeds EUR 40,000 per year for the population aged above 85. The volume is below EUR 10,000 between the ages of 25 and 55 years and during some years before starting school. For young people, child care and education raise the level of public benefits.

Financial crisis and public finances

One of the sustainability indicators of EU's growth and stability pact is the budget deficit of the general government. It consists of the central government, the local governments and social security institutions, including pension insurers. In Figure 2, the solid line depicts the development of the general government deficit during the euro era. This is broken down to contributions of social security institutions (light bar) and an aggregate of local and central governments (dark bar).

Figure 2.
General government deficit (-) relative to GDP by public institutions.
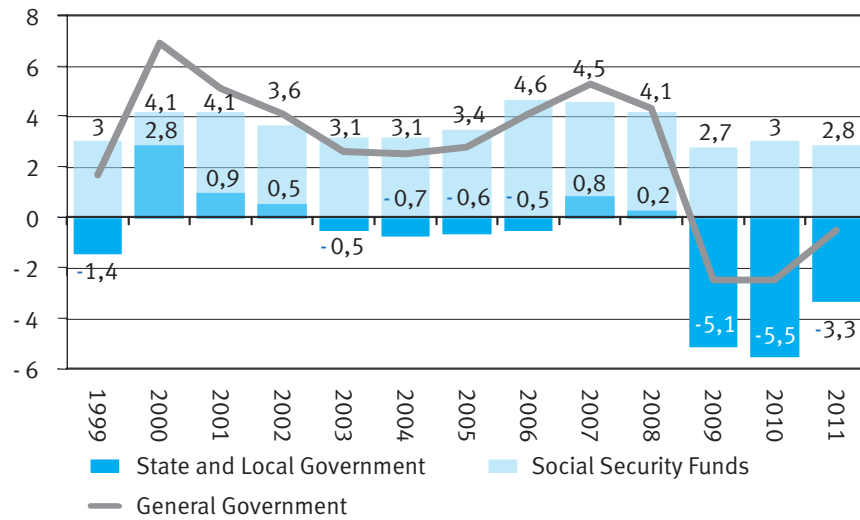
In Finland the finances of the general government have been in surplus for most of the euro era. The years following the financial crisis in 2008 make the only exception. The deficit, however, does not exceed the 3 per cent limit agreed in the stability and growth pact.

By looking at the sub-sectors one finds out that the central and local governments have been roughly in balance and social security institutions have been running significant surpluses, on average close to four per cent of GDP, before the financial crisis. After the crisis, the overall deficit has stayed below the growth and stability pact criteria because of the surplus in social security institutions. The deficit increased significantly in the rest of the public sector because of revenue losses due to the declining economic activity and fiscal policy accommodating the business cycle (OECD, 2010)

The observed patterns in public deficits are reflected in the accumulated wealth of the public sector. Table 2 reviews the development of public gross and net wealth by different subsectors. The general government gross debt is a consolidated figure subtracting cross ownership of liabilities with sub-sectors. This indicator is specified in the Stability and Growth Pact legislation as another criterion to monitor excessive budgetary deficits.

However, the criterion takes into account only the financial liabilities but not the assets owned by the public sector. The row below Gross Debt in Table 2 describes net financial wealth, which is the difference between the assets and liabilities of the general government.

Table 2.
Financial wealth of the public sector.

|	2007	2008	2009	2010	2011
Consolidated Gross Debt	35.2	33.9	43.5	48.6	49.0
Net financial wealth General government	73.1	53.5	65.4	67.0	55.6
Net financial wealth Pension institutions	68.1	56.6	72.5	77.3	72.0
Net financial wealth Other sub-sectors	5.1	-3.1	-7.1	-10.3	-16.4

Source: National account statistics, 2012.

The general government owned assets equaling the size of GDP in 2007. Taking into account the gross debt, net financial wealth turned out to be 73 percent relative to gross domestic output. Most of the net wealth was possessed by pension insurance institutions, but also central and local governments owned assets that exceeded their liabilities. Financial crisis did reverse the asset liability balance in other than pension insurance sectors of the general government. In 2008, the decline in net wealth is due to the financial crises that had an adverse impact on asset values across all sub-sectors. The asset prices revived in 2009 and in 2010, following another year of low performance in 2011. With a lag, the financial market crisis led to a decline in economic activity, followed by a recession and a public debt crisis in high-income countries throughout the world.

The net wealth position of the Finnish public sector has also deteriorated because of increased deficits in the central and local government sectors. However, the situation is, in general, much less severe than it is in almost any other high-income nation. In 2010, there were only seven OECD countries with positive public sector net wealth. Relative to GDP, Finland had the second highest figure after Norway (OECD, 2011).

Asset allocation of public wealth

Figure 3 shows the portfolio of the net financial wealth of the general government decomposed to the contributions of pension insurers and the rest of the public sector. The figure shows that the net fixed income instrument position of the general government is nearly zero and the net assets are more risky than, for example, government bonds. However, one could expect that, in the future, the deficits and surpluses will be cumulated in the form of bonds, holding the share of other asset classes constant.

Figure 3.

Allocation and expected real rate of return of general government net wealth.

