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ABSTRACT

National Transfer Accounts (NTA) is a methodology used to measure intergenerational resource flows. In this study, using the NTA methodology, we evaluate the implications of changing life-cycle patterns of earnings and consumption that have taken place in Finland from 1990 to 2006.

Differences in consumption and production by age cause a life-cycle deficit (LCD). The changing age patterns of production and consumption in Finland have been manifested in a growth of the life-cycle deficit aggregated over the ages. On average, in the 1980s, the aggregate LDC was only a few percentage points relative to wages. After 1990, the deficit has increased considerably and amounted to approximately 17 per cent of the wage sum in 2006. Approximately 40 per cent of the growth can be attributed to changes in the population structure. The remainder is explained by shifts in age-specific consumption and wages. Without changes in consumption profiles by age, the LCD would have been 13 percentage points lower.

The changing profiles of wages by age alone would have reduced the deficit roughly by four per cent. A lengthening of working careers would have almost eliminated the burden of ageing at the given consumption structure. However, growth in private consumption relative to wages has increased the life-cycle deficit.

ABSTRAKTI

Ikäryhmätilinpito (National Transfer Accounts, NTA) on menetelmä mitata ja tulkita sukupolvien välisiä resurssien siirtymiä. Tutkimuksessamme arvioimme vuosina 1990–2006 tapahtuneiden elinvaiheen ansainta- ja kulutusrakenteen muutosten vaikutuksia hyödyntämällä ikäryhmätilinpitoa.

Palkkatulojen ja kulutuksen ikäprofiilit luonnehtivat taloudellista elinkaarta. Niiden erotusta kutsutaan elinkaarialijäämäksi. Kulutuksen ja tuotannon muuttuneet ikärakenteet heijastuvat koko talouden elinkaarijäämän aggregaatissa. Keskimäärin koko talouden elinkaarialijäämä oli 1970-luvun puolivälistä aina 1980-luvun lopulle vain muutamia prosentteja suhteessa talouden palkkasummaan. Vuoden 1990 jälkeen tämä suhde on kasvanut huomattavasti ja vuonna 2006 se oli 17 prosenttiyksikköä. Väestörakenteen muutos selittää noin 40 prosenttia vuosien 1990–2006 välisenä aikana toteutuneesta alijäämän kasvusta lopun selittyessä kulutuksen ja palkkojen ikäjakauman rakenteiden kehityksellä. Ilman ikäriippuvaisen kulutuksen kasvua koko talouden elinkaarialijäämä olisi ollut 13 prosenttiyksikköä alemmalla tasolla suhteessa talouden palkkasummaan.

Palkkaprofiilin kehitys olisi toteutuneella ikärakenteen muutoksella alentanut elinkaarialijäämää noin neljä prosenttiyksikköä. Työurien pidentyminen on hillinnyt alijäämän kasvua, mitä väestön vanheneminen annetulla ikäryhmittäisellä kulutusrakenteella olisi merkinnyt. Yksityisen kulutuksen kasvu suhteessa keskipalkkoihin on keskeisesti kasvattanut elinkaarialijäämää.

EXECUTIVE SUMMARY

All societies transfer resources across generations or along life-cycles because individual consumption needs and the capacity to finance these needs do not match. Intergenerational transfers or transfers from one age group to another are means to finance this gap. They exist alongside market mechanisms for shifting income from one age to another by borrowing and lending or by saving and investing in capital. In this study we evaluate the implications of changing life-cycle patterns of earnings and consumption that have taken place in Finland from 1990 to 2006.

Putting Age into Finnish National Accounts

The National Transfer Accounts (NTA) is a methodology to measure intergenerational relations and provides means to interpret its economic aspects. Existing systems of national accounts do not include the dimension of age, nor do they include familial transfers. NTA adds these two dimensions to national accounting systems in a way that is consistent with existing measures of intergenerational transfers. In section two we review NTA methodology and its implementation to the Finnish data.

Demographic Transition and Macroeconomic Turbulence

In section three, we discuss the institutional setup of generational relations in Finland, the economic policy changes and aspects of general macro-economic development that are of significance for intergenerational exchange. In terms of intergenerational transfers, Finland displays two specific features. Approximately two thirds of public expenditure can be regarded as age-related spending, accounting for approximately 30 per cent of the GDP. Unlike most countries, the public sector in Finland has a positive net financial wealth because of partially funded statutory employment pension insurance. Another distinguishing feature of the Finnish society is that, in relative terms and compared to other countries, the post-war 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 far the transition has been moderate. The largest generations enter the retirement age during 2008–2013 causing a sharp decline to the share of the working-age population in the 2010s. The decline will continue at an accelerating rate during

the next decades. The population transition as such will have profound implications for intergenerational resource flows.

The transition in population structure during the period under review has coincided with major transformations in the economic policy environment: The dual income tax system was introduced in 1993; Finland became a member of the EU in 1995 and later on a common currency and monetary regime were introduced. When becoming a member of the EU value added tax was adopted as a main form of taxing overall consumption. These changes coincided with macro-economic volatility that has been unprecedented in the Finnish post-war history.

Consumption is the Main Contributor to the Increased LCD

The economic lifecycle is characterized by the age profiles of consumption and labor income. The gap between the two is called the life-cycle deficit (LCD). It is large and positive for children and the elderly. Lifecycle deficits are possible only because economic systems facilitate two kinds of inter-age flows of income: transfers and asset-based reallocations. In section four, we evaluate the changing patterns in the age profiles of consumption and labor income. We decompose the change in LCD into elements caused by transition in population structure and to those caused by changes in the patterns of age specific per capita consumption and wage income.

The changing age patterns in consumption and production are manifested in the aggregate life-cycle deficit of Finland. On average, the aggregate LDC was only a few percentage points relative to the wage sum from the mid-1970s to the late 1980s. After 1990, the deficit increased considerably and amounted to approximately 17 per cent of the wage sum in 2006.

We have estimated that, had the relative profiles of life-cycle earnings, and consumption remained constant, the life-cycle deficit relative to the wage sum would have been 5.5 percentage points lower than the one we observed in 2006. Thus, about 40 per cent of the growth in the deficit between 1990 and 2006 can be attributed to the transition in the population structure. The remaining part is explained by structural shifts in age-specific patterns of consumption and wage earnings. As a matter of fact, the changing profile of per capita wages by age has reduced the deficit by roughly four percentage points. The labor market and population developments have had a modest, joint net impact on the aggregate life-cycle deficit.

The demography alone would have reduced the child deficit, but a delayed entry onto the labor market at young ages has had an impact in the opposite direction. This has more than neutralized the effect of demography and implied an increasing child deficit. The opposite is true for the generation of the old-age deficit. Improved labor market performance has succeeded to eliminate three quarters of the deficit that ageing alone would have implied. A lengthening of working careers has thus almost eliminated the burden of ageing at the given consumption structure.

Growth in private consumption relative to wages has increased significantly the life cycle-deficit. Without changes in consumption by age and relative to the wages, the LCD would have been 13 percentage points lower. Consumption relative to wages has increased uniformly at all ages. Its importance in changing the life-cycle deficit has been almost as significant in the group generating the old age-deficit as in the group generating a life-cycle surplus. Since the population responsible for the old-age deficit is a significantly smaller group than the prime-age population, the consumption per head among the elderly population in 2006 has increased relative to others since 1990.

The Growing LCD has been Mainly Financed by Private Asset Income

Lifecycle deficits are financed either by inter-age transfers or asset-based reallocations. Asset based reallocations are composite of two flows: asset income and saving, which include purchases and sales of assets, and borrowing and lending from financial institutions. These flows are mediated by either private or public institutions.

Since the aggregate LCD relative to the wage sum has increased considerably it is worthwhile to consider whether the newly established level is sustainable in the future. It turned out that at the first phase of the growth of the LCD in 1991–1995 it was financed by private but especially by negative public saving or de-cumulation of net wealth. In later years the financing stems from private asset income. Private and public saving has recovered and both have been positive, private saving for the last 15 and public saving for the last 10 years. From a sustainability point of view, one of the necessary conditions for sustainability has been fulfilled. Taking into account the probable future age-structures of the Finnish population, and without further research, it is not evident whether the level is sufficient.

We have evaluated the financing of life-cycle deficits by private and public transfers across ages and private and public asset reallocations along the life cycle using five broad age categories those aged 0–19, 20–29, 30–54, 55–64 and 65+ years. The most significant relative shifts in per capita terms have taken place in broad age groups of 10 years before and after the group of the prime-age working population of those aged 30–54 years.

In public age reallocations, changes in transfers are of more importance than asset-based reallocations. We have subdivided public transfers into net cash and net in-kind transfers. Pensions are the most important age related cash transfers. The received transfers-in-kind by age comprise of the age-specific public services that people consume. The age-specific share of the financing of the public transfers-in-kind is the same as the age-specific share of all taxes, excluding social security contributions.

The most significant decline in the net public cash transfers has taken place in the population aged 55–64 years. Relative to the peak value in this group, net public cash transfers have declined by 15 percentage points to nearly zero in net terms. The same positive pattern, from the point view of the LCD, also appears in net in-kind transfers. The opposite is true in both cases of public transfers for young adults aged 20–29 years. In the case of in-kind transfers, young adults have turned from net contributors to net beneficiaries. In per capita terms, this particular group has turned from a modest life-cycle surplus contributor, with 9 per cent relative to prime-age wages, to a life-cycle deficit contributor, with equals 8 per cent relative to the prime-age wages.

We have noted that, in aggregate terms, private asset-based reallocation, and especially income on private assets, has contributed mainly to the financing of the growth in the life-cycle deficit during the period under study. The relative asset income per capita has followed the general pattern among all broad age categories. The development has been the most pronounced among those aged 55–64 years. The relatively abundant asset incomes within this group during the last years coincide with an expansion of private consumption within the same age range compared to earlier cross-sections of consumption by age.

The relative importance of private asset-based reallocation to the financing of the life-cycle deficit has also increased significantly among the elderly population aged 65 or more. Private asset-based reallocation covers half of the increase in

their life-cycle deficits. The improved asset income of senior citizens is reflected in the increased private consumption relative to that of the middle-aged. This is most apparent among those nearing the retirement age, but also those aged 70+ are consuming more, in relative terms, than did the population of the same age in 1990.

Final remarks

The changing age patterns in consumption and production have manifested themselves in the growth of the overall life-cycle deficit from three per cent in 1990 to 17 per cent in 2006 relative to the wage sum. Demographic transition explains for two fifths of the overall increase. However, improved labor market performance at older ages has almost neutralized the deteriorating effect of ageing to the LCD. It turns out that growth in consumption relative to wages is the main contributor to the growth in aggregate LCD. Is the observed increase in the deficit sustainable? Giving a definite answer to this question is beyond the scope of this study. However, we can say that the growth in the deficit has been sustainable in the sense that it has not been financed by de-cumulating private or public net wealth. As a matter of fact, private asset income, which has become an increasing share of the total disposable income, has been the main source in the financing of the life-cycle deficit. To evaluate whether the public and private wealth is sufficient to cover future obligations or aspirations would require a forward-looking framework of analysis.

CONTENTS

1 Introduction

All societies transfer resources across generations or along life-cycles because individual consumption needs and the capacity to finance these needs do not match. Public-sector programs transfer income from the working ages to the old and young through pensions, public education, public health care, long-term care, and several smaller programs. In families, parents pay their children's consumption costs and invest in their health and education. Working-age people may provide economic support to their elderly parents or receive support from them, either when the elderly co-reside with them or when they live apart. These flows are all intergenerational transfers or transfers from one age group to another. They exist alongside market mechanisms for shifting income from one age to another by borrowing and lending or by saving and investing in capital.

The National Transfer Accounts (NTA) provides measures for this type of resource flows and means to interpret economic aspects of intergenerational relations (Lee, Lee and Mason 2008). Existing systems of national accounts do not include the dimension of age, nor do they include familial transfers. NTA adds these two dimensions to national accounting systems in a way that is consistent with existing measures of intergenerational transfers. A comparative analysis of different institutional arrangements of intergenerational relations is Lee and Mason (2011).

Previously, intergenerational relations in Finland have been charted by cross-sectional studies of a single year (Vaittinen and Vanne 2008 and 2010). In this study we characterize the changing patterns of intergenerational and along life-cycle resource reallocation over 17 years in Finland. In cross-sections, intergenerational reallocation means private and public net transfers by age. In a longitudinal perspective by birth, cohorts' age specific net transfers sum up to a life-cycle net figure with respect to other cohorts. Private net saving and net asset income are not resource reallocations between generations but, by definition, resource reallocation along the life cycle of the generation itself. Public net saving and net asset income are policy tools that can be used in many ways, either as cross-sectional intergenerational transfers, as reallocations along the life cycle, or even as bequest-like 'longitudinal' transfers between generations.

Using a sequence of micro-economic data sets of Household Expenditure Surveys, Income Distribution Statistics and the Wealth Survey, we have compiled

series of NTA's of Finland for the period spanning from 1990 to 2006, which is compatible with National Accounts data. NTA allows us to analyze, among other things, the intergenerational consequences of profound changes that have taken place in Finnish tax and transfer structures during the 17 years under review. However, we study the aggregate LCD and its components for an even longer period, beginning in 1975 and ending in 2009.

In terms of intergenerational transfers, Finland displays two specific features. Approximately two thirds of public expenditure can be regarded as age-related spending, accounting for approximately 30 per cent of the GDP. Unlike most countries, the public sector in Finland has a positive net financial wealth because of partially funded statutory employment pension insurance.

Another distinguishing feature of the Finnish society is that, in relative terms and compared to other countries, the post-war baby-boom generations are exceptionally large in our country. The largest generations enter the old-age stage of the life-cycle deficits during 2008–2013. Large public asset reallocations and the exceptionally large baby-boom generations are features that make the structure of Finnish NTA's somewhat different from those of most other countries.

The transition in population structure during the period under review has coincided with a profound transformation in the economic policy environment. These changes coincided with macro-economic volatility that has been unprecedented in the Finnish post-war history.

Significant changes in taxation of profits, capital income, and consumption were introduced at the beginning of the 1990s. With regard to its foreign economic relations, Finland joined the European Union in 1995 and became a member of the European common currency area in 1999. The euro was adopted as a common currency in all transactions in 2002.

