UNIVERSITY OF LJUBLJANA
FACULTY OF ECONOMICS

JOŽE SAMBT

NATIONAL TRANSFER ACCOUNTS FOR SLOVENIA

DOCTORAL DISSERTATION

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IZJAVA

Študent Jože Sambt izjavljam, da sem avtor te doktorske disertacije, ki sem jo napisal pod mentorstvom prof. dr. Janeza Malačiča in skladno s 1. odstavkom 21. člena Zakona o avtorskih in sorodnih pravicah dovoljujem objavo doktorske disertacije na fakultetnih spletnih straneh.

V Ljubljani, dne_____

Podpis:_____

RAČUNI NACIONALNIH TRANSFERJEV ZA SLOVENIJO

Povzetek

V zgodnjih obdobjih svojega življenja je človek odvisen od transferjev, ki jih prejme od svojih staršev in drugih virov v družbi, da bi lahko zadovoljil svoje osnovne potrebe, deležen je zdravstvene oskrbe, izobraževanja itd. Na samem začetku življenja so ti transferji ključni za posameznikovo preživetje in določajo tudi kvaliteto njegovega življenja ter možnosti za nadaljnji razvoj. Tudi v starosti transferji v obliki pokojnin, zdravstvene oskrbe, dolgotrajne oskrbe itd. pomembno določajo blagostanje posameznikov. V teh obdobjih so posamezniki ekonomsko odvisni, saj trošijo več, kot proizvajajo. »Primanjkljaj življenjskega cikla« (*lifecycle deficit*) v teh starostnih razredih mora biti financiran z ekonomskimi tokovi, ki potekajo med posameznimi starostnimi razredi.

V preteklosti so bile analize tovrstnih tokov parcialne, običajno so se ukvarjale samo s posamezno vrsto transferjev. Ker so se pristopi analize, nabor transferjev, ki so bili vključeni v analizo, uporabljene predpostavke itd. razlikovali, je bila tudi možnost primerjave rezultatov omejena. Prisotna je bila želja po metodi, s katero bi sistematično in celovito analizirali ekonomski vidik medgeneracijskih odnosov. V zadnjem času so se tega izziva lotili »računi nacionalnih transferjev« – *national tansfer accounts* (NTA). Računi nacionalnih transferjev so usklajeni z dobro znanim in široko uporabljanim sistemom nacionalnih računov (SNA). NTA uvajajo dimenzijo starosti v SNA, hkrati pa se dobljeni starostni profili tudi že v samih NTA uporabljajo za razne nadaljnje analize.

Disertacija predstavi idejo in osnovno metodologijo NTA. Razvija jo mednarodna ekipa raziskovalcev, v kateri aktivno sodelujem. V besedilu predstavim metodo in celovit osnovni nabor rezultatov za Slovenijo ter jih primerjam z rezultati drugih držav. Na podlagi podatkov za leto 2004 ugotavljamo, da ljudje v Sloveniji ustvarijo več kot potrošijo zgolj od 25. do (vključno) 55. leta starosti. Ta ozek razpon, ki traja samo 31 let, nas preseneča in skrbi, saj je bilo tega leta življenjsko pričakovanje ob rojstvu za moške 74 let, za ženske pa 81 let. Ti rezultati tudi potrjujejo našo osnovno hipotezo, da imamo skozi življenje posameznika opravka z izrazitim ekonomskim življenjskim ciklom. Rezultati za Slovenijo se v primerjavi z drugimi državami najbolj razlikujejo glede starostnega profila dohodka iz dela, ki prikazuje delovni dohodek na predstavnika posamezne starosti. V slovenskem primeru začne naraščati pozno, medtem ko začne na drugi strani upadati najhitreje med vsemi državami, vključenimi v analizo. Na splošno obstajajo med razvitimi in manj razvitimi državami velike razlike v rezultatih. Razlike so pri nekaterih kategorijah velike tudi med državami na približno enaki stopnji razvitosti. S tem smo potrdili še eno hipotezo doktorske disertacije.

Na osnovi dobljenih starostnih profilov za različne kategorije se lahko analiza nadaljuje v različne smeri, še zlasti če predpostavljamo, da se relativni profili v času ne spreminjajo in če jih hkrati povežemo z razvojem prebivalstva skozi čas. Pomembno povezavo med demografskim in ekonomskim dogajanjem lahko analiziramo s pomočjo koncepta prve in

druge demografske dividende. V preteklosti je bil demografski vpliv pozitiven. Trenutno pa smo priča prehajanju prve demografske dividende iz pozitivnih v negativne vrednosti, kar smo pričakovali tudi v naši naslednji hipotezi, ki je bila s tem potrjena. Izračuni kažejo, da naj bi bila prva demografska dividenda negativna prihodnjega pol stoletja, z najnižjimi vrednostmi v obdobju 2020–2025. Pozitivni učinek druge demografske dividende bo predvidoma zelo majhen, saj je analiza NTA pokazala, da se starejši (65+) naslanjajo predvsem na javne transferje, ne pa na dohodek iz naslova sredstev. Podaljševanje pričakovanega trajanja življenja jih tako ne spodbuja posebej močno h kopičenju sredstev, kar bi imelo pozitivne ekonomske učinke.

Neodvisno od običajnih analiz v okviru NTA sem na osnovi dobljenih in nadalje razčlenjenih starostnih profilov oblikoval slovenski model za simuliranje dolgoročnih učinkov spreminjanja demografske strukture na javnofinančne izdatke in prihodke. Model je zelo celovit in omogoča najrazličnejše simulacije, vključno z učinki blažitve naraščajočih pritiskov na dolgoročno vzdržnost javnofinančnega sistema. S proučevanjem učinkov zniževanja pokojnin na posamezne kohorte se približamo modelu generacijskih računov. Menim, da bi morala modela generacijskih računov in NTA čim bolj konvergirati. Prikazani model predstavlja korak v to smer.

Disertacija predstavi tudi analizo občutljivosti rezultatov projekcij prebivalstva na posamično spreminjanje predpostavk, ki je v običajnih variantah projekcij zabrisana. Projekcije prebivalstva imajo v večini primerov poleg srednje variante tudi visoko in nizko varianto, ki predstavljata zgornjo in spodnjo mejo verjetnega gibanja v prihodnje. Opozarjamo pa, da sta ti dve varianti postavljeni z vidika vpliva na število prebivalcev, zato ne predstavljata zgornje oz. spodnje meje z vidika staranja prebivalstva in demografskih učinkov na finančno vzdržnost javnofinančnega sistema, saj se s tega vidika njihovi učinki do določene mere medsebojno izničijo. Predlagamo, da bi se predpostavke visoke in nizke variante za ta namen ustrezno preuredile. To teoretično priporočilo demonstriramo na slovenskem primeru.

Izračuni kažejo, da naj bi se v obdobju 2008–2060 javnofinančni prihodki, izraženi kot delež v BDP, nekoliko znižali, medtem ko naj bi se delež javnofinančnih izdatkov močno povečal – zaradi izdatkov za pokojnine, zdravstvo in dolgotrajno oskrbo, ki so povezani predvsem s starejšim prebivalstvom v starosti 65 let in več. V skladu s srednjo varianto projekcij prebivalstva naj bi se delež te starostne skupine v celotnem prebivalstvu v omenjenem obdobju več kot podvojil. Rezultati so v veliki meri posledica obstoječe starostne strukture prebivalstva, saj bodo generacije »baby-boom« kmalu začele vstopati v starostni razred 65+ (med upokojence), medtem ko bodo generacije, rojene po letu 1980, ko se je število živorojenih hitro zmanjševalo, začele vstopati v rodno (in delovno) dobo. Pričakovano močno staranje prebivalstva tako ni rezultat črnogledih demografskih predpostavk, temveč prihajajoča stvarnost z vsemi izzivi, ki jih bo staranje prineslo s sabo.

Ključne besede: medgeneracijski transferji, staranje prebivalstva, projekcije, projekcije prebivalstva, vzdržnost javnofinančnega sistema, modeli, simulacije

NATIONAL TRANSFER ACCOUNTS FOR SLOVENIA

Summary

In the early years of life human beings have to rely on transfers from their parents and other parts of society to satisfy their basic needs, receive health care, education etc. At the very beginning these transfers are crucial for survival and they determine the quality of their life and success of their future development. In addition in old age transfers in the form of pension, health care, long-term care etc. significantly determine the wellbeing of individuals. In those ages individuals are economically dependent, their consumption exceeding their production. The consumption surplus or 'lifecycle deficit' has to be financed through economic flows across age.

In the past the analyses of those economic flows were partial, concentrating usually only on certain type of transfers. Further, because of differences in approaches, differences in the set of transfers included in the analysis, different assumptions etc. the comparison of the results was also limited. There was a desire for systematic and comprehensive methodology for analyzing economic aspect of intergenerational relations. Lately the methodology called national transfer accounts ('NTA') has tackled this challenge. The NTA are synchronized with the well-known and established system of national accounts ('SNA'). NTA are introducing the age dimension into the SNA. However, the obtained age profiles are used for many further analyses, some of them are already included in the NTA.

This dissertation presents the idea and basic methodology of the NTA. It is developed by an international team of researchers in which I actively participate. I have constructed a comprehensive set of results for Slovenia, presented in the dissertation, while comparing them with the results of other countries. Based on the data from 2004 people in Slovenia were producing more than they were consuming only from age 25 to (including) 55. This narrow interval of only 31 years is a striking result considering that life expectancy at birth was at that time 74 years for men and 81 years for women. Those results confirm our main hypothesis that there is a strong economic lifecycle at the individual level. The most distinctive Slovenian result compared to other countries is the labor income age profile, which presents per capita labor income by age. In the Slovenian case it starts to rise late but falls first. In general, there are huge differences in the NTA results between more developed countries and less developed countries. In some categories the differences are big, even among countries at about the same development level, confirming another hypothesis of the dissertation.

Based on the resulting age profiles the analysis can be extended in various directions, especially when constant relative age profiles through time are assumed and connected to population development through time. An important link between demography and the economy is analyzed through the first and the second demographic dividends. In the past the effect of changing demographic structure was positive. Currently, the first demographic dividend is just turning into a negative one. This was also expected in our hypothesis, and is

confirmed. Further, the first demographic dividend is projected to remain negative for the next half a century, with the lowest values in the 2020-2025 period. The positive effect of the second demographic dividend is expected to be negligible since the NTA analysis has revealed that the elderly in Slovenia rely predominantly on public transfers instead of asset-based income. The increasing longevity (and retirement period) is thus not a strong incentive for people of working age to accumulate assets which would yield positive economic effects.

Independently of the NTA practice, but resting on the obtained age profiles, I have developed a model for simulating the long-term effect of the changing demographic structure on public expenditures and revenues based on Slovenian data. Besides being very comprehensive, it also enables various simulations, including the effect of measures for mitigating the increasing pressure on the long-term sustainability of the public system. By simulating the effects of these measures on individual cohorts it leans toward the generational accounting model, which I believe should be converged with the NTA system as far as possible. The presented model is a step in this direction.

This dissertation also presents a sensitivity analysis of the results of population projections on changing only one assumption at a time. A separate effect of individual assumptions is blurred in standard variants of population projections. Further, besides the medium variant, the low and high variants are standard variants used in population projections. They represent the upper and lower boundaries in the interval of likely future population development. However, we argue that those boundaries are set from the aspect of how the assumptions influence the size of the population and, as such, they are inappropriate boundaries when analyzing the sensitivity of population ageing and demographic effects on the sustainability of the public system since the effects partly neutralize each other. We propose rearranging the assumptions from those two variants. This theoretical recommendation is demonstrated in the Slovenian case.

The share of public revenues in GDP is projected to decline in the 2008-2060 period moderately, while a strong increase of public expenditures in GDP – for pensions, health and long-term care is expected. Those expenditures are concentrated with the elderly (aged 65 and over). According to the medium variant of population projections, their share in the total population is expected to more than double in that period. The results are strongly driven by the existing age structure: baby-boom generations will start to enter age 65+ (retirement) soon, while generations born after 1980, when the number of newborns was strongly declining, are starting the fertility (and working) period. The expected strong population ageing is thus not a result of pessimistic demographic assumptions, but a robust outcome accompanied by challenges for the future.

Keywords: intergenerational transfers, ageing, projections, population projections, financial sustainability of the public sector, models, simulations

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APPENDIX

SUMMARY (IN THE SLOVENIAN LANGUAGE)

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List of Abbreviations

AWG	Ageing Working Group
COFOG	Classification of the Functions of the Government
EUROPOP2004	Eurostat's population projections published in 2005 (using the trend method)
EUROPOP2008	Eurostat's population projections published in 2008 (using the convergence method)
ESA	European System of Accounts
EPC	Economic Policy Committee
EU	European Union
EUR	Euro (the currency of the European Union)
GDP	Gross Domestic Product
GRR	Gross replacement rate
HES	Household Expenditure Survey
ILO	International Labor Organization
IMAD	Institute of Macroeconomic Analysis and Development
NRR	Net replacement rate
NTA	National Transfer Accounts
OECD	Organization for Economic Cooperation and Development
OLG	Overlapping Generations Model

PDIA	Pension and Disability Insurance Act
PROST	Pension Reform Options Simulation Toolkit (World Bank's software)
SIT	Slovenian tolar (the currency of Slovenia from 1991 until December 31, 2006, when the euro was introduced)
SNA	System of National Accounts
SORS	Statistical Office of the Republic of Slovenia
TFR	Total fertility rate
UN	United Nations

1 INTRODUCTION

1.1 PROBLEM DEFINITION

In the early years of life human beings have to rely on transfers from their parents and other parts of society to satisfy their basic needs, receive health care, education etc. At the very beginning these transfers are crucial for survival and determine the quality of their life and success of their future development. Also in old age transfers in the form of pension, health care, long-term care etc. significantly determine the wellbeing of individuals, although individuals can influence such transfers substantially unlike the transfers received during one's youth. When reaching working age they can decide about their consumption, savings, becoming involved in different social systems, how long they will stay in the labor market etc., which all determine the amount of transfers they will receive after the cessation of their labor-related income.

In the last two decades important progress has been made in measuring, modeling and estimating intergenerational transfers on micro and macro levels (Mason, Lee, Tung, Lai, & Miller, 2006, p. 3). This research topic has attracted interest due to demographical changes which are radically changing the population's age structure and because they affect transfers and economic activity in general. Population projections indicate that in the future we will face even more drastic changes than we are witnessing now. Some demographers predict that while the 20th century was a century of explosive growth, the 21st century is likely to see the end of world population growth and become the century of population ageing (for example Lutz, Sanderson, & Scherbov, 2004).

Such a basic topic has always been the subject of observation and analysis since intergenerational transfers affect inequality and economic growth. The direction, form and extent of transfers depend greatly on the development level, but even in approximately equally developed countries they can vary a lot as result of different socioeconomic systems, different culture, moral, historical or other factors. In the past, various authors drew different conclusions about intergenerational transfers, largely also because of the different methodology used and different levels of transfers included.

Lee, for example, concluded that in societies where agriculture and hunting prevail intergenerational transfers flow extensively from the older to the younger. The need to support the consumption of infants dominates over the need to care for the older. In more developed industrial countries (or at least in the US) the direction of transfers is inverse – from the younger to the older. Although transfers within families are still 'downwards' they are more than compensated for by transfers in an 'upward' direction due to capital

accumulation and public transfers[1] (R. Lee, 2000, p. 52). These results are not in line with the conclusions of John Caldwell who developed the hypothesis that the decline in fertility during development is a consequence of the reversal of transfers from children to parents into a flow from parents to children (Mason & Tapinos, 2000), which is the reason why (rational) parents decide on a smaller number of children.

The family is still the fundamental institution for understanding intergenerational transfers. It plays the central role in forming human capital, economic growth and income distribution (Mason & Tapinos, 2000, p. 3). Yet transfers among family members are difficult to analyze. In surveys data are usually collected at the household level which does not enable such analyses. Money transfers also represent just a small share in comparison to material goods and services, which are however difficult to evaluate. If we also consider transfers as including the time devoted to other family members then even the question of the direction of these transfers emerges.

In traditional societies young and older people depend almost exclusively on other family members, who help them satisfy their (material) needs. With development the role of the family as an agent in intergenerational distribution has decreased considerably in many countries (Mason & Miller, 2000). Over time the welfare state has taken over many of its traditional roles. Relations among family members have become much more of a one-way flow. It is still common for parents to take care of their children, but the other way around is much less common. The welfare state is what takes care of pensioners, the sick, disabled, unemployed and poor.

In developed countries the state has gradually expanded its role to an extent which it will probably be unable to maintain in the future. Researchers have warned about this problem for a long time, yet not much has been done about it, partly because of short-term-oriented policy decisions, partly since the necessary changes are not in favor of older people who have voting power, partly because the projections are not as convincing as the reality etc. In recent times public finance systems and/or their parameters have finally started to change. The measures involved of course include lowering benefits from public systems and/or increasing payments to the systems to establish the long-term sustainability of the system or at least to reduce its unsustainability.

'The reason' for these problems and the need for reforms is the rapid ageing of the population seen in developed countries. According to population projections, in the future this process will be even more radical than in the past. Population ageing is caused by a combination of low fertility levels and increasing longevity. In Slovenia this situation is especially serious.

[1] The direction of transfers in the public system is not the same in all societies. According to Lee, in 'third world countries' the direction of transfers moves from the older to the younger – partly because of the prevailing share of children in these countries and partly because the older ones are still supported by their families, while in developed countries this role has been taken over by the state.

We have one of the lowest fertility rates in the world. The total fertility rate in Slovenia in the last decade has been 1.2 to 1.4 children, which means that each woman on average gives birth to about 1.2 – 1.4 children. A total fertility rate of 2.1 children would be necessary if we would like the population to reproduce itself in the long run – assuming no migration. According to the latest population projections for Slovenia provided by Eurostat in 2008, the share of people aged 65 years and over (being 16% in 2008) is expected to more than double up to 2060 (to 33%). On the other hand, the size of the working age population should shrink considerably. The combination of these two processes should have drastic consequences for the long-term (un)sustainability of public finance systems if they are not adjusted accordingly.

I understand national transfer accounts (NTA) as a logical continuation of the generational accounting method which was the topic of my master's thesis. The subject of the generational accounting method is only those transfers among different generations that flow through the public finance system. At its beginning this method represented a criticism of the budget deficit and public debt – the most usual measures of public finances. Authors of this method offered it as a (better) alternative to the budget deficit and public debt. Those two categories are influenced by the particular labeling of categories – they can end up in a budget deficit or out of one merely due to arbitrarily created differences among differently labeled categories, even though the content is basically the same (Auerbach, Gokhale, & Kotlikoff, 1991a, p. 2).

Critics of the generational accounting method have pointed out that this method is also not immune to arbitrary definitions, but at the same time they recognize its importance and usefulness – stressing the need for its further refinement (Diamond, 1996, p. 606; Haveman, 1994, p. 110). Generational accounts have not succeeded in replacing the budget deficit concept, yet they have become a very important and complementary system that enables many additional analyses and the identification of problems. They have been prepared for many different countries – including Slovenia (Sambt, 2004) – which indicates that they have become widely accepted.

Transfers that flow through the public system are also part of the national transfer accounts, but this method, when fully developed, also includes all other transfers among different age groups that are expressed in a money form. Thus they also include private transfers among members of the same household, transfers among members from different households, in the form of bequests, they try to capture transfers that flow through the market in the form of credits, investments etc. Like with generational accounts, with national transfer accounts we can estimate and simulate the impacts of future demographic changes and changes in the system of transfers on economic happenings and individual cohorts. Although both of those methods are technically based on age profiles and often NTA experts have a background in generational accounting, there are still distinctive conceptual and some technical differences between generational accounting and NTA.

The method of national transfer accounts does not seek to criticize and offer an alternative to the standard indicators – in this case this would be the system of national accounts (SNA) which represents an organized system of aggregate product in the economy and its distribution to different income forms. On the contrary, it uses the national accounts system as a starting point for the analysis so it is synchronized with it.

National transfer accounts measure at the aggregate level the reallocation of economic resources from one age group to another. Reallocations occur because at some ages individuals produce more than they consume and vice versa. National transfer accounts present the ways the difference between consumption and production is covered at different ages. So the basic category is a lifecycle deficit defined as the difference between the value of goods and services consumed by members of some age group and the value of goods and services produced by members of that age group.

Distributions (which we sometimes call 'transfers' in a broader sense) among different age groups can be in the form of transfers or on the basis of assets. The latter can have the form of capital and the form of property and credit. All of these transfers can have public and private implementing institutions.

1.2 PURPOSE AND AIMS OF THE DISSERTATION

The main purpose of the dissertation is to comprehensively analyze transfers among different generations or cohorts.

The main aim of the dissertation is to form a national transfer accounts system which provide a comprehensive insight into the transfer flows among members of different age groups. Generally, it could also be said that national transfer accounts try to introduce age into the system of national accounts; however, at the same time they can provide many additional analyses. Recent research related to macroeconomic consequences of population change emphasizes the age structure. The established system is providing a broad range of age profiles and results that are interesting for various further analyses.

One of such concepts is the *demographic dividend*. At some level of development the population's mortality starts to fall and after a certain period of declining it stabilizes at a low level. Fertility follows the same pattern, but with some time delay. During that period the size of the population usually increases a lot. In demographic studies, this process is called a *demographic transition*. Consequently, the population's age structure also changes fundamentally. Due to the fertility decline the growth of the labor force exceeds the growth of the dependent population, especially children, whose share declines. As a result, resources can be used for investment in economic development and family welfare. With everything else being equal, per capita income grows faster. That is called the *first demographic dividend*.

Eventually the lower fertility rate also reduces the growth rate of the labor force and, on the other hand, the ongoing decline in mortality speeds up the growth of the elderly population. By analogy, with everything else being equal, per capita income now increases with a smaller rate i.e. the first demographic dividend turns negative. A *second demographic dividend* is also possible since increasing longevity can be a strong incentive for people to accumulate assets for a longer lasting retirement period (R. Lee & Mason, 2006, p. 16). The size, duration and timing can vary considerably and those dividends do not come automatically. This period is a *window of opportunity* which can however be used or not used – it depends on (in)effective policies. The aim of the analysis is to calculate those two demographic dividends for Slovenia.

Age profiles are also broadly used for projection purposes. The age profile for drugs and medical (technical) devices, for instance, shows the distribution of these expenditures by age. The analysis reveals that those expenditures are concentrated among the elderly. Combining a calculated age profile with population projections results in an expected increase of those expenditures in the future. There are also other factors beside demographic changes that will influence expenditures in the future, of course, but the age profiles are a crucial input for the analysis. The aim of the dissertation is not only to present age profiles for many categories that can be used for various analyses, but also to apply them to some of the most relevant purposes.

Intermediate results are also interesting and useful. For example, not only will the share of the public sector in transfers among generations be important but so too will its structure. There can be huge differences in the shares that health care, the pension system, long-term care etc. have in public expenditures. This can also be the case in similarly developed countries and/or where the share of the public system is roughly the same. Because of the mentioned differences in culture, mentality, how fast the socioeconomic system developed, or due to history and other factors the ratio between private and public financing of those services can essentially differ. The differences between countries on different development levels can, however, be much greater. National transfer accounts present and quantify those different compositions of transfers among different age groups. This is done for different sorts of transfers and different financing types (private or public). The dissertation will also present basic patterns that emerged by comparing the results across countries.

1.3 THE RESEARCH METHODOLOGY

In the theoretical part we will place the subject of analysis within the broader framework of current processes and analyses. We will present a short overview of relevant studies and their results concerning transfers among different generations which were made in the past. Different authors have drawn varying conclusions. Because of the differences in approaches, differences in the set of transfers included in the analysis, different assumptions etc. it is

difficult to compare their findings and draw firm conclusions for different countries and time periods. It would be desirable to not only develop a comprehensive and systematic methodology for this analysis but also to apply it to different countries.

After the introductory part the dissertation will describe the method of national transfer accounts. This system was not comprehensively presented prior to 2003 or 2004 and it is therefore quite understandable that the literature will mostly be in the form of working papers and articles published in this relatively recent period. The NTA methodology is developed in the framework of an international project. Slovenia has also been included in the project and I therefore have the opportunity to play an active role in the development and refinement of the methodology. The activities of the country members, the latest version of the methodology and methodological guidelines, discussions about the issues and suggested solutions etc. are presented at the http://www.ntaccounts.org/ webpage. When describing the methodological part of the dissertation this will be the main 'literature'.

Building national transfer accounts requires extensive data collecting from various sources, combining them through appropriate calculation methods. The basic database is the system of national accounts, as published by statistical offices. These data systematically, comprehensively and consistently present the main macroeconomic categories broken down by different categories. Another key data source is public finance data since this system is a very important system of mediating transfers among different generations in developed countries. Also many other data are used, some of which are available in aggregate form because they are collected by a particular authority, some can be estimated indirectly while other data are estimated from microdata. In the latter case the most important source are survey data (predominantly the Household Expenditure Survey), which are used in the function of redistributing aggregate data by age groups.

Aggregate data are usually not tracked by age. On the other hand, age profiles based on survey data can seriously underestimate or overestimate the actual values of aggregate categories if they are not adjusted to the aggregate controls. This issue is especially relevant for categories when there is only a small sample available and/or the variable has non-zero values only with a limited number of observations. Further, some categories are delicate for the responders to report them freely – like questions about earnings. We therefore combine those two data sources. The age profile for a particular category, obtained from microdata, is adjusted accordingly to match the aggregate value of that particular category. The sum of products (age profiles multiplied by the number of persons by age groups) should equal the aggregate value of that particular category. Following this procedure, the problem of over- and underestimation is also solved – but only if we assume that the extent of over- and underreporting does not differ by age.

The unit of analysis in national transfer accounts is an individual. For categories where the data are collected on the individual level we use the described method of combining micro-

and macrodata. However, not all data are available at the level of individuals. For example, what people consume is usually reported at the household level; sometimes this is also true for income acquired in family enterprises. In those cases, we have to assign household data to individuals. In the national transfer accounts for some data we use the *regression* method while for other data we apply the *ad hoc* method.

The next important issue concerns data on transfers among household members since these data usually do not exist. The NTA methodology assumes that household members who are *not head household members* use their incomes (i.e. incomes from labor and public transfers in a money form, after subtracting taxes) only for the consumption of products and services. Thus we assume that they do not accumulate assets nor do they receive transfers which flow among households in the form of gifts, donations, aliments etc. since those transfers are assigned to the *head household member*. The differences between the earnings of non-head household members and their consumption are treated as intrahousehold transfers. Positive differences are treated as transfers from this household member to the head of the household while negative differences are denoted as a transfer from the household's head to the non-head member of the household.

An important element of the methodology is comparing the results obtained for different countries. A high level of uniformity provides for the comparability of results across countries, while the heterogeneity of the countries included makes them variegated and interesting.

1.4 POTENTIAL CONTRIBUTIONS OF THE DISSERTATION

The scientific contribution of the dissertation can be summarized as follows. The dissertation presents 'national transfer accounts' at the current stage of development. The method enables a consistent and comprehensive insight into transfer flows between persons in different age groups. The dissertation locates this method within a broader context, i.e. in relation to other analyses from this field made in the past. The method is in the process of intensive development and searching for the best solutions, given the conditions of data and other limitations. It uses findings and elements from other, methodological or otherwise, related analyses. Some parts of the methodology have only very preliminary results for now, some parts have been substantially revised lately, while some directions have not been empirically explored yet. Thus, the dissertation presents the methodology to a limited level, relevant for the empirical analysis that is applied afterwards. However, the main categories and the framework of the national transfer accounts are preserved.

A further contribution is the results for Slovenia as such. The countries included in the analysis are very heterogeneous regarding their settlements and development levels so there are fundamental differences among them. Results for the Slovenian case are interesting at the

international level since Slovenia is a country that experienced socialism (or a specific form of it) in the past which led to its current arrangement of transfers – institutionalized ones and informal private ones. It has turned out that some results are distinctive in the international context. This enriches the results of the NTA project and provides information for Slovenia, where it is positioned among other countries.

Extensive work has been done on forming age profiles for many economic categories. The resulting database is ready to be used in my further research on this topic, with which I intend to continue, and for other researchers who might need these data for their analyses. With the changing demographic structure such analyses are becoming ever more interesting and data broken down by age are needed. Hence, I consider the database which is emerging due to the work on the NTA to be the next contribution and benefit of the dissertation. This contribution is further strengthened by the fact that the results are internationally comparable with the results for many countries across the world. Therefore I consider them as a valuable input for future analysis for researchers from Slovenia and abroad. Both results for Slovenia and other NTA countries will be publicly accessible in the future on the NTA webpage. Having the latest version of the data always available is an important advantage of this option, which should be considered as supplementary material of the dissertation.

The dissertation also demonstrates the use of the obtained NTA results on two analyses. First, the important link between demography and the economy is analyzed by calculating the first and second demographic dividends. Calculating dividends is a standard extension of the NTA methodology, which does not limit itself only to calculating the age profiles. Second, we develop a model for comprehensive projections of expenditures and revenues of the public sector, which is based on the age profiles. With this tool we can also simulate the effects of policy measures on different age groups. The results shed some light on the increasingly important topic about the relations between generations. Those two extensions complement the basic results of the NTA analysis, emphasizing their relevancy.

1.5 THE DISSERTATION'S STRUCTURE

The dissertation is divided into seven chapters. The theoretical part has two chapters. Following this introductory part in Chapter 2 the theoretical elements on which the method of national transfer accounts is built are briefly presented. Results of earlier studies that have been done on the subject of transfers among cohorts are summarized. Chapter 3 focuses on the NTA method itself, explaining theoretical background and principles of constructing age profiles. It explains which transfers are taken into accounts by the NTA method and to which level the method will be presented and applied to the Slovenian case. The methodology for constructing age profiles is presented in details. The age profiles of labor income and consumption determine the age profile of the lifecycle deficit, which has to be covered

through the transfers or asset-based reallocation. The concepts and assumptions used when constructing these and other age profiles are described.

The emphasis of the dissertation is on the three empirical chapters that follow. Chapter 4 presents the data on which the analysis is conducted. NTA aggregate controls are derived, whereby some adjustment of the SNA data is required. Age profiles or required categories are calculated and adjusted to the aggregate controls. They present basic results of the NTA analysis per se and will be subject to our commentary.

Chapter 5 combines the results obtained in Chapter 4 in more complex analyses. First, an insight into the flows among different age groups is provided. A comprehensive picture about the reallocations through which the lifecycle deficit is covered is the central result of the NTA method. Second, by assuming that the calculated age profiles keep their relative shape through time, the first and second demographic dividends are calculated. Population projections for Slovenia are made in various variants and scenarios, providing a sensitivity analysis of population projections to alternative assumptions. Ongoing and forthcoming demographic changes and population ageing in particular are one of the central issues of developed countries. Therefore the population projections and age profiles are used for projecting expenditures and revenues of the Slovenian public finances system. Via the developed model additional simulations of the effects on the pension system and individuals are offered.

In Chapter 6 Slovenian results are compared to the results for some other NTA countries. Although the results by countries (including Slovenia) are still a work in progress, some interesting patterns have already crystallized. An international comparison also reveals Slovenian specificities.

In Chapter 7 the main contributions of the dissertation are outlined. Thereafter, some of the limitations of the presented work are identified and further research opportunities are proposed. The dissertation concludes with a dissertation summary in Slovenian.

2 THEORETICAL FOUNDATIONS OF THE NATIONAL TRANSFER ACCOUNTS

Transfers among people of different ages are not only vitally important for the survival of an individual, but they also have a strong influence on inequality and economic growth. The direction and extent of these economic flows vary significantly among individuals. However, patterns appear when they are summed up to the cohort level. Having them available for countries at different development levels, institutional settings, cultural and other features

brings a new dimension to the analysis. Various questions, simulations and hypotheses can be analyzed when such results are accessible.

Next we will present several theoretical elements that are relevant to the NTA methodology. Further, we will describe some results of earlier studies that tackled the question of transfers in the sense pertaining to our analysis. However, this introductory chapter is relatively short for two reasons. First, in a broader sense, the NTA is linked to many different analyses and topics. Trying to review all of them would be very difficult or even impossible and it is also not the purpose of this dissertation. We will hence present this field in the narrower sense that is directly relevant to our analysis. Most of this work was done by authors who were initiators of the NTA project and are actively involved in the project. Therefore, the related work will already be presented when describing the NTA analysis and results.

Second, once the main results of the NTA analysis (age profiles by various categories) are calculated they are used in further analyses. We believe it is more appropriate to present the basic NTA method and the resulted age profiles first and only then to expand the analysis theoretically and empirically. Some parts that might otherwise constitute this chapter are thus postponed to later ones.

The origins of the current theoretical framework were presented in 1994 by R. D. Lee (1994), and R. D. Lee and Miller (1994). However, it was usually applied to specific questions based on a set of assumptions (like a steady-state equilibrium and golden-rule growth). On the other hand, Mason (1987, 1988) has done extensive research on population saving. Recently, both Ronald Demos Lee and Andrew Mason have, as the NTA project leaders, been intensively continuing and extending their work in the NTA framework.

2.1 LIFECYCLE THEORY

Lifecycle hypothesis originally emphasized how to maintain a relatively stable standard of living through a lifetime while one's income changes. According to modern consumption theory the decision about consumption is a lifetime decision-making process. The lifecycle theory assumes that individuals are planning their consumption and savings behavior over a long period. They want to allocate their consumption over the lifecycle in the best way to achieve the highest utility. The basic assumption is that people prefer stable lifestyles, consuming about the same level in each period. In addition the accumulation of assets is attached to the relationship between income and consumption. During the working period people's income exceeds the level of their consumption resulting from lifecycle optimizing. Therefore, individuals accumulate assets during their working period. After their working life is over, their income drops below the lifecycle level of consumption. To cover the difference an individual has to dissave (Dornbusch, Fischer, & Startz, 2001).

The lifecycle hypothesis has many points in common with the permanent-income hypothesis, although the latter has attracted more attention in the literature. This is perhaps because Milton Friedman has from its beginning suggested various tests for verifying the empirical relevance of the theory (Landsberger, 1970). In addition, the permanent-income theory argues that individuals plan consumption with a longer term estimate of income in mind – the income over their entire lifetime (Romer, 2006). Permanent income is thus a steady rate of consumption that someone can maintain for the rest of their life through wealth and income – that is currently earned and will be earned in the future (Dornbusch et al., 2001).

At first glance, this is exactly what is presented as the main results of the NTA methodology. In the NTA the lifecycle deficit is a central concept, showing the difference between consumption at a given age less the labor income at that given age. In the next step how this difference is covered through economic flows across ages is analyzed. However, there are important differences between the lifecycle hypothesis and permanent income theory on one side and the NTA approach on the other.

The NTA do not consider an individual as a unit that would rely on their income limitations and optimize through their lifetime. The NTA results indicate that individuals are largely involved in various processes of reallocation among age groups. This can be considered as evidence against the standard lifecycle model where Modigliani and Brumberg (Lüth, 2001) propose there is no transfer motive.

Further, the lifecycle is a longitudinal concept presenting the development of an individual or (usually) cohort through a lifetime. Usually there are no data available for the cohort's entire lifetime period. However, even if data are available the results depict happenings of about the past 100 years, including after the time longer living individuals of that cohort have passed away. These results therefore describe happenings in the distant past instead of describing the most recent developments. On the other hand, the NTA results represent a cross-sectional snapshot of a certain point in time, with well-known deficiencies of the results being synthetically composed from various generations – like being subject to cohort effects, postponing events through the lifecycle and therefore exhibiting biased results at the certain point in time etc.

We have to bear in mind the cross-section origin of the NTA when interpreting the results for the lifecycle deficit. Therefore, the results as such do not directly present the lifecycle of an individual. We can interpret them in this way by assuming that the age profiles obtained do not change much through time. Indeed, this assumption is used in various calculations. In addition, some basic conclusions about the lifecycle of an individual can be drawn from those results. However, we have to be cautious about drawing conclusions that are too strong. For each individual case we have to consider whether the cross-sectional nature of the age profiles can have a considerable impact on the results and conclusions.

The lifecycle deficit concept is also related to *lifecycle wealth*. A surplus of consumption has to be covered by decreasing the wealth owned by the individual or by increasing their debt. By discounting we can calculate the average lifecycle wealth by age that is required to sustain the desired path of consumption over the lifecycle. When in a given population the net reallocation is on average upward, the average person will hold positive lifecycle wealth. When the net reallocation is on average downward, this will result in negative lifecycle wealth for an average person. Whether the net transfers are flowing 'upward' or 'downward' among the age groups is important because the direction determines the effect of a increasing or decreasing population on the growth rate.

Intergenerational transfers are thus related to the process of wealth accumulation. Transfers among age groups and generations might be substitutes for wealth. Because of the transfer of wealth people can have lifecycle consumption paths that suit their needs better than market transactions alone (R. Lee, 1994; Samuelson, 1958). Therefore, there is an important relationship with lifecycle savings (Feldstein, 1974). As Kotlikoff and Summers (1981) pointed out, there might be a motivation for saving and capital formation because the elderly may want to leave bequests to their children.

2.2 FORMS OF REALLOCATION AND MOTIVES

The NTA represent a new approach to perceiving flows of resources between age groups. They simplify the analysis to the difference between what is produced and what is consumed by age groups. The missing part is covered through some sort of reallocation across ages – i.e. a transfer, credit transfer or capital accumulation (R. Lee, 2000).

In general, a reallocation can take various forms and be made through various mechanisms. They can be voluntary or enforced by law. In the latter case we above all have the public sector in mind. The transfers to and from individuals are provided by the public sector regardless of the will or choice of an individual. On the other hand, there are many different decisions made by individuals which might cause intergenerational transfers. They decide whether they will have children and how much they will invest in them, how much they want to bequeath to them etc. The decision about children usually has important and strong implications for transfer flows during an individual's life. Further, there are numerous market and other interactions that cause upward or downward net reallocations – like buying a house with a loan, buying stocks or bonds, paying private pension annuities etc. (R. Lee, 2000).

An important contribution of the NTA methodology is that it treats private transfers in an innovative way. The NTA decompose them into interhousehold transfers (transfers between different households) and intrahousehold transfers (transfers among members of the same household). Having all other forms of reallocation flowing among the age groups adjusted

against the aggregate controls, the intrahousehold transfers are calculated through a residual approach.

In the past researchers estimated private transfers in various ways, whereby the emphasis was on motives. Altruism is usually listed as the most prominent motive for private intergenerational transfers. This motive was introduced by Barro (1974) and Becker (1974). Altruism is incorporated into the models by the child's utility affecting their parents' utility.

Altruistic bequests are also relevant when analyzing the effects of public intergenerational transfers – like the pay-as-you-go system. Let us assume that the government in a given period cuts taxes and issues bonds in the international market. After a one-generation period the government raises taxes to repay the interest and principal. The tax burden is thus shifted from parents to the children. 'Ricardian Neutrality' suggests that, with altruism, public transfers from young to old agents will be neutralized by the private transfers flowing in the opposite direction. Therefore, the described government action would have no real effects (Lüth, 2001).

In past analyses intergenerational transfers were usually considered to predominantly be in the form of bequests. Actually, assuming no liquidity constraints the form and timing of the transfers do not matter because only the present value of received transfers is important. However, if young individuals are facing liquidity constraints their parents will transfer resources to them when they need them the most. In this case, the transfers will also (or predominantly) take the form of *inter vivos* transfers instead of bequests. A tax system that often levies lower tax rates on gifts than on bequests can be another reason for transfers taking the *inter vivos* form instead of a bequest (Poterba, 2001).

A second motive for private intergenerational transfers is accidental bequests. The research into this motive was initiated by Yaari (1964) and followed by various other authors. Unlike the altruistic motive, this motive considers bequests a consequence of uncertainty through lifetime. People want to avoid running out of resources in case they will live to some high age. Depending on how much earlier they pass away than anticipated, bequests arise. However, excluding the assumption about people deriving utility from leaving bequests to their children (altruistic motive) and assuming there are perfect annuity markets, people will prefer to purchase annuities and there will be no accidental bequests.

Accidental bequests are thus usually explained by imperfections in annuity and insurance markets, especially adverse selection causing returns on annuities below that of other forms – like bonds, for example. The analysis of Friedman and Warshawsky (1990) confirmed that annuity purchasers on average live longer than people in general. For some individuals it is therefore a rational option to invest in bonds instead of purchasing annuities. Having liquid assets for unexpected expenditures of a higher magnitude could be another reason for holding

bonds rather than purchasing annuities (which are not liquid). Serious illness in old age could be such an example – again, this argument assumes imperfect health insurance markets.

A third motive listed for intergenerational transfers is exchange. These transfers are seen as a payment for services provided by the extended family – a view that fits in with economic thinking well. According to this approach, the family is an institution that provides some services more efficiently and at lower costs than the market or they cannot be supplied by the market at all. Many different authors have explored the exchange motive. The basic and most general model comes from Cox (1987), while other authors developed various models emphasizing different elements of services (attention, insurance, loans), the timing of transfers (*inter vivos*, *post-mortem*), and the mechanism for how implicit transfers come into force (altruism, strategic interaction) – or their combination (Lüth, 2001).

Kotlikoff & Spivak (1981) assert that consumption and bequest-sharing arrangements in larger families or marriage can take the role of a complete and fair annuity market, especially if annuities are not provided by the market. Lucas and Stark (1985) depict a non-altruistic motive for migrants' remittances to their families, with both parties having an implicit understanding that this arrangement is of mutual benefit. To select certain members as migrants may be a Pareto-superior strategy of the family, while the remittances are the mechanism for redistributing the gains (Stark, 1995). Cox (1990) concluded that private intergenerational transfers are targeted at liquidity-constrained consumers. This should indicate that intergenerational transfers have a function of loans and subsidies to help family members overcome liquidity constraints. Rosenzweig (1988a) emphasizes the role of the family as a risk-mitigating institution, whereby its structure depends on the existence of formal institutions that serve to mitigate income risk or technological change (Rosenzweig, 1988b).

Thinking about the private intergenerational transfers through the exchange motive can also explain why parents prefer bequests over *inter vivos* transfers. If they were to transfer resources already during their lifetime there would be no assurance under the family arrangement that the family would support them in their old age (Desai & Shah, 1983) and their bargaining power would be reduced (Bernheim, Shleifer, & Summers, 1985).

The fourth motive given for private intergenerational transfers is the 'joy-of-giving'. In this model, the transfers enter the donor's utility function. However, there are not many testable implications of this motive since it reduced to the tautology that people make intergenerational transfers because they appreciate intergenerational transfers. This motive resembles the altruism motive yet there are also differences between them. While altruistic transfers are inversely related to beneficiaries' endowments, this is not the case of transfers motivated by joy-of-giving; the same is true for Ricardian Neutrality, prevailing in the context of pure altruism, but not under joy-of-giving (Lüth, 2001).

Past research mainly concentrated on interhousehold transfers (transfers between different households) and bequests. Researches sought to find out which motive is the most important. Empirical evidence in favor of a specific motive is inconclusive. However, some findings can be stressed. The volume of *inter vivos* transfers is significant. Cox and Jimenez (1990) concluded that in some countries up to one-half of all households either give or receive private financial transfers and they constitute a significant fraction of overall income for recipients and can be essential for the survival of very poor households. Since transfers before a donor's death are by definition intentional, this can be considered as evidence against the standard lifecycle model without a transfer motive as proposed by Modigliani and Brumberg. In their model, the young save for their older age so as to have money to spend when they either cannot or do not wish to work any more (Angus, 2005). In addition, the Ricardian Neutrality and unequal sharing of bequests is rejected by the data, with both offering evidence against pure altruism (Lüth, 2001). Thus, the general findings indicate that transfer behavior fits the exchange model more closely than the altruism model (Cox, 1987; Cox & Rank, 1992) or that the data reject the altruism hypothesis (Altonji, Hayashi, & Kotlikoff, 1992, 1997).

We have listed those motives because most of them are also relevant to *inter vivos* transfers and to emphasize that bequests were the primary interest of private intergenerational transfers in the past. In the analysis presented in the dissertation bequests are not included in the analysis. They represent capital transfers while the basic NTA results only include flows. For example, if someone inherits a house, land, bonds, stocks etc. this does not affect the flows of money, unless they sell this capital, the capital is consumed or it yields an income. Including a complete set of capital transfers in the NTA analysis is a task that is currently under development.

The NTA analysis also does not concentrate on motives for interhousehold and intrahousehold reallocations. It documents and calculates flows among age groups without trying to find definite answers about the motives. However, it is implicitly assumed that those flows are transfers (with no *quid pro quo*) instead of being an exchange.

2.3 DEMOGRAPHY-ECONOMICS LINK

The origins of the research on the demography-economics link date back to Samuelson's 'overlapping generations' model from 1958. The model was very simple, as already pointed out by the author himself. He assumed that men enter the labor market at the age of about 20, they work for about forty-five years and then they spend fifteen years in retirement (Samuelson, 1958). The idea of a two-period case with two overlapping generations (the young and the old) and a mathematically derived equilibrium has attracted huge interest and been further developed by other authors.

Arthur and McNicoll stressed that Samuelson's finding represents important progress compared to Solow's neoclassical model. In Solow's model, rapid population growth was considered harmful to economic growth because an increase in population growth requires greater investment to maintain the level of capital per head. Consequently, there are fewer resources left for consumption and capital deepening. In Samuelson's model of overlapping generations, having more children provides people with more extensive support when they are old (Arthur & McNicoll, 1978).

Arthur and McNicoll proposed more realistic assumptions. They adopted the individual as a basic unit and they followed him through the lifecycle. Production and consumption are spread realistically over a continuous lifecycle (instead of assuming just two statuses – being young or old), where people are treated from birth onwards (instead only from the age of 20 years on). Both time and age are measured as continuous variables. Having transfers to younger people in the model, the net intergenerational transfer effect is no longer necessary positive. Life span is subject to an age-specific mortality risk (Arthur & McNicoll, 1978, p. 242). Further, they also introduced savings and physical capital into the model, together with the assumption that aggregate output depends on aggregate labor and capital.

The Arthur and McNicoll model went into the essence of the relationship between population growth and its economic consequences. In the second half of the 20th century there were recommendations to reduce the rapid population growth seen in less developed countries. This suggestion was a straightforward conclusion based on the Solow model. However, when taking the age structure into the account, the results depend on the population setting regarding intergenerational transfers. These transfers can have different forms – private transfers among family members, public transfers or transfers involving the market. Some of them can flow in an upward direction and some in a downward direction. Estimating the effects of **negative** population growth is more relevant nowadays in developed countries. In addition, in developing countries rapid population growth is expected to eventually slow down and turning into rapid population ageing as well.

In a society where transfers are flowing from the older to the younger (i.e. 'downwards') population ageing may have a positive long-run effect because of a capital-deepening effect. In contrast, societies with 'upward' transfers like a pay-as-you-go system for financing old-age security see a reduction of the net savings of the household sector. In addition, with population ageing the system may become impossible to maintain without increasing taxes and/or reducing retirement benefits. The direction and magnitude of transfer systems is thus crucial. Besides transfers at the aggregate level, different subsystems of transfers can also be analyzed separately (National Research Council (U.S.), 2001). In particular, in the dissertation we will analyze the link between the demographic structure and the number of effective consumers and producers through the *first demographic dividend*, while the effect of a changing demographic structure on savings will be examined through the *second demographic dividend*.

2.4 DIRECTION OF FLOWS

At the beginning of their life the human being needs transfers, predominantly from their parents, to survive. When old and when they pass away they often make transfers to younger people. In addition, due to uncertainty about survival and impatience people are generally encouraged to consume goods earlier than when being able to finance them through labor earnings. In such cases, the direction of the net flows is 'downwards' from older to younger ages.

On the other hand, there are various reasons for reallocating resources 'upwards'. People want to ensure their consumption for those times when their productivity will decrease and they will not work anymore. Unlike those two reasons that people are expecting, they also want to address the risk that something might unexpectedly happen and they will need resources to cover consumption. Further, people are encouraged to save because they are rewarded with positive interest rates, enabling them to consume more if they delay their consumption. They might want to leave bequests to their children. Transfers can result from young children's surplus of earnings over consumption. The elderly can be supported by their children when they are old and needy. In all those examples there is a net upward reallocation of income from younger to older ages (R. Lee, 2000; Lüth, 2001).

According to Caldwell's results, in '… all primitive societies and nearly all traditional societies the net flow is from child to parent' (Caldwell, 1976, p. 140). He was explaining that the direction of flows of wealth shifts when society goes through a demographic transition. Before the transition, net flows from younger to older people are expected, while after the transition the direction of the flow should reverse. This change is due to the spread of new values that emphasize individual satisfaction and achievements. Based on these conclusions the theory proposes that fertility decisions are economically rationale responses to familial wealth flows (Caldwell, 1980, 1982).

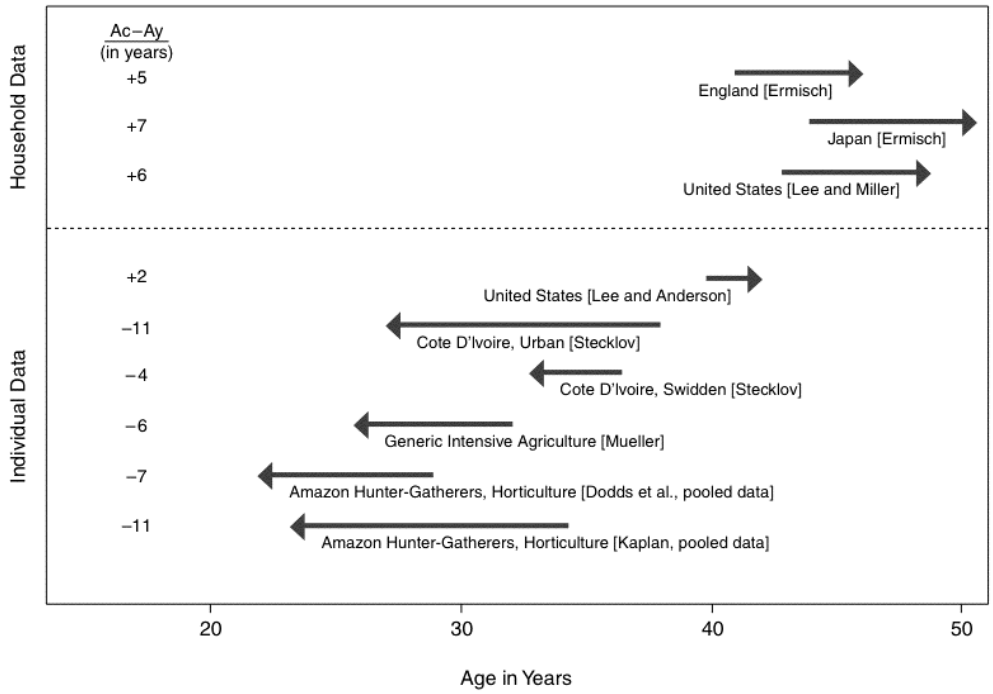
However, for Lee just the opposite is true. Through time the demographic situation and economic settings change. There have been various estimates about the direction of transfers at various stages of development through history. Lee argues that in pre-agricultural societies the flows of transfers were strongly downward – i.e. from older to younger people. In addition, in agricultural societies before the demographic transition they were, very likely, still downward (R. Lee, 2000).

Caldwell's theory was challenged already earlier, probably most explicitly by Kaplan. In the 1980s he thoroughly examined: 1) the northern Ache in the subtropical forests of eastern Paraguay (about 200 inhabitants); 2) the Diamante of mixed, but mostly Piro, ancestry in southeastern Peru at the base of the Andes (also about 200 inhabitants); and 3) the Yomiwato consisting of 105 Machiguenga in southeastern Peru. They were at the hunting-and-gathering level. Those groups provided food through swidden agriculture, together with hunting and

gathering. Based on analyzing calorie intakes and production he has asserted that in all of those communities the net flows were strongly downwards – i.e. from adults and the elderly to the children (Kaplan, 1994). This is in line with findings of other evolutionary biologists who expect that net wealth flows are downward in all organisms, including humans.

According to Lee, in the modern industrial welfare state the direction of flows has reversed. The reversal is a result of two changes: 1) population ageing combined with spending an extensive period in retirement status; and 2) institutional changes with the enhanced function of state transfers, property rights, emergence of financial institutions, capital markets, insurance (R. Lee, 2000).

Figure 1: Summary of inter-age reallocations in various contexts



Source: R. Lee, Intergenerational transfers and the economic life cycle: A cross-cultural perspective, 2000, p. 44.

In Figure 1 the results of relevant studies are summarized. The orientation of the arrows represents the direction of the net flows in different societies. The tails of the arrows represent the average age of production (labor earnings), while the point of the arrow indicates the average age of consuming.

To summarize, in the evolutionary past children were nutritionally dependent until a certain age. Massive transfers were required from parents and other society members to fulfill their basic needs. People were usually net producers until their death and therefore the elderly almost did not require any transfers. All transfers were private since a public system did not exist. There was also no system of asset accumulation and therefore no asset-based

reallocation. Today, children are still dependent (even at much higher ages[2]), also requiring extensive transfers. However, nowadays children also receive transfers (education, health care) from the public system, thereby mediating the transfers instead of relying only on private transfers. Public transfers to the elderly enable them to work less or even not to earn a labor income at all. Asset-based reallocation is an important mechanism of transfers, but can differ considerably among countries (R. Lee & Donehower, 2009, January).

There are different institutions via which transfers flow. The family has been a central institution for the individual through history. However, other institutions have also been accompanying it. Of these, the state has lately become a very dominant institution for regulating transfers. It has overtaken many functions that other institutions have held in history. In economic terms, the public sector represents a very large share of the economy (R. Lee, 2007, November).

What is new compared to the past are transfers to the elderly. In the last few decades life expectancy at birth has gone up tremendously while the age of retirement has decreased. People enjoy a large part of their life in retirement status receiving transfers in the form of pensions. Yet this arrangement has lately been challenged by ageing populations.

People are nowadays living much longer than centuries or even decades ago and this is something about which we all can be happy. It is an achievement of modern societies, with higher living standards, where people rarely die of hunger; practically all have access to at least a minimal health care system while also prolonging people's lives through pharmaceutical products, surgery etc. However, the process of *individual* ageing has to be distinguished from the process of *population* ageing. Population ageing denotes an increasing share of people above some age (usually age 60 or 65) in the total population (Malačič, 2006). This process is receiving more and more impetus.

Fertility has dropped far below the replacement level. Combined with the increasing longevity and baby-boom generations that will start to commence retirement *en masse* in the following decade, the share of the elderly population will rise strongly compared to the employed population. In the past, not many people achieved a high age and those who did remained relatively productive. Thus, old-age dependency has resulted from changes in both the demographic lifecycle and the economic lifecycle (R. Lee, 2000).

With the changing demographic structure the patterns of economic flows across age groups are becoming increasingly relevant. In previous research it was estimated that these transfers

[2] In the traditional reproduction regimen people already started to work in early childhood (Malačič, 1985, p. 30). In England, for example, parents already sent their children off to work at about the age of 12 (Malačič, 1985, p. 31). Nowadays in developed countries almost all young people are enrolled in secondary education and more than half of the young generations continue education at the tertiary level. Consequently, the period of dependency has extended greatly.

are very large and important. Lee and Miller (1994) estimated the present value of expected future transfers (i.e. 'transfer wealth') for the USA in 1987 to be about two-thirds as large as the country's real wealth. In Taiwan even family transfers alone were estimated for 2000 to be about half of the country's total material wealth (R. Lee, Mason, & Miller, 2003).

In the past, intergenerational transfers were approached from various angles, but always partially. Different authors drew varying conclusions. Given the differences in approaches, differences in the set of transfers included in the analysis, different assumptions etc. it is difficult to compare their findings and draw firm conclusions for different countries and time periods. It would be desirable not only to develop a comprehensive and systematic methodology for this analysis but also to apply it to different countries. There has been a need to comprehensively analyze intergenerational transfers from the macro perspective. The *National Transfer Accounts* represent a methodological framework that seeks to fill this gap.

3 METHODOLOGY OF THE NATIONAL TRANSFER ACCOUNTS

3.1 RESEARCH HYPOTHESES

The human being is a creature that needs help from other older humans for an extended period of time to survive. In older age this is not necessary in all cases since some individuals work and take care of themselves through to the very end of their life. However, often their production is not enough to cover their consumption. With economic development those two periods of dependency have been prolonged. In developed countries almost all the young continue education at the secondary level and a large share of them also at the tertiary level. Therefore, many of them remain economically dependent long after becoming biologically capable of taking care of themselves. On the other side, the elderly usually also do not work for the entire period they are biologically capable of producing. In developed countries there are widespread pension schemes that enable people to retire, even though they are still very productive and healthy. Based on these arguments, which hold also for the Slovenian case, we propose the following chief hypothesis:

Hypothesis 1*: There is a strong economic lifecycle at the individual level.*

When observing the age structure of the Slovenian population we see that currently there are many people aged 40-60 years in Slovenia. They are members of baby boom generations born after World War II. At the same time, in the last three decades the number of newborns has declined radically. Even without having detailed results about the economic lifecycle, we know that in the last few decades the first group was predominantly of working age, while the

latter group was predominantly dependant. If that is true, Slovenia has in the last few (three) decades enjoyed an advantageous population structure. However, baby boom generations will soon start retiring, while children born in the last three decades are already starting to work. Holding the age profiles of consumption and production constant through time and by taking into consideration that extra resources originating from the positive changes in the demographic structure are called the 'first demographic dividend' we pose the following hypothesis:

> ***Hypothesis 2****: In the last three decades of the 20th century there was a positive first demographic dividend in Slovenia and it has continued in the first decade of this century. However, in the second decade of this century the positive demographic dividend is expected to turn into a negative one.*

Further, the calculations will also provide the magnitude of this effect, which will be more comprehensive than by simply decomposing GDP per capita into GDP per active person and activity rates. By having the age profile of labor income and consumption through the whole lifecycle the **effective** number of producers and consumers can be calculated. This provides more accurate results than the described decomposition, which only classifies people as active or non-active regardless of how much they produce and how much they consume.

The economic flows among age groups can be presented separately by sectors, including the public sector. In developed countries like Slovenia the public sector is a very important mediator of intergenerational flows. By building on the calculated age profiles and combining them with population projections, we can project future public revenues and expenditures. To make the result more realistic we will introduce appropriate adjustments to the initial age profiles. By already knowing that public transfers to individuals are largely concentrated among the elderly (pensions, health care, long-term care) and that the public system is predominantly financed by those of working age we posit another hypothesis:

> ***Hypothesis 3****: Serious imbalances in Slovenia's public finances in the future will result if the current fiscal system does not change and future demographic projections are materialized.*

As explained, we expect that in developed countries the periods of dependency among the elderly and young are expanding. We expect that in less developed countries the public sector is less involved in flows among age groups than in developed countries since the public system in those countries is less developed. However, the pattern of flows among age groups is not only determined by the development level but also depends on the socioeconomic system, cultural, moral, historical and many other factors. Based on the results for other countries included in the NTA project we will test the following hypothesis:

***Hypothesis 4**: There are large differences among countries regarding the magnitude of transfers and their distribution by age groups. In addition, the structure of private and public transfers can differ considerably.*

3.2 NATIONAL TRANSFER ACCOUNTS (NTA)

National Transfer Accounts (NTA) is a system that measures the reallocations of economic resources between people of different ages. At some ages people produce more than they consume while at others they produce less than they consume. This reallocation across age is measured at the aggregate level in a comprehensive way.

From a technical point of view NTA use approaches similar to those previously used in other analyses, above all in generational accounting, although there are conceptual differences between those two methods. However, none of the earlier methods has tackled the subject in such a comprehensive way. Another strength of the NTA lies in relating the analysis to the well established, recognizable and internationally used **System of National Accounts** (SNA). NTA are synchronized with the SNA, which also presents the main source of the aggregate data for NTA. Perhaps the shortest definition of the NTA is that they introduce the age dimension into the SNA. But, as will be presented, their ambitions go beyond that.

We will shortly describe the SNA since the NTA build on it. The SNA systematically, comprehensively and consistently present the main macroeconomic categories. They consist of a coherent, consistent and integrated set of macroeconomic accounts that provide a comprehensive aggregate picture about the economy. However, at the same time they also provide very detailed information about complex economic activities when needed (Eurostat, IMF, OECD, UN, & Bank, 1993). The last revision of the SNA is from 1993 and provides world-wide guidelines on national accounting.

In the European Union (thus also in Slovenia) the **European System of Accounts** (ESA) is used. It is fully consistent with the SNA. The ESA is focused more on the circumstances and data needs of the European Union itself, while the SNA tend to be more universal and also provides general guidelines. Both are harmonized with the concepts and classifications used in many other social and economic statistics (Statistical Office of the European Communities, 1996). For further details about the SNA, see the Inter-Secretariat Working Group on National Accounts (1993), while a comparison of both systems and putting them into a broader context is undertaken in Bregar, Ograjenšek & Bavdaž Kveder (2002).

The SNA observes the economy from three angles: 1) production by sectors in which product and services are produced (sectors by ISIC[3] classification); 2) how the produced wealth is distributed among the production factors that have produced it (employees, owners of incorporated businesses, government); and 3) how the distributed wealth is consumed (consumption, gross investment, government spending, and net exports). Depending on those three aspects there are three methods of measuring gross domestic product (GDP): production method, income method and expenditure method. Because all of them are observing the same economy, their aggregate values (GDP) should perfectly match. Through the process of adjustments this is indeed achieved. When analyzing aggregates from the income point of view, we will use the SNA term also to refer to the National Income and Product Accounts (NIPA), where the income aspect is employed.

The SNA describes flows between five sectors: 1) households (including non-profit institutions serving households); 2) government; 3) financial corporations; 4) non-financial corporations; and 5) the rest of the world. Although comprehensive and detailed in presenting macroeconomic flows between those sectors, they do not provide an insight into the following two dimensions. First, they do not provide any information about the flows of private (familial) transfers. Second, they do not contain information about flows between people of different ages. The NTA complement the SNA in those two directions, while remaining synchronized with the SNA. After introducing the age dimension into macroeconomic categories the NTA extend the analysis into various directions and provide a useful input for many other analyses as well.