% Net wealth
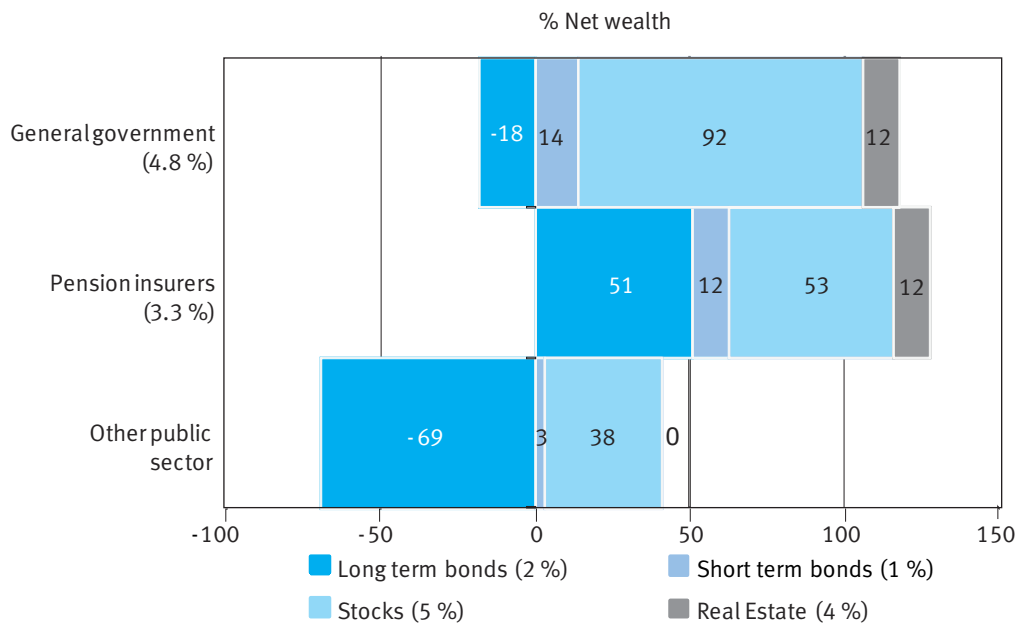
Using the current allocation weights of four assets categories, the expected rate of return has been calculated for the general government and pension insurers' wealth separately. In the calculation of the expected returns for alternative asset allocations, global averages for the short- and long-term bond yields reported in Kahra (2009) are used. A consensus estimate of 3 per cent for a risk premium (Kahra, p. 147) on stocks and other high risk instruments is used. The annual expected return for short term bonds is 1 per cent, for long term bonds 2 per cent, for real estate 4 per cent and 5 per cent for stocks and other high risk assets for general government wealth. Using the observed asset allocations they imply the expected returns of 4.8 per cent for general government and 3.3 per cent for pension insurers' wealth.

3   Partial funding of earnings-related pensions

Public pension expenditure represented more than half of the total volume of public transfers. Finnish statutory pensions are made up of partly-funded earnings-related pensions and national pensions. Private voluntary pensions play a relatively minor role in the total pension provision. Earnings-related pensions are defined-benefit in the sense that the size of the pension expenditure determines the contribution level and the need for other financing. Since the 2005 pension reform, the rules for public and private sector employees have been almost identical, though with a significant transition period because the rules for public-sector pensions prior to 2005 were more generous than in the private sector.

Benefits

The earnings-related pension scheme consists of several pension acts, which together cover the different sectors of the economy. The most important of these are the Employees Pensions Act, the State Employees' Pensions Act, and the Local Government Pensions Act. In practice, all wage income by employees and self-employed aged 18-67 is insured by some pension act. Earnings-related pension benefits include old-age, disability, survivor and part-time pension benefits.

At present, earnings-related pension accrues from earnings between the ages of 18 and 67. The insured is entitled to a normal old-age pension at the age of 63, but he or she can continue to work up to the age of 68 at an increased accrual rate. The national pension guarantees a minimum income for pension recipients with no other pension income or with only a small earnings-related pension.

Financing pensions

Currently, the Finnish earnings-related pension scheme is a partially-funded scheme with about EUR 140 billion worth of assets, that is, about 1.9 times the insured wage sum. About 67 per cent of these assets are owned by private-sector pension providers. Funds are invested both domestically and internationally in commercial assets.

As opposed to many other schemes, the funds in the Finnish scheme are not individualized at employee level. The amount of funding in the private sector is linked to each individual in order to determine the liability of each pension provider, and the funds are used to pay the specific individual's pension once he or she retires. Yet it is not individualized in the sense that an employee would be able to differentiate the funded part from the pay-as-you-go part or, even closer, to individual accounts in the Anglo-Saxon sense. Pension expenditure for self-employed persons and for farmers is financed through the annual premium income and the State's share. The State's share is the part of the pension expenditure which is not covered by premium income. In practice, it is covered by general tax collection.

The state and local government pension schemes were originally based on a pure pay-as-you-go system. Keva (formerly the Local Government Pensions Institution) started funding pensions in 1988 in order to curb the increase in pension contributions. The State Pension Fund was established in 1990 to prepare for the State's future pension expenditures. The aim of this fund is to gather assets so that the cost burden caused by the pensions of the post-war baby-boomers can be lessened in the years when the pension expenditure is at its highest. National pensions are completely financed on a pay-as-you-go basis.