A severe macro-economic crisis, with visible consequences throughout the entire review period, preceded these policy events. While reviewing the development of the macro-economic aggregates of NTAs, we discuss the contributions of policy changes and macro-economic volatility to the intergenerational transfers relative to the demographic transition that has taken place during the review period.

Taking into account the recent history of population, economic policy and business cycles highlighted above, we study whether any structural or business cycle effects are to be observed in intergenerational and along life cycle reallocation.

In section two, we briefly describe the NTA methodology and the data we have used while applying this framework. In section three, we discuss the institutional setup of generational relations in Finland, the economic policy changes and aspects of general macro-economic development that are of significance for intergenerational exchange. In section four, we evaluate the changing patterns in the components of the life-cycle deficit. Furthermore, we attempt to separate the elements caused by transition in population structure from those of macro-economic fluctuations and changes in structural factors. In section five, we discuss the changing patterns in the financing of the life-cycle deficit. Finally, in section six, we present concluding remarks.

2 National Transfer Accounts – A Methodology to Introduce Age into National Accounts

National Transfers Accounts (NTA) is a methodology and a framework for collecting, combining and analyzing cross-sections of intergenerational and life cycle reallocation variables that is consistent with the System of National Accounts (Mason, Lee, Tung, Lai and Miller 2009). The essence of NTA is to estimate private as well as public consumption and labor income by age, and to calculate the difference of the two, called life-cycle deficit (LCD). Using the data on age-specific information of public and private asset income savings and transfers, the sources of financing the life cycle deficit can be derived. If necessary, the variables are adjusted so that corresponding economy-wide aggregates in the National Accounts are satisfied.

The system of National Accounts (SNA) provides information on aggregate economic resources but not on distribution among generations or age-groups. NTA methodology uses micro-economic data to estimate age distributions of income and consumption. SNA data is used as aggregate control variables into which the National Transfer (flow) Accounts are calibrated (Mason, Lee, Tung, Lai and Miller 2009). The aggregate of estimated age profiles and the per capita age profiles are estimated from individual or household surveys and administrative records. The age profiles are adjusted proportionately to match aggregate totals reported in SNA. Details of these procedures are described in Mason et al. (2009).

In this section, we discuss how the aggregate control variables for NTA are constructed from National Accounts data and what data sources we are using in compiling age distributions for these variables from Household Expenditure Surveys (HES), Income Distribution Statistics (IDS) and administrative sources for public consumption.

2.1 The Framework and National Account Aggregates

The aggregates in the SNA flow account are the total values of factor incomes generated and their use when producing final goods and services in one calendar year by a country's residents, including net factor and transfer incomes from

abroad. In tracking income and its use, National Accounts measures the flows of five main institutions in the economy: households, non-profit institutions serving households, the government, financial institutions, and non-financial enterprises, corporate and quasi-corporate.

NTA measures all the inflows and outflows at the household and finally at the individual level. Total inflows and outflows are equal to the total flows in the economy. NTA classifies two main sectors: the private and the public. However, the individual is the fundamental analytic unit in NTA. All transactions are treated as flowing to and from individuals. The government and families only mediate these transactions.

Both SNA and NTA share the same basic economic concepts: the production in the economy is equal to total factor income, which further equals to total spending. NTA measures national, not domestic, values. Net national disposable income equals spending:

$$Y_l + Y_a + T_g + T_f = C_g + C_f + S_g + S_f$$
$$= \text{net national disposable income}$$

where labor income (Y_l) includes also net compensation of employees from the rest of the world, and asset income (Y_a) includes also property and entrepreneurial income from the rest of the world. Net public transfers (T_g) and net private transfers (T_f) are net current transfers from the rest of the world. Consumption (C) includes both public (*g*) and private (*f*) consumption as well as net savings (*S*). Aggregate net transfers, aggregate consumption and aggregate net savings in NTA are directly drawn from SNA. Two remaining aggregate variables, labor and asset income, are obtained after adjusting some SNA variables. The definitions and adjustments are discussed in more detail, e. g., by Lee, Lee and Mason (2008).

2.2 The Framework by Age

In NTA, the national aggregates in Equation (1) are allocated by age. By rearranging the terms, taking age into account and writing transfers in terms of gross flows, we can express the main equation of a NTA flow account by age:

$$\underbrace{c_f(x) + c_g(x) - y_1(x)}_{\text{Lifecycle deficit}} =$$

$$\underbrace{\underbrace{y_{a,f}(x) - s_f(x) + y_{a,g}(x) - s_g(x)}_{\text{Asset reallocations}} + \underbrace{\underbrace{\tau_g^+(x) - \tau_g^-(x)}_{\text{Net public transfers}} + \underbrace{\tau_f^+(x) - \tau_f^-(x)}_{\text{Net private transfers}}}_{\text{Net transfers}}}_{\text{Age reallocations}}$$

In Equation (2), small case letters refer to age-specific components of the aggregate variables in Equation (1). Age at the end of a calendar year is denoted with x, c(x) is consumption (private and public) at age x, $y_l(x)$ is labor income, $y_{a,g}(x)$ and $y_{a,f}(x)$ are net capital incomes, $s_g(x)$ and $s_f(x)$ are net savings in public and private sector respectively, $\tau_g^+(x)$ is received and $\tau_g^-(x)$ given public transfers, $\tau_f^+(x)$ and $\tau_f^-(x)$ are corresponding private transfer variables.

The difference between consumption and production by age, the life cycle deficit (LCD) , must be matched by age reallocations consisting of asset reallocations and net transfers. The right side of Equation (2) describes where the financing of LCD comes from. Asset reallocations are capital income[1] less saving. Both capital income and saving can be private or public. Saving may take the form of financial instruments or physical capital. Transfers are further divided into net public transfers, consisting of monetary and benefit-in-kind transfers, and net private transfers, consisting of inter- and intra-household transfers.

Taking age into account makes explicit many flows that cancel each other out when aggregated. For example, net private transfers to the rest of the world may be nearly zero, but it only means that every received transfer corresponds to an equal given transfer among the residents of Finland.

In NTA, all transactions are treated as flowing from one individual to another and classified by the age of these individuals. When treating age groups or cohorts of the economy, the required information is inflows and outflows by age or by age group. The measurement of all variables needed in Equation (2) is not possible directly at the individual level. For some variables, there may exist total population statistics or registers with age as a categorical variable. Several conventions have

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[1] Capital income refers here to all net returns on private physical and net financial investments as well as on public net financial wealth. The return on private physical investments may materialize in the form of services based on capital (e.g., housing).

been adopted to allocate flows that can only be measured at the household, firm or public-sector level in order to allocate them to individuals or age groups.

The economic life cycle by age, as described in Equation (2), reflects many behavioral and non-behavioral factors that influence the relationship between age, consumption and labor income. Average labor income at each age depends on hours worked, labor force participation, the age profile of wages and the many cultural, political, social, and economic factors that influence each of these elements of labor income. In a similar fashion, average consumption at each age is influenced by many forces such as historical events, preferences, prices (including interest rates), and political systems.

At the aggregate level, the economic life cycle also reflects the population age structure. In young populations, the aggregate economic life cycle is dominated by a large life-cycle deficit and economic resource needs of the young. Over the course of the demographic transition, the population's age and the life-cycle deficit of the old become increasingly important.

2.3 Macro Controls for NTAs

In this sub-section, we discuss briefly the construction of each component in Equation (1) that we use in calibrating the age-specific components of the corresponding variables. Table 1 displays the macro aggregates of generating and financing the life-cycle deficit for selected years in the period under study. These coincide with the years for which we have complete sets of micro-economic data for constructing the private accounts discussed in more detail in Section 2.5. The macro aggregates of NTA do not have a straightforward correspondence in National Accounts. Furthermore, NTA recognizes only the private and the public sectors. In this section, we briefly discuss the way NTA aggregates are derived from National Accounts.

Table 1. Macro controls for Finnish NTAs in selected years (MEUR)

	1990	1995	2001	2006
Life-cycle deficit	1,937	10,404	10,479	15,930
Consumption	56,324	62,542	84,257	105,365
private consumption	36,891	40,689	55,782	68,952
public consumption	19,433	21,853	28,475	36,413
Labor income	-54,387	-52,138	-73,777	-89,435
Age reallocation	1,937	10,404	10,479	15,930
Asset-based reallocation	2,547	10,600	11,603	17,661
Private asset-based reallocation	6,411	7,437	17,875	20,503
asset income, net	5,778	15,453	31,139	35,457
less: savings	-633	8,016	13,263	14,955
Public asset-based reallocation	-3,864	3,163	-6,272	-2,842
asset income, net	2,309	-34	1,393	3,930
less: savings	6,173	-3,197	7,665	6,772
Transfers	-610	-196	-1,124	-1,731
Private transfers (net)	746	1,039	1,665	2,187
interhousehold transfer, inflow	5,795	5,635	7,794	8,818
interhousehold transfer, outflow	5,049	4,596	6,129	6,631
Public transfer (net)	-1,356	-1,235	-2,789	-3,918
public transfer, inflow	41,308	53,583	68,843	79,327
public transfer, outflow	42,664	54,818	71,632	83,245

Consumption Aggregate Controls

Consumption, aggregated across all ages, is the total value of final goods and services consumed in one calendar year by a country's residents. Labor income, aggregate across all ages, is equal to an estimate of the total value of production attributable to the labor of a country's residents. These values are based on National Income and Product Accounts in NTA.

The macro controls for consumption is equal to "Final consumption expenditure", consisting of public and private components. Private consumption is equal to "Household final consumption expenditure" plus " Non Profit Institutions Serving Households (NPISH) final consumption expenditure", with an exception in consumption of durable goods. Consumption of durables is measured as depreciation of the stock in consumer durables, which is estimated from the Household wealth

survey. Current expenditures in durables exceeding depreciation are defined as savings and subtracted from the aggregate final household expenditures.

Public consumption is equal to "General government final consumption expenditure". The macro controls for public consumption of health care, education, social services, and other public consumption are based on the classification of public consumption by purpose.

In NTA, the consumption is measured as pre-tax consumption, and hence, an estimate of indirect taxes on consumption should be subtracted. Mason et al. (2009) discuss taxes and their incidence in more detail.

Labor Income Macro Controls

Total labor income is estimated from the System of National Accounts. Labor income consists of three components: compensation of employees, labor's share of mixed income, and labor's share of taxes on production and on imports (indirect taxes), less business subsidies. The compensation of employees consists of wages and salaries and employers' social contributions, including labor income of residents who are working abroad.

Labor's share of mixed income is not reported in national product and income accounts (NIPA) and must be estimated. In the absence of information to the contrary, we assume that two-thirds of the mixed household income is labor income. The aggregate control mixed income includes the operating surplus (imputed rent) of households, which is subtracted from the mixed income before labor's share is estimated.

Some of the production and import taxes are borne by employees in the form of reduced compensation, some by owners of assets in the form of reduced asset income, and some by consumers in the form of higher prices. In NTA, the labor income is measured as pre-tax labor income. Hence, total labor income should be increased by net taxes on labor, i.e., an estimate of the share of production and import taxes less subsidies borne by labor (see Mason et al. [2009] for the incidence of indirect taxes).

Public Reallocations – Transfers

Administrative records and household surveys are used for constructing age profiles of public consumption and, hence, in-kind public transfer inflows. Cash transfers

are estimated using household surveys with information about the amount of public cash transfers and the characteristics of the recipients.

Transfer outflows must equal current transfer inflows. Public Transfer Outflows are by definition equal to Public Transfer Inflows and also to Taxes and Grants plus the Transfer Surplus(+)/Deficit(-). In the transfer deficit case, taxes and grants are less than public transfer outflows.

Transfer outflows in NTA are classified on the basis of the economic resource, transaction, or activity being taxed. Eight transfer outflow sources (tax sources) are distinguished in NTA: labor income, asset income, consumption, asset holding, asset transactions, other sources, and the rest of the world.

In constructing Finnish NTAs, public revenues, except payroll taxes, are pooled into a general fund used to support public programs other than earnings-related social security. In this case, the relative age profiles of public transfer outflows will be the same for all functions, but they will vary in their magnitude. Earmarked sources of funding have been subdivided to finance pension and other social security programs.

The age profile of any public transfer outflows depends on the tax incidence, i.e. the age of the individual who bears the tax. The profile of the public transfer outflow will depend on the age distribution of the economic resource being taxed and the age profile of the tax rate.

Public Asset-based Reallocations

Public asset-based reallocations summarize the inflows to and outflows from age groups that are a consequence of public asset transactions. Asset-based reallocations consist of two distinct flows: public asset income (or loss) and public saving. Public asset income (if positive) is an inflow for taxpayers while public saving (if positive) is an outflow for taxpayers. Thus, public asset-based re-allocations are calculated as public asset income less public saving.

In NTA, public asset-based flows are assigned to age groups in proportion to each age group's general (non-earmarked) tax payments. The basis for this approach is relatively clear for public asset-based outflows: interest expense and the acquisition of public assets. Public interest expense is paid by taxpayers and allocated across age groups, using the same procedures followed for the allocation of public transfer outflows. Likewise, the acquisition of public assets is financed

from taxes that are assigned to age groups, using the same procedures as when assigning public transfer outflows.

The conceptual foundation for treating public asset income and public borrowing in this way relies on a counterfactual. In the absence of public asset income or public borrowing, general tax revenues would have been greater (given public spending). Thus, the asset-based inflow is allocated to age groups in proportion to the general taxes that they pay. Note that the asset-based inflow is balanced in the accounts by an asset-based outflow or a public transfer outflow. For example, the inflow public asset income may lead to an outflow public saving. Or, the inflow public borrowing may lead to an outflow – to a deficit in public transfer outflows.

Public Asset-based Reallocations – Asset Income

Public Asset Income is equivalent to the net operating surplus plus property income of the Government. Public capital used in the production of public goods and services does not generate income in the SNA. The reason is that public goods and services are not sold, and hence, they are valued at the cost of production. Consequently, there is no profit and no net operating surplus generated. Property income consists of five components: Interest, distributed income of corporations, reinvested earnings on direct foreign investment, property income attributed to insurance policy holders and rent. As already explained, public asset income is allocated to age groups in proportion to the age profile of taxes.