While the SNA is concentrated on the five sectors listed above, the central analytical entity in the NTA is the individual. Institutions (sectors) like government, financial corporations, etc. are only mediating and redistributing flows between individuals. In terms of sectors, the NTA differentiate between the private and public sectors. However, at the end in the NTA everything has to be assigned to individuals – as an inflow flowing to them or an outflow flowing from them. If the data are available at the level of individuals, they are directly applicable to the analysis. Some data like, for instance, those on consumption in the Household Expenditure Survey (HES) are only available at the household level. In such cases, household data have to be allocated to individuals, whereby different methods can be used. When transfers are (re)distributed through institutions, assumptions are made about the most appropriate age profiles to allocate their categories to individuals. Questions like who owes the public debt, who receives the capital income of non-financial corporations etc. arise.

[3] The 'international standard industrial classification' used by the United Nations. In Europe NACE ('Nomenclature statistique des activités économiques dans la Communauté européenne') is used, while in Slovenia SKD ('Standardna klasifikacija dejavnosti') is employed. They are all synchronized with each other up to a certain level.

Below we present the ideas and equations of the NTA methodology. The text follows the description and denotations of the methodology available on the website of the NTA project (www.ntaccounts.org) within which the NTA method is being developed.

Just like the SNA and accounting in companies, all accounting events in the NTA have equalization counterparts. For each age group inflows are matched with outflows. This is also true for the central NTA's budget identity, which holds at the household level, but also for individuals, every age group, and for the whole economy:

$$YL + YK + YM + T_g^+ + T_f^+ = C + I_K + I_M + T_g^- + T_f^- \quad (1)$$

The left-hand side of Equation (1) represents total income which consists of labor income (*YL*), returns to capital (*YK*), returns to land and credit (*YM*), transfer income from the public sector (T_g^+) and transfer income from the private sector (T_f^+). Total expenditures on the right-hand side of Equation (1) consist of total (private and public) consumption (*C*), investment in capital (I_K), investment to credit and land (I_M), transfer payments to the government (T_g^-) and transfers to the private sector (T_f^-). Inflows from the left-hand side of Equation (1) thus match the outflows from the right-hand side of Equation (1).

Equation (1) can be rearranged. By subtracting T_g^- from T_g^+ we obtain net public transfers (T_g); subtracting T_f^- from T_f^+ results in net private transfers (T_f); the sum of *YK* and *YM* we will denote as return to assets (*YA*); while summing up I_K and I_M results in net savings (*S*). By this pooling Equation (1) is reduced to:

$$YL + YA + T_g + T_f = C + S \quad (2)$$

Equation (2) says that total disposable income (the left-hand side) equals the consumption (private and public) plus savings (the right-hand side).

The NTA represent national values; therefore the left-hand side of Equation (2) represents national disposable income. For the same reason, labor income (*YL*) also includes the net compensation of employees from abroad, while returns to assets (*YA*) also includes property and mixed income from abroad. The same holds for net private transfers (T_f) and net public transfers (T_g).

Although the categories appear to be the same as in the SNA system, some adjustments are necessary. We have to adjust the labor income category (*YL*) and the asset income category (*YA*). From labor income (*YL*), which in the NTA includes all compensation that is a return-to-work effort, indirect taxes on consumption are subtracted. On the other hand, net

compensation from abroad and the labor share of mixed income are added to the compensation of employees.

As suggested by its name, mixed income, also called 'entrepreneurial income' or 'proprietors' income' or 'income from self-employment', is a mix of labor and capital income. Data separated into those two categories are not available at the aggregate level. However, the NTA methodology requires this division. Also at the micro level (in surveys) this information is unavailable. But even if that information were available, to what extent the data reflect the true situation would be questionable. The reason is that a self-employed person can report their labor share and capital share to the tax offices in such a decomposition so as to minimize their tax payment. At the current stage of the NTA methodology it is arbitrarily assumed that two-thirds of mixed income is the labor income and one-third is capital income.

The aggregate control for labor income (*YL*) is thus calculated as the compensation of employees including the net compensation of employees from the rest of the world (*YLC*) plus two-thirds of the mixed income (O_h).

$$YL = YLC + \frac{2}{3} O_h \tag{3}$$

Income on asset (*YA*) is calculated as the total operating surplus including net property and mixed income from abroad (*o*) plus indirect taxes allocated to capital ($TGSMI_a$) less subsidies less two-thirds of the mixed income (as explained, this part goes to labor).

$$YA = o + (TGSMI_\alpha) - Subsidies - \frac{2}{3} O_h \tag{4}$$

The rationale for adding the indirect taxes allocated to capital and subtracting the subsidies is the fact that the income method of measuring GDP presents income as income **after** taxes and subsidies. To obtain income **before** taxes and subsidies, being matched with the expenditure method of GDP, we have to reverse the process of calculation.

Aggregate control for private consumption is calculated as private final consumption obtained from the SNA less indirect taxes allocated to consumption ($TGSMI_c$) less import duties:

$$\text{Aggregate Control Private Consumption} = \text{Private Final Consumption} - TGSMI_c - \text{Import Duties} \tag{5}$$

Operating surplus is a category reported in the SNA. It is reported separately for incorporated and unincorporated business. In the NTA we understand by 'operating surplus' both of those categories joined and calculated as:

(Net) operating surplus = Gross Domestic Product – Depreciation – Compensation of Employees – (indirect taxes plus import duties less subsidies) (6)

The interesting part of the NTA calculation is intrahousehold transfers, which are transfers that flow among members of the same household. The analysis is concentrated at the micro level and the calculation is based on the residuals. At the macro level domestic intrahousehold transfers are zero since outflows from individuals of certain age groups are inflows to individuals in other some age groups. At this point, we will only present the macro controls of the intrahousehold transfers, while detailed calculations at the micro level will be presented in Section 3.4.1.2.1.

The aggregate controls for intrahousehold transfers are derived from the following variables:

$$x(i,j) = \theta^{YL} YL(i,j) + \theta^{TGC} TGCash(i,j) - \theta^{TGT} TGTax(i,j) + \theta^{TPB} TPB(i,j) - \theta^{CC} CC(i,j) \quad (7)$$

where *TGCash* stands for total cash transfers received by individuals, *TGTax* are total taxes paid by individuals, *CC* stands for private consumption, while *TPB* are interhousehold transfers. Further, *i* is a subindex for individuals and *j* is a subindex for households. θ^{YL}, θ^{TGC}, θ^{TGT}, θ^{TPB} and θ^{CC} are proportional adjustment factors, invariant by age, individual and household. They are used to adjust data, available at the micro level, to match the aggregate controls. For example, the proportional adjustment factor for labor income (*YL*), derived from Equation (3), is calculated as:

$$\theta^{YL} = \frac{YL}{\sum_a YL(a)N(a)} \quad (8)$$

where $YL(a)$ is the per capita age profile of labor income and $N(a)$ is the age distribution of the population. The rationale behind Equation (7) is to compare inflows to individuals (*YL*, *TGCash*) with outflows from individuals (*TGTax*, *CC*). *TPB* can be outflows as well as inflows assigned to the household head. They are interhousehold outflows if the household is giving transfers to other households, and they are interhousehold inflows if the household is receiving transfers from other households.

Data for all the categories required by the NTA methodology have to be provided somehow. If data are not available directly, the best proxy is sought to be found or estimated from the available data. As a last resort, aggregate data estimates can be obtained from the sample (survey) data. In this case, a serious overestimation or underestimation of aggregate categories can result. Finally, the NTA methodology is still under development. There is a continuous search for better solutions, also depending upon the available data.

Next, we present aggregate components that were so far only outlined in more details. Further, the methodology for calculations at the micro level will also be presented.

3.3 LIFECYCLE DEFICIT

The lifecycle deficit is a central concept of the NTA methodology. For age group *a* the lifecycle deficit (*LCD*(*a*)) is defined as the difference between the consumption (*C*) of age group *a*, and the labor income (*YL*) of that age group *a*:

$$LCD(a) = C(a) - YL(a) \tag{9}$$

If the lifecycle deficit in some age group *a* is positive, members of that age group consume more than they produce. Their consumption has to be covered through some other sources – there will be *age reallocation inflows* through which age group *a* will cover the consumption surplus. On the contrary, members with a negative lifecycle deficit consume less than they produce. Those members will generate *age reallocation outflows*. In total, the age reallocation outflows of some age groups match the age reallocation inflows of other age groups. The NTA try to answer two questions that arise at this point. First, in which age groups does people's consumption exceed their production and vice versa – in which age groups do they produce more than they consume. Second, what are the forms and structure of age reallocation flows through which the lifecycle deficits are covered.

For now we will just briefly mention that an age reallocation can be in the form of transfers or asset-based reallocation. Both of them can have a public or private nature. We will present those two forms of age reallocation in more details below, but first we will present the components of consumption and labor income – the categories from which the lifecycle deficit is calculated.

3.3.1 Consumption

In the NTA consumption is disaggregated into private consumption and public consumption. All components of consumption and incomes have to be entirely assigned to individuals.

3.3.1.1 Private consumption

Although the NTA tend to be synchronized with the SNA, some adjustments regarding the private consumption have to be made. Obeying these relations the SNA categories are used as a data source for the NTA variables and calculations:

1. In the SNA indirect taxes on consumption are also included as part of consumption. However, those taxes should not be included in the NTA; therefore, they have to be subtracted from the consumption reported in the SNA.

2. In the SNA public consumption is defined as the value of goods and services purchased by the general government. Purchases made by individuals and reimbursed by the government are classified as private consumption. In the NTA there is tendency to treat those expenditures as public consumption. We think that this item is less relevant for the Slovenian case where such a kind of public financing is quite rare. Most publicly financed goods and services are financed directly by the government.

3. The SNA treats expenditures for consumer durables as current consumption. In the ideal NTA world purchases of durables would be treated as an investment. Every year this investment would yield a flow of services that would be accounted for as consumption. At the same time, the value of investment would decrease accordingly. The problem is that there are usually no data available on the value of durables that individuals (or households) possess. In the Slovenian case and in most other countries expenditures on durables are nowadays therefore treated as current consumption. Thus, for now there are no differences between the NTA and SNA about treating durables.

The NTA distinguish the following components of private consumption:

1. *Private education consumption* includes private expenditures that households make regarding education. Those expenditures are, for instance, expenditures for books and fees, school supplies for all school levels including pre-school and tutoring expenses, tuition fees etc.
2. *Private health consumption* includes out-of-pocket health expenditures and reimbursements to health providers as provided by private health insurance companies. Thus, expenditures covered by the voluntary health insurance (in the Slovenian case provided by 'Vzajemna', 'Adriatic Slovenica' and 'Triglav') are also taken into account.
3. *Private consumption of housing*, capturing the rental value of owner-occupied housing, i.e. *imputed rents*.
4. *Other private consumption* encompassing all remaining private consumption, not included in the categories listed above (including actually paid rents).

Those categories were formed after also having the international setting in mind. In some countries private expenditure on education and health represent a large proportion of total private consumption expenditures. However, in the Slovenian case and in some other countries these two categories are predominantly covered through the public system. Still, they are interesting because they are highly age-specific, as we will see, and it is also

interesting to analyze how they complement (or do not) public expenditures in those two categories.

3.3.1.2 Public consumption

By the public sector we have the general government in mind. In the Slovenian case it constitutes the central government, local governments (municipalities) and the two compulsory social security funds (the Institute of Pension and Disability Insurance of Slovenia and the Health Insurance Institute of Slovenia). In the NTA, the public sector is seen as an intermediary that allocates resources across age groups and also through time. Also, all public consumption has to be allocated to individuals.

Part of public consumption is directed to known beneficiaries ('individual public consumption') while the remaining part supports general systems like national defense, police, government bodies etc. ('collective public consumption'). Analogous to the decomposition of private consumption, where health and education represent separated categories, the NTA method distinguishes three categories of public consumption: 1) education expenditures; 2) health expenditures; and 3) other public expenditures.

3.3.2 Labor income

In the NTA labor income consists of:

1. Compensation of employees, encompassing all categories which are a return-to- work effort: labor earnings, employer-provided benefits including social contributions, compensation to those on paid leave etc. The compensation of employees consists of 'earnings' (wages and salaries) and 'benefits' representing an employer's social contributions.

2. Labor's share of net mixed income, also known as the 'operating surplus of unincorporated enterprises' or 'entrepreneurial income' or 'proprietors' income'.

Earnings and benefits will be further described in Chapter 4 when presenting data and calculations for the Slovenian case.

Besides the described issue of not being decomposed into labor and capital components, mixed income is subject to another issue. The data about mixed income are usually available at the household level. According to the NTA system the return to labor has to be allocated to individuals. In some countries mixed income is reported by individuals, making it appear that this problem is not relevant. However, the total amount of mixed income that a household

receives is often assigned to the household head, leaving the spouse, children and unpaid family workers without any reported mixed income. This could lead to the over-reporting of labor income in those age groups where household-heads are concentrated, and the under-reporting of labor income among younger and possibly older age groups.

If we suspect that this problem is present, we can introduce an alternative approach of distributing mixed income to the household members. The procedure uses the mean wage of wage earners as weights for allocating the mixed income to the household members. Relative wages are taken from the estimated wage age profile of the whole population. The rationale behind this procedure is that the relative wage profile also depicts the productivity age profile – i.e. the relative productivity of one age group compared to other age groups. The same weights are then also used for allocating the mixed income of each household to its members. In other words, it is assumed that productivity in producing the mixed income depends on age, whereby productivity by age is supposed to be captured by the age profile for wages. Technically, $YLS(a, j)$, denoting the self-employment (i.e. mixed) labor income of an individual of household j who is aged a, is calculated as:

$$YLS(a, j) = \gamma(a) YLS(j) \tag{10}$$

$$\gamma(a) = \frac{w(a) N(a, j)}{\sum_x w(x) N(x, j)} \tag{11}$$

where $YLS(j)$ stands for the self-employment labor income for household j, which is two-thirds of the mixed income of household j; $w(x)$ is the average wage of employees aged x; $N(x, j)$ is the number of persons in household j who are self-employed, unpaid family workers or employers; and $\gamma(a)$ is the share of total household self-employment labor income allocated to each household family member being a self-employed or unpaid family member aged a.

Following this procedure the total self-employment labor income for individuals aged a in each household is calculated. After having assigned the data to individuals, the standard procedure of forming age profiles if applied: total self-employment labor income at age a, reported in the survey, is divided by the number of individuals aged a in the survey. In the final step the relative age profile is adjusted to match the aggregate values drawn from the SNA.

3.4 REALLOCATIONS

According to the NTA framework, the lifecycle deficit can be covered through *transfers* or through *asset-based reallocation*.

By rearranging Equation (9) and having in mind (as already explained when going from Equation (1) to Equation (2)) that *YK* and *YM* sum into return to assets (*YA*) and that I_K plus I_M equals net savings (*S*), we obtain:

$$\underbrace{C(a)-YL(a)}_{\text{Lifecycle deficit}} = \underbrace{YA(a)-S(a)}_{\text{Asset-based reallocations}} + \underbrace{T_g^+(a)-T_g^-(a)}_{\text{Net public transfers}} + \underbrace{T_f^+(a)-T_f^-(a)}_{\text{Net private transfers}} \quad (12)$$

$$\underbrace{\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad}_{\text{Age reallocations}}$$

If the value of goods and services consumed by the members of a given age group exceeds the value of goods and services produced by members of that age group the lifecycle deficit is positive. The difference has to be covered through age reallocation inflows. This can be in the form of positive net public transfers (receiving unemployment benefits from the public sector, for example), positive net private transfers (children, receiving transfers from their parents, for example) or through asset-based reallocation (selling government bonds, for example). In contrast, for age groups with a negative lifecycle deficit the labor income exceeds consumption, generating age reallocation outflows.

3.4.1 Transfers

Transfers are determined by a combination of legislation, social norms and individual choices (R. Lee, 1994). They are defined as all economic flows (according to the NTA definition) that do not involve *quid pro quo*. The one who is giving them does not receive any direct payment, any contra transfer etc. They include **current** transfers only, while capital flows form a separate category. However, we cannot know if a transfer is really a transfer or whether it is a transaction since we do not know the motives and expectations of both parties. Therefore, in the NTA we estimate presumptive transfers, for which we believe they are mostly transfers (R. Lee & Donehower, 2009, January, p. 5).

3.4.1.1 Public transfers

Again, according to the accounting rules, inflows equal outflows and they are all assigned to individuals. If someone is receiving something from the government, this is an inflow to them; if someone is giving or paying something to the government, this is an outflow from them. Yet, as already mentioned, the government is only an intermediary that mandates or directs the transfers of resources between age groups. At the aggregate level in the closed economy net transfers would net to zero, while in an open economy they equal net public transfers received from abroad. Despite being largely canceled out at the aggregate level,

there can be huge transfers between age groups – positive for some of them and negative for others.

Public transfers consist of *in-kind* transfers and *cash* transfers. In-kind transfers by definition equal public consumption. They are decomposed into the same three categories as public consumption: education, health and other. Also, their age profiles are the same. Public cash transfers are public transfers that are received by individuals, from the government, in a money form. They include transfers like pensions, child allowances, maternity leave, unemployment benefits etc. Data sources on the age structure of beneficiaries of particular cash transfers can be administrative sources in the government, disaggregated by the age of recipients. If that is not the case, the age profile can be estimated from surveys in which people report public cash transfers as their income.

3.4.1.2 Private transfers

Private transfers consist of interhousehold transfers and intrahousehold transfers. Interhousehold transfers can take the form of gifts, different kinds of alimony and all other forms of transfers that flow between **different** households. They also include transfers that flow to/from abroad, like remittances, since those are transfers between different households as well. Intrahousehold transfers flow among members of the **same** household. A comprehensive estimation of intrahousehold flows is an invention of the NTA methodology and we therefore will present them in detail.

3.4.1.2.1 Intrahousehold transfers

Data on transfers between household members usually do not exist. In the past it was therefore difficult to analyze intrahousehold transfers. The analyses were limited to cases and territories for which such data were available, mostly from special surveys made for that purpose. Further, the analysis was partial – concentrating only on intrahousehold transfers without linking them to other kinds of transfers.

With the NTA approach we can tackle intrahousehold transfers even without having any data on the flows among household members available. The key lies in the residual approach, which is possible because of having all variables adjusted to the consistent aggregate controls. Household members have to cover the difference between their consumption and **disposable** income through intrahousehold transfers. The disposable income is defined as the sum of: 1) labor income; 2) net public cash transfers (cash inflows minus paid taxes); and 3) interhousehold transfers (which by assumption flow among the household heads, as will be explained in the continuation). Intrahousehold transfers flow from those household members

who are consuming less than their disposable income to those household members who are consuming more than their disposable income.

Total consumption of all household members can be greater than their total disposable income or vice versa. At this point the NTA introduce a set of assumptions, rounding them up into the model for calculating intrahousehold transfers. For intrahousehold transfers the agent method (R. Lee & Mason, 2004) is used, which assumes that household members who are **not the head** of the household use their incomes (i.e. incomes from labor and public transfers in a money form, after subtracting taxes) only for the consumption of products and services. By assumption they do not accumulate assets nor do they receive interhousehold transfers, which are by definition assigned to the household head.

It is also assumed that the current consumption deficit (current consumption exceeding the disposable income) of the household members is financed by all household members that have a current consumption surplus (current consumption smaller than disposable income). Each household member with the current consumption surplus transfers the same share of his/her surplus to the members with a current consumption deficit. Putting it more technically, within the household each member with a current surplus is 'taxed' at the same rate to cover the current deficits of those members in the same household who have a current deficit.

Further, the intrahousehold transfers between the household members are analyzed separately by sectors. By 'sectors' we mean 'education', 'health' and 'other expenditures' when talking about current private consumption; and 'housing' and 'other durables' when talking about the private consumption of durables. An inflow of a household member with a current deficit is allocated by the sectors proportionally to the shares that each sector has in the current consumption of that particular **individual**. For example, let us assume an individual who is not the head of the household in some period consuming EUR 100: EUR 10 for health, EUR 20 for education and EUR 70 for other current consumption. Let us further assume that his/her disposable income in that period is EUR 95. This individual has a current deficit of EUR 5, which has to be covered through transfers from other household members. EUR 5 of intrahousehold inflow is distributed by sectors in the following way (following the structure of his/her consumption): EUR 0.5 is allocated to the 'health' sector, EUR 1 to the 'education' sector and EUR 3.5 to the sector 'other current consumption'. On the other side, outflows of every household member with a current **surplus** are distributed by the sectors proportional to the share of each sector in the **total** (of all household members) household inflows.

By assumption, the household head is holding all the assets, which means that by definition he/she receives all the asset income and (dis)saves. The head also finances the consumption of 'housing' and 'other durables' of the other household members. The consumption of non-head household members in those two sectors is thus covered by the intrahousehold transfers from the head to the non-head household members. When intrahousehold inflows and outflows are

allocated to individuals, age profiles are constructed following the standard procedure that will be described in Section 4.2.

Below we also present the described procedure with a mathematical description. It is important to adjust variables at the micro level to exactly match the aggregate values at the macro level before doing the calculations. Technically this is done by saving all of the coefficients used when adjusting the micro profile to the aggregate values. Therefore intrahousehold transfers are calculated at the end, when all the necessary coefficients of adjustment are obtained.

In the following equations and variables *i* denotes persons, *j* denotes households and *x* stands for the sectors. If some of those indexes are missing with some variables, it means they represent sums over the omitted dimension. NTA variables, relevant for calculating intrahousehold transfers, are as follows:

YL(*i*,*j*): labor income
TGCash(*i*,*j*): public cash transfer inflows
TGTax(*i*,*j*): taxes paid
TFB(*i*,*j*): inter-household transfers
CC(*i*,*j*,*x*): sector-specific current consumption
CD(*i*,*j*,*x*): sector-specific durable consumption
X(i,j): current surplus or deficit

First we compute the current surplus or deficit for each household member and for the entire household. If the disposable income[4] of the household member is greater than his/her current private consumption, he/she faces a current surplus. If his/her disposable income is smaller than his/her current private consumption, he/she faces a current deficit.

$$X(i,j) = YL(i,j) + TGCash(i,j) - TGTax(i,j) + TFB(i,j) - CC(i,j) \tag{13}$$

$$Surplus(i,j) = \max[0, X(i,j)] \tag{14}$$

$$Deficit(i,j) = -\min[0, X(i,j)] \tag{15}$$

From the surpluses and deficits of the household members the total surplus and deficit of the household are calculated by summing the surpluses (deficits) of all household members:

$$Surplus(j) = \sum_i Surplus(i,j) \tag{16}$$

[4] To recall, disposable income is calculated as the sum of: 1) labor income; 2) net public cash transfers (cash inflows less paid taxes); and 3) interhousehold transfers.

$$Deficit(j) = \sum_i Deficit(i,j) \tag{17}$$

By assumption, the 'tax rate' on each individual's surplus is the same inside the households, but it differs between households. A tax rate in household *j*, at which each household member with a current surplus is taxed, is calculated as:

$$tax(j) = \min\left(1, \frac{Deficit(j)}{Surplus(j)}\right) \text{ ; if } Surplus(j) = 0, \text{ then } tax(j) = 0 \tag{18}$$

The intrahousehold transfer outflow ($TFWO_C(i,j)$ for individual *i* in household *j*) for non-heads is calculated as the tax rate multiplied by the surplus. For the household head the outflow is calculated as the tax rate multiplied by the surplus, but also any household shortfall which has to be financed by the household head (through selling assets or dis-saving). However, if the household head faces a deficit, it reduces the magnitude of his/her intrahousehold outflow (through the positive sign in Equation (21)).

$$Shortfall(j) = \max[0, Deficit(j) - Surplus(j)] \tag{19}$$

$$TFWO_c(i,j) = -tax(j) \cdot Surplus(i,j) \text{ for } i \neq 1 \tag{20}$$

$$TFWO_c(i,j) = \min[0, -tax(j) \cdot Surplus(i,j) - Shortfall(j) + Deficit(i,j)] \text{ for } i = 1 \tag{21}$$

In Equations (20) and (21) *i*=1 denotes the head of the household and $i \neq 1$ denotes non-head household members.

Next, we also introduce sectors as a further dimension by which we seek to disaggregate intrahousehold inflows and outflows. By *xxx* we will denote 'health', 'education' and 'other current expenditures' – i.e. sectors of **current** consumption only. As explained, the current transfer inflows to non-head *i* in each sector ($TFWxxxI_c(i,j,x)$) are proportional to an individual's current consumption in that sector. For household heads the calculation is similar, but a head can also finance his/her own deficit through dis-saving or selling assets. This would not be recorded as a transfer.

$$TFWxxxI_c(i,j,x) = \frac{CC(i,j,x)}{CC(i,j)} \cdot Deficit(i,j) \text{ for } i \neq 1 \tag{22}$$

$$TFWxxxI_c(i,j,x) = \frac{CC(i,j,x)}{CC(i,j)} \cdot \max[0, Deficit(i,j) - Shortfall(j)] \text{ for } i = 1; \tag{23}$$

if $CC(i,j) = 0$, then $TFWxxxI_c(i,j,x) = 0$

Current transfer outflows from individual *i* into each sector (of current consumption) are proportional to the total household inflows to each sector:

$$TFWxxxO_c(i,j,x) = \frac{TFWxxxI_c(j,x)}{TFWI_c(j)} \cdot TFWO_c(i,j) \tag{24}$$

If $TFWI_c(j) = 0$, then $TFWxxxO_c(i,j,x) = 0.$

The current surplus of non-head household members is transferred to the household members with a current deficit only to the extent that covers all deficits. Any remaining surplus (i.e. if the tax rate on surpluses was less than 1) is transferred to the household head and saved:

$$TFWSO(i,j) = -Surplus(i,j) - TFWO_c(i,j) \ for\ i \neq 1 \tag{25}$$

$$TFWSO(i,j) = 0 \ for\ i = 1 \tag{26}$$

The sum of excess surpluses, which are transferred to the household head, are accounted as his/her inflow:

$$TFWSI(i,j) = -\sum_i TFWSO(i,j) \ \text{ for } \ i = 1 \tag{27}$$

$$TFWSI(i,j) = 0 \ for\ i \neq 1 \tag{28}$$

Assuming the household head owns all the assets, the consumption of durables by non-heads generates intrahousehold transfers from the head to non-heads. Inflows to non-heads in the sector of durables are thus equal to the consumption of non-heads in that sector. Consecutively, in sectors of durables non-heads cannot have outflows, while the outflows of the heads equal the total non-head consumption of that sector. In equations (29) to (32) the subscript *d* denotes 'durables' while *xxx* stands, as before, for sectors – but this time for the sectors of **durable** consumption ('housing' and 'other durables').

$$TFWxxxO_d(i,j,x) = CD(i,j,x) - CD(j,x) \ \text{ for } \ i = 1 \tag{29}$$

$$TFWxxxO_d(i,j,x) = 0 \ \text{ for } \ i \neq 1 \tag{30}$$

$$TFWxxxI_d(i,j,x) = 0 \ \text{ for } \ i = 1 \tag{31}$$

$$TFWxxxI_d(i,j,x) = CD(i,j,x) \ \text{ for } \ i \neq 1 \tag{32}$$

At this point the procedure of constructing intrahousehold transfers rounds up by summing outflows and inflows by sectors:

$$TFWO(i,j) = \sum_{xxx} TFWxxxO_c(i,j) + \sum_{xxx} TFWxxxO_d(i,j) \tag{33}$$

$$TFWI(i,j) = \sum_{xxx} TFWxxxI_c(i,j) + \sum_{xxx} TFWxxxI_d(i,j) \tag{34}$$

If everything is done properly, inflows equal total outflows for each sector. Having inflows and outflows available by individuals, in the final step age profiles by sectors are constructed using the standard procedure of constructing age profiles.

The results are much more accurate and simpler to calculate if the data on expenditures and income are available from the same data source (survey), which is indeed the case in our analysis.

3.4.2 Asset-based reallocation

Asset-based reallocation is special in the sense that it involves an inter-temporal ‘exchange’. Individuals can shift resources through time and (thus) also from one age group to another. Assets can be further disaggregated to capital and credit. While they have a similar function from the individual's point of view, they have a different function from the macroeconomic point of view. Capital is a factor of production, being complementary to labor, which is another production factor. On the other hand, credits cancel out between creditors and debtors (including debt and credit held by the foreign sector). Another distinctive feature is that capital can only be positive and it can therefore shift resources only forward in time. Thus, an investment is made first and the income follows in the future. On the other hand, a credit can shift resources in both directions – through a credit one can consume first and pay it off later in time.

An asset is accumulated by saving, generating asset outflows. Asset inflows are generated by asset-yielding income and by selling assets (dissaving). Asset-based reallocations thus consist of two flows: asset income, representing an inflow; and saving, representing an outflow. Further, asset-based reallocation can be disaggregated to private asset-based reallocation and public asset-based reallocation. While the private one is self-explanatory based on what we have just described, the public one is less intuitive.

The reason for the existence of a public asset-based reallocation is the fact that, just like in the private sector, government can also save and dissave, it has (public) assets and (public) debt. The adaptation of thinking is to clarify how to allocate them to individuals. Who should be considered as an owner of public assets and public debt? Various options have been discussed

in the past by the NTA team. The most serious proposals were to: 1) assign public assets (or debt) to all inhabitants uniformly; or 2) assign them to the taxpayers. Currently, the latter approach is being used. The rationale behind this option is that taxpayers are those who are financing public investment and are responsible for debt payment. This function is similar to the private asset-based reallocation where individuals are financing and responsible for their (private) assets financing and paying debt.

Public asset-based reallocation equals public asset income less public saving. Public asset income can be in the form of rent and in the form of net interest. Public capital, like infrastructure, public buildings etc., by assumption does not yield asset income. Asset income is a net inflow for taxpayers if positive and a net outflow if negative. If positive, public saving generates an outflow from taxpayers while public dis-saving or the accumulation of public debt generates an inflow to taxpayers.

In the dissertation we will not go further explaining the asset-based reallocation. It is one of the topics on which the NTA analysis is currently focused and is in the process of revision. Fortunately, *net* asset-based reallocation can be calculated without going into details and its decomposition.

3.5 SOME ADDITIONAL METHODOLOGICAL NOTES BEFORE STARTING

Before starting with the analysis, we will explain some methodological issues and solutions that are used in the analysis. This should give the reader a better insight into the procedure applied for forming age profiles and the background of the presented results.

3.5.1 Weighting

The purpose of the survey weights is to balance the structure of the sample to the structure of the population. Some observations have a higher probability of ending up in the survey and others have a lower probability. Weights are basically inverse values of probabilities of units to be chosen in the sample. Those who are more likely to end up in the sample get lower weights and vice versa. When population data are available, weighting is of course not relevant. In our survey's data source – the Household Expenditure Survey – the weights are provided and were used in the calculations.

3.5.2 Smoothing

The survey data are subject to the random selection of units into the sample. Parameter calculated from the sample data can therefore more (if we are unlucky) or less (if we are lucky) differ from the true value of the parameter for the population (which is not known) from which the sample was drawn. The smaller the sample, the bigger is the random effect. Even in big samples some variables can have positive values only with a limited number of observations, whereby a random effect can again have a strong impact on the results. To reduce this kind of variation, a smoothing procedure is applied. In the analysis we present an unsmoothed version of age profiles, together with smoothed versions. In the latter case we present three different alternatives of the results, applying three different parameters ('bandwidths') of smoothing, among which one is chosen as being the 'right' one and/or which enters the further calculations.

In the STATA software which was used in the analysis for most calculations the smoothing is conducted by the 'lowess' command. An example is presented in Equation (35), where '*yvar'* is the variable we want to smooth; 'bwidth(*)' specifies the bandwidth (which is in this case 0.1; the greater is the bandwidth, the greater is the smoothing); and 'gen(*)' saves the smoothed variable under the name specified in the parentheses (in our case '*s_yvar*'). Variable '*xvar*' denotes the variable over which the profile is formed (in our case '*age*').

lowess *yvar xvar*, bwidth(0.1) gen(*s_yvar*) (35)

The procedure carries out a locally weighted regression of variable '*yvar*' on variable '*xvar*'. Unfortunately, the 'lowess' procedure does not allow us to add a variable of weights into the syntax. As sensitivity analysis reveals, omitting weights from the analysis can result in a seriously deformed age profile.

Without having the weighting option directly available, we can still introduce weights into the procedure indirectly. Instead of having a variable which would give some observation weight of 3, for instance, we can create two additional duplicates of that same observation. To put it differently, three observations with exactly the same values have the same effect on the results as a three times higher weight. This pre-weighting of the data can be implemented in the STATA software by the 'expandcl' function.

Yet the drawback is the fact that the 'lowess' smoothing procedure is computationally intensive. 'Lowess' calculations, performed on 100,000 observations, for instance, require 100,000 regressions. Generating many new duplicates can strongly increase the computational time upon smoothing. The user faces a trade-off between accuracy and the computational time spent. Accuracy is regulated through the scalar with which the original weights are multiplied. This procedure is allowed since only the relative size of the weights matters, not the absolute one.

If the sum of weights multiplied by the scalar equals the sample size, the reduced accuracy through rounding would be substantial. After applying the 'expandcl' function most observations would remain without being 'cloned' – i.e. they would have a weight of one. All observations for whose weight would round off to 1 or 0 would get the weight of one. Observations for whose weights are rounded to zero are not deleted. They remain in the analysis, just like the observations with a weight of 1. Therefore, all observations with a weight of less than 1.5 (i.e. the large majority of observations – in the Slovenian case such cases represent over 91% of all cases in the Household Expenditure Survey) receive equal weights. The rationale behind this is, of course, that while weights can be expressed in decimal numbers the 'expandcl' function has to round them off to whole numbers. Only a whole number of 'clones' of each observation can be generated.

In the calculations we used a scalar that resulted in a six times larger number of observations than the original sample size. As the simulations reveal, there is no noticeable decrease in accuracy and the computational time is still acceptable with today's computers. Proper implementation of the expandcl STATA function before using the STATA lowess smoothing method seems to be an adequate general and robust approach with an acceptable calculation duration. Another possibility would be to use some other software which enables the weight variable to be included in the smoothing procedure.

Smoothing is subject to a personal judgment about choosing the smoothing factor and in some cases also to a further 'fine-tuning' of the results. Therefore, we performed the 'lowess' smoothing procedure using three different smoothing coefficients: 0.1, 0.2 and 0.3. We believe that this interval provides a reasonable set of smoothed results, among which the most appropriate one is to be chosen. When the number of observations for a certain variable is small and/or the variability is high, higher coefficients are taken. The optimal bandwidth is determined through an examination of smoothed profiles plotted against unsmoothed ones. In particular, a smoothing factor of 0.1 is used by default. Thus, this variant of the results will be selected as the final results if nothing further is commented on when the age profiles are presented.

NTA categories at the higher level are often composed of subcategories at the lower level. For matching *unsmoothed* results at the higher level of aggregation with the lower level of aggregation the bottom-up approach is used. The age profiles are calculated at the lowest level of aggregation and then the values by age groups are summed up into categories at the higher level. For *smoothed* results we hesitated between two options. The first option would be to smooth the age profiles at all levels. An advantage of this approach would be that the smoothed results would closely follow the unsmoothed ones at all levels of aggregation. However, by applying this procedure the sum of categories at the lower level would not sum up into the age profile at the higher level. The aggregate values would match, of course, since they are adjusted to the actual aggregate values by definition; but the results by age groups would not.

We leaned toward the second option whereby only age profiles at the lowest level of dis-aggregation are smoothed. The age profiles of the variables at the higher levels of aggregation are calculated as the sum of smoothed variables at the lowest level, compounding variables at the higher levels. This summation is done by age groups. Therefore, matching also by age groups (not only the totals) is preserved. On the other hand, the resulting age profiles on the higher levels produce less smooth age profiles than under the first option.

3.5.3 Outliers

In the population certain variables can contain a few units with extreme values. For example, in a country there are usually a few individuals who have an extremely high income. The probability that they end up in a survey sample is quite small. However, if some of them by chance are chosen for the sample, they can strongly affect the average of this particular age group. An observation with an extreme value can also cause the average of the corresponding age group to become an outlier compared to the averages of other age groups. Neither using the smoothing procedure nor broader (5-years, for example) age groups can remove the effect of strong outliers. In such cases, the best approach is to simply remove those observations. On the other hand, this approach introduces a certain degree of subjectivity into the analysis and we have therefore tried to avoid it unless really necessary.

3.5.4 Assigning household data to individuals

Individuals live in households and the consumption of individuals in those households is subject to resource pooling, scale economies and public goods. Therefore, a household accounting framework seems like an appropriate unit of analysis. However, at the same time households are changing during the lifecycle. They can be reconstituted, they can dissolute, multiple adults of different ages can be present in the household etc. Accordingly an individual accounting framework seems a better option and is employed in the NTA analysis despite the fact that occasionally some calculations require artificial disaggregation and introducing assumptions (R. Lee, 1994).

The NTA methodology requires that all categories be allocated to individuals. Data on expenditures from the Household Expenditure Survey (HES) are reported at the household level – i.e. for all household members together. Further, some sorts of income can be reported at the individual level. However, information on the number and age of household members is usually available in those data sources. This information combined with certain assumptions can be used to allocate categories from the household level to individuals. Various methods can be chosen for this.

The work of Deaton (1997) presents a comprehensive explanation of why estimating allocation rules is difficult. Many questions and dilemmas arise. What pattern should be used to assign goods that have the nature of a household public good, being used by all family members at no additional cost? How to allocate joint consumption? There can be economies of scale arising from living together, and family members can benefit from each other's consumption. Further, how much to allocate to children? On one hand, they consume special goods but, on the other hand, they require less of most things than adults.

In fact, most of the available research is concentrated on allocating consumption between adults and children, while much less is known about the allocation of consumption between prime-age adults[5] and the elderly. There is also fairly little research on how consumption varies with age among adults. Some goods can be assigned to children or to adults according to the nature of a good. Children's clothing and education expenditures are assigned to children, while clothing for the elderly, tobacco and alcohol are assigned to adults. Food surveys or caloric needs can be used for allocating food among household members (R. Lee, Lee, & Mason, 2004).

For estimating the cost of children Engel's method and the Rothbarth method are frequently used. For the theoretical basis of estimating different models see, for example, Bourguignon (1999). Engel's method uses the budget share that the household devotes to food expenditures. According to Engel's Law there is a negative relationship between the share of food and total expenditures. Therefore, Engel's method uses the share of food in the household budget as the welfare measurement. The cost of an additional child is estimated through the increase in income that is required to keep the food share at the same level compared to a household with one less child. However, children may be more intensive consumers of food than adults. This would increase the food share in households with more children, indicating the high cost of children. For that reason, Engel's method generally overestimates the cost of children (Deaton, 1997).

Rothbarth's method avoids this deficiency of Engel's method by focusing on goods that are not consumed by children – like tobacco, alcohol and adult clothing. Additional children should thus have an income effect only. However, other problems arise with that method. Consumption by adults is not independent of the presence of children. For example, adults may decide to smoke less out of concern for their children's health or smoke more because of increased stress related to having children. In the first case, the Rothbarth method would overestimate the cost of children while, in the second case, it would underestimate it. Further, the method is sensitive to the decision about which goods are selected as being 'adult goods'. Data availability can narrow this selection to tobacco and/or alcohol, which in some countries are consumed in very low quantities (for example, alcohol in Muslim societies). Further, the

[5] For people aged 20-64 years we will use the terms 'prime-age adults' and 'working age' people.

income elasticity of those goods can be very low, not varying enough to obtain estimates. Finally, some adult goods can already be consumed by older children.

According to Deaton, from the theoretical point of view problems with the Rothbarth method are less serious than those associated with Engel's method (Deaton, 1997, pp. 258-259). He also suggests that true values should lie somewhere between Engel's estimates, being upwardly biased, and Rothbarth's method, being downwardly biased. Indeed, Engel estimates are generally higher than those obtained by the Rothbarth method. However, it cannot be conclusively demonstrated that those two estimates bracket the true values (R. Lee et al., 2004).

The described deficiencies and practical evaluations which have shown the Rothbarth and Engel methods to be unreliable has led to the use of other methods in the NTA calculations (Mason et al., 2009). In the past two methods were recommended by the NTA methodology: *the regression method* and *the ad hoc method*. Most of the estimates so far are thus made using those two approaches. The regression method is used in the NTA framework as the preferred method for distributing private education and private health care expenditures. For distributing other categories of private expenditures to household members, the ad hoc method is used. Lately, a non-parametric *iterative method* is being tested as an alternative to the regression method (S.-H. Lee, n.a.).

3.5.4.1 Regression method

First we will present the regression method in the form used for allocating private health expenditures from the household level to household members. Health expenditures of the household are regressed on the number of household members in each age group. From a purely technical view, coefficients of the linear regression show how much **on average** the dependent variable would increase if the independent variable were to increase by one unit, holding other independent variables unchanged. That is exactly the information we would like to have – i.e. how much would health expenditures of the household increase if there were one additional member of the household aged *a*. The constant in the regression shows what the level of the dependent variable would be if all independent variables were zero. It is clear that if there were be no members in the household, expenditures (a dependent variable) would also amount to zero. Therefore, a regression is performed without the constant term. In other words, we want all expenditures to be allocated to the household members, leaving nothing to the constant term.

If we treat each age from 0 to 90+ as a separate variable, there would be 91 independent variables. So as not to lose too many degrees of freedom, usually 5-year age groups are used instead. The fear that this will cause the age profiles to look like 'stairs' is unjustified since those coefficients are only an intermediate result. If we denote the number of household

members aged *a* in household *j* by $M_j(a)$, we can write down what we have just described in this way:

$$CFH_j = \sum \beta(a) M_j(a) \tag{36}$$

where CFH_j represents health expenditures of household *j* and $\beta(a)$ are estimated regression coefficients for age *a*. It can happen that the regression method assigns even negative coefficients to some age groups with low health expenditures. In such cases, the values are limited to 0 to avoid negative expenditure. This is done during the calculation procedure already, otherwise negative values for some household members would mean assigning too much to other household members[6].

In the next step, we use the obtained regression estimates to allocate the health expenditures of household *j* to household member *i*:

$$CFH_{ij}(x) = \frac{CFH_j \beta(x)}{\sum \beta(a) M_j(a)} \tag{37}$$

whereby *x* stands for the age of household member *i*. This step is necessary because regression coefficients cannot be used directly. For all individuals in the same age group they are equal and, by applying them to the micro (household) level, they do not sum up to the reported expenditures of the household. Therefore, a further adjustment is needed whereby we only use the relative size of those coefficients between household members, i.e. we consider them as within household shares or weights. The relative share that an individual's coefficient has in the sum of coefficients at the household level determines the share of household expenditures that will be assigned to that individual. After household expenditures are allocated to individuals, the standard procedure for creating an age profile is applied.

When estimating private education expenditures the regression method is slightly different. In this case, the model adds in a separation into individuals who are formally included in the educational process and those who are not. Having this information available from the survey helps us obtain a more accurate estimation because the expenditures of those enrolled in the formal educational process and those who are not probably differ. Technically, private expenditures that household spends on education (CFE_j) are regressed on the number of household members in each age group who are enrolled in a formal educational process ($E_j(a)$) and the number of household members who are not ($NE_j(a)$).

$$CFE_j = \alpha(a) E_j(a) + \sum \beta(a) NE_j(a) \tag{38}$$

[6] The sum of expenditures for all household members has to match the reported expenditures of the household.

Equation (38) provides the relative share for each age group. Again, to achieve the full allocation of household consumption expenditure the equation is estimated in a homogenous form and negative values are limited to zero. The share that an individual has in the total (sum) of shares of all household members determines his/her share of total household education expenditures.

3.5.4.2 Ad hoc method

The ad hoc method is based on an equivalence scale. The equivalence factor of 1 is assigned to an adult aged 20 years or more, while the equivalence factor of 0.4 is assigned to children aged 0 to 4 years. From age 5 to 19 a linear increase of equivalence factors is assumed. The equivalence scale can be written down as in Equation (39), where $\alpha(a)$ represents the equivalence factor. After assigning equivalence factors to household members, Equation (40) is used to distribute household expenditures to individuals:

$$\alpha(a) = 1 - 0.6 \cdot (4 < \alpha < 20) \cdot \frac{20 - a}{16} - 0.6 \cdot (a \leq 4) \tag{39}$$

$$CFX_{ij}(x) = \frac{CFX_j \alpha(x)}{\sum \alpha(a) M_j(a)} \tag{40}$$

where *j* stands for the household, *x* is the age and *i* denotes the household member.

Using an equivalence scale is probably a better option than distributing consumption uniformly across all household members. Simplicity is a big advantage of this method. It is also a method that can easily be applied to all countries in the same way. However, we have to be aware that reality is much more complex and differs by countries, depending on their development level, point in time, arrangements of the public system, cultural and other norms etc.

The age profiles of private consumption are thus driven by the rule of allocating household expenditures among individuals. Despite being addressed by various methods, general conclusions are difficult to drawn. Numerous questions remain unanswered, in turn representing a field for future research.

4 PREPARING DATA FOR THE ANALYSIS

Calculating the national transfer accounts requires extensive data collecting from various sources, applying appropriate methods and combining them to create a harmonized and comprehensive set of results. Aggregate controls, mostly drawn from the SNA, sometimes

adjusted accordingly, form a framework of the analysis. In most cases they are combined with survey data, but also with various other sources.

All financial data are expressed in euros (EUR). Current prices from 2004 are used, which is also the year to which the analysis refers. We have chosen the euro currency even though in 2004 the Slovenian tolar (SIT) was still the official currency. The first reason for this decision is the fact that in the meantime the euro has become the national currency. Second, the results will be made more easily internationally comparable, especially to other European NTA countries with the euro currency. Shortly after joining the EU on May 1, 2004, on June 28, 2004 Slovenia entered the Exchange Rate Mechanism ERM II, fixing the exchange rate at SIT 239.64 = EUR 1, keeping it until it introduced the euro currency on January 1, 2007. This exchange rate is also used for conversions from SIT to EUR for the period before then – thus, it is also employed in our analysis.

The year 2004 was chosen according to the availability of a crucial data source – the Household Expenditure Survey. As we will explain, the data from this data source in fact refer to the 2003-2005 period. This was the latest version of the HES available when we started the analysis.

Data for all categories required by the NTA methodology have to be provided. If they are not directly available, the best proxy from the available data is chosen or estimated instead. If aggregate data for some categories are unavailable, the estimations from survey data can be used as the last resort. When estimating population data from survey data we have to be aware that the results can seriously underestimate or overestimate the true values, which are not known. Finally, it is to be noted that the NTA methodology is still under development. There is a continuous search for better solutions, also depending on the available data.

4.1 AGGREGATE CONTROLS

SNA data are predominately taken from publications of the Statistical Office of the Republic of Slovenia (SORS). In some calculations where detailed data has been required, we have used unpublished internal data from the SORS. Various other data sources have also been used in the analysis. The public system is important for mediating transfers among different generations and cohorts in developed countries. Another important data source are thus institutes and other government bodies (for example, the Institute for Pension and Disability Insurance, Ministry of Finance, Health Insurance Institute of Slovenia etc.), which possess data that are not available in the SNA and/or in the SNA their distribution by age groups is not available. Most of those data are freely available from these institutions, while some of them are internal data.

In Table 1 and Table 2 we present the composition of GDP by the expenditure method and by the method of primary incomes. The data are taken from the SNA. By following the methodology described in Chapter 3 we derive aggregate NTA categories.

Table 1: Gross domestic product by expenditures; Slovenia, 2004 [in EUR million]

Consumption		**19,531.727**
Government final consumption expenditure	5,087.181	
Private final consumption expenditure	14,444.546	
Gross investment		**6,869.350**
Gross fixed capital formation	6,284.489	
Increase in stocks	584.861	
Net export		**-315.098**
Exports of goods and services	15,696.553	
Less: imports of goods and services	16,011.651	
Gross domestic product (GDP)		**26,085.979**

Source: Statistical Office of the Republic of Slovenia, Statistical Yearbook of the Republic of Slovenia 2005, p. 450.

Table 2: Gross domestic product and primary incomes; Slovenia, 2004 [in EUR million]

Compensation of employees		**13,753.130**
Gross wages and salaries	12,067.122	
Employers' actual social contributions	1,686.008	
Indirect taxes less subsidies		**3,838.946**
Indirect taxes	4,297.563	
Less: subsidies	458.617	
Gross operating surplus		**6,543.240**
Consumption of fixed capital	3,626.711	
Net operating surplus	2,916.529	
Gross mixed income		**1,950.663**
Consumption of fixed capital	426.106	
Net mixed income	1,524.558	
Gross domestic product		**26,085.979**

Source: Statistical Office of the Republic of Slovenia, Statistical Yearbook of the Republic of Slovenia 2005, p. 459.

To obtain the NTA 'labor income' category, we have to sum up: 1) the compensation of employees (EUR 13,753 million, see Table 2), net compensation of employees from the rest of the world (EUR 173 million; not presented in tables), and two-thirds of the net mixed income (2/3 of EUR 1,525 million; see Table 2), which is EUR 1,016 million. To calculate non-labor income ('private income on assets') we have to subtract from the operating surplus 2/3 of the mixed income (which goes to labor) and subsidies. On the other hand, 'indirect taxes on capital' (EUR 764 million; not presented in tables) and 'net property and entrepreneurial income from ROW' (EUR -422 million) have to be added. 'Indirect taxes on capital' are obtained by decomposing indirect taxes (EUR 4,298 million; see Table 2) into the 'indirect taxes on consumption' category and 'indirect taxes on capital' category. Taxes like

value added tax (VAT), excises etc. fall into the former category (amounting to EUR 3,533 million; not presented in tables), while taxes on production are assigned to the latter category (EUR 764 million; not presented in tables).

From the consumption reported in the SNA (EUR 19,532 million; see Table 1) indirect taxes on consumption (EUR 3,533 million; not presented in tables) are subtracted. This yields EUR 15,998 million in the 'consumption' category, which is in line with the NTA definitions.

Net saving is taken directly from the SNA, whereby the NTA category 'public net saving' equals the net saving of the 'general government' from the SNA. The NTA 'private net saving' category encompass the net savings of all remaining sectors ('households including non-profit institutions serving households (NPISH)', 'financial corporations' and 'non-financial corporations').

The results are summarized in Table 3. The age profiles that will be presented in the continuation are adjusted to those aggregate controls.

Table 3: Aggregate NTA categories; Slovenia, 2004 [in EUR million]

Lifecycle deficit	**1,056.121**
Consumption	15,998.361
Private	10,911.180
Public	5,087.181
Less: labor income	14,942.240
Age reallocations	**1,056.121**
Asset-based reallocation	1,004.565
Public asset-based reallocations	-199.512
Public income on assets	0.000
Less: public saving	199.512
Private asset-based reallocations	1,204.077
Private income on assets	3,307.927
Less: private saving	2,103.851
Transfers	51.557
Private	78.933
Public	-27.377

Sources: Statistical Office of the Republic of Slovenia and various other sources; author's calculations.

4.2 FORMING AGE PROFILES

In the SNA aggregate economic flows are presented systematically and comprehensively, but they do not contain information about the age dimension. Distributing SNA categories by age

groups is one of the key ambitions of the NTA. For some categories aggregate data, broken down by age are available, which represents the ideal case regarding accuracy.

For most variables the data are not available in such a form. However, countries conduct various surveys containing relevant variables for the NTA. It is common that surveys also contain information about the age of the respondents. Using survey data directly could seriously underestimate or overestimate the actual aggregate values. This is especially true for surveys where only a small sample is drawn and/or for variables with only a small number of observations. In such cases, the variability and the impact of outliers is also large. Further, the respondents are sensitive about reporting categories like income, for instance, therefore they intentionally and systematically under- or over-report the values of such categories. People also tend to overestimate the value of their apartment, for instance, since they are emotionally attached to it.

Therefore, the most common approach is to construct a **relative** age profile from the survey data and to adjust it to match their aggregate controls. Technically, the sum of products when multiplying the age profile by the number of inhabitants by age groups should equal the aggregate control. This is assured by the proportional adjustment factor θ, calculated by using Equation (41). The obtained θ enters then into Equation (42) to calculate the total value of category X for all individuals aged a:

$$X = \theta \sum x(a)N(a) \tag{41}$$

$$X(a) = \theta\, x(a)N(a) \tag{42}$$

where $x(a)$ denotes the per capita age profile; $N(a)$ stands for the number of people aged a, while X is the aggregate control. This procedure solves the problem of a general over- and underestimation.

With higher ages the number of observations in surveys eventually decreases to negligible amount. At the age of about 100 years, for example, there are only a few people in the total Slovenian population, while usually none of them are captured by the survey. This can produce great variability of the age profile because of the increasing influence of the random effect. The general rule in NTA analysis is to form the age group 90+, including all individuals aged 90 and above. For some variables with a few observations this margin could turn out to be too high. In such cases a uniform distribution is assumed from the selected year until the age 90+. For example, if the age of 80 years is considered appropriate for some category, the value for age 80+ is calculated and assigned to all ages from 80 to 90+.

The main data source of micro data is the Household Expenditure Survey (HES). In Slovenia the HES is a nationally representative survey that has been conducted since 1983. In 1997

there were some changes to its contents and implementation. It was adjusted to Eurostat's recommendations and the data started to be collected continuously. The HES for 2004 is the key micro-level database used in our analysis. To be precise, the data consist of values for three consecutive years (2003-2005), calculated to mid-year (2004). Providing this 'big HES'[7] is a standard approach of the Statistical Office of the Republic of Slovenia to enlarging the number of observations and consequently to obtaining more accurate estimates (Statistical Yearbook of the Republic of Slovenia 2007, p. 249). The HES 2003-2005 contains 11,303 individuals constituting 3,725 households. Some data are reported by individuals, while others (including all data about expenditures) are only available at the household level – i.e. for all individuals constituting households together.

The HES also contains data about various forms of income. Most of them are reported at the level of individuals. Having income and expenditure data from the same data source, i.e. for the same individuals, enables an easier and more accurate analysis of intrahousehold transfers. Combining incomes and expenditures from separate databases would require models and techniques of imputations to link those various sources.

4.2.1 Labor income

As explained in the theoretical part, labor income consists of earnings, benefits and the labor share of mixed income.

4.2.1.1 Earnings

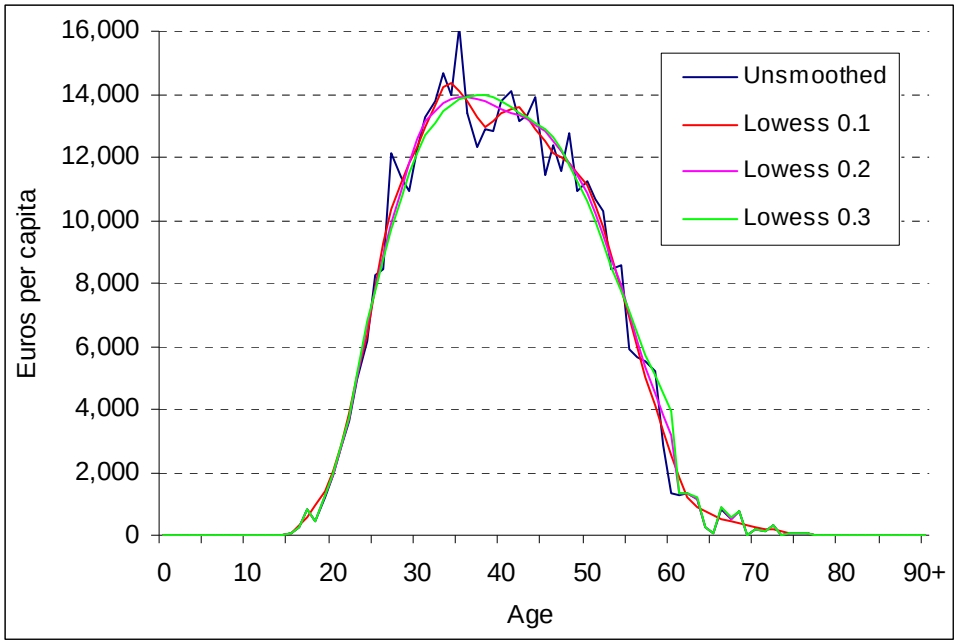
The age profile for labor income is estimated on the HES data source, providing data about net wages and other categories of payments received that are related to work: holiday leave payments ('regres'), compensation for food, compensation for transportation to work, other payments that an organization provides, net wages received from abroad, income from an author's contract ('avtorska pogodba'), work by contract ('pogodba o delu'), direct payments ('neposredno plačilo'), and payments received through student employment offices. Earnings are reported by individuals; therefore the age profile is simply estimated by calculating (weighted) averages by age groups. The results are presented in Figure 2.

It would be desirable to have data on gross wages which conceptually constitute the NTA category of 'earnings'. Further, earnings also include social contributions paid by employees out of their gross wages. However, the HES does not contain data on gross wages. Generally, this creates a problem if wages are, for instance, increasing with age. Then the ratio between gross and net wages is increasing due to progressive income tax rates. The resulting age

[7] Compared to the 'small HES', which contains data for one year only.

profile would be less steep than it should be, making the age profile of net wages a less adequate proxy of the age profile of gross wages. This deficiency, relevant to most other countries, is less serious in the Slovenian case since the age profile of average earnings per earner from the age of 30 years on is relatively flat (see Figure 3). Therefore, the ratio between gross and net wages is expected to be fairly constant by age. Further, in Slovenia there is no ceiling on the social contribution paid out of gross wages, consequently social contributions are proportional to gross wages. Thus, for the Slovenian case we expect the age profile of net wages to represent the NTA 'earnings' category well.

Figure 2: Earnings age profile

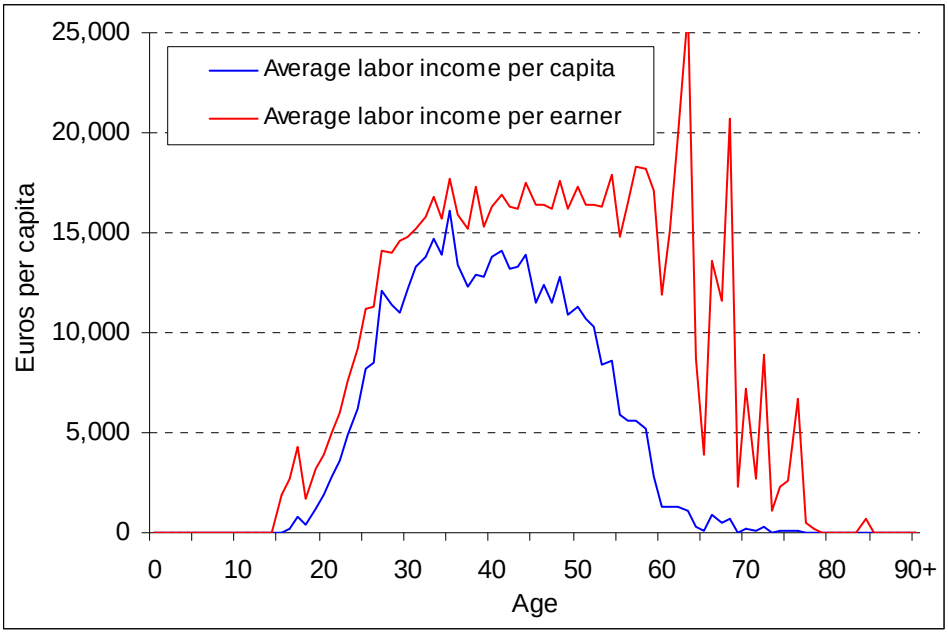


Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

The smoothing procedure creates 'tails' in the lower and higher age groups (see Figure A-1 in Appendix 1) when smoothed with higher smoothing factors. Yet, it is unreasonable to assume that children aged 15 years or below receive substantial labor income since original data do not show that. Therefore, in such cases we use an unsmoothed age profile for age groups below a certain age combined with a smoothed age profile thereafter. The same thinking also applies to higher age groups where labor income falls relatively sharply to low levels, while the smoothed curve only decreases gradually and thus seriously overestimates labor income in those age groups. Since we have chosen the age profile with a smoothing factor of 0.1 for our final results, the described adjustment was not needed in this case. However, this will be relevant for some other age profiles that will be presented below.

It could be debated whether it is better to use a smoothing factor of 0.2 and thus smooth out two peaks that occur in the age 30-40 years when a smoothing factor of 0.1 is used. Having numerous observations for the labor income profile with the age profile having a fairly low level of variability we decided on the 0.1 variant. However, it would be interesting to see whether two peaks would also occur when using data from other years.

Figure 3: Unsmoothed age profile of labor income per capita and labor income per earner



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

As already indicated, in Figure 3 we have decomposed average earnings per inhabitant to average earnings per earner and to the share of persons reporting earnings among all persons in age groups (employment rates) so as to gain additional information about the driving forces of the presented age profile:

$$\frac{YLE_x}{N_x} = \frac{YLE_x}{E_x} \cdot \frac{E_x}{N_x} \tag{43}$$

where x denotes age, YLE are earnings, N is the number of persons and E is the number of persons who receive earnings. It can be observed that the early falling age profile (already at the age of 50 years) is driven by the falling share of people receiving earnings. Average earnings for those who reported non-zero earnings seem to be stable across all ages. Yet, we have to be careful with that interpretation in age groups after the age of 50 years because a decreasing share of people staying among earners increases the potential problem of selection bias. Those with higher earnings are expected to be working longer, while those with lower earnings tend to retire earlier. In these age groups higher values in the labor income age profile are thus expected.