Pension Reform in 2005

The 2005 pension reform profoundly altered the Finnish earnings-related pension system. The main motivating factor in the reform was to improve the long-term sustainability of the system. The reform restricted access to early retirement: the unemployment pension was abolished for persons born in 1950 or later, part-time pension was made less attractive by reducing the accrual rate and increasing the eligibility age. The level of prefunding for the benefit obligations was improved. Most importantly, old-age and survivors' benefits were linked to increasing longevity through the life-expectancy coefficient.

The initial amount of old-age pension is adjusted to account for the change in longevity for 62-year-olds through the life expectancy coefficient. The coefficient is determined to keep the capital value of the old-age pension unchanged when the life expectancy for persons at retirement age changes in comparison to the expectancy calculated based on statistics for 2003–2007 as a reference value. The coefficient was 1.00 in 2010. According to the latest forecast by Statistics Finland (OSF, 2009), it is projected to be 0.91 in 2025 and 0.81 in 2050 (see Risku et al., 2012 p. 77).

Financial crisis

The global financial markets faced a crisis in 2008, causing earnings-related pension investments to suffer a loss of 18 per cent in real terms. The development in the following two years has more-or-less compensated the losses experienced in 2008.

The growth in gross domestic product slowed down to 1 per cent per year in 2008, compared to the high figure of 5.5 per cent in 2007. The consequences of the financial crisis for the economic activity manifested themselves a year later. In 2009, GDP was reduced by 8.2 per cent and the recovery since then has been modest. The level of GDP achieved in 2008 is expected to be reached at the earliest in 2014.

The reduction in the value of pension assets, along with the reduced wage sum, increases the pressure to raise the earnings-related pension contribution. However, pension expenditure will not grow significantly due to the recession. In short, the recession will increase pension expenditure if the number of retirees increases as a result of the weak employment development. On the other hand, the poor development in labor markets will reduce the amount of accrued pensions and thus reduce future pension expenditure.

4   Generational accounts and fiscal imbalance

The generational account (GA) for a cohort is the present value of net tax that the cohort pays over its whole life (its "tax burden"). The account evaluated at year t for the cohort born in year k is as follows:

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

where $T_{s,k}$ stands for the projected average net tax payments to the government made in year s by the generation born in year k. The term $P_{s,k}$ stands for the number of surviving members of the cohort in year s who were born in year k. D is the maximum length of life and r is the annual discount rate.

Inter-temporal budget of the government

A set of generational accounts is simply a set of values of $N_{t,k}$ one for each existing and future generation. The computation of the GAs starts with the following inter-temporal budget of the government:

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

in which the left hand side are the generational accounts split between the living and future generations (as above). The second term on the left hand side is an infinite sum, but with ordinary assumptions about the interest and growth rates, it would converge to a finite number. G_s is government non age-related consumption and W_t^g is government net wealth.

Generational accounts indicate counterfactual lifetime tax burdens conditional on the perpetuation of current fiscal policy parameters. Particularly, it maintains the original age incidence of tax payments, transfers receipts, and projects it into the future, using demographic forecasts. Generational accounting formulates the inter-temporal 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. This benchmark matches the inter-temporal perspective of economic agents as life-cycle planners.

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

Projecting future taxes and benefits

In equation (1), net 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 greatly from each other [2]. In the baseline, projecting the future values of net taxes, we follow the standard practice of generational accounting as in Raffelhüschen (1999).

Let $e_{t,k}^i$ and $\tau_{t,k}^j$ be per capita benefits of type i and taxes of type j for age group k in base year t, then benefits and taxes in year $s>t$ are calculated as follows:

$$(3) \qquad \begin{aligned} e_{s,k}^i &= (1+g)^{s-t} \times e_{t,k}^i; \\ \tau_{s,k}^j &= (1+g)^{s-t} \times \tau_{t,k}^j \end{aligned} \quad,$$

in which g stands for the long term annual productivity growth rate. Using the observed age profiles as a basis for the future reflects the assumptions of the prevailing current policy.

Sustainability indicator for fiscal policy

Using equations (1) - (3), inter-temporal public net liabilities can be defined as:

$$(4) \qquad \begin{aligned} L_t &= \sum_{s=t}^{\infty} \sum_{k=s-D}^{s} \sum_{i=1}^{I} \left(\tfrac{1+g}{1+r}\right)^{t-s} \times P_{s-k,s} \times e_{s-k,s-t}^i - \sum_{s=t}^{\infty} \sum_{k=s-D}^{s} \sum_{j=1}^{J} \left(\tfrac{1+g}{1+r}\right)^{t-s} \times P_{s-k,s} \times \tau_{s-k,s-t}^j \\ &+ \sum_{s=t}^{\infty} G_s \left(\tfrac{1+g}{1+r}\right)^{-(s-t)} - W_t^g \, . \end{aligned}$$

We define our sustainability indicator by solving the coefficient for taxes that sets the future net liabilities as zero ($L_t=0$).

