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HEALTH EXPENDITURE SCENARIOS IN THE NEW MEMBER STATES

COUNTRY REPORT ON HUNGARY

ANDRÁS GÁBOS
RÓBERT IVÁN GÁL

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A brief description of the AHEAD project and a list of its partner institutes can be found at the end of this report.

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András Gábos & Róbert Iván Gál*

Introduction

The sustainability of welfare systems (including health care) has been the focus of public policy debates over recent decades. This challenge gives an accentuated importance to the long-term projections in this field. While projections on pension expenditures can rely on relatively simple assumptions, those on future expenditure in public health care remain uncertain due to the number and complexity of influencing factors.

The Hungarian public health care system already faces a considerable deficit. While Hungary managed successfully to shift from an integrated health care to a contract system, a social health insurance scheme has been implemented and the role of private sector has increased considerably, the funding of health services is nevertheless not secure.[1] Additionally, there are no effective incentives or control mechanisms built into the system to avoid unnecessary provision of services and to provide definitive care at the lowest possible level. (Gaál, 2004)

The health status of the Hungarian population is at the top of the list of challenges that the health care system must face. Hungarian mortality rates have not changed since 1980s and are well above the EU average. Cardiovascular, cerebrovascular, circulatory diseases and cancer account for over 60% of deaths. While mortality due to ischaemic heart disease remains high, mortality rates from cerebrovascular disease have fallen slightly. Deaths from chronic liver diseases and cirrhosis have risen dramatically. Unhealthy lifestyles, such as high consumption of alcohol, increasing rates of smoking and a high fat and high sugar diet, are thought to be important causative factors in explaining these trends. The factors contributing to the health status of a population are complex, however, and include social and economic factors as well as access to good health services. (Remák, Gál, Németh, 2004)

Hungary faces the same or even greater challenges in other fields related to the health sector to many other European countries. The level of fertility is among the lowest in Europe, while figures of life-expectancy are the worst in the EU25 for most adult age-sex groups, especially for males aged between 40 and 60 years. Due to these trends the Hungarian population has been decreasing year by year since 1981. The Hungarian labour market is characterised by relatively low unemployment rates, but also by low activity rates. In addition, high inequalities in tax and social security contribution payment can be observed, which means that relatively few contributors finance extended programs. Figures of economic growth in Hungary have been

* András Gábos and Róbert Iván Gál are with the TÁRKI Joint Research Centre. The athors are indebted to Péter Mihalicza (ESKI, previously Ministry of Health) for his valuable help in collecting and interpreting data.

[1] For a detailed presentation of organizational, management and financial structure of the Hungarian health care system see e.g. Gaál (2004), Orosz and Burns (2000), Ferguson and Irvine (2003), Remák, Gál and Németh (2004).

higher than those of the EU25 in the last years, but currently the country's economic performance is poor compared to that of other economies in the region, and short-term prospects are discouraging (Convergence Program, 2006; Kopint-Tárki, 2007).

This country report aims to give an estimation of the development of public health care expenditures in Hungary during the first half of the 21st century. The model used for analysis is the ILO social budget model. Since this model is a full budget model, it includes not only the expenditure side, but the revenue side also. The structure of the model is presented in Section 2 of this report following a discussion of the long-term projections recently prepared for the Hungarian health care system (Section 1). The third section contains a review of main databases used by the model, while the fourth describes the underlying assumptions and development of main variables of the baseline scenario. The second part of the same section discusses alternative assumptions, aiming to provide sensitivity analyses for the baseline scenario. Results of both the baseline scenario and sensitivity analyses are presented in Section 5. Section 6 summarises these results and draws conclusions, while the final section formulates some policy recommendations based on the findings of our model (Section 7).

1. Health care expenditure models applied in Hungary

While debates on the future of Hungarian health care system are on the agenda and even some steps towards reform have been made, the number of studies aimed at a long-term projection of expenditures is limited. Two works can be mentioned here that aim in one way or another to predict the trends in health expenditure for Hungary.