It is indeed interesting how flat the actual age profile of labor income per earner is. Generally, we would expect an increasing age profile since in Slovenia employees collect a seniority bonus[8], which grows with years spent in employment. It is indicated that the hypothesis about

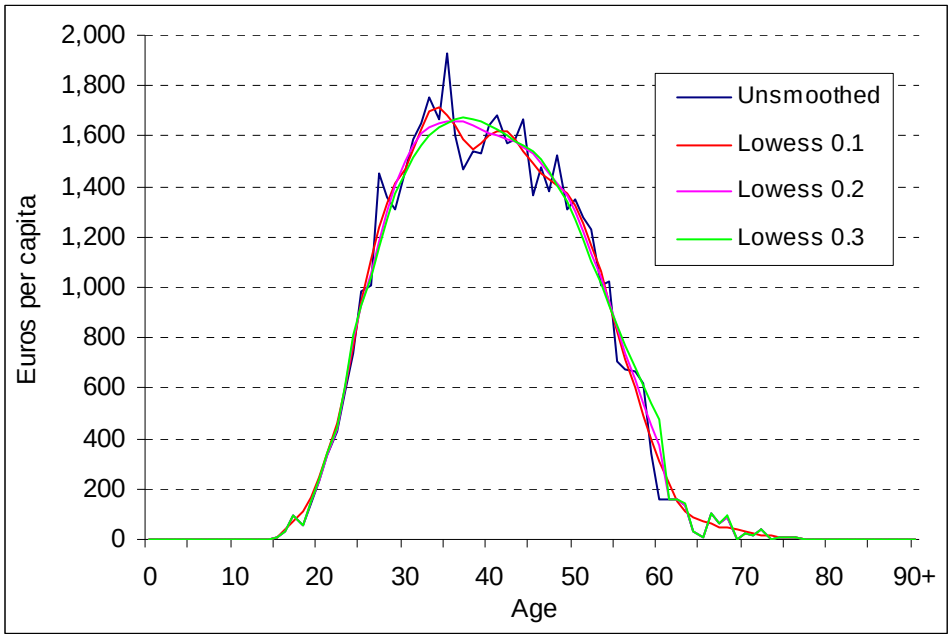
[8] Until the end of 2002 the increase was 0.5 of a percentage point per working year. In 2003 deregulation of collective agreements on the industry level followed, but most of them have preserved the solution of 0.5 of a percentage point increase per year.

a flattening earnings profile in ex-socialist countries, reported for some other countries (Köllő & Kertesi, 2000), might also be relevant to the Slovenian case. According to this hypothesis, some new industries like the financial sector are becoming dominantly occupied by a younger, more educated labor force that receives higher wages. This segregation of jobs by education level, which correlates with age, counterbalances the seniority payment regime.

4.2.1.2 Benefits

The NTA variable entitled 'benefits' encompass 'employers' social contributions', while employees' social contributions are already contained in the variable 'earnings'. What we have said about the employees' social contributions also applies to employers' social contributions. For the employers' social contributions we are thus assuming the same shape of the age profile as has been estimated for 'earnings'. Both of those categories are paid proportionally to gross wages. Only their absolute levels differ, being adjusted to different aggregate values.

Figure 4: Age profile of 'benefits' (employers' social contributions); Slovenia, 2004



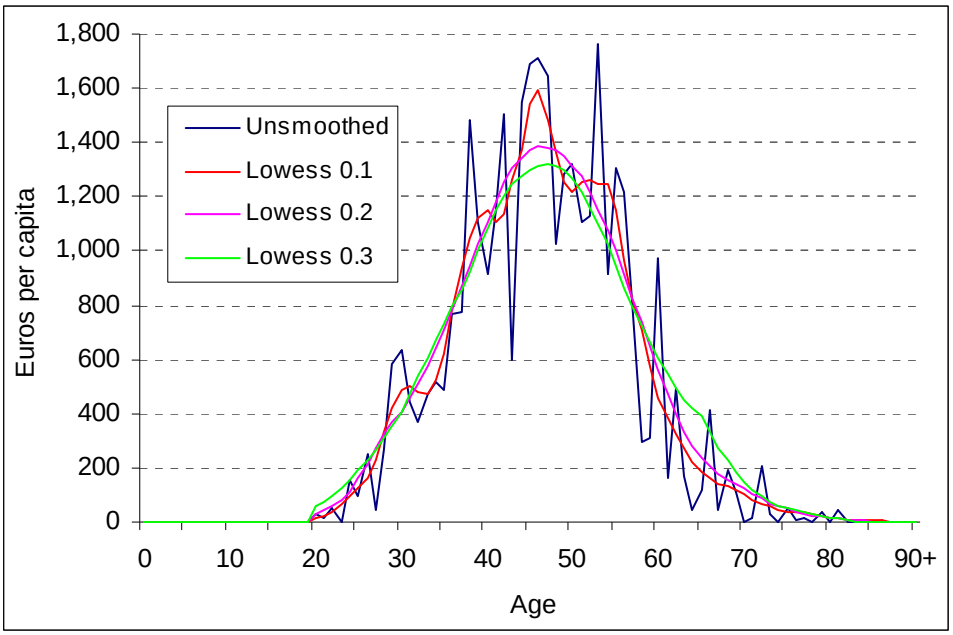
Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

4.2.1.3 Labor share of mixed income

In the Slovenian case mixed income in the HES is reported on the individual level. Out of 366 individuals who reported they were self-employed, 347 reported a non-zero mixed income. The obtained age profile is presented in Figure 5. Because of the limited number of observations the variability is considerably higher than with the age profile for earnings.

Therefore, we have chosen the age profile smoothed with a factor of 0.2 to enter the further analysis.

Figure 5: Unsmoothed and smoothed (using various smoothing factors) age profile of labor's share of mixed income; Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

On the other side, there were 97 individuals who declared themselves as being unpaid family workers and of these 31 reported a non-zero income. This could indicate the potential problem of reporting that we pointed out in the theoretical part, namely, of assigning too much to the self-employed persons and too little to unpaid family workers. We have therefore formed the joined group of 'self-employment', 'unpaid family workers' and 'employer' statuses. In line with the NTA methodology we have summed those three income forms into the category 'self-employment labor income'[9] by households. The resulting self-employment labor income has been distributed among individuals of those three statuses. The relative age profile of the mean earnings of wage earners has been used as the criterion.

As presented in Appendix 3, the results obtained using that procedure almost do not differ from the results obtained from the reported values. The problem of assigning too large a share of the household's mixed income to the household head seems not to be present in the Slovenian case.

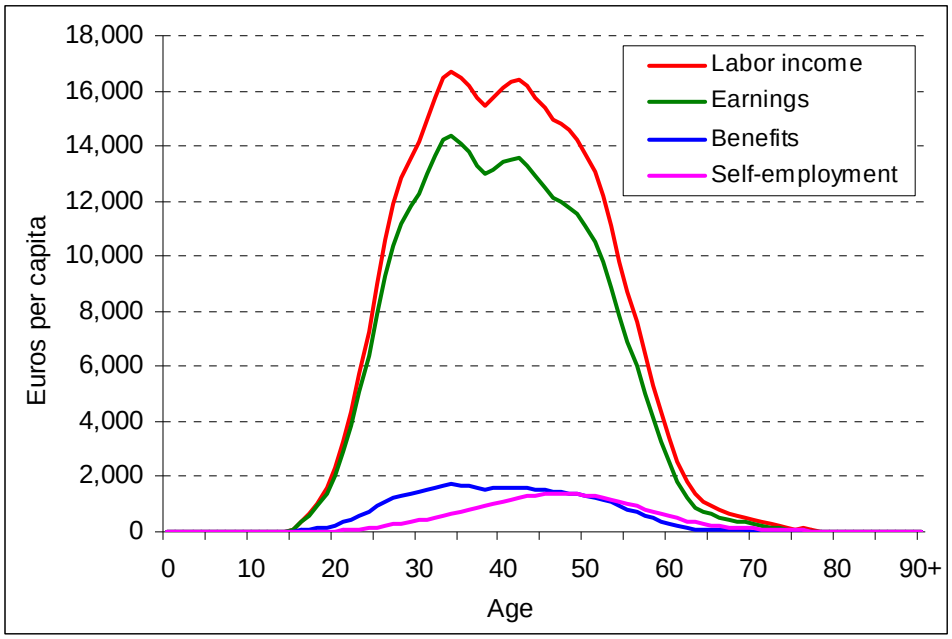
Comparing Figure 5 with Figure 4 reveals that persons receiving a mixed income are on average older than employees receiving earnings. The difference is also seen in the level, of course, with the labor share of mixed income being much lower than earnings.

[9] We use 'self-employment labor income' instead of 'part of the mixed income assigned to labor' to make the text easier to read.

4.2.1.4 Summarizing the age profile of labor income

In Figure 6 all three presented components are summarized: earnings, benefits and the labor share of the self-employment (mixed) income. Labor income is the sum of those three categories, representing one of the key age profiles of the NTA.

Figure 6: Smoothed age profiles of labor income and its components; Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

To gain a deeper insight into the labor market behavior and the shape of the labor income age profile, in Figure 7 we present the shares of different activity statuses by age groups. The reason for this presentation is also Chapter 6 in which Slovenian results will be compared to the results of some other countries. We will see that the age profile of labor income is very distinctive for the Slovenian case – it starts to rise late, but falls first compared to other countries.

The share of people in working status gradually rises between age 20 and 30. In this age span the share of working people is a mirror to the student status, while about 10% represent unemployed persons. This is the age group with the highest unemployment. Of course, this number is not directly the unemployment rate since the unemployment rate is calculated as the ratio between the number of unemployed persons and the active population, while in our case the denominator is the total population. On the other side, the share of people with employed status starts to decrease noticeable already at age 50 and in the period until age 65 it is a mirror of the increasing share of retired people. The share of inactive persons and housewives is quite low in Slovenia. One of the characteristic features of socialism was the high employment rates of women. This tradition has been continuing since then.

Figure 7: Shares of certain activity statuses in HES by age groups; Slovenia, 2004

Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

4.2.2 Private consumption

Consumption consists of private consumption and public consumption. First we will present the results for private consumption and thereafter for public consumption. The preferred NTA concept is to measure consumption, not expenditures. However, in reality we usually observe expenditures, not consumption.

4.2.2.1 Education

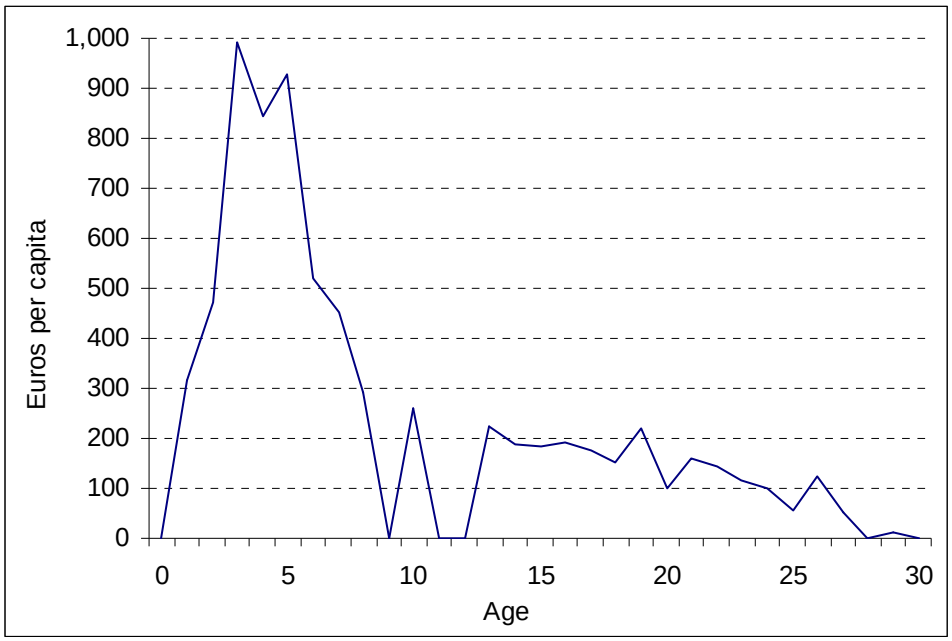
As described in Chapter 3, for allocating the private education expenditures of households to individuals the regression method is used. Positive values on private education expenditures were reported by 844 households out of the 3,725 households included in the HES. For those aged 15 years and over the activity status is reported, whereby the status of being a pupil/student is relevant in this case. Yet, for all children aged less than 15 years only the status 'younger than 15 years' is available. It is therefore unknown whether they are enrolled in an educational process or not – which would be required for the procedure presented in Section 3.5.4.1.

Among education consumption, preschool expenditures are also included and they can represent a considerable amount of households' education expenditures. Unfortunately, we do not have a detailed disaggregation of education expenditures available in the HES, but only as synthetic variable. Children can already attend kindergarten at the age of 1 year. Without having information about their attendance in those low age groups available, we have

included all children from age 1 to 14 in the analysis. For children aged 15 years and over, the variable about status is used to differentiate between those formally enrolled in an educational process and those who are not.

The results obtained by the regression method described in Section 3.5.4.1 are presented in Figure 8. According to the NTA methodology we do not apply the smoothing procedure to this variable. Breaks in the age profile at certain ages are expected since stepping in and out of the school enrolment of certain level occurs for the majority of pupils/students at about the same age. Through smoothing those breaks would be unjustifiably eliminated.

Figure 8: Age profile of private education consumption; Slovenia, 2004



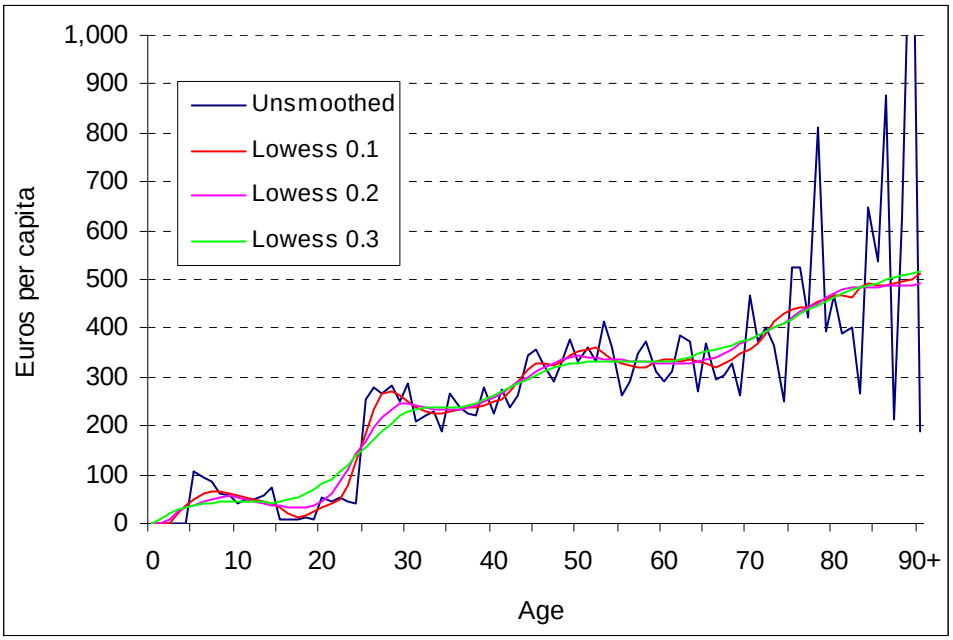
Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

The private co-financing of kindergartens treated as private education consumption dominates in the presented age profile. After the first few years of primary education, starting at about the age of 7, the age profile drops to fairly low levels. Primary and secondary levels of education are practically completely publicly financed. Private expenditures are limited to books and other education expenditures of smaller amounts. Tertiary education is also predominately financed through public sources, which together with lower enrolment rates keeps the age profile at low levels in those age groups as well. In 2004 private education expenditures amounted to EUR 151 million, representing 0.58% of GDP (Statistical Yearbook of the Republic of Slovenia 2005, p. 452).

4.2.2.2 Health

Private health expenditures are allocated from the household level to individuals using a regression method as explained in Section 3.5.4.1. The unsmoothed age profile together with smoothed versions are presented in Figure 9.

Figure 9: Age profile of private health consumption; Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

It is interesting that private health expenditures for newborns do not show the distinct peak that is observed in the results for other countries. This will also be clearly reflected in the presented age profile of public health expenditures in the Slovenian case. On the contrary, during the first years of life the age profile of private health expenditures exhibits the lowest values, even limited to zero, since the regression procedure assigns negative values to them. It is thus indicated by the data showing that the public sector completely takes care of health expenditures for newborns and that additional private expenditures are therefore not needed. Private health expenditures stay on fairly low levels during the entire childhood. They increase sharply during the late 20s and thereafter they continue to gradually increase with age. At the aggregate level, private health expenditures are relatively low compared to other countries. In 2004 they amounted to EUR 474 million, which represented 1.82% of GDP (Statistical Yearbook of the Republic of Slovenia 2005, p. 452).

4.2.2.3 Private consumption of housing

This category includes the consumption of owner-occupied housing, which in statistical sources is presented as 'imputed rentals for housing'. It encompasses amounts that housing owners are implicitly 'paying' to themselves. 'Actual rentals for housing', which are tenants

actually paying to lessors, are thus not included. They are assigned to 'other private consumption' which will be presented below. In Slovenia housing is predominantly proprietorial and only a small share is rented. Both imputed rentals for housing (EUR 1,670 million in 2004) and actual rentals for housing (EUR 83 million in 2004) are reported in the SNA statistics.

Besides actually paid rents, data on imputed rents are also usually provided by the HES and can be used in creating age profiles. For Slovenia this is unfortunately not the case. Although such data were collected by the HES, in the SORS' opinion they were too unreliable to make them available to researchers for analyses. Because of the small share of rented housing in Slovenia, in many areas there is practically no market of rented apartments so as to provide market prices. Estimates in the HES, as reported by respondents, are however very subjective and seriously overestimated. The aggregate value of imputed rents, calculated from the reported estimates, considerably exceeds the aggregate value reported in the SNA.

We hesitated choosing from among two candidates for a proxy for this variable. One option would be to use the shape of the age profile for some other country with a similar housing situation. The Austrian case would be an option, as it also has a relatively low share of rented versus owned housing. The fact that we have available detailed data on the Austrian case would be another reason for choosing this option. However, using age profiles of other countries would increase similarities in international comparisons, especially compared to the Austrian case, which would be unjustified. It would also cause problems of calculating intrahousehold transfers since data from two different surveys would have to be combined.

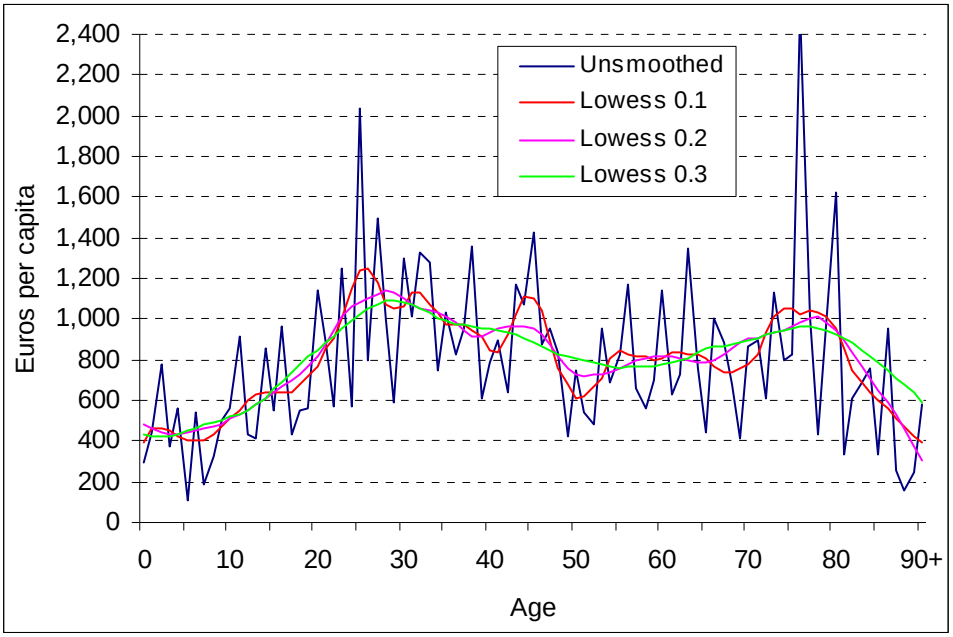
We decided on the second option, namely, also applying the age profile of actual rents to imputed rents. The resulting age profile (see Figure 10) thus uses the age profile of the actual rents, but is adjusted against imputed rentals for housing from the SNA. Following the NTA methodology, operating costs[10] have been excluded from the analysis and are included in 'other private consumption'.

In spite of the high variability of the unsmoothed age profile, a 'twin peak' shape is suggested. Up to age 20 the increasing age profile can be explained by the applied equivalence scale for allocating household data to individuals, gradually rising from 0.4 to 1 in the period from age 4 to age 20. The first peak occurs at the age of about 25-30 years, while the age profile is decreasing afterwards. Another peak seems to occur during the 70s. This shape of the age profile can be explained by family composition. During the ages of 20-30 years the profile is increasing because young people are moving away from their parents, forming new households. Since they do not yet have children, housing consumption is allocated only to them and is therefore high. The consumption of housing gradually reduces after they have children. Gradually the weight of their children's consumption is increasing

[10] 'Maintenance and repair of the dwelling', 'water supply and other dwelling services' and 'electricity, gas, and other fuels'.

while the parents' weight remains 1, which means it is decreasing in relative terms. Total household expenditures for housing are thus gradually being 'redistributed' from parents to children, explaining the decreasing age profile.

Figure 10: Age profile of the private consumption of housing; Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

When parents reach the age at which their children move away from home, housing consumption increases again. If they stay in the same dwelling, the entire housing consumption is only assigned to them. Further, if one of the spouses passes away the entire consumption is assigned to just one person. That could be the explanation for the second peak, if it really exists, with higher age. There could also be an interaction with the increasing wealth effect, of course, which might explain the upward trend – i.e. moving to more expensive apartments since people of higher ages can afford them. However, at the same time individuals can move to smaller apartments since they do not need big apartments any more and/or they want to use the difference in price between a large and small apartment as part of a transfer to their children who are establishing a household.

Further, there can be an interaction with the cohort effect, especially having in mind what has been happening in the housing market in Slovenia in the last few decades. In the 1980s houses were cheap to build since real interest rates on loans were highly negative. Further, in the early 1990s employees could buy the dwellings in which they had been living (owned by the firms which employed them) at prices far below their market value. In the past, some cohorts could thus acquire more apartments than others. This is probably also partly the explanation for the high share of owned housing compared to rented housing mentioned earlier: if people did not own an apartment before, they could buy it in the early 1990s at a price far below market prices. A special law was introduced for this purpose (Stanovanjski zakon, 1991).

The presented explanations about the shape of the age profile should be considered as speculative only since strong conclusions are difficult to draw. The age profile builds only upon the data on actual rentals; the number of observations is small, especially in higher age groups, and there is great variability of the age profile. The results for more consecutive years would be welcomed, especially once data on imputed rentals are also available in the HES.

4.2.2.4 Flow of services from consumer durables

As just presented, private consumption of housing is measured as the value of the flow of services. As explained in the theoretical part, this is the ideal way of treating durables in the NTA. However, this is the only category that is measured in this way in the SNA, while other consumer durable consumption is measured in the SNA by expenditures.

When the purchase of a car, for instance, is accounted in this way, the consumption of a given household in a given year is seriously overestimated. The original idea of the NTA is to treat durables as an investment. Buying a car should be treated as an investment that provides a flow of services for many years to come. Only a fraction of the car's value should be considered as consumption in each year of the period when the car is used. Ideally, this would be the value that was indeed consumed, i.e. the share for which the value of this durable has decreased. As already mentioned in the theoretical part, there is a huge problem of having adequate data available. The value of cars and other durables that individuals possess is not known. Models containing assumptions about depreciation rates etc. could provide some estimates. In a few countries experimental calculations have been carried out, while the majority of countries now treat durables as current consumption. Also in the Slovenian case the variable 'private consumption of durables' is set to zero and thus expenditures on consumer durables end up in the 'other private consumption' category.

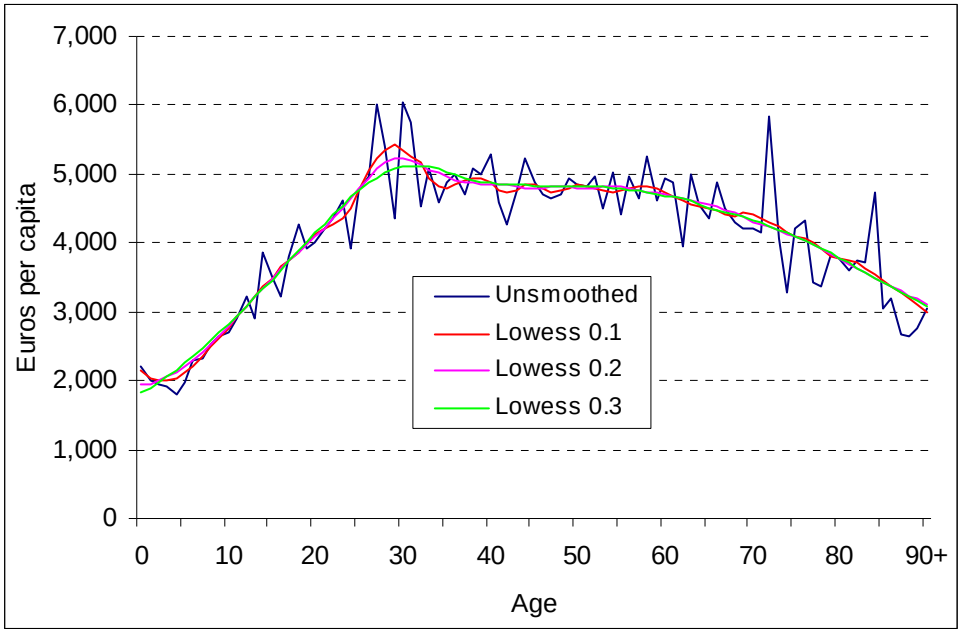
4.2.2.5 Other private consumption

The variable 'other private consumption' includes all private consumption expenditures not being the private consumption of health, education or imputed rentals for housing. As explained, they also include expenditures for durables directly, without treating them as an investment first and their flows of services as consumption. The age profile is created using the ad hoc method – i.e. by using an equivalence scale.

As shown in Figure 11 the age profile of the 'other private consumption' category is rising until about age 30. Up until age 20 the increase is driven by the equivalence scale used. During working age consumption is relatively stable and starts to decrease again after retirement. At about age 30 there is an interesting hump present. Further analysis of its sub-categories reveals that it is caused by expenditures on vehicles and expenditures on

apartments (like furniture etc.), whereby the former category peaks somewhat earlier than the latter one. A possible explanation could be the assumption that we do not treat purchases of durables as an investment, but as immediate consumption.

Figure 11: Age profile of other private consumption; Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

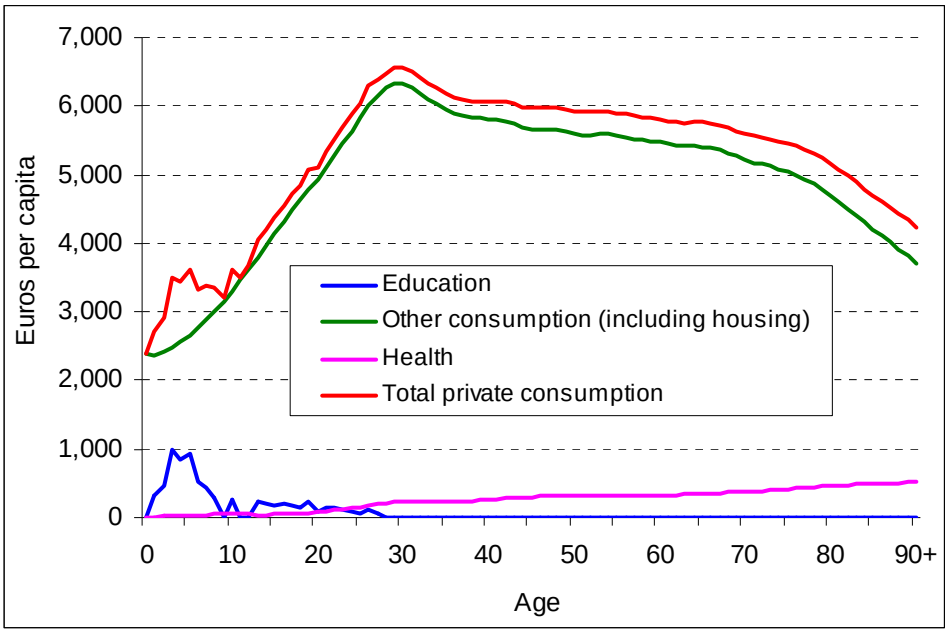
In normal circumstances when, during the analyzed period, people are not buying durables more or less intensively than otherwise, in aggregate it does not make a big difference whether we treat those expenditures as direct consumption or an investment in durables. However, it can make a big difference for the results by cohorts if purchases of durables are concentrated in certain age groups. At about the age of 30 years people are generally already employed and form families. This could explain why they buy vehicles and equip their apartments more intensively in that age period. Interestingly, this peak is not that obvious in other countries using the same methodology. A further investigation and data (also for various years) would be required to ascertain more confidently whether this result can be considered as a random effect (the variability of the age profile is indeed high at that age) or a Slovenian peculiarity.

4.2.2.6 Private consumption – total

Comparing the components of public consumption presented in Figure 12 with the components of public components that will be presented in Figure 16 reveals that education is only financed from private sources to a small extent. The share of private financing is somewhat larger for health expenditures, although health care is predominately financed through public sources. In Figure 12 we have included the private consumption of housing among 'other consumption'. We present its age profile separately because it will be treated

separately when analyzing intrahousehold transfers. At this point, we do not want to confuse the reader by thinking that the entire housing consumption is presented, while it is only the imputed part. The age profile of total private consumption is thus driven by 'other private consumption'.

Figure 12: Age profile of private consumption and its components; Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

4.2.3 Public consumption

Some public consumption is directed to known beneficiaries ('individual consumption') while the remaining part ('collective consumption') supports general systems like national defense, police, various institutions of the state etc. A detailed classification of final consumption expenditures is presented in Table 4. Analogously to the decomposition of private consumption, where health and education are treated as separate categories, the NTA methodology examines those two categories of public consumption separately as well. Remaining public expenditures are encompassed by the category 'other public consumption'.

Public health consumption and public education consumption together represent more than half of the total public consumption in Slovenia. In line with the NTA methodology those two categories are distributed over the age profiles described in the continuation. For other public consumption categories a uniform distribution across all age groups is assumed. However, the values for health and education that are reported in Table 4 assign administration costs and some other costs to collective consumption. We have also assigned part of those expenditures to those two categories; they are therefore higher while 'other public expenditures' are accordingly lower.

Table 4: Government final consumption expenditures; Slovenia, 2004 [in EUR million]

Government final consumption expenditures	**5,087.2**
Collective	**2,012.1**
Research and development	90.9
Administration, defense, etc.	1,921.2
Individual	**3,075.1**
Dwellings	3.6
Education	1,355.2
Health	1,454.9
Social services	115.3
Other individual services	146.0

Source: Statistical Office of the Republic of Slovenia, Statistical Yearbook of the Republic of Slovenia 2005, p. 455.

4.2.3.1 Education

Data on aggregate public expenditures for education are available for each level of education – from kindergartens to the education of adults, but not allocated by age. Data on the number of pupils and students by age groups and education levels are available as well. Accepting the assumption that the expenditures per pupil/student are about the same within the same educational level, regardless of their age, the available data suffice. Table A-1 in Appendix 2 provides detailed data on the number of enrolled students at different levels of education. For the age groups 30-34, 35-39 and 40-44 years the data are only available for 5-years age groups, whereby we assume a uniform distribution to 1-year age groups. For the education of adults the number and/or distribution across age groups is unknown. A uniform distribution has been applied in this case as well, whereby the upper age limit at 44 years and the lower age limit at 20 years have been arbitrarily assumed.

Following the described assumptions, expenditures have been allocated by age groups proportionally to the number of pupils/students in each age group. Estimated age profiles are presented in Table A-2 in Appendix 2. Their sum over all educational levels is presented in the last column of the table. As already indicated, this value is higher than presented in Table 4 since part of the collective consumption that is related to education (like administration costs of the educational system) is added. The obtained age profile is also presented graphically in Figure 13. This age profile does not undergo a smoothing procedure since those are population data. Smoothing is only conducted on survey data to eliminate any random effect.

It is noteworthy that after the age of 18 years expenditures fall quickly to a low level. The age profile after the age of 15 years is not only declining because of decreasing enrolment rates, but also because of decreasing costs per child/pupil/student. Average expenditures per individuals enrolled in the educational process are presented in the last row of Table 5.

Figure 13: Age profile of public education consumption; Slovenia, 2004

Sources: Statistical Office of the Republic of Slovenia, Elementary schools in Slovenia at the end of the school year 2002/2003 and at the beginning of the school year 2003/2004, 2004; Statistical Office of the Republic of Slovenia, Kindergartens, Slovenia, school year 2003/2004, 2004; Ministry of Finance, internal materials, 2007; author's calculations.

Table 5: Number of children/pupils/students in the 2003/2004 academic year and expenditures [in EUR million] in 2004 by education level; Slovenia

	Kinder-gartens	Elementary schools	Secondary schools	Under-graduate	Post-graduate	Education of Adults	TOTAL
Expenditures [in thousand EUR]	180,984	770,082	307,641	192,806	36,715	5,717	1,493,947
Number of children/ students	54,515	179,532	100,132	98,304	6,092		438,575
Costs per child/student [in EUR]	3,320	4,289	3,072	1,961	6,027		3,406

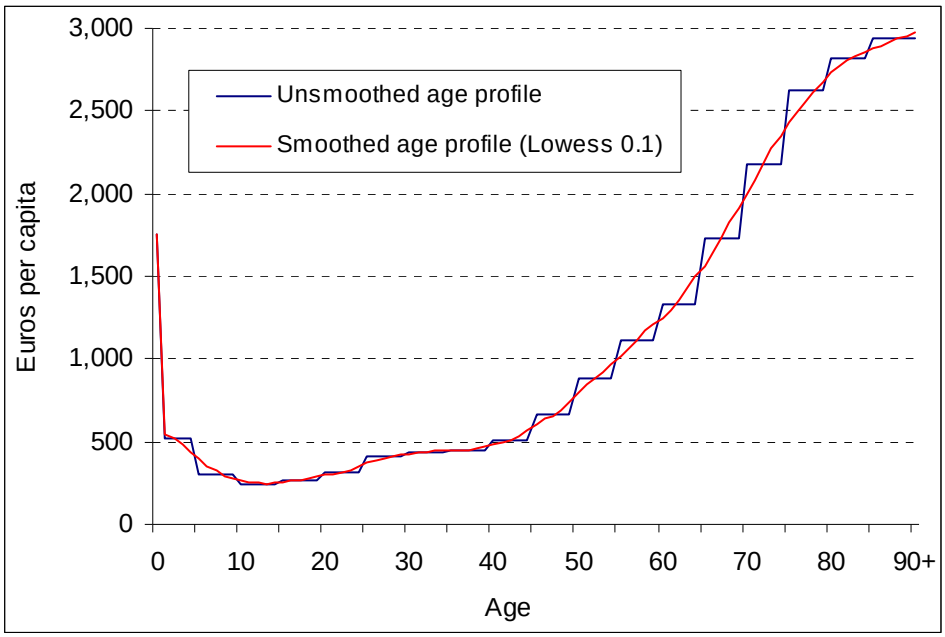
Sources: Ministry of Finance, internal materials, 2007; Statistical Office of the Republic of Slovenia, Upper secondary education, Slovenia, end of the school year 2002/2003 and beginning of the school year 2003/2004, end of the school year 2003/2004 and beginning of the school year 2004/2005, 2006; Statistical Office of the Republic of Slovenia, Student enrolment in undergraduate studies and in postgraduate master's and specialist's studies in the academic year 2003/2004, 2004.

4.2.3.2 Health

In Slovenia most health expenditures are covered by the public sector. According to detailed data from the *Health Insurance Institute of Slovenia* health expenditures amounted to EUR 1,769.2 million (Poslovno poročilo Zavoda za zdravstveno zavarovanje Slovenije za leto 2005, 2006, p. 14). Also long-term care expenditures are considered in the NTA analysis as part of this variable. Detailed data on public expenditures on health and long-term care by age in 2004 are collected by various Slovenian institutions. Based on them we prepared the age profiles that have been used by the European Commission for long-term projections of age-related expenditures, related to population ageing.

The separation of health and long-term care in practice is difficult and often arbitrary. The estimated long-term care financed from public sources amounts to EUR 217.1 million. It is estimated that the officially published value for publicly financed health care (EUR 1,769.2 million) overlaps with long-term care in the amount of EUR 102.2 million (Health Insurance Institute of Slovenia, 2006a). When health and long-term care are analyzed separately, this amount should be subtracted from the value of health care. The sum of those two categories is thus EUR 1,884.1 million, representing the NTA variable for health expenditures (including long-term care). In the figures below we present those two age profiles separately to preserve the insight into the age profiles for each of them – since they differ considerably.

Figure 14: Age profile of health (without long-term care); Slovenia, 2004



Sources: Ministry of Finance, internal data, 2007 and various other data sources; author's calculations.

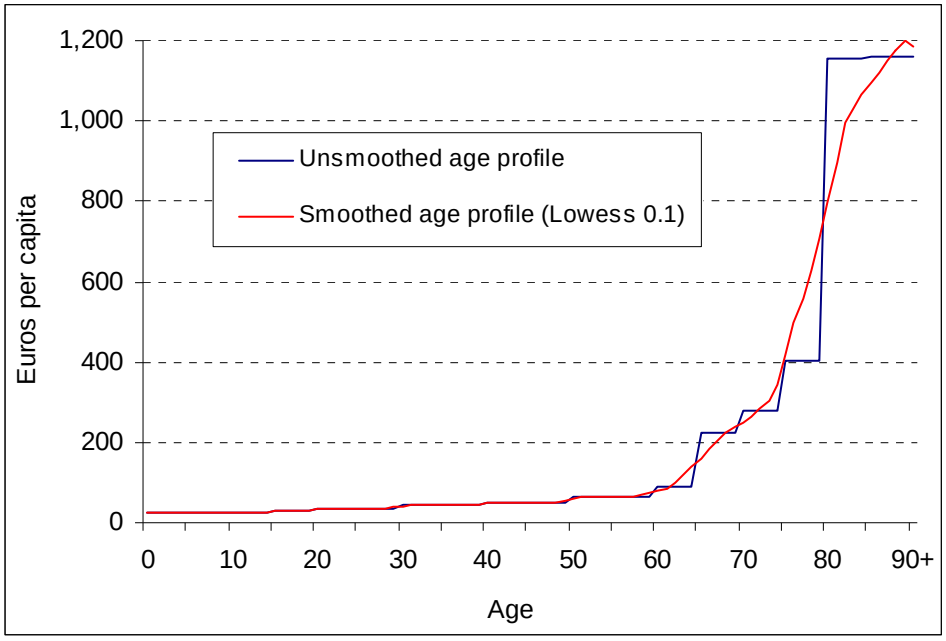
The age profile of long-term care consists of 8 subcategories while the age profile of health consists of 4 subcategories. All of those 12 subcategories have their own age profiles. Unfortunately, the data on long-term care were available for only very broad age groups but by applying the smoothing procedure we transformed them into one-year age group profiles and they look similar to the age profiles for other European countries. We took the same approach to health expenditures, for which data by five-year age groups were available.

Interestingly, for the first year of age data on the health profile are available separately. They show that at the age less than 1 year health expenditures are distinctively higher than in the following age groups. This is in line with the results for other countries for which such detailed data are available. Children are provided with intensive 'start up' medical services like vaccinations, frequent examinations, medical treatments etc. Once this phase is over, expenditures decrease to fairly low levels by the end of childhood. In the 20s and 30s health

expenditures for women[11] increase, mainly because of treatments related to motherhood. From about age 45 health expenditures start to grow with an increasing rate, up to the highest age groups.

The age profile for long-term care differs from the age profile for health. Long-term care consumption is at relatively low levels until the age of about 60 years (see Figure 15). Thereafter, those expenditures start to increase more and more rapidly. Compared to health expenditures, long-term care expenditures are much more concentrated in the highest age groups. According to population projections the share of these age groups is expected to increase the most and, consequently, also long-term care expenditures, if constant age profiles are used in the projections.

Figure 15: Age profile of long-term care; Slovenia, 2004



Sources: Ministry of Finance, internal data, 2007 and various other data sources; author's calculations.

According to the latest EUROPOP2008 population projections the share of people aged 80+ should about quadruplicate – from 3.5% in 2008 to 13.9% in 2060. The most important is to have a detailed and reliable age profile in the interval between 70 and 80 years. In those years expenditures rapidly grow and there is still a large proportion of the population alive. In the highest age groups long-term care expenditures are higher, but not many people survive till the highest ages so the effect on aggregate long-term care expenditures is not that important any more.

[11] Not presented in the figure since the NTA do not analyze age profiles separately by gender.

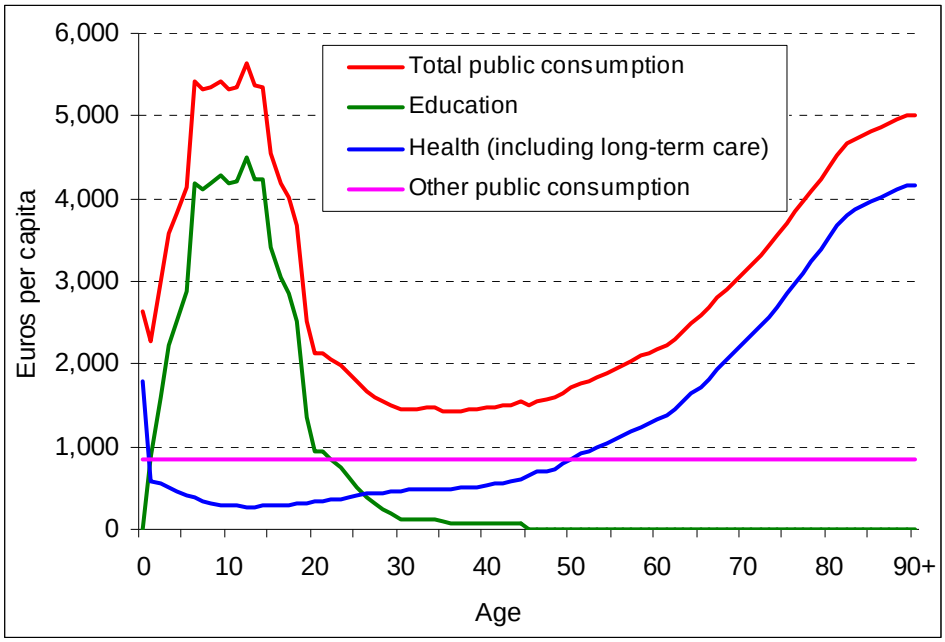
4.2.3.3 Other public consumption

Other categories of public consumption beside education and health (the later also including long-term care) have much smaller shares in total public expenditures. For most of them, like police, defense, general institutions of the state etc. it would not make sense to assume they are consumed by some age groups more intensively than by others. By allocating the remaining part of public consumption uniformly (in the amount of EUR 1,709.0 million), they amount to EUR 856 per capita.

4.2.3.4 Total public consumption

Figure 16 encompass all components of public consumption. Public consumption is concentrated with the young in the form of education and with the elderly in the form of health and long-term care. To complete the picture on the public sector's involvement we proceed to analyze transfers that individuals receive from the government in cash form.

Figure 16: Age profiles of public consumption and its components; Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia; Health Insurance Institute of Slovenia, internal data, 2006; various other sources; author's calculations.

4.2.4 Public transfers

Public transfers also have two sides: inflows and outflows. The age profiles of inflows (recipients of public transfers) differ from the age profiles of outflows (taxpayers who are funding those transfers). The NTA try to capture those public transfers flowing among different age groups.

As explained in the theoretical part, public transfer inflows can be in the form of in-kind transfers or in cash form. In general, in-kind public transfer inflows represent goods and services received directly from the government. By definition, public in-kind transfers equal public consumption. Accordingly, in-kind transfer inflows are again disaggregated to: 1) public consumption, education; 2) public consumption, health; and 3) public consumption, other. Since we have already described them under public consumption, we will not repeat them here; also the age profiles are the same.

Cash transfers are transfers in money form that are provided by the government. We took the values from the 'consolidated balance of public finances' where detailed data by categories of financial transfers to individuals and households are available. We tried to distribute them according to the NTA variables used in the past. Currently, the NTA simplify the classification by joining categories into broader groups. Basically, two categories are distinguished: 1) pensions; and 2) other social protection. Since not all detailed data are available in all NTA countries, with these broad categories the results are more comparable among NTA countries. In the Slovenian case detailed aggregate data are available and the same is true for variables in the HES from which age profiles can be calculated. Therefore, we made the calculations on those detailed levels presented in Table 6. Aggregation to 'other social protection' is still possible by summing them up. Generally, data according to those categories are also provided by the United Nations scheme called 'Classification of Functions of Government (COFOG)'.

Table 6: Transfers to individuals and households; Slovenia, 2004 [in EUR million]

Pensions (including survivors)	2,827.3
Sickness and Disability	244.2
Unemployment	83.8
Family and children	413.9
Housing	0.0
Other	810.1
Total	**4,379.2**

Source: Ministry of Finance, Consolidated balance of public financing (general government), 2008.

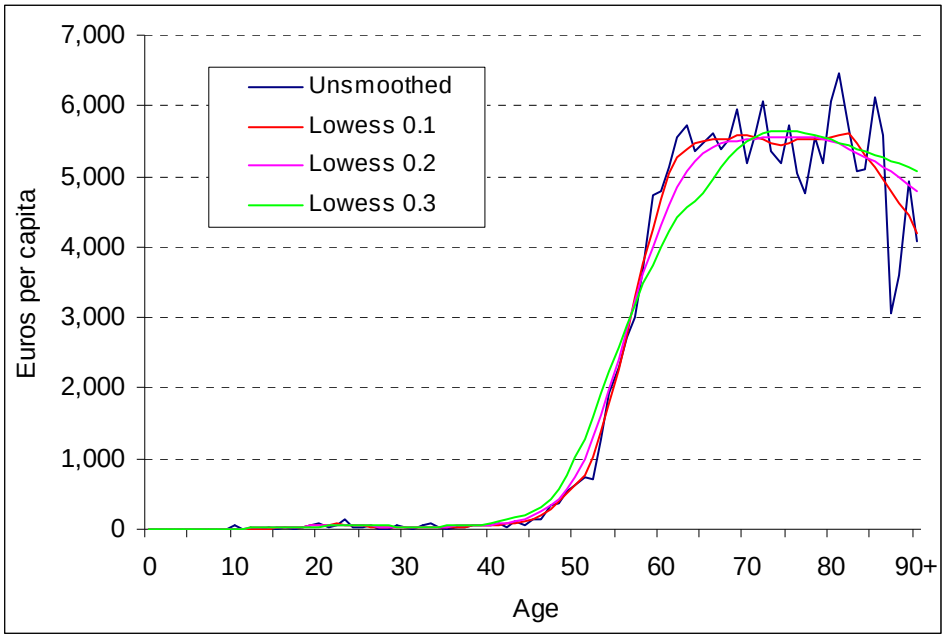
From an individual's point of view, public cash transfers are income. Therefore, the age profiles of public transfers are based upon HES data containing income variables.

4.2.4.1 Pensions

In the HES data source 2,772 individuals out of 11,303 respondents reported a pension income. The results presented in Figure 17 are in line with the labor income age profile – being a mirror of each other. At the time the labor income profile starts to decline (at about

age 50) the age profile of pensions starts to rise. At the age of 60 years the reported labor income is at low levels already, consistent with the high pension profile at that age.

Figure 17: Age profile of pension benefits; Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; Institute of Pension and Disability Insurance of Slovenia, Annual Report 2005, p.85; author's calculations.

The results are presented as net values. We should have this in mind when comparing the age profile of pensions with the age profile of labor income that is expressed in gross terms and, as described, also includes various other categories beside wages. If we were to ignore this, we could get the impression of a very low pension level compared to wages in Slovenia. Speaking about the ratio between pensions and wages: in 2008 the average net pension (for the group of old-age, disability and survivor pensions) amounted to 61.6% of the average net wage in the country. In particular, it was 67.1% for old-age pensions, 53.8% for disability pensions and 46.3% for survivor pensions.

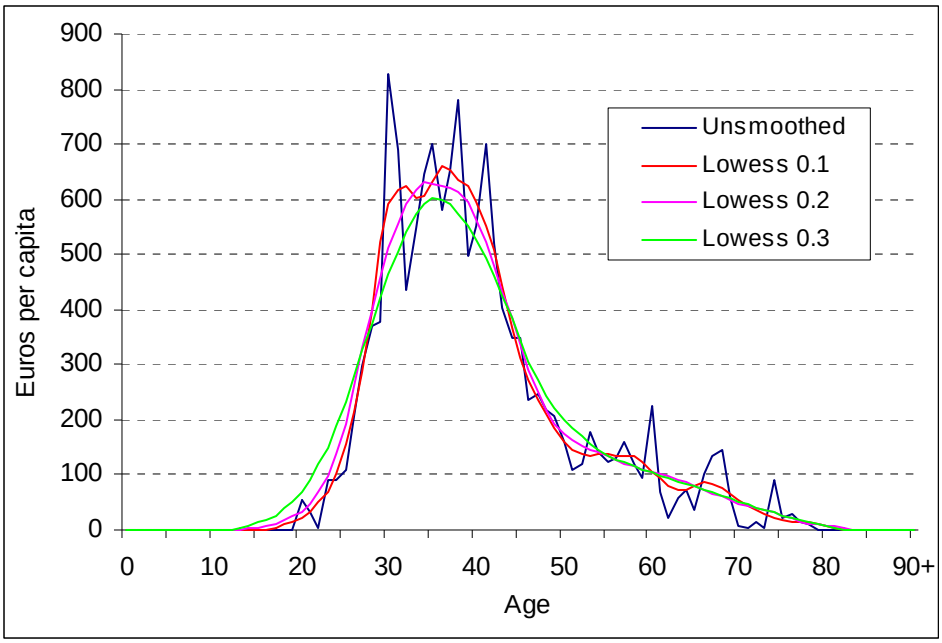
4.2.4.2 Social protection for the family and children

The following variables related to the family and child social protection are available in the HES: child allowance, parental leave allowance ('denarno nadomestilo za čas porodniške'), parental allowance ('starševski dodatek') and package for the newborn child ('paket za novorojenca'). The sum of these categories from the HES was used to create the age profile of transfers related to the family and children. The amounts were reported by individual household members. From the household structure we can assume they were mostly reported by the child's parents. The question arises of to whom those transfers should be assigned – to the parents, children or maybe even someone else? For now, according to the NTA methodology these transfers are assigned to the household head.

Some family transfers – above all, child allowances – have the purpose of co-financing parents' expenditures related to raising children. People not familiar with the NTA methodology often perceive the function of those transfers as being transfers from the public system to the children, i.e. that the public system is supporting children through those transfers. However, the rationale behind the current NTA decision of assigning child allowances to the household head is that he/she can freely decide whether to spend it on the child or some other household member or if the amount will be saved.

Children do not yet receive a labor income or income from assets. Thus, their consumption is financed either through private transfers or through public transfers. The current rule of assigning all family-related transfers to the household head increases the share of private transfers to children and reduces the share of public transfers to children. Since cash inflows are not assigned to the child, his/her consumption has to be covered through the intrahousehold transfers received from the household head.

Figure 18: Age profile of family-related allowances (child allowances assigned to the household head); Slovenia, 2004

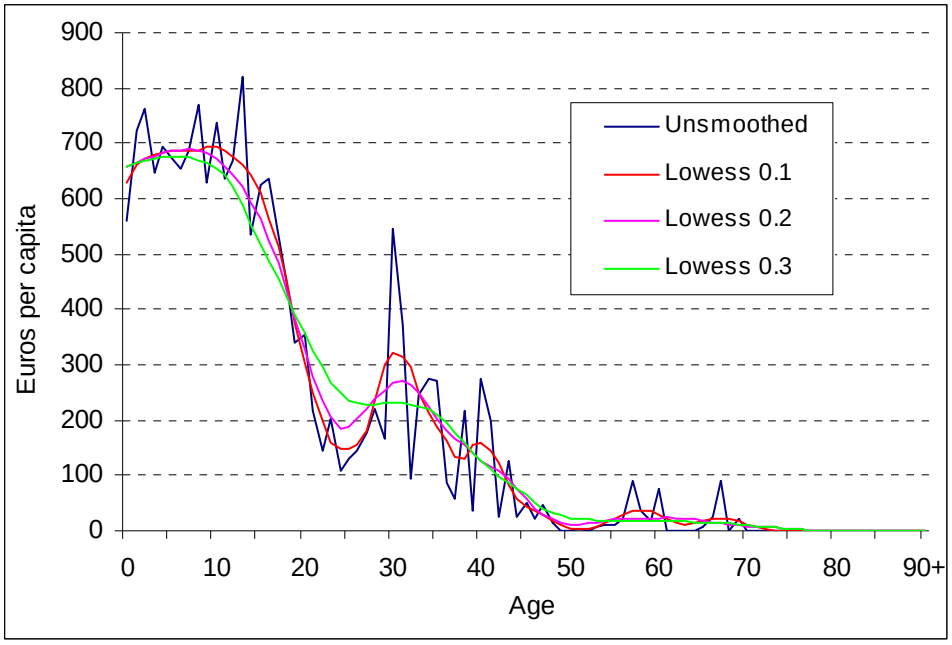


Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

The age profile of family-related allowances peaks at the age of mid-30s, extending from the mid-20s until the mid-40s. Such a result was expected since this is a period of being a parent and thus entitled to various family and children transfers. When having young children one of the parents usually holds the status of the household head and therefore family-related public inflows are allocated to them.

To show how much the age profile changes if we allocate child allowances to children, in Figure 19 we also present this version. Other family-related transfers, like parental leave, remain assigned to the household head.

Figure 19: Age profile of family-related allowances (child allowances assigned to the children); Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

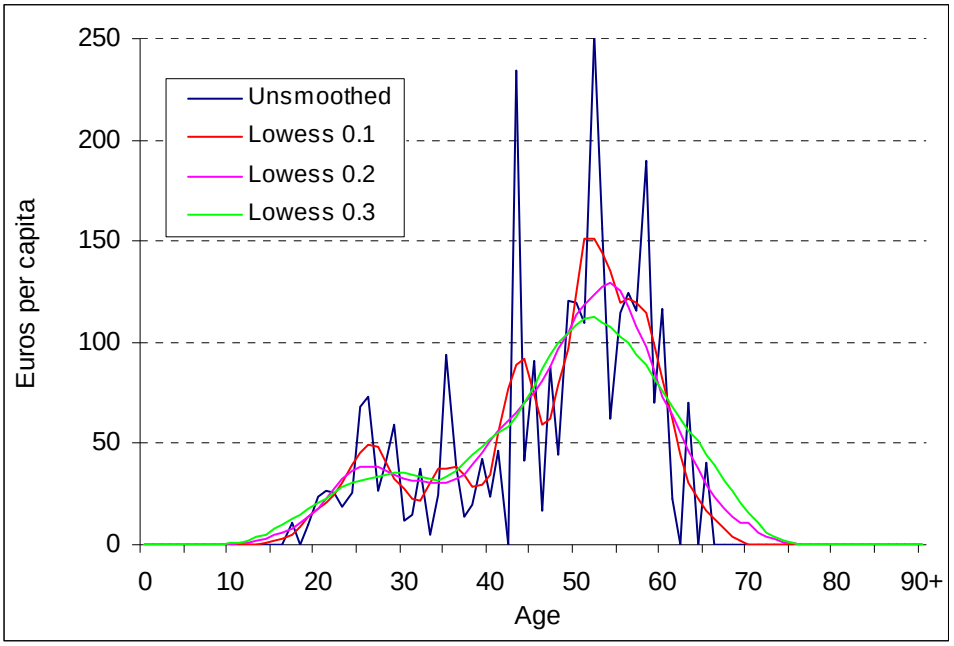
Child allowances represent the predominant share of family-related transfers; therefore, the age profile changes greatly. In this case, most of the transfers are assigned to children below the age of 20 years. Another peak, but at a lower level, arises during parenthood when receiving family transfers other than child allowances.

4.2.4.3 Unemployment benefits

In 2004 the unemployment rate in Slovenia defined according to ILO criteria amounted to 6.3%, which was distinctively below the average for the EU-25 countries (9.0%) and EU-15 countries (8.1%) (Eurostat, 2009c). In lower age groups the unemployment rate is higher than later in life. In 2004 in the 15-24 age group the unemployment rate was 16.1% (but still lower than in the EU-25 where it amounted to 18.2%) (Eurostat, 2009d). In this age group, when young people enter the labor market, the first peak therefore arises (see Figure 20).

However, the age profile of unemployment benefits peaks between ages 50 and 60. At this age most people are employed before they become unemployed. Since the level of benefits depends on the wage level before becoming unemployed, people at this age are entitled to high unemployment benefits if they become unemployed, which is not the case in lower age groups where unemployed persons are entering the labor market for the first time. The high variability of the age profile is due to the small sample size since only 217 out of 11,303 respondents reported receiving unemployment benefits. Therefore, an age profile smoothed with the factor of 0.2 was chosen.

Figure 20: Age profile of unemployment-related expenditures; Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

4.2.5 Private transfers

Private transfers consist of interhousehold transfers and intrahousehold transfers.

4.2.5.1 Interhousehold transfers

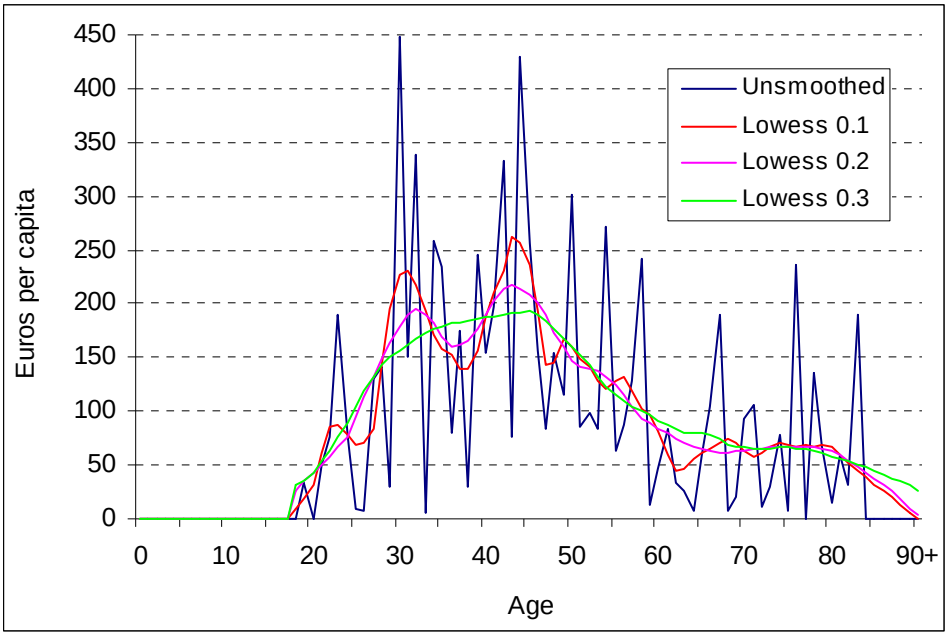
4.2.5.1.1 Interhousehold inflows

Interhousehold inflows are flows received by household members given by some other household. In the Slovenian case in the HES this variable is available at the household level which is in fact not a drawback since interhousehold transfers are by assumption assigned to household heads. The household head is the one who gives and receives interhousehold transfers. To estimate the age profile of interhousehold inflows we used the following HES variables: 1) 'money gifts and transfers among households' ('denarna darila in transferi med gospodinjstvi'); 2) 'alimony payments from an ex-spouse' ('preživnina od nekdanjega zakonca'); 3) 'alimony payments for the child' ('preživnina za otroka'); 4) 'regular financial assistance' ('redna denarna pomoč'); 'payments for elderly people' ('vzdrževalnina ostarele osebe'); and 5) 'monetary gifts' ('denarna darila').

For interhousehold inflows there is no aggregate control variable available. If we assume that the survey sample is perfectly representative, the aggregate value can be estimated from the sample. This is done by multiplying the sample total with the ratio between the total population and sample population (the sum of their weights). These results are not the same as

a directly formed age profile since the values are adjusted to the age structure of the population. A serious under- or over-estimation could occur and we do not know how large it is. Using this procedure the aggregate interhousehold inflows are estimated at EUR 71 million. The results are presented in Figure 21. Because of the high variability involved we chose the age profile with an applied smoothing factor of 0.3 for the final results.

Figure 21: Age profile of interhousehold inflows; Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

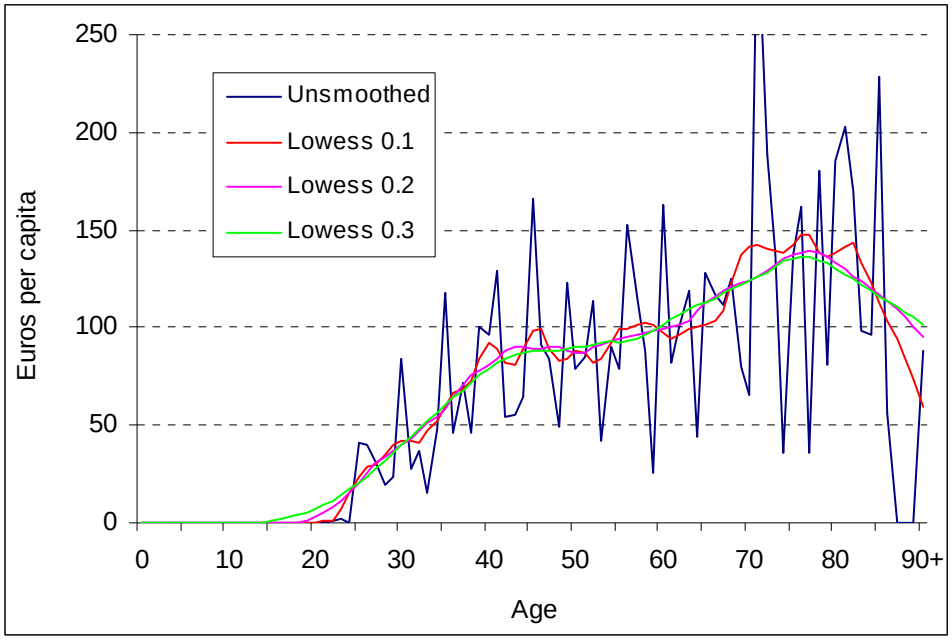
4.2.5.1.2 Interhousehold outflows

The same five variables that were used for interhousehold inflows are also available for interhousehold outflows. Again, they are available at the household level which is not a drawback since they are by assumption assigned to the household head. Non-zero outflows were reported in 900 households. For interhousehold outflows the aggregate control is also not available and therefore we estimated it from the survey data, which yielded EUR 124 million.