Business cycle correction

In general, the government tax revenue increases and transfer spending falls during an economic boom, whereas the opposite happens during a recession. As a consequence, fiscal policy might appear more or less sustainable, depending on the macroeconomic stance in the base period of the projection. Bonin and Patxot (2010) have noted that the main limitations of GA as a sustainability indicator is that it tends to perpetuate the initial business cycle conditions reflected both in primary surplus and net taxes.

Considering public-sector net liabilities, it is obvious that constant growth updating according to (3) perpetuates not only initial fiscal policy parameter, but also the initial economic conditions, to the extent that primary imbalance for constant fiscal policy vary

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2 The related statistics come from different sources (see Vaittinen and Vanne, 2006).

over the business cycle. Accordingly, life-time net tax burdens measured by the generational accounts and the sustainability gap develop pro-cyclically.

In this study, we use cyclically adjusted revenues $R*$ and expenditures $E*$:

(5)
$$R_t^{*j} = \sum_{k=0}^{D} \tau_{t,k}^{*j} P_{t,k}$$
$$E_t^{*i} = \sum_{k=0}^{D} e_{t,k}^{*i} P_{t,k}$$

where actual revenues and expenditures deviate from the potential output level values as follows:

(6)
$$\frac{R_t^{*j}}{R_t^{j}} = \left(\frac{Y_t^*}{Y_t^j}\right)^{\varepsilon_j}$$
$$\frac{E_t^{*j}}{E_t^{j}} = \left(\frac{Y_t^*}{Y_t^j}\right)^{\eta_j}$$

We have calculated cyclically adjusted revenues and expenditures using sensitivity parameters (ε_j, η_j) estimated for Finland by Girouard and Christophe (2005). The estimate for the output gap in 2011 for Finland is taken from IMF (2011).

Future policies and net taxes

It is important to acknowledge the indicative nature of net tax burdens measured by generational accounts (Bonin and Patxot, 2004). 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.

If policy measures which have already taken place change the values of expected taxes and benefits, it is reasonable to depart from the business-as-usual approach. Several discretionary measures to increase general government tax revenue have taken place that can be included in the generational accounts. It has been agreed that social security contributions will be increased by 1.6 per cent relative to the insured wage sum in 2012–2016 in order to finance the growth of pension expenditure. Energy and other indirect taxes have already been increased and a 1 per cent overall hike to value added tax has been agreed. We have included the revenue estimates of the Ministry of Finance (*Economic* Outlook ,p. 76) to our GA calculations to characterize the fiscal stance.

In this study, we have calculated net taxes based on two alternative sets of projections on statutory earnings-related pension benefits and contributions. The first set follows standard GA methodology using equation (3). The second set uses information produced

by the actuarial model of the Finnish Centre for Pensions, which simulates the operation of the pension schemes stated by current law. The model consists of several interconnected modules that use information of population and employment forecasts together with judgements about earnings and asset yields to project development of pension expenditures and contributions compatible with current legislation. Unlike the standard GA approach, it takes into account in a proper way the implications of productivity growth to benefit indexation and the automatic adjustment of benefits to incorporate growth in the expected lifetime (Risku et al., 2012).

Discounting, primary balances and public asset allocation

It is rather common that the net wealth of a country's general government is equal or almost equal to its debt, i.e. negative. In that case, the 'natural' discounting factor is the one derived from the interest rate on the public debt. The primary balances of the country may show surpluses or deficits in the future, but its net financial wealth allocation remains the same, as well as the discount factor. We disregard here, for example, the effects of over-indebtedness.

The above simple reasoning is ill-suited to Finland. The net asset allocation of the general government includes all asset classes, and non-zero primary balances constantly change the allocation. Expected returns are specific to asset classes, and the discounting factor varies respectively over time.

However, at any point in time, the prevailing allocation can be used as a basis for the discounting factor. The resulting net present value of public liabilities is correct, if we assume that asset allocation is always rebalanced to the starting level in the future. The value of net public wealth changes over time due to non-zero primary balances, but shares of different assets in the portfolio are assumed to be kept constant. This assumption may be unrealistic in practice. If the allocation changes in the future, we have to change the discounting factor in the calculations to be made at future points in time. We do not deal here with the time inconsistency between calculations made at different points in time, although we can already now almost certainly state the inconsistency.

5   Population prospects, pensions and sustainability of public finances

A distinguishing feature of the Finnish demography is exceptionally large baby-boom generations. Finland has also entered the stage of demographic transition where the share of the working-age population is declining because of the population ageing. This is expected to continue at an accelerating rate over the next decades.

To assess the impact of the future demographic change to public finances, we use the population forecast of Statistics Finland (OFS 2009) until 2060. This forecast assumes that the total fertility rate is 1.85, net migration is 15,000 persons per year (circa 0.28% of the population), and that the observed decrease in mortality in 1989-2008 will continue in the future. Risku et. al (2012) have extended the forecast from 2060 onwards to 2100 as such, except that from 2060, the rate of decrease in mortality is expected to be halved.