Orosz (2003) tried to answer how utilisation, unit cost and per capita expenditures are influenced by age, by closeness-to-death and by special characteristics of service types. The analysis uses a 0.5% sample of the total population provided by the National Health Insurance Fund (NHIF) for the reference year, 2002. The author concluded that when considering all services, closeness-to-dead is the most important influencing factor of the health services' unit cost. In estimating the direct effect of ageing she found that two-thirds of the difference of per capita age specific expenditures between people aged 80+ and young adults can be attributed to ageing and one third to closeness-to-death. When considering only in-patient care however, these rates are inverse. One of the main findings of this research was that ageing and closeness-to-death influence in different ways the utilisation, the unit cost and the full cost of service types.

Hungary was included a recent project of the European Commission, coordinated by the DG ECFIN that aimed to estimate the effect of ageing on public expenditures in the EU25 member states in the long-run. (European Commission 2006) A separate estimation was made for long-term care expenditure as well. While for both the model of new member states in the AHEAD project and that of the DG ECFIN similar sets of factors (demography, labour market, economy, utilization o health care systems) were taken into account, the model of DG ECFIN covers only the expenditure side. The pure ageing scenario of DG ECFIN predicts for Hungary a 1.0 percentage point increase in public health care expenditure relative to GDP between 2004 and 2050 (from 5.5% to 6.5%). (European Commission, 2006) The death-related cost scenario estimates only a 0.5 percentage point increase for the same period.

2. Synthetic description of the ILO health budget model

The model used for the long-term projection of health care expenditure within the framework of the AHEAD project is an adjusted version of the ILO social budget model.2 While most of the models in this field (EcoFin, OECD, AGIR) concentrate solely on expenditure side, the original social budget model as well as the adjusted health model includes both expenditure and revenues sides. Therefore, we have a full budget model, that could be summarized by the following formula:[3]

TF + SI + UC + PI = P × Q = W × Z

REVENUES = COSTS = OUTPUT VALUE,

where:

TF = sum of taxation
SI = social insurance contributions
UC = out of pocket payments and user charges
PI = voluntary or private insurance premiums
P = price
Q = quantity of goods and services
W = income of health services providers
Z = price of inputs

The ILO model itself is a system of Excel files that follows a structure compatible with the above-described model. The central module of the model containing the budget itself receives input data from four different external modules: the demographic module, the labour supply module, the economic module and the health care utilisation (j-curve). The demographic module also serves as an input for the labour supply module. The projection made by the model which ran until 2050. 2002 was chosen as year for Hungary. Structure and variable development of all of these modules is broadly discussed in Section 4. Following on in this section, the central module comprising the health budget itself is briefly described.

2.1 Expenditure side

The expenditure side of the model is based on two inputs characterising the base year of the model: the National Health Accounts (NHAs) describing the aggregate patterns and the health care utilisation patterns by age. The projection extrapolates the patterns using assumptions on the development of demographic and economic parameters. The model uses matrices obtained from the NHAs, presenting expenditure data by provider, category and sources of financing and functions. Health care utilisation by age comes from estimations based on a 0.5% sample of the population. These databases are presented briefly in Section 3. The input module of the model makes additional assumptions on future health expenditures. These assumptions establish yearly increase rates that are independent of demographic trends for utilisation and non-staff costs, as well as similar rates for staff costs and investments. However the model incorporates a separate module for long-term care, this sector is not considered in our projection due to lack of comprehensive data.

Total public expenditure is composed of three dimensions: by sector (social insurance and government), by health care provider (in-patient, out-patient, drugs and other supply) and by

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[2] The original model is presented by Scholz,, Cichon and Hagemejer (2000). See also Cichon et al.

[3] Source: Mossialos, E., A. Dixon, J. Figueras and J. Kutzin (2002): *Funding health care: options for Europe*. European Observatory on Health Care Systems Series. Open University Press, WHO.

category (staff, material and other). For both inpatient and outpatient care, staff and non-staff cost components are estimated separately, based on data from NHAs. The model estimates hospital care expenditure for base years by using utilisation, average length of stay and average costs, while estimating utilisation and average costs in the case of outpatient care expenditure. Utilisation is calculated as sum of age specific utilisation. For this exercise, average utilisation rates estimated from individual data were used, these rates being multiplied by population belonging to the respective age group. Utilisation rates are held constant for the whole period of analysis, the development of expenditures are driven by demographic trends in this dimension. Average length of stay as well as average costs are also kept constant. Expenditures are also separately estimated for the insured and non-insured population, assuming that the Government vouches for the latter group.