Public Asset-based Reallocations – Savings

Public saving in SNA is reported in the Use of disposable income account as net saving by the general government. The age profile of public saving is equal to the age profile of general taxes, or earmarked taxes in the case of quasi-independent programs.

Private Reallocation – Transfers

Inter-household transfers consist of direct transfers between households, transfers mediated by NPISHs, and transfers to and from the rest of the world (ROW). Inflows are current economic transfers received by resident households and ROW. Outflows are donations and gifts given to households, to NPISHs and to the ROW.

Inter-household transfer values are based on survey estimates of private transfers received and given.

In general, inflow estimates are inconsistent with outflow estimates. We chose to scale the inflow level to the corresponding outflow value. In practice, these form a relatively small component in the overall flows of age-related transfers. Intra-household transfers by age are estimated indirectly as the balancing item between private consumption and disposable income (labor income plus net private transfers plus public cash transfer inflows less taxes paid). When disposable income at young ages is insufficient to fund consumption, this is covered by intra-household transfers. If disposable income by age is more than sufficient to fund age-specific consumption, the residual is saved.

Private Asset-based Reallocation

The existence of assets provides an important mechanism for shifting economic resources across age. Asset-based reallocations are the composite of two flows: asset income and saving. In NTA, two kinds of asset income are distinguished: capital income and property income.

Capital income is the return to capital held by corporations and households. Property income arise because of the existence of financial assets, e.g., debt instruments and corporate shares. Important forms of property income are interest, dividend and rent.

Private asset income consists of capital income plus net property income for households, corporations, and non-profit institutions serving households (NPISHs), all sectors distinguished in national income accounts (financial and non-financial corporations are also often distinguished). Capital income is the return to private sector capital and includes the operating surplus of corporations, public enterprise, and NPISHs, the operating surplus of the household sector, and the portion of mixed income of the household sector that is estimated to be a return to capital. NTA estimates are based on the assumption that one third of mixed income is a return to capital and two thirds are a return to labor.

The methods for allocating asset income by age require a comprehensive income and expenditure survey with the following information: property income (interest income, dividends, and rent), mixed income (income from a business,

farm, self-employment income, etc.), imputed rent from owner-occupied housing, and interest expenses.

Private saving is the final balancing item in National Transfer Accounts. At each age, reallocations must equal the life-cycle deficit. Age reallocations, in turn, must equal net transfers plus public asset-based reallocations plus private asset-based reallocations. Private asset-based reallocations are equal to private asset income less private saving:

Private saving = Life-cycle deficit – transfers – public asset-based reallocations – private asset income.

This identity holds at each age. Total private saving calculated in this way must equal net private saving as calculated in National Accounts.

2.4 Data for the Life-cycle Deficit and Its Financing by Age, 1990–2006

We have used two separate series of micro-economic survey datasets to estimate age-specific private consumption, earnings, capital income and public money transfers. The first dataset series is Household Budget Surveys (HSB) for 1990, 1994–1996 (denoted later 1995), 2001 and 2006. The other one consists of large samples of annual Income Distribution Statistics (IDS). Both data are collected using several administrative registers and personal interviews. Consumption in the HSB has been collected by households' consumption accounts. Asset income and public money transfers include both positive and negative flows, or as expressed in NTA terms, both inflows and outflows. The IDS datasets include some survey data on inter-households' money transfer inflows. The HSB data also includes public individual consumption. However, for most of the years, public consumption has been estimated by using administrative data.

Data on the cross-section of earnings and public received and paid money transfers is available annually. Consumption data, for both private and publicly provided goods, is available only for selected years. The missing years have been interpolated. Please see the appendix for a more detailed description of this data).

Private Consumption

We have used series of Statistics Finland's cross-sectional Household Budget Surveys

for 1990, 1995, 2001 and 2006 to allocate private consumption to different cohorts. The statistics contain data describing households' use of money for diverse purposes. Consumption expenditure is classified according to the international COICOP-HBS classification. The main consumption groups are: 1) food, 2) beverages and tobacco, 3) clothing and footwear, 4) housing and energy, 5) furnishings and household maintenance, 6) health, 7) transport, 8) communications, 9) recreation and culture, 10) education, 11) hotels, restaurants and cafes and 12) miscellaneous goods and services. There is also plenty of information about households' characteristics and their possession of durable goods, dwellings, liabilities and income.

Public Consumption

The main age-related public consumption items, i.e., items of individual public consumption, are education, health and social services. The latter include children's daycare and long-term care of the elderly or the handicapped. Data on health and social services, including health insurance refunds for use of private health services in 1990–2004, was supplied by the Ministry of Health and Social Affairs (2010). The public service data is based on enrolment by age and unit production costs of different types of services. Data on health care services by age in 2006 stem from the Household Budget Survey, and the figure for 2005 is an average of observations made in 2004 and 2006. Age-profiles of social services in 2005 and 2006 are equal to the profile in 2004, and the profiles are adjusted so that the aggregates are fulfilled when the annual change in age structure is also taken into account.

Public education service consumption by age is reported in Household Budget Surveys of 1990 and 2006. In addition, we have included data from the years 1993 (Parkkinen, Mäki and Vanne 1996) and 2004 (Vaittinen and Vanne 2006). These papers include more information on the sources and transformations of the data. Use of public education services by age is based on enrolment data for different education levels by age and the respective unit production costs. The data for 2004 is reported by the education authorities in 2005.

Disposable Income

Statistics describe income of households in detail: wage and salary income, entrepreneurial income of households, capital income and the income transfers

received and paid by households. Disposable income[2], which is the key concept in these statistics, is formed from these income components. Data is also produced on the debts, housing, housing expenses, daycare charges and other matters that have a bearing on the subsistence of households.

Table A2 presents components of disposable income. Income formation can be described as follows: factor income consists of labour income, entrepreneurial income and property income. Entrepreneurial income is partly taxed as capital income and partly as earned income. In NTA, one third of entrepreneurial income is assumed to include capital income. Capital income consists of interest income and dividends, imputed net rents of owner-occupied dwellings and other capital income (e.g. rental income and capital gains). Imputed net rents of owner-occupied dwellings in IDS are part of property income. In SNA, the rents are part of entrepreneurial income.

When we add transfers received by household to factor income we get gross income. In this study, transfers received have been classified into seven sub-groups: pensions, income maintenance during illness, family policy transfers, unemployment security, other age-related transfers, other transfers, and inter-households' transfers received. In this age distribution context, child benefits and home care subsidies are allocated to the children.

When reducing taxes and tax-like charges from gross income, we receive disposable income. This type of income consists of state taxes (from earned and capital income), municipal taxes, wealth and property taxes, social security and employment pension contributions, and inter-household transfers paid. The dual income tax system was introduced in 1993. It combines progressive taxation on earned income with a flat rate of tax on capital income. Also a full imputation system of corporation taxation has been applied (avoir fiscal), which means that double taxation of dividends was eliminated. Many untaxed income components e.g., capital gains, also became subject to taxation.

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[2]   The concept of 'income' has been harmonized as far as it has been possible. One example of this is the way in which taxes paid by corporations has been managed in IDS in 1993–2004. Since, in an avoir fiscal system, the taxes from corporate income are taken into account in shareholders' taxes on dividends, they are included in IDS as taxes and capital income by shareholders. This procedure includes an assumption from tax incidence. We have eliminated this assumption to receive more comparable data after 2004.

3 Demographic and Economic Landscape

In this section, we first describe the long-term demographic development in Finland compared to the rest of the world. As the essential focus in NTA lies in consumption related to labor income, one of the demographic key factors is the proportion of the working-age population.

After demographics, we look at institutions, policy changes, and general macro-economic developments which, together with the changes in population structure, have shaped the intergenerational allocation of resources in Finland, especially since 1990. We briefly describe the institutional setup of intergenerational transfers and describe the most important policy reforms that have taken place during the review period. We continue by looking at the demographic development and describing the macro-economic environment that has conditioned the generational implication of these developments.

Finally, we examine the aggregates of consumption and earnings and the financing components of their difference since 1975.

Finland experienced a severe recession at the beginning of the 1990's, which has had profound and long-lasting effects on the economy. GDP declined by approximately 13 percent, and it took five years to reach the pre-crisis level of output. To a great extent, recovery in the output was due to economic restructuring and productivity growth. In absolute terms, the employment did not recover to the level of 1990 until 2008. Relative to the working age population, employment rates have never recovered to the pre-recession levels. These general factors in the economic environment should be kept in mind while interpreting changes in the patterns of age-related production and consumption. Several changes in economic policies are also relevant in this respect.

3.1 Demographic Development

The changing population age distributions are commonly described through dependency ratios, where the economically non-active part of the population is related to the economically active one. Figure 1 shows statistics and projections of the proportion of the labor force (age group 20–64 years) of the total population in Finland, compared with both other advanced as well as less developed countries.

This proportion is thought to approximate the ratio of employed persons to the total population. True ratios are lower because of unemployment and non-participation in the labor markets. However, it can be expected that changes in the true ratios are more or less the same as in the potential ratios.

The rationale underlying these age-supported ratios is that they reflect the so-called first demographic dividend (Lee and Mason 2007). The first demographic dividend materializes in the form of higher per capita consumption opportunities due to the rise of the share of the working-age population during a demographic transition based on decreased fertility.

Figure 1. *The labor force (aged 20–64) as a percentage share of the population in Finland, in other advanced countries and in developing countries, 1950–2050*
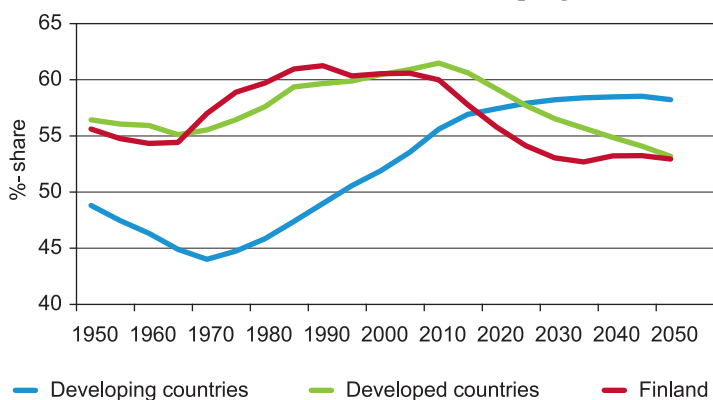
Source: UN Population Data and Projection Revision 2005

The advanced countries have experienced an almost forty-year period of growth in the proportion of the labor force, a period that is now reaching its end. In Finland, the age support ratio already peaked around 1990, after which it began to deteriorate moderately. This deterioration is expected to continue in a pronounced manner after 2010.

In other advanced countries, the deterioration in age support ratio will take place somewhat later and also in a smoother manner than in Finland. On the other hand, in developing countries, the ratio of the working-age population is expected to increase until 2030.

The aggregate results to be presented below with 1975 as the starting year reflect a two-phase period. The first 14 years was a period of rise and the latter 20 years a period of moderate deterioration or no change of the age support ratio. The age-specific results to be presented below describe the latter period only.

The comparisons in Figure 1 are made using 5-year age groups from the UN Population data. In Figure 2, we will have a closer look at the demographic transition in Finland, comparing age groups of the population in 1990 and 2006, which are the starting and ending years in our study of the life-cycle deficit and its components.

The total population has increased during this period by approximately 5.5 percent. The population aged 0–19 years has decreased in absolute terms, and more than two thirds of the growth has been caused by an increasing share of the retired population. Although the number of people of working age has increased slightly, the dependency ratio has deteriorated. As a consequence of the demographic shift, the average age of the population has increased during the 17-year review period from 37.0 to 40.2 years.

Figure 2. *Changes in the age structure in Finland, 1990–2006*
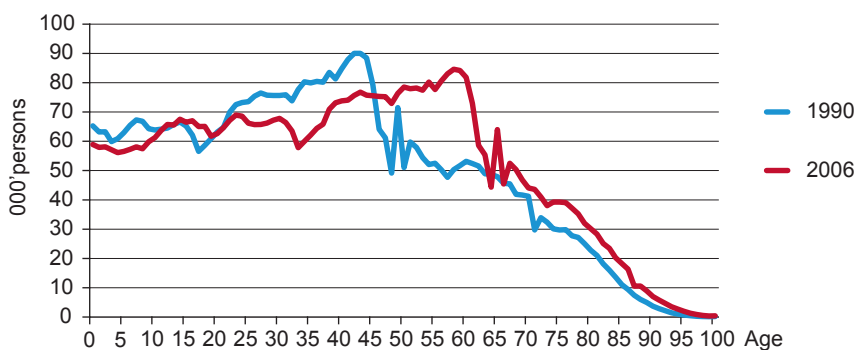
Source: Statistics Finland

In Figure 3, the age-based support ratio statistics from 1975 to 2009 is shown again. The ratio deteriorated slightly between 1989 and 1996, when the small generations born around 1970 entered the working age. During the next 10 years, the indicator shows almost a constant value. However, there is a sharp decline to be expected in the 2010s, as was shown in Figure 1.

Figure 3. *Population share of working-aged and employed persons, 1975–2007*
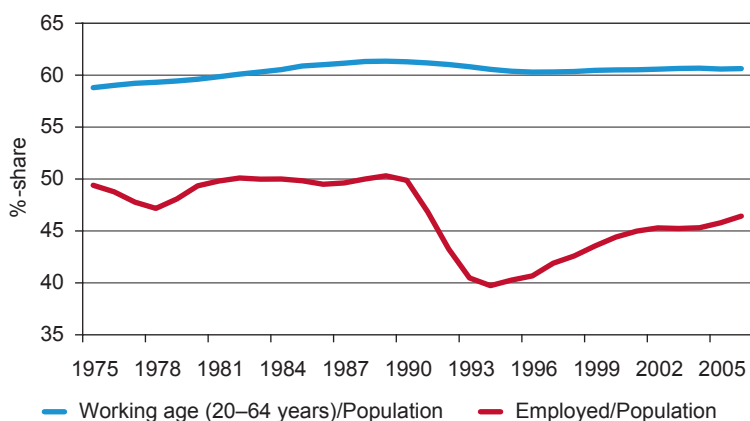
Source: Statistics Finland

The other curve in Figure 3 shows the share of employed persons of the total population. This indicator includes the first-mentioned indicator as one component. Its other component is the employment rate among the working-age population (not shown). It is evident that the employment effect dominates the age-dependency effect during the period. The time pattern of the share of employed persons is also clear. Until 1990, the share was approximately 50 per cent, with the exception of a slow growth effect in the late 1970s. During the recession in the early 1990s, the value of the indicator dropped to 40 per cent, after which it has increased monotonously until 2007, but has failed to reach the value of 50 per cent again. Due to the present recession and the future population age-structure effect, it is unlikely to ever reach its former level.