Figure 4.
Population by Age in Finland in 2011, 2030 and 2100.
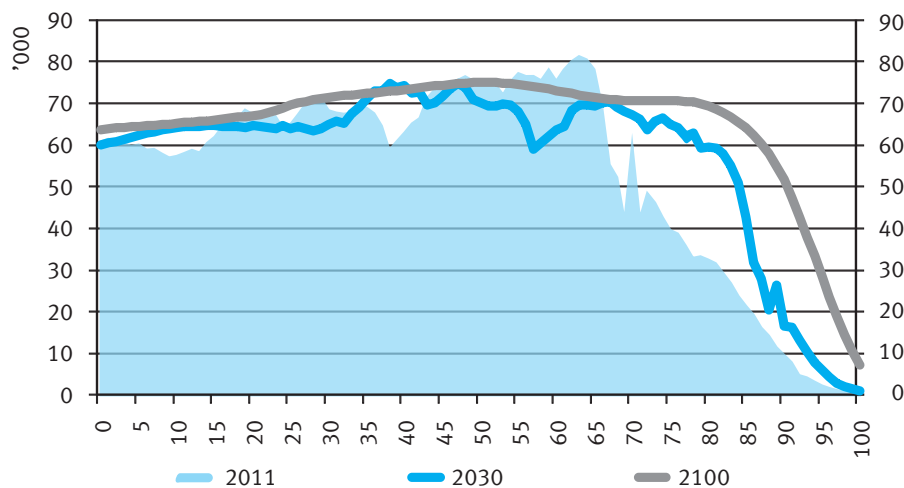
Figure 4 demonstrates the dramatic change in age distribution by comparing the population by age in 2011 and in two future years: 2030 and 2100. The size of the population remains relatively stable at the young end of net recipients of public transfers. This is also the case for net tax payers. The tail at the old end of net recipients increases drastically. At present, the share of the population above 65 years relative to those at working age (15-64 years) is 27 per cent. It is expected to increase to 44 per cent in 2030 and 56 per cent at the end of this century. The same shares of those over 85 years are 3 per cent, 7 per cent and 17 per cent, respectively. The population projection by 5-year age groups is presented in the appended Table A2.

Figure 5 demonstrates the consequences of demographic change on public finances by presenting cyclically adjusted deficits in 2015, 2030 and 2100. Population prospects of Figure 4 are combined with age-dependent public receipts and revenues as presented in Figure 1. In the calculation of future balances, known decisions (Ministry of Finance, 2012)

on revenues and expenditures have been taken into account as well as the impact of the business cycle on the fiscal stance (IMF, 2012). The deterioration of the primary balance in Figure 5 reflects only a change in demography. Initially, the primary balance has a moderate deficit of 1.1 per cent relative to GDP. The age pattern in the deficit is such that the old age deficit is 4.0 percentage points larger than the young age deficit. The old age deficit tends to be higher because of ageing by 3.7 percentage points relative to GDP in 2030 compared to 2015. The overall deficit is 5.5 per cent of GDP because of a small (-1.0%) deterioration in the working age surplus, with the young age deficit remaining close to its 2015 value.

Figure 5.
Demography and primary balance.
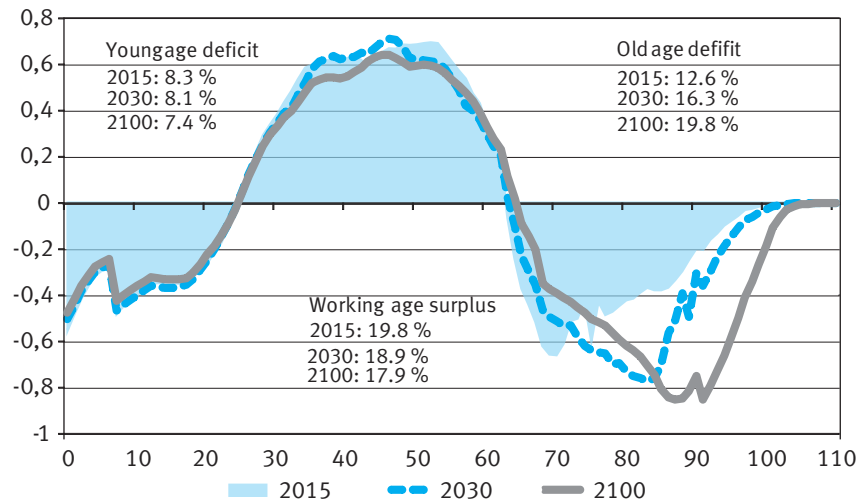
The primary deficit continues to deteriorate towards the end of the century because of the growing population at old-age deficit ages, with the annual deficit being almost 10 per cent of GDP. Given the projected population prospect, the current fiscal stance with age-related expenditures and revenues would not be sustainable.

Projections

In projecting future benefits and taxes, we have used a 1.6 per cent annual productivity as the compounding factor on the standard scenario and a 5 per cent interest rate to discount the present values of net benefits. The 5 per cent interest rate is motivated by the fact that public sector net wealth consists almost exclusively of stocks and high-risk assets. The long-term expected rate of return in these assets is estimated to be close to the figure we use (Kahra, 2009).

The business-as-usual approach to project future public revenues and expenditures per capita is to compound existing benefits by productivity growth rate. If policy measures which already have taken place change the values of expected taxes and benefits, it is reasonable to depart from the business-as-usual approach. In this study, we have calculated the indicators based on two alternative sets of statutory earnings-related pension benefits and contribution projections.