The model has four originally built-in scenarios that contain additional assumptions on yearly cost increase in health expenditure:

- scenario I.: increase separated for wage and non-wage share;
- scenario II.: increase with same rate as GDP/capita;
- scenario III.: increase with same rate as GDP/employment;
- scenario IV.: elasticity over unity of expenditures over labour productivity.

Only the second out of these built-in scenarios was considered. However, alternative scenarios on assumptions of the expenditure side were run, which are discussed in detail in Section 4.5.

2.2 Revenue side

Two main components of the revenue side can be distinguished: total income from contribution and transfers from the state budget. Revenues from contributions are estimated separately for employed, self-employed, unemployed and pensioners. The module estimates the amount of income subject to contributions for each of the above mentioned groups and then calculates the total revenue from contributions, taking into account the actually valid contribution rate.

On the revenue side an additional element was introduced for Hungary. Next to the earnings-related health contribution, a lump sum contribution was introduced for employers in 1997. This lump sum contribution amounted to 1,800 HUF in 1997 and obtained its peak exactly in the base year of the model at 4,500 HUF/month. Revenue collected in this way amounted to 185 billion HUF in 2002 and this sum represented almost one quarter of total NHIF revenues. The Government abolished the lump sum contribution from the beginning of 2007 and increased the earnings-related contribution in parallel. The model takes into account all of these changes.

The annual total of transfers from the state budget is estimated from the situation characterising the base year. We calculated the ratio of government transfers towards the NHIF relative to the revenues from contributions, and found that the proportion remained constant for the whole period under analysis.

2.3 Results

As earlier was stated, the ILO model adjusted for purposes of the AHEAD project is a full budget model. Consequently, results of the model include long-term projection for expenditures and revenues of the public health care system, as well as for the deficit/surplus of the same system. Estimates on level of premium required to close revenue and expenditure gaps are undertaken as well. The model gives estimates for the entire public health budget and the social security system independently. All these results are presented in absolute values (billions of HUF), as well as relative to GDP.

3. Data sources for the ILO health budget model

3.1 National Health Accounts

The System of Health Accounts (SHA) was implemented by the Health Policy Unit at the OECD together with local experts in Hungary.[4] The work began at the Hungarian Central Statistical Office (HCSO). Hungarian Health Accounts were compiled for four years, 1998-2001. Although main aggregate figures are available for the years 2002 and 2003, the 2001 wave of NHAs still remains the last one to supply detailed data by health care providers, sources of financing and functions. Starting from this fact, cross tables for 2001 were used in the ILO health budget model for Hungary, corrected to generate 2002 aggregate figures (marginals). An iteration process took place, where holding constant the internal distribution of the tables marginal distribution for the year 2001 was approached in a few steps to the 2002 marginal values. The cross-table used by the model as main input is presented in the Annex 1, while we present below the cross-tables used in the model.

According to 2002 data, total expenditure on health care in Hungary is around 1,300 million NCU (HUF). The main source for this expenditure is the Social Security Fund with approximately 760 million NCU. The private sector contributes 390 million NCU to the costs, while central government supplies an additional 180 million NCU. The Fund's deficit in 2002 was about 87 million NCU. The deficit has steadily increased annually since then: it was 310 million NCU in 2003, 340 million NCU in 2004, and was expected to reach 400 million NCU in 2005. The rapid increase in the Fund's deficit, according to some experts, occurred due to the discontinuation of lump-sum contributions. Some notes should be made here concerning the Hungarian NHIF deficit, which is considerable not only *per se*, but by international comparison as well.

- As regulated by law, the Fund's deficit is fully supported by the central budget.
- Social contributions are not explicitly paid after children and pensioners. Considering this fact, some experts argue that the deficit would disappear if these contributions were explicitly paid by central government.
- The NHIF finances not only health care services, but cash benefits as well, namely (expenditures in billion NCU in 2002[5]):
  - *sick-pay* (81);
  - *pregnancy and confinement benefit*, which is an earnings-related cash benefit received during the maternity leave (16);
  - *disability* and *accident pension* (180);
  - *survivor's pension* (7);
  - other pensions (8).

  Child care fee (earnings-related maternity benefits received until the second birthday of the child, 38) are also financed by the NHIF, but are explicitly reimbursed by the central budget. The total amount of cash benefits inside the Fund's budget was 336 billion NCU for the year 2002, including child care fee and 298 billion NCU excluding it.