By definition, net interhousehold transfers equal net private transfers from the rest of the world, for which the data are available from the national accounts. In 2004 they amounted to EUR 79 million (calculations based on: Statistical Yearbook 2005, p. 458; Statistika, Arhiv plačilne bilance do l. 2006 v SIT, 2008). A positive value means that inflows from the rest of the world exceeded by that amount the outflows to the rest of the world. Either interhousehold outflows have to be reduced accordingly or interhousehold inflows have to be increased. We decided on the latter option, assuming that interhousehold inflows in the HES survey were underreported and/or underestimated. Thus, we choose the value of interhousehold inflows of EUR 203 million instead of EUR 70 million that were estimated from the survey data.

Knowing that households in Slovenia received EUR 79 million more private transfers than they gave away and by estimating outflows at EUR 124 million (estimate from the survey), inflows should amount to EUR 203 million. Again, because of the high variability of the age profile, the variant with a higher parameter of the lowess smoothing function was chosen (0.3) for the final results.

Figure 22: Age profile of interhousehold outflows; Slovenia, 2004



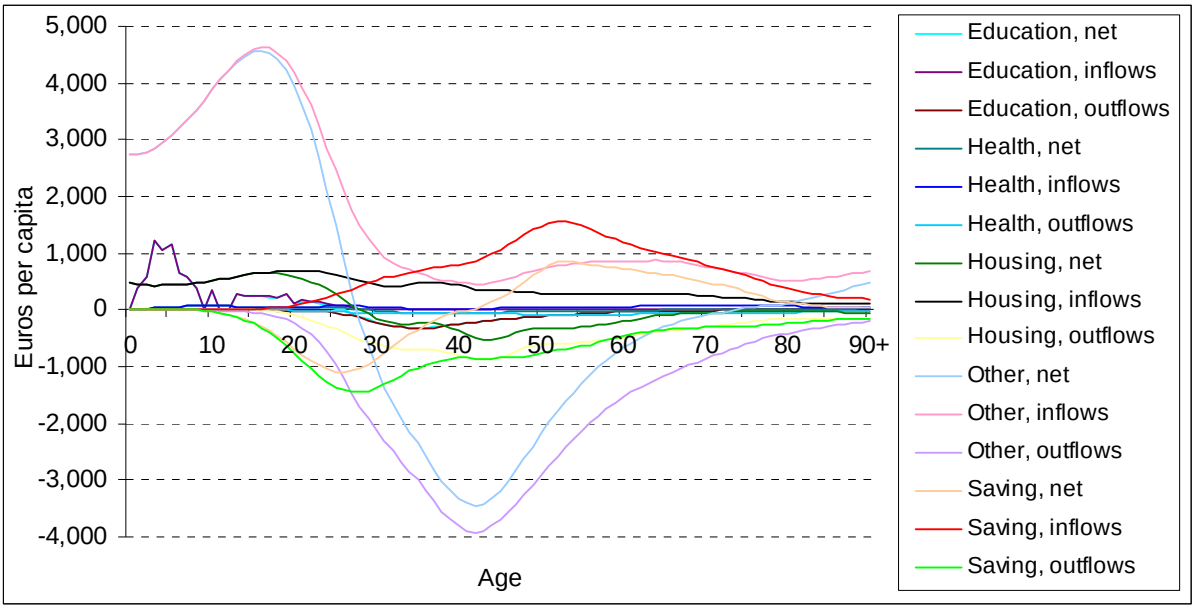
Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

Because we lack information about the aggregate values we are afraid that the interhousehold transfers might still be underestimated in the HES. Some forms of intrahousehold inflows and outflows may not be captured in those five variables on whose basis we calculated them. On the other hand, in Slovenia we do not expect high interhousehold transfers compared to other countries since a high level of public involvement decreases the need for private support between households.

4.2.5.2 Intrahousehold transfers

Following the procedure described in Section 3.4.1.2.1 we obtain results for intrahousehold transfers that are presented in Figure 23. So far we have presented both inflows and outflows in figures on a positive scale so as for them to look more natural. In the calculations the inflows have a positive sign, while the outflows have a negative sign. This time we present them both in the same figure and we therefore follow this general accounting rule: inflows have positive values (they are above the x-axis) while outflows have negative values (they are below the x-axis). The difference between inflows and outflows are net flows. At the aggregate level, the inflows match the outflows for each category since, by definition, net intrahousehold transfers have to be zero.

Figure 23: Age profiles of private intrahousehold transfers; Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

The largest are the transfers for the category of 'other consumption'. This is expected since this 'other consumption' is by far the biggest component of private consumption. Consequently, also the intrahousehold transfers for this category are the largest to cover lifecycle deficits in those ages. As presented in Figure 23, the inflows for this category are concentrated below age 30. The highest values are recorded in ages below age 20. Those are the transfers received by children to finance their consumption. In line with the equivalence scale used, their consumption is gradually increasing until the age of 20 and therefore also is the need to cover them with intrahousehold transfers – i.e. private familial transfers among household members. However, inflows peak somewhat earlier because at the age of 20 years some people are already receiving labor income; they therefore do not need intrahousehold transfers to such an extent any more.

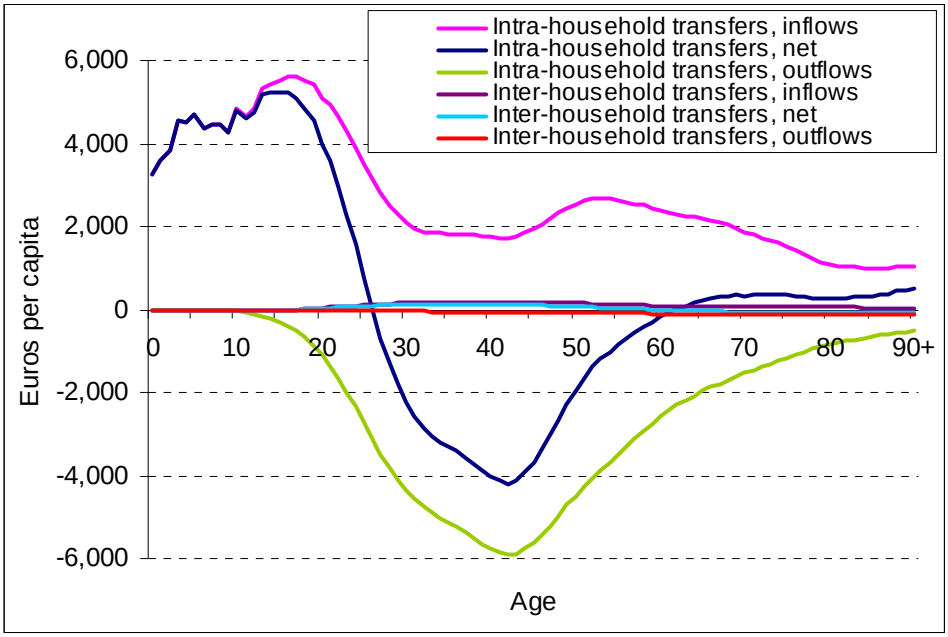
Intrahousehold outflows are spread out from about age 30 to 55 with a peak at about age 40-45. Thus, these are the cohorts that most intensively cover the lifecycle deficits of other household members through intrahousehold transfers.

A similar age pattern is observed about the covering of the private education expenditures of children through intrahousehold transfers. These transfers are however of a much smaller magnitude and are concentrated in lower age groups. The latter is true of inflows, being concentrated below age 10, and consequently this also holds for outflows. The rationale behind this is, of course, that younger parents are those who have younger children. Prime-age adults are also the ones who are predominantly financing housing and health outflows, while inflows are more spread out over the lifecycle. Also important are the age profiles of saving. From age 15 to 40 outflows predominate, while from age 40 to 80 inflows predominate. The elderly seem to be much less involved in intrahousehold transfers than prime-age adults.

4.2.5.3 Summing up the private transfers

Figure 24 encompasses interhousehold transfers from Figure 21 and Figure 22 with intrahousehold transfers from Figure 23. Intrahousehold inflows exhibit a twin peak age profile. The first peak occurs at the age of children and is driven by the intrahousehold inflows they receive from their parents for co-financing the remaining part of their consumption (it is partly financed through public transfers). The second one occurs during the 50s and is driven by positive savings. Intrahousehold outflows are concentrated amongst prime-age adults and are related to the financing of children's consumption and negative savings.

Figure 24: Age profile of private (interhousehold and intrahousehold) transfers; Slovenia, 2004



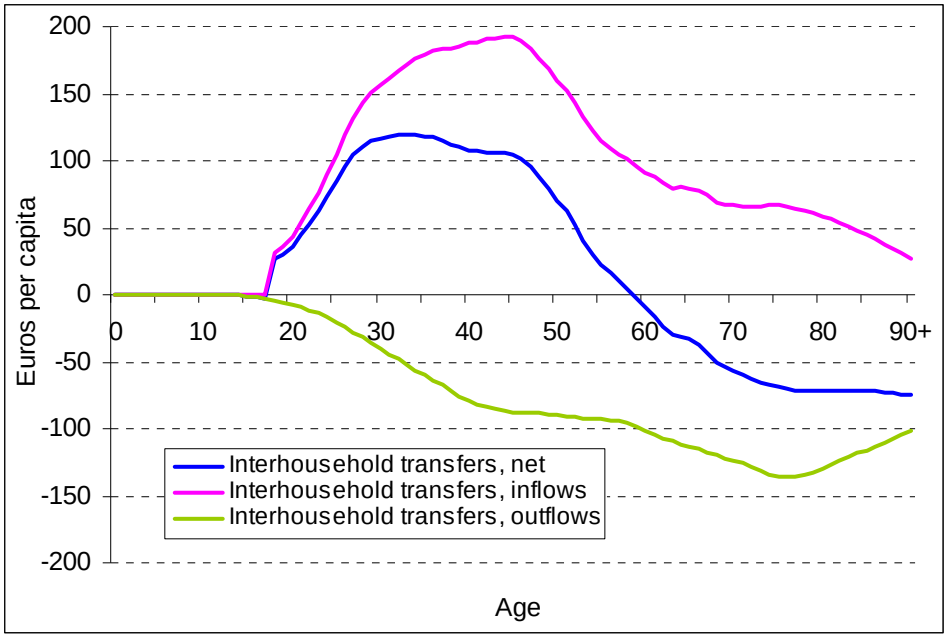
Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

The magnitude of interhousehold transfers is negligible compared to intrahousehold transfers. The age profiles are even hardly recognizable in Figure 24 since they are strongly dominated by intrahousehold transfers. We therefore also present them separately in Figure 25.

The age profiles suggest that up to about age 50 household heads are net receivers of interhousehold transfers, while after that age they become net givers. Net transfers are increasingly negative after that age. The elderly are making interhousehold transfers to their children (or grandchildren[12]) to a much greater extent than they receive transfers from them.

[12] We cannot differentiate between those two cases since the receivers in both cases are household heads. Thus, transfers given to the children are not assigned to them but to the household head.

Figure 25: Age profile of interhousehold transfers; Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

5 RESULTS BASED ON THE NATIONAL TRANSFER ACCOUNTS FOR SLOVENIA

The results presented hitherto provide important information *per se*; however, we can use these age profiles for further analyses and models. First, we will round up the presented age profiles into a comprehensive picture of transfers among cohorts. All consumption has to be financed somehow. This holds at the level of the individual, the household and also – which is most relevant for our analysis – at the cohort level. Therefore, we will present sources through which the consumption of various cohorts is covered.

Second, we can apply age profiles of consumption and labor income based on past and projected future population development. Assuming that the relative age profiles are unchanged through time, we can estimate the effects of the changing population on the economic sphere. This will be done through the concepts of the first and second demographic dividends. Projections are first required for the expected future population development. Beside the latest Eurostat demographic projections we will provide a sensitivity analysis of the results to alternative demographic assumptions. The relevance of the analyses in the dissertation is emphasized by population ageing. We wish to check whether the expected population ageing is just an outcome of pessimistic assumptions or whether those projections are really robust.

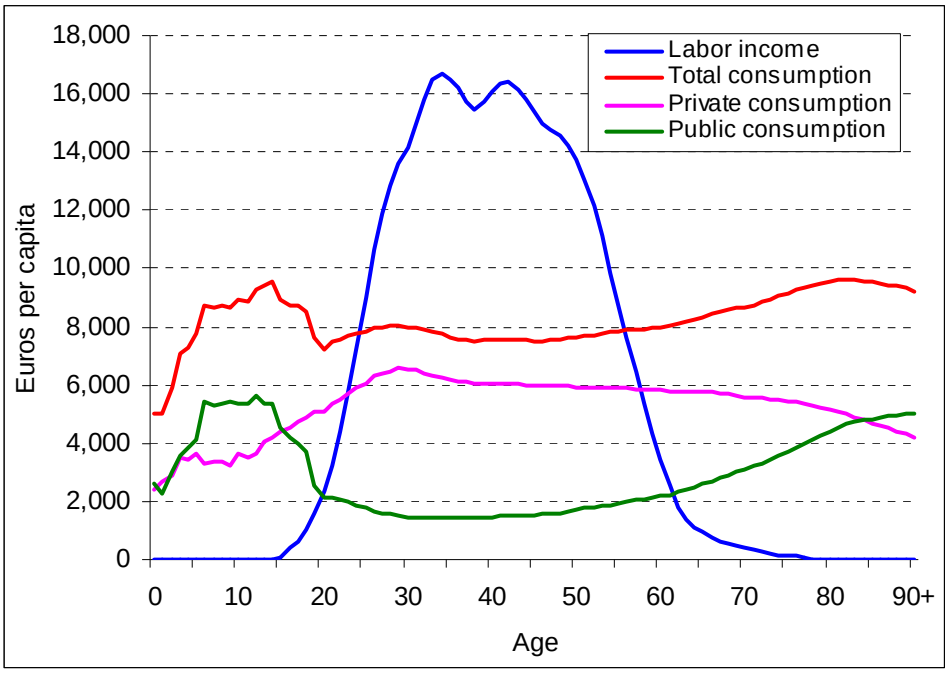
The obtained age profiles are an important input for analyzing the long-term sustainability of the public system. The application of the age profiles of public revenues and expenditures on expected population development provides their projections for the future. A model that combines age profiles with some further assumptions and simulations will be presented. It goes beyond revenue and expenditure projections, thereby also enabling us to simulate the effects of potential policy measures on different cohorts.

5.1 MAGNITUDE AND DECOMPOSITION OF THE TRANSFERS AMONG DIFFERENT AGE GROUPS

5.1.1 Consumption profile (private and public consumption together)

Figure 26 shows the age profiles of consumption and labor income that we calculated in Chapter 4. Public consumption has a U-shaped age profile, while private consumption has an inverse U-shaped age profile. The sum of those two age profiles results in relatively flat total consumption over the lifecycle. The results thus suggest that private and public consumption have a complementary function.

Figure 26: Age profile of the lifecycle deficit components (labor income and consumption); Slovenia, 2004



Sources: Author's calculations based on various sources mentioned earlier.

During childhood high public education consumption more than outweighs lower private consumption for children, which is by assumption (using the equivalence scale) lower than for adults. With higher age groups the increasing health and long-term public consumption again

outweigh the decreasing private consumption. Consequently, the consumption of children and the elderly even exceed the consumption by prime-age adults.

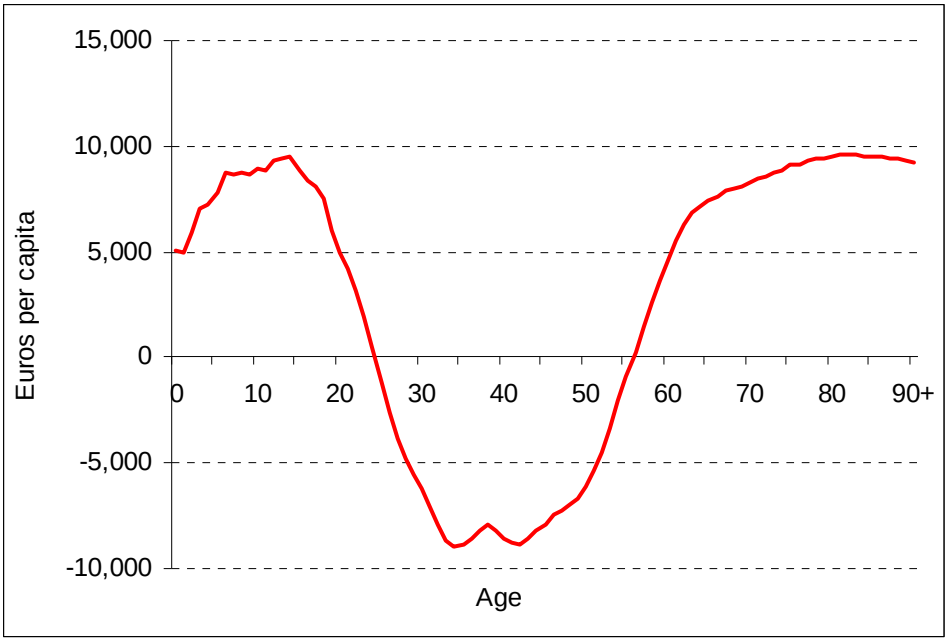
The age profile of total consumption also presents some information about inequality in terms of how consumption differs by age. To some extent in Figure 26 the lifecycle allocation to the formation of human and physical capital can also be observed. Resources from workers to children in the form of health care and education determine the productivity of next-generation workers (Mason & Kinugasa, 2008).

5.1.2 The lifecycle deficit and its financing

At the very beginning of the NTA description we said that the central category of the NTA is a lifecycle deficit. It is defined by the difference between consumption and labor income. The lifecycle deficit can be calculated because both of these categories are available.

As shown in Figure 27 the lifecycle deficit starts positive and increases up until about age 15. It thereafter starts to decline and turns negative at about age 25. The lowest values are reached between about age 35 and 45. At about age 56 the lifecycle deficit turns positive again, thereafter increasing into the highest ages. There is a long period of life during which people in Slovenia consume more than they produce.

Figure 27: Lifecycle deficit (difference between consumption and labor income); Slovenia, 2004

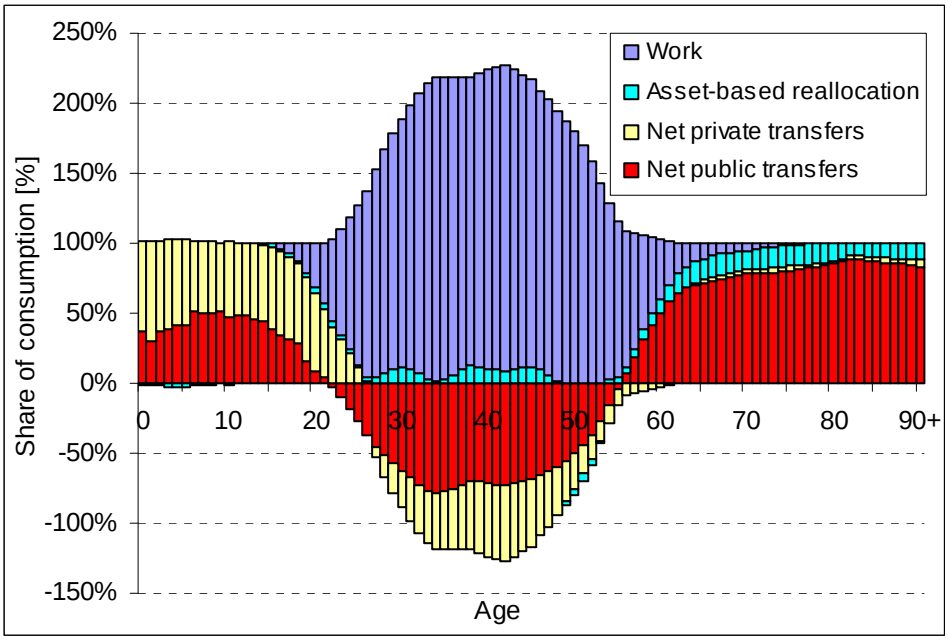


Sources: Author's calculations based on various sources mentioned earlier.

The identified lifecycle deficit has to be covered through age reallocations. By combining age profiles of labor income and all possible flows from one age group to another we obtain a

comprehensive picture of how consumption in different ages is financed. Such a picture is presented in Figure 28, building on the smoothed variants of the results.

Figure 28: Finance of consumption (using smoothed age profiles); Slovenia, 2004



Sources: Author's calculations based on various sources mentioned earlier.

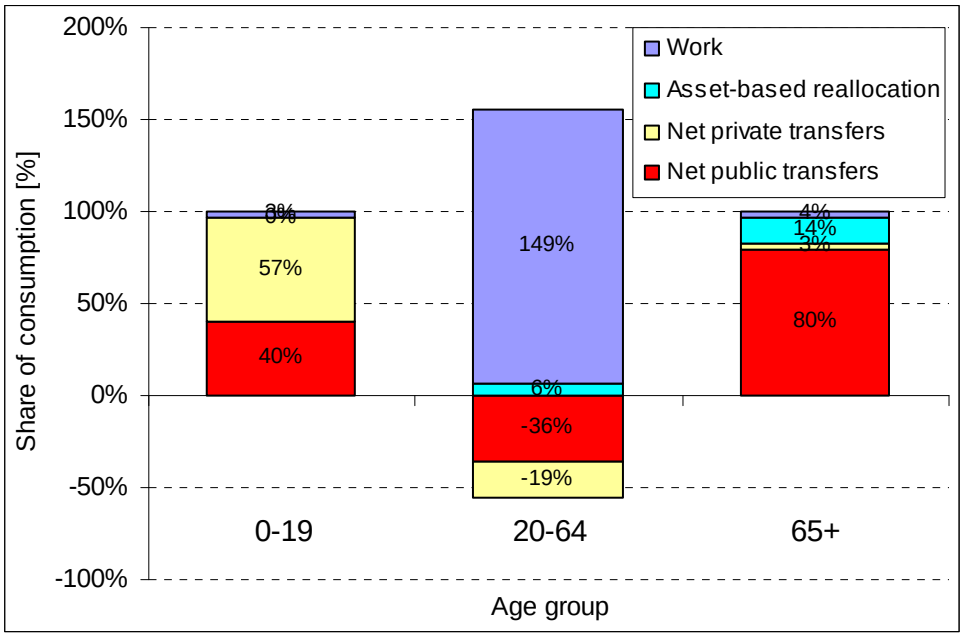
In this subchapter we have analyzed the hypothesis:

***Hypothesis 1**: There is a strong economic lifecycle at the individual level.*

The period of dependency lasts until age 25 and starts again already at age 56. There are only 31 years during which persons are producing enough to support their own consumption. In other age groups consumption has to be financed through intergenerational transfers. Life expectancy at birth in Slovenia in 2004 was 74 years for males and 81 for females. At the age of 56 years life expectancy was 22 years for males and 27 years for females (calculated on the basis of: Population of Slovenia 2004 and 2005, 2007; Life Table for the Population of Slovenia, 2000-2002, 2008). Based on these data and the results presented we believe it is legitimate to assert that there is a strong lifecycle at the individual level, i.e. that **Hypothesis 1 has been confirmed**.

Figure 29 summarizes the results presented in Figure 28 in three age groups which are especially relevant in economic aspects. People aged below 20 years of age are predominantly dependent in developed countries, as they are not yet involved in the labor market. The 20-64 age group includes individuals who are mostly active in the labor market, predominately having a lifecycle surplus. The elderly aged 65+ are again predominantly dependent and most of them no longer economically active.

Figure 29: Financing of consumption by three economic age groups (0-19 years, 20-64 years and 65+); Slovenia, 2004



Sources: Author's calculations based on various sources mentioned earlier.

According to the presented NTA results 57% of children's consumption is financed through public transfers. Of the remaining share, 40% is financed through private transfers – i.e. by intrahousehold transfers. The minor remaining gap is financed through labor income and asset-based reallocation since some persons aged 15-19 years already receive some income from those two sources.

For prime-age adults labor income represents 149% of their consumption. Also net asset-based reallocation is positive – expressed relative to the consumption in this age group it amounts to 6%. This surplus (55%, expressed relative to the consumption of this age group) is used for financing the lifecycle deficit of children and the elderly who are predominantly dependent, earning only negligible amounts of labor income. About two-thirds of the lifecycle surplus (36%, expressed relative to the consumption of that age group) are public transfers, while about one-third (19% relative to the consumption of that age group) is used for intrahousehold transfers.

We have to bear in mind that there are many more transfers flowing among the age groups, but they are consolidated inside those broad age groups. Further, there is also a large degree of consolidation already inside the 1-year age groups. For instance, assume two individuals, both age 45, have the same level of consumption. The first one is employed and his labor income is 200% higher than his consumption. The second one does not earn a labor-based income at all. The analysis would reveal that in this age group there is a lifecycle surplus of 50% over the consumption (which is close to our results for the 20-64 years age group). Further, the first person could finance the consumption of the second person through

intrahousehold transfers or through the public system. This would not show up as a transfer since they are in the same age group and therefore this is not a transfer **between** age groups.

It is noteworthy that the consumption of elderly people is extensively covered by public transfers. It is indicated that they use neither an asset-based reallocation nor private transfers from prime-age descendants to support their consumption. It could be the case that they adjust consumption to the available sources because they do not want to rely on transfers from their children and/or do not want to use (or do not have) assets to support their consumption. However, since the consumption of the elderly does not decrease (as compared to the consumption of the prime-age group) this is a less likely explanation. It may be that the public system is generous enough so that they simply do not need to use other resources beside public ones to support their consumption.

5.2 POPULATION PROJECTIONS FOR SLOVENIA

According to the population register, in 2004 (June 30) there were 1,997,004 inhabitants in Slovenia. It was just below the 2 million mark for some time and, according to the register data, this figure was finally exceeded in 2005. The Slovenian population belongs to the modern demographic regime with low levels of fertility and mortality. The demographic transition was completed in the country at the end of the 1950s. After having been strongly positive for decades, in 1993 natural population growth in Slovenia turned negative. Until 1997 it was around zero and thereafter negative values have been recorded. The exceptions are the last two years (2006 and 2007) that were again temporarily positive. Positive net migrations are currently compensating for the negative natural population growth.

The number of people in a certain territory depends upon mortality, fertility and migration. Population projections are only a technical result of the initial population structure and assumptions about the future development of those three categories. Despite the strong desire to foretell the future, the future remains uncertain. Regardless of the models applied and how deep the analysis of past development is, population projections can only estimate intervals among which future demographic development is expected to happen.

The simplest method of making population projections is to find a mathematical function that fits the past development of the population size well. Determining the form of this mathematical function usually involves a combination of minimizing deviations (of the function from the actual data) and expert opinion. The obtained mathematical function is then extrapolated into the future. Those projections, called *mathematical projections*, are only used for short- and medium-term projections up to about 7 years. *Analytical projections,* on the other hand, decompose the aggregate population into the fertility, mortality and migration component. The decomposition is also usually by age and gender. This richness of information greatly improves the accuracy of the projections. Their drawback is that not all of

the required data is available, especially for small territories, while the drawback of being computational intensive is because microcomputer development is not relevant any more. From the mathematical and analytical projections we can also derive numerous projections for subpopulations (projections of households, the active population, population by school involvement, the retired population etc.) (Malačič, 2006).

A standard approach in demography is to create population projections in three variants: medium, low, and high. The *medium variant* is the one that seems most likely – in the opinion of those who construct population projections. However, nobody expects that future development will go perfectly in line with the projections. Therefore, an interval for likely future population development is set. The upper limit of the interval is represented by the *high variant*, which combines optimistic assumptions on fertility (higher), mortality (lower) and net migration (higher) regarding the impact on the size of the population. On the other hand, the lower limit is represented by the *low variant*, combining pessimistic assumptions.

Sometimes a *zero-migrations variant* is also calculated, assuming there was no migration. The results obtained for this variant compared to the reference scenario present the effect of migration on the outcome. As a benchmark, a *constant variant* can also be calculated. It represents the results if fertility, mortality and migration were to remain unchanged at the level of the latest available data. It is considered to be a variant that is not affected by the subjective nature of the authors of projections. However, by usually observing a clear trend in the past data this variant is not considered a realistic one and therefore only has a benchmarking purpose.

The evolution of mortality is somewhat easier to predict than the evolution of fertility and migration. It is less volatile and can be based on evidence from more developed countries which already have a considerably higher life expectancy. On the other hand, in developed countries there is still no evidence of a substantial and permanent recovery of fertility once it drops to such low levels as currently seen in Slovenia. For a level of fertility below an average 1.3 children per woman the term 'lowest low fertility' is used (Billari & Kohler, 2004). Migration, on the other hand, is highly sensitive to economic, political and various other circumstances, which can trigger sudden and strong changes in migration flows. Regardless of the data quality and method used we have to bear in mind that population projections have a limited range. Analytical projections are considered 'to be relatively reliable for a projection horizon of about 10 to 25 years' (Malačič, 2006), while projections for a much longer period can only be considered as a mathematical exercise.

Probabilistic projections are most explicitly linked to the idea that each outcome has some probability that it will occur. If confidence intervals for the future fertility, mortality and migrations are set, then the probability of each outcome can be calculated – see, for example (Keilman, Pham, & Hetland, 2002; Wolfgang Lutz, Sanderson, & Scherbov, 1996; Prskawetz, Kögel, Sanderson, & Scherbov, 2007). But still, probability intervals for fertility, mortality

and migration have to be estimated from their past developments (analyzing errors in past forecasts; model-based estimates of forecast errors) or by expert judgment. Lately this approach has been applied to different countries, including EU-27 countries (for example Prskawetz, Kögel, Sanderson, & Scherbov, 2007; Scherbov, Mamolo, & Lutz, 2008; Wilson & Bell, 2007). However, when population projections are used as an input for further analyses, as will happen in our case, they are still predominantly made in the form of variants.

In 2005 Eurostat published population projections for all EU member states at that time and also for two EU candidates: Bulgaria and Romania (Eurostat, 2005). The projection horizon was up to 2050. The Statistical Office of the Republic of Slovenia has also declared them as official Slovenian population projections. Those were the first projections after population projections made in 1996 (Šircelj, Vertot, Cruijsen, & Exterkate, 1995). In the conditions of rapid demographic changes such a time gap is a very long period. In the meantime various unofficial projections have therefore been constructed by researchers who have needed them as an input for their analyses (Kraigher, 1998; Majcen et al., 2005; Sambt, 2004; Verbič, Majcen, & van Nieuwkoop, 2006).

The Eurostat projections published in 2005 (EUROPOP2004) were prepared using the 'trend' method. The name suggests that assumptions about the future development of fertility, mortality and migration have been set from their past trends. On the contrary, in the latest Eurostat projections from 2008 (EUROPOP2008) the 'convergence' method was used. For the convergence year 2150 was set. However, the projections were really only prepared for the period up until 2060. Beside the baseline variant the EUROPOP2008 projections also contained a *zero-migrations* scenario, while low and high variants were not prepared. The focus of those projections was not population projections *per se*. They were prepared as an input for projecting public expenditures related to ageing population.

In the analysis we will build on the baseline demographic variant of EUROPOP2008, which does not have any specific name. We will refer to it as 'medium variant', involving the function that medium variants have: being the variant of projections that is considered to be most likely to happen. It will be the reference variant from which we will build other variants and scenarios[13].

First, we will produce low and high variants, supplementing the medium variant in population projections. As already explained, the high (low) variant combines an optimistic (pessimistic) assumption by all three factors: fertility, mortality and migration. This has the following consequences. First, the span between the high and low variants is usually very broad. Already the probability that one of the processes will exceed the upper or lower limit is often fairly low. Advocates of probabilistic projections warn that as a matter of fact no indication is

[13] We will use the term 'variant' for demographic projections that are commonly produced and recognized in the science of demography. For various tests and experiments that are not commonly used in demography, we will use the term 'scenario'.

given to the likelihood that the high or low variant will come true (Lutz & Scherbov, 1998; Tuljapurkar & Lee, 2000).

Second, the point of view for the high and low variants is the number of people. Lately the effects of demographic changes on the sustainability of the public system are becoming increasingly important. It is the changing population structure that is more relevant in this case. From this aspect, the high and low variants do not represent the upper and lower boundaries of the interval. We will therefore also prepare 'favorable' and 'unfavorable' scenarios, where the criteria will be the influence of assumptions on population ageing.

Third, since assumptions about fertility, mortality and migration are all changed at the same time we do not see the effect of each of these components. Therefore, we will prepare a set of scenarios where we will only change one demographic factor at a time, holding the other two unchanged. This will provide information about the sensitivity of the results to each of the demographic assumptions separately. Using those different simulations we will also try to test the robustness of the results about population ageing to alternative assumptions. The deficiency of deterministic projections not providing probabilities for certain outcomes will of course remain.

Ongoing and forthcoming demographic changes are the central process on which the dissertation is focused. Therefore, we will extend standard population projections with further scenarios[14]. They are not common to demography but we believe they can provide a better insight into demographic processes and the magnitude of the effects on the public system which is also a topic of the dissertation.

For population projections we used the computer software called 'LIPRO 4.0', which was also the official software used by Eurostat for the EUROPOP2004 and EUROPOP2008 projections. For technical details about the software, its procedures and algorithms, see van Imhoff & Keilman (1991). Having the same input data of assumptions we first reproduced Eurostat's' medium variant. There are negligible differences (less than 100 persons in 2060; and even much less in earlier years), probably caused by the rounding off of decimal numbers. It is worth mentioning that assumptions about fertility, mortality and migration, which will be presented in the text, are not one-dimensional. The same life expectancy at birth can be the result of a very different mortality distribution by age groups. By analogy, a certain level of fertility, expressed as the *total fertility rate*[15] (TFR), can be the result of various age distributions of fertility; while the total number of net migration is composed of the number of net migrations by age and gender. In all variants and scenarios the same age and gender distributions of those hidden assumptions are used as in the EUROPOP2008 projections.

[14] Since those projections are not common demographic variants, we will instead call them 'scenarios'.

[15] The total fertility rate is the average number of children that a woman gives birth to in her lifetime, assuming: 1) that the prevailing rates remain unchanged; and 2) she will survive from birth through to the end of her reproductive life.

5.2.1 Assumptions

When describing the assumption about future fertility, mortality and migration used in the EUROPOP2008 projections, we will also shortly describe their development in the past. However, we will not go into much detail since their past development was not the criterion in this round of projections. All the countries are assumed to grow gradually from their current level to the convergence level in 2150, regardless of their past demographic development. Up until 2060 some degree of convergence will be achieved, but countries are still expected to differ substantially because they have very different starting points. Figures 30 to 32 also present the assumptions about fertility, mortality and migration by variants and scenarios that will be presented and described afterwards – when describing their results.

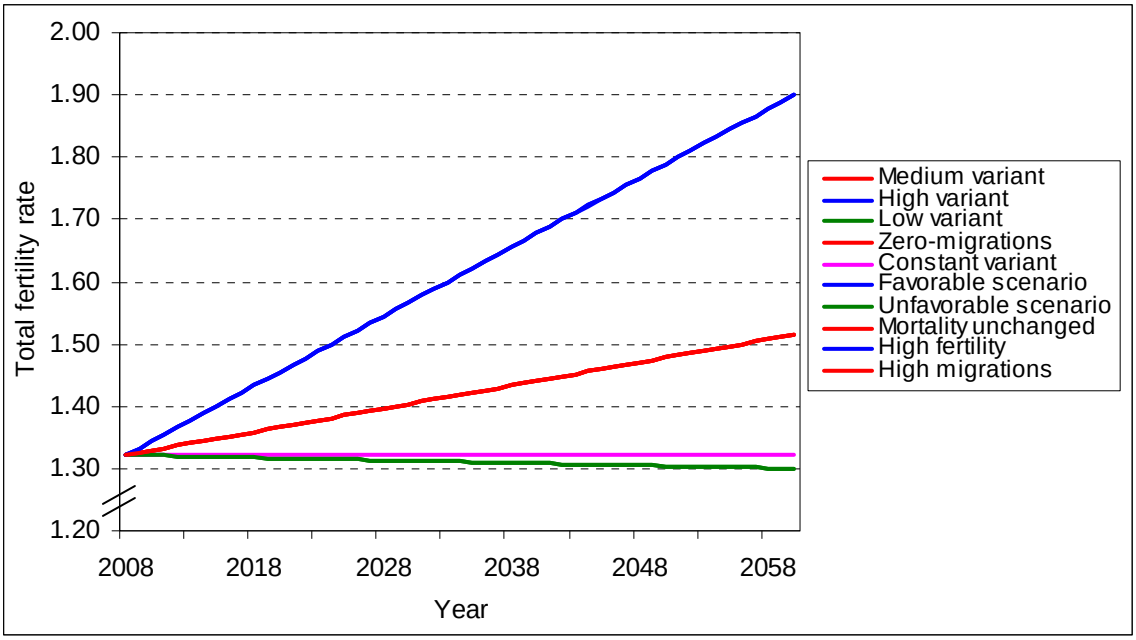
5.2.1.1 Fertility

The fertility level in Slovenia was stable and slightly above the replacement level in the 1960s and 1970s. In 1981 the total fertility rate (TFR) dropped below 2.1, a margin that represents the replacement fertility rate for developed countries[16]. Since then, the TFR was continuingly declining until 2003, reaching the level of 1.2 (Population of Slovenia 2006, 2008, p. 56). A population model with such low fertility would have an intrinsic growth rate of –1.9 percent. Such a model population would shrink to half its original size in just 37 years. In the last two years it has somewhat increased: it was 1.31 in 2006 and 1.38 in 2007 (Statistical Yearbook of the Republic of Slovenia 2008, p. 85).

Further analysis would be required to estimate whether fertility has truly increased in those two years. The total fertility rate is calculated from data about fertility by age groups for a given year. From those cross-sectional data a longitudinal estimate is constructed. Here it is implicitly assumed that the fertility age pattern from one year also represents a probability pattern of fertility for an individual woman throughout her lifetime. When women are delaying fertility to higher ages, the TFR is underestimating the true fertility level. Methods have been developed that try to separate the 'pure' level (*quantum*) effect from the *tempo* effects, since in reality we observe an interplay between those two. By applying the Bongarts-Feeney method adjustment (for technical details see, for example, Bongaarts, 2002; Bongaarts & Feeney, 1998; Philipov & Kohler, 2001) it was also estimated for Slovenia. The low fertility rate in 1995-2005 is supposed to have been largely caused by the exceptional intensity of fertility postponement. The tempo effect was estimated at -0.42. Adjusting the value of the TFR to be 1.26 for the 1995-2000 period, the results are an adjusted TFR of 1.68 (Sobotka, 2004).

[16] Populations with fertility below this replacement level will shrink in the long run, assuming there is no constant flow of immigrants.

Figure 30: Assumptions about fertility in the 2008-2060 period by variants and scenarios; Slovenia



Sources: Eurostat, internal materials, related to the population projections 'EUROPOP2008', 2008; author's calculations.

The ongoing process of delaying fertility into higher ages is expected to slow down. In Slovenia the mean age of a mother at the birth of a child in 2007 was already 29.9 years (Statistical Yearbook of the Republic of Slovenia 2008, p. 84). Evidence from more developed countries suggests that a slowdown can be expected after reaching about age 30. In the medium variant of EUROPOP2008 Eurostat assumes for Slovenia a gradual increase in the total fertility rate from 1.32 to 1.52 children per woman (see Figure 30).

5.2.1.2 Mortality

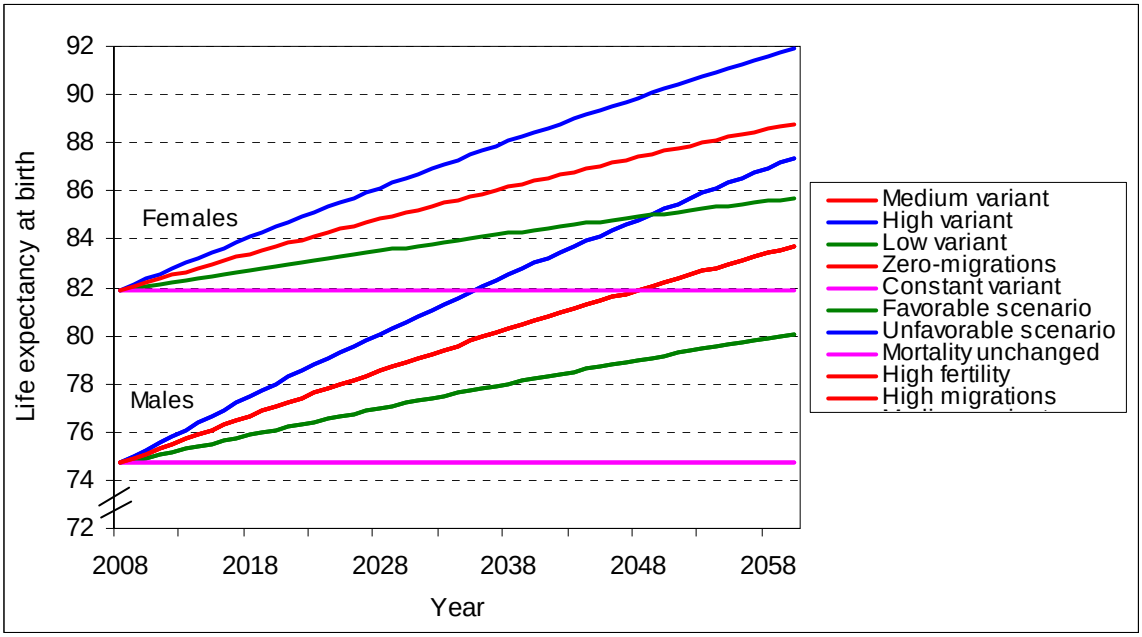
Since 1960 mortality in Slovenia has been declining. Life expectancy at birth increased in the 1958/59 – 2006/07 period from 65.6 to 75.0 years for males and from 70.7 to 82.3 years for females (Statistical Yearbook of the Republic of Slovenia 2008, p. 83). The progress was substantial and without periodic retardations as seen in many other ex-socialist countries in Europe. According to the EUROPOP2008 assumptions, longevity will continue to increase. They predict life expectancy at birth will reach 83.7 years for males and 88.8 years for females by 2060.

Those values are considerably higher than assumed in the EUROPOP2004 projections when life expectancy at birth was set to 79.8 years for males and 85.1 years for females in 2050[17], which was the end-year of the projections. The assumption of life expectancy at birth reaching almost 90 years of age for women in 2060 might seem (too) optimistic. But, on the other

[17] For a direct comparison of assumptions from the same year: in the EUROPOP2008 projections the life expectancy at birth for the year 2050 was assumed to be 82.2 years for males and 87.6 years for females.

hand, comparing assumptions from population projections in the past with actual data shows that the increase in life expectancy was systematically underestimated (for example, Brody, 1985).

Figure 31: Assumptions about mortality in the 2008-2060 period by variants and scenarios; Slovenia



Sources: Eurostat, internal materials, related to the population projections 'EUROPOP2008', 2008; author's calculations.

However, throughout history mankind has been accompanied by all kinds of diseases among which influenza pandemics are especially relevant. The most serious pandemic was Spanish flu in 1918-1919 caused by an influenza A virus of the H1N1 subtype. It is estimated that one-third of the world's population (i.e. about 500 million people) were infected and had a clinically apparent illness. This flu was responsible for the death of about 50-100 million people worldwide (Taubenberger & Morens, 2006). The spread of H5N1 avian influenza viruses from Asia to the Middle East, Africa and Europe a few years ago has raised the alarm that an influenza pandemic might occur again (Morens & Fauci, 2007). There is a widespread belief, especially among biologists, that another influenza pandemic might be imminent. In their opinion, the question is not **whether** there will be a next pandemic outbreak, but **when** it will happen and how to prepare for it – see, for example, Iwami, Takeuchi, & Liu (2009) and Morens & Fauci (2007). Now and then the general public also realizes that this threat does indeed exist. Just recently the media was full of headlines about the H1N1 flu that appeared in Mexico.

Such a pandemic outbreak could strongly change mortality, altering the size and age structure of the population. The age profile of influenza deaths has historically had a U-shaped form, with mortality being greatest among the very young and old, with a comparatively low frequency of deaths at all ages in between. However, different patterns can also occur – like in the case of the described Spanish flu that had a W-shaped' form (see Figure A-3 in Appendix 4), also strongly affecting healthy young adults (Taubenberger & Morens, 2006).

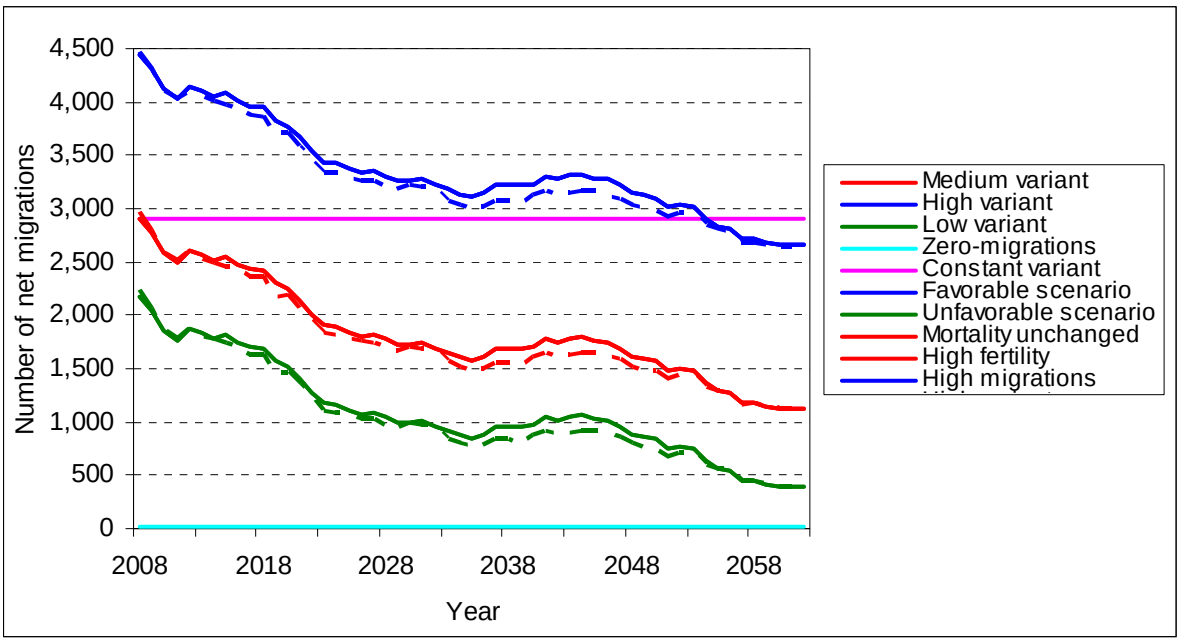
5.2.1.3 Migration

During the 1960s Slovenia transformed from a traditional emigration country to an immigration destination. The most important was the Balkan South-East to North-West immigration stream. In the 1970-1990 period, all net migration flows between Slovenia and other federal parts of Yugoslavia were positive for Slovenia (Malačič, 2000). Since 1990 this pattern has not changed in spite of the several new state borders which have emerged since the breakdown of Yugoslavia. In the last decade net migration has amounted to 2,000 to 3,000 people per year, with higher values in 2005 and 2006 reported of 6,436 and 6,267 net migrations, respectively; while in 2007 an extreme value of even 14,250 net migrations was recorded (Statistical Yearbook of the Republic of Slovenia 2008, p. 95).

However, those high migrations were the result of a non-standard definition of the population compared to the international definition, combined with the high culmination of workers, especially construction workers who are temporarily working in Slovenia but are treated as immigrants. It is planned that in 2009 the Slovenian population definition will be synchronized with the international one.

Eurostat assumes positive net migrations for the entire projection period. In other words, it expects that immigration will continuously exceed emigration. However, the positive difference is expected to gradually decrease from 5,863 people in 2008 to 2,254 persons in year 2060 (see Figure 32).

Figure 32: Assumptions about migrations in the 2008-2060 period by variants and scenarios; Slovenia



Note: Full lines denote values for males while dashed lines denote values for females.

Sources: Eurostat, internal materials, related to the population projections 'EUROPOP2008', 2008; author's calculations.

5.2.2 Results

The results of population projections by variant and scenarios are summarized in Table 7 on page 95. They are presented by the three age groups mentioned before. First, the group of young people aged 0-19 years who are largely not yet in the labor market. Second, the age group 20-64 years, representing people of a working age. Third, people aged 65 years and over (65+) who are predominantly not entitled to remain in the labor market any more, with majority of them already being retired. In demography these age groups are named 'contingents'. Initially the boundary between the first and second age group was 15 years, but lately in developed countries a boundary of 20 years has been seen as more adequate from the economic point of view. In developed countries most people complete secondary education and a large share of them continues education even at the tertiary level so the age boundary of 20 years is more realistic. The total number of population and share of elderly are also presented graphically in Figures 33 and 34. In Appendix 5 the remaining results of the projections are graphically presented.

5.2.2.1 Medium variant

According to the most relevant variant for further analysis – the medium variant – the Slovenian population will decrease by about 244,000 inhabitants by 2060. This will happen despite the assumed substantial positive net migration, fertility increase and increased longevity. The age structure of the population will change radically. The share of elderly people is projected to more than double: from 16.1% in 2008 to 33.4% in 2060.

5.2.2.2 High, low and constant variants

The assumptions for those two variants build on suggestions proposed in 2007 by the Slovenian national group of experts for population projections. At that time, the low and high variants were also still planned for the EUROPOP2008 projections. During the preparations Eurostat was collaborating with that group, asking for its opinions and suggestions. We have used the relative position of the low and high variants compared to the medium variant at that time.

The group agreed on Eurostat's proposals regarding fertility and mortality. The total fertility rate of 1.90 was suggested for the high variant in the final year of projections while 1.30 was suggested for the low variant. There is almost no difference between the Eurostat proposal from 2007 and the EUROPOP2008 projections regarding the total fertility rate in the medium variant. Therefore, we have kept the same TFR of 1.90 in the high variant and 1.30 in the low variant . However, the trajectory of the increase from the initial to the final year of projections has been adjusted according to the trajectory used in the EUROPOP2008 medium variant. A

more linear trajectory has been assumed in the EUROPOP2008 (see Figure 30) compared to the EUROPOP2004 projections when more apparent logarithmic growth was used.

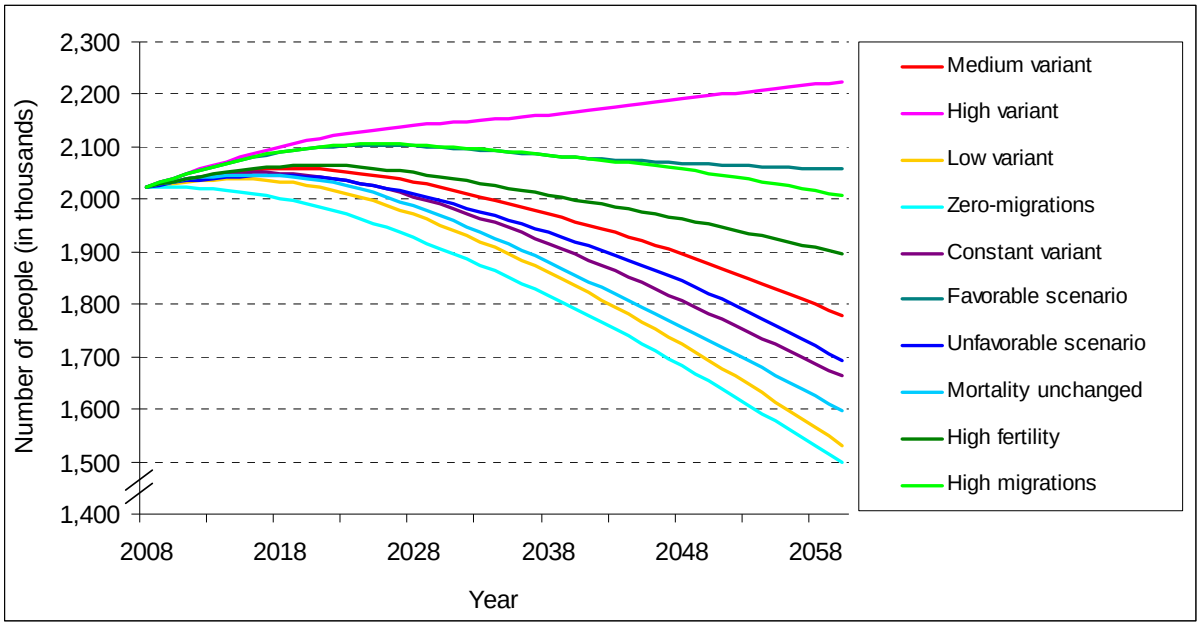
In 2007, the national group also agreed with Eurostat on the proposed assumptions about mortality. For the high variant a life expectancy of 83.48 years is assumed for males and 88.25 years for females. This is 3.65 years (for males) and 3.10 years (for females) higher than in the medium variant (being 79.83 years for males and 85.15 years for females). In the low variant, the same differences are assumed in a negative direction. Thus, for 2060 76.18 years is assumed for males and 82.05 years for females. The assumptions about mortality are presented in Figure 31.

For migration the national group suggested different assumptions than Eurostat: compared to the medium variant a 3,000 people higher value was assumed in the high variant and a 1,500 people lower value was assumed in the low variant. We have applied this difference for the entire period of the projections. The trajectories of the assumed net migrations in the high and low variants are presented in Figure 32.

As shown in Table 7, the high (low) variant projects a much higher (lower) number of inhabitants since it combines optimistic (pessimistic) assumptions regarding all three dimensions: fertility, mortality and net migration. However, despite projecting a much different population size compared to the medium variant, the differences in age structure are not very big. In the low variant the share of people aged 65+ is almost the same as in the medium variant. In the high variant the share of people 65+ is somewhat lower (29.8% compared to 33.4% in the medium variant), the share of people aged 0-19 years is somewhat higher (21.8% compared to 17.5% in the medium variant), while the share of the age group 20-64 years is similar (48.3% compared to 49.1% in the medium variant). In those two variants the opposing effects of assumptions on the age structure largely cancel each other out.

The ‘constant variant’ assumes that everything remains at the level of the starting year. While this could be a reasonable assumption for fertility and migration, for mortality it is not so sensible since a further increase in longevity is expected. Migrations in this variant are higher than assumed in the medium variant while fertility is lower. Those two effects almost compensate for each other for people below age 65. There is a huge difference in age group 65+, where the projected number of people in 2060 is about 142,000 lower than in the medium variant. Therefore, the share of this age group is also lower (27.3% instead of 33.4%).

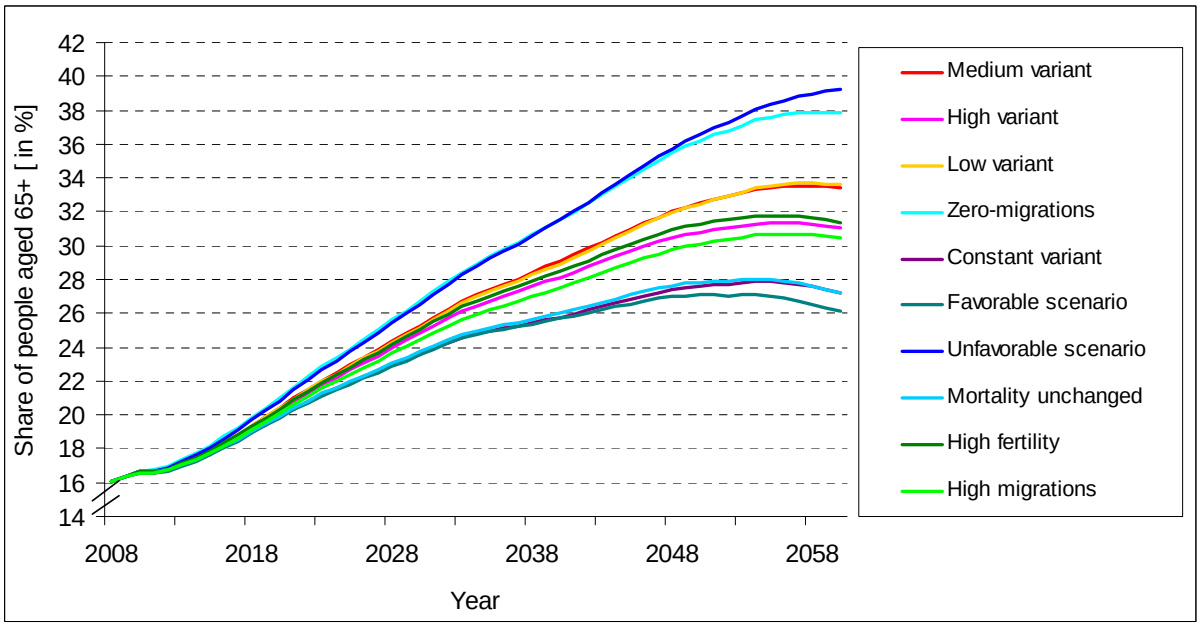
Figure 33: Slovenian population by various variants and scenarios in the period 2008-2060 [in thousands]



Sources: Eurostat, internal materials, related to the population projections 'EUROPOP2008', 2008; author's calculations.

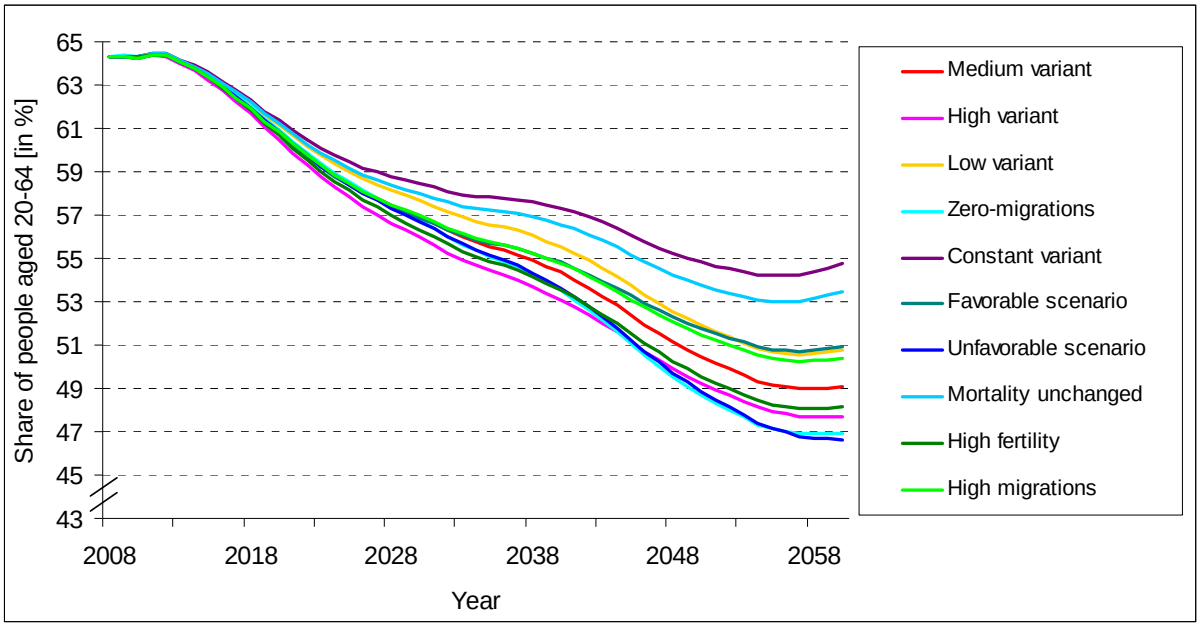
A graphical presentation for the age group 0-19 years and a synthetic picture about changing shares for all three age groups are presented in Figure A-4 and Figure A-5 of Appendix 5.

Figure 34: Share of people aged 65+ by various variants/scenarios in the period 2008-2060 [in %]; Slovenia



Sources: Eurostat, internal materials, related to the population projections 'EUROPOP2008', 2008; author's calculations.

Figure 35: Share of people aged 20-64 [in %] by demographic variants/scenarios



Sources: Eurostat, internal materials, related to the population projections 'EUROPOP2008', 2008; author's calculations.

5.2.2.3 Favorable and unfavorable scenarios

As presented, in the high and low variants the opposite effects of assumptions on population ageing partially cancel each other out. In the high variant people are assumed to live longer than in the medium variant, which increases the number of elderly people aged 65+. At the same time, higher fertility and net migration are assumed, raising the number of children and working age people – and thus decreasing the relative share of elderly people. Whether the share of elderly people will increase or decrease remains an empirical question, but the effects partially cancel each other out.

To obtain upper and lower limits regarding the share of elderly people, we have rearranged the assumptions of the high and low variants. From the public finances' point of view, we will create a scenario we will name 'favorable'[18] that combines fertility and net migrations from the high variant (higher levels) and mortality from the low variant (lower life expectancy). Analogously, the 'unfavorable' scenario combines low fertility and low net migrations from the high variant with the low mortality from the low variant. As shown in Table 7 and Figure 34, even with this extremely optimistic combination of assumptions the projected share of people aged 65+ increases from the current 16.7% to 25.5% by 2060, while the pessimistic combination of assumptions yields an increase to 40.3%.

[18] The name of this scenario is not part of the standard demographic terminology, but is made up for the purpose of this analysis.