As an alternative, for a mechanical projection of earnings-related pension contributions and benefits, we use results from the latest long term projections of statutory pensions provided by the actuarial simulation model of the Finnish Centre for Pensions (Risku et al., 2012). These simulations take into account the gradual phasing in of the features in the 2005 pension reform. In this study, the allocation of pension wealth gives an expected return of 3.5 per cent, which is used to discount future pension contributions and expenditures produced by the simulations.

As already noted, government tax revenues increase and transfer spending falls during an economic boom, whereas the opposite happens during a recession. Fiscal policy appears more or less sustainable, depending on the macroeconomic balance in the base period of the projection, because life-time net tax burdens measured by the generational accounts and the sustainability gap develop pro-cyclically. For this reason, sustainability gaps are calculated using cyclically adjusted revenues and expenditures.

Sustainability gaps

In assessing the sustainability of public finances, with the prospective of deterioration of old-age dependency, we evaluate separately the importance of the earnings-related pension system to the overall sustainability of public finances. To do this, we have to break up public net wealth to assets owned by pension insurers and the rest of the public sector. We have also subtracted the contributions of pension insurers to aggregate primary deficit.

Pension contributions of currently large working-age cohorts are partially funded. For this reason, the current contributions of insured wages to the pension schemes are larger than benefits paid out of these schemes. The primary balance and net lending of these schemes are positive. The remaining public benefits are on a pay-as-you-go basis and are initially in deficit.

Ageing has a profound impact on the sustainability of public finances. The expected change in the population structure widens the sustainability gap to 7.2 per cent or 4.6 per cent relative to GDP, depending on the discount rate used with conventional GA calculations. In this setting, also pension schemes have a sustainability gap with a lower discount rate.

Table 3.
Implicit debt and sustainability gaps (% of GDP).

	Implicit debt - Standard GA[1]		Implicit debt - Actuarial pension projections		Sustainability gap - Standard GA[1]		Sustainability gap - Actuarial pension projections	
Discount rate	3.5	5.0	3.5	5.0	3.5	5.0	3.5	5.0
General gov't less pension schemes	421	165	421	165	6.1	5.1	6.1	5.1
Earnings related pension schemes	67	-15	-30	-56	1.1	-0.5	-0.3	-1.5
General gov't total	431	150	391	109	7.2	4.6	5.8	3.6

[1]All benefits determined similarly.

[2]Pension benefits calculated using actuarial model (Risku et al, 2012).

The mechanical projection is not able to take into account the population-driven breaks in benefit accrual or the actual indexation of pension benefits. Taking these into account, as in Risku et al. (2012), it turns out that the contribution of the statutory pension system has a moderately negative impact (around -0.3% or -1.5%) on the sustainability gap for Finnish public finances, implying a 5.8 and 3.6 per cent sustainability gap for the general government.

The difference between mechanical GA calculation and actuarial calculations is mainly explained by two features in the pension system. The most significant factor controlling pension expenditures is the life-expectancy coefficient introduced in connection with the pension reform in 2005. It adjusts the magnitude of old-age pensions to the change in life-expectancy for those aged 62 years. The second important factor is indexation. Implicitly, standard GA calculation assumes wage-indexation of the benefits, but within current practices, pensions are only partially indexed to real wage growth.

Risku et al. (2012) show that there is a pressure to increase the contribution rate in the private-sector earnings-related pension scheme. However, things are different in the public-sector schemes. The structural changes in the labor markets and the effects of pension reforms on prospective replacement rates for the public-sector pensioners makes the current contributions to public-sector pension schemes more than sufficient in the future. This relation is concurrent with the fact that, at present, the contribution rates are clearly higher in the public-sector employees' schemes compared to rates of the private sector schemes. The agreed hikes on employees' contribution rates in 2012 – 2016, improves also the financial balance in public pensions.

In fact, given the expected liabilities, the possibility to decrease contributions, and not to risk the financial balance, in the public sector more than compensates the need to increase them in the private sector. Since the accrued benefits are practically identical in both private and public earnings-related schemes, we can say that the currently existing structure in determining the benefits is maintainable at existing relative costs.

Harmonizing the debt burden in the euro zone

We are not making conjectures about the institutional arrangements to public finances within the euro zone that might emerge as a consequence of the present financial crisis. To demonstrate implications of one possible outcome in the GA framework, we have calculated the sustainable tax increases that a debt harmonization to the average euro-zone level in Finland would imply.

By financial co-responsibility we mean harmonization of debt levels within the euro zone. In the Finnish case, this is operationalized by assuming convergence of the gross debt to the average European level for the general government, excluding the pension schemes. The average public debt was about 100 per cent of GDP in 2010. Harmonization of Finnish public finances in this respect would imply an additional debt of about EUR 100 billion. To be compatible with the public-sector inter-temporal budget constraints, this would require a 1.6 percentage point raise in the overall tax rate relative to GDP.

6   Concluding remarks

The exceptionally large Finnish baby-boom generations are retiring in the near future. The working-age population is already declining because of the population ageing. This is expected to continue at an accelerating rate during the next two decades.