[4] http://www.oecd.org/dataoecd/53/42/33740640.pdf

[5] Data were provided by ESKI (National Institute for Strategic Health Research), a methodological research institute owned by the Ministry of Health. Detailed data are available at http://www.eski.hu/new3/adatok_en/adatok_tablazatok_en.php.

Table 1. Current health care by provider and sources of financing – Hungary, 2002[1] (million HUF)

	General Government		Private Sector						
	General Government (excl. Social security)	Social Security Funds	Private Social Insurance schemes	other private insurance schemes	Private out-of pocket payments[2]	Non-Profit institutions (other than social insurance)	Corpo-rations	Rest of the world	Subtotal
	in mio. of local currency (current prices)								
Hospitals	40 501	377 630	-	-	41 089	-	-	-	**459 219**
Nursing and residential care facilities	7 817	728	-	-	3 008	-	-	-	**11 553**
Providers of ambulatory health care	42 787	104 879	-	-	150 011	-	-	-	**297 678**
Retail sale and other providers of medical goods	21 679	234 961	-	-	164 104	-	-	-	**420 744**
Provision and administration of public health	39 562	8 695	-	-	28 938	-	-	-	**77 195**
General health administration and insurance	9 784	15 268	-	-	15	-	-	-	**25 067**
Governmental administration of health	4 784	-	-	-	-	-	-	-	**4 784**
Social Security Funds	-	15 268	-	-	-	-	-	-	**15 268**
other social Insurance	1 284	-	-	-	-	-	-	-	**1 284**
Other industries (rest of the economy)	8 284	-	-	-	-	-	-	-	**8 284**
Occupational health care services	-	-	-	-	-	-	-	-	**-**
Private household as providers of home care	-	-	-	-	-	-	-	-	**-**
All other secondary producers of health care	-	-	-	-	-	-	-	-	**-**
Rest of the world	-	-	-	-	-	-	-	-	**-**
Unclassified	-	-	-	-	-	-	-	-	**-**
Total current expenditure on health care	**176 482**	**757 429**	**-**	**-**	**387 165**	**-**	**-**	**-**	**1 299 740**
Gross Capital Formation	*9 825*	*42 165*	-	-	-	-	-	-	*51 990*

Source: Hungarian NHA 2001, OECD Health Data for year 2002.

Notes. 1. The matrix is based on data from 2001. Sub-total ratios by functions did not change in 2002.

2. No break down to private categories available. Here we ascribe everything to out-of-pocket.

Table 2. Current health expenditure care by provider and functions[1] – Hungary, 2002

	Services of curative care	Services of rehabilitative care[2]	Services of long-term nursing care	Ancillary services to medical care	Medical goods dispensed to outpatients	Prevention and public health services	Health admin. and health insurance[3]	Subtotal
Hospitals	90%	-	3%	7%	-	0%	0%	**100%**
Nursing and residential care facilities	39%	-	56%	0%	-	4%	-	**100%**
Providers of ambulatory health care	82%	-	0%	15%	-	1%	1%	**100%**
Retail sale and other providers of medical goods	-	-	-	-	100%	-	-	**100%**
Provision and administration of public health	8%	-	0%	-	-	92%	-	**100%**
General health administration and insurance	5%	-	-	-	-	-	95%	**100%**
Other industries (rest of the economy)	44%	-	23%	-	-	25%	8%	**100%**
Rest of the world	-	-	-	-	-	-	-	**-**
Subtotal	**51%**	**-**	**2%**	**6%**	**34%**	**5%**	**2%**	**100%**

Source. Hungarian NHA 2001, OECD Health Data for year 2002.

Notes. 1. The matrix is based on data from 2001. Sub-total ratios by functions did not change in 2002.

2. No information is separately available for rehabilitative care, expenditures are included in 'services of curative care'.

3. Includes also category ‘other not specified’.

3.2 National Health Insurance Fund's 0.5% population sample

A half percent sample of population was used to estimate utilisation patterns and health care costs by age groups.[6] This dataset also allows us to extract death-related costs in order to generate alternative scenarios in this respect. The main characteristics of the dataset are as follows:

- data owner: National Health Insurance Fund;
- sample size: 0.5% of total population, 52,581 persons;
- reference year: 2002;
- three sub-samples:
    - people alive on 1 January, 2004,
    - people who died in 2002,
    - people who died in 2003;data from seven different registers (funds):
- active and chronic inpatient (considered as inpatient for calculations), outpatient, CT, kidney dialysis (considered as outpatient for calculations), drugs, medical aids;
- other: e.g.. GPs: no data are available.information available in the dataset: sex, zip code, date of birth (year, month, day), date of death (year, month, day), BNO code, BNO type, DRG weight, payment (HUF).