3.2 Institutions

Households or families, the financial market or investing directly in physical capital, and the public sector are institutions that intermediate transfers between generations or along the life cycle. In Finland, the public sector has a substantial role in the intergenerational distribution. About two thirds of public expenditure can be regarded as age-related spending, which is roughly 30 per cent of the GDP. Education and health care are predominantly provided by the public sector. Responsibility for the provision of most of these services rests with municipalities.

They have the authority to collect taxes to fund these services, but they also receive state subsidies to enable them to arrange the services they are required to provide.

In the Finnish educational system, there are no tuition fees for full-time students. Both the primary and the secondary education sectors are financed by the municipalities. All the Finnish universities, on the other hand, were owned by the state during the period under review. At the beginning of 2010, our universities were privatized, but they continue to be mainly state financed.

Extensive public health care services are offered to all residents. The responsibility for the provision of primary health services rests with the municipalities. Private-sector services complement those provided publicly. Expenditures for these private health care services are partly reimbursed by the compulsory and universal National Health Insurance run by the Social Insurance Institution. The health insurance is a compulsory, universal coverage program. All-in-all, public consumption with an age-related dimension amounts to approximately 16 per cent of the GDP.

In Finland, all residents are covered by social security schemes which govern basic pensions (national pensions), sickness, parenthood, and unemployment benefits. In addition, all employed persons are entitled to benefits based on employment, such as earnings-related pensions and benefits for employment-related injuries. The National Health Insurance compensates for income lost due to temporary incapacity for work, in proportion to the applicant's earnings.

3.3 Main Changes in the Economic Policy Environment

Several important economic policy changes have taken place during the period under review. These changes should be taken into consideration when evaluating the life-cycle patterns of consumption and production. Most likely, the financial market liberalization at the end of the 1980s has had an impact on intergenerational resource allocation. It preceded the economic crisis and, as a matter of fact, has been regarded as a significant factor behind the economic disaster Finland was tackling in the 1990s (Bordes, Currie and Söderström 1993).

The dual income tax system was introduced in 1993. The reform aimed at removing the unfavorable tax treatment of capital income by combining a progressive labor income tax with a flat tax rate on capital income. At present, taxable capital income comprises income derived from interest, dividends, capital

gains from financial assets, benefits from voluntary individual pension plans, and profits from personal enterprises. Therefore, this base includes some forms of capital income that were completely untaxed under the previous system. Tax laws applied to voluntary pension plans have been amended on several occasions during the last 15 years. Originally, in 1993, private pension benefits were taxed as earnings income in the dual tax system (see also the Appendix 3)

Capital income was taxed at a rate close to the lowest marginal rate on labor income. Corporate taxation is also harmonized to this rate, with imputation allowing a close integration of the capital and corporate tax systems. Apart from improving the tax treatment of legitimate capital income, this opened an opportunity for high income earners to reclassify labor income as capital income and to take advantage of the lower tax rate if they work in an unlisted corporation that they own.

When Finland became a member of the EU, harmonized commodity taxation and a common currency and monetary policy regime were introduced. Among other things, the closer integration within Europe has meant a less protectionist agricultural policy regime with lower food prices and a more comprehensive and efficient consumption tax system. When becoming a Member State in the EU, Finland introduced value added tax as the main form of taxing overall consumption. At the same time, several commodity-specific excise taxes were reduced or abolished (see Appendix 3).

Commodity taxes in general have contributed a relatively constant 30 per cent share of public revenues, but the composition of tax content has changed because of policy shifts. Immediately before entry into the EU, general consumption taxes accounted for 16 per cent of the total tax revenue, while excise taxes contributed a 14 per cent share. In 2006, VAT stood for 20 per cent of the total tax revenue, but the share of specific taxes had declined to 11 per cent. It is worthwhile to recognize this, since commodities consumed by younger generations are typically more heavily taxed by excise taxes (Vaittinen and Vanne 2008). A shift towards general commodity taxation treats generations in a more neutral fashion.

3.4 Economic Growth and the Aggregate Life-cycle Deficit, 1975–2007

There is a strong link between the real growth rate and labour income formation in an economy. In a time series, one could expect a link between real growth and the aggregate life-cycle deficit. As shown in Table 2, there have been five different periods in the Finnish economy during the period from 1975 to 2007 characterized by average real growth rates. The total annual growth rate is also decomposed to growth in primary inputs, quality of labour force and technological change, as specified in the standard growth accounting framework (e.g. Weil 2009).

Between 1975 and 1989, the only slow-growth years (real growth below 2 per cent/year) were 1976, 1977 and 1981. In 2008, a new slow growth period similar to that in the early 1990s began. Real growth rates were 0.9 and -8.0 per cent in 2008 and 2009, respectively.

Table 2. Average real growth rates of the Finnish economy in 1990–2007 by sub-periods

		Contributions for growth			
Sub-period	Average annual real growth rate	Hours Worked	Labor Quality	Capital	Total Factor Productivity
1975–1989	3.3	0.1	0.5	1.1	1.6
1990–1993	-2.5	-3.8	0.8	0.2	0.3
1994–2000	4.5	1.1	0.2	0.8	2.4
2001–2003	2.0	0.1	0.3	1.3	0.3
2004–2007	4.2	0.8	0.2	1.0	2.2

Source: Statistics Finland

The output growth between 1975 and 1989 was driven mainly by productivity growth and capital deepening. The contribution by labor input was mainly in an improved quality. The labor force increased, but the average number of hours worked per employee declined significantly. The main contribution of labor input was improved quality. The output growth after the 1990s includes two downturns with a severe recession in 1990–1993, which is reflected in a sizeable decline in labor input. During this episode, the composition of employed people changed. This is reflected in the positive quality contribution of labor that is significantly above the average in the 1970s and the 1980s.

During the recovery after the crisis, from 1994 to 2000, the growth in the number of hours worked is a significant contributor to the output growth because employment rates were increasing. The growth was interrupted by the burst of the technology bubble, experienced also in Finland, and reflected among other things by stock market volatility and slow growth. The first years of the new century were also characterized by local financial crises that had ramifications to Finnish economy. This development manifested itself as modest labor contributions and productivity on output growth. After a few years of modest performance, the growth recovered with improving labor markets and a relatively high productivity growth.

Figure 4. *Life-cycle deficit as a percentage of labour income, 1975–2007*
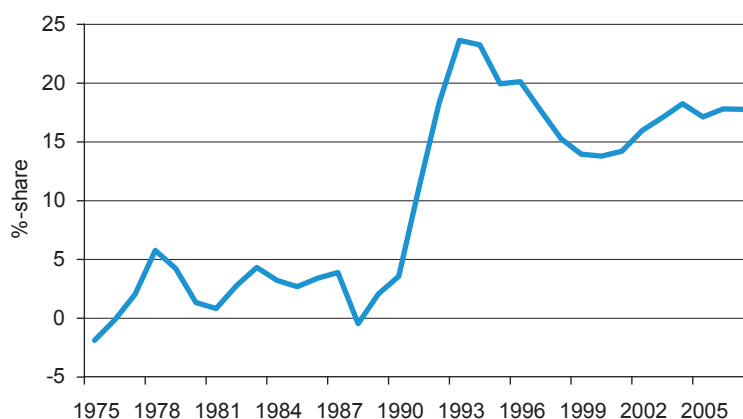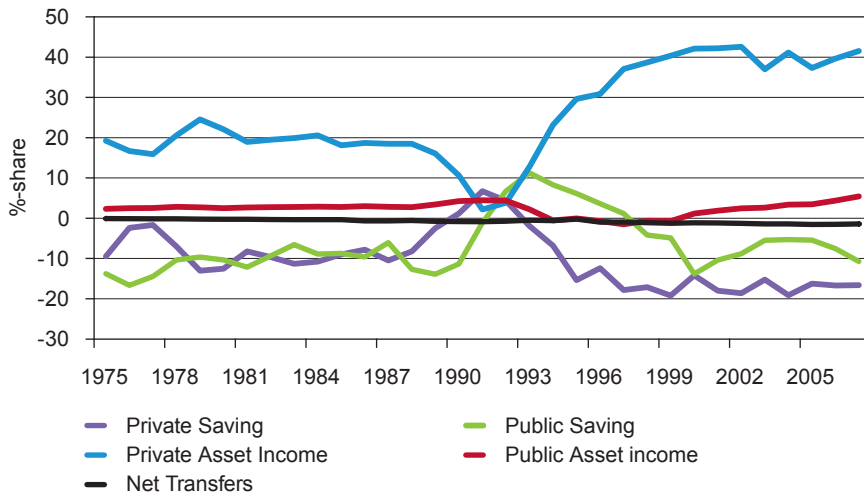

Source: Statistics Finland and our own calculations

Figure 4 presents life-cycle deficit, consumption over wage incomes, over all ages relative to the wage sum from 1975 to 2007. Until 1990, the ratio varied between -2 and 5 per cent of the labour income. The average is 2.4 per cent. As was to be expected from the growth and employment data presented above, the LCD jumped to 23 per cent during the recession after 1990.

After the recession, LCD began to shrink. However, less evident was the fact that the declining trend did not continue in the 2000s. The LCD did not return to its 'initial' values or even close to them, but appeared to fluctuate between 15 and 20 per cent. Based on the employment curve in Figure 3, one could expect a declining trend in the LCD also in the 2000s.

There are several questions raised by the LCD curve. Maybe the most important question is whether the 'new', relatively high LCD level is compatible with sustainability in the future. Another question is whether there has been a change in relative shares of private and public consumption. It is also interesting to examine whether there are similar phenomena in other countries.

Figure 5. *Aggregate asset reallocation components of the financing of the LCD as a percentage of labor income, 1975–2007*

Source: Statistics Finland and our own calculations

In order to begin answering the question concerning sustainability, we need to study whether consumption was partly financed by decumulating physical capital or financial wealth. Taking the future and, in particular, the ageing of the population into account, we need some metrics for the demand of asset reallocation. The main aggregate asset reallocation components of the financing of the LCD are shown in Figure 5.

It turned out that the first phase of the regime change in 1991–1995 was financed by private and especially by public dissaving, but after that, the financing stems from private asset income. Private and public saving has recovered and both have been positive (i.e., negative components of LCD financing), private saving for the last 15 and public saving for the last 10 years. From a sustainability point of view, one of the necessary conditions for sustainability has been fulfilled. Taking into

account the probable future age-structures of the Finnish population, and without further research, it is not evident whether the level is sufficient.

As to the question of relative consumption and its structure, we refer in Figure 6 to the observations about the share of public consumption in relation to the total consumption and labor income share of the total disposable income. Since the early 1990s, public and private consumption have changed at equal paces.

In fact, the ratios mean that consumption in relation to disposable income has been more or less stable since 1975, except during the recession in the 1990s. We also know that the general government in Finland, as well as the private sector, have been mainly in surplus and accumulated financial assets. The economy as a whole has been running a current account surplus for the last ten years. We have to study the 'regime change' observed in the 2000s in more detail, also in aggregate terms.

Figure 6. The labor share of disposable income and public consumption as a percentage of the total consumption, 1975–2007
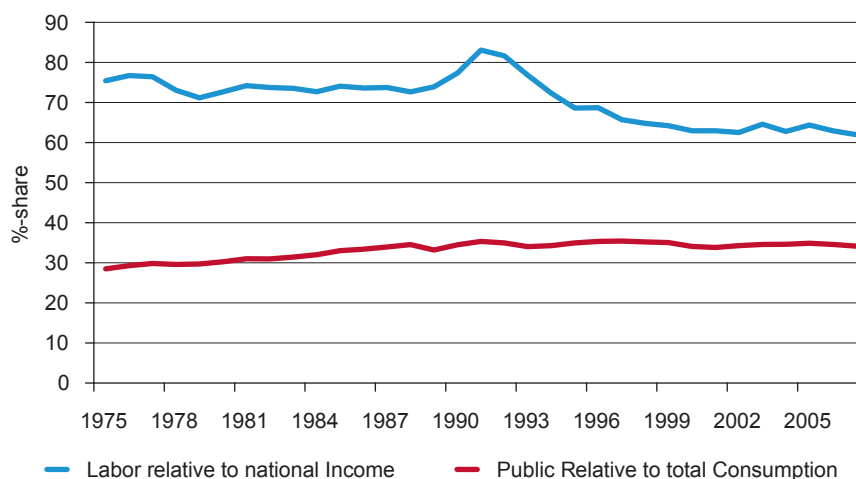
Source: Statistics Finland and our own calculations

The top curve shows that the share of labour income has declined steadily since 1975, except during the recession in the early 1990s. Apparently, there has been a structural shift in the functional distribution of income. There are at least two potential causes for this. First is the dual income tax reform. While some of the increase in capital income might be attributable to a trend toward greater equity-based remuneration of senior executives, particularly in the high-tech sectors, much

of this is due to income shifting. As a consequence of this reform, capital income of the top 1 per cent of income earners increased from 28 per cent to 54 per cent of their total disposable income between 1994 and 2006 (Riihelä 2009).

The other potential factor, at least partly explaining the observed development, is the structural change that has taken place in Finnish industry. This has been facilitated by both the financial market liberalization and trade integration. Kyyrä and Maliranta (2006) have analyzed dynamics of labor shares within and between firms in the Finnish business sector. Using a decomposition method applied in productivity analysis, they show that a significant part of the decline in the labor share stems from the reallocation of resources between firms, while labor shares within firms have remained relatively stable. Thus, factor shares have been changing because capital-intensive firms or firms with a higher rate of return have remained on the markets while labor-intensive firms have disappeared as a result of structural change.