We have used the method of generational accounting to evaluate the effects of changing demographic structures on the sustainability of public finances. We have demonstrated that current debt and deficits are not able to track how maintaining the current fiscal stance will affect future generations.

Assuming the current structure of public income and expenditure, the sustainability gap in public finances is estimated to be 7.2 or 4.6 per cent of GDP, with 3.5 or 5 per cent discount rates respectively. These estimates include a mechanical projection of net pension liabilities that are not able to take into account the population-driven breaks in benefit accrual or the actual indexation formulas of pension benefits.

The harmonizing of relative public debt levels in the euro area is operationalized here by assuming the public debt to be 100 per cent of GDP. This would increase the sustainability gap by 1.6 percentage points relative to GDP.

We know that, due to the 2005 pension reform and labour market agreements, both contribution and benefit structures are changing. Using actuarial estimates of the impacts of the pension reform, the sustainability gap for the whole public sector is estimated to be between 5.8 and 3.6 per cent of GDP, depending on the discount factor. However, the impact of the pension system alone on the sustainability gap turns out to be slightly negative.

We have separated the contribution of earnings-related pension system to the sustainability of public finances from other net transfers systems of general government. Assuming the current structure of benefits implies a 1.1 per cent sustainability gap relative to GDP. Using actuarial estimates of pension expenditures, we find out that the pension system as a whole improves the sustainability of public finances by 0.3 per cent relative to GDP. A significant proportion of the difference to the status quo calculation is due to the automatic adjustment as a result of the life expectancy coefficient that is reflected only in actuarial calculations. The probably unexpected positive impact to the sustainability of public finances is due to, on the one hand, the diminishing liabilities of public pensions and, on the other hand, to agreed hikes on contribution rates in 2012–2016.

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Table A1.
Public Finances by Age 2011 (MEUR).

Age	Taxes			Pension Contributions	Transfers							NASNB and subsidies	Net Transfers
	Income Tax	Capital Taxes	Indirect Taxes		Other Social insurance	Earnings related pensions	National pensions	Health and welfare	Unemployment	Family policy	Education		
0-4	0	1	402	0	0	0	1	1525	0	1815	0	1381	-4319
5-9	1	2	495	0	0	0	4	1394	0	496	1122	1342	-3861
10-14	2	3	638	0	1	0	9	559	0	483	1966	1342	-3716
15-19	69	16	896	101	36	0	24	829	47	285	2262	1513	-3840
20-24	563	56	1300	794	216	2	34	1385	211	4	1730	1560	-1997
25-29	1406	126	1918	1619	443	9	41	1123	291	3	915	1646	1484
30-34	2034	313	2218	2066	566	26	45	896	320	4	339	1727	3839
35-39	2404	672	2185	2204	596	48	51	895	350	2	202	1664	4848
40-44	2715	657	2361	2440	656	100	67	931	368	1	51	1793	5518
45-49	3098	913	2802	2745	730	201	92	1167	395	0	39	2017	6375
50-54	2921	1021	2749	2572	679	411	127	1261	373	0	33	2026	5710
55-59	2688	885	2884	2254	608	907	205	1318	409	0	31	2146	4304
60-64	2408	966	2400	1304	411	3669	393	1327	279	0	31	2139	-348
65-69	1532	734	1345	194	145	5361	356	1050	11	0	29	1549	-4404
70-74	879	422	960	0	73	4064	365	1172	0	0	17	1251	-4533
75-79	562	286	622	0	47	2736	359	1350	0	0	4	933	-3866
80-84	399	259	436	0	32	1824	390	1752	0	0	0	733	-3572
85-90	207	143	214	0	15	829	361	1600	0	0	0	412	-2623
90+	94	82	75	0	6	314	188	1087	0	0	0	177	-1508
Total	23983	7557	26902	18292	5261	20500	3112	22621	3053	3094	8771	27351	-6508

Source: SNA, Income distribution statistics, own calculations.

Table A2.
Population ('000 persons.).

	2010	2011	2020	2030	2040	2050	2060	2070	2080	2090	2100
0-4	302	303	314	305	306	315	313	314	319	319	320
5-9	289	293	314	316	307	317	319	317	322	324	324
10-14	297	293	310	322	313	315	324	321	322	327	328
15-19	332	328	297	322	323	315	325	327	325	330	332
20-24	328	333	308	322	333	325	327	336	333	335	340
25-29	346	345	352	319	343	345	337	347	349	347	352
30-34	339	340	350	333	345	357	349	351	360	358	359
35-39	314	321	360	366	336	359	361	353	363	366	364
40-44	350	339	348	359	343	355	367	360	362	371	369
45-49	377	376	320	365	372	343	366	368	361	371	373
50-54	375	372	349	348	360	345	358	370	363	366	374
55-59	384	384	368	315	359	367	341	363	366	360	370
60-64	402	395	357	336	338	351	339	352	364	359	362
65-69	282	297	356	347	301	347	357	334	357	360	355
70-74	223	239	359	329	316	324	340	331	345	358	354
75-79	180	180	237	313	316	282	331	344	323	347	352
80-84	142	144	164	283	275	276	292	313	307	323	338
85-90	80	82	100	149	216	235	223	270	286	274	300
90+	35	37	59	83	161	197	227	250	290	305	324
Total	5375	5400	5622	5831	5964	6071	6195	6320	6418	6499	6590