The content of the database allow us to draw the age profile of Hungarian health care expenditures, as well as to calculate death costs. We have to mention here that the dataset contains no information on general practitioners (family doctors).

3.3 Population projection

The demographic module of the ILO model was used, but assumptions were taken from the population projection model of KSH NKI. (Hablicsek, 2003) The ILO module uses: age structure of the population in the base year, input data and assumptions on fertility (TFR) and mortality (life expectations).

3.4 Data provided by the Hungarian Central Statistical Office and other sources

The ILO model was supplied by the officially published HCSO statistics on macroeconomic and labour market data. All base year data for variables in the labour market and economic module of the model were collected in this way, with the exception of:

- real interest rates, which were obtained from the Hungarian National Bank (MNB);
- participation rates by age and sex were provided by a Hungarian government agency to ILO for year 2003;
- the proportion of self-employed in or outside of agriculture for the year 2000 was estimated from the TARKI Household Monitor Survey, 2001.

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[6] The dataset was first utilised by Éva Orosz for the project *The health care system and the life cycle* (Az egészségügyi rendszer és az életciklus) financed by the NKFP (no. 2002/5/62).

4. Variables and assumptions on variables development

In this section variables and assumptions on their development is presented. First the baseline scenario is discussed, while at the end of the section we show assumptions and variable development of the alternative scenarios. The expenditure side of the model requires demographic and economic inputs, as well as health care utilisation data, while the revenue side is mainly based on the demographic and labour supply module.

4.1 Demography

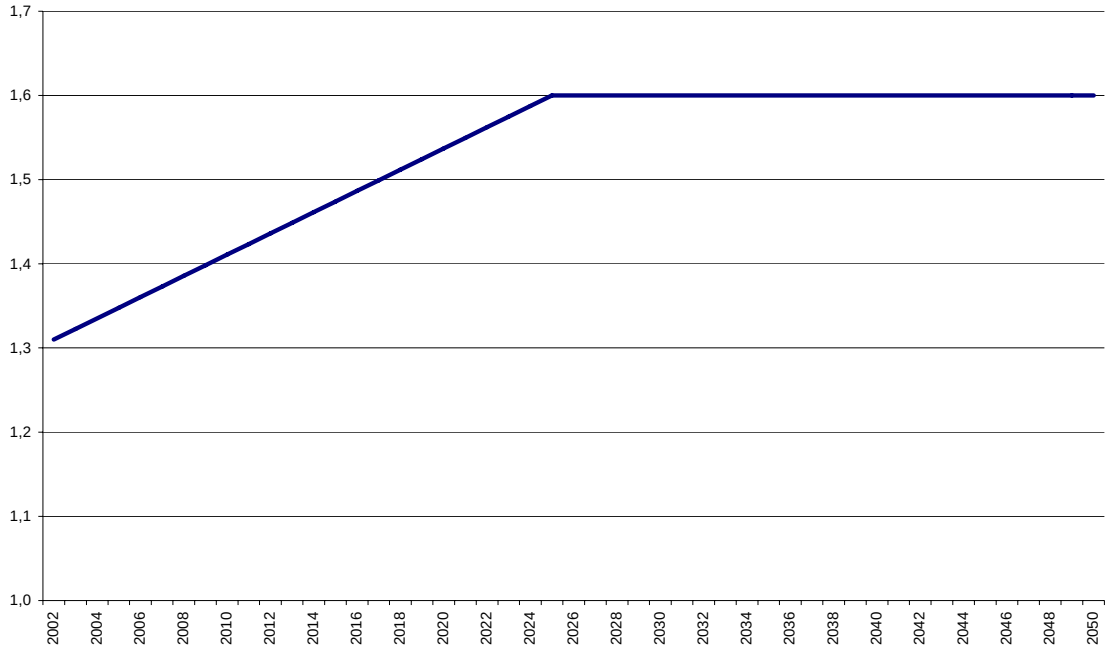
The output of the demographic module is a projection of population structure by age and sex from the base year (2002 for Hungary) to 2005. Separate tables for survivors and death are also estimated by single age and by five year age groups. Fertility, migration and mortality data are used as inputs to obtain this projection. At the same time databases of the United Nations serve as inputs for the built-in panels of the module.