4   Changing Patterns in Age-specific Consumption and Labor Income

In this section, we describe the developments in consumption, earnings and the life-cycle deficit by age, examining more closely three cross-sectional years: 1990, 1993, and 2006. Year 1990 was the last one preceding the deepest post-war economic crisis experienced in Finland. As a matter of fact, growth at that time had already slowed down from the top figures at the end of the 1980s. However, employment relative to population reached record-high levels in 1990. When the crisis broke out in 1991, output began to decline and continued to do so until 1993. Employment reached its lowest level a year later, in 1994, when the output had already began to recover. At the turn of the century, there was a short period of modest growth, but in 2006, output performance recovered to the relatively fast pace characteristic for its post-crisis development.

We begin by looking at the development of private and public per capita consumption and earnings during the period under study. To make cross-sectional comparisons in terms of age patterns more straightforward, we have de-trended all per capita variables by per capita wages for the prime working-age population, i.e. for those aged 30–49 years. We call these normalized variables. This practice eliminates both the influence of general productivity growth and inflation on consumption and earnings patterns.

After discussing the development in per capita variables, we look at the development over the whole age distribution, presenting some summarizing statistics over the whole period and discussing the relative, important changes in the population structure and other factors influencing the life-cycle deficit in Finland.
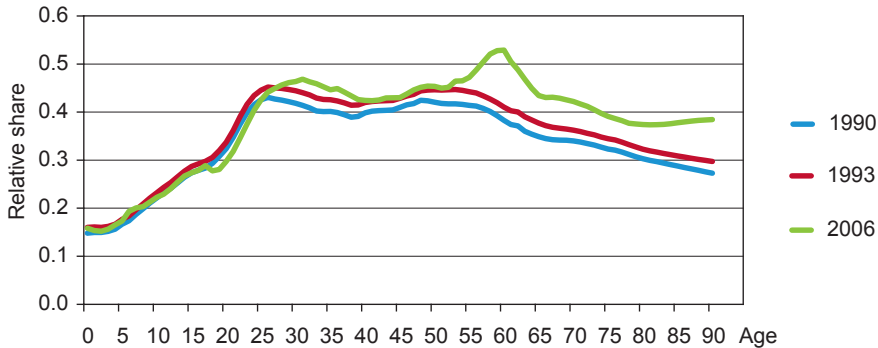
4.1   Consumption

Age profiles of per capita private and public consumption in relation to average prime-age labor income for selected years are presented in Figures 7a and 7b. The steady increase of private consumption at young ages reflects mainly the NTA allocation rule for child consumption (Mason et al., 2009). The active adult-age consumption follows a double-hump pattern, where consumption at early adulthood and near the retirement ages is relatively high compared to mid-age

consumption. During the review period, the mid-age decline in the pattern of per capita consumption has become more manifest. At the same time, the age group that has the lowest consumption in the mid-age range has grown and shifted from the 40- to the 45-year age group during the period under study.

There is a very clear overall shift in per capita consumption by age between 1990 and 1993. The private consumption increase relative to prime-age labor income during this period can be interpreted as consumption smoothing in a time when incomes decline. Consumption smoothing implies that individuals prefer to change their consumption to a lesser degree than their income varies. To make this feasible, people have to change their asset position. They de-cumulate their wealth or accumulate debt to stabilize their consumption relative to unexpected changes in income. This phenomenon is reflected in the aggregate reallocation displayed in Figure 5 in Section 3: both public and private savings decreased and assets de-cumulated in order to absorb the income shock during the crisis in the early 1990s.

The age profiles in public consumption follow the general pattern observed in developed countries (Lee and Mason 2010). Consumption is relatively high at young ages because of day care expenses and educational spending. There is a long age bracket of more or less constant per capita consumption and a rapid rise by age in the very old age groups because of health care and social service expenses. The crisis had similar but less pronounced effects in public age-related consumption. However, in most of the age groups, public consumption returned to its relative level before the crisis. The public consumption in young age groups has shifted from primary school ages to pre-school and young adult age groups.

Figure 7a. *Normalized private cross-sectional per capita consumption in selected years*

Source: Statistic Finland: Household Budget Surveys, own calculations

Figure 7b. *Normalized public cross-sectional per capita consumption in selected years*
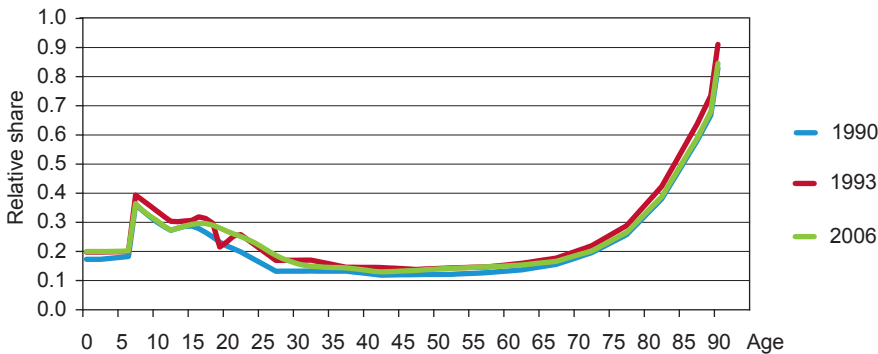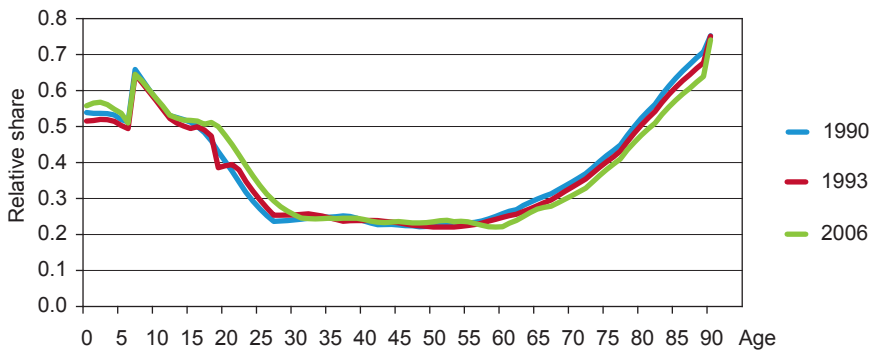

Source: Statistic Finland: Household Budget Surveys, own calculations

On the other hand, private consumption remained at a relatively high level after the economy had recovered and even increased further in some older age brackets. Nevertheless, there is no general and clear restoring effect in the consumption that would bring it back to the shares experienced at the beginning of the 1990s in a time before the income decline, except for in the consumption at the young ages. The consumption of school-aged children has declined to the initial levels, and there is also a modest decline within the consumption of the prime-age population.

At the same time, there is a visible expansion in the consumption of those around the age of 60.

The permanent shift in the wage consumption ratio partly reflects the fact that, as a source of private-sector income, labor earnings have not gained the relative importance that they had before the financial crisis. There are two potentially credible reasons for this. First is the dual income tax reform that was introduced in the early 1990s. Apart from improving the tax treatment of legitimate capital income, it opened an opportunity for high-income earners to reclassify their labor income as capital income in order to be able to take advantage of lower tax rates.

Figure 8. *Age-profiles of the relative share of public consumption in relation to total consumption in selected years*

Source: Statistic Finland: Household Budget Surveys, own calculations

The other reason was a structural change that was launched by the crisis in the 1990s. In this process, capital-intensive firms were gaining markets at the cost of more labor-intensive ones, inducing a structural shift in the distribution of income as discussed earlier in Section 3. The relative merits and empirical significance of these complementary hypotheses are an open issue and a subject for another study.

The age pattern in the relative share of public consumption has changed quite distinctively and probably in a somewhat surprising manner. The relative importance of public consumption has increased at young ages, in particular among those within the age-range of 20 to 27 years. The importance, on the other hand, has shrunk in all age groups above 55 years. In young age groups, this is due to a higher than proportional growth in public consumption. In the older age groups, this is mainly

due to a faster than average growth in private consumption. Only in the very old ages, some of the impact is due to a decline in public consumption.

4.2 Labor Income

Age profiles of normalized per capita labor income for selected years are presented in Figure 9. The most distinct change in the patterns of labor income across age groups from 1990 to 1993 is the considerable decline in labor income among the population below the age of 30 relative to the prime-age average. This was the case mainly because employment rates in those age groups declined most dramatically during that period. On average, employment rates declined more than 20 percentage points in the young age groups while, although significant, the simultaneous decline for the prime-age population was approximately half of that of the young generations.

***Figure 9.*** *Normalized cross-sectional wages per capita in selected years.*
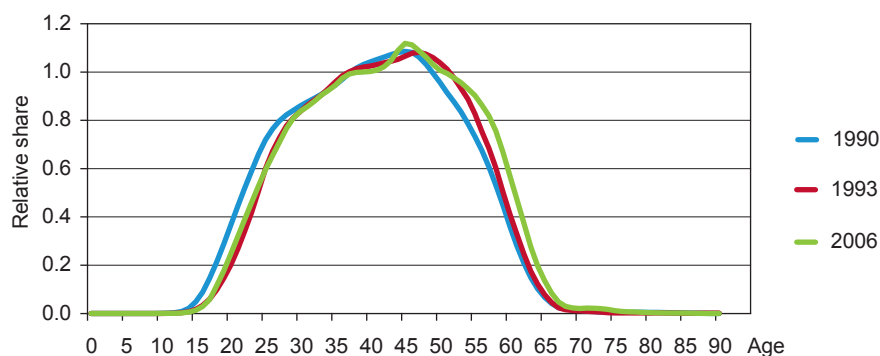
Source: Statistic Finland: Income distribution statistics, own calculations

The very pronounced shift in the highest-earning age group from 45 to 50 years between 1990 and 1993 was due to the fact that the particular cohorts seemed to have done relatively well in terms of employment. As a matter of fact, the large post-war cohorts managed to pass through the crisis with comparatively small injures to their labor market conditions.

Employment rates have never recovered to the levels of the beginning of the 1990s, except for among those above 55 years. In 2006, the average employment rates were below those in the 1990s, except for the rates of the aged population. In all age groups over 55 years, employment has surpassed the activity rates in the

peak year 1990. This is also reflected in the 2006 curves of per capita earnings, which show the relative growth of labor income for those aged 50+.

**Figure 10.** *Employment rates by age groups in selected years*
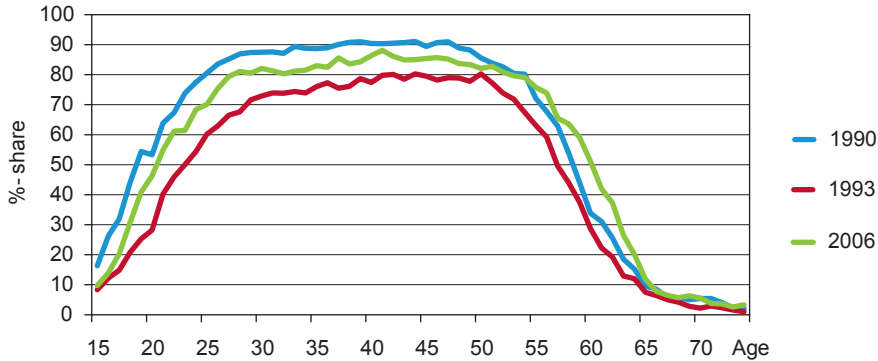
Source: Statistic Finland: Labor force survey

4.3 Outcomes for the Life-cycle Deficit

In Figure 11, we present the per capita age profiles of consumption and labor income in order to compare changes in the different components of the life-cycle deficit in 1990 and 2006. To detrend the figures, both variables have been normalized by the per capita wage earnings in the prime working-age group of those aged 30–49 years. The earnings profile has shifted to the right and the consumption profile upwards.

As a consequence, the cross-over point where people become surplus producers has increased by three years from 23 to 26. At the same time, the cross-over age exiting from the surplus population has remained the same, 59 years.

Figure 11. *Age-profiles of consumption and labor income in 1990 and 2006 in terms of the average labor income of the age-group 30–49*
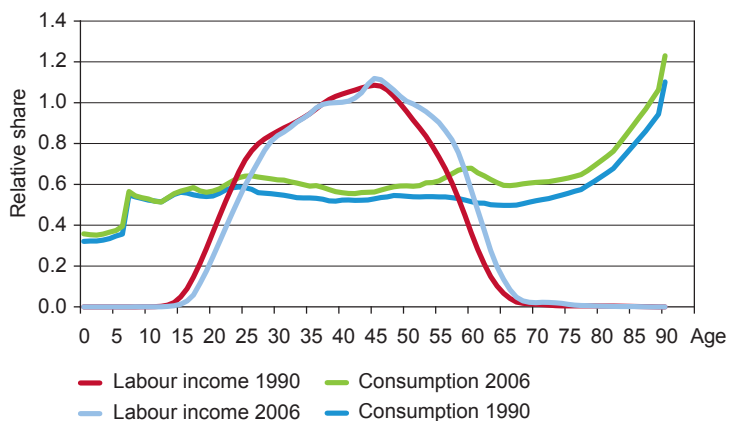
Source: Statistic Finland: Household budget surveys Income distribution statistics, own calculations

Together with the ageing of the population discussed in section 3.1, the rise in consumption levels have implied a larger overall life-cycle deficit, as shown in Figure 4. Combining the developments in population structure together with consumption and earnings patterns in Figure 11, we sum up these effects in Figures 12a to 12c. They display aggregate life-cycle deficits by age in relation to the total labor income in 1990 and 2006 and the decomposition of their change into demographic, consumption and labor market effects. The sum of ratios over all age-groups is equal to the aggregate ratio shown for the same year in Figure 4. In 1990, the deficit was only 4 per cent, but by 2006, it had increased to 18 per cent.