Source: Risku et al. (2012).
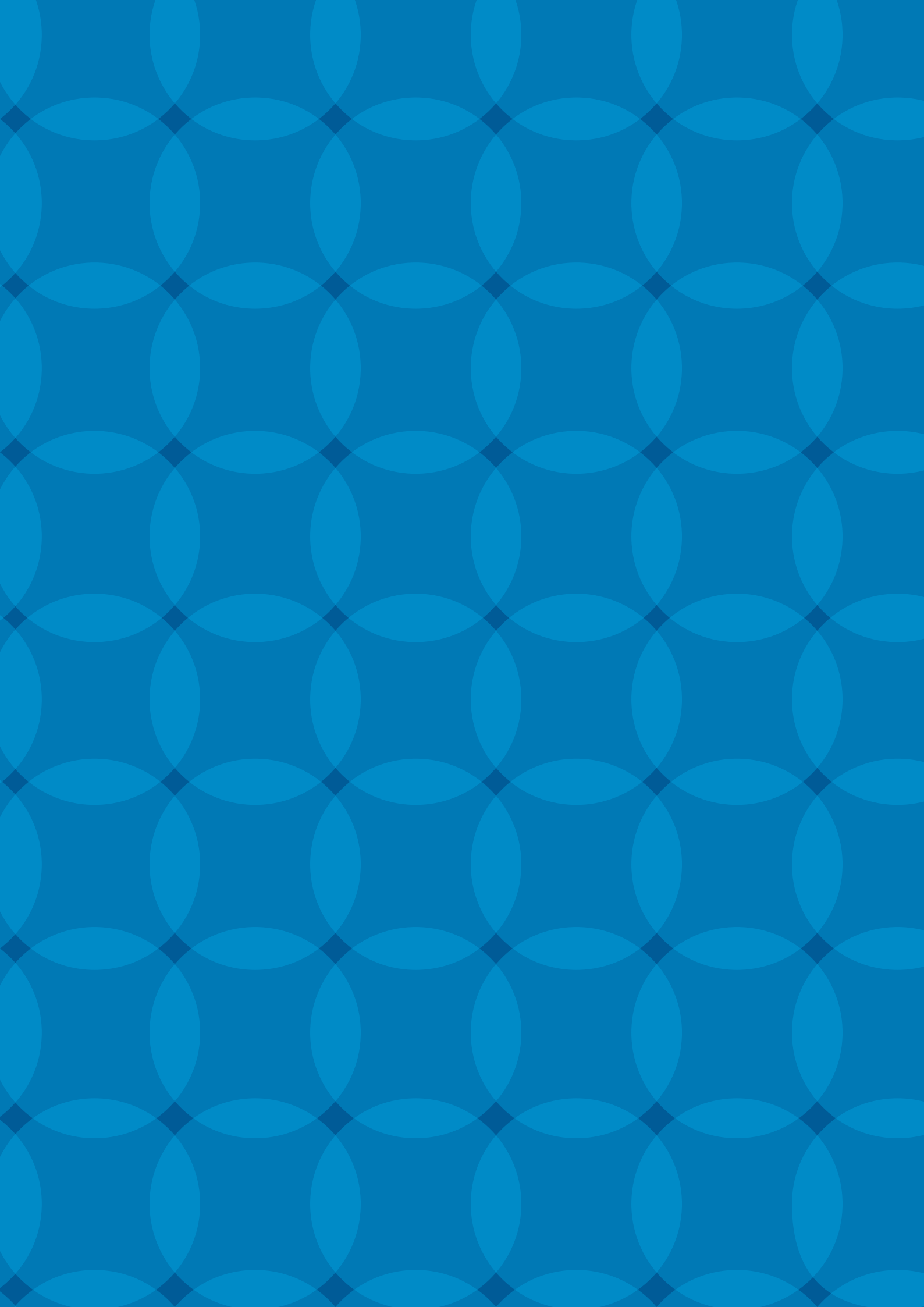
The Finnish Centre for Pensions is a statutory co-operation body,
expert and producer of joint services for the development and
implementation of earnings-related pension provision.
The aim of our research is to produce high-quality, widely
applicable information for the evaluation and development
of pension provision.

Eläketurvakeskus on työeläketurvan kehittämisen ja
toimeenpanon lakisääteinen yhteistyöelin, asiantuntija
ja yhteisten palveluiden tuottaja. Tutkimustoiminnan tavoitteena
on tuottaa korkeatasoista ja laajasti hyödynnettävää tietoa
eläketurvan arvioimiseen ja kehittämiseen.

Pensionsskyddscentralen är ett lagstadgat samorgan
och sakkunnig inom verkställigheten och utvecklingen
av arbetspensionsskyddet. Vi producerar gemensamma tjänster
för arbetspensionssystemet. Vår forskning har som mål att ta
fram högklassig information som nyttiggörs på bred front vid
bedömningen och utvecklingen av pensionsskyddet.

Finnish Centre for Pensions
ELÄKETURVAKESKUS