Table 7: Population projections for Slovenia by different variants and scenarios

		0-19				20-64				65+				TOTAL			
		2008	**2020**	**2040**	**2060**	**2008**	**2020**	**2040**	**2060**	**2008**	**2020**	**2040**	**2060**	**2008**	**2020**	**2040**	**2060**
Medium variant	Number*	396	385	324	311	1,301	1,253	1,064	873	325	420	569	595	2,023	2,058	1,958	1,779
	Share [%]	19.6	18.7	16.6	17.5	64.3	60.9	54.4	49.1	16.1	20.4	29.1	33.4	100.0	100.0	100.0	100.0
	Dep. ratio	30.5	30.7	30.5	35.7					25.0	33.5	53.5	68.2	55.5	64.3	84.0	103.8
High variant	Number*	396	407	406	474	1,301	1,277	1,151	1,061	325	427	610	690	2,023	2,112	2,167	2,225
	Share [%]	19.6	19.3	18.7	21.3	64.3	60.5	53.1	47.7	16.1	20.2	28.1	31.0	100.0	100.0	100.0	100.0
	Dep. ratio	30.5	31.9	35.3	44.6					25.0	33.5	53.0	65.0	55.5	65.3	88.3	109.7
Low variant	Number*	396	374	285	239	1,301	1,240	1,019	778	325	413	531	515	2,023	2,028	1,835	1,532
	Share [%]	19.6	18.5	15.5	15.6	64.3	61.2	55.6	50.8	16.1	20.4	28.9	33.6	100.0	100.0	100.0	100.0
	Dep. ratio	30.5	30.2	27.9	30.7					25.0	33.3	52.1	66.2	55.5	63.5	80.0	96.9
High fertility	Number*	396	392	359	388	1,301	1,253	1,071	913	325	420	569	595	2,023	2,064	1,999	1,896
	Share [%]	19.6	19.0	18.0	20.5	64.3	60.7	53.6	48.2	16.1	20.4	28.5	31.4	100.0	100.0	100.0	100.0
	Dep. ratio	30.5	31.3	33.5	42.5					25.0	33.5	53.2	65.1	55.5	64.8	86.7	107.6
Mortality unchanged	Number*	396	498	498	603	1,301	1,253	1,177	1,157	325	420	569	595	2,023	2,171	2,244	2,354
	Share [%]	19.6	22.9	22.2	25.6	64.3	57.7	52.4	49.1	16.1	19.4	25.4	25.3	100.0	100.0	100.0	100.0
	Dep. ratio	30.5	39.8	42.3	52.1					25.0	33.5	48.4	51.4	55.5	73.3	90.7	103.5
Zero-migrations	Number*	396	385	323	309	1,301	1,249	1,050	854	325	406	483	435	2,023	2,040	1,856	1,598
	Share [%]	19.6	18.9	17.4	19.3	64.3	61.2	56.6	53.4	16.1	19.9	26.0	27.2	100.0	100.0	100.0	100.0
	Dep. ratio	30.5	30.8	30.8	36.2					25.0	32.5	46.0	50.9	55.5	63.3	76.8	87.1
High migrations	Number*	396	359	268	228	1,301	1,214	959	704	325	418	565	567	2,023	1,992	1,792	1,498
	Share [%]	19.6	18.0	14.9	15.2	64.3	60.9	53.5	47.0	16.1	21.0	31.5	37.9	100.0	100.0	100.0	100.0
	Dep. ratio	30.5	29.6	27.9	32.3					25.0	34.5	58.9	80.6	55.5	64.1	86.8	112.9
Constant variant	Number*	396	400	368	385	1,301	1,276	1,139	1,011	325	421	572	611	2,023	2,098	2,080	2,007
	Share [%]	19.6	19.1	17.7	19.2	64.3	60.8	54.8	50.4	16.1	20.1	27.5	30.5	100.0	100.0	100.0	100.0
	Dep. ratio	30.5	31.4	32.3	38.0					25.0	33.0	50.2	60.4	55.5	64.4	82.5	98.5
Favorable scenario	Number*	396	384	320	300	1,301	1,256	1,087	910	325	407	489	453	2,023	2,047	1,895	1,663
	Share [%]	19.6	18.8	16.9	18.0	64.3	61.4	57.3	54.7	16.1	19.9	25.8	27.3	100.0	100.0	100.0	100.0
	Dep. ratio	30.5	30.6	29.5	32.9					25.0	32.4	45.0	49.8	55.5	63.0	74.4	82.7
Unfavorable scenario	Number*	396	407	406	472	1,301	1,274	1,140	1,048	325	415	534	538	2,023	2,097	2,080	2,057
	Share [%]	19.6	19.4	19.5	23.0	64.3	60.8	54.8	50.9	16.1	19.8	25.7	26.1	100.0	100.0	100.0	100.0
	Dep. ratio	30.5	31.9	35.6	45.1					25.0	32.6	46.9	51.3	55.5	64.5	82.4	96.4

*Note: * in thousands.*

Sources: Eurostat, internal materials, related to the population projections 'EUROPOP2008', 2008; author's calculations.

5.2.2.4 Scenarios when only changing one assumption at a time

In the following scenarios only one factor at a time is changed, while other demographic dimensions remain the same as in the medium variant. Thus, the 'high fertility' scenario assumes a fertility trajectory equal to the high variant while mortality and migration trajectory are the same as in the medium variant. A gradual increase in fertility to almost a replacement level in 2060 would limit the drop in population size by about half of the drop in the medium variant (117,000 instead of 244,000). Fertility has a essential influence on population size in the long run. However, as we can see we cannot expect that increased fertility will considerably mitigate the process of population ageing in Slovenia in the coming decades. Further, from the economic aspect we have to be aware that increased fertility does not have positive economic effects for about 20 years. Only then do cohorts of newborns start to enter the labor market. In the meantime the economic effect is even negative since children require higher public expenditures in the form of education and other transfers (like child allowances, health care etc.).

The ‘mortality unchanged’ scenario assumes that mortality rates will remain at the level of the start year – i.e. that there is no increase in longevity. Fertility and migration are assumed to be the same as in the medium variant. Some developed countries already have a considerably higher[19] life expectancy than Slovenia and it is still increasing. Also in Slovenia life expectancy at birth is still growing rapidly – in the last decade alone (from 1996/97 – 2006/07) an increase of 4.0 years for males and 3.7 years for females was recorded (Statistical Yearbook of the Republic of Slovenia 2008, p. 83). Therefore, this assumption is considered to be less realistic and is mainly meant to present the effect of the expected prolongation of longevity assumed in the medium variant on the results for the medium variant. In the ‘mortality unchanged’ scenario the population size would shrink by an additional 181,000 persons up to 2060 compared to the medium variant. The contribution of the expected increase in longevity to the share of people 65+ is 6.2 percentage points (33.4% compared to 27.2% in the medium variant). Thus, the assumption of increasing life expectancy at birth that is made in the medium variant contributes to the increasing share of people aged 65+, about one-third of the total increase (6.2 percentage points out of 17.4 percentage points of the total increase). The results of the ‘mortality unchanged’ scenario are similar to the results of the ‘constant variant’.

The ‘zero-migrations’ variant, already provided in the EUROPOP2008 projections, assumes no migrations. Comparing the results of the medium variant with this variant shows the contribution of net migrations to the number and age structure of the population. In the absence of migration the Slovenian population would decline by more than half a million (524,000 inhabitants) up to 2060. The positive net migrations assumed in the medium variant also decrease the share of people aged 65+. Without net migrations, the projections predict that the share of people aged 65+ would rise to 37.9%. A dampening effect comes through the age structure of immigrants since most of them are younger. The mean age of immigrants coming from abroad to Slovenia in 2007 was 32.5 years (Statistical Yearbook of the Republic of Slovenia 2008, p. 96). However, with time immigrants are also ageing and entering the age group 65+.

It is important to stress that we have combined only a very limited set of assumptions on the future development of fertility, mortality and net migrations and rearranged them in different combinations. In this way we have isolated the impact of an individual assumption, while at the same time we have avoided introducing additional subjective opinions about their trajectories (by only rearranging them in different combinations). Yet in reality limitless other combinations of fertility, mortality and net migrations are possible and are also more likely if they do not contain such an extreme assumption. Further, demographic processes are usually also interrelated. For example, low fertility that eventually causes shortages in the labor market can invoke a proactive immigration policy of a country to partly compensate the negative effects on the decreasing number and share of the active population. This effect is

[19] In Japan, for instance, the estimated life expectancy at birth in 2008 was 78.73 years for males and 85.59 years for females (Central Intelligence Agency (CIA), 2008).

usually strengthened through a **selective** immigration policy, accepting only certain immigrants – younger, the educated, those needed in the country etc.

5.2.2.5 Effect of the current age structure on the population projections

Results for all presented variants and scenarios show the expected rapid population ageing. Individual assumptions have only a limited effect on the age structure. Partially that is because fertility in all variants is assumed to be below the replacement level of 2.1 children per woman. The replacement level is not reached even at the end of the projection period, while earlier it is even much lower, starting from the level of 1.32 (see Figure 30).

However, even with the completely unrealistic assumption of an immediate increase in the total fertility rate to the replacement level, which assumes the same mortality and net migration as in the baseline scenario, we would face strong population ageing. In this case, the share of elderly people aged 65+ would grow from 16.1% in 2008 to 25.3% in 2060 (Sambt, 2008). It is as if there is some other factor influencing the ageing process and making it so robust. Indeed, that is the current age structure of the population.

In demography the processes have a long time delay and are very persistent once they gain impetus. The situation at some point in time is determined by processes from the distant past. After World War II there was a burst of fertility which lasted for about two decades. Those numerous generations, often called 'baby-boom generations', are currently in about their 50s[20]. In the next decade they will start to enter the age group 65+ and it is expected that they will remain in that age group much longer than today's elderly because of increasing longevity.

On the other hand, some people born in the 1980s will start to enter the labor market. Soon they will also start entering ages of the highest fertility during a woman's life. The declining fertility during the 1980s and 1990s, and stabilization at low levels thereafter, has sharply decreased the number of newborns in that period compared to the earlier number of births. In 2003 just 17,321 children were born, while in 1979 the figure was 30,604 (Statistical Yearbook of the Republic of Slovenia 2008, pp. 82-83). Those generations, whose number is almost half that of the generations of their parents, will determine fertility levels in the next two to three decades.

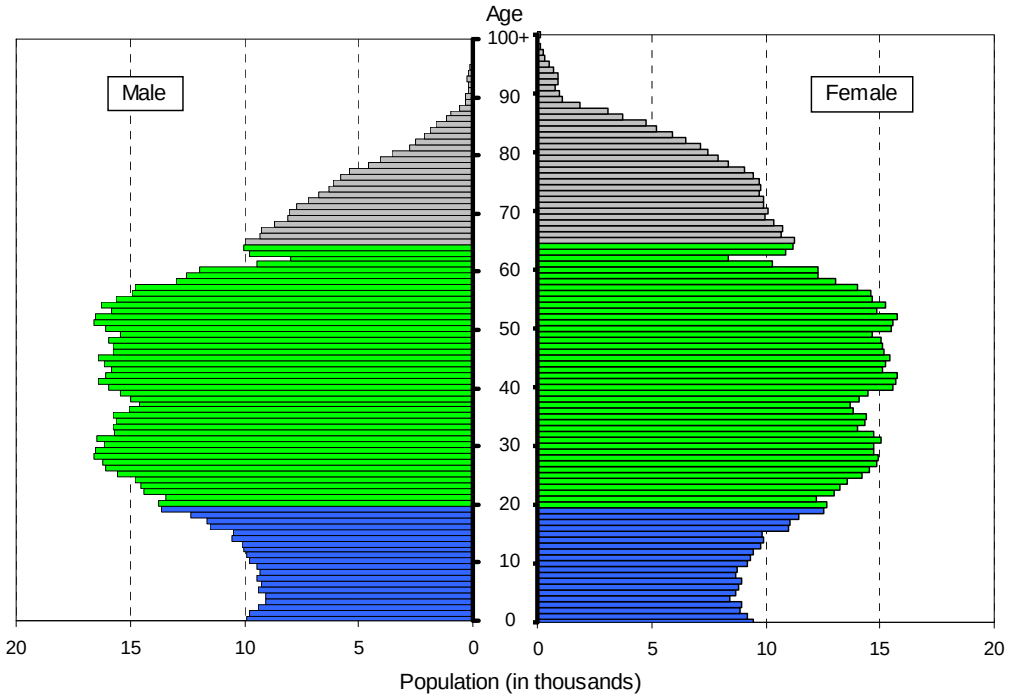
Even if fertility were to somehow increase (measured as the total fertility rate), the absolute number of newborns is expected to fall considerably because there will be less women to give birth. Analogously, the current numbers of newborns would be much lower if we did not have such a favorable age structure of women in the fertility age. Generations of women aged 25-29 and 30-34 (the two 5-year age groups with the highest fertility rates) are among the

[20] Baby-boom generations are sometimes explicitly defined as generations born between 1946 and 1964.

most numerous generations in the whole population. However, this favorable age structure will soon be exhausted, transferring to a very unfavorable one in the next few decades. On the other hand, longevity is still rapidly rising and baby-boom generations are not at high mortality ages yet. Changes on both sides will come soon. Therefore, the positive natural population growth seen in 2006 and 2007, which could last for another few years, is only the calm before the storm.

This situation can be presented graphically with a population pyramid. In Figure 36 the horizontal axis shows the number of people: males on the left-hand side and females on the right-hand side; while age is depicted on the vertical axis. In times when there was high mortality and high fertility its shape was indeed similar to a pyramid. In Slovenia this was in the 1960s and 1970s with stable fertility slightly above the replacement level. The shape of the population pyramid (i.e. demographic structure) also depends on various other events that influence large proportions of the population if they are age-specific – like, wars, epidemics, immigration or emigration and so on. The three different colors in Figure 36 denote demographic contingents: children (aged 0-19), working age population (20-64) and elderly (65+).

Figure 36: Population pyramid for the Slovenian population on January 1, 2008

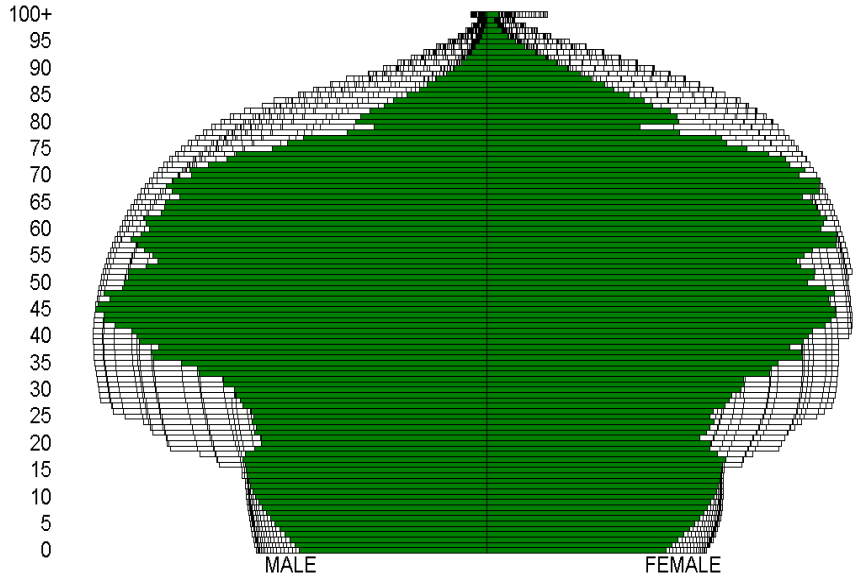


Sources: Statistical Office of the Republic of Slovenia, Population, Slovenia, 30 June 2008, 2008; author's presentation.

In Figure 37 another population pyramid is presented, this time depicting the projected demographic development in Slovenia (the medium variant) in the future. The pyramid in a solid color presents the projected situation in 2025, while the shades are outlines presenting demographic developments in the period 2008 to 2060. The shading in the lower age groups reflects the number of people in those age groups in the time period 2008-2024, while the

shading in the higher age groups reflects the number of people in those older cohorts for the projected period 2026-2060. Figure 37 thus presents an intermediate stage (the situation in 2025) of 'emptying' the number of people in lower age groups and the 'filling in' of higher age groups during the period of the projections.

Figure 37: Population pyramid for the projected Slovenian population in 2025 (solid color) and outlines of the demographic developments in the 2008-2060 period (shaded)



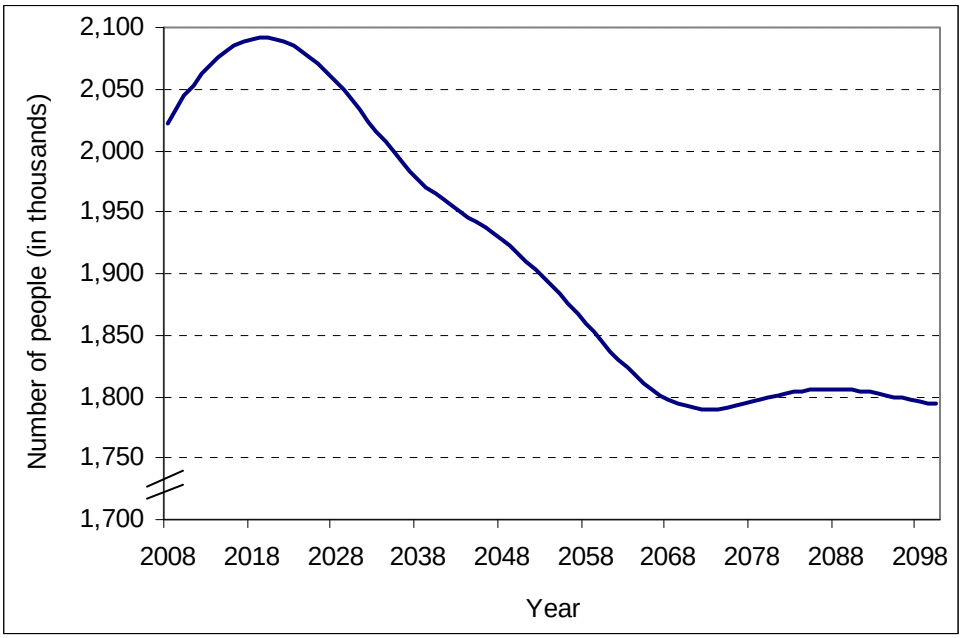
Sources: Eurostat, internal materials, related to the population projections 'EUROPOP2008', 2008; author's calculations and presentation.

5.2.2.5.1 Population momentum

In the last section we presented the expected effect of the changing age structure on future demographic development only by a descriptive analysis, supplementing the medium variant of the demographic projections. However, the effect of the current age structure on future population growth can also be expressed analytically. The demographic term for this analysis is *population momentum*. A young population has a *positive momentum* (a built-in impetus to grow), while an older population can have a *negative momentum* (when a smaller number of newborns eventually leads to a smaller number of parents and eventually to a population decline) (Lutz, O'Neill, & Scherbov, 2003).

Population momentum can be estimated in a straightforward manner. The idea is to isolate the effect of the demographic structure on future demographic development. It is calculated by performing a hypothetical projection where the effects of all other factors causing changes in population size are excluded. In particular, mortality is held constant, migrations are assumed to be zero, while fertility is assumed to jump immediately to the replacement level (TFR of about 2.1 – for detailed explanations see Appendix 6). In the long run, in those circumstances the population stabilizes at a stationary size and age structure.

Figure 38: Demographic momentum – effect of the current demographic structure on the Slovenian population size in the future



Sources: Eurostat, internal materials, related to the population projections 'EUROPOP2008', 2008; author's calculations.

As shown in Figure 38, even if fertility were at the replacement level in 2008 and to remain at that level for the whole projection period, assuming no migration, the Slovenian population would decline before stabilizing. To be more precise, until 2019 the population even grows (from the current 2,023,000 people to 2,092,000 people) before declining since a large number of people were born during the baby-boom period. However, thereafter the population would decline until the 2070s and eventually stabilize at a level of 1,799,000 people, which is 11.1% below its current size. This decline is the calculated negative momentum of the current demographic structure of the Slovenian population. We will not repeat the detailed description of the processes since we already provided it in Section 5.2.2.5.

At the same time, the age structure of the population also depends on the momentum. Figure A-6 (see Appendix 7) presents the shares of the 0-19, 20-64 and 65+ age groups in the total population. Purely because of momentum effect the share of people aged 65+ would increase from 16.0% in 2008 to 24.8% in 2047 and thereafter it would start to decline and eventually stabilize at 19.6%. The momentum is thus expected to have a very strong effect on population ageing in the next few decades. The share of children aged 0-19 would grow from 19.6% in 2008 to 25.5% in the long run, while the share of working people (aged 20-64) would decrease from 64.3% in 2008 to 50.3% in 2054 and stabilize in the long run at 55.0%.

Momentum can also be analyzed by Equation (44). Keyfitz (1971) analyzed momentum assuming that age-specific fertility rates of an initial stable population drop immediately and proportionally to the replacement level. In this case, the ultimate stationary number of the population will be given by:

$$Q = \left(\frac{b\dot{e}_0}{r\mu} \right) \left(\frac{R_0 - 1}{R_0} \right) \tag{44}$$

multiplied by the current number of the population. In Equation (44) b represents the crude birth rate, r is the growth rate, $\dot{e}_0$ is life expectancy at birth, R_0 is the Net Reproduction Rate ('NRR'), all before the drop in fertility, while μ is the stationary population mean age at childbearing afterwards. For further technical details, see Keyfitz (1971), Schoen & Hrafn Jonsson (2003) and Goldstein (2002), while an intuitive description can be found in Knodel (1999).

These results complete the picture of the sensitivity analysis, identifying the effect of individual factors on demographic changes. Of these, the current demographic structure in Slovenia is also very important.

5.2.2.6 Dependency ratios

The focus of our interest is the consequences of demographic development on the economic sphere. During the demographic projections we concentrated on three age groups: 0-19 years, 20-64 years and 65+. By comparing those three demographic contingents we can calculate *dependency ratios*, which already provide basic information about the economic consequences of demographic changes.

The *old age dependency ratio* expresses the population aged 65+ as a percentage of the working-age population aged 20-64. Analogously, the number of people aged 0-19 with the number of people aged 20-64 years results in a *young age dependency ratio*. Joining both dependent age groups and dividing them by the number of working-age population results in the *(total) dependency ratio*. All three dependency ratios are usually expressed per 100 inhabitants (aged 20-64).

$$Old\ age\ dependency\ ratio = \frac{number\ of\ \ people\ aged\ 65+}{number\ of\ \ people\ aged\ 20-64} \cdot 100 \tag{45}$$

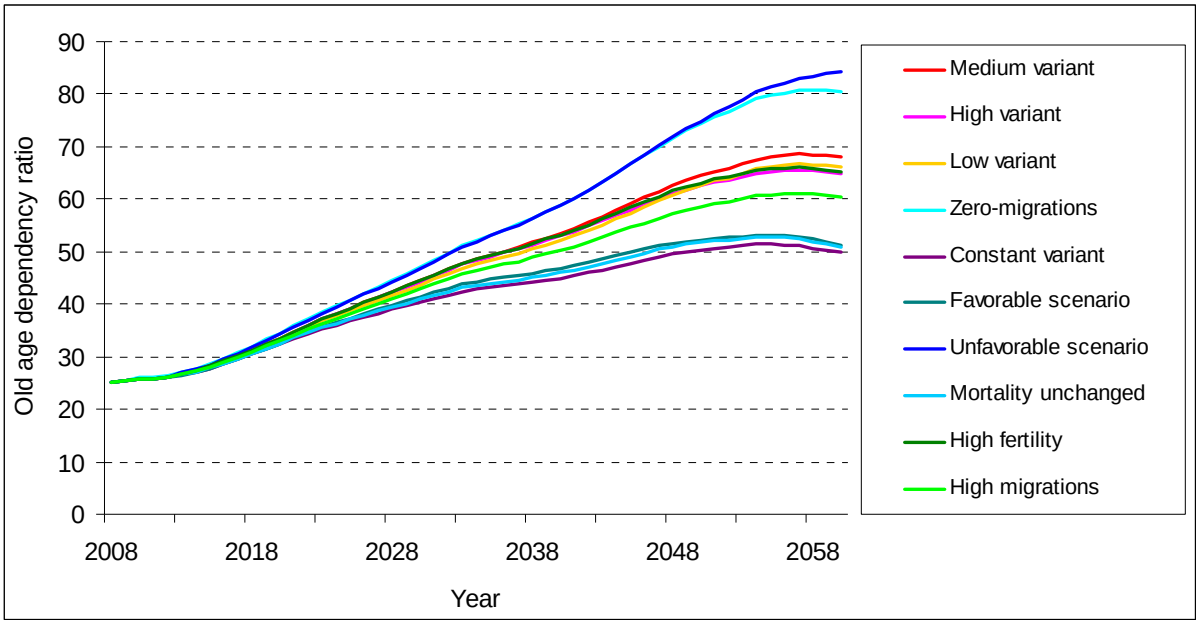
$$Young\ age\ dependency\ ratio = \frac{number\ of\ \ people\ aged\ 0-19}{number\ of\ \ people\ aged\ 20-64} \cdot 100 \tag{46}$$

$$Dependency\ ratio = \frac{(number\ of\ \ people\ aged\ 0-19) + (number\ of\ \ people\ aged\ 65+)}{number\ of\ \ people\ aged\ 20-64} \cdot 100 \tag{47}$$

The dependency ratio is an important economic indicator presenting the extent to which the productive part of the population is burdened by the dependent one. The results in Table 7

show that the dependency ratio is expected to increase strongly in the future. According to the medium variant it is projected to grow from 55.5 in 2008 to 103.8 in 2060. The young age dependency ratio is projected to rise in the same period from 30.5 to 35.7.

Figure 39: Old age dependency ratio by demographic variants/scenarios



Sources: Eurostat, internal materials, related to the population projections 'EUROPOP2008', 2008; author's calculations.

Thus, the huge increase in the total dependency ratio is driven by the expected increase in the old age dependency ratio from 25.0 in 2008 to 68.2 in 2060. Results by other variants and scenarios are presented in Figure 39, where it can be seen that the increase in the old age dependency ratio is very robust. Even in the 'favorable scenario'[21] the old age dependency ratio more than doubles (to 51.3 in 2060), while in the 'unfavorable scenario' it more than triples (to 81.4).

5.3 DEMOGRAPHIC DIVIDENDS

The interaction between population momentum and the decline in fertility and mortality is interesting for both demographers and economists. The process is called a demographic dividend or demographic bonus. It is also related to the young and old age dependency ratio, capturing the key features of the economic lifecycle. However, the demographic dividend is a more detailed and precisely estimated indicator (Mason, 2005).

[21] If we neglect 'constant variant' and 'mortality unchanged' scenario, since they have quite unrealistic assumption that mortality will remain at the level from starting year of projections in the entire projection period.

5.3.1 Demographic transition

Demographic dividends, as highlighted by one of the dissertation's theses, are closely related to the concept of *demographic transition*. The demographic transition has been succinctly summarized by Demeny (1972, p. 153): 'In traditional societies, fertility and mortality are high. In modern societies, fertility and mortality are low. In between is the demographic transition'.

5.3.1.1 Decline in mortality

At some point in time mortality starts to fall. In the literature there is no agreement about the key factors of this process. Contributing factors, differently emphasized by various authors are: an improved standard of living, developments in the field of medicine (like vaccinations), personal and public hygiene, an improved quality of water (consequently decreasing mortality for some sorts of diseases), general economic development (improved nutrition and consequently stronger immune systems) etc. (Malačič, 2006). The process is also closely related to the transition from predominantly rural agrarian societies with high fertility to predominantly urban industrial societies with low fertility and low mortality rates (R. Lee & Mason, 2006).

In countries that are now classified as developed the process of mortality decline lasted for about 150 years, while in less developed countries a time span of about 60 to 80 years is expected. The possibility of transferring the means and know-how from developed countries will make this transition process faster and thus shorten the transition period.

5.3.1.2 Decline in fertility

In most countries of Western and Northern Europe the process of a fertility decline started in the last quarter of the 19th century. The exceptions were France and the United States. In France fertility started to decline at almost the same time as when mortality started to fall, which was in the last decades of the 18th and beginning of the 19th century. In the United States fertility started to drop at the beginning of the 19th century as well, but from very high fertility rates. The process of a fertility decline to low levels lasted in Western and Northern Europe about four decades, until the 1930s. In less developed countries the process of decreasing fertility did not start until the second half of the 20th century. In Egypt and India it started as late as the 1970s (Malačič, 2006).

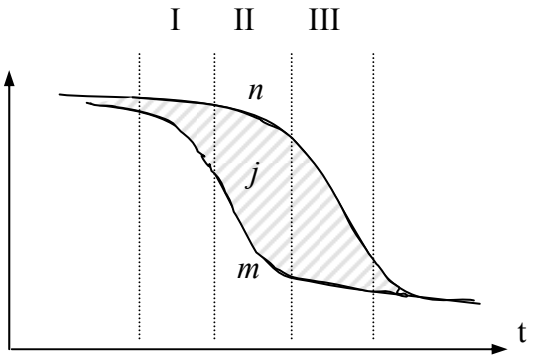
The fertility decline is related to the introduction of modern birth control methods. However, they were not the cause of the fertility decline. The decline in mortality and modernization in general are usually given as more valid reasons. Authors also point out the changed structure of the production, the decreasing role of the family, impersonal systems of work allocation, women switching from housekeeping to the labor market, increasing economic mobility

(which is easier to implement with a smaller family size). Economic development accelerates urbanization. The benefits of big families are reduced. In villages big families were once a source of wealth and labor for working on a farm. In cities they had become a burden for the new forms of production, where there is need for mobility and flexibility. Some other authors also emphasize factors like changed patterns of intergenerational transfers, inheritance legislation about the firstborn, cultural factors etc. (Malačič, 2006).

5.3.1.3 Effect of the demographic transition on the number and age structure of the population

An important characteristic of the demographic transition is the time delay between the decrease in mortality and decrease in fertility. Three phases of the demographic transition can be differentiated. During the *early stage* of the demographic transition ('I' in Figure 40) mortality starts to fall, whereby fertility remains almost unchanged. During the *intermediate stage* (II) mortality falls strongly, while fertility only starts to drop. The difference between the *crude birth rate* (number of births per thousand people) and the *crude death rate* (number of deaths per thousand people) is the *natural increase of the population*. In this period there is a strong natural (assuming no net migration) increase in the population. Indeed, during the demographic transition there has been a strong increase in the number of people in practically all countries if that was at the same time not accompanied by strong emigration. In the *late stage* (III), mortality stabilizes at a low level, while fertility is still decreasing for some time, gradually approaching low levels of mortality. The shaded area in Figure 40 represents the population increase.

Figure 40: Demographic transition and its stages



Notes: *n*… crude birth rate (annual number of births per thousand population)
m… mortality rate (annual number of deaths per thousand population)
j… rate of natural increase (growth of population if excluding migration; *j=n–m*)

Sources: Malačič, Demografija: teorija, analiza, metode in modeli, 2006; author's presentation.

At the same time, the demographic transition also has a profound effect on the age structure of the population. During the early stage of a demographic transition the number of surviving children increases rapidly and so does their share. In the intermediate stage, when fertility starts to decline, the number (and share) of children starts to drop while the number (and

share) of working age people increases. The late stage is related to the process of population ageing as a consequence of low fertility and low mortality (i.e. increased longevity). Population ageing continues even more strongly after the demographic transition is completed and is a result of the modern reproduction pattern of the population.

The concept of a demographic dividend is closely related to the demographic transition from its intermediate phase on. The demographic dividend has recently been decomposed into two separate dividends: the first and the second demographic dividend. In the intermediary phase of the demographic transition the first demographic dividend starts to be positive, but towards the end of this phase the second demographic dividend can also start. The process of population ageing, which also continues after the demographic transition finishes, is related to the first demographic dividend (eventually becoming negative), but also to the second demographic dividend whose existence and size depends on the economic policy.

5.3.2 The first demographic dividend

During the demographic transition when the fertility rate falls, there are fewer dependent children who have to be supported. In that period, the number of working age people grows relatively faster than the number of children. Assuming a labor force growing in line with the increased number of people of working age, this frees up more resources for investment in economic development and family welfare. With all other things being equal, per capita income grows faster. That is the *first* demographic dividend (R. Lee & Mason, 2006).

During the early stages of the demographic transition the first demographic dividend is positive. However, its duration is limited to a certain period. After some time the cohorts born during the fertility decline start to enter the labor market. Cohorts with fewer people enter the labor force more and more intensively, causing labor force growth to slow down and eventually to even start declining. Now the decreasing share of the labor force in the total population is driven by the increase of elderly people. The number of elderly people is rising because: a) numerous cohorts are passing over from the labor force to the elderly (retired); and b) of improvements in old-age mortality rates, increasing longevity. From demographic point of view (if the labor force participation rates are not adjusted accordingly) this causes slower per capita income growth; in other words, the first demographic dividend becomes negative.

5.3.3 The second demographic dividend

The second dividend concept has until recently gone virtually unnoticed by researchers who have merely concentrated on the effects of the first dividend. During the ageing process the labor force is increasingly concentrating in higher age groups. Rapidly increasing longevity

can be a strong incentive for people to accumulate assets for their old age. The second demographic dividend is related to the concept of the lifecycle wealth and its relation to the population age structure. First, there are compositional effects, reflecting the growing share of the population consisting of individuals who are approaching retirement or who have completed their productive years. Second, there are behavioral effects: increasing life expectancy and the accompanying increase in retirement duration lead to an upward shift in the age-profile of wealth (Mason, 2005).

For the second dividend to come into place people have to be encouraged to save for their retirement – to support their consumption, to finance bequests and to be able to finance other uncertain events. It is the consequence of investment in **assets** such as personal savings, housing, funded pensions etc. We are facing capital accumulation by people of working age. The second response by the ageing population can be the use of unfunded familial or public transfer programs. With this option, the incentive to build up asset wealth is decreased or even vanished. Relying on **transfer wealth** for financing consumption in older age does not yield benefits in the form of the second demographic dividend.

As suggested by their names, the first and second demographic dividends appear in sequence. While the first one is still positive, the second one can start, therefore for some period they overlap (R. Lee & Mason, 2006). Eventually the first dividend turns from positive to negative values. The second one can already work in a positive direction, offsetting some of the negative effect of the first dividend. Unlike the first demographic dividend, the (positive) effect of the second demographic dividend on per capita assets and income is permanent (Mason & Lee, 2007). The second demographic dividend thus challenges the presumption that population ageing only has a bad influence on economic growth. However, there is no free lunch since the current generations have to reduce their consumption to increase their wealth for higher consumption in future periods (Mason & Lee, 2006).

5.3.4 Window of opportunity

The term *demographic window* is also used for a demographic dividend. The idea is related to the phrase *window of opportunity*, being defined as a short period of time during which an opportunity must be grasped or lost (Business Dictionary, 2009). Indeed, demographic dividends are not realized automatically and depend on institutions and policies to transform changes in population age structure into economic growth (Bloom & Canning, 2001). For example, the first demographic dividend can be reduced or eliminated if the positive effect on economic growth is mitigated by reduced activity rates – like decreasing age at retirement. As already explained, where familial or public support are especially strong saving incentives may be undermined (Mason & Kinugasa, 2008). If the demographic dividend is not used, the window of opportunity is permanently lost (R. Lee & Mason, 2006).

According to the projections, there will be huge pressure in the future on public expenditures for pension, health care and long-term care. It could be dangerous if the active population relies too much on transfers, especially if they expect they will remain in the extent currently provided to the elderly. Such expectations can probably not be fulfilled in the future. That could result in substantially lower levels of resources available to the elderly, dictating a low standard of living for them in the future. The same is true for private transfers. In developed countries, today's elderly have on average more children than the elderly in a few decades from now will have. In the future the ability of the working population to provide private support for their elderly parents will therefore decrease. The second dividend is seen as an option to mitigate the increasing burden placed on families and governments for supporting the elderly.

5.3.5 Estimating the first and second demographic dividends for Slovenia

The size of the first and second dividends depends on consumption and production age profiles – which are provided by the NTA analysis, presented in Chapter 4 and summarized in Section 5.1. When estimating demographic dividends the shape of those two age profiles is assumed to be time-invariant. In fact, when calculating demographic dividends for various countries around the world, the same age profile is applied to all countries included. This approach enables us to calculate demographic dividends for a range of countries without having age profiles available for them. It also enables a comparison of only the effects of demographic changes on the demographic dividends, eliminating the effect of different age profiles by countries (see for example Mason & Kinugasa, 2008).

For a technical description of how the first and second demographic dividends are calculated we will combine the notations and descriptions used in Mason & Kinugasa (2008), Feng & Mason (2008), and Mason & Lee (2006).

According to the demands of the model, population projections have to be prolonged into the distant future until a steady-state is achieved in the model. It is advisable that the prolongation is at least 200 years into the future. To be on the safe side, we have prolonged them until 2300. Again, this is a technical requirement of the model, without involving any naive expectations that we are able to predict population development for such a distant future.

Target values in 2150, towards which demographic assumptions of all EU countries are supposed to converge (according to the Eurostat assumptions in the EUROPOP2008 projections), have not been revealed. After contacting them, they explained that the target values for 2150 are not meant for use in (prolonged) population projections by that year. They were only used as technical values for calculating trajectories for demographic assumptions until 2060. Therefore, we have prolonged the population projections by a standard approach in cases where there is no further information available: we assumed that after 2060 all the

assumptions (about fertility, mortality and migrations) remain the same as for 2060. Since those projections are only used as an input for the calculations, we will not present them in details.

On the other hand, in 2004 the United Nations published projections that were extended up to 2300. This was far beyond their usual projection horizon, which is 2050. They were not only prepared for the world population but also at the national level (United Nations, 2004). According to those projections, the world population should peak at 9.22 billion in 2075, with a slight decrease to 8.97 billion by 2300. By assuming a long-range total fertility rate of 0.3 children above the replacement level, the world population in 2300 would be four times as large as in the main projections. On the other hand, assuming a fertility of 0.2 children below the replacement level would result in a world population of just one-quarter of the main projections (United Nations, 2004, p. 1). From those results we can see how sensitive the long-term projections are to the fertility assumption used, which is the driving force of the population number in the long run.

In their past projections for the period until 2050 they have assumed that the TFR will settle in each country at an arbitrarily chosen value of 1.85 in 2050, except for African countries where higher values are assumed. This assumption was also retained in the long-term projections we are describing. After 2050 it is assumed that the TFR will stabilize at the replacement level – for Slovenia this is at 2.064 in 2100, with a slight decrease to 2.056 by 2300 (United Nations, 2004, p. 211). They pointed out that it is difficult to make reasonable assumptions about long-range international migrations and therefore they assumed zero net international migration per country beyond 2050. Male life expectancy in more developed regions is expected to continuously grow until 2300 to 96.9 years for males and 100.0 years for females (United Nations, 2004, p. 186).

According to those projections, Slovenia would have 1,569,000 inhabitants in 2050, stabilizing at 1,159,000 inhabitants in 2100, with a slight increase to 1,268,000 inhabitants in 2300 (United Nations, 2004, p. 201). The approach of the convergence of all countries has a long tradition in the United Nations' population projections. In my opinion, this relates to the reconciliatory function of the UN – in this case not to upset people with projections about radically changing world population maps in the future. By analogy, when providing long-term projections they assume a replacement fertility rate so as not to frighten people with projections about a strongly reducing number of their population. There is no mechanism, of course, to ensure a replacement level of fertility. As explained earlier, a departure from this assumption results in strikingly different results. Nevertheless, we can understand this stance since we cannot say anything particular about assumptions for such a distant period. As mentioned, projections for such a distant future should be considered as an exercise only. They provide interesting information about the sensitivity of population development to demographic assumptions especially fertility, in the long run. However, they definitely should not be seen as confident predictions for the demographic situation in 2300.

5.3.5.1 The first demographic dividend

As explained, the concept of the first demographic dividend is related to the share of the working age people in the population. By multiplying the age profiles of consumption and production with the age distribution of the population we obtain the effective number of consumers and producers.

Mathematically, we define the effective number of consumers by *N* and the effective number of producers by *L*:

$$N(t) = \sum_{a=0}^{100} \alpha(a) P(a,t) \tag{48}$$

$$L(t) = \sum_{a=0}^{100} \gamma(a) P(a,t) \tag{49}$$

where $P(a,t)$ represents the population of age a in year t; $\alpha(a)$ is an age-specific, time-invariant vector of coefficients measuring age variation in consumption; while $\gamma(a)$ is an age-specific, time-invariant vector of coefficients measuring age variation in productivity.

Following those notations we can decompose output per effective consumer, (Y/N), into the support ratio (L/N) and output per effective worker (Y/L):

$$\frac{Y(t)}{N(t)} = \frac{L(t)}{N(t)} \cdot \frac{Y(t)}{L(t)} \tag{50}$$

By converting Equation (50) into growth terms, we derive:

$$\dot{y}(t) = \dot{L}(t) - \dot{N}(t) + \dot{y}^{l}(t) \tag{51}$$

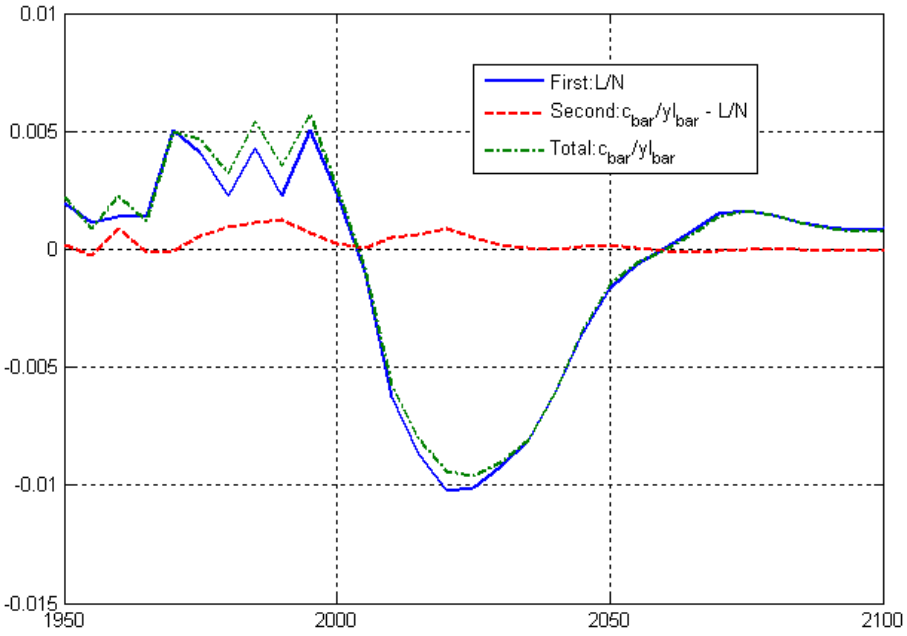
Equation (51) says that the growth rate of output per effective consumer ($\dot{y}$) equals the growth of the effective labor force ($\dot{L}$) less the rate of growth of the effective number of consumers ($\dot{N}$) plus the growth rate in output per worker ($\dot{y}^{l}$). The excess of the growth rate of the effective labor force ($\dot{L}$) over the growth rate of the effective number of consumers ($\dot{N}$) is the growth rate of the support ratio. Changes in this support ratio represent the first demographic dividend. The productivity weights are assumed to be proportional to labor income, while the consumption weights are assumed to be proportional to estimated consumption.

The rationale behind the procedure is that we take differences in productivity and consumption of different age groups into account. It not only matters if someone works but

also how productive they are. It not only matters if, for example, someone is economically dependent but so too is the amount of their consumption that needs to be financed by others. This approach is more comprehensive than the standard decomposition of GDP per capita into GDP per active person and activity rates, which only classifies people as active or non-active regardless of how much they produce and how much they consume.

The estimate of the first demographic dividend for the 1950-2100 period is presented in Figure 41 (category 'First:L/N'). For the whole period from 1950 until the present Slovenia has enjoyed a positive first demographic dividend. Currently, we are just about in the period when it is turning into a negative one. The negative effect of the support ratio on output per effective consumer is expected to last for the next five decades. The 'bottom' is projected to be reached during the 2020s when the negative effect of the support ratio on output per effective consumer is expected to amount to about minus 1 percentage point per annum. In other words, because of the changing support ratio consumption in every age will have to be decreased annually by about 1 percentage point without having an effect on the share of consumption in GDP.

Figure 41: Estimated first and second demographic dividends for the 1950-2100 period (model with 5-year age groups); Slovenia



Sources: Statistical Office of the Republic of Slovenia, internal data, 2008; Eurostat, internal data, 2008; NTA webpage; author's calculations.

In this section we examined the hypothesis:

> ***Hypothesis 2****: In the last three decades of the 20th century there was a positive first demographic dividend in Slovenia and it has continued in the first decade of this century. However, in the second decade of this century the positive demographic dividend is expected to turn into a negative one.*

This hypothesis was based on general knowledge of demographic processes in Slovenia and the experiences of other countries. There are different ways of calculating the first demographic dividend. The NTA method introduces a more comprehensive and detailed approach by calculating the effective number of consumers and producers. Indeed, a positive demographic dividend was already present in Slovenia throughout the whole second half of the 20th century, being especially emphasized in its last three decades. Currently, the positive first dividend is just about to become negative. Thus, **Hypothesis 2 is generally confirmed**.

5.3.5.2 The second demographic dividend

Estimating the second demographic dividend is more complex than estimating the first one, as it rests many assumptions. Partially that is because the accumulation of wealth is intrinsically forward-looking (Mason, 2005).

We will only point out the basic idea and values of the parameters following Mason and Kinugasa (2008), who build on the neoclassical growth model of Cutler, Poterba, Sheiner, & Summers, 1990 (as cited in Mason & Kinugasa, 2008) and Solow, 1956 (as cited in Mason & Kinugasa, 2008). For a detailed technical description of the model, see the work of Mason and R. Lee (2006) on which the outline presented in the continuation is also based.

The parameters that influence the results are as follows. The steady-state year was set to 2300. The model requires the parameter denoting the share of family transfers flowing to the cohorts below the age at which the lifecycle deficit turns negative. In the Slovenian case this share amounts to 64.5%. This parameter is required to calculate 'child wealth', which is the present value of net costs of supporting children in the future. It is a negative value. On the other hand, 'pension wealth' is the wealth used to fund consumption at older ages. To calculate it, a coefficient is required showing the share of old age consumption supported through (private and public) transfers, as opposed to assets. According to the presented age profiles, the elderly in Slovenia are only to a very limited extent using assets to cover their consumption in higher ages. Their consumption is predominately covered through transfers (85.4%), whereby public transfers strongly dominate over the negligible share of private transfers. It is assumed that the ratio of assets to pension transfer wealth will not change in the future. When calculating the present value, a discount rate of 3% was used, while for the annual interest rate the value of 6% is assumed. Annual technological growth is set at 1.5%. The stated values were chosen in line with the calculations for other countries made in the past.

As presented in Figure 41, the positive effect of the second demographic dividend (denoted as 'Second: $c_{bar}/yl_{bar} - L/N$ ') is relatively negligible in the Slovenian case. The result is driven by the low share of asset-based reallocation used to cover the lifecycle deficit of the elderly. In the next two decades its effect is projected to be positive, but the additional growth of output per effective consumer is expected to remain below 0.1 of a percentage point per

annum. The total effect of both demographic dividends ('Total: c_{bar}/ly_{bar} ') is thus dictated by the first demographic dividend.

5.4 THE SLOVENIAN SYSTEM OF PUBLIC FINANCES IN CONNECTION WITH FORTHCOMING DEMOGRAPHIC CHANGES

The economic effects of the forthcoming demographic changes have lately become especially relevant to analysis of the public sector. In developed countries the public sector has become heavily involved in the economic process of distributing resources, whereby up to about half of GDP is redistributed through the public system. In EU-27 countries in 2007 this share of total general government expenditure in GDP was 45.7%, ranging from 34.4% in Slovakia to 52.5% in Sweden (Eurostat, 2009b).

Further, practically all developed countries have public debt of a considerable magnitude. This public debt has to be financed. In countries with large public debt, like Italy (105.8% of GDP in 2007), Greece (98.8% of GDP in 2007) or Belgium (82.2% of GDP in 2007) (Eurostat, 2009a), a substantial amount of GDP must be devoted to cover interest payments on public debt. Although there is no clear limit, when the share of public debt in GDP becomes unsustainable, there are limits to its growth. The Maastricht criteria for entering the European Union ('EU') and thereafter the European Monetary Union ('EMU') suggest that public debt should not exceed 60% of GDP. In countries where it is greater already than that, there should be tendency of reducing that limit.

Changes in the population age structure, particularly an increase in the number of elderly, can put serious fiscal pressure on public system expenditures if there are no changes in the public system (especially public pensions), labor supply and saving behavior (for example, Bongaarts, 2004; Gruber & Wise, 2001; R. Lee, 2000; Rizza, 2009). Researchers have for decades already warned about this issue, but it has been more or less ignored by short-term-oriented politicians. There is a growing body of studies and projections about the long-term consequences of population ageing.

For quite some time it has also been a topic of research interest of international organizations and institutions like the OECD (for example, OECD, 1998), World Bank (for example, World Bank, 1994), ILO, EU and others which try to play a guardian role encouraging timely acting. For instance, the Ageing Working Group (AWG) in the Economic Policy Committee (EPC)[22] periodically prepares simulations of future public expenditures related to ageing: pensions,

[22] Economic policy committee is one of the bodies of the European Commission.

health care and long-term care. The last round of projections for all EU member states was in 2006 (European Commission, 2006) and the next round of results is scheduled for 2009.

Various indicators have been developed to monitor the impact of ageing populations on projected public finance revenues and expenditures. For EU member states, the European Commission now routinely calculates 'S1' and 'S2' sustainability indicators based on projected population ageing. These two indicators show how much of a permanent budgetary adjustment is required to maintain the sustainability of public finances. The measure can be, for example, a constant reduction of non-age-related public expenditure or a constant increase in public revenue. S1 and S2 express the extent of necessary adjustment as a **share of GDP**. S1 shows the adjustment needed to meet the Maastricht government debt target (of 60% of GDP) by 2050. S2 indicates the adjustment needed to fulfill the inter-temporal budget constraint over an infinite horizon (Eckefeldt, 2007; Langenus, 2006). A more detailed description of the S1 and S2 indicators is provided in Appendix 8.

Projections can be made with many different approaches, using varying methods and models. The World Bank employs software called PROST, which is a widespread model, used in more than 80 countries (World Bank, n.d.); the ILO has a family of three models: for population, labor market and pension projections; some countries use Overlapping Generations Models (OLG) etc. Each of these models is based on a large set of assumptions about future macroeconomic development, relations between various variables, the (non)responsiveness of one category relative to another etc. Generally, using different assumptions and models can result in a broad range of projections, but practically all of them project strong demographic pressure on the sustainability of public finances in developed countries.

For Slovenia various models have been developed and used in the past. The beginning of the pension reform in 2000 is related to the use of PROST model. In the first half of the 2000s the set of tools was widened with a generational accounting model. This model showed that the Slovenian system of public finances, in connection with future demographic development, would face a huge intertemporal budget imbalance (Sambt, 2004).

At the same time, the OLG model was developed for estimating the recurrent effects of increasing public expenditures on pensions in GDP. In this model, economic agents react to the increasing tax rates through which growing expenditures are financed. Different options (income tax, consumption tax or a mix of those two) produce different results. This version of the OLG model cannot leave the gap between revenues and expenditures unfinanced. Although they expressed the results in a different way, they showed the strong pressure of future demographic development on the public system. For detailed results, see Verbič, Majcen & van Nieuwkoop (2006) and Verbič (2007, 2008).

When building the generational accounting model in 2004 we calculated a set of age profiles for categories of public expenditures and revenues. In the meantime we have obtained many partial results from various simulations on macro and micro data. Especially extensive work has been done on the effect on the pension system, trying to simulate the effects of the complex Slovenian pension system with all its transition periods, pension assessment base calculations, indexing the growth of wages to the growth of pensions, estimating the effects of prolonging the time period from which the pension assessment base is calculated etc.

Those age profiles, simulations and insight into the pension system have been the basis for two models. One of them is the ILO model, applied to the Slovenian pension system (see Čok, Sambt, Berk Skok, & Košak, 2008). The second one will be presented below. Technically, it is derived from the generational accounting model. However, the point of view has changed. The focus has been shifted away from observing public expenditures and revenues by cohorts. Instead, it tracks expenditures and revenues by calendar years and uses standard fiscal categories like government deficit and public debt. We will refer to it as the *age-profiles-based model*.

All those models have been used in parallel and yielded quite similar results. All of them have projected the rapid deterioration of public finances in future decades because of the changing demographic structure. The age profiles-based model comprehensively projects not only public expenditure related to ageing, but also all other categories of public expenditure. At the same time, it also projects all categories of public revenue.

5.4.1 Technical description of the model

Before going into the details of the age profiles-based model, we present the idea and technical description of the generational accounting model upon which the age-profiles-based model is derived. Further, some ideas of the generational accounting have been kept, allowing some additional informative analyses.

5.4.2 The generational accounting model

A comprehensive set of ideas is presented under the name generational accounting in Auerbach, Gokhale and Kotlikoff (1991a). They criticized public debt and the budget deficit, being arbitrarily defined, depending on labeling instead of economic content. Further, they believe these terms are inappropriate for analyzing the effects of forthcoming radical demographic changes on the long-term sustainability of the public system (Auerbach, Gokhale, & Kotlikoff, 1991b).

The generational accounting approach should overcome these deficiencies through its ambition to replace the public debt and budget deficit categories. This ambitious plan has not been realized, but in its short history the generational accounting method has become an important supplement to other fiscal indicators. Long-term fiscal analysis and planning can be conducted with the generational accounting method. It tries to assess the sustainability of fiscal policy and measure fiscal burdens facing current and future generations. It has been implemented in many countries (Auerbach & Chun, 2003; Auerbach, Kotlikoff, & Leibfritz, 1999; Cardarelli, Sefton, & Kotlikoff, 2000; European Commission, 2000; Kotlikoff & Walliser, 1995; Mayr, 2005). In addition, the critics of generational accounts recognize their usefulness and importance, but stress the need for their further development and improvement (Haveman, 1994).

The basic idea of the generational accounting method may be represented by the inter-temporal budget constraint of the government. For year *t* it can be written as:

$$\sum_{s=0}^{D} N_{t,t-s} + \sum_{s=1}^{\infty} N_{t,t+s} + W_t^g = \sum_{s=t}^{\infty} G_s (1+r)^{-(s-t)} \tag{52}$$

The first term on the left-hand side of Equation (52) represents the sum of present values of net payments of existing generations. $N_{t,t-s}$ ($s = 0...D$) denotes the present (discounted to year *t*) value of net payments that generations born in year $t-s$ will pay in their remaining lifetime. Index *s* runs from age 0 up to age *D*, which denotes the maximum length of life. The first element ($N_{t,t}$) represents the present value of the remaining net payments of the cohort born in the base year, while the last element ($N_{t,t-D}$) represents the present value of remaining net payments for the oldest generation whose members are still alive in year t, i.e. those who were born in year $t-D$.

By analogy, the second term on the left-hand side of Equation (52) is the sum of the present values of net payments of future generations, i.e. those who were not yet born in base year *t*. Theoretically, the sum should run to infinity but in practice it is enough to make calculations for about 100 years into the future. Due to discounting, events after such a distant future reveal negligible effect on the results.

The third term on the left-hand side of Equation (52) stands for the government's net wealth in year *t*. It is **net** because public debt is subtracted from the government's wealth. On the right-hand side of Equation (52) there are government consumption expenditures discounted by the pre-tax rate of return *r* back to base year *t*.

The zero-sum nature of intergenerational fiscal policy is very clear. Holding the right side of Equation (52) unchanged and since the third term on the left-hand side of Equation (52) is constant, a smaller second element of the left side requires a higher value of the first element

on the left side. In other words, there is no such thing as a free lunch: what will not be covered by the net payments of currently living generations will have to be paid for by future generations.

The term $N_{t,k}$ (which is general notation for $N_{t,t-s}$; $s = 0...D$ and $N_{t,t+s}$; $s = 1...\infty$) is defined as:

$$N_{t,k} = \sum_{s=\max(t,k)}^{k+D} T_{s,k} P_{s,k} (1+r)^{-(s-t)} \tag{53}$$

where $T_{s,k}$ represents the average net payment of a representative of the generation born in year *k*. $P_{s,k}$ denotes members born in year *k* who are still alive in year *s*. For generations born before year *t*, the sum begins in year *t*; for generations born in year *k* when $k > t$ the sum begins in year *k* (see Equation (53)). Regardless of the year of birth, the values are always discounted back to year *t*. Generational accounts are usually formed for males and females separately but to avoid further complications of mathematical expressions we skipped the notations for gender.

To summarize, generational accounts are formed by applying projections of net taxes (by age groups and gender) on population projections (by age groups and gender) and then discounting the obtained values to the base year. To form age-specific net tax payments we first disaggregate the average age-specific net tax payment in year *s* paid by individuals born in year *k* into:

$$T_{s,k} = \sum_{i} h_{s,k,i} \tag{54}$$

where $h_{s,k,i}$ denotes the average tax or transfer of type *i* paid or received in year *s* from someone born in year *k*, i.e. of the age of $s-k$ years. If $h > 0$ then *h* denotes paid taxes and if $h < 0$ then *h* denotes received transfers.

We thereby assume that the initial policy of public finances and economic behavior will not change and that categories grow along with productivity growth. With this simplified assumption we can create future profiles of paid taxes and received transfers, based on age profiles from the base year:

$$h_{s,k,i} = h_{t,t-(s-k),i} (1+g)^{s-t} \tag{55}$$

where g denotes annual productivity growth. Equation (55) assigns in year s to someone aged $s-k$ taxes and transfers from persons who were of this age (which they are now) in the base year.

The age profiles in the base year are calculated in the same way as in the NTA methodology. First, we estimate tax and transfer payments of a representative member of each cohort from surveys or some other available micro-data set. Second, we weight them with cohort members and adjust them proportionally to match the aggregate controls.

$N_{t,k}$ in Equation (53) stands for aggregate net payments that members of certain cohorts will pay to the government in their remaining lifetimes. Finally, when dividing the aggregate payments of a certain cohort by the number of individuals of the same age group in the base year, we obtain the average payments a member of a specific cohort will pay to the government in their remaining lifetime, i.e. we obtain generational accounts:

$$GA_{t,k} = \frac{N_{t,k}}{P_{t,k}} \tag{56}$$

Generational accounts are thus defined as the present value of net taxes (taxes paid minus transfers) which individuals of different age cohorts would pay, under the current policy, over their remaining lifetimes.

From an aggregate point of view, generational accounts can identify an intertemporal fiscal imbalance of the public sector. From an individual point of view, they present expected net payments into the public system under a 'no-changes' scenario. The generational accounts for Slovenia revealed serious intertemporal imbalances if it is assumed the public system from 2001 remains unchanged in the indefinite future. To restore an intertemporal imbalance, at the beginning of 2006 all kinds of public expenditure (broadly defined transfers, including public defense, administrative costs of the system etc.) should be decreased by 18.7% or all kinds of public revenue (taxes, social contributions etc.) should be increased by 22.8% (Sambt, 2004, pp. 61-62).

The method was named generational accounting because it analyses relations between people born at different points in time. Generational accounts are especially interested in the relation between the results for currently living newborns and generations that will be born in the future. They answer the question of how different generational accounts would be for generations born in the future if all of the burden of restoring an intertemporal balance were put on them.

We can also express this answer in less abstract language by answering to what extent all taxes would have to be increased (or all transfers lowered) if the entire burden of restoring an intertemporal balance were shifted only to generations born in the future. In this case, the tax

burden on future generations should be increased by 105.8% or, alternatively, the public transfers to them should be lowered by 81.0% (Sambt, 2004, pp. 61-62). For currently (in 2001) living generations taxes and transfers would remain the same for their remaining lifetime. The purpose of this completely unrealistic assumption is to emphasize that delaying the necessary changes rapidly increases their magnitude.

5.4.3 The age-profiles-based model

We have presented the model of generational accounts in some detail because the age profiles-based model is technically based on that model. To be precise, there are distinctive conceptual and some technical differences between generational accounts on one side and the SNA, NTA and cohort approach on the other. The differences and possible convergence of generational accounts with the NTA are under consideration. Indeed, lately the generational accounts have become part of the NTA project and some founders and protagonists of the generational accounting method are members of the NTA research team. My personal opinion is that they should converge technically as far as possible so they can be calculated in parallel without too much additional effort. Both of them provide information highly relevant for obtaining a deep insight into the reallocation processes between cohorts and the long-term sustainability of the public system. They could retain their immanent differences that shape them as separate methods, not only technically but also from a conceptual point of view.

The basic procedure of the age profiles-based model is the same as in generational accounting. Age profiles are combined with population projections. However, we have adjusted the model of generational accounts in different ways. The focus has changed from observing the results by cohorts to observing them by calendar years. We have retained some features of the generational accounting model (like discounting the results to the base year and observing the influence on individual cohorts) to obtain additional relevant information and parameters. This time, the projections also use more detailed and therefore more realistic assumptions.

In generational accounting only one growth rate was used for all public revenues and expenditures, while now we use different growth rates by categories. Some categories grow with productivity growth, some with GDP per capita, some with inflation (i.e. a zero real growth rate) etc. Those assumptions follow currently valid legal provisions, if there are any, or they are arbitrarily set in line with general economic assumptions and recommendation of experts from the Ministry of Finance, the Institute of Macroeconomic Analysis and Development and other institutions. In addition, the coefficient matrix summarizes the effect of legislation and other effects expected to cause a departure from the current age profiles.

Further, in the generational accounting model for Slovenia, constructed in 2004, it was assumed that the public system from 2001 would remain unchanged for the indefinite future.

This was not a realistic assumption. For instance, pension legislation includes various transition periods that will affect the retirement age up to 2014 and the level of pensions up to 2024. Yet at that time we did not have reliable estimations about the future effects of the Slovenian pension system. In the meantime, more detailed data have become available along with the results of various calculations and simulations. We have also employed the latest set of macroeconomic assumptions from the European Commission instead of the very simplified assumptions used by the generational accounting method.

Next we provide a mathematical description of the model. The *matrix of age profiles for a given category of public revenues or expenditures* (*PROF*) includes the average age profile of that category by years in the future. It builds on the situation from the base year (2007).

The *population matrix* (*P*) is based on the EUROPOP2008 population projections, presented earlier in the text as the 'medium variant'. For some calculations a longer time span is required. To compare the results for lifetime payments and takings, we have to follow the cohorts through their entire lifetime until death. For cohorts of young people this goes beyond 2060. In this case, we use the medium variant of Eurostat's population which we have extended into the distant future as described.

The *coefficient matrix* (*C*) summarizes the effects of future departures from the basic age profile, assumed in the matrix of age profiles. The legally enforced, but not yet fully realized, effects of the Slovenian pension reform is a typical such case. Data for coefficient matrices have also been obtained from various simulations on micro data. For instance, for simulating the effects of the PDIA-1999[23] on pension expenditures we have taken individual data about pension years, age, pensions at the time of retirement etc. about individuals who retired in the second half of 1990s. We have simulated when they would retire and what their pension would be according to the new conditions. Weighted averages by age groups enter the coefficient matrix.

Technically, the matrices have age (*a*) in their rows and calendar years (*t*) in their columns. The matrix of age profiles for some category of public expenditure or revenue (*PROF*) has average values of that particular category in its cells; the population matrix (*P*) has the number of people in its cells; and the coefficients matrix (*C*) contains the coefficients of adjustments. The amount of transfers received by individuals (or taxes paid by individuals) aged *k* in year *t* is thus calculated as:

$$CAT_{a,t} = PROF_{a,t} P_{a,t} C_{a,t} G_t \tag{57}$$

where *G* contains coefficients of the cumulative growth of a particular category from the base year (in our case 2007) to time *t*. Public expenditures (revenues) of some particular category

[23] Pension and Disability Insurance Act passed in the year 1999.