Figure 12a. *The total life-cycle deficit by age relative to labor income in 1990*
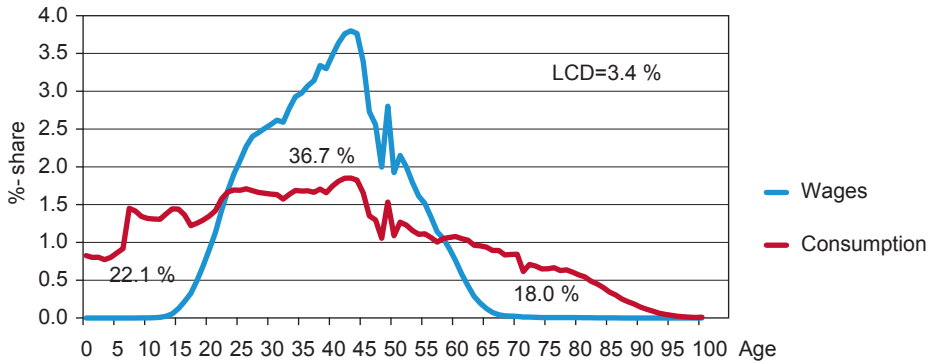
Source: Statistic Finland: Household budget surveys Income distribution statistics, own calculations

Figure 12b. *The total life-cycle deficit by age relative to labor income in 2006*

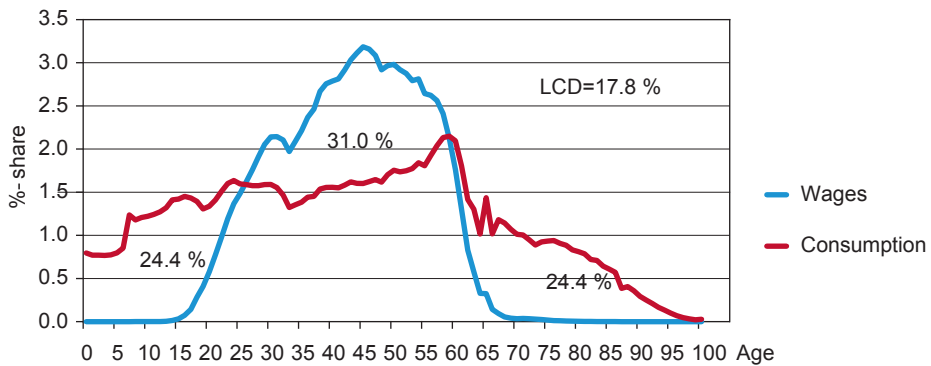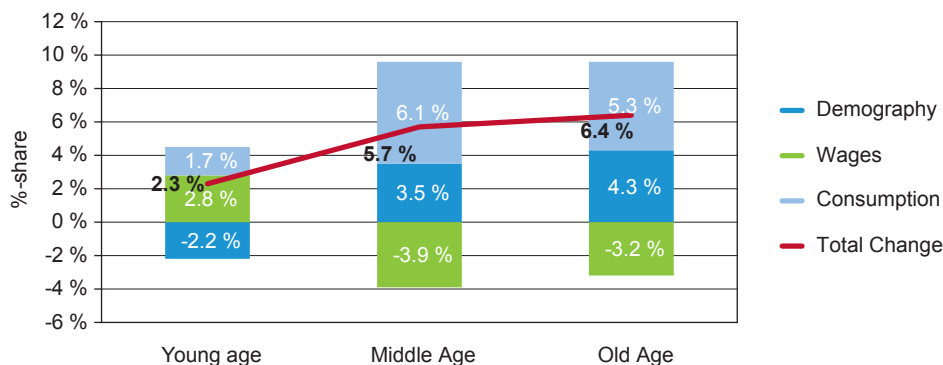Source: Statistic Finland: Household budget surveys Income distribution statistics, own calculations

Figure 12c. *Contributions of consumption, labor markets and demography to the change in the relative LCD*

Source: Statistic Finland: Household budget surveys Income distribution statistics, own calculations

The demographic effect has been obtained by asking what the relative LCD would have been with the 1990 consumption and wage profiles and the 2006 population structure. Similarly, labor market and consumption effects have been derived by looking at the differences between the 1990 and the 2006 profiles. In these comparisons, the average productivity growth has been taken into account by scaling the age-specific per capita values of consumption and wages by average labor productivity growth in 1990.

The total LCD in both years is subdivided into young-age and old-age deficits and a mid-age surplus. In 1990, the mid-age surplus was almost 37 per cent relative to the wage sum. The young-age deficit was 22 per cent, which was four percentage points larger than the old-age deficit. Thus, on average, intergenerational flows went down by age in 1990. In 2006, the surplus generated at the mid-ages diminished almost six percentage points, while the deficits both at young and old ages increased compared to the values in 1990. The old-age deficit has expanded more in relative terms, equalizing the intergenerational resource flows that go up- and downward by age. Altogether, the life-cycle deficit relative to wage sum has increased by 14.4 per cent during our review period.

The change in the life-cycle deficit has been decomposed into three components: demography, consumption and labor markets, as shown in Figure 12c. The demographic effect has been obtained by calculating what the LCD would have been with the 1990 consumption and wage profiles and the 2006 population structure.

Similarly, the labor market and consumption effects have been derived by looking at the differences between the 1990 and the 2006 profiles. In these comparisons, the average productivity growth has been taken into account by scaling the 1990 values with average labor productivity growth and inflation.

The life-cycle deficit with 1990 wage and consumption patterns and the 2006 population structure would have been a total of 5.6 percentage points higher than the observed one. The young-age deficit would have been lower but, at the same time, the produced surplus would have been smaller and the old-age deficit larger because of the population ageing. Demography thus explains approximately two fifths of the overall increase in the life-cycle deficit of 14.4 percentage points.

Labor market income by age in 2006 compared to that in 1990 has improved uniformly in the age-range of 50+, while simultaneously deteriorating within the groups below 30 years. This change in income patterns has increased the young age deficit by 2.8 per cent and decreased the old-age deficit slightly more, by 3.1 per cent. The opposing changes almost neutralize each other.

The growth in per capita wages at surplus-producing ages would have alone implied a 3.8 percentage point increase in the life-cycle surplus. However, this is eliminated by the fact that a significant share of people with relatively high per capita wages at the older end of the age scale has shifted to ages with lower wages. Simultaneously, the number of working-age people, aged 20 to 64 years, has not yet decreased, so the transition from high to low wages at old ages has not been compensated on the labor market by a large enough entry of young generations with relatively low initial wages .

Consumption relative to wages has increased uniformly at all ages. Its importance in changing the life-cycle deficit has been almost as significant in the group generating the old age-deficit as in the group generating a life-cycle surplus. Since the population responsible for the old-age deficit is a significantly smaller group than the prime-age population, the consumption per head among the elderly population in 2006 has increased relative to others since 1990. This has been caused by a growth in private consumption, as discussed in Section 4.1.

Jointly, the labor market and population developments have had a modest net impact on the aggregate life-cycle deficit. As a matter of fact, the demography alone would have had a reducing impact on the child deficit. On the other hand, the delayed entry into the labor market at young ages has had an impact in the opposite

direction and more than neutralized the population effect. The opposite is true regarding the old-age deficit. Improved labor market performance has succeeded to eliminate three quarters of the deficit that ageing alone would have implied. A lengthening of working careers has thus almost eliminated the burden of ageing, given the relative consumption prevailing at the beginning of the 1990s. However, growth in private consumption relative to wages has increased the life cycle-deficit.

Consumption growth has increased the life cycle deficit by a total of 13 percentage points. The contribution of demography has augmented 5.6 percent to the deficit. This implies that, in total, labor market developments have decreased the relative life-cycle deficit by approximately four percentage points.

The changing age patterns of life-cycle transfers are reflected in the cross-over ages of the deficit and surplus ages, and in the length of the life-cycle surplus presented in Figure 13. Reviewing the whole period from 1990 to 2006, the first cross-over age from the child deficit to the surplus ages has increased by three years, from 23 to 26. The length of the life-cycle surplus years was 35 in the pre-crisis year 1990. In 2006, the surplus period was three years shorter, totaling 32 years. While the creation of a surplus ended at the age of 58, both in 1990 and in 2006, it started three years later. This reflects the enduring impact of the crisis in the 1990s on declined employment rates and earnings of the younger age groups relative to prime-age workers.

*Figure 13.* The length of the life-cycle surplus period
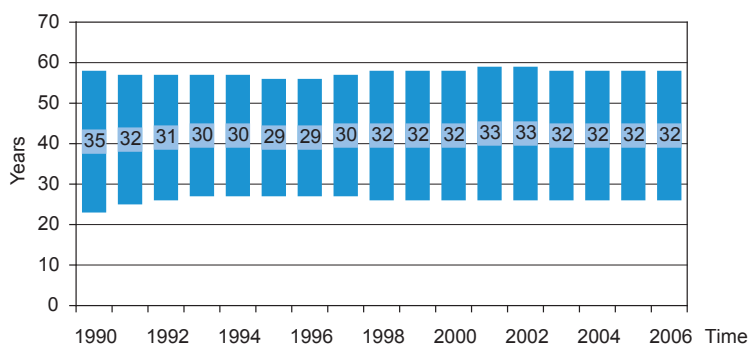
It is somewhat surprising that the cross-over year for the old-age deficit has remained so stable over the entire period under study, despite the fact that both employment rates and normalized per capita earnings have grown relatively favorably in age

groups close to the cross-over age. Furthermore, consumption relative to wages has been increasing significantly near the cross-over years to the old-age deficit. All in all, the older part of the active population has expanded its contribution to the life-cycle surplus.

Life-expectancy has increased during the period under study. Figure 14 shows the remaining life-time at the upper x-axis intersection points of the life-cycle deficits. The variation is due to two reasons: the variation of the intersections and the increase in life expectancy.

From 1990 to 2006, the width of the deficit age bracket has risen from 20.6 years to 23.9 years. This is quite a remarkable change in only 16 years. We can also calculate a money-weighted indicator of width of the deficit age bracket by weighting the age-specific survival probabilities with the corresponding deficits.

Figure 14. *The remaining life-time at the upper intersection points of the life-cycle deficit, 1990–2006*
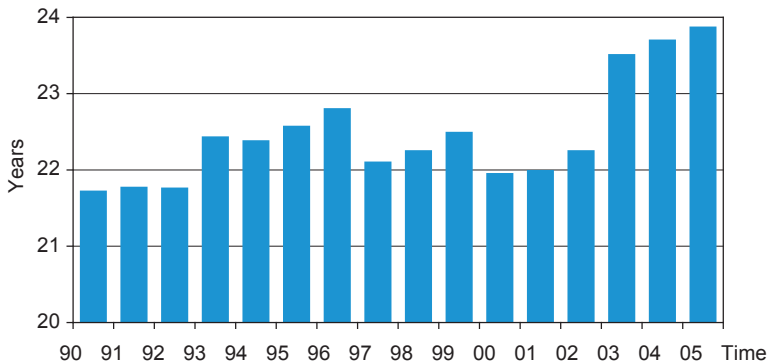
Source: Statistics Finland and our own calculations

Changes in the relative lengths of earnings- and consumption-weighted average ages are indicated through the shifting patterns of intergenerational transfers. If, on average, consumption takes place earlier than earnings, society must transfer resources to younger generations through certain institutions, and vice versa.

So far, in the Finnish society, transfers have been flowing downwards. However, as can be seen in Figure 15, net transfers downwards have been shrinking during most of the period under study. Due to the change in population structure, the average age of the population has increased by 3.2 years, but the earnings-weighted age

has grown by 3.7 years. Similarly, the average age in consumption has increased by 4.4 years between 1990 and 2006.

Figure 15. The average age of the population and consumption- and earnings-weighted ages of the population
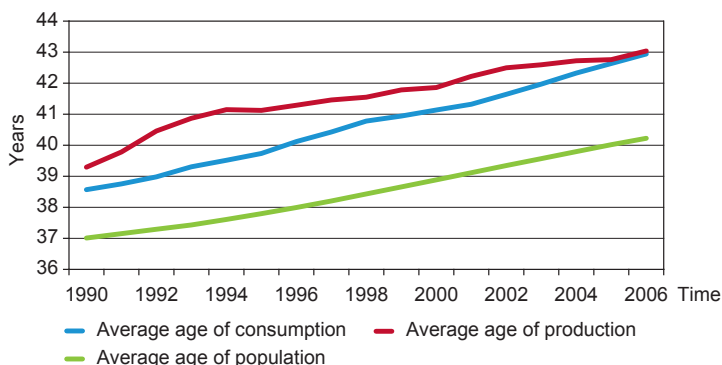
The faster growth in the consumption- and earnings- weighted ages reflects the fact that per capita total consumption is higher at the older end of the age distribution scale, and increasingly so at the oldest end. Furthermore, the highest earnings per capita are paid at the age above the mean age of the population. This, as such, changes the balance of old-age and child transfers without any behavioral or structural changes.

In the early years of our study, the faster growth in the average earnings age manifested in a comparatively good performance of generations around the age of 50, although employment generally deteriorated in those years. In later years, younger generations have regained their position on the labor market in a time when the average age of the working-age population has increased.

The average age in terms of consumption has grown even faster than that in terms of earnings. This is partly because, unlike in most of the age groups, consumption at young ages has reversed back to the pre-crisis level. At the same time, private consumption in ages at the neighborhood of the older cross-over age has also increased significantly.

The growing life-cycle deficit, caused by changing patterns in consumption and wages, has been financed mainly by increased private asset income that has increased its share on disposable income. One can say that the growth in the deficit

relative to the wage sum has been sustainable in the sense that the deficit has not been financed by de-cumulating private or public net wealth.

Figure 16. *Total life-cycle deficits (-) and surpluses (+) relative to the total labor income by broad age groups*
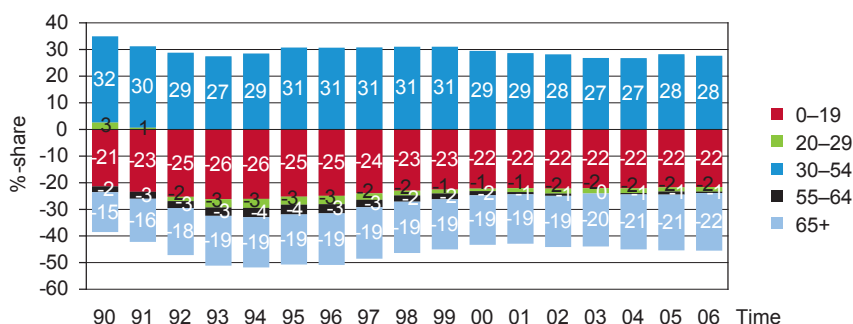
In Figure 16, we take a closer look at the variations of the age pattern of the life-cycle deficits over the entire period 1990–2006. The annual development of deficits and surpluses is presented for five broad age groups. Again, the sum of age-groups for every year is equal to the corresponding aggregate in Figure 4.