4.1.1 Total fertility rate

The fertility input of the module makes the following assumptions in order to run the baseline scenario:

- *base year*: 2002
- *target year*: 2025
- *age pattern*: Eastern-Europe intermediate
- *total fertility rate*: 1.31 for base year
  1.60 for target year
- *trend:* linear

Figure 1. Total fertility rate in the baseline scenario



Source: Hablicsek (2003).

Age pattern and shape of the trend were chosen from the built-in panel of the model. TFR for the base year is data published by HCSO, while TFR for the target year is the same as was used by the Institute for Population Research (IPR, HCSO) and prepared as a medium variant for their population projection. The assumption of the medium variant of this projection was that once TFR reaches the value of 1.60 in 2025, it will then remain unchanged for the next 25 years until 2050. We used the same assumption in our model, that is we assumed TFR takes the same value for all years between 2025 and 2050. The recover of fertility rates in the first half of the period is assumed to occur due to those trends that indicate a delay in birth of cohorts who began their procreative period in the nineties. The development of TFR based on these assumptions is presented on Figure 1.

Assumption on sex ratio (males/females) at birth is also an input of the model. Based on HCSO data this ratio was 1.055 for 2002.

4.1.2 Migration

The population projection of the IPR, HCSO makes a very simple assumption: every year 6000 men and 6000 women will immigrate to Hungary until 2050. That means a solid positive migration balance for the country over this period. This aggregate data was evenly distributed by age in the ILO model. Therefore, every cohort of men and women gain every year a surplus of 59 individuals, started from those aged 0 to those aged 100. This assumption does not take into account the eventual heterogeneity of migrants by age. Analyses in this respect have highlighted that the age pattern of immigrants in Hungary is somewhat different from what we would expect based on experiences of other countries. The age structure of immigrants is dominated not only by young adults, but by pensioners as well. This phenomenon could be explained by the fact that immigrants are predominantly Hungarian ethnic minorities from the surrounding countries (mainly Romania, Serbia, Ukraine). The immigration of older generations is facilitated on the one hand by the regulation of citizenship (those being once Hungarian citizens can get very easily citizenship), while on the other hand by the regulation of pensions, which allowed until recently the calculation of the amount of the pension following the Hungarian rules, independently of the pension received previously by the immigrant in the emissive country. However, no quality data is at hand and no reliable assumptions can be made on further development of migration.

4.1.3 Life expectancy

Main assumptions on mortality are also built-in panels of the ILO model. We have chosen those listed below:

- *regional pattern*: general
- *improvement of life expectancy*: middle

Data for base years were provided by HCSO

- *life expectancy* (year 2002):
    - males: 68.3 years
    - females: 76.6 years

Using these inputs and assumptions, the model calculates the quinquennial gain in life expectancy and consequently estimates the life expectancy at birth for every five years starting from 2002. As a next step, the model interpolates data for the missing years. Values calculated by the model for the target year 2050 (76.4 years and 83.0 years respectively) differ only slightly from those expected by the projection of KSH NKI (76.6, respective 82.6).

4.1.4 Age structure

As a consequence of the above described assumptions, the ILO model predicts an ageing Hungarian population. The classic pyramid form of the graph showing the population age structure can not be observed even for the base year. Through studying Figure 2, one can observe two baby-boom generations and a narrowing base of the pyramid. The picture becomes more striking when looking at the predicted situation in year 2050 (Figure 3). The most numerous generations will be those at age 75, while the younger cohorts become fewer and fewer.