(*CAT*) in year *t* are calculated as the sum of projected expenditures (revenues) by all age groups:

$$CAT_t = \sum_{a=0}^{D} CAT_{a,t} \tag{58}$$

where index *a* runs from 0 to *D*; with *D* denoting the maximum length of life (in our model it is the age group 100+).

For categories that depend on activity rates, the *PROF* matrix is decomposed as the product of two matrices. One of them contains age profiles of average public revenues (expenditures) by taxpayers (beneficiaries), while the other one includes the share of taxpayers (beneficiaries) paying (receiving) taxes (benefits). For pensions, for example, the *PROF* matrix is a product of 'retirement rates', representing the share of people who are retired (by age) and the average pension per **receiver** of pension benefits. This decomposition enables us to introduce future changes into the age profiles much easier and more accurately than by only introducing them through the *C* matrix.

Otherwise, simulating the increase in retirement age could require high multipliers in the *C* matrix for some age groups of the labor income profile. This would be especially relevant to age groups where involvement in the labor market is already very low. Further, this would be even impossible to achieve if the value of the initial age profile in some age groups were zero. There can be no scalar (in the *C* matrix) with which a zero value can be multiplied to obtain positive values that are 'emerging' when the labor income profile shifts to higher age groups. Through the described decomposition the age profile per employed person is extrapolated into higher age groups, while the age profile is 'lifted' through the activity rates. In the same way, the age profile of pensions is also decomposed into the average pension per beneficiary and 'retirement rates'. Simulating the effects of retirement postponement thus simplifies the interplay between employment rates and retirement rates. Conceptually, the retirement rates in higher age groups are decreasing (withdrawing into higher age groups), while employment rates in those age groups are increasing.

To link employment rates with the retirement rates the sub-model of the Institute of Macroeconomic Analysis and Development (the 'IMAD sub-model') is used. For a detailed description of the model, see Kraigher (2005). Two versions of this model have recently been developed. One of them treats all pensions as one homogenous category. The model simulates the interaction between rates of education involvement, employment rates, unemployment rates and a balancing item in the form of 'informally employed persons' (it also contains some other smaller or minor categories like farmers, prisoners etc.).

The second version of the model treats categories of pensions separately: old-age pensions, survivor pensions (separately widow pensions and family pensions), disability pensions and

farmer pensions. Separate age profiles have been used for each sort of pension. This adds further details to the calculations and can take the changing structure between different kinds of pensions into account. However, at the same time the model has lost the interactive link between employment rates and retirement rates. This version can be considered a more detailed one, but is limited mainly by the baseline results. It is not adequate for simulations where the described link is important – for estimating the effects of increasing retirement age, for example. Therefore, we will present the results using the first version of the model. The results obtained by this version of the model provide a somewhat higher share of pension expenditures in the long run. The difference in the final year of projections (year 2060) is 0.9 of a percentage point, expressed as a share of pensions in GDP.

All categories of public expenditures and revenues are linked to the GDP module. Usually the results in projections are expressed as a share of GDP instead of being expressed in currency units (euros). GDP growth is calculated as the sum of the labor productivity growth rate and the labor input growth rate. Further, the labor input growth is defined as the growth of employees in the 15–71 years age group. This approach is also used by the European Commission (Ageing Working Group) in its latest methodology for projecting public expenditures related to population ageing (Ageing Working Group, 2008).

The data on projected activity rates, unemployment rates and productivity growth are taken from the set of macroeconomic assumptions of the European Commission (Ageing Working Group, 2008). Labor productivity growth enters into the calculations exogenously, neglecting the possible relation to the age structure of the population when using alternative demographic variants.

The budget deficit is calculated as the difference between total public expenditures and total public revenues. The value of the budget deficit is added to the public debt from the end of the previous year to obtain the public debt at the end of the current year. Interest on public debt is calculated by applying a 3% (real) interest rate on the public debt from the end of the previous year. The interest rate of 3% was assumed by the Slovenian Ministry of Finance.

For all components of public revenues the corresponding age profiles are applied. The age profile of consumption has been used for allocating value-added tax; labor income tax has been used for social contributions; income from dividends and interest has been used for allocating taxes on property etc. For most of the categories constituting ‘other revenues’ a uniform distribution across age is assumed, therefore projections of that category are not sensitive to the changing demographic structure. The exception is government entitlement to profits, for which the Ministry of Finance assumes a gradual decline.

For each category of revenues and expenditures, the model enables us to select its growth rate – i.e. to which the age profile is attached (matrix *G*). Public revenues in the form of social contributions, for example, are assumed to rise with the growth of average wages, while by

assumption most age profiles constituting 'other revenues' grow with GDP per capita. For wages, it is assumed that they increase with labor productivity growth, which is the standard assumption in macroeconomic models.

We have tried to introduce all available details into the model to make the simulations as realistic as possible. For instance, following the default procedure (applying the age profile to population projections) parental leave expenditures are determined by the number and age distribution of women of fertility age. However, actually those expenditures also depend on the average number of children that women are giving birth to. Therefore, in the model the relative growth of the total fertility rate is also influencing parental leave expenditures.

The described age profiles-based model uses a relatively simple procedure compared to the simulations, where retirement criteria are programmed and cohorts or individuals are 'ageing' inside the model. After they fulfill the criteria, the model retires them. However, in those models it is often impossible to program every detail of the pension legislation. For example, there was such a case with the Slovenian ILO model, generating too few pensioners in the starting years of the projections. This was the consequence of cohorts not fulfilling the general criteria for retirement, while we were unable to include all details about earlier retirement concerning which they were retiring in reality. Although the approach in the age profiles-based model is methodologically simple, we consider the smooth transition from the base year to the starting years of the projections one of its advantages.

5.4.3.1 Projecting public revenues and expenditures

The results of projected revenues and expenditures of the public sector are presented in Table 8 and Table 9. For the share of public revenues in GDP in the 2007-2060 period a slight decrease is projected. It is expected to be somewhat greater for categories that are related to the labor income age profile (social contributions, for example) and smaller for taxes related to the consumption age profile (like value-added tax and excises).

Most of the other models are only oriented to project public expenditures. They neglect the revenue side completely or assume revenues grow in line with GDP, i.e. assuming their constant share in GDP. Indeed, also in our projections the share of revenues of the public sector is not projected to change much in the future. However, this outcome is related to the assumptions of the European Commission regarding employment rates. They only assume a moderate increase in employment rates in higher age groups. Further, the changing age structure of the population is reducing the total employment rate since it is composed of employment rates by age, weighted by the population structure. According to the population projections the age structure during the working age will worsen.

Table 8: Projections of revenues of the public sector for the 2008-2060 period in selected years [as % of GDP]; Slovenia

	2007	2010	2015	2020	2030	2040	2050	2060
Taxes on income and profits	8.7	8.5	8.7	8.9	8.8	8.6	8.2	8.2
Social security contributions	13.7	13.4	13.6	13.8	13.5	13.2	12.9	12.9
Payroll tax* + tax on work contracts	1.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Taxes on property	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Value-added tax + Excises	13.8	13.8	13.8	13.7	13.6	13.5	13.4	13.3
Non-tax revenues (non-age specific)	3.7	3.7	3.6	3.6	3.5	3.5	3.5	3.4
Total revenues of the public sector	**41.8**	**40.0**	**40.3**	**40.7**	**40.1**	**39.5**	**38.6**	**38.5**

* 'Payroll tax' is a translation used in statistical sources in Slovenia denoting a special tax paid by employers, calculated from the mass of wages. This tax was used for some time in the past, was gradual declining in the 2006-2008 period and completely abolished in 2009. We stress this is not a payroll tax in the sense used internationally.

Sources: Author's calculations based on various sources mentioned earlier.

In the continuation we will also present simulations of prolonging the age of retirement. In this case, revenues related to labor income would be affected since people would pay them longer by staying in the employment status longer. Given a gradual increase of the retirement age by an additional[24] 6 years in the 2015-2059 period, revenues in the form of social security contributions are projected to rise to 14.9% in 2060. This is a considerable increase compared to the baseline scenario presented in Table 8 (12.9%). We believe it is important to also simulate the revenue side, not only the expenditure side, to obtain a complete picture of future development of the public system. It is even necessary to have them for such exercises as that just presented. Therefore, we think the model presented contributes significantly to comprehensive analyses of the public system.

As just announced, major changes (already in the baseline scenario) are expected on the expenditure side. In absolute terms, the increase in pension expenditures is expected be the most striking. According to the results presented in Table 9 the share of pension expenditures in GDP is expected to almost double by 2060. Also for health and long-term care expenditures a high increase is expected. As shown when presenting the NTA, the age profiles of those three categories, together with education expenditures, are the most age specific (concentrated in certain ages). However, education expenditures are related to the young. According to the population projections the share of the 0-19 age group is not expected to change much in the future. In the next decade those expenditures are even expected to decline, whereby the results are predominantly driven by the projected decline in the number of newborns. Thereafter, a gradual increase is expected, ending at a level slightly above the current one.

In contrast, pensions, health and long-term care expenditures are concentrated among elderly. According to the population projections, the share of people aged 65+ will more than double by 2060. Further, the share of people aged 80+ is expected to even quadruple. The latter is relevant for long-term care expenditures which are concentrated in the highest age groups. The relative increase of those expenditures is therefore by far the highest, projected to

[24] A slight increase is already assumed in the baseline scenario.

increase from 1.0% in 2007 to 3.2% in 2060. Those three types of expenditure are of great concern for developed countries and various international institutions. We will therefore present them in more details, also simulating their sensitivity to alternative demographic variants and scenarios.

Table 9: Projections of expenditures of the public sector for the 2008-2060 period in selected years [% of GDP]; Slovenia

	2007	**2010**	**2015**	**2020**	**2030**	**2040**	**2050**	**2060**
Pensions	10.1	10.3	11.2	11.9	14.2	17.0	19.3	19.8
Health	4.5	4.5	4.8	5.0	5.7	6.5	7.1	7.3
Long-term care	1.0	1.1	1.3	1.4	1.8	2.4	2.9	3.2
Unemployment transfers	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Education	5.4	5.2	5.0	5.1	5.2	5.0	5.3	5.6
Other	19.2	19.1	18.9	18.8	18.8	18.8	18.9	18.9
Primary expenditures	**40.4**	**40.4**	**41.4**	**42.4**	**45.9**	**50.1**	**53.7**	**55.0**
Primary surplus (+) or deficit (-)	1.3	-0.4	-1.1	-1.7	-5.8	-10.5	-15.1	-16.5
Interest payments	1.1	0.7	0.8	1.0	2.2	5.4	10.8	18.4
Total expenditures of the public sector	**41.5**	**41.1**	**42.2**	**43.4**	**48.1**	**55.4**	**64.5**	**73.4**
Total surplus (+) or deficit (-)	0.3	-1.1	-1.9	-2.7	-8.1	-15.9	-25.9	-34.9

Sources: Author's calculations based on various sources mentioned earlier.

5.4.3.1.1 Public pension expenditures under different population projections

In 1983 the Yugoslav pension system became quite generous by passing a new indexation rule, with the indexation of pensions not being related to the cost of living any more but to wage growth. This was in the same year that Yugoslavia faced a serious debt crisis that was followed by a general political and economic crisis, which was one of the main causes of the collapse of Yugoslavia in 1991 (Stanovnik, 2002, p. 21). From 1980 to 1989 the net replacement rate[25] rose from 73.5% to 80.0%, while the ratio between insured persons per pensioner decreased from 3.66 to 2.52. Consequently, pension expenditures rose from 7.3 to 8.7% of GDP (Stanovnik, 2002, p. 22)[26].

Table 10 presents selected parameters related to pension expenditures in the 1989-2007 period. During socialism unemployment was very low. Everybody willing to work could get a job since companies were self-managed which led to more labor-intensive production. However, some workers did not have much to do in their workplaces, for which the term 'unemployment of the employed' was applied. After the change in system this 'hidden unemployment' was not (or less) tolerated under the private system and turned into a visible form. Further, the Yugoslav market almost completely disappeared overnight and Slovenian enterprises could not redirect their exports to other/new markets rapidly. This led to a strong

[25] The net replacement rate for pensions is defined as a person's net pension divided by their net wage before retirement.

[26] The value for the year 1989 is lower than they are presented in Table 10. It seems that the author presented figures for narrowly defined pension expenditures than in our analysis.

fall in industrial production in the early 1990s. In addition, the existing socialist economic structure had to be radically restructured and adapted to the new conditions. Unemployment, which almost did not exist in socialism, suddenly became the central issue of the country.

The number of registered unemployed rose from 34,000 in 1989 to 137,000 in 1993. That increase would have been even greater had early retirement not been used as a tool to mitigate unemployment and buy social peace. This was an elegant solution at the time, but led to strong negative pressure on public pensions expenditure. As presented in Table 10 the average retirement age for old-age retirement in 1991 was just 52.3 for females and 56.1 for males. Thus, the average old-age retirement age dropped in only two years (from 1989 to 1991) by more than two years for males (from 58.3 to 56.1) and by almost three years for females (from 55.2 to 52.3). In that period, the ratio between insured pensions and pensioners sharply decreased from 2.52 to 1.95 in 1991 and in 1992 further to 1.70.

Consequently, the share of pensions in GDP rose from 9.6% in 1989 to 14.4% in 1994. The Pension and Disability Insurance Act of 1992 (PDIA-1992) introduced a gradual increase in the retirement age and some other measures to cope with the rapidly growing pension expenditure. In 1999 the share of pensions in GDP was 13.4% but the projections simulated a sharp increase in the future if no further measures were introduced.

Under the Pension and Disability Insurance Act from 1992 eligibility conditions were somewhat strengthened, but they were not really ambitious: a gradual increase of the legal retirement age for males from 55.5 years in 1992 to 58 years in 1998 and for females from 50.5 to 53 years (Stanovnik, 2002). The actual retirement age for old-age retirement was lagging considerably behind those limits (see Table 10).

The Pension and Disability Insurance Act from 1999 (PDIA-1999) further tightens the retirement conditions and reduces retirement benefits. Full retirement age has been increased to 63 years for males and 61 years for males (after the transition period is over). However, both genders can retire already at the age of 58 years and still receive a full pension if they have a full pension qualifying period of 40 years (men) or 38 years (females). While for males the later criterion was implemented immediately, for women a transition period up to 2014 is foreseen.

The changes introduced by the PDIA-1999 were not fully realized in 2000 but are being introduced gradually, involving different transition periods. The PDIA-1999 will thus be fully applied by 2024, although it has already yielded some results. For details of the legislation, see (PDIA-1999 (Pension and Disability Insurance Act) [in original: Zakon o pokojninskem in invalidskem zavarovanju], 1999). The share of pensions measured as a percentage of GDP has therefore (temporarily) stabilized and has not been increasing in the last few years, despite the growing number of retired people. The effect was especially strong in the 2000-2005 period since the indexation of pension growth to the growth of wages turned out in reality to

be about 80%, following a complicated indexation mechanism. Together with other effects of the PDIA-1999 this had a strong dampening effect on the growth of pensions. In 2005, the Pensioners' party as a member of the coalition succeeded in 2005 to restore the indexation of pensions to wages to 100%. In reality, the indexation is still less than full because of other parameters of pension legislation – above all due to a decreasing service factor.

Table 10: Selected parameters relevant to the Slovenian pension system for the 1989-2007 period

Year	Insured persons per pensioner	Average retirement age (old-age retirement)		Life expectancy at birth*		Pension expenditure (% of GDP)	Active insured persons ('000)	All pensioners ('000)	Old age pensioners ('000)
1	2 (= 8/9)	3	4	5	6	7	8	9	10
		Male	Female	Male	Female				
1989	2.52	58.3	55.2	68.86	76.72	9.57	921.5	365.1	180.4
1990	2.30	57.7	53.6	69.38	77.19	10.79	884.6	384.1	197.3
1991	1.95	56.1	52.3	69.54	77.38	10.92	816.9	418.9	227.5
1992	1.70	56.2	52.5	69.45	77.25	13.76	764.9	448.8	249.0
1993	1.71	56.2	53.3	69.40	77.29	14.05	782.6	457.5	256.0
1994	1.69	57.6	53.2	69.58	77.38	14.42	772.5	458.1	257.3
1995	1.67	57.5	53.1	70.27	77.76	13.55	769.0	460.3	259.3
1996	1.65	57.5	54.0	70.79	78.25	13.34	765.7	463.3	262.1
1997	1.67	58.3	54.9	71.01	78.62	13.31	783.2	468.2	266.9
1998	1.66	58.4	55.3	71.05	78.68	13.35	784.2	472.4	271.5
1999	1.68	58.2	54.8	71.34	78.75	13.43	800.5	476.4	276.3
2000	1.74**	59.2	55.4	71.94	79.10	13.47	839.4**	482.2	282.0
2001	1.71**	59.3	55.4	72.13	79.57	13.41	841.5**	492.5	287.9
2002	1.64**	59.9	55.5	72.33	79.87	13.44	836.5**	509.1	295.3
2003	1.61**	59.9	55.7	73.15	80.70	13.23	834.0**	517.8	302.4
2004	1.60**	60.6	56.6	73.48	81.08	13.03	836.7**	523.9	308.4
2005	1.59**	60.4	57.1	74.08	81.30	12.96	843.2**	531.1	315.1
2006	1.59**	60.3	57.2	74.84	81.89	12.65	854.6**	536.9	322.8
2007	1.62**	60.7	57.4	74.98	82.30	12.25	879.0**	543.5	332.8

Note: *The Statistical Office of the Republic of Slovenia calculates and publishes data on life expectancy as the average for the previous year; for example, for 2006 the values represent data for 2005-2006.

** Higher values due to a change in the methodology (including additional groups); without this change the values for 2000 would be 807.0 (active insured persons) and 1.67 (insured persons per pensioner).

Sources: Institute of Pension and Disability Insurance of Slovenia, Annual Report (various years) and internal data; Statistical Office of the Republic of Slovenia, Statistical Yearbook of the Republic of Slovenia 2008, p. 83.

The effects of the current pension system with transition periods have been analyzed by several researchers using different models, assumptions and partial simulations of the complex Slovenian pension system. However, all of them have concluded that, despite the positive effects of the pension reform starting in 2000, further measures will be required in the future to maintain the system's long-term fiscal sustainability – see, for example, (Čok et al., 2008; European Commission, 2006; Sambt, 2004; Verbič, 2007; Verbič et al., 2006). The results of our model again confirm that the challenges of the changing demographic structure will have to be met soon if no further measures are implemented.

In the analysis we have concentrated on 'narrowly' defined pensions only. The category includes old-age pensions, disability pensions, survivor pensions, military pensions and farmer pensions. The share of those expenditures in 2007 was 10.1% of GDP, while total

pension expenditures amounted to 12.25%, including the costs of the Institute of Pension and Disability Insurance of Slovenia itself, state pensions, supplements for help and service, and various other expenditures predominantly or exclusively with asocial function.

In Figure 42 we present projected pension expenditures by demographic variants and scenarios. The results concerning the increasing share of public pensions in GDP seem to be robust. As presented in Table 9, using the medium variant of population projections an increase to almost 20% of GDP is projected. Note that the vertical axis is cut off to make differences between the variants more visible. The results of the high and low variants are relatively close to the results of the medium variant. The positive effect of higher fertility and higher net migrations on the public pension expenditures are largely neutralized by higher longevity. Analogously, but in opposite directions, are the effects neutralized in the low variant. In both of those two variants the share of pensions in GDP would be lower than in the medium variant – in the high variant by about 1 percentage point while in the low variant by about 0.5 of a percentage point.

In the 'high fertility' scenario, where only the fertility rate is assumed to be different (higher) than in the medium variant (TFR gradually increasing to 1.90), the share of pensions in GDP is projected to be lower in 2060 by about 1 percentage point compared to the medium variant. The effect comes exclusively through the higher GDP, but not before generations of more numerous newborns reach working age. Therefore, the positive effect of higher fertility does not kick in until the second half of the 2030s.

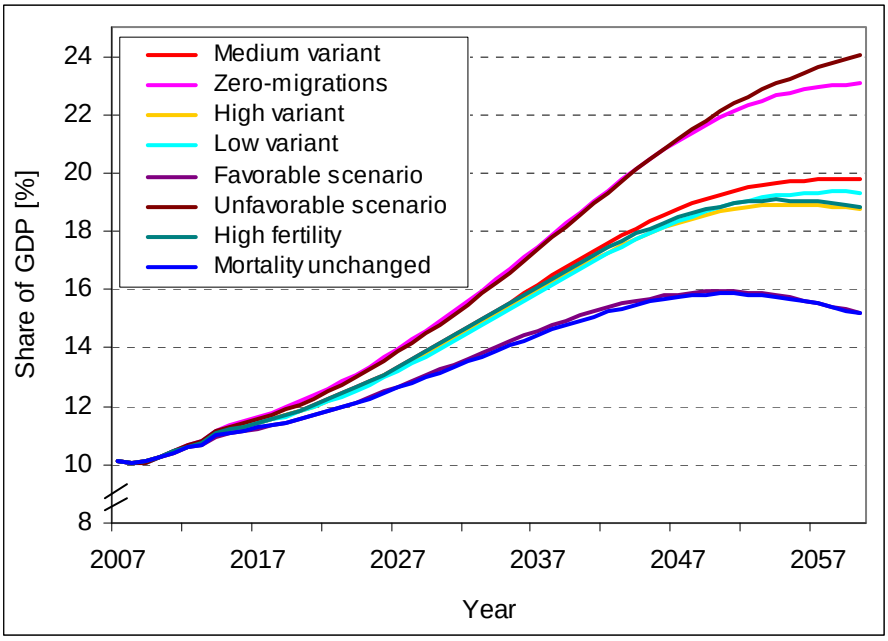
According to the 'mortality unchanged' scenario, pension expenditures would only increase to about 15% of GDP by 2060. Thus, without an increase in longevity after 2008 the share of pensions in GDP would be about 4.5 percentage points lower in 2060 than in the medium variant. By chance, the results resemble the results of the 'favorable' scenario where mortality is taken from the low variant (mitigating the pension increase compared to the medium variant), while fertility and net migrations are taken from the high variant (also mitigating the pension increase compared to the medium variant). In contrast, the 'zero migrations' scenario and 'unfavorable' scenario would increase pension expenditures in GDP to 23% and 24% by 2060, respectively.

Even according to the extremely 'favorable' scenario pension expenditures are expected to increase strongly. The driving force behind those results is demographic pressure coming through the increased longevity and low fertility, further emphasized by the population structure – in the next few decades especially by baby-boom generations acquiring retirement status.

However, the results are not surprising having in mind that the number of people aged 65+ is projected to more than double. Without further changes to the pension system practically all people of that age are expected to retire. On the other hand, the number of people of working

age is projected to decrease from almost two-thirds of the population to less than half the population (Table 7 on page 95). According to the PDIA-1999, the service factor for full pension conditions amounts to 0.805 in 2008 and will gradually decrease to 0.725 until 2024[27]. The service factor is applied to the pension assessment base when the pension is calculated[28]. Its presented decline will to some extent mitigate the growing share of pensions in GDP. Another positive effect is the increasing age at retirement. A large part of that effect, introduced by the PDIA-1999 has already been brought into effect, while the autonomous increase of retirement age is currently difficult to predict.

Figure 42: Projections of pension expenditures [% of GDP]



Sources: Author's calculations based on various sources mentioned earlier.

Future developments of employment rates, which influence retirement rates, are exogenously provided by the European Commission. They assume just a moderate further increase of employment rates in higher age groups of the working age period. In the 2007-2060 period

[27] To be precise, the service factor depends on the number of years collected until the 31.12.1999 and the number of years collected after that date. For the 15 working years it amounts to 35% for males and 38% for females. For each working half-year above 15-year limit both males and females receive 1 percentage point for the years collected before December 31 1999, but only 0.75 percentage points for the years collected after that date. In our stylized example we assume that person has collected full working period (40 years for males and 38 years for females) and that they have been collected continuously (without any interruptions because being unemployed or out of the labor market). At the end of the transition period (2024) this will amount to 72.5 percents for both genders: 35+50*0.75=72.5 (for males) and 38+46*0.75=72.5 (for females).

[28] However, when calculating the pension assessment base a set of valorization coefficients is applied to the series of wages first. In the set of coefficients for the 1965-2007 period that was published in 2008 (a new set is published every year), the valorization coefficient for 2007 was 0.749 (for details about the set of valorization coefficients and how they are calculated, see PDIA-1999 and Pravilnik o valorizacijskih količnikih za preračun plač in zavarovalnih osnov iz prejšnjih let na raven plač in pokojnin iz leta 2007, 2008). The resulting replacement rate under certain assumptions is presented in Figure 46 on page 138.

employment rates should in the age group 55-59 years rise from 45.5% to 58.0%, in the age group 60-64 years from 17.1% to 37.6% and in the age group 65-71 years from 12.4% to 15.3%. Despite this increase, the employment rate for the age group 15-64 years would increase during the projection period from 67.8% to only 68.6%, while for the age group 15-71 years the employment rate would even decrease from 63.1% in 2007 to 61.2%. Those results are mainly driven by the deteriorating effect of the employees' age structure. The relative share of employees aged 30-49 years (where employment rates are about 90%) is projected to decline, while the relative share of employees aged 50+ (with employment rates as presented earlier in this paragraph) is projected to strongly increase.

The question arises of how realistic these assumptions of the European Commission are. Further analyses would be required to obtain more reliable estimates of the increasing employment rates in higher age groups. It is difficult to predict the effect of the voluntary prolongation of the working period because of the bonuses that are established in the PDIA-1999. The analysis by Ahčan and Polanec (2007) suggests that most people in Slovenia retire immediately upon fulfilling their retirement conditions. It seems that the current system of bonuses and increasing service factor does not convince people to continue working once they satisfy their retirement conditions.

However, in the future the retirement age could also increase because people would only fulfill their retirement conditions later. Education enrolment levels in the last few decades have strongly increased; especially in tertiary education. Since they stay much longer in the educational process, people are entering the labor market later and therefore they will satisfy the retirement conditions (collected years) later. Unfortunately, data on collected working years are not available – by individuals. These data would enable us to simulate the retirement process in the future.

5.4.3.1.2 Projected public pension expenditures under scenarios of prolonging age at retirement

The presented results show a strong increase in public expenditure related to population ageing. Positive economic theory cannot provide a definite answer to the question of when changes have to be introduced. However, we believe that the government will not allow an increase in pension expenditures to such high levels as presented in Section 5.4.3.1. Various measures can be introduced to mitigate the growing share of pension expenditures. Boosting labor productivity growth is strongly welcomed, but in the Slovenian case it practically does not have any positive effect on reducing pension expenditures in GDP. By the standard assumption used in the models, the growth of wages equals productivity growth. In Slovenia pension growth is fully indexed to the growth of wages. Labor productivity growth thus directly translates into higher pensions, without lowering the share of pensions in GDP. The main measures for mitigating the growing share of pension expenditures will thus probably be

prolonging the working period and lowering the level of pensions. Increasing the tax burden (like social contributions for pensions) would be another option, but that would further increase the labor tax burden, which is already very high in Slovenia.

First we present simulations of a prolonging the working period through increasing age at retirement. In Chapter 6 where the main NTA results for other countries are presented, we will see that in Slovenia people retire distinctively earlier than in other countries. Therefore, this measure should probably be considered one of the first choices when introducing changes for improving the long-term sustainability of public finances.

In our age profiles-based model the employment-retirement relationship is determined by the matrices of employment and unemployment rates, with calendar years in rows and age groups in columns. Separate sets of matrices are available for both genders. The model enables us to set three separate transition periods in the period up until 2060. For each of them the starting year and the end year should be selected, between which a linear increase is assumed. In each of those three periods an increase up to 5 years can be chosen, separately for males and females.

Technically, the increasing retirement age is introduced in the following way. The matrix of employment rates from the baseline scenario is taken as a reference matrix on which the procedure builds. Next, the final matrix of the transition period is calculated by shifting employment rates into the higher age. A shift to the 'right' – into the higher age – is done for ages after the 45-49 age group. Until the age 45-49 years the employment rates are still at a high level, therefore we do not assume changes in that age group as the retirement age increases. If the retirement age were to increase by 5 years, we would just shift the employment rates of the reference matrix by one 5-year age group (it is a 5-year age group model). For example, employment rates from the age group 55-59 years would shift to the age group 60-64 years. By analogy, rates from the 50-54 age group would shift to the 55-59 age group, while rates in the 45-49 age group would remain unchanged. Rates in the 45-49 and 50-54 age groups would thus be equal.

If the assumed increase in retirement age is less than 5 years, we calculate the weighted average of two consecutive 5-year age groups of the baseline scenario. For example, if an increase of 4 years is assumed, the employment rates for the age group 50-54 years would be calculated as employment rates for the 50-54 age group (from the baseline scenario) weighted by 0.2 and employment rates from the age group 45-49 years weighted by 0.8. By adjusting weights any other increase of the retirement age can be simulated.

Using the described procedure, a matrix of employment rates for the end of the transition period is obtained. However, the increase in the age of retirement is assumed not to be implemented immediately, but gradually over the selected transition period. Therefore, the transition procedure is also applied for the time dimension. The 'final' (obtained as described

earlier) matrix of employment rates, arrived at with the described procedure, is compared to the baseline matrix. During the transition period employment rates by age groups are again calculated as weighted averages. At the beginning of the transition period the employment rates of the baseline matrix have weight 1, while the employment rates of the final matrix have weight 0. At the end of the transition period it is the other way around. During the transition period the weight of the baseline matrix is gradually declining from 1 towards 0, while the weight of the final matrix is gradually increasing from 0 to 1. Thus, a linear transition from the baseline matrices to the earlier described final matrices is assumed.

As mentioned, the model enables us to use up to three transition periods for simulating the effects of increasing age at retirement. The procedure in the second and third transition periods is the same as for the first transition period. The final matrix of the first transition period becomes the starting matrix of the second transition period; and the final matrix of the second transition period turns into the starting matrix of the third transition period. Technically, the transition period can also overlap, i.e. the next increase of the retirement age can start already while the previous one is still underway. Finally, we have described the procedure for employment rates, but the same procedure is also conducted for unemployment rates.

Employment and unemployment rates are an exogenous input into the IMAD sub-model that links them with matrices of other economic statuses, among which the matrices of retirement rates (one for each gender) are most relevant. Conceptually, the pension age profile withdraws when the employment age profile expands into higher age groups.

In Figure 43 various scenarios of public pension expenditures in GDP are presented, depending on the extent and pattern of the increase[29] in retirement age. Two remarks are appropriate before we present the results. First, as presented, the matrices at the end of the transition period are derived from the matrices of the baseline variant. In the baseline variants a certain increase of the retirement age is already foreseen. Thus, assuming that age at retirement will increase by a certain amount of years actually means an **additional** amount of years compared to the baseline variant. However, since a minor increase of employment rates in higher ages is assumed this distinction is not as crucial as it could otherwise be. Second, by assuming that the retirement age will increase by a certain number of years we have in mind an **effective** increase of the retirement age. For example, this does not necessary equal the legally enforced increase in the retirement age. An immediate sharp increase in the retirement age could cause a massive increase in the number of disability pensioners, increasing the **actual** retirement age much less.

In the simulation we will assume an additional increase in the retirement age before starting with the year 2015. Up until 2014 gradual increase in the retirement age for women is already

[29] Again, since some moderate increase of the retirement age is assumed already in the baseline variant, an 'additional increase of retirement age' is meant.

in progress following the PDIA-1999 legislation. However, this decision is purely arbitrary, partly selected also because we then have three 'round' 15-year periods until the end of the projection period. An earlier start could also be selected. Thus, we assume three transition periods: 2015-2029, 2030-2044, and 2045-2059. Numbers in the labels of the scenarios presented in Figure 43, separated by a semicolon, denote an increase in the retirement age by those three periods.

In general, we assume an equal increase in all three periods: 1-, 2- and 5- year increase in each period. We have omitted scenarios with an assumed increase in the retirement age of 3 and 4 years. Instead of the '3; 3; 3' scenario we present a '3; 4; 2' scenario, complying with the fact that in the baseline scenario the strongest increase of pension expenditures in GDP is projected for the second period, while during the third period the tempo of the increase slows down. Therefore, we have assumed a stronger increase in the second period when it is more needed (to prevent a strong increase of pension expenditures) and milder in the third period. This pattern results in a somewhat lower share of public pensions in GDP compared to the '3; 3; 3' scenario (not presented, to keep the picture more readable).

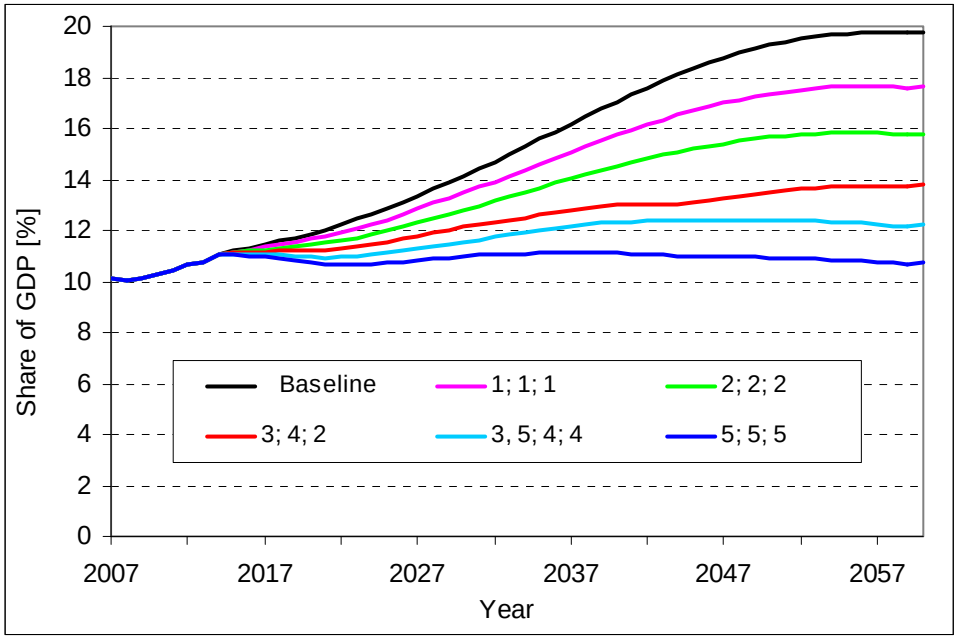
Instead of the '4; 4; 4' scenario we present a '3, 5; 4; 4' scenario, yielding practically the same result as the '4; 4; 4' scenario (not presented). The first two numbers, separated by the comma, denote an increase differentiated by gender (for the first, i.e. 2015-2029 period): the first number (3 years) denotes the assumed increase for males, while the second one (5 years) is for females. The idea of this scenario is gender equalization. In 2014 the gradual increase of retirement conditions for women will be over. Still, a shorter working period will be required for females than for males (38 years instead of 40 years), while the full age at retirement will also be 2 years lower (61 years instead of 63 years). According to the principle of gender equalization and non-discrimination between genders, there is a general recommendation and tendency in the European Union to equalize retirement conditions for both genders.

As presented in Figure 43 the effect of increasing the retirement age is estimated to be strong. The positive effect on the pension share in GDP comes from both sides – a declining nominator (pension expenditures) and an increasing denominator (GDP). Pension expenditures are lower than in the reference scenario since there are fewer pensioners because people start retirement later. On the other hand, they are staying in employment longer, therefore increasing GDP.

To keep pension expenditures at about an unchanged level, an increase in the retirement age of about 4 to 5 years in every 15-year period would be required. For the entire 2015-2060 period the required increase is thus between 12-15 years. This may sound unreasonably and unrealistically high. However, this is about the same tempo at which the current retirement age for women is increasing in the 1999-2014 transition period, following the PDIA-1999 legislation. Further, population projections rest on assumptions about rapidly increasing life expectancy. Life expectancy at birth in the 2008-2060 period is assumed to increase by 6.9

years for females and 9.0 years for males. Life expectancy at age 65 in 2008 was 19.6 years for females and 15.7 years for males. By 2060 they are projected to increase to 24.9 and 21.4 years, respectively (Eurostat, 2008).

Figure 43: Share of pubic pensions in GDP under various scenarios of increasing age at retirement



Sources: Author's calculations based on various sources mentioned earlier.

As explained in Footnote 27 on page 124, by increasing the working period for each half-year the service factor for calculating pensions increases by 0.75 of a percentage point[30]. In addition, those who remain employed after reaching their full retirement age (63 for males and 61 for females) are entitled to special 'bonuses'. They receive an additional 0.3 of a percentage point for each month of staying in employment during the first year of prolongation, 0.2 of a percentage point for each month during the second year and 0.1 of a percentage point for each month during the third year. Thus, prolonging the working period by three years after reaching the full retirement age increases the service factor by 11.7 percentage points.

There can be various interpretations concerning whether we should assume that pensions will also increase if the measure of increasing the retirement age is introduced. In our simulations, bonuses and the increase of the service factor are ignored. We have leaned toward this option for two reasons. First, according to the current structure of the model it would be difficult to implement a different assumption. It would require the separate treatment of existing pensioners, and newly retired pensioners. The pensions of newly retired pensioners should be at a higher level.

[30] In PDIA-1999 'percentages' are used, whereby I believe there should be 'percentage points'.

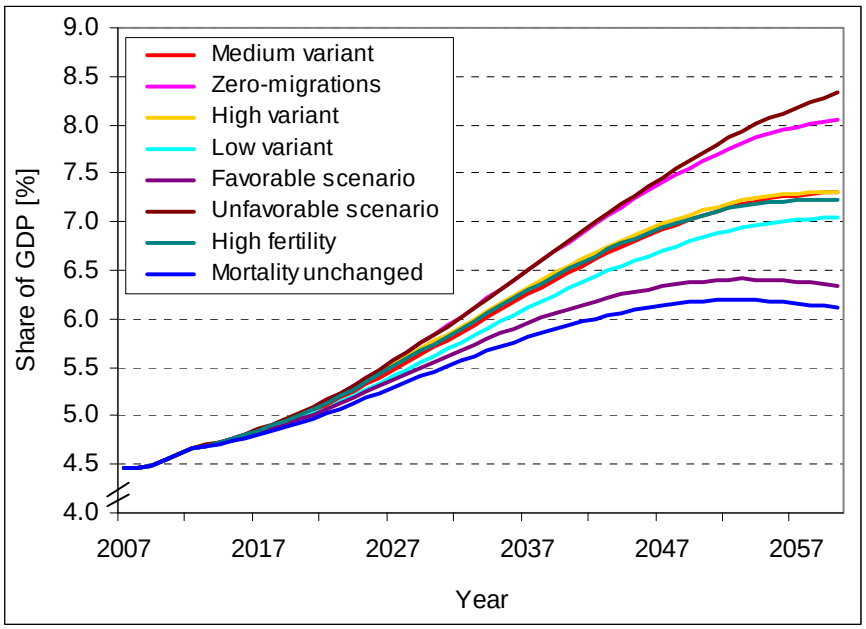
Second, in Slovenia we already have recent experience of increasing the retirement age. As already explained, the retirement age and required working period for women are gradually increasing. The age at which they can retire with full benefits if they have full working period is gradually rising from 53 years in 1999 to 58 years in 2014. In about the same period, the full working period is also gradually increasing: from 35 years in 2001 to 38 years in 2013 (PDIA-1999, revised in 2005, Article 398). However, those prolongations are not accompanied by any increase in the pension level. Women still receive for the full working period the same service factor as they did before the prolongation. Thus, our assumption rests on the true process of increasing the retirement age that is currently ongoing in Slovenia.

It is important to emphasize that none of the presented results should be taken as a projection of what is believed to happen in the future. On the contrary, all those simulations are meant as a warning to act in time so as to ensure those scenarios do **not** happen.

5.4.3.1.3 Public health and long-term care expenditures under different population projections

Figure 44 presents the projections of health expenditures, while Figure 45 presents the projections of long-term care expenditures in period until 2060. The results by variants and scenarios have a similar ranking as was the case for pension expenditures. This is not surprising since all of them are predominantly driven by the share of elderly people. The share of public health expenditures in GDP is projected to grow from the current 4.5% to about 6-8%, depending on the demographic variant or scenario used, while the share of long-term care expenditures is projected to increase from the current 1% to about 2-4%.

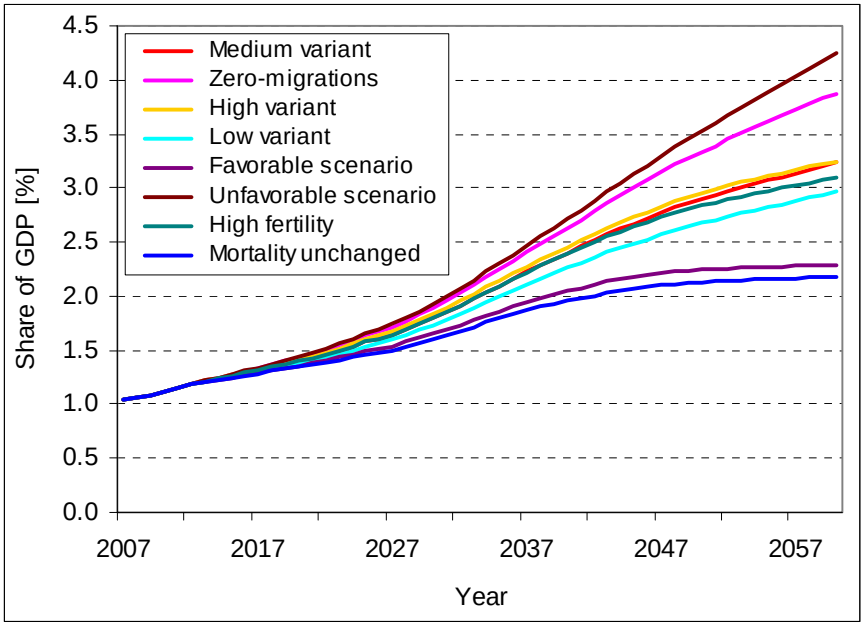
Figure 44: Projections of health expenditures for the 2008-2060 period and actual values in 2007 [% of GDP]; Slovenia



Sources: Author's calculations based on various sources mentioned earlier.

The relative increase in health expenditures (as share of GDP) is smaller than for long-term care since they are not only allocated to the elderly – although they also increase strongly in higher age groups. On the other hand, the **relative** increase of long-term care expenditures is distinctively the strongest all public expenditures (note that this time the scale starts at 0). Those expenditures are concentrated in the highest age groups, i.e. in those groups whose share in the total population is expected to increase the most.

Figure 45: Projections of long-term expenditures for the 2008-2060 period and actual values in 2007 [% of GDP]; Slovenia



Sources: Author's calculations based on various sources mentioned earlier.

The presented results of health and long-term care expenditures are made under the assumption of expenditures being driven only by demographic factors. In the literature this view has been challenged. Various other factors are analyzed which are supposed to drive those expenditures; those factors could be even more important than demographic factors.

A question arises of how the health status of people will change (improve) in the future as life expectancy will be increasing. Currently we are using the *expansion of morbidity/disability* hypothesis. This scenario assumes that most (all, in our case) of the projected gain in life expectancy would be spent in poor health and with a high degree of disability. On the other hand, the *dynamic equilibrium* hypothesis assumes that nearly all gains in life expectancy are spent in good health and without disability. Further, the *compression of morbidity/disability* scenario assumes that gains in healthy/disability-free life expectancy are even greater than the increase in life expectancy. Studies indicate that it is likely that long-term trends in age-specific mortality will exhibit a downward pattern (for example, Kinsella & Phillips, 2005). For the US the survey evidence suggests a reduction in disability among the elderly population. Despite early doubts about whether this disability decline will continue, in the 1990s the decline was even greater than in the 1980s (Manton & Gu, 2001).

Lately, another explanation has been provided that concentrates on cost related to the last few months or years before death – also called *death-related costs*. They should represent a high share of total costs. Authors have shown that age can become insignificant if proximity to death is controlled (Felder, Meier, & Schmitt, 2000; Zweifel, Felder, & Meiers, 1999; Zweifel, Felder, & Werblow, 2004). In that case, the projected expenditures would be substantially lower since the number of deaths will not increase nearly as much as the share of people in higher age groups.

There are other factors to be considered as well when projecting future development. Because of changing living arrangements informal help among family members is diminishing. This increases demand for the institutional provision of care provided by the public sector. Further, historical evidence indicates, although not very clearly, that the income elasticity of demand for 'luxury' health care is larger than one, i.e. health is a 'superior good'. In other words, with increasing income the share of those expenditures in total income rises. The technology and drugs that are emerging with technological development are becoming ever more expensive. 'Health inflation' is higher than inflation in general. Output produced in health and long-term care services consists of personal services with only a limited increase of productivity through time. With productivity growth being lower in this sector than in other parts of the economy, the same growth of wages (compared to wages elsewhere) is causing relative prices to rise faster (OECD, 2006). Reliable parameters for all those effects are still to be provided. For now the simulations of those effects on the results are limited to sensitivity analysis.

Most of the presented approaches were applied to the Slovenian case by the European Commission in the last round of calculations regarding the impact of ageing on public expenditures (European Commission, 2006). Having only data on age profiles for very broad age groups available, they used various assumptions based on data for other countries. Using the presented variants and their combinations they projected an increase of health expenditures in the 2004-2050 period in the range between 0.9 and 2.9 percent of GDP (European Commission, 2006, p. 135), while for long-term care expenditures an increase of between 1.0% and 2.7% of GDP was simulated (European Commission, 2006, pp. 157-162).

5.4.4 Observing results by the cohorts

One measure for mitigating increasing pension expenditures is to reduce pension benefits. If a proportional cut for all pensions is assumed, the calculation for a given point in time simplifies to a reduction of the baseline results by the assumed percentage. However, the timing of the introduced measures has fundamental effects on the distribution of cost and benefits over the cohorts. Thus, we proceed to present the possibility of the constructed age profiles-based model for simulating the effects of policy measures on individual cohorts. This analysis also contains some flavor of the generational accounting approach. We will calculate the reduction in pension benefits that representatives of different cohorts will receive in their

remaining lifetime, i.e. the reduction of their pension wealth. For a detailed explanation of the pension wealth definition and empirical results, see, for example, Brugiavini, Maser, & Sundén (2005, June) and Feldstein (1974). Technically, pension wealth is obtained by performing a diagonal aggregation of the expected pension benefits in the future, discounted back to the base year t_0 (in our case 2007).

$$PENS_a^W = \sum_{i=a}^{D} PENS_{i,t_0+i-a}(1+r)^{-(i-a)} \tag{59}$$

We stress the relevancy of these simulations by referring to the current pension legislation in Slovenia. One of its cornerstones is the principle of providing equal benefits for individuals, retired at different points in time, but having the same pension conditions (regarding age, collected working years, being or not being limited with maximum or minimum pension etc.). The first item of Article 151 of the PDIA-1999 (adjusted in 2005) explicitly assures '… equal rights for pensioners, who have retired at different time points'. This article is aligning the growth of pensions to the growth of wages (in February and in November), but also an adjustment for existing pensioners relative to newly retired pensioners is taking place. In February, the growth of benefits for existing pensioners is adjusted downwards in line with the decreasing benefits of newly retired pensioners.

In the light of growing questions about the positions of different generations this arrangement suggests fairness. If we ignore payments and benefits to/from the public system that individuals faced in the past, it seems reasonable and fair to distribute future burdens equally across all generations. We will contrast this view with the results of the age profiles-based model.

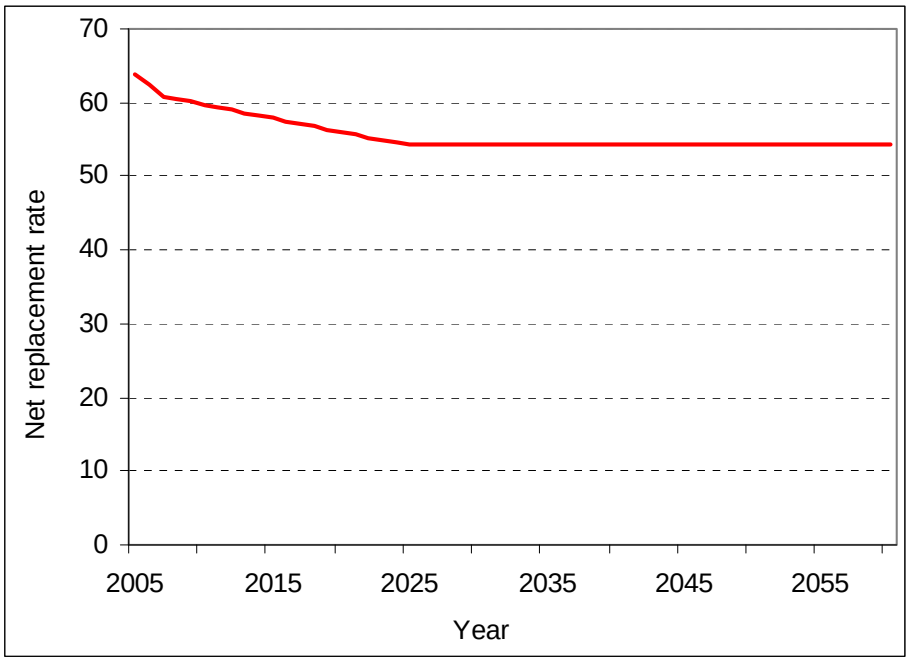
The model projects all taxes that individual cohorts will pay to the public system in the future and all transfers they will receive from it. We will concentrate on pensions only, calculating the pension wealth, which represents projected future pensions, discounted to the base year (in our case 2007). Discounting is necessary for comparing values occurring at different points in time. In general, discounted values depend heavily on the assumption about the discount rate. However, in our case the results are not expressed in **absolute** discounted values. We will only compare the results according to assumed pension reductions compared to the baseline scenario. Results in terms of **relative** differences are much less sensitive to the selected discount rate. In our simulations a 5% discount rate has been assumed. The same discount rate is used in the generational accounting method for discounting future flows to the base year. A sensitivity analysis has been performed for a range from 2% to 7%. It has revealed that the results are not affected much and yield the same conclusions.

As explained, according to the PDIA-1999 the service factor for calculating pensions from the pension assessment base will be declining up to 2024. The net replacement rate is therefore expected to systematically decline during that period. For individuals with full pension

conditions the trajectory is presented in Figure 46. It is calculated on an assumption about non-extreme low or high wages which would limit pensions to minimum or maximum pensions etc. In reality, other factors also influence the net replacement rate, therefore such a straight development cannot be expected. However, it represents the projected decline that will be **systematically** driven by the PDIA-1999. Individuals who constitute cohorts have various characteristics influencing the replacement rate, including the service factor that depends on working years. Another important parameter in those calculations is life expectancy, which is expected to prolong during the projection period. The model attempts to capture all of this.

We introduce a relatively simple assumption about future reductions of pension benefits. We assume the government will limit public pension expenditures (as % of GDP) at a certain level, preventing a further rise. We also assume that all pensions will be cut proportionally – regardless of the type of pension and their level. Thus, we set the 'tolerated' maximum share of public pensions in GDP, alternatively, at rates of 11, 12, 13, 14, 15, and 16%; i.e. we assume that after reaching this tolerated maximum, the government will cut all pensions simultaneously in order to prevent pensions from exceeding the tolerated maximum. We concentrate only on the medium variant of population projections.

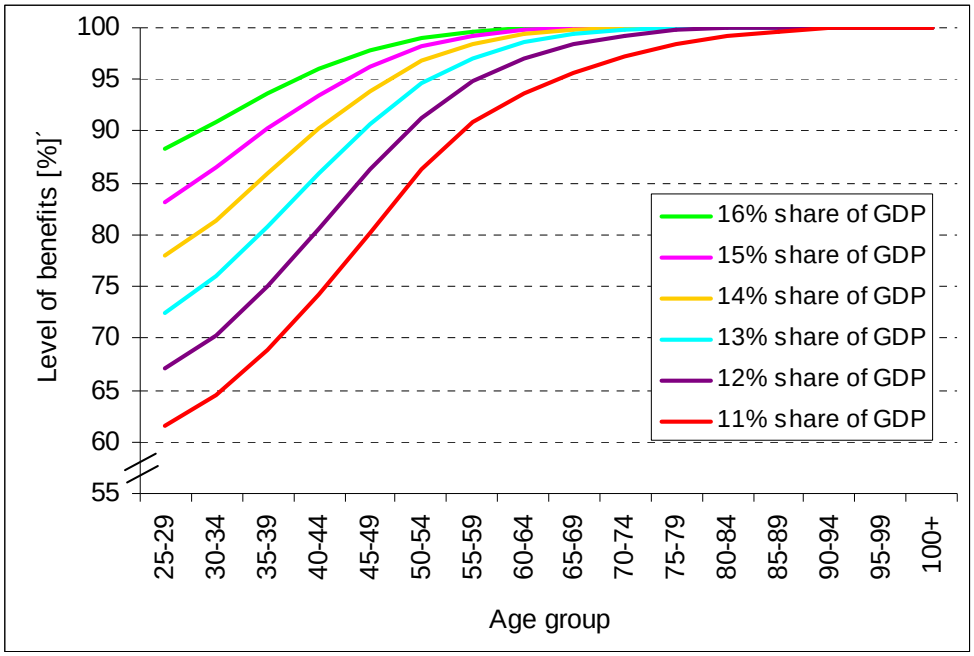
Figure 46: Net replacement rate [in %] for an individual with full pension conditions, under certain assumptions



Sources: PDIA-1999, 1999; Pravilnik o valorizacijskih količnikih za preračun plač in zavarovalnih osnov iz prejšnjih let na raven plač in pokojnin iz leta 2007, 2008; author's calculations.

Figure 47 compares: 1) the present values of pensions that representatives of a certain age group would receive in their remaining lifetime when limiting pension expenditure; with 2) the case without limitations. The results are also presented in Table 11.

Figure 47: Level of benefits (discounted pension wealth) as % of benefits in an unconstrained case



Sources: Author's calculations based on various sources mentioned earlier.

First we will present how Table 11 and Figure 47 should be read for the example of age groups 35-39 and 60-64 years on the assumption of a 14% limitation – where the indexes are 85.9 and 99.4, respectively. If we assume that the government limits pension expenditures in GDP to 14% (which would start in 2030 – see Figure 42), then an individual aged 37.5 years (mean value for the age group 35-39) would receive in his/her remaining lifetime 14.1% less pension benefits (discounted to the base year) compared to his/her remaining lifetime pension benefits if the government were not to pose any limitations. However, the same measure would reduce the discounted value of the expected pension benefits of an individual aged 62.5 years by only 0.6%.

These results are driven by the timing of when a cut in pension benefits occurs. The model projects that the share of public pension expenditures will exceed 14% of GDP in 2030. By that time, only a few members of the 60-64 years cohort will still be alive. Most people currently in that age group would thus collect pension benefits at an unreduced rate for their entire life. In addition, for those still alive in 2030 the total lifetime reduction would be minor from today's point of view since it will be not affecting them for long (the life expectancy of those people will be relatively low at that time). Further, reductions are also quite strongly discounted back to the base year – i.e. for more than 20 years. On the other hand, those aged 35-39 years would practically for their entire retirement period collect pension benefits at a reduced level.

Table 11: Level of benefits (discounted pension wealth) as % of benefits in an unconstrained case [index]

	Limiting share of pensions in GDP to:					
Age	**16%**	**15%**	**14%**	**13%**	**12%**	**11%**
20-24	86.3	81.1	75.9	70.5	65.2	59.8
25-29	88.2	83.2	77.9	72.5	67.0	61.5
30-34	90.8	86.5	81.4	75.9	70.3	64.5
35-39	93.6	90.2	85.9	80.8	75.0	68.9
40-44	96.0	93.5	90.3	86.0	80.6	74.3
45-49	97.8	96.2	93.9	90.7	86.3	80.2
50-54	99.1	98.2	96.7	94.6	91.3	86.2
55-59	99.7	99.2	98.4	97.1	94.8	90.8
60-64	99.9	99.7	99.4	98.5	97.0	93.7
65-69	100.0	99.9	99.8	99.4	98.3	95.7
70-74	100.0	100.0	100.0	99.8	99.2	97.2
75-79	100.0	100.0	100.0	100.0	99.7	98.4
80-84	100.0	100.0	100.0	100.0	99.9	99.2
85-89	100.0	100.0	100.0	100.0	100.0	99.7
90-94	100.0	100.0	100.0	100.0	100.0	99.9
95-99	100.0	100.0	100.0	100.0	100.0	100.0
100+	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Author's calculations based on various sources mentioned earlier.

The government could decide to introduce a stricter limitation on the increase of public pensions in GDP. If the limit were set at 11% the effect on the level of pensions would be much greater and would start earlier. According to the pension projections the government would start to act already in 2014. We will again comment on the results for the same age groups as before. With an 11% limitation the effect would also not be that negligible any more for the cohort 60-64 years – reducing their pension wealth by 6.3%. Still, the measure would again affect younger generations to a much greater extent. They would be affected for a longer period than older cohorts and the cut in pensions would have to be much greater during their retirement period, keeping the pension share on such a low level during the stronger upward pressure. Lifetime pension benefits (discounted to the base year) for the age group 35-39 years would 31.1% lower. For further details about the approach, see Sambt & Čok (2008).

In subchapter 5.4 we have analyzed the hypothesis:

> ***Hypothesis 3****: Serious imbalances in Slovenia's public finances in the future will result if the current fiscal system does not change and future demographic projections are materialized.*

The NTA provides age profiles that can be used for various analyses. Assuming unchanged age profiles in the future, it can provide projections of public revenues and expenditures by years. Usually this approach only provides rough estimates, being subject to the cohort effect and other effects that are in reality causing age profiles to alter through time. The most

sensitive category are pensions since simulating various parameters of the pension legislation affects new and existing pensions differently. However, one of the cornerstones of the Slovenian pension system is the principle of equal rights for pensioners who have retired at different points in time. This Slovenian specificity makes use of this model less problematic than in other countries. Further, by using the results from various macro and micro simulations we have tried to minimize drawbacks of this approach.

The results show that, under the current fiscal system and based on demographic projections, there will be strong pressure on Slovenia's public finances in the future. According to the simulations, the share of public revenues is expected to decrease from 41.8% of GDP in 2007 to 38.5% in 2060. Primary expenditures are projected to rise in this period from 40.4% to 55.0%. This increase would be driven by public pension, health and long-term care expenditures. Because of the growing gap between public expenditures and revenues public debt would explode. Interest on public debt in 2060 would amount to 18.4% of GDP. Adding this number to primary expenditures (55.0), the total public expenditures would be 73.4%.

These results should merely be considered as a purely hypothetical exercise, without believing that government would and could allow something like this to happen. We can already say that those results are certainly far beyond being sustainable in the long run. However, we can also calculate the quantitative sustainability gap indicators S1 and S2, mentioned in Section 5.4 and technically described in Appendix 8. Their values for the Slovenian case (t_0=2008) are 5.1 and 9.8 percentage points, respectively. The S1 indicator assumes government debt will increase from 24.1% in 2007 to 60% in 2050. In this case, an immediate permanent adjustment (increasing taxes or reducing public expenditures in GDP) of 5.1 percentage points would be enough. However, to achieve a sustainable public finance position in the long term (S2 indicator) an increase of 9.8 percentage points would be required. **Hypothesis 3 is thus confirmed**.

The results of the simulations have shown that the timing of measures to ease the pressure of an ageing population on pension expenditures strongly affects the distribution of burdens across different age groups. If the suggested measure takes the form of reduced pension benefits, pensioners and persons approaching retirement will struggle to delay this measure as long as possible. They would prefer, of course, that the measures would not be implemented while they are still alive. However, the measures will have to be introduced at some point. If they take the form of reduced pension benefits, younger generations should prefer prompt actions. This would distribute the burden more equally over all generations, without it being shifted only to them and to an increasing extent because of the delay.

We cannot tell for sure whether in the future government will introduce further reductions in pension benefits or use other measures. However, the results of this simulation are already relevant to the current situation of a gradually decreasing service factor in the period up to 2024. Existing pensioners have collected their pension benefits in the past at higher service

factors than they will be collected by newly retired pensioners who are currently retiring. However, all of them are in a better position than future pensioners for whom the situation will gradually further deteriorate. While Article 151 of the latest PDIA sounds 'fair', assuring equal rights (**at given point in time**) for pensioners who have retired at different points in time, it is good to be aware of the kind of equality and fairness we are talking about.

5.4.4.1 Intergenerational 'battle'

Policy decisions are made by politicians. At this point, the theory about whose interests politicians follow, the theory about the political power of different demographic groups etc. enter the picture. Positions in this intergenerational 'battle' are unequal. Children do not have voting power and still unborn generations do not have representatives in these intergenerational 'negotiations' – a fact that is especially emphasized by the generational accounting method (see, for example, Auerbach et al., 1991a). On the other hand, there is a rapidly growing number of elderly people, they have voting power and participate at elections over-proportionally (compared to those aged 18-30 years, for example) with a very clear and unified criterion: the level of benefits that is promised to them by political parties. 'In democracies, one-issue voters have a disproportionate impact on the political process, since they do not split their votes because of conflicting interests on other issues' (Thurow, 1999).

Short-term-oriented politicians are not interested in projections for several decades into the future. Especially they do not want to introduce measures in their period of office if they are unpleasant for voters. The horizon of politicians is up to the next elections. However, without necessary changes the long-term sustainability of the public system could deteriorate rapidly, also increasing the severity of the required measures once they are finally implemented. Benefits for the elderly compete with other public categories like expenditures on education, infrastructure, research, investments etc.

The rapidly increasing number of people with claims for benefits and at the same time the rapidly declining number of active insured persons bring the idea of a 'catch the cash' game to mind. To improve the sustainability of public finances the benefits will have to be reduced or fiscal burdens will have to be raised. All of these measures are morally and/or economically problematic. An individual is positioned in a system that burdens them with obligations and debts on which they did not have an opportunity to decide. Instead, it was shaped in the past by politicians, according to their ideas, conceptions, desires and benefits. Eventually it became too important to be altered radically. When the current older generation was contributing to the public system it received implicit promises about the entitlements. It got used to the generous public system and does not want to renounce the benefits it has. Due to the strongly unfavorable demographic changes, it seems that changes will soon be unavoidable. Lowering the benefits for them would mean breaking those promises. However,

the simulations indicate that they will be broken to an even much larger extent for younger generations.