The child-age deficit for the population aged 0–19 years increased considerably during the financial crisis in the 1990s but was stabilized almost to the level prior to the recession. The old-age deficit has grown all the time because of the population ageing. In 2006, it reached a level that was approximately seven percentage points higher than that at the beginning of the 1990s.

The contribution of the prime working-age population to the life-cycle surplus has been significantly reduced. Its share relative to the wage sum has declined from 32 to 28 percent. During the whole review period, the largest contributors to the deficit are those aged 0–19 years, although their share has remained nearly constant from the beginning of this century. The old-age deficit for the population aged over 65 years has increased steadily, reflecting the growing number of people entering retirement age. It is also worthwhile to notice that the young workers aged 20–29 have become net receivers of transfers while, before the financial crisis, they were net contributors. This particular shift alone explains a five-percentage-point change in the relative deficit, which is about one third of the total change. The deficit has declined among those close to retirement, i.e. those aged 55–64 years. This is

especially true when looking at their contribution to the overall deficit during the crisis years.

Every age group contributed to the rise of the LCD during the recession in the early 1990s. During the period of the decreasing LCD in the late 1990s, a significant contribution was made by the prime-age working population, i.e. by those aged 30–54 years. The decline in the deficit of the very young was equally large but took place during a slightly longer period. The growth in the prime-age surplus was not durable but reversed its path at the turn of the century.

5   Financing the Life-cycle Deficit by Age

We have already found that, in aggregate terms, private asset-based reallocation, and especially income on private assets, has contributed mainly to the financing of the growth in the life-cycle deficit that has taken place over the period under study. In this section, we consider how the life-cycle deficit is financed or the surplus used by broad age categories in per capita terms. To de-trend the variables, they are normalized by wages per capita in the prime-age working population, as in all other comparisons over time.

We look upon this issue by applying the same categories used in evaluating the time series development of aggregate surpluses and deficits. The financing of LCD is subdivided into four main categories: private asset-based reallocations, public asset-based reallocations, private net transfers, and public net transfers. In this section, we do not present an overall picture on the financing of the life-cycle deficit but discuss selectively those categories in which the most significant changes have taken place.

Figure 17. *Normalized per capita LCD, 1990–2006*
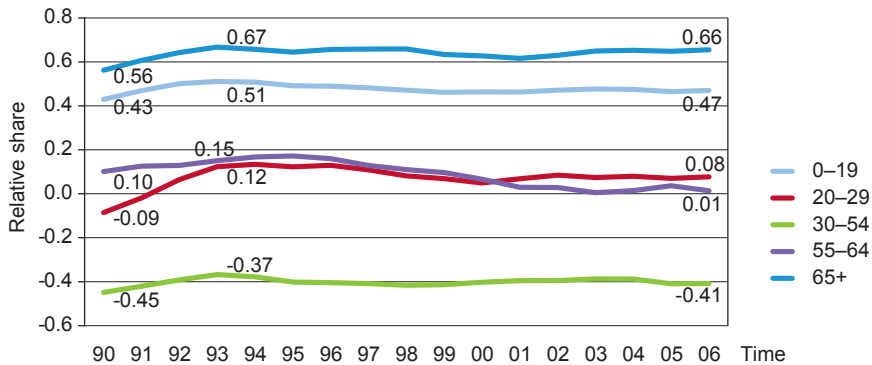
The evolution over the years in most of the age groups has increased the life cycle deficit per head. The only exception to the general tendency is the group of 55–64-year-olds. In this group, the normalized deficit has shrunk from 10 percent to almost zero. Within this broad age-group classification, only the prime-age population of 30–54-year-olds has created a surplus in the final year included in our study. During the period covered by our data, the surplus created by the

adult population declined four percentage points from 45 to 41 per cent. The most significant change in the net life-cycle position, in per capita terms, has been among the young adults, the 20–29-year-olds. Initially, in 1990, they created a surplus that was 9 percent relative to the prime-age wages, but they have ended up creating an equally large deficit in 2006. The overall change in deficit position has been 17 percentage points. The second largest contribution per head to the growth in the deficit stems from the elderly population, i.e. from those over 65 years of age.

In the following section, we focus on private asset-based reallocations and public transfers in particular. In public age reallocations, changes in transfers are of more importance than asset-based reallocations. We have subdivided public transfers into net cash and net in-kind transfers. The received transfers-in-kind by age comprise the age-specific public services that people consume. The age-specific share of the financing of the public transfers-in-kind is the same as the age-specific share of all taxes, excluding social security contributions.

5.1 Contribution of Public Transfers in the Financing of the Life-cycle Deficit

Public transfers are a significant component in the financing of the life-cycle deficit. In 2006, the share of public transfers amounted to 47.5 per cent relative to the gross domestic product (GDP) and 55.8 per cent relative to the net national income (NNI), as shown in Table 3. We use two nominators to describe the size of transfers. GDP is a widely-used conventional measure. Net national income is the key aggregate control variable used by NTA in measuring the intergenerational resource flows[3].

Table 3 presents transfers for the deepest crisis year in 1993, as well as for 1990 and 2006, so-called 'regular' years before and after the crisis. Interestingly enough, transfers relative to the GDP are higher compared to their pre-crisis levels but lower when compared to the net national income. Resources that are reallocated through the public sector in 2006 are three percentage points lower relative to the net national income than they were a year before the crisis began in 1990. The difference in relation to the regular levels is almost entirely explained by the

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[3]   GDP measures the value of commodities produced in one year. The net national income differs from GDP in that it takes into account the cost of maintaining the current capital stock (depreciation) and the net flows of primary incomes to the rest of the world.

diminished importance of depreciation investments that is one component forming the difference between the GDP and the NNI. The current share of transfers is almost twenty percentage points lower than in 1993, when public transfers accounted for a remarkable three quarters of the national income.

Table 3. Public transfers relative to the GDP and the NNI

	1990	1993	2006
Transfers-in-kind relative to GDP	21.7 %	24.2 %	21.8 %
Cash Transfers relative to GDP	24.4 %	31.6 %	25.7 %
All Transfers relative to GDP	46.0 %	55.8 %	47.5 %
Transfers-in-kind relative to NNI	27.6 %	32.3 %	25.6 %
Cash Transfers relative to NNI	31.1 %	42.2 %	30.2 %
All Transfers relative to NNI	58.8 %	74.5 %	55.8 %

The evolution in public cash and in-kind transfers per head are plotted out in Figures 18a and 18b. The largest per capita cash transfers are pensions, which, as a contribution to the financing of the old-age deficit, equal 40 per cent of the prime-age wages. Over time, there has been a counter-cyclical pattern in normalized pensions. The share relative to wages rose in the deepest downturn when wages per capita declined significantly. Since 1994 and until the turn of the century, pensions relative to prime-age wages have been declining. However, in recent years, they have remained relatively stable.

Figure 18a. *Normalized per capita public cash transfers, 1990–2006*
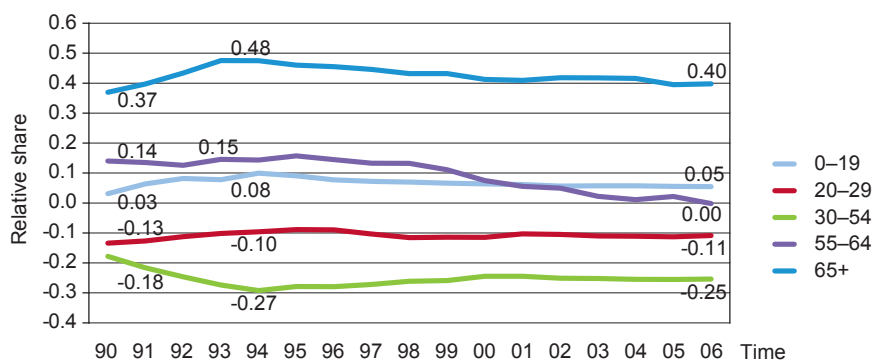
Figure 18b. *Normalized per capita public in-kind transfers, 1990–2006*
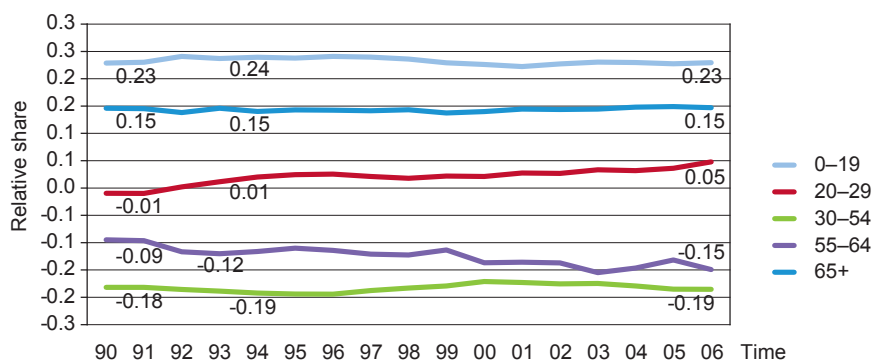
The most significant shift in cash transfers has taken place in net transfers for 55–64-year-olds. In this group, the normalized net transfers have declined 15 percentage points relative to their peak value. This has happened mainly during the last seven years. The same positive pattern in the financing of the life-cycle deficit for this age group appears also in net in-kind transfers. The opposite is true in both cases of public transfers for young adults. In the case of in-kind transfers, they have turned from net contributors to net beneficiaries. Relative to prime-age wages, the change has been six percentage points. In cash transfers, the change is not so pronounced. It is somewhat peculiar that there are no cyclical effects in the in-kind transfers that were visible in cash transfers.

5.2 Contribution of Private Asset-based Re-allocation in the Financing of the Life-cycle Deficit

The use of private assets is an important means in shifting economic resources across ages. Asset-based reallocations are the composite of two flows: asset income and saving. Individuals can finance their life-cycle deficit by acquiring debt or disposing of existing assets. The main motivations for individuals to accumulate wealth include protecting themselves from unforeseen events, leaving a bequest to their children, or smoothing consumption over the life cycle. Asset income at each age reflects previous saving behavior, but it s also a consequence of changes in asset prices and capital transfers, such as bequests.

In the conventional life-cycle saving model, asset-based reallocations are used to shift resources from younger ages to older ages. On the other hand, young adults may generate resources by accumulating debt to finance, for example, their education. Asset reallocation is used as a mean to transfer resources downwards on the age scale.

We have already recognized the increased importance of capital as a source of primary income in discussing the general economic development in the period covered by our study. The relative asset income per capita has followed the general pattern among all the broad age categories. The development has been the most pronounced among the age group of 55–64-year-olds. In the final year of our study, asset incomes in this age group amounted to approximately 40 per cent relative to the mean-age labor income, which is four times larger than the figure in 1990 for the same age group. Less than half of this income is used to finance current consumption through asset-based reallocation in 2006, as is evident in Figure 19b. The relatively abundant asset incomes coincide with the pronounced expansion of the hump-shape pattern in the age profile of private consumption within the same age range.

It is somewhat eye-catching that the increase in normalized asset incomes has evolved with the same magnitude among the retired population and those of the prime working age. This reflects the relative wealth per head of the retired compared to that of the prime working-age population. Although people over 65 years used only half of their asset incomes to finance consumption in 2006, the relative importance of private asset-based reallocation to the financing of the life-cycle

deficit has doubled compared to that in the pre-crisis year 1990. The normalized life-cycle deficit has increased by approximately ten percentage points. Private asset-based reallocation covers half of the increase, three percentage points are maintained by increased pensions, and the residual contribution comes from private transfers and public asset reallocation. The improved situation of senior citizens is reflected in the changing patterns of private consumption. In particular, private consumption relative to the middle-aged has improved among the aged population. This is most apparent among those who are near the retirement age, but also those aged 70+ are consuming more, relatively speaking, than did the population of the same age in 1990.

The main change from 1990 to 2006 is the growing importance of private asset-based reallocations during the 2000s in every broad age category. In recent years, in contrast to the situation in 1990, the retired population in particular has extended its use of asset-based reallocations as a means to finance its consumption.

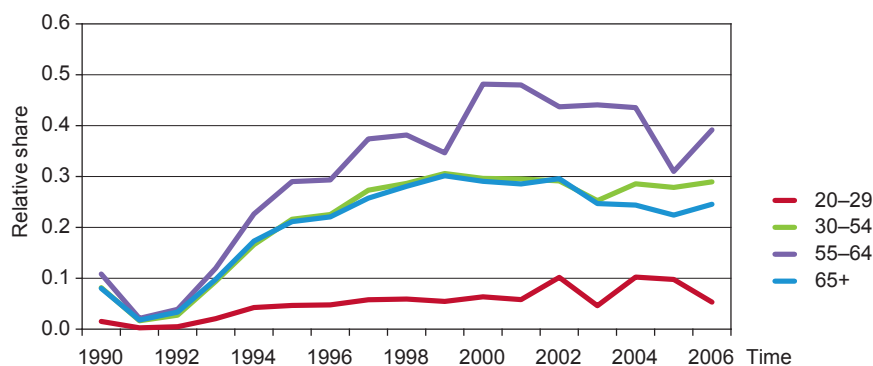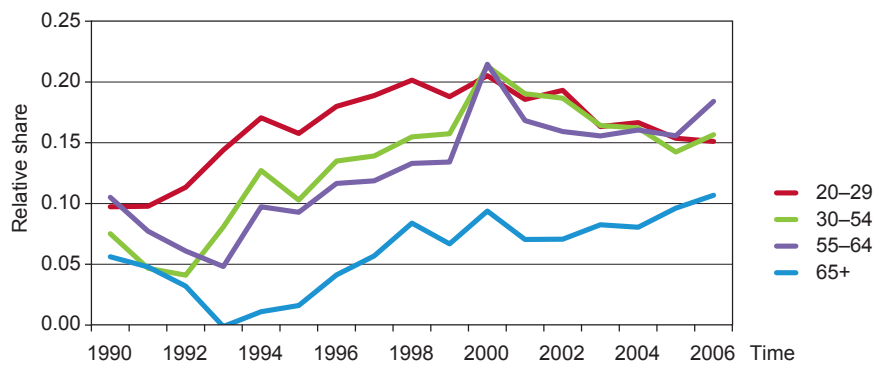***Figure 19a.*** *Normalized asset income per capita, 1990–2006*

Figure 19b. *Normalized private asset-based reallocations per capita, 1990–2006*

6   Concluding remarks

In this study, we have evaluated the life-cycle patterns of wage earnings and consumption in Finland over almost two decades. During the period covered by our study, Finland has already entered the stage of demographic transition where the share of the working-age population has declined because of the population ageing. The share of the working-age population, measured as the population of 20–64-year-olds, reached it peak in the 1990s and has declined, although modestly, most of the time since then. The decline will continue at an accelerating rate during the next decades. So far, the demographic transition has been intertwined with substantial changes in the economic policy environment and unprecedented macro-economic turbulence in the post-war period.

The changing age patterns in consumption and production are manifested in the aggregate life-cycle deficit (LCD) of Finland. On average, the aggregate LDC was only a few percentage points relative to the wage sum from the mid-1970s to the late 1980s. After 1990, the deficit increased considerably and amounted to approximately 17 per cent of the wage sum in 2006. In this study, we have analyzed the relative importance of demographic and age-specific factors in production and consumption in relation to the changes in the life-cycle deficit.

We have estimated that, had the relative profiles of life-cycle earnings, and consumption remained constant, the life-cycle deficit relative to the wage sum would have been 5.5 percentage points lower than the one we observed in 2006. Thus, about 40 per cent of the growth in the deficit between 1990 and 2006 can be attributed to the transition in the population structure. The remaining part is explained by structural shifts in age-specific patterns of consumption and wage earnings. Changes in consumption have been far more important. Without changes in consumption by age and relative to the wages, the LCD would have been 13 percentage points lower.

As a matter of fact, the changing profile of per capita wages by age has reduced the deficit by roughly four per cent. The labor market and population developments have had a modest, joint net impact on the aggregate life-cycle deficit. The demography alone would have reduced the child deficit, but a delayed entry onto the labor market at young ages has had an impact in the opposite direction. This has more than neutralized the effect of demography and implied an increasing child

deficit. The opposite is true for the generation of the old-age deficit. Improved labor market performance has succeeded to eliminate three quarters of the deficit that ageing alone would have implied. A lengthening of working careers has thus almost eliminated the burden of ageing at the given consumption structure. However, growth in private consumption relative to wages has increased the life cycle-deficit.

Ageing has been reflected in the consumption and wage-earning weighted average ages. In 1990, the average age of consumption in Finland was 38.6 years, whereas it was 42.9 years in 2006. It has increased by one year in every four years. At the same time, the average age of production has also increased, but not at a similar pace. It has grown from 39.3 years to 43.0 years. Thus, during the period under study, intergenerational resource flows have gone downwards, but at a reduced pace over time. The ageing is expected to reverse the direction of resource flows in the near future.

We have looked at the life-cycle deficit from two angles. Life-cycle deficits are created as a discrepancy of consumption and wage income by age. These deficits are covered by private and public transfers across ages and private and public asset reallocations along the life cycle. The most significant relative shifts in per capita terms have taken place in broad age groups of 10 years before and after the group of the prime-age working population of those aged 30–54 years.

The most significant decline in the net public cash transfers has taken place in the population aged 55–64 years. Relative to the peak value in this group, net public cash transfers have declined by 15 percentage points to nearly zero in net terms. The same positive pattern also appears in net in-kind transfers. The opposite is true in both cases of public transfers for young adults aged 20–29 years. In the case of in-kind transfers, young adults have turned from net contributors to net beneficiaries. In per capita terms, this particular group has turned from a modest life-cycle surplus contributor, with 9 per cent relative to prime-age wages, to a life-cycle deficit contributor, with equals 8 per cent relative to the prime-age wages.

In our discussion about the general economic development, we have recognized the increased importance of capital as a source of primary income during the period under study. The relative asset income per capita has followed the general pattern among all broad age categories. The development has been the most pronounced among those aged 55–64 years. The relatively abundant asset incomes within this

group during the last years coincide with an expansion of private consumption within the same age range compared to earlier cross-sections of consumption by age.

The relative importance of private asset-based reallocation to the financing of the life-cycle deficit has increased significantly among the elderly population aged 65 or more. Private asset-based reallocation covers half of the increase in their life-cycle deficits. The improved asset income of senior citizens is reflected in the increased private consumption relative to that of the middle-aged. This is most apparent among those nearing the retirement age, but also those aged 70+ are consuming more, in relative terms, than did the population of the same age in 1990.

The changing age patterns in consumption and production have manifested themselves in the growth of the overall life-cycle deficit from three per cent in 1990 to 17 per cent in 2006 relative to the wage sum. Is the increase in the deficit sustainable? Giving a definite answer to this question is beyond the scope of this study. However, we can say that the growth in the deficit has been sustainable in the sense that it has not been financed by de-cumulating private or public net wealth. As a matter of fact, private asset income, which has become an increasing share of the total disposable income, has been the main source in the financing of the life-cycle deficit. To evaluate whether the public and private wealth is sufficient to cover future obligations or aspirations would require a forward-looking framework of analysis.

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Appendices

Appendix 1

Table A1 includes information from the available survey data collected by Statistics Finland, although we only use data since 1990. We have used the data of two surveys: the Household Budget Survey (HBS) and Income Distribution Statistics (IDS). Both surveys are based on a representative probability sample that represents approximately 2.3 million households in Finland. The sample size is listed in Table A1. In all data, the target population are resident private households, i.e. institutional households are excluded. In the IDS material, the target population is on both the household and the individual level. In all surveys, income concepts are based on the same international recommendation from households' disposable income. Nearly all cash income is from administrative registers, but in the IDS, some information stems from interviews, e.g. interest income and inter-household transfers. Some non-cash income is imputed using registers and interviews. Non-cash income includes imputed net rent of owner-occupied dwellings and maternity benefits.

Income Distribution Statistics is provided annually since 1989. It represents a sample survey whose final samples include 9,000–12,000 resident households and 25,000–33,000 individuals in Finland. The data on households and their members is collected through interviews and from administrative registers. The statistics describe the amount of disposable income and its formation from different sources when taking taxation and income transfers into consideration. Income and its distribution are examined by groups according to level of income, socio-economic status, stage in life cycle, and area of residence.

The HSB has been conducted since 1966 at intervals of approximately five years. It is the main source of information on private consumption. The survey is a sample survey of varying sizes. The final samples include 4,007–8,258 resident households. The sample sizes in HSB surveys in1994, 1995 and 1996 are approximately 2,000 per year. To improve the accuracy of the results, Statistics Finland has combined the HSB data of these three years to represent the year 1995.

Publicly provided goods in HBS are collected only in 1971, 1976, 1981, 1985, 1990 and 2006. Therefore, the date of only two years is available for our analyses

of public consumption. Further information has been received from other sources (see page 26).

Table A1. *Survey data and sample size*

Year	Household Budget Survey: Private consumption Households	Household Budget Survey: Publicly provided goods Households	Income Distribution Statistics Households	Indivivuals
1966	3,259			
1971	2,986	2,986	8,816	
1976	3,348	3,348	7,971	
1981	7,368	7,368		
1985	8,200	8,200		
1987			11,863	
1988			12,192	
1989			11,971	
1990	8,258	8,258	11,445	31,471
1991			11,749	32,412
1992			10,417	28,763
1993			9,176	25,354
1994	(2,180)		8,964	24,774
1995	(2,313) 6,743		9,262	25,229
1996	(2,250)		9,349	25,358
1997			10,010	26,902
1998	4,359		9,345	25,010
1999			9,590	25,646
2000			10,423	27,841
2001	5,495		10,736	28,303
2002			10,843	28,201
2003			11,200	29,070
2004			11,229	29,112
2005			10,868	28,039
2006	4,007	4,007	10,624	27,454
2007			10,472	26,481
2008			10,137	25,157

Source: Household Budget Survey and Income Distribution Statistics, Statistics Finland

Table A2: *Average disposable income by components, EUR*

Income source	1990	1995	2001	2006
Earned income	8,812	8,165	11,193	13,439
Wages and salaries	7,957	7,260	10,214	12,362
Entrepreneurial income	855	905	980	1,077
+Income from capital	652	1,246	2,224	3,102
Interest income and dividends	198	226	552	665
Imputed net rents of owner occupied housing	350	762	1,178	1,436
Other capital income	104	258	494	1,002
=Factor income	9,464	9,411	13,418	16,541
+Current transfers received	2,659	4,174	4,304	5,050
Public transfers received				
Pensions	1,901	2,508	2,871	3,476
Income maintenance during illness	79	81	117	133
Family policy transfers	335	504	446	475
Unemployment security	124	725	465	509
Other age-related transfers	107	272	295	310
Other transfers	4	12	25	45
Inter households' transfers received	110	73	85	101
=Gross income	12,129	13,588	17,724	21,594
+Current transfers paid	3,012	3,607	4,331	5,079
Public transfers paid				
State income tax and municipal tax	2,708	2,703	3,364	3,736
Tax on capital	0	90	170	372
Wealth and property tax	6	28	57	41
Social security contribution	277	358	205	287
Employment pension contribution	5	407	519	614
Inter households' transfers paid	16	22	16	28
=Disposable income	9,117	9,981	13,393	16,515
Consumption	8,219	8,325	11,550	14,313
Durable consumption	980	830	1,435	1,956

Source: Income Distribution Statistics and Household Budget Survey, Statistics Finland

Appendix 2

Because our analyses contain data from different sources, a comparison between the survey data and National Account (SNA) is useful. The total consumption in HBS covers nearly 90 percent of the figures in SNA. The largest differences seem to be in sub-components.

Table A3. *Coverage between the Households Budget Survey and the National Accounts*

	HSB coverage compared to NA, %		
	1998	2001	2006
Private consumption	89	92	87
Food	101	100	94
Beverages and tobacco	47	46	45
Clothing and footwear	89	76	75
Housing	100	107	98
Furnishings and household maintenance	86	94	82
Health	95	86	75
Transport	93	114	113
Communications	95	103	87
Recreation and culture	85	84	88
Education	29	35	44
Hotels, cafes and restaurants	63	76	67
Miscellaneous goods and services	78	70	66
Public consumption	-	-	86
Education	-	-	65
Health	-	-	40
Social services	-	-	68

Source: Households Budget Survey and National Accounts, Statistics Finland

Table A4. *Coverage between the Income Distribution Survey and the National Accounts*

Income source	1990	1995	2001	2006
Factor income	100	98	106	105
Gross income	98	97	103	101
Disposable income	99	95	107	107
Wages and salaries	103	99	99	99
Entrepreneurial income	88	86	91	96
Income from capital	82	101	175	100
Imputed net rents of owner occupied housing	466	142	195	188
Current transfers received	93	94	95	89
Current transfers paid	96	102	92	84

Source: Income Distribution Statistics and National Accounts, Statistics Finland

Appendix 3

The main tax reforms which were introduced during or immediately prior to our research period spanning from 1990 to 2006 are briefly introduced in Table A6. In 1989, many tax deductions were eliminated with the aim to widen the tax base. Changes in income schedules were made. Eleven tax brackets were reduced to six. The marginal tax rate has been reduced frequently ever since, so that in 2006, marginal tax rates are approximately 10 percentage points lower than in 1989 in all income levels.

Table A5. Main tax reforms

Year	Reform
1989	Many tax deductions were reduced.
1990	The avoir fiscal system was introduced, allowing the shareholder to account of the taxes from dividends paid by a corporation. The effective tax rate was zero.
1993	Tax reform for capital income: The dual income tax system was introduced. It combines progressive taxation on earned income with a flat rate of tax on capital income. Many types of untaxed income became taxable. Capital gains were taxed at the same rate as other capital income. Imputed rents from owner-occupied housing exempted from taxation. Many child-related deductions were reduced.
1994	The turnover tax system was changed into added value taxation.
2004	The excise tax on alcohol and tobacco was reduced.
2005	Tax reform for capital income: The avoir fiscal system was abolished.
2006	Wealth tax was eliminated.

The avoir fiscal system was introduced in 1990. The capital income tax reform was introduced in 1993. The dual income tax system combines progressive taxation on earned income while capital income is taxed at a flat rate. At the same time, many untaxed income types became taxable. For instance, capital gains became part of the tax base. Capital gains were only partly taxed before 1993. Many child-related tax

deductions were reduced. The deductions were replaced by direct public transfers. For instance, child benefits increased.

In 1994, the turnover tax was replaced by added value tax. Services and construction work became tax-based, and the hidden part of the tax system disappeared. At the same time, the number of excise taxes decreased. Excise tax on alcohol and tobacco was reduced until 2004. Tax reform for capital income led to the abolishment of the avoir fiscal system. Moreover, listed and unlisted corporations are now treated differently: 70 per cent of the dividend from listed corporations is taxable. In unlisted corporations, dividends under 9 per cent of the net asset (max. EUR 90,000) are exempt from tax. 70 per cent of the amount in excess is taxed. In 2006, the wealth tax was eliminated.

The Finnish Centre for Pensions is the statutory central body of the Finnish earnings-related pension scheme. Its research activities mainly cover the fields of social security and pension schemes. The studies aim to paint a comprehensive picture of the sociopolitical, sociological and financial aspects involved.

Eläketurvakeskus on Suomen työeläkejärjestelmän lakisääteinen keskuslaitos. Sen tutkimustoiminta koostuu pääasiassa sosiaaliturvaan ja työeläkejärjestelmiin liittyvistä aiheista. Tutkimuksissa pyritään monipuolisesti ottamaan huomioon sosiaalipoliittiset, sosiologiset ja taloudelliset näkökulmat.

Pensionsskyddscentralen är lagstadgat centralorgan för arbetspensionssystemet i Finland. Forskningsverksamheten koncentrerar sig i huvudsak på den sociala tryggheten och på de olika pensionssystemen. Målet för forskingsprojekten är att mångsidigt belysa aspekter inom socialpolitik, sociologi och ekonomi.

Finnish Centre for Pensions
ELÄKETURVAKESKUS