On the other hand, trying to preserve the current level of benefits would require a big increase in taxes, probably predominantly on labor, which in Slovenia are very high already and can hinder international competitiveness. Introducing higher taxes is also nothing other than lowering benefits – but in this case predominantly to the working-age population. It is often overlooked that increasing the tax burden is not a magic source of funds, but a measure that also has negative effects on employment and incentives to work, especially if taxes are strongly progressive.

Both the pay-as-you-go system and funded system have advantages and disadvantages, therefore a combination is suggested (Blanchet & Kessler, 1992; Lindbeck & Persson, 2003). If the pay-as-you-go system wants to be partly transformed into the funded system, being less vulnerable to demographic changes and economically more efficient (Feldstein & Samwick, 1998), in the transition period a twofold burden would fall on younger generations. They have to continue supporting the pay-as-you-go system and at the same time contribute to their individual accounts. Estimates show the huge burden of the transition for younger generations – estimates for the Slovenian case were made by Bole (1998). Use of a long transition period is usually suggested to distribute the burden among many generations. Unfortunately, a Pareto-efficient way of the transition does not of course exist (for example, Peters, 1992).

The possibility to shift the 'bills' to future generations is tempting. However, it is warned that current generations should be responsible enough to deliver fiscally sustainable public finances to the next generations. By delaying the necessary changes, they will have to be increasingly drastic once they are implemented and the greater burden will be shifted from older to younger and unborn generations.

Some authors see this development as an enormous issue in the future, employing expressions like 'war between generations' (Gokhale & Kotlikoff, 2001) and the 'coming generational storm' (Kotlikoff & Burns, 2004), while some even see this as a threat to democracy in the future (Thurow, 1999). Let us hope that, instead of going into an intergenerational battle, the discussion will be directed to a search for solutions and an acceptable distribution of burdens among generations.

6 COMPARING SLOVENIAN RESULTS WITH OTHER NTA COUNTRIES

The results obtained for the Slovenian case become more relevant and interesting when they are compared with the results for other countries; which group of countries Slovenia can be

placed in can be identified, which results are specific or peculiar etc. If some results are very different from other countries then they can be seen as supporting a call for changes.

There are 28 countries included in the NTA project (the situation at the beginning of 2009): nine Asian-Pacific countries (Australia, China, India, Indonesia, Japan, Philippines, South Korea, Taiwan, and Thailand), six American countries (Brazil, Chile, Cost Rica, Mexico, United States, and Uruguay), eight European countries (Austria, Finland, France, Germany, Hungary, Slovenia, Spain, and Sweden), and five African countries (Kenya, Mozambique, Nigeria, Senegal, and South Africa). Research teams of those countries are helping to co-develop the NTA methodology and are applying it to their own countries.

The NTA methodology is thus not only developing theoretically but also practically applied in a consistent manner across countries, which is a huge advantage of the project. Further, the set of countries is very heterogeneous in economic, cultural, political and other aspects. The variety of results is therefore high. Characteristics of the countries are reflected in the NTA results and they are compared to the general expectations and previous research outcomes. The results obtained at a certain stage are a valuable input for further development of the methodology in the next stage.

Countries are also very heterogeneous in terms of data availability. In some countries very detailed data are available while they are very limited in others. For data that are not available, various proxies are searched for; sometimes models are developed to estimate them etc. Further, countries are at different stages regarding the results that have been calculated so far. In some countries numerous members have been working on the calculations for years already, providing a complete set of NTA results (which are continuously changing and refining), while other countries have just joined the project. A comparative book about NTA results by countries is being prepared. Part of that book will be comparative chapters, searching for similarities and differences among countries and also trying to provide explanations for them.

Aspirations to include as many countries in the analysis as possible and continuous refinements in the methodology have postponed initial plans for the NTA book. Therefore, this chapter of the dissertation is less comprehensive than was initially planned. It draws predominantly from the NTA working papers and presentations that originate from various points in time. Nevertheless, we hope to provide a general outline about the differences between countries and position Slovenian case among the others. The focus will be the distinctive features of the Slovenian case instead of trying to be comprehensive. Also being a member of the Austrian NTA team, I have insights into their results and therefore in some places results will be presented and commented upon in greater detail than for other countries. In Slovenia the Austrian case is also often used as a reference for various comparisons.

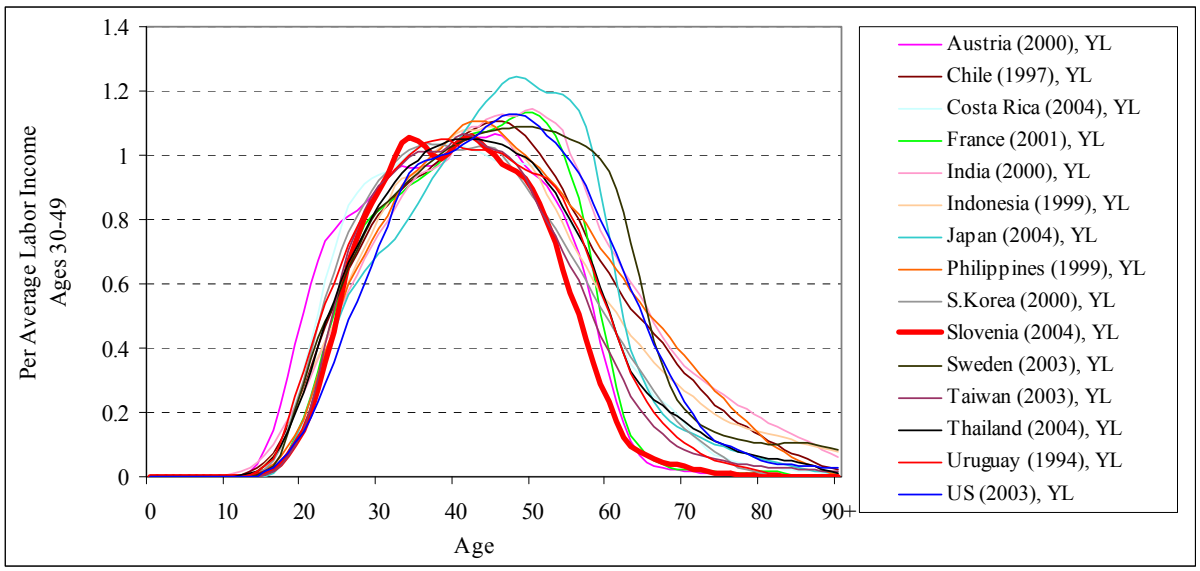
6.1 'Narrow' labor income profile

To compare the results among countries the scale is normalized to the average labor income in the age group 30-49 years. Labor income is chosen as a denominator because it is a central NTA category to which other categories are directly related. Even in countries where labor income starts to increase late, at the age of 30 years it is already relatively high. On the other side, even in countries where the labor income profile starts to decline early, the fall is not very strong before the age of 50. The 30-49 years age interval is thus chosen for being relatively unaffected by late entry into the labor market and early withdrawal.

In Figure 48 the labor income profile for Slovenia is presented, together with the age profiles for some other NTA countries from 2007. The per capita labor income profile for the Slovenian case starts to rise late compared to other countries, but starts to decline much earlier. We consider this very 'narrow' age profile to be the most distinctive feature of the Slovenian case and also a very important one since the labor income age profile is one of the most important characteristics of the economy. We will provide a further description of this result later, but first we will comment on some further figures.

In Figure A-7 of Appendix 9 the age profiles of 15 countries are grouped into three sets with five countries in each with respect to the development level. It is indicated that in the group of 'poor' countries people start to work earlier. This can be explained by lower attendance levels in the educational process compared to 'rich' countries. On the other hand, rich countries experience a peak later which is followed by a sharp drop and early retirement. The explanation could be that a widespread pension system enables people in those countries to stop working earlier. In the 'medium' group of countries, and even more so in poor countries, people continue to work into a higher age.

Figure 48: Slovenian age profile of labor income compared with other NTA countries



Source: Sambt & Malačič, NTA Accounts for Slovenia: Independence and Return in the Family of European Market Economies, 2007, November, p. 6.

The latest available results on labor income profiles are presented in Figure A-8 of Appendix 9. They are from the beginning of 2009 when the results for 23 countries were available. However, because of the large number of countries the results are harder to follow. Figure A-9 of Appendix 9 is 'cleaner', presenting only the labor income age profiles of Slovenia and Austria compared to the unweighted average labor income age profile for all countries together. As we will see below, the Slovenian and Austrian cases often have very similar NTA results, but a very distinctive one for the labor income age profile.

In Austria the labor income age profile has the steepest and earliest rise among all NTA countries. This distinctive feature can be explained by the peculiarity of the Austrian schooling system. There is a high prevalence of participation in apprenticeships (*Lehre*), finishing at age 17 or 18 (at the latest at 19), *mittlere Berufsbildende Schule* (on average completed before age 18) and *Pflichtschule* (on average ending at age 15). The share of Austrians who continue schooling at the tertiary level is relatively low, considering that it is a highly developed country. Because of the close connection between secondary education and the labor market youth unemployment is at low levels, which also adds to the high labor income age profile among young. On the other side, the labor income age profile is decreasing earlier than the age profile of the NTA average and the drop is relatively steep. The low labor force participation of the elderly in Austria is also of great concern and is attributed to the disincentives generated by the Austrian pension system (Hofer & Koman, 2006). However, the situation is not as serious as in the Slovenian case where withdrawal from the labor market starts even several years earlier.

According to the HES data, the majority of people retire between age 50 and 60 (Figure 7 on page 56). Table 10 on page 124 reveals that in the 2004-2007 period the average age at retirement (for old age retirement) increased by only 0.1 of a year for males and 0.8 of a year for females. For females the increase was also higher because of the PDIA-1999 legislation, (gradually) tightening the retirement conditions more intensively than for males. This modest increase suggests that currently the situation has not improved much compared to 2004.

Further, in other countries less recent data are used as compared to Slovenia. Using somewhat older data for the Slovenian case would reveal even larger differences since a few years earlier the average age at retirement was even considerably lower. In 2001, about which on average analyses in other countries refer, the average retirement age for old-age pensioners in Slovenia was even 1.3 years (for males) and 1.2 years (for females) lower than in 2004. Taking the situation in other countries as a benchmark, a further tightening of the retirement conditions should be considered as a measure to mitigate the growing share of pension expenditures in GDP in the future.

The 'left side' of the labor income age profile is also specific. Up to the mid 20 years of age Slovenia has one of the lowest labor income profiles among the analyzed countries.

Increasing enrolment in tertiary education is one of the factors here, but this is a general trend, not only specific to Slovenia.

We believe that the generous benefits students receive in Slovenia are an important factor of the postponed employment. Among others, students enjoy a very advantageous tax status regarding labor income taxes. They are tempted to work too much, causing their studies to last too long or remain unfinished. The absence of taxes and social contributions also makes this kind of labor attractive to employers. Therefore, students allegedly spend too much of their highly productive age in the educational process instead of already entering the labor market proper.

The HES data exhibit high student participation in student work: in 2004 45% of students aged 19-28 years were receiving income through student employment offices. Not only was almost every second student involved in this kind of work, but the level of payments they received was also relatively high. Average reported earnings paid via student employment offices for this age group was 24.7% of the average reported net wage of all employed respondents in the HES data source. If we compare them only with employed respondents of the same age (19-28 years), the average earnings of students represented almost one-third (32.2%) of the average employee's wage in this age group.

To show how advantageous this is, we have simulated the case where a regularly employed worker and a student received in 2004 the same net amount of monthly payments (calculated ex-post, after paying different amounts of taxes and social contributions). It is assumed that this amount was exactly the same as the average net wage in Slovenia in 2004, i.e. EUR 8,423 (EUR 702 at the monthly level). Summing up all the costs that an employer has to pay, there was a striking cost difference between the two kinds of work. In our example, student work was 40% cheaper for an employer than having a regularly employed worker (EUR 9,754 instead of EUR 16,210). Employers are generally a much stronger party in employment relations so they usually take the predominant share of this difference and are therefore strongly motivated for this kind of work. Student work also provides them with perfect flexibility at times when they no longer want or need a worker. This is a big advantage since it can be very difficult to fire a regularly employed worker in Slovenia. This form of work is also a very convenient way of testing candidates (students) who might eventually obtain regular employment in the future.

Good payment and the hope of improving their future employment chances often allure students to participate strongly in this kind of work. However, this unfortunately turns out to be a shortsighted decision. Study often becomes significantly extended due to the intensive work and in some cases students do not complete their study at all. They are seemingly myopic and not sufficiently aware that student work also does not bring them credit years for their retirement. Finally, this kind of work is definitely not advantageous for the public budget since it finances student benefits during their prolonged study instead of receiving their social

contributions and labor taxes if they are employed. After 2004 some measures were introduced to reduce the extent of student work, yet it is still widespread.

6.2 Consumption

Compared to the results for other countries private consumption in Slovenia is relatively low and public consumption is relatively high. This indicates the high level of state involvement in economic processes typical of European welfare systems. It is also higher in developed countries in general as compared to less developed countries (see Figure A-10 in Appendix 10). European countries lie predominantly above the correlation line, indicating a share of public consumption above the level, suggested by the correlation with development level. On the other hand, the USA is positioned distant below this line, indicating a low share of public consumption relative to its development level.

Partially the high share of public consumption in Slovenia is probably also a legacy of socialism. Education and health care were provided by the public sector to everyone free of charge and private institutions in these two sectors were not allowed. This tendency is also indicated by other NTA countries with a socialistic tradition. When regressing the share of public consumption in total consumption on GDP per capita (thus being controlled for the development level effect) and a dummy variable for ex-socialistic countries, both variables are positive and statistically significant (Tung, 2009, p. 28).

Further features indicated by comparing consumption patterns across NTA countries are: 1) in richer countries the share of public consumption spent on health relative to education is higher than in poorer countries; and 2) Western economies tend to have higher public expenditures on health (Tung, 2009, p. 31).

In all countries the private consumption of the elderly (65+) is greater than the private consumption of children (0-19). In addition, the private consumption of adults (20-64) exceeds the private consumption of children in all countries. The lower private consumption for children was expected, bearing in mind the equivalence scale used for allocating consumption to them. Eight out of 22 countries have a rising pattern of private consumption, while 14 countries (including Slovenia) have a hump pattern (Tung, 2009, p. 21). In other words, in eight out of 22 countries consumption of the elderly is higher than of prime-age adults, while in 14 of them it is lower. Public consumption for children and the elderly is generally higher than for prime-age adults (Tung, 2009, p. 23). The latter feature is expected since education and health consumption are concentrated in those two age periods, while other public consumption is uniformly distributed over all ages.

Total private consumption per capita for the elderly and working-age population exceeds the private consumption of children. The same is generally true for total consumption (obtained

by summing public and private consumption) since the higher public consumption of children in the form of education is more than compensated by the lower private consumption of children compared to later ages (Tung, 2009, p. 30). The age profiles of public and private consumption by countries are presented in Figure A-11 of Appendix 10.

6.3 Interhousehold transfers

In some countries interhousehold transfers have a very important magnitude. In the Philippines interhousehold inflows represent almost 70% (see Figure A-12 in Appendix 10) expressed relative to private intrahousehold inflows. In that country they are related to remittances, which are also counted as part of interhousehold transfers. Interhousehold transfers are also important in Mexico, China, Brazil and Thailand while in other countries private transfers are strongly dominated by intrahousehold transfers (R. Lee & Donehower, 2009, January). It seems that interhousehold transfers have a fairly low share of private transfers in most countries, especially developed ones, including Slovenia.

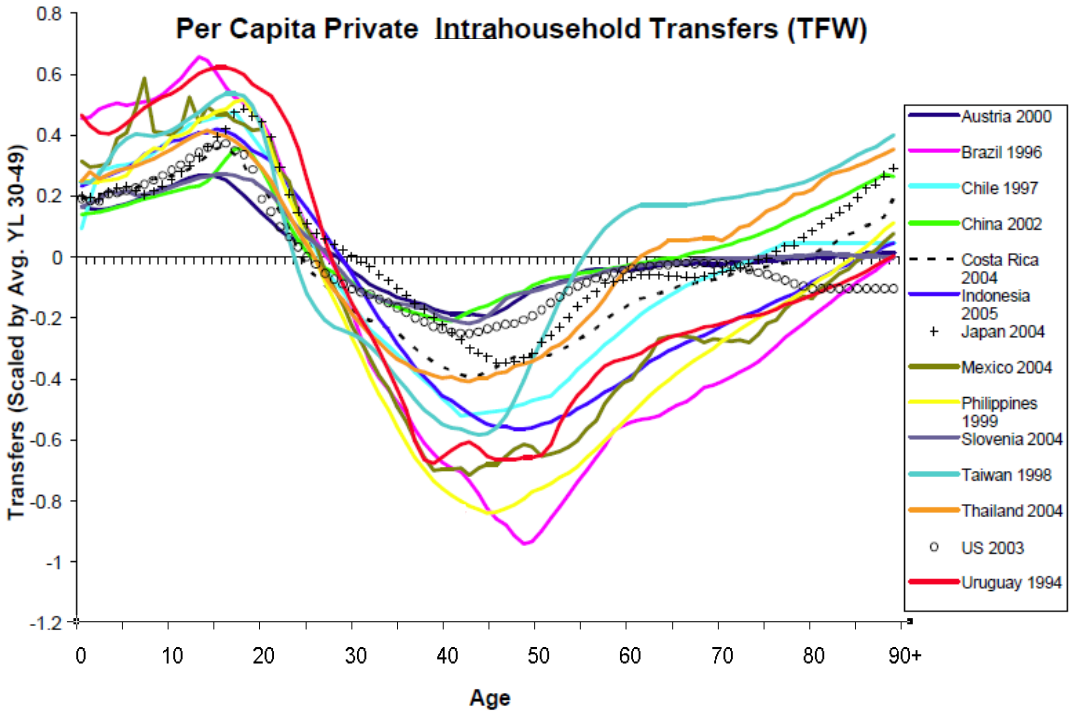
6.4 Intrahousehold transfers

As presented in Figure 49, countries can differ considerably in the extent of intrahousehold transfers. They are again scaled by the average labor income in the age group 30-49 years. In the quoted source (R. Lee & Donehower, 2009, January) among European countries the results are unfortunately presented only for Slovenia and Austria. The age profile until older age for those two countries is similar to the results for the USA and China, partially also to Japan. In general, in Western countries intrahousehold transfers are lower than in other countries. The lower transfers to children in those countries can be explained by education and health care being provided by the public sector, while in other countries they are (especially education) to a larger extent or predominantly privately financed. The exception is China, having a Western pattern of low intrahousehold inflows for children and low intrahousehold outflows for prime-age workers.

Among the elderly, only Taiwan and partly also Thailand and China show the expected pattern where the elderly are receiving net transfers from prime-age workers. In other countries, the elderly are generally continuing giving (net) transfers to other household members. As seen in Figure 48 and Figure A-8 of Appendix 9, in some countries like the Philippines and Indonesia people are also receiving relatively high labor income late in life (R. Lee & Donehower, 2009, January). In Brazil, the elderly are receiving very high pension benefits (Turra & Queiroz, 2005), sharing them with other household members. However, the results are also partially driven by the definition of the household head. Interhousehold transfers are assigned to the household head, from whom the transfers flow to other household members. As already mentioned, such a case involves the very high interhousehold inflows in

the form of remittances in the Philippines. They are assigned to them and if the elderly are sharing them with other household members they appear as intrahousehold transfers. The same is true for income related to assets, also being assigned to the household heads. In some countries people retain the position of household head longer than in other countries, which can on the presented assumptions also influence the results to some degree.

Figure 49: Comparing net intrahousehold transfers among NTA countries



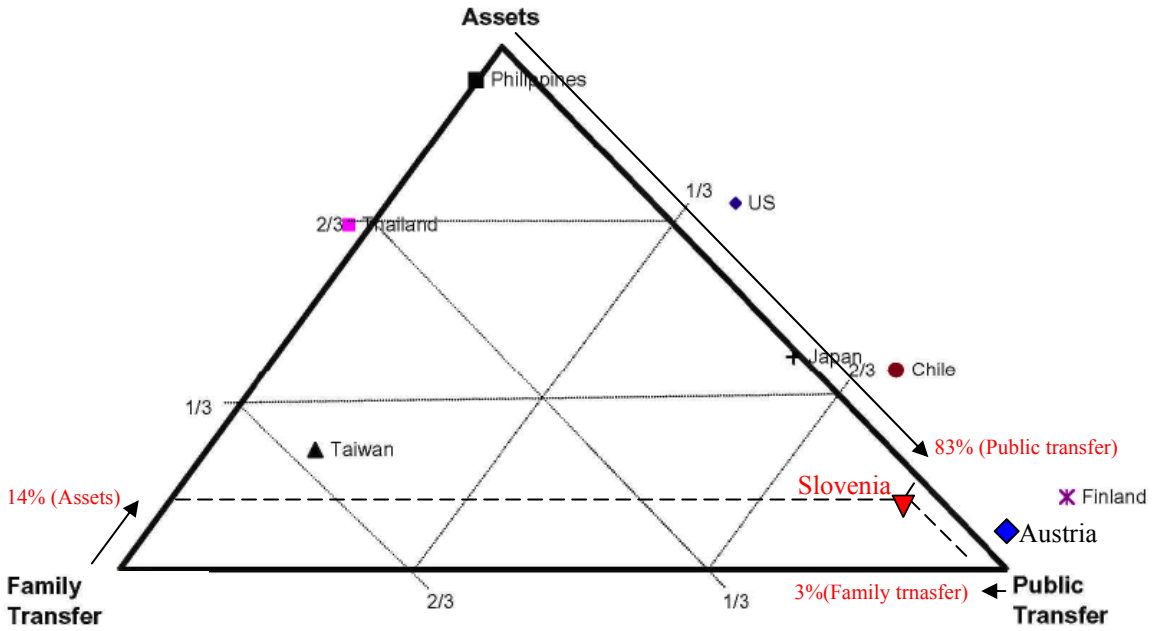
Source: R. Lee & Donehower, Private Transfers in Comparative Perspective, 2009, January, p. 34.

6.5 Reallocation systems of the elderly

The lifecycle deficit of the elderly (unlike of children) can also be financed through asset-based reallocation. Further, as pointed out by the NTA analysis the way the consumption of the elderly is financed has important macroeconomic consequences.

An interesting presentation of those three sources through which the lifecycle of the elderly can be financed is a triangle graph. It presents shares for all three possible sources of reallocation. A triangle graph measures asset-based reallocation from the left corner towards the top corner, public transfers from the top to the left corner and family transfers from the right to the left corner. Each of those three reallocation sources is scaled from 0 to 100% of the total reallocation, through which the lifecycle deficit is covered. The idea is to present a combination of those three shares with one spot in the triangle since the sum of all three dimensions is by definition 100 in the triangle. Figure 50 presents results for seven countries available (Mason, 2007, October) to which we have also added the results for Slovenia and Austria.

Figure 50: Old-age reallocation systems, recent year, proportion of old-age lifecycle deficit funded by assets and transfers



Sources: Mason, Transfers and Assets in Economic Lifecycle: NTA Evidence, 2007, October, p. 18; author's calculations.

The general characteristic of the age reallocation system for the elderly in Slovenia compared to other countries is a high share of public transfers. Slovenia is in the same group with Austria and Finland, where this share is even greater (96% and about 100%, respectively). In other countries included the share is lower, ranging from 60% to 70% in Chile and Japan, being about 40% in the USA, about 15% in Taiwan, while in the Philippines and Thailand net public transfers to the elderly are close to zero. Note that countries can also be classified outside the triangle. This happens if, for some dimension, a country has a negative value. In Finland, for example, the elderly are not using private transfers to finance their own consumption. On the contrary, they are transferring resources to individuals of lower age groups – in the form of intrahousehold transfers (transfers to other members of the same household) or interhousehold transfers (transfers to members of other households). In such a case, the sum of public transfers and asset-based reallocation has to be greater than 100 since all three dimensions still have to sum up to 100%.

Family transfers for covering the lifecycle deficit of the elderly differ less among countries. In the Philippines, Slovenia and Japan net familial transfers have low positive values, while in Austria, the USA, Chile and Finland they are negative in a range of about 5-15%. Family transfers are very important for the elderly in Thailand, representing about one-third of their lifecycle deficit, and in Taiwan, amounting almost to two-thirds.

The asset-based reallocation differences between countries are much greater (Mason, Ogawa, Chawla, & Matsakura, 2009, January, p. 35). Only 14% of the lifecycle deficit of the Slovenian elderly is covered through asset-based reallocation, which is about the same share as in Finland (about 15%), while in the Austrian case this share is even lower (9%). In

Taiwan, Chile and Japan the share is between 25% and 35%, while in Thailand and the USA it amounts to about as high as two-thirds of the lifecycle deficit. In the Philippines the lifecycle deficit of the elderly is almost exclusively covered through this source.

It is expected that in less developed countries the role of the public sector is smaller, being much less developed. However, it is interesting that there are also big differences among developed countries. In Europe the elderly rely on the public system, while in the USA they finance their lifecycle deficit through asset-based reallocation. Japan is somewhere in between. As explained in the section on demographic dividends, the higher the share of asset-based reallocation, the higher the positive effect of the second demographic dividend. While in the USA substantial positive effects can be expected, this is not the case for European countries.

In Chapter 6 we have shed some light on the international comparison of the NTA results to test the hypothesis:

> ***Hypothesis 4****: There are large differences among countries regarding the magnitude of transfers and their distribution by age groups. In addition, the structure of private and public transfers can differ considerably.*

We have combined several recently published results, mostly presentations from meetings. For an in-depth analysis, results for a broader set of countries would be welcomed along with a detailed insight into countries' characteristics. However, already from these presented results it can be seen that there is great variety among countries regarding the results provided by the NTA analysis. Different living arrangements and levels of public sector involvement are shaping private and public transfers among age groups, the need to work longer, the need to save for higher age etc. and are closely related to the development level. It is also interesting that between developed countries there can be huge differences. In the USA, for example, the lifecycle deficit of the elderly is about two-thirds financed from asset-based reallocation, while European countries rely heavily on public transfers. We thus consider that on the basis of the NTA analysis **Hypothesis 4 is confirmed**.

7 CONCLUSIONS

7.1 CONTRIBUTIONS

The main aim of the dissertation is to provide a comprehensive insight into the transfer flows among members of different age groups. Ideas about this approach have already been collected for more than a decade, while in the last several years they have been encompassed

by the *National Transfer Accounts* system. Trying to comprehensively capture economic flows across age groups raises a number of questions and issues on which we are trying to find the most appropriate answers and solutions. At the beginning of 2009, 23 countries from all continents were included in the international NTA project and many more researchers analyzing them. As the leader of the Slovenian team and a representative of the Austrian team I have actively participated in the development of the NTA methodology in the last few years. We believe the NTA system is a very important contribution to its field, as also indicated by the strong interest the results have attracted at numerous international institutions.

This doctoral dissertation presents the methodology of the NTA at the stage the analysis was conducted. We consider this is one of its contributions, although it was becoming obsolete already at the time of writing. Because the NTA methodology is still rapidly developing, we did not try to be comprehensive in its description, rather concentrating on those parts that provide comprehensive basic results. Based on data from 2004 we have established that people in Slovenia less than 25 years old depend on transfers, with their consumption exceeding their labor income. At the age of 56 a period of dependency appears again, with labor income declining below the consumption of that age group. In the intermediate period of 31 years they are producing more than they consume. This is a striking result, knowing that life expectancy in Slovenia in 2004 was 74 years for males and 81 years for females. We believe this also clearly confirms our first hypothesis about the presence of a strong lifecycle through the lifetime of an individual.

The most distinctive feature of the Slovenian NTA results compared to other countries is the labor income profile starting to rise late and especially it starting to decline very early. The Slovenian case is also characterized by a high share of public consumption relative to total consumption, ranking high among developed countries and European countries in particular. Total consumption of the young (0-19 years) is predominantly (57%) covered through private (intrahousehold) transfers. Public transfers represent 40%, while in higher ages of this age group some individuals already receive labor income (3%). The consumption of the elderly (aged 65 years and over) can, in addition to those three sources, be covered through asset-based reallocation – i.e. income originating from asset income exceeding savings. However, in the Slovenian case it only adds up to 14%, while consumption of the elderly is covered predominantly by public transfers (80%). The remaining share is covered by private transfers (3%) and labor income (3%).

While in Austria and Finland the elderly are even financing their consumption to an even greater extent through public transfers (about 100% in Finland), in the USA their consumption is predominantly (about two-thirds) financed through asset-based reallocation. Japan is classified somewhere between the USA and European countries, while some less developed countries rely predominantly on private transfers. The development level is a very important factor that shapes transfers; however, even among countries at about the same development level the differences can be very large. The results thus confirm our next

hypothesis claiming there are huge differences among countries regarding transfer arrangements.

The age profiles provided by the NTA analysis are not only relevant *per se* but are also very important for various further analyses. In fact, the NTA analysis can already extend in several directions once age profiles are available. Assuming that relative age profiles remain constant through time, the first and second demographic dividends can be calculated. The first dividend arises because changes in the population age structure lead to an increase in working ages relative to non-working ages. Those estimates were already provided before the NTA by decomposing GDP per capita into GDP per active workers and activity rates. However, having the age profiles of consumption and labor income available improves these estimates since it becomes possible to calculate the **effective** number of consumers and producers. The first dividend is positive when the growth rate of output per effective consumer exceeds the growth rate of output per effective producer.

Slovenia has enjoyed a positive first demographic dividend in the whole period since 1950, when the simulation starts, up to the present. On average, the output per effective consumer has grown by up to 0.5 of an additional percentage point per annum because of the positive first demographic dividend. Yet it is currently just about to turn into a negative one. In the next 50 years it is expected to remain negative, with the lowest values around 2020, having a negative effect on output of about 1.0 percentage points per annum. In general, this is what our second hypothesis was claiming, without being specific about the magnitude. Therefore we consider it as having been confirmed. A second demographic dividend is also possible since increasing the longevity of elderly people can be a strong incentive for them to accumulate assets for their older age. However, since the elderly in Slovenia are financing their consumption predominantly through public transfers instead of relying on asset-based reallocation, the positive effect of the second demographic dividend is fairly low – it is expected to remain below 0.1 of a percentage point during the next two decades and to reduce to zero thereafter.

Age is also an ever more important dimension in economic analysis because of the rapid population ageing that will become even more severe in the future. Lately its financial pressure on the public system has attracted the interest of various international organizations and bodies. Independently of the analysis followed by the NTA project we have developed a model for a comprehensive analysis of the long-term demographic effects on all expenditures and revenues of the public system. It builds on the age profiles provided by the NTA analysis and we therefore refer to it as ‘age profiles-based model’. However, many categories are further decomposed, adjusted to the latest aggregate controls (year 2007) and extended by various simulations and assumptions. The results project a moderate decline of the public sector’s revenues on one side (from 41.8% in 2007 to 38.5% in 2060) and a strong increase of primary expenditures on the other (from 40.4% to 55.0%), which would cause total expenditures to ‘explode’ by virtue of servicing the rapidly expanding public debt (from

41.5% to 73.4%). We believe those figures clearly confirm our hypothesis that serious imbalances for Slovenia's public finances in the future would be brought about by not changing the current fiscal system together with the realization of future demographic projections.

The main driving factors behind these results are public pensions, health care and long-term care expenditures. They are concentrated among the elderly, whose share is projected to widen significantly. However, we should not see those projections as something that is expected to happen, but as an indication that radical changes will be required in the future to preserve the sustainability of the public system. Increasing the retirement age by about 4-5 years every 15 years in the 2015-2059 period would keep pension expenditures at a low and stable level. This is about the tempo of the increase that women in Slovenia are facing in the 1999-2014 period.

Cuts in pension benefits could be another measure to improve the financial long-term sustainability of the public sector. Depending on the time they are introduced it would affect individual cohorts (generations) very differently. The later they are introduced the better for older generations, but the worse for younger ones. We believe that this analysis is very close to the idea of generational accounting. We propose that the NTA and generational accounts be converged as far as possible and used in parallel since both of them provide relevant information. Therefore, we consider the age profiles-based model to be an important theoretical contribution for bringing the NTA and generational accounts closer. We also believe that the model is an important and useful tool for comprehensive projections of all public expenditures and revenues. This is not something that most models provide as they are usually only oriented to one or several categories. Further, it can provide simulations of various policy measures – affecting revenues and expenditures through time, but also their distribution across cohorts.

Finally, we also tested how robust the results of the population projections on the ageing process are. We warned and demonstrated through calculations that the standard low and high variants of population projections are inappropriate for testing the sensitivity of the results on population ageing and sustainability of the public system. They are indeed 'high' and 'low', having the size of the population as a criterion: the high (low) variant assumes high (low) longevity, high (low) net migrations and high (low) fertility. However, regarding the share of elderly people and related pressure on the public system, the high (low) longevity from the high (low) variant is to some extent cancelled out by the higher (lower) net migrations and higher (lower) fertility. Indeed, in the Slovenian case the net result is small. This creates a false illusion that the outcome does not depend much on population development.

Therefore, we suggest rearranging the assumptions about mortality, fertility and migrations provided in the low and high variants. We have named the 'favorable' scenario a combination of mortality from the low variant with high net migrations and high fertility from the high

variant – and the other way around the 'unfavorable' scenario. This provides much more adequate intervals for a sensitivity analysis from the population ageing point of view. It also does not introduce additional subjective assumptions about the trajectories of mortality, fertility and migrations. In our simulations, those two scenarios present the lower and upper boundaries of the sensitivity analysis in population projections. The share of the elderly is projected to increase from 16.1% in 2008 to the range of 26.1-39.2% by 2060. Thus, even with the very optimistic assumptions of the favorable scenario strong population ageing would continue. By testing the outcomes of individual assumptions it has been shown that the results are largely driven by the given population structure. In the next decade massive baby-boom generations will start to enter the age group 65+ (and retirement), while generations born after 1980, when the number of newborns was strongly declining, are entering the fertility (and working) period. The expected strong population ageing is thus not a result of pessimistic demographic assumptions but a robust outcome accompanied by the challenges that it will bring.

7.2 LIMITATIONS AND FURTHER RESEARCH OPPORTUNITIES

By providing basic results in the form of age profiles and a comprehensive view on the flows among age groups, the NTA system opens numerous further research opportunities. Before pointing some of them out we present the limitations of the NTA system.

There could be a misunderstanding or premature conclusion that the provided age profiles reveal the lifecycle of an individual or generation. We have to bear in mind that those age profiles are cross-sectional snapshots of the situation at a certain time. Further, those age profiles are expected to change in the future. That is not only because the economic and other environment will change, but also because age profiles may include cohort effects of a certain point in time. For example, the baby-boom generation can have a specific age profile because there is a large number of individuals in those age groups. It could be the case that, because of their numerousness, they are receiving lower wages compared to the less numerous cohorts. In the case of pensions, some cohorts can have lower pensions due to retiring with a smaller number of collected working years. In the latter case, it is not expected that age profiles will remain the same in the future, even without any changes to the pension system and other settings.

The NTA system only measures transfers between age groups. Thus, it does not capture flows among individuals of the same age. There can be large transfers among spouses, especially in countries where often only one partner (usually male) is employed. However, since spouses are usually of about the same age, those transfers are consolidated without appearing as an intrahousehold transfer.

The NTA system is based on the SNA system. Although the SNA is a well-established and commonly used system worldwide, it is based on various agreements and assumptions that are debatable. The SNA has to differentiate what to include in the accounts and what should be left out. There are soft and arbitrary distinctions; let us mention just a few. Production on farms is included in the SNA, while vegetables and fruit from a garden are not. Building your own house is included, while preparing your own meals or cleaning your house is not. Damage to the environment is not taken into account; thus, it does not matter whether clean production is used instead of one that causes serious pollution. On the contrary – if one plant pollutes a river and another one is cleaning it, the production of the cleaning plant increases GDP. Leisure is not taken into account while attempts are made to estimate the grey and black economies and they are included in GDP. Thus, all the problems and assumptions from the SNA are also relevant to the NTA, entering the analysis through the SNA. Limitations and underlying assumptions should be carefully considered when interpreting the results and using them in further analysis, so as not to draw premature and wrong conclusions.

There are many further research opportunities. There are plans to extend the NTA analysis into the time dimension. This would provide information about how transfers among age groups are changing over time. In fact, for some countries a set of basic age profiles has already been prepared. For the USA partial accounts have been done – for special samples for 1888, 1917 and 1935, and annually with a national sample from 1962 to the present (Donehower, 2007). In the Slovenian case it would be very challenging yet also very interesting to compare the set of NTA results for the previous socio-economic system with the current one. This would provide some indications as to how the reallocation among age groups has changed (also) because of the changed socio-economic system. Having the NTA results for consecutive years available would enable us to follow cohorts through time by constructing a quasi-cohort analysis.

So far we have presented the results of the asset-based reallocation only as a residual. This is possible because of a comprehensive approach where all categories are adjusted to the aggregate categories from the SNA. However, the presented results only encompass the net values without allowing an insight into the gross values. We treat asset-based reallocation as one category, while it could be further decomposed into sub-categories. For some countries these calculations have already been done, while in most countries only preliminary and/or partial calculations have been prepared.

Capital transfers are still under development in the NTA methodology. Among private capital transfers bequests are expected to be especially important. In a few countries preliminary estimates have been done but they are only estimated with models, without direct data being available. According to information from the Tax Administration of the Republic of Slovenia, detailed data could be provided in the future about the age of a person who is making a bequest and the age of those who are receiving them. Those data would probably seriously underestimate the true value of the bequest since people try to convince the tax office that

their bequest is not worth much so they pay less tax. However, information about the pattern of those flows would be very valuable. We could also compare the direct data with the results obtained by the models to see how they match. We hoped to have already obtained these data for this doctoral dissertation; however, they are not yet available.

Intrahousehold transfers and savings of household members are based on the residual approach – as the difference between what they consume and their disposable income. Further, they are calculated using various assumptions and simplifications. We have to bear those assumptions in mind when interpreting the results. The difference between the calculated results and true situation (which we do not know) ends up in those 'residual' categories. Thus, intrahousehold transfers are only as accurate as the estimates from which they are derived. It is comforting that most categories are adjusted to the aggregate SNA values. However, direct estimations of the categories, which are currently calculated as residuals, would be welcomed in the future if the data permit. In addition, experiments or some other form of simulating patterns of intrahousehold transfers could be considered, or a way to use some information about this topic could be found in other sciences like sociology and psychology.

The national transfer accounts do not include in the analysis the time used in mutual interactions among family members. For some countries surveys are available that contain some information about the time transfer between household (family) members. Although correct estimations of such time transfers are difficult to obtain and subject to many assumptions, important insights could be gained through their introduction. First, they would supplement the information on intergenerational transfers. Currently, (private) services provided by parents to children are not taken into accounts. However, they provide comparable utility as if those services were bought in the market or provided by the public sector; conceptually, they are transfers from one age to another as well. This example also exposes the comparability of the results between countries and relates to the SNA limitations. Second, having data about time transfers available at the micro level would enable us to analyze the possible exchange between household family members. Perhaps it would turn out that there are more *quid pro quo* transfers than previously thought. Some transfers (from the elderly to their adult children, for example) might just be 'payments' for the time transfers those children are giving to them – currently, or in the past.

At the current stage of the analysis the data are only broken down by age. It would be interesting to introduce further dimensions into the analysis, like gender, working status, education, income class or some other criteria. So far the availability of data and the number of observations in survey data are hindering breaking the analysis down into further dimensions, but we will keep that option open for the future.

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APPENDIX

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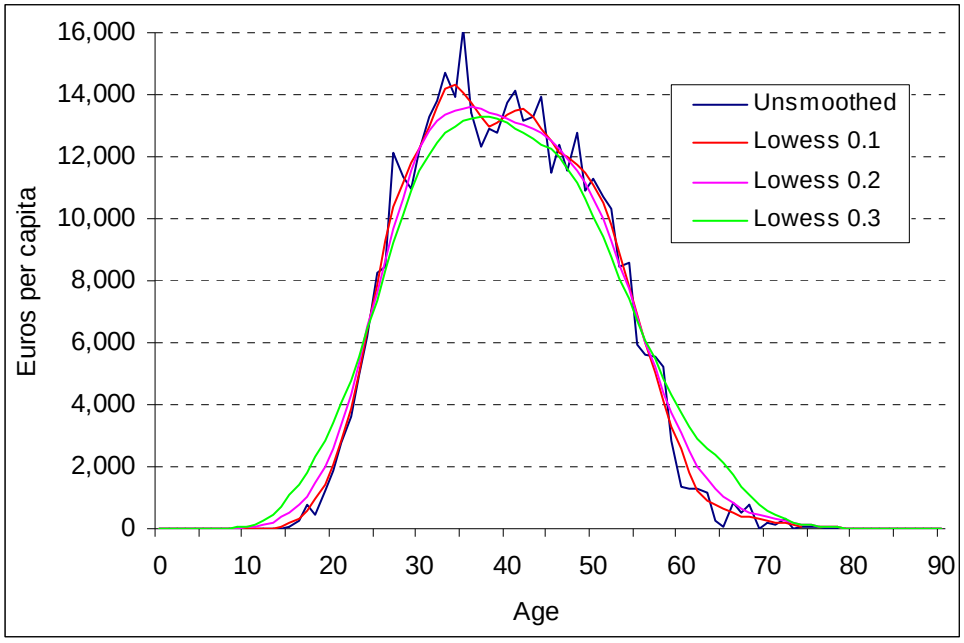
Appendix 1: Earnings age profile with 'tails' when smoothed with high smoothing factors

Figure A-1: Earnings age profile with 'tails' when smoothed with high smoothing factors



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

Appendix 2: Allocating public education expenditures by age groups

Table A-1: Number of students/pupils by education level

Age	Kinder-gartens	Elementary schools	Upper secondary schools	Undergraduate	Post-graduate	TOTAL	Population
0	0	0	0	0	0	0	17,594
1	4,547	0	0	0	0	4,547	17,552
2	8,550	0	0	0	0	8,550	17,682
3	12,145	0	0	0	0	12,145	18,113
4	13,798	0	0	0	0	13,798	18,201
5	15,475	0	0	0	0	15,475	17,919
6	0	17,719	0	0	0	17,719	18,119
7	0	18,217	0	0	0	18,217	19,016
8	0	18,644	0	0	0	18,644	19,124
9	0	19,341	0	0	0	19,341	19,426
10	0	19,450	0	0	0	19,450	19,946
11	0	19,973	0	0	0	19,973	20,348
12	0	21,545	0	0	0	21,545	20,539
13	0	22,232	0	0	0	22,232	22,545
14	0	22,411	0	0	0	22,411	22,762
15	0	0	26,728	0	0	26,728	24,070
16	0	0	25,519	0	0	25,519	25,806
17	0	0	23,748	0	0	23,748	25,539
18	0	0	19,622	1,212	0	20,834	24,888
19	0	0	4,515	10,804	0	15,319	26,661
20	0	0	0	11,869	0	11,869	27,024
21	0	0	0	11,917	1	11,918	27,657
22	0	0	0	11,492	3	11,495	29,193
23	0	0	0	10,426	128	10,554	30,102
24	0	0	0	7,855	411	8,266	30,420
25	0	0	0	5,007	795	5,802	30,932
26	0	0	0	2,819	845	3,664	30,288
27	0	0	0	1,836	788	2,624	30,574
28	0	0	0	1,460	615	2,075	30,731
29	0	0	0	1,194	423	1,617	29,540
30	0	0	0	776	206	982	29,145
31	0	0	0	776	206	982	29,494
32	0	0	0	776	206	982	29,220
33	0	0	0	776	206	982	27,683
34	0	0	0	776	206	982	28,172
35	0	0	0	579	101	680	28,496
36	0	0	0	579	101	680	29,919
37	0	0	0	579	101	680	31,375
38	0	0	0	579	101	680	31,669
39	0	0	0	579	101	680	31,256
40	0	0	0	508	110	618	30,619
41	0	0	0	508	110	618	31,179
42	0	0	0	508	110	618	31,391
43	0	0	0	508	110	618	30,713
44	0	0	0	508	110	618	30,694
TOTAL	**54,515**	**179,532**	**100,132**	**87,205**	**6,092**	**427,476**	

Note: Some more detailed categories were joined to form meaningful groups and to match the categories of aggregate data. For example, 'Elementary schools (8 years)',' Elementary schools with a special educational curriculum (8 years)', 'Elementary schools (9 years – new system)' and 'Elementary schools with a special educational curriculum (9 years – new system)' have been summed up to 'Elementary schools'.

Sources: Statistical Office of the Republic of Slovenia, Kindergartens, Slovenia, school year 2003/2004, 2004; Statistical Office of the Republic of Slovenia, Elementary schools in Slovenia at the end of the school year 2002/2003 and at the beginning of the school year 2003/2004, 2004.

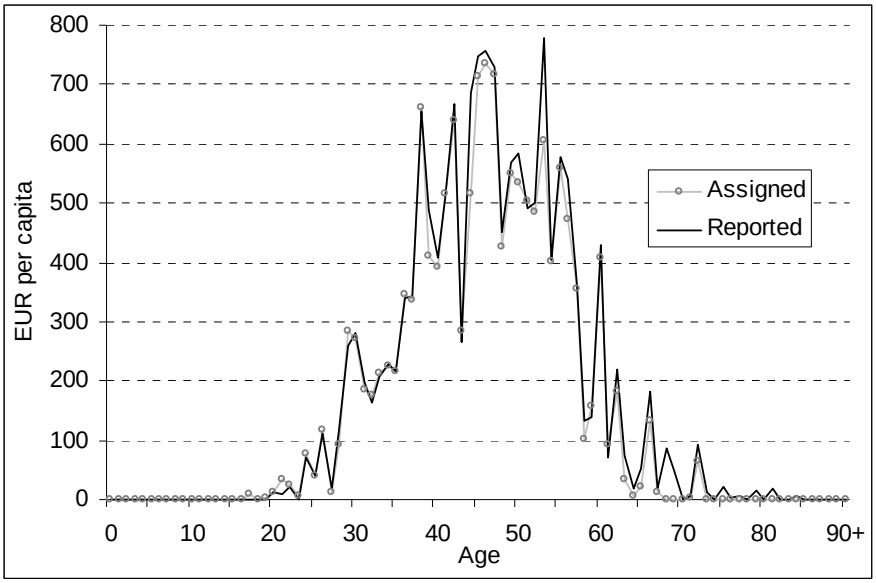
Table A-2: Aggregate education expenditures by levels of education distributed by age and the age profile of total education expenditures

Age	Kinder-gartens	Elementary schools	Upper secondary schools	Under-graduate	Post-graduate	Education of Adults	TOTAL	Expendi-tures per capita
0	0	0	0	0	0	0	0	0
1	14,995,073	0	0	0	0	0	14,995,073	854
2	28,196,145	0	0	0	0	0	28,196,145	1,595
3	40,051,717	0	0	0	0	0	40,051,717	2,211
4	45,502,972	0	0	0	0	0	45,502,972	2,500
5	51,033,373	0	0	0	0	0	51,033,373	2,848
6	0	74,827,275	0	0	0	0	74,827,275	4,130
7	0	76,930,327	0	0	0	0	76,930,327	4,046
8	0	78,733,547	0	0	0	0	78,733,547	4,117
9	0	81,676,975	0	0	0	0	81,676,975	4,205
10	0	82,137,282	0	0	0	0	82,137,282	4,118
11	0	84,345,909	0	0	0	0	84,345,909	4,145
12	0	90,984,460	0	0	0	0	90,984,460	4,430
13	0	93,885,658	0	0	0	0	93,885,658	4,164
14	0	94,641,575	0	0	0	0	94,641,575	4,158
15	0	0	82,163,141	0	0	0	82,163,141	3,414
16	0	0	78,446,618	0	0	0	78,446,618	3,040
17	0	0	73,002,480	0	0	0	73,002,480	2,858
18	0	0	60,318,960	2,679,945	0	0	62,998,905	2,531
19	0	0	13,879,324	23,889,544	0	0	37,768,869	1,417
20	0	0	0	26,244,446	0	206,708	26,451,154	979
21	0	0	0	26,350,583	6,027	211,550	26,568,160	961
22	0	0	0	25,410,833	18,082	223,299	25,652,214	879
23	0	0	0	23,053,720	771,512	230,252	24,055,483	799
24	0	0	0	17,368,786	2,477,277	232,684	20,078,747	660
25	0	0	0	11,071,358	4,791,813	236,600	16,099,770	520
26	0	0	0	6,233,305	5,093,184	231,674	11,558,163	382
27	0	0	0	4,059,719	4,749,620	233,862	9,043,201	296
28	0	0	0	3,228,317	3,706,874	235,063	7,170,253	233
29	0	0	0	2,640,144	2,549,606	225,953	5,415,703	183
30	0	0	0	1,715,872	1,239,241	222,931	3,178,045	109
31	0	0	0	1,715,872	1,239,241	225,601	3,180,714	108
32	0	0	0	1,715,872	1,239,241	223,505	3,178,619	109
33	0	0	0	1,715,872	1,239,241	211,748	3,166,862	114
34	0	0	0	1,715,872	1,239,241	215,489	3,170,602	113
35	0	0	0	1,280,271	607,566	217,967	2,105,804	74
36	0	0	0	1,280,271	607,566	228,852	2,116,688	71
37	0	0	0	1,280,271	607,566	239,989	2,127,825	68
38	0	0	0	1,280,271	607,566	242,238	2,130,074	67
39	0	0	0	1,280,271	607,566	239,079	2,126,915	68
40	0	0	0	1,122,835	664,224	234,206	2,021,265	66
41	0	0	0	1,122,835	664,224	238,490	2,025,548	65
42	0	0	0	1,122,835	664,224	240,111	2,027,170	65
43	0	0	0	1,122,835	664,224	234,925	2,021,984	66
44	0	0	0	1,122,835	664,224	234,780	2,021,838	66
TOTAL	**179,779,280**	**758,163,007**	**307,810,522**	**192,825,592**	**36,719,147**	**5,717,553**	**1,481,015,102**	

Sources: Ministry of Finance, internal data, 2007; author's calculations.

Appendix 3: Simulating the effects of the definition of the household head on the age profile of self-employment

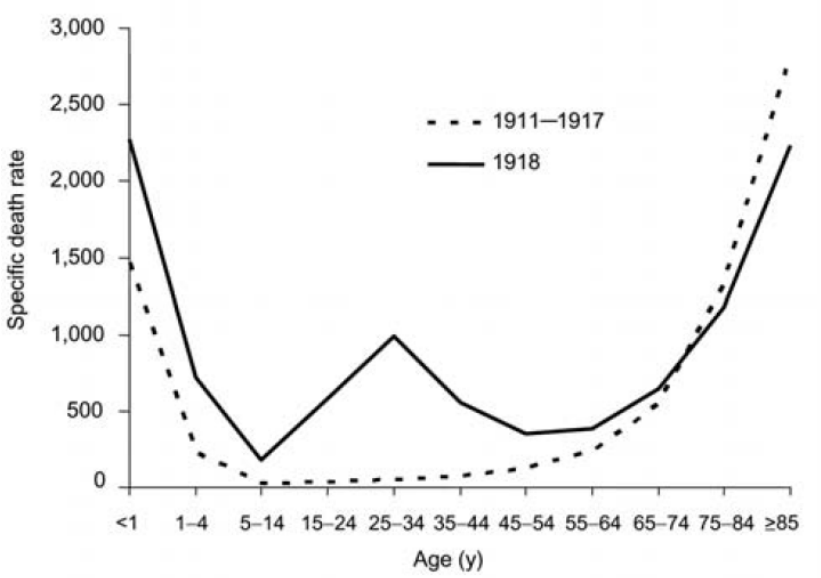
Figure A-2: Age profile of self-employment labor income – a version based on reported values and a version with assigned values; Slovenia, 2004



Sources: Statistical Office of the Republic of Slovenia, HES-2004 and various other sources; author's calculations.

Appendix 4: Age-specific mortality of Spanish flu (influenza from 1918) and the general age pattern of fertility (data for 1911-1917)

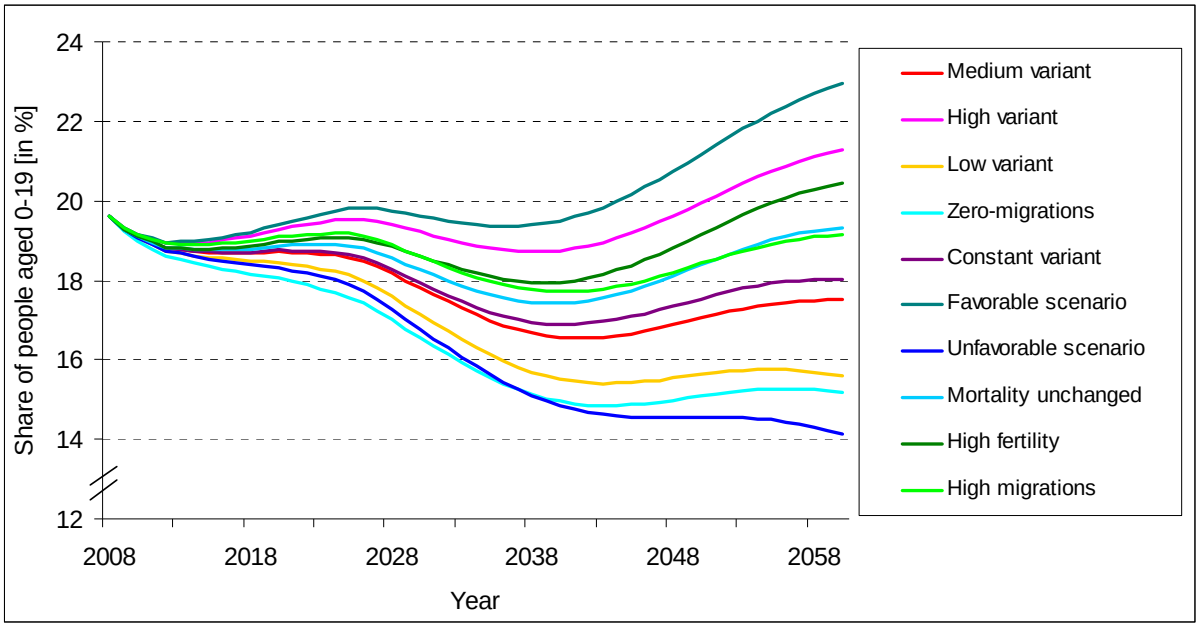
Figure A-3: 'U-' and 'W-' shaped combined influenza and pneumonia mortality, by age at death, per 100,000 persons in each age group, United States, 1911–1918. Influenza- and pneumonia-specific death rates plotted for the interpandemic years 1911–1917 (dashed line) and for the pandemic year 1918 (solid line)



Source: Taubenberger & Morens, 1918 Influenza: the Mother of All Pandemics, 2006, p. 19.

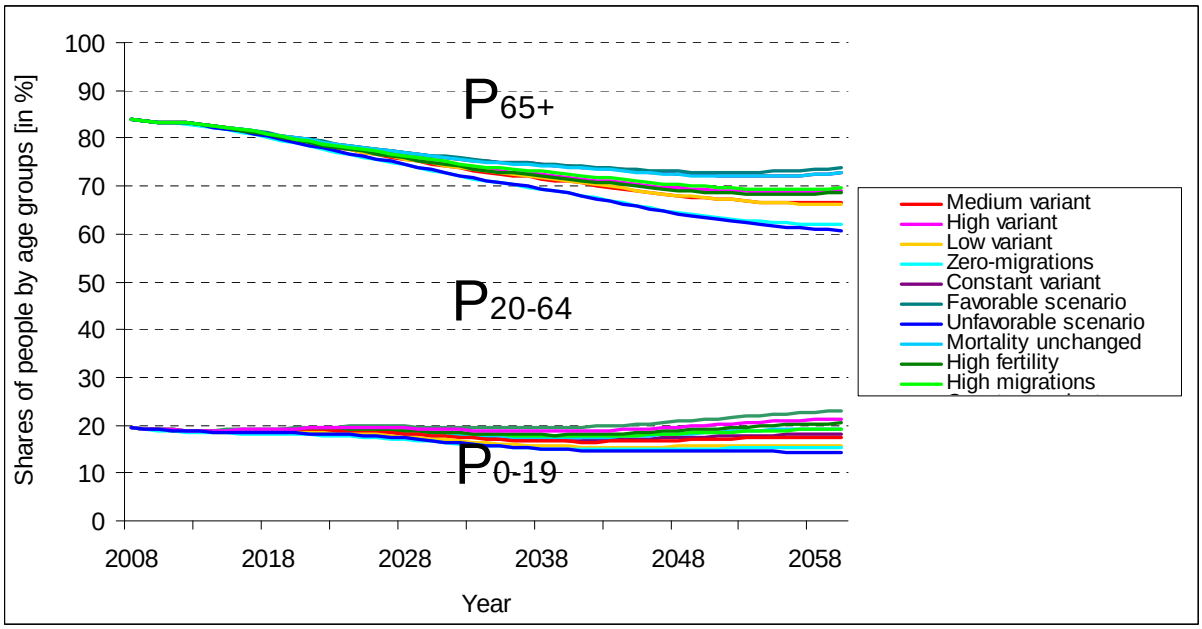
Appendix 5: Graphical representation of some results related to demographic projections by variants; Slovenia, 2008-2060

Figure A-4: Share of people aged 0-19 [in %] by demographic variants/scenarios



Sources: Eurostat, internal materials, related to the population projections 'EUROPOP2008', 2008; author's calculations.

Figure A-5: Share of people by main age groups 0-19 [in %] by demographic variants/scenarios



Appendix 6: Total fertility rate and replacement-level fertility

In the text we describe a TFR of 2.1 as being the replacement level of fertility – i.e. the level at which a population in the long run replaces itself from one generation to the next, assuming no migration. Being more precise, the replacement level for each country differs somewhat, depending on the sex ratio at birth and mortality of women until age 50.

The sex ratio at birth is relatively stable and similar across most countries. In Slovenia about 48.5% of newborns are females and 51.5% are males (Malačič, 2006, p. 15). This ratio can be expressed in the form of an index whereby in countries around the world there is usually an average of about 105 to 107 boys per 100 girls. If the sex ratio at birth in some country is distinctively different it usually indicates that people interfere in the natural process. In some countries (for example, China, Korea, Taiwan, India, Iran, Afghanistan, Iraq etc.) cultural norms prefer male children over female children. In China the sex ratio at birth in 2007, expressed as an index, was 111.2 (U.S. Census Bureau, 2009). This high value is related to the one-child policy in China that sometimes has cruel consequences for female children (born or even those not yet born).

On the other hand, the mortality of women until the end of their childbearing period greatly differs between countries. For example, in Slovenia 97.5% of females live past 50 years of age while in Swaziland only 37.2% do (World Health Organization, 2009). The higher the mortality, the higher is the required TFR, to ensure that every woman is on average replaced by her daughter. For a better understanding of the replacement level of TFR we will present the calculation of the TFR and some related fertility indicators.

An age-specific fertility rate (f_x) is calculated as the ratio between the number of newborns born to mothers aged *x* years (N_x) and the number of all women aged *x* (denoted $V_{f,x}$) :

$$f_x = \frac{N_x}{V_{f,x}} \tag{60}$$

We can also consider age-specific fertility rates as probabilities of woman giving birth at age *x*. Summing up single-year age-specific fertility rates at a given time results in the *total fertility rate* (TFR):

$$TFR = \sum f_x \tag{61}$$

The TFR is a synthetic rate, not observed in reality. It is an indicator calculated from cross-sectional data interpreted in a longitudinal manner. It represents the total fertility of an imaginary woman passing through the reproductive life being subject to the age-specific fertility rates recorded in a given population in a given year. An alternative indicator is

completed fertility that realistically shows the number of children of a certain generation, calculated by following those women through their childbearing period. However, completed fertility cannot be calculated before they are 50 years old, i.e. until they complete the childbearing period. Therefore, the TFR is more relevant when we want to describe a more up-to-date fertility level.

Another indicator related to population reproduction is the *gross reproduction rate* (GRR). It is analogous to the TFR, but only includes newborn **girls** in the analysis ($N_{x,f}$):

$$GRR = \sum \frac{N_{x,f}}{V_{f,x}} \tag{62}$$

Without having detailed data about newborns available (being decomposed into boys and girls), the GRR can be estimated from the TFR by:

$$GRR = TFR \cdot p \tag{63}$$

where *p* represents the probability that a newborn is a girl. It is calculated as the share of girls among all newborns – as already explained, for the Slovenian case this is about 0.485.

Finally, the *net reproduction rate* (NRR) is calculated similarly to the GRR, whereby the age-specific fertility rates (taking only newborn girls into consideration) are weighted by the share of women in a given age group who are still alive in that age group. Intuitively, this is required because age-specific fertility rates are calculated by having only surviving women in the denominator.

$$NRR = \sum (\frac{N_{f,x}}{V_{f,x}} \cdot \frac{l_{f,x} + l_{f,x+1}}{2 \cdot 10^5}) \tag{64}$$

whereby $l_{f,x}$ is an indicator from life tables showing the number of women (out of 100,000 women who were by assumption born at the same time) who are still alive at age *x*. If all the required data are not available, the NRR can be approximated by:

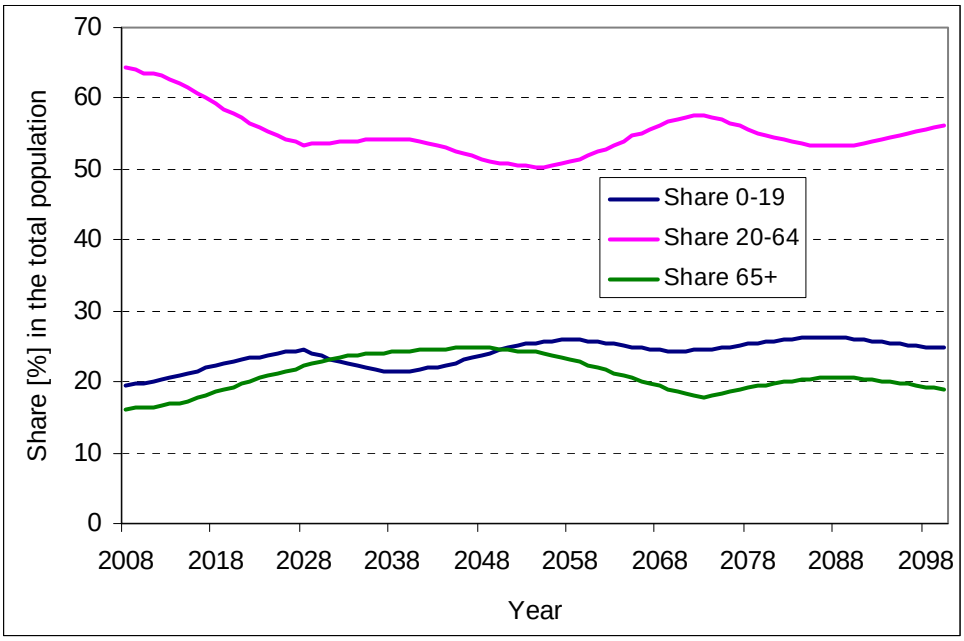
$$NRR = GRR \cdot l_{f,33} \tag{65}$$

The NRR represents a very clear criterion for defining the replacement level of fertility. If a woman on average gives birth to one girl (who replaces her), the population will replace itself from one generation to the next (assuming there is no migration), while the population with an NRR below one will shrink in the long run. Expressing the replacement level with the TFR requires values greater than 2 children since: 1) there are fewer girls among newborns than boys; and 2) some women die before they live past 50 years of age. In developed countries the

mortality of women is low and we can therefore say that replacement-level fertility is at the level of a TFR of about 2.1, while in less developed countries it has to be substantially higher, depending foremost on the mortality of women in the country. Since in developed countries the mortality of women during the childbearing period is still slightly decreasing, replacement-level fertility is slightly below 2.1. According to mortality levels in Slovenia in 2008 (assumed in the EUROPOP2008 projections) this value was 2.0838.

Appendix 7: Effect of momentum on the age structure of the Slovenian population in the 2008-2100 period

Figure A-6: Effect of momentum on the age structure of the Slovenian population in the 2008-2100 period



Sources: Eurostat, internal materials, related to the population projections 'EUROPOP2008', 2008; author's calculations.

Appendix 8: Calculating the 'S1' and 'S2' sustainability gap indicators

$$S_1 = \underbrace{rD_{t_0} - PB_{t_0}}_{A} + \underbrace{\frac{r(D_{t_0} - 60)}{(1+r)^{2050-t_0} - 1}}_{B} \underbrace{\frac{\sum_{t=t_0+1}^{2050} \frac{\Delta PB_t}{(1+r)^{t-t_0}}}{\sum_{t=t_0+1}^{2050} \frac{1}{(1+r)^{t-t_0}}}}_{C} \tag{66}$$

D_t denotes gross government debt at date t relative to GDP; PB_t is the cyclically-adjusted primary balance; ΔPB_t is a change in the cyclically-adjusted primary balance ($PB_t = PB_0 + \Delta PB_t$) relative to GDP; and r is the difference between the nominal interest rate and nominal GDP growth rate.

Thus, the term 'A' denotes the initial budget position. The debt/GDP ratio is growing by the difference between the nominal interest rate (which is assumed to be 3% in our calculations – an assumption also used by the European Commission) and the nominal growth rate (assumed to be zero in our case since we are modeling categories in real terms – meaning that the GDP nominal growth rate equals the GDP real growth rate). If the initial primary balance exactly compensates for this increase, S1 would be zero since the debt/GDP ratio would remain stable. Thus, the debt relative to GDP increases by the difference between the nominal interest rate and the nominal growth rate. If S1 is positive, the debt/GDP ratio is on an explosive path.

The term 'B' ensures that S1 will make government debt converge toward 60%. In the Slovenian case the gross debt is below that level – in 2007 it was 24.1% of GDP (Ministry of Finance, 2008, internal materials). Therefore, S1 will be smaller than otherwise since it allows an increase of the gross debt to the 60% limit.

The term 'C' calculates the discounted average of future (until 2050) changes in the primary balance compared with the base year (2007 in our case).

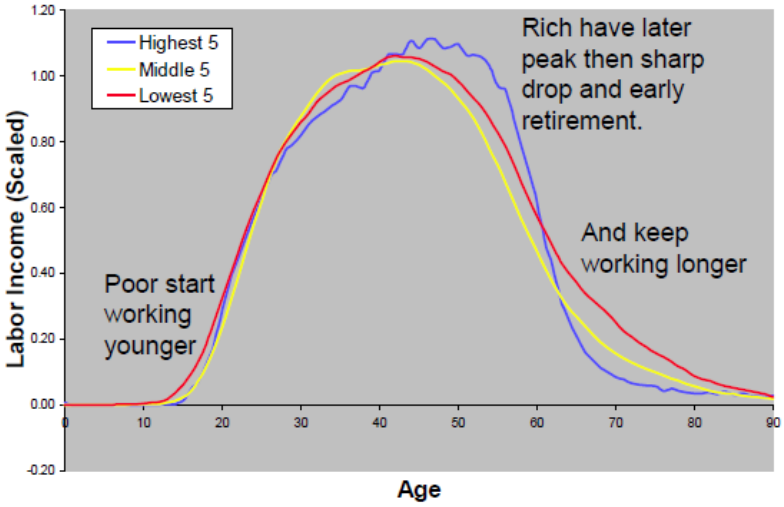
On the other hand, S2 takes into account not only the development of revenues and expenditures until 2050 but over an infinite horizon.

$$S_2 = \underbrace{rD_{t_0} - PB_{t_0}}_{D} \underbrace{- r \sum_{t=t_0+1}^{\infty} \frac{\Delta PB_t}{(1+r)^{t-t_0}}}_{E} \tag{67}$$

We have already explained the term 'D' since it equals the term A in S1. The term 'E' is similar to the term 'C' n S1, but it takes account of changes in the primary balance (compared with the base year) not only until the 2050 but over an infinite horizon. We assume the values of the input variables remain at the same levels as they were in 2050. The description of calculating 'S1' and 'S2' is taken from the AWG internal materials (2008).

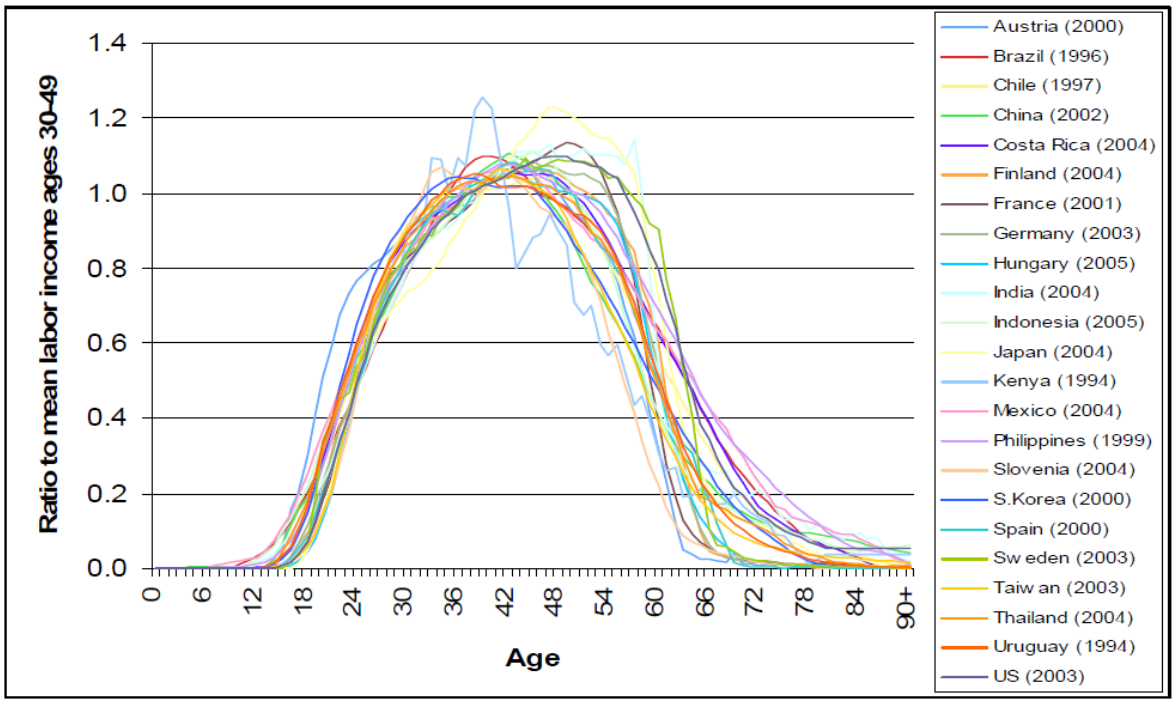
Appendix 9: Labor income: international comparison of NTA countries

Figure A-7: Average labor income profiles grouped by GDP per capita



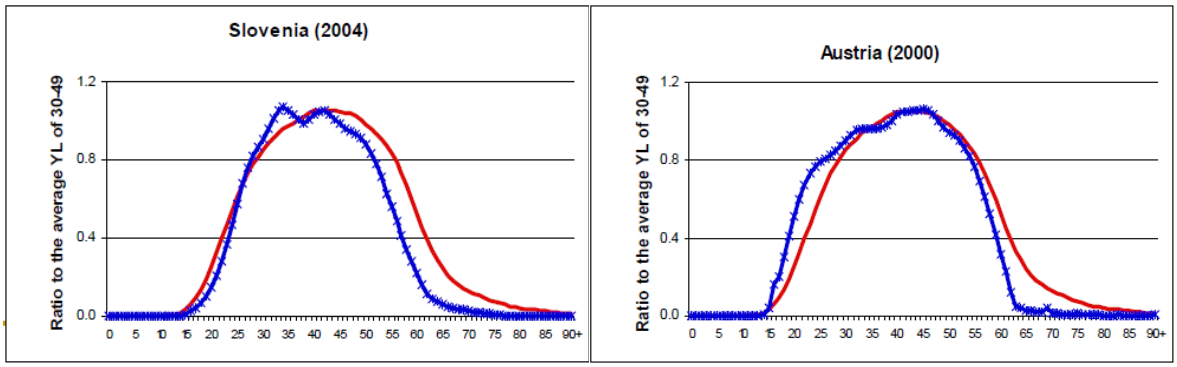
Source: R. Lee, Accounting for Intergenerational Transfers: An Overview, 2007, November, p. 13.

Figure A-8: Labor income profiles for 23 NTA countries



Source: S.-H. Lee & Ogawa, Labor Income over the Life-Cycle: Evidence from Twenty-Three Countries, 2009, January, p. 14.

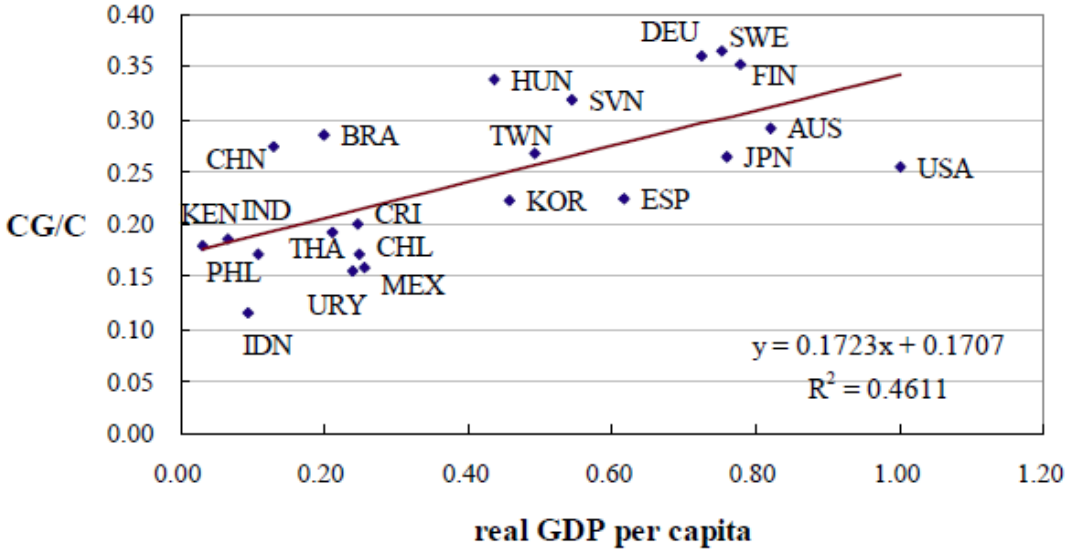
Figure A-9: Labor income profile for Slovenia and Austria compared to the average NTA profile



Source: S.-H. Lee & Ogawa, Labor Income over the Life-Cycle: Evidence from Twenty-Three Countries, 2009, January, pp. 20, 21.

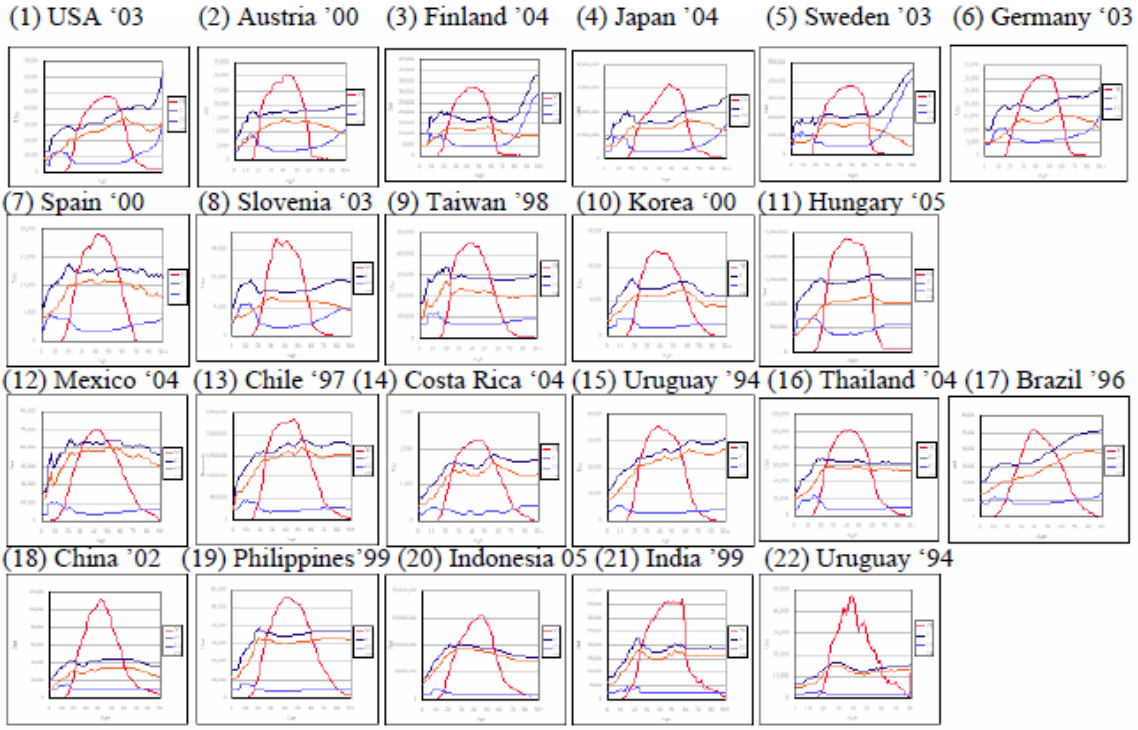
Appendix 10: Consumption: international comparison of NTA countries

Figure A-10: Correlation between the share of public consumption (CG) in total consumption (C) and real GDP per capita (purchasing power parity, US=1); NTA countries



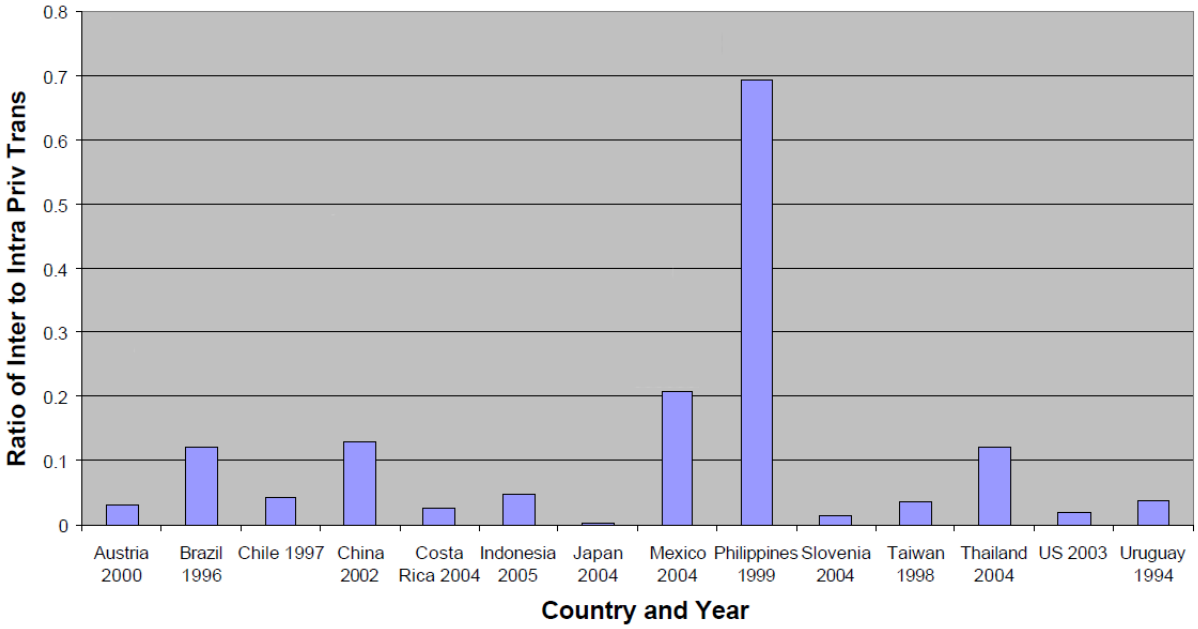
Source: Tung, Consumption: An International Comparison in the NTA Framework, 2009, p. 26.

Figure A-11: Consumption at a glance: Labor income (red humped shaped curve), public consumption (light-blue curve), private consumption (red curve) and total consumption (dark-blue curve)



Source: Tung, Consumption: An International Comparison in the NTA Framework, 2009, p. 11.

Figure A-12: Ratio of aggregated private interhousehold transfers received relative to intrahousehold transfers received; weighted by standard population age distribution



Source: R. Lee & Donehower, Private Transfers in Comparative Perspective, 2009, January, p.25.

SUMMARY (IN THE SLOVENIAN LANGUAGE)

Človeško bitje je velik del svojega začetnega življenjskega obdobja odvisno od transferjev, ki jih prejme s strani svojih staršev in drugih članov družbe za namene zadovoljevanja osnovnih življenjskih potreb, zdravstvenega varstva, izobraževanja itd. V začetnih letih življenja je od teh transferjev odvisno posameznikovo preživetje, pozneje pa je od njih odvisna kvaliteta posameznikovega življenja in uspešnost njegovega prihodnjega razvoja. Tudi v starosti transferji v obliki pokojnin, zdravstvenega varstva, dolgotrajne oskrbe itd. v veliki meri določajo blagostanje posameznikov, čeprav ima na transferje v tem življenjskem obdobju posameznik že bistveno večji vpliv kot v otroštvu. V obdobju svoje ekonomske aktivnosti se je namreč v okviru dohodkovnih, medčasovnih in drugih omejitev lahko odločal tudi o vrsti in obsegu transferjev in dohodkov, ki jih bo prejemal, ko ne bo več prejemal dohodka iz dela. V aktivnem življenjskem obdobju posameznik praviloma proizvaja več, kot troši, tako da lahko s presežkom financira primanjkljaj prej omenjenih dveh obdobij življenjskega cikla.

V zadnjih dveh desetletjih je bil na tem področju dosežen pomemben napredek glede merjenja, modeliranja in ocenjevanja vplivov medgeneracijskih transferjev na mikro- in makroravni. Aktualnost področja se je močno povečala zaradi demografskih procesov, ki v zadnjem času močno spreminjajo starostno strukturo prebivalstva in s tem vplivajo na transferje ter ekonomsko dogajanje na sploh. Glede na projekcije prebivalstva se nam v prihodnjih desetletjih obetajo še mnogo bolj drastične spremembe.

Ker gre za temeljno področje družbe, je bilo že od nekdaj opazovano in analizirano s strani ekonomske in drugih znanosti, saj medgeneracijski transferji pomembno vplivajo na neenakost v družbi in gospodarsko rast. Potek, oblika in obseg transferjev so močno odvisni od stopnje razvitosti družbe, od družbenoekonomskega sistema, kulturnih, moralnih, zgodovinskih in drugih dejavnikov. Deloma zaradi tega, deloma pa tudi zaradi različne uporabljene metodologije in različne stopnje vključevanja transferjev v analizo so v preteklosti različni avtorji prihajali do različnih rezultatov in zaključkov.

R. Lee (2000) npr. ugotavlja, da v družbah, ki so na stopnji ukvarjanja s kmetijstvom in lovom, potekajo medgeneracijski transferji izrazito od starejših k mlajšim. Potreba po zagotavljanju potrošnje v otroštvu močno prevladuje nad potrebo po oskrbi v višji starosti. Tako Lee ugotavlja, da v državah tretjega sveta transferji potekajo izrazito od starejših k mlajšim – deloma zaradi visokega deleža otrok v teh družbah, deloma pa zaradi tega, ker so starejši še vedno vzdrževani v okviru družinskih transferjev. V industrijskih državah je to vlogo v glavnem prevzela država (R. Lee, 2000). V industrijskih, razvitejših družbah (oz. vsaj v ZDA) naj bi bila smer obratna – od mlajših k starejšim. Transferji znotraj družine še vedno potekajo izrazito »navzdol«, torej od starejših k mlajšim, vendar pa so več kot kompenzirani z akumulacijo kapitala, ki razporeja potrošnjo v višjo starost, in s transferji javnega sektorja, ki potekajo pretežno »navzgor«. Smer transferjev v javnem sektorju se prav tako razlikuje po družbah oziroma državah. Navedene ugotovitve o transferjih znotraj družine so v nasprotju z

rezultati Caldwella (1980, 1982), ki je razvil hipotezo, da je upad rodnosti med razvojem posledica spreobrnitve toka transferjev od otrok k staršem v tok od staršev k otrokom (Mason & Tapinos, 2000), zaradi česar se (racionalni) starši odločajo za manjše število otrok.

Družina je (še vedno) institucija, ki je ključnega pomena za razumevanje medgeneracijskih transferjev. Ima osrednjo vlogo pri razumevanju formiranja človeškega kapitala, ekonomske rasti in porazdelitve dohodka (prav tam, str. 3). Vendar pa je transferje znotraj družine težko analizirati. Podatki anket, kjer je enota opazovanja gospodinjstvo, postavljeno kot aktualna celica za sprejemanje odločitev, tovrstnih analiz ne omogočajo. Poleg tega pomenijo denarni transferji med družinskimi člani relativno majhen delež glede na transferje v obliki materialnih dobrin in storitev, te pa je običajno težko ovrednotiti. Če postavimo kot predmet transferjev tudi čas, posvečen drugemu družinskemu članu, se pojavi celo vprašanje smeri, v katero naj bi transfer pri tem potekal.

V tradicionalnih družbah so mladi in starejši skoraj izključno odvisni od drugih družinskih članov, ki jim pomagajo pri zadovoljevanju njihovih (materialnih) potreb. Z razvojem se je v mnogih državah pomembnost družine kot agenta v medgeneracijskem prerazdeljevanju zmanjšala (Mason & Miller, 2000). Sčasoma ji je mnoge tradicionalne funkcije odvzela (socialna) država.

V preteklosti so bile analize tovrstnih tokov parcialne, običajno so se ukvarjale samo s posameznimi vrstami transferjev. Zaradi različnih pristopov, ravni vključevanja transferjev v analizo, uporabljenih predpostavk, različnih časovnih obdobij in raznih drugih razlik v analizi je bilo njihove posamične ugotovitve težko primerjati ter sprejemati sklepe o zakonitostih v različnih državah in različnih časovnih obdobjih.

Pojavljali sta se želja in potreba po metodi, s katero bi sistematično in celovito analizirali ekonomski vidik medgeneracijskih odnosov. V zadnjem času so se tega izziva lotili »računi nacionalnih transferjev« – *National transfer accounts (NTA)*, ki so predmet pričujoče doktorske disertacije. Predstavljajo sistem, ki ekonomske tokove med posameznimi generacijami oziroma kohortami prikazuje sistematično in do sedaj najbolj celovito.

Disertacija predstavi idejo in osnovno metodologijo NTA. Razvija jo mednarodna ekipa raziskovalcev, v kateri tudi sam aktivno sodelujem. V besedilu predstavim principe NTA in celovit osnovni nabor rezultatov, ki sem ga izračunal za Slovenijo. Sistem računov nacionalnih transferjev meri premike ekonomskih resursov od posameznikov v enih starostnih skupinah k posameznikom v drugih starostnih skupinah. Ta realokacija nastane, ker v enih starostnih razredih posamezniki porabljajo več kot proizvajajo, v drugih pa proizvajajo več, kot porabljajo. V starostnih razredih, kjer je primanjkljaj življenjskega cikla pozitiven, mora biti financiran z ekonomskimi tokovi iz drugih starostnih razredov. Računi nacionalnih transferjev torej prikažejo načine, na katere mladi in starejši črpajo presežek, ustvarjen v času delovne aktivnosti. Osnovna kategorija je primanjkljaj življenjskega cikla (*lifecycle deficit*), ki predstavlja razliko med vrednostjo blaga in storitev, ki jo predstavniki posameznega

starostnega razreda porabijo, in vrednostjo blaga in storitev, ki jo predstavniki tega starostnega razreda proizvedejo.

Prerazporeditve (ki jih včasih kar poenostavljeno poimenujemo »transferji«, mišljeno širše) med posameznimi starostnimi razredi lahko potekajo v obliki transferjev ali v obliki prerazporeditev, ki so povezane s sredstvi (*asset-based reallocation*). Vse navedeno lahko poteka prek zasebnega ali javnega sektorja. Odtoki javnega sektorja predstavljajo plačila posameznikov v obliki raznih davkov in prispevkov, ki so namenjeni za financiranje javnega sistema. Na drugi strani so s strani javnega sektorja posamezniki deležni raznih pritokov. Ti so lahko v denarni ali v nedenarni obliki (*in-kind*). Slednji so v NTA po definiciji enaki potrošnji javnega sektorja.

NTA so usklajeni z ustaljenim in široko uporabljanim sistemom nacionalnih računov – *System of national accounts (SNA)*. Rekli bi lahko, da NTA uvajajo dimenzijo starosti v SNA, vendar se dobljeni starostni profili že v okviru samih NTA interpretirajo in uporabljajo za nekatere nadaljnje analize, tako da omejeni cilj presegajo.

Po uvodnem teoretičnem delu se analiza usmeri v empirični del, na katerem je poudarek doktorske disertacije. Osnovne rezultate NTA predstavljajo starostni profili, ki kažejo povprečja posameznih kategorij pritokov in odtokov na predstavnika v posamezni starosti. Pritoki (*inflows*) in odtoki (*outflows*) so med seboj vedno usklajeni. Pritoki določenih starostnih razredov (npr. v obliki otroškega dodatka) so hkrati odtoki določenih drugih starostih razredov, ki prek davkov in prispevkov te transferje financirajo. Analogno so pritoki, ki jih prejmejo otroci v obliki zasebnih transferjev znotraj družine, enaki odtokom od staršev ali drugih družinskih članov, ki te odtoke financirajo. Čeprav so pritoki in odtoki na agregatni ravni pogosto zelo podobni, pri določenih kategorijah pa so celo po definiciji enaki, je po navadi njihova porazdelitev po posameznih starostnih razredih bistveno različna.

Graditev računov nacionalnih transferjev temelji na obsežnem kombiniranju podatkov iz različnih virov, pri čemer uporabljamo ustrezne metodološke prijeme. Osnovni vir agregatnih podatkov je sistem nacionalnih računov (SNA), ki ga objavljajo statistični uradi posameznih držav. V njih najdemo sistematično, celovito in konsistentno predstavljene osnovne makroekonomske kategorije, razčlenjene po različnih kriterijih. Ključni vir so tudi javnofinančni podatki, saj je javnofinančni sistem v razvitih državah zelo pomemben sistem prerazdeljevanja med posameznimi starostnimi skupinami.

Agregatni podatki v veliki večini primerov niso razčlenjeni po starosti, temveč se spremljajo in objavljajo zgolj razčlenjeni po posameznih vsebinskih kategorijah. Na drugi strani mikropodatki omogočajo oblikovanje starostnih profilov, vendar bi neposredna uporaba teh profilov v analizi lahko bistveno precenila ali podcenila agregatne vrednosti. To je še zlasti aktualno pri kategorijah, kjer imamo na voljo le majhen vzorec in/ali gre za vsebinsko občutljive kategorije, kjer anketiranci sistematično navajajo previsoke ali prenizke vrednosti

glede na dejansko stanje, npr. vprašanja glede višine posameznih vrst dohodkov. Na osnovi mikropodatkov dobljene starostne profile za posamezne kategorije ustrezno uskladimo z agregatnimi, tako da je na koncu vsota produktov starostnih profilov (povprečnih vrednosti za posamezne starostne razrede) in števila prebivalcev po posameznih starostnih razredih ravno enaka agregatni vrednosti te kategorije. Tako odpravimo problem splošnega podcenjevanja ali precenjevanja v anketah, medtem ko je natančnost ocen po posameznih starostnih razredih odvisna od sistematičnih razlik v precenjevanju oziroma podcenjevanju med anketiranci različne starosti in slučajnega dejavnika.

Enota proučevanja v NTA je posameznik. Pri kategorijah, kjer se podatki spremljajo po posameznikih, smo uporabili nakazano metodo kombiniranja makropodatkov in mikropodatkov. Vendar pa se vsi podatki v anketah ne spremljajo na ravni posameznika, saj ključni vir podatkov »Anketa o porabi v gospodinjstvih« spremlja izdatke na ravni gospodinjstev. Tako se postavi vprašanje razporejanja vrednosti teh kategorij z ravni gospodinjstva na raven posameznika. Za določene kategorije se v NTA uporablja regresijska metoda razporejanja, za druge pa *ad hoc* metoda razporejanja s pomočjo ekvivalenčne lestvice.

Poseben problem so podatki o transferjih znotraj gospodinjstev, saj ti podatki tako rekoč ne obstajajo. To je bil osnovni problem preteklih analiz, ki se tematike niso lotevale celovito. NTA predpostavljajo, da člani gospodinjstev, ki niso nosilci gospodinjstva (ki niso *head household members*), porabljajo svoje dohodke (to je dohodke iz dela in javne transferje v obliki denarja, potem ko se odštejejo davki) samo za potrošnjo proizvodov in storitev. Predpostavljamo torej, da ne akumulirajo premoženja niti ne prejemajo transferjev, ki potekajo med gospodinjstvi v obliki daril, donacij, alimentov ipd. Za to naj bi bili po predpostavki pristojni nosilci gospodinjstev. Razliko med zaslužki članov, ki niso nosilci gospodinjstva, in njihovo potrošnjo obravnavamo kot transferje znotraj družine. Če je razlika pozitivna, to upoštevamo kot transfer od tega člana gospodinjstva k nosilcu gospodinjstva. Če je razlika negativna, jo metoda zabeleži kot transfer od nosilca gospodinjstva k temu članu gospodinjstva. Celovitost obravnave vseh prerazporeditev med posameznimi starostnimi razredi omogoča, da se transferji znotraj družine ocenijo kot rezidual.

Empirični del disertacije nadaljujemo v petem poglavju, kjer dobljene starostne profile najprej združimo v celovito sliko tokov med posameznimi starostnimi skupinami. Na podlagi podatkov za leto 2004 ugotavljamo, da ljudje v Sloveniji ustvarjajo več, kot trošijo, zgolj od 25. do vključno 55. leta starosti. Ta rezultat ocenjujemo kot presenetljiv in zaskrbljujoč glede na to, da je bila tega leta pričakovano trajanje življenja ob rojstvu za moške 74 let, za ženske pa 81 let. Ti rezultati potrjujejo našo osnovno hipotezo, da je skozi življenje posameznika prisoten izrazit ekonomski življenjski cikel.

Potrošnja mladih (starih 0–19 let) je večinoma (57 %) financirana z zasebnimi transferji znotraj gospodinjstev. Javni transferji predstavljajo 40 %, medtem ko proti koncu tega starostnega razreda nekateri tudi že prejemajo dohodke iz dela, ki predstavljajo 3 %. Starejši

(stari 65 let in več) lahko financirajo primanjkljaj življenjskega cikla tudi z neto pritoki iz naslova sredstev (*asset-based reallocation*). Za kritje njihove potrošnje jim ta vir predstavlja 14 %, medtem ko večino svoje potrošnje financirajo s pomočjo javnih transferjev (80 %). Neto zasebni transferji predstavljajo 3 %, medtem ko 3 % predstavljajo dohodki iz dela, ki jih nekateri v tej starosti še vedno prejemajo. Posamezniki v starosti 20–64 let ustvarijo 49 % več, kot znaša njihova poraba. Neto pritoki iz naslova sredstev predstavljajo 6 %, izraženo glede na potrošnjo tega starostnega razreda. Iz tega presežka delovnega dohodka nad potrošnjo se financirata primanjkljaja življenjskega cikla v ostalih dveh starostnih razredih. Za financiranje zasebnih transferjev mladih in starejših zadoščajo neto transferji v višini -19 % (izraženi v odstotku glede na potrošnjo v starostnem razredu 20–64 let), medtem ko predstavljajo neto transferji za financiranje javnih transferjev -36 %. Negativne vrednosti neto transferjev pomenijo, da so odtoki večji od pritokov.

Rezultati nakazujejo, da imata zasebna in javna potrošnja komplementarno funkcijo. Medtem ko ima starostni profil zasebne potrošnje obliko obrnjene črke U, ima starostni profil javne potrošnje obliko črke U. Slednja je posledica visokih izdatkov za izobraževanje v nizkih starostnih razredih in visokih izdatkov za pokojnine, zdravstvo in dolgotrajno oskrbo v višjih starostnih razredih. Njuna vsota, ki predstavlja celotno potrošnjo, je tako relativno stabilna skozi življenjski cikel.

Empirično analizo nadaljujemo z izračuni in simulacijami, ki gradijo na dobljenih starostnih profilih. Ob tem predpostavljamo, da se relativni starostni profili v času ne spreminjajo in jih povežemo z razvojem prebivalstva skozi čas. Tako najprej pripravimo variante in projekcije prebivalstva Slovenije. Izhajamo iz Eurostatove projekcije prebivalstva iz leta 2008 (EUROPOP2008), ki jo dopolnimo s številnimi dodatnimi variantami in scenariji. Izraz »varianta« uporabimo za projekcije, ki so v demografiji ustaljene, izraz »scenarij« pa razne druge kombinacije, ki jih sami skonstruiramo.

Disertacija predstavi tudi občutljivost rezultatov projekcij prebivalstva na posamično spreminjanje predpostavk, ki v standardnih variantah projekcij ni razvidna. Projekcije prebivalstva se sicer običajno pripravijo v več variantah. Posamezne variante se razlikujejo po vseh treh predpostavkah, torej po vseh treh dejavnikih dinamike prebivalstva: rodnosti, smrtnosti in migracijah. Tako ne moremo vedeti, koliko prispeva posamezna predpostavka k skupnemu končnemu rezultatu.

Pri oblikovanju projekcij prebivalstva se poleg srednje variante običajno pripravita tudi visoka in nizka varianta, ki predstavljata zgornjo in spodnjo mejo verjetnega gibanja števila prebivalstva v prihodnje. V besedilu opozorimo, da sta ti dve varianti oblikovani z vidika vpliva na število prebivalcev in kot taki ne predstavljata zgornje oz. spodnje meje z vidika staranja prebivalstva in demografskih učinkov na finančno vzdržnost javnofinančnega sistema. S tega vidika se njihovi učinki do določene mere medsebojno izničijo, kar prikažemo tudi z izračuni. Tako je visoko (nizko) življenjsko pričakovanje iz visoke (nizke) variante, ki povečuje (zmanjšuje) število starih prebivalcev v primerjavi s srednjo varianto, do določene

mere nevtralizirano z visoko (nizko) rodnostjo in visokimi (nizkimi) neto migracijami, ki povečujejo (zmanjšujejo) število prebivalcev v nižjih starostnih razredih.

Predlagamo, da se predpostavke visoke in nizke variante za namen tovrstnih analiz ustrezno preuredijo. Predpostavka o visokem življenjskem pričakovanju iz visoke variante naj se kombinira z nizko rodnostjo in nizkimi neto migracijami iz nizke variante ter tako oblikuje neke vrste »neugoden« scenarij z vidika javnofinančne vzdržnosti in staranja prebivalstva. Analogno (a obratno) naj se kombinirajo predpostavke za »ugoden« scenarij. To teoretično priporočilo prikažemo na slovenskem primeru z vidika gibanja starostne strukture prebivalstva, v poznejši analizi pa tudi z vidika vpliva na javnofinančne izdatke za pokojnine, zdravstvo in dolgotrajno oskrbo.

Ob preizkušanju občutljivosti rezultatov projekcij prebivalstva na posamezne predpostavke ugotovimo, da poleg omenjenih treh dejavnikov na rezultate močno vpliva tudi obstoječa starostna struktura prebivalstva. Generacije, rojene v obdobju izbruha rodnosti po drugi svetovni vojni (generacije »baby-boom«), bodo v naslednjem desetletju začele intenzivno vstopati v starostni razred 65+ (ekonomsko gledano v upokojitev), medtem ko bodo generacije, rojene po letu 1980, ko se je število živorojenih močno zmanjševalo, začele vstopati v rodno (ekonomsko gledano tudi v delovno) dobo. V skladu s srednjo varianto projekcij prebivalstva naj bi se tako delež oseb, starih 65 let in več, v celotnem prebivalstvu v obdobju 2008–2060 več kot podvojil – s 16,1 % na 33,4 %. Močno povišanje napovedujejo tudi ostale variante in scenariji, v letu 2060 na raven med 26,1 % in 39,2 %.

Hkrati projekcije kažejo bistveno znižanje deleža prebivalstva v starosti 20–64 let, kjer je večina prebivalstva aktivnega. Iz 64,3 % v letu 2008 naj bi se po srednji varianti odstotek teh prebivalcev znižal na 49,1 %, po ugodnem scenariju na 50,9 %, po neugodnem na 46,6 %. Glede deleža mladih v starosti 0–19 let do bistvenih sprememb v tem obdobju naj ne bi prišlo. V srednji varianti se predpostavlja znižanje njihovega deleža z 19,6 % na 17,5 %, sicer pa v razponu med 14,1 % in 23,0 %.

Ob takem dogajanju se razmerje med starejšim (starost 65+) in delovno aktivnim prebivalstvom (starost 20–64 let) še posebno zaostri. Koeficient starostne odvisnosti starih, ki izraža število starih prebivalcev na 100 prebivalcev v starosti 20–64 let, se bo po srednji varianti tako s 25,0 v letu 2008 predvidoma povišal na 68,2 do leta 2060 (na 51,3 po ugodnem scenariju in 84,1 po neugodnem scenariju). To napoveduje močan pritisk na javnofinančne izdatke, povezane s staranjem, ki so v doktorski disertaciji tudi posebej obravnavani.

V nadaljevanju prikažemo koncepta »prve demografske dividende« in »druge demografske dividende«, s katerima lahko analiziramo povezavo med demografskim in ekonomskim dogajanjem. Če predpostavljamo ohranjanje izračunanih starostnih profilov tudi v prihodnje, se bodo skupaj s spreminjanjem starostne strukture prebivalstva spreminjali tudi prihodnji agregatni dohodki iz dela in prihodnja agregatna potrošnja. Koncept omenjenih dveh demografskih dividend je tesno povezan z demografskim prehodom.

Na določeni stopnji razvoja se začne smrtnost prebivalstva zniževati in se po določenem obdobju upadanja ustali na nizki ravni. Podobno velja za rodnost, le da se njeno upadanje začne pozneje. To obdobje »demografskega prehoda« (Malačič, 2006) ima poleg vpliva na (povečano) število prebivalstva tudi bistven učinek na spremembo starostne strukture. Z upadanjem rodnosti je rast delovne sile hitrejša od rasti vzdrževanega prebivalstva (otrok), kar pomeni, da se gospodarstvo do določene mere razbremeni. Sredstva se tako lahko namenijo za investicije v ekonomski razvoj in blaginjo. Ob vsem ostalem nespremenjenem se dohodek na prebivalca zaradi tega povečuje hitreje. V stroki se to poimenuje »prva demografska dividenda«. Vendar začne sčasoma nižja rodnost zniževati stopnjo rasti delovne sile. Na drugi strani se z nadaljnjim zniževanjem smrtnosti povečuje število starih prebivalcev. Ob vsem ostalem nespremenjenem postane zaradi tega prva demografska dividenda sčasoma negativna.

Slovenija je od leta 1950, s katerim v pričujoči analizi pričnemo analizo demografskih dividend, pa vse do pred kratkim uživala pozitivno prvo demografsko dividendo. V povprečju je output na efektivnega potrošnika iz tega naslova rasel v razponu do dodatne 0,5 odstotne točke letno. Trenutno smo ravno priča prehajanju prve demografske dividende s pozitivnih na negativne vrednosti, kar smo približno pričakovali v naši naslednji hipotezi, ki je bila s tem potrjena. Predvidoma bo prva demografska dividenda ostala negativna skozi prihodnjega pol stoletja, z najnižjimi vrednostmi okrog leta 2020. Takrat naj bi njen učinek znašal kar okrog -1,0 odstotne točke letno.

Nastopi lahko tudi druga demografska dividenda. S podaljševanjem trajanja življenja se namreč lahko povečuje akumulacija sredstev (*accumulation of wealth*), saj si ljudje hočejo zagotoviti sredstva za (daljše) obdobje upokojenosti (R. Lee & Mason, 2006). Pri tem ne gre za avtomatizem, temveč za »okno priložnosti« (*window of opportunity*), ki je lahko (ali pa tudi ne) izkoriščeno. V Sloveniji bo pozitiven učinek druge demografske dividende predvidoma zelo majhen, saj so rezultati NTA pokazali, da se starejši (65+) naslanjajo predvsem na javne transferje, ne pa na neto pritoke iz naslova sredstev. Podaljševanje pričakovanega trajanja življenja jih tako ne spodbuja kaj dosti k akumulaciji sredstev, kar bi imelo pozitivne ekonomske učinke.

Neodvisno od običajnih analiz v okviru NTA smo na osnovi dobljenih in nadalje razčlenjenih starostnih profilov oblikovali kohortni model za simuliranje dolgoročnih učinkov spreminjanja demografske strukture na javnofinančne prihodke in izdatke. Model je celovit, saj vključuje vse javnofinančne prihodke in izdatke. Poleg tega omogoča najrazličnejše simulacije, vključno z učinki blažitve naraščajočih pritiskov na dolgoročno vzdržnost javnofinančnega sistema. Tehnično temelji na modelu generacijskih računov (Sambt, 2004), vendar javnofinančnih prihodkov in izdatkov ne spremlja samo po kohortah, temveč tudi po koledarskih letih. Za razliko od metode generacijskih računov, kjer so predpostavke glede prihodnjega gibanja makroekonomskih kategorij zelo poenostavljene z arbitrarno določenimi parametri, ta model upošteva najnovejše predpostavke Evropske komisije glede prihodnjega gibanja produktivnosti dela, gibanja stopenj aktivnosti po posameznih starostnih razredih ipd. Hkrati samostojno izračunava rast BDP, ki je referenčna kategorija za izražanje rezultatov. Na

ta način npr. sprememba izbrane variante projekcij prebivalstva vpliva tako na javnofinančne izdatke kot tudi na BDP kot referenčno kategorijo. Hkrati vključuje rezultate simulacije učinkov različnih parametrov pokojninske zakonodaje, da bi dosegel čim večjo realističnost rezultatov glede projekcij pokojninskih izdatkov. Upošteva tudi povezavo med stopnjami aktivnosti in upokojenosti za simuliranje vplivov v primeru spreminjanja stopenj aktivnosti itd.

Izračuni kažejo, da naj bi se v projekcijskem obdobju 2008–2060 javnofinančni prihodki, izraženi kot delež v BDP, nekoliko znižali (z 41,8 % na 38,5 %). Javnofinančni izdatki pa naj bi se močno povišali zaradi izdatkov za pokojnine, zdravstvo in dolgotrajno oskrbo, kar je povezano predvsem s starejšim prebivalstvom v starosti 65 let in več. Delež te starostne skupine pa se bo, kot smo že omenili, predvidoma močno povečal. Primarni izdatki (brez upoštevanja plačil obresti na javni dolg) naj bi tako narasli s 40,4 % v letu 2007 na 55,0 % v letu 2060. Celotni javnofinančni izdatki pa bi zaradi plačevanja obresti na izjemno visok in hitro naraščajoči javni dolg narasli kar na 73,4 % BDP.

Delež javnofinančnih izdatkov za pokojnine naj bi v tem obdobju porasel z 10,1 % na 19,8 %, delež zdravstvenih izdatkov s 4,5 % na 7,3 %, delež izdatkov za dolgotrajno oskrbo pa z 1,0 % na 3,2 %. Vsi prikazani rezultati se nanašajo na srednjo varianto projekcij prebivalstva. Naredili smo test občutljivosti rezultatov za te tri kategorije izdatkov na uporabljene variante in scenarije projekcij prebivalstva. Vsi dobljeni rezultati napovedujejo bistveno povečanje deleža teh treh vrst javnofinančnih izdatkov v prihodnje. Izračuni torej kažejo, da obstoječi javnofinančni sistem v kombinaciji s predvidenimi prihodnjimi demografskimi gibanji na dolgi rok ni vzdržen. To smo trdili v naslednji izmed hipotez disertacije in jo s temi izračuni potrdili. Pri tem je treba poudariti, da simulacije niso mišljene kot napovedi prihodnjega dogajanja v smislu, da bi verjeli, da se bodo uresničile. Pravzaprav so zelo nerealistične, saj si ne bo mogoče dovoliti niti približno tako visokega povišanja javnofinančnih izdatkov. Namen je, da se prikaže, kam bi obstoječa ureditev javnofinančnega sistema v kombinaciji s predvidenimi prihodnjimi demografskimi dogajanji vodila. Kaže na resnost problema in potrebo po ukrepanju.

Prvi izmed ukrepov za izboljšanje dolgoročne vzdržnosti javnofinančnega sistema, ki ga predstavimo, je poviševanje starosti ob upokojitvi. Obdobje projekcij od začetka leta 2015 do začetka leta 2060 razdelimo na tri petnajstletna podobdobja. Rezultati kažejo, da bi se za ohranjanje izdatkov za pokojnine v BDP na približno nespremenjeni ravni morala efektivna starost ob upokojitvi poviševati za približno 4–5 let na vsakih 15 let. S približno takim tempom poteka tudi zakonsko poviševanje starostne meje za upokojitev žensk v obdobju 1999–2014. Seveda se moramo zavedati, da se zakonsko in efektivno poviševanje starostne meje lahko precej razlikujeta.

Če bi bilo poviševanje starostne meje nižje od omenjenih od 4–5 let na vsakih 15 let, bi delež javnofinančnih izdatkov za pokojnine v BDP še vedno naraščal, vendar manj kot v osnovni varianti. Za vsako leto povišanja starosti ob upokojitvi (v vsakem petnajstletnem obdobju –

torej za vsaka 3 dodatna leta v celotnem obdobju 2015–2060) bi bil delež pokojnin v BDP v letu 2060 za nekaj manj kot 2 odstotni točki nižji. Močan pozitivni učinek tega ukrepa prihaja tako iz naslova nižjih izdatkov za pokojnine, saj se ljudje pozneje upokojujejo, kakor tudi višje rasti BDP (pa tudi javnofinančnih prihodkov), saj ljudje dalj časa proizvajajo.

Naslednji ukrep, za katerega smo naredili simulacije, je zniževanje pokojnin. Njegov učinek na višino izdatkov za pokojnine je očiten in preprosto izračunljiv, zato smo raje preusmerili pozornost na prikaz rezultatov po posameznih kohortah. S proučevanjem učinkov zniževanja pokojnin na posamezne kohorte se približamo ideji modela generacijskih računov. Menim, da bi morala modela generacijskih računov in NTA tehnično čim bolj konvergirati, saj bi tako lahko z manj dodatnega napora dobili rezultate obeh metod, ki se lepo dopolnjujejo. Opisani model je korak v to smer. Da bi prikazali njegovo uporabo, predpostavljamo, da se vlada odloči naraščajočim javnofinančnim izdatkom za pokojnine v BDP postaviti zgornjo mejo. Ne verjamemo namreč, da bi vlada dovolila njihov porast na tako visoke ravni, kot smo prikazali v izračunih. Predpostavljamo, da vlada z ustreznim zniževanjem pokojnin zagotavlja, da delež v BDP ne preseže vnaprej določene ravni. Zniževanje pokojnin je po predpostavki enako za vse starostne skupine in za vse pokojnine (ne glede na vrsto ali višino).

Ugotovimo, da se učinki na posamezne generacije oziroma kohorte močno razlikujejo glede na to, kdaj je ukrep uveden. Čim pozneje se ukrep uvede, manj prizadene starejše generacije, ki medtem pokojnine črpajo v nezmanjšanem obsegu. Breme zniževanja pokojnin tako doleti pretežno ali izključno mlajše generacije. Pri izračunu uporabimo diskontno stopnjo 5 %, ki je običajna predpostavka v izračunih generacijskih računov. Tako bi npr. pri omejevanju deleža pokojnin v BDP na 14 % ta ukrep posameznikom v starosti 60–64 let zmanjšal diskontirano vrednost pokojnin, prejetih v preostanku življenja, zgolj za 0,6 %, hkrati pa bi za posameznike v starosti 35–39 let znižanje znašalo kar 14,1 %.

Razlog za te izračune je bila tudi trenutna pokojninska ureditev v Sloveniji. Ta namreč v 151. členu Zakona o pokojninskem in invalidskem zavarovanju (ZPIZ-1-UPB4) pravi, da »… se za zagotovitev enakopravnega položaja med upokojenci, ki so se upokojili v različnih obdobjih, opravi uskladitev med pokojninami, uveljavljenimi v tekočem letu, in pred tem uveljavljenimi pokojninami«(PDIA-1999 (Pension and Disability Insurance Act) [in original: Zakon o pokojninskem in invalidskem zavarovanju], 1999). Čeprav zveni omenjeno določilo pravično, se je dobro zavedati, da bo različnim generacijam različno znižalo sedanjo vrednost pokojnine v primerjavi z referenčnim scenarijem – to je v primerjavi s scenarijem, če zniževanja ne bi bilo.

Na tem mestu se tematika neposredno dotakne vprašanja odnosov med generacijami in vprašanja moči v »medgeneracijskih pogajanjih«. Ta pogajanja so zelo neenakopravna, saj otroci (pa tudi prihodnje generacije) v njih tako rekoč nimajo svojih predstavnikov, medtem ko je politična moč starejših generacij zelo velika. Njihova volilna moč ne izhaja samo iz velikega deleža teh volivcev (ki se bo v prihodnje še močno povečal) in njihovega nadproporcionalnega udeleževanja volitev (še zlasti v primerjavi s tistimi v starosti 18–30 let),

ampak tudi iz tega, da imajo pri tem odločanju zelo jasen kriterij – ali jim je obljubljeno povišanje pokojnine in razne ugodnosti, predvsem v zvezi z zdravstvom in dolgotrajno oskrbo. Volivci s tako ozkimi interesi imajo v demokraciji nadproporcionalen vpliv, saj ne drobijo svojih glasov zaradi nasprotujočih si interesov na drugih področjih (Thurow, 1999). Pri tem pa se ustvarjajo močni pritiski na javnofinančni sistem, hkrati pa se ti izdatki »bojujejo« z drugimi javnofinančnimi kategorijami, ki jih družba potrebuje za uspešno prihodnost – npr. z investicijami v infrastrukturo, izobraževanjem, raziskovalno dejavnostjo ipd.

Tako sistem sprotnega prispevnega kritja (pay-as-you-go) kot sistem vplačevanja na individualne račune imata prednosti in pomanjkljivosti, zato se priporoča uporaba kombinacije obeh sistemov (Blanchet & Kessler, 1992; Lindbeck & Persson, 2003). Breme (delnega) preoblikovanja sistema pay-as-you-go v sistem individualnih računov, ki je manj občutljiv na demografska gibanja in ekonomsko učinkovitejši (Feldstein & Samwick, 1998), pade na mlajše generacije. Te morajo tako še naprej vzdrževati prvega, kar je vedno težje, in hkrati vplačevati v drugega. Simulacije kažejo, da so bremena zelo velika, kar je pokazala tudi simulacija za primer Slovenije (Bole, 1998), zato se priporoča izbira dolgega obdobja prehoda in s tem razporeditev bremen na daljše obdobje in na veliko generacij. Pareto učinkovitega prehoda seveda žal ni (npr. Peters, 1992). Tako se v povezavi z odnosi med generacijami pojavljajo izrazi, kot so »prihajajoča generacijska nevihta« (Kotlikoff & Burns, 2004), »vojna med generacijami« (Gokhale & Kotlikoff, 2001), medtem ko nekateri vidijo v tem procesu celo grožnjo obstoju demokracije v prihodnje (Thurow, 1999).

Rezultati za Slovenijo postanejo še zanimivejši, če jih lahko primerjamo z rezultati drugih držav. Ta možnost je še zlasti aktualna zaradi uporabe usklajene metodologije, velikega števila vključenih držav v projekt NTA, v katerega je vključena tudi Slovenija, in njihove raznolikosti. Če rezultati določenih kategorij odstopajo od rezultatov za druge države, lahko neobičajno ureditev razumemo tudi kot priporočilo za premislek o morebitnih spremembah.

Rezultati kažejo, da se Slovenija od drugih držav izrazito razlikuje glede starostnega profila dohodka iz dela. Ta začne naraščati pozno, medtem ko se na drugi strani njegovo upadanje začne najhitreje izmed vseh vključenih držav. Slovenija ima dolgo tradicijo zgodnjega upokojevanja. Ta se je v začetku 1990-ih še posebno utrdila, ko je bilo predčasno upokojevanje način blažitve visoke brezposelnosti. Kot kaže, tudi ukrepi poviševanja starosti ob upokojitvi, ki so sledili (predvsem ukrepi pokojninske zakonodaje), niso odpravili te posebnosti. Primerjava rezultatov z drugimi državami tako kaže, da bi prikazano podaljševanje starosti ob upokojitvi lahko bil eden izmed prvih ukrepov za blažitev predvidenih naraščajočih javnofinančnih izdatkov za pokojnine v prihodnje.

Razlog za pozno vstopanje na trg dela je po našem mnenju med drugim tudi to, da so študenti v Sloveniji deležni relativno visokih ugodnosti, zato se jim ne »mudi« na trg dela. Med drugim je pomembna davčna obremenitev študentskega dela, ki je bistveno nižja kot za običajnega zaposlenega. Ob predpostavljanju, da oba prejmeta na koncu enak neto znesek

(enak takratni povprečni plači v Sloveniji), smo izračunali, da je bil v letu 2004, na katero se nanaša analiza NTA, strošek študentskega dela za delodajalca za 40 % nižji kot strošek običajnega delavca. Gre torej za zelo privlačno obliko dela tako za študente kot za delodajalce. Delodajalec poleg nizkih stroškov dela s tem dosega tudi visoko fleksibilnost zaposlovanja, saj lahko s študentom zelo preprosto prekine sodelovanje, medtem ko je običajnega delavca težko odpustiti. Podatki »Ankete o porabi v gospodinjstvih« kažejo na visoko vključenost študentov v študentsko delo in relativno visoke dohodke iz tega naslova. Žal pogosto ob tem trpi kvaliteta študija, ki se zato podaljšuje, ali pa študenti študij podaljšujejo namenoma za ohranjanje študentskega statusa. Z vidika javnofinančnega sistema je taka ureditev izrazito neugodna. V zadnjem času se je študentsko delo nekoliko omejilo, vendar je še vedno zelo razširjeno.

Glede potrošnje je za Slovenijo značilen visok delež javne potrošnje, kar je značilnost razvitih držav, še zlasti evropskih. Glede na rezultate k temu deloma prispeva tudi to, da gre za bivšo socialistično državo, saj se je v regresijski analizi neprava spremenljivka statusa bivše socialistične države izkazala kot statistično značilna. Zaradi visokega deleža javnega financiranja je delež zasebnih transferjev, še posebno za izobraževanje, manjši. Kot smo povedali, se stari (65+) prebivalci zanašajo predvsem na javne transferje, kar Slovenijo prav tako uvršča v skupino razvitih evropskih držav. Na drugi strani pa ta starostna skupina v ZDA uporablja za pokrivanje primanjkljaja pretežno (dve tretjini) dohodke, ki izvirajo iz sredstev. Japonska je glede tega deleža nekje vmes med ZDA in evropskimi državami. V manj razvitih državah je lahko delež javnega sektorja bistveno manjši, tako da je velik delež primanjkljaja financiran z zasebnimi transferji ali pa skoraj v celoti z neto pritoki iz naslova sredstev. Na splošno obstajajo med razvitimi in manj razvitimi državami glede rezultatov velike razlike. Hkrati so razlike lahko tudi med državami na približno enaki stopnji razvitosti velike, kar je bila še zadnja hipoteza doktorske disertacije, ki smo jo na osnovi teh rezultatov prav tako potrdili.

Zadnji del disertacije je namenjen predstavitvi prispevkov in smeri nadaljnjih analiz. Eden izmed prispevkov disertacije je celovita predstavitev osnovne metodologije NTA, ki je bila v času nastajanja disertacije še v fragmentih. Nadalje, aplikacija metodologije na slovenski primer nam kaže celovito sliko o ekonomskih tokovih med posameznimi starostnimi razredi. Ti rezultati so lahko vhodni podatki za različne prihodnje analize in kot taki so po našem mnenju nadaljnji pomemben prispevek.

Na podlagi rezultatov NTA lahko Slovenijo primerjamo z drugimi državami, vključenimi v analizo, in tako identificiramo slovenske posebnosti. Te so lahko smernica za morebitne spremembe v prihodnje. Hkrati so rezultati zanimivi za mednarodni projekt (NTA) kot tak, saj gre za specifično državo v svetovnem kontekstu – predvsem z vidika posebne oblike socializma, ki ga je imela v preteklosti in ki se odraža še v sedanjosti – tudi v rezultatih NTA.

Naslednji prispevek vidimo v predstavitvi posameznih dejavnikov dinamike prebivalstva (rodnosti, smrtnosti in migracij) z vidika rezultatov projekcij prebivalstva. Kot je bilo že

omenjeno, se namreč po navadi projekcije prebivalstva oblikujejo v omejenem številu variant (poleg srednje običajno še visoka in nizka), ki se med sabo razlikujejo tako glede rodnosti kot tudi smrtnosti in neto migracij. Zato uporabniki – tudi npr. oblikovalci ekonomskih politik – ne morejo imeti predstave o tem, kolikšen je vpliv posameznega dejavnika. Pojavijo se lahko neutemeljena pričakovanja, da bo problem staranja prebivalstva in njegovih učinkov na javnofinančni sistem rešen z rahlim dvigom stopnje rodnosti ali nekoliko višjim priseljevanjem.

Menimo, da bo disertacija pripomogla k boljši predstavi o vplivu oziroma dometu posameznega demografskega dejavnika in o pričakovanem razponu rezultatov glede staranja prebivalstva in prihodnjih pritiskov na javnofinančni sistem. Hkrati analiza zagotavlja natančnejše rezultate glede vpliva sprememb v demografski strukturi na gospodarsko rast (prva demografska dividenda), kot je to bilo prej. Upošteva namreč, koliko posamezniki trošijo in koliko proizvajajo skozi celotni življenjski cikel in s tem vplivajo na gibanje efektivnih proizvajalcev in potrošnikov.

NTA so zagotovili starostne profile, na osnovi katerih smo oblikovali kohortni model, ki predstavlja celovito orodje za preučevanje gibanja javnofinančnih izdatkov in prihodkov v prihodnje. Simuliramo lahko učinke različnih projekcij prebivalstva, učinke zviševanja starosti ob upokojitvi, učinke zniževanja višine pokojnin na posamezne starostne skupine in še nekatere druge. Ocenjujemo, da gre za pomembno orodje, ki je lahko praktičen pripomoček za pripravo podlag ukrepov za izboljševanje dolgoročne vzdržnosti javnofinančnega sistema.

Menimo, da z doktorsko disertacijo pomembno prispevamo k razumevanju transferjev med posameznimi starostnimi skupinami, kar postaja s hitrim spreminjanjem starostne strukture prebivalstva vedno bolj aktualno, in učinki staranja na starostno strukturo in vzdržnost javnofinančnega sistema. Z dobljenimi rezultati in idejami se odpirajo številne nove raziskovalne možnosti. Tako bi lahko preučili, kako se je potek transferjev v Sloveniji spreminjal skozi čas. V slovenskem primeru bi bilo ob pestrem dogajanju v preteklosti na tem področju to še posebno zanimivo. Priča smo bili spreminjanju družbenoekonomskega sistema, nacionalizaciji, denacionalizaciji, odkupom družbenih stanovanj po skoraj simbolnih cenah in raznim drugim transferjem. Seveda se ob tem postavlja vprašanje o možnosti pridobitve ustreznih podatkov.

Sistem tokov med posameznimi starostnimi skupinami, kot smo ga predstavili v disertaciji, nameravamo v prihodnje dopolniti še s transferji v obliki kapitala, kjer pričakujemo, da bodo še zlasti pomembne dediščine. Še nadaljnji korak bi bila vključitev računov premoženja, ki bi ugotavljali spreminjanje vrednosti oziroma cene kapitala. Prav tako bi bilo mogoče natančneje razčleniti posamezne kategorije, npr. tokove na osnovi sredstev, ki smo jih zaenkrat prikazali kot eno kategorijo. Rezultate, ki so zaenkrat izračunani kot ostanki, bi bilo koristno primerjati z neposredno izračunanimi starostnimi profili, če bi imeli na voljo potrebne podatke.