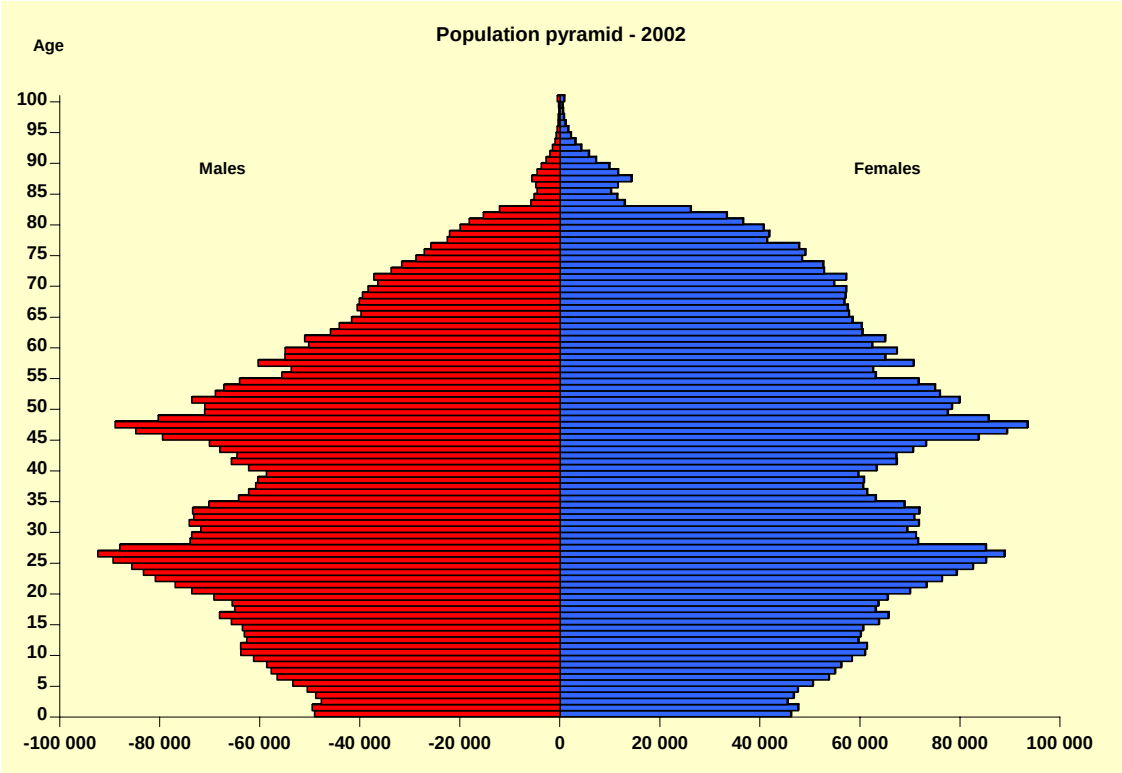
Figure 4 shows that the proportion of population aged above 65 will increase continuously during the period under analysis, mostly at the active cohorts expense. Older cohorts, representing 15 per cent of population in the base year, will count for almost one-third of the Hungarian population fifty years hence. At the same time, the sum of active cohorts will decrease considerably, from about 70 per cent to less than 60 per cent.

Table 3. Demographic variables as input to the model

		2002 (base year)	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Population – total		10,174,853	10,133,588	10,037,740	9,920,473	9,776,867	9,604,262	9,399,951	9,158,467	8,889,277	8,601,860	8,307,027
Population – male		4,836,980	4,825,822	4,798,019	4,757,895	4,700,068	4,622,853	4,526,157	4,411,944	4,285,348	4,147,403	4,001,632
Population – female		5,337,873	5,307,766	5,239,721	5,162,578	5,076,799	4,981,409	4,873,795	4,746,523	4,603,929	4,454,457	4,305,395
Increase			-14,938	-21,112	-25,211	-31,233	-36,643	-44,074	-50,833	-55,699	-58,297	-59,398
Birth			96,632	94,387	91,428	86,092	82,155	78,298	75,385	72,716	69,883	66,891
Death			99,570	103,499	104,638	105,326	106,798	110,372	114,218	116,415	116,180	114,289
Migration			12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Population share of specific age groups	0-14	16%	16%	14%	14%	14%	14%	13%	13%	13%	13%	13%
	15-64	68%	69%	69%	68%	66%	64%	64%	63%	61%	59%	58%
	65+	15%	16%	17%	18%	21%	22%	23%	24%	26%	28%	30%
TFR		1.31	1.35	1.41	1.47	1.54	1.60	1.60	1.60	1.60	1.60	1.60
LE – males		68.3	69.0	70.2	71.3	72.3	73.2	74.0	74.8	75.4	75.9	76.4
LE – females		76.6	77.2	78.1	78.9	79.7	80.5	81.1	81.6	82.1	82.6	83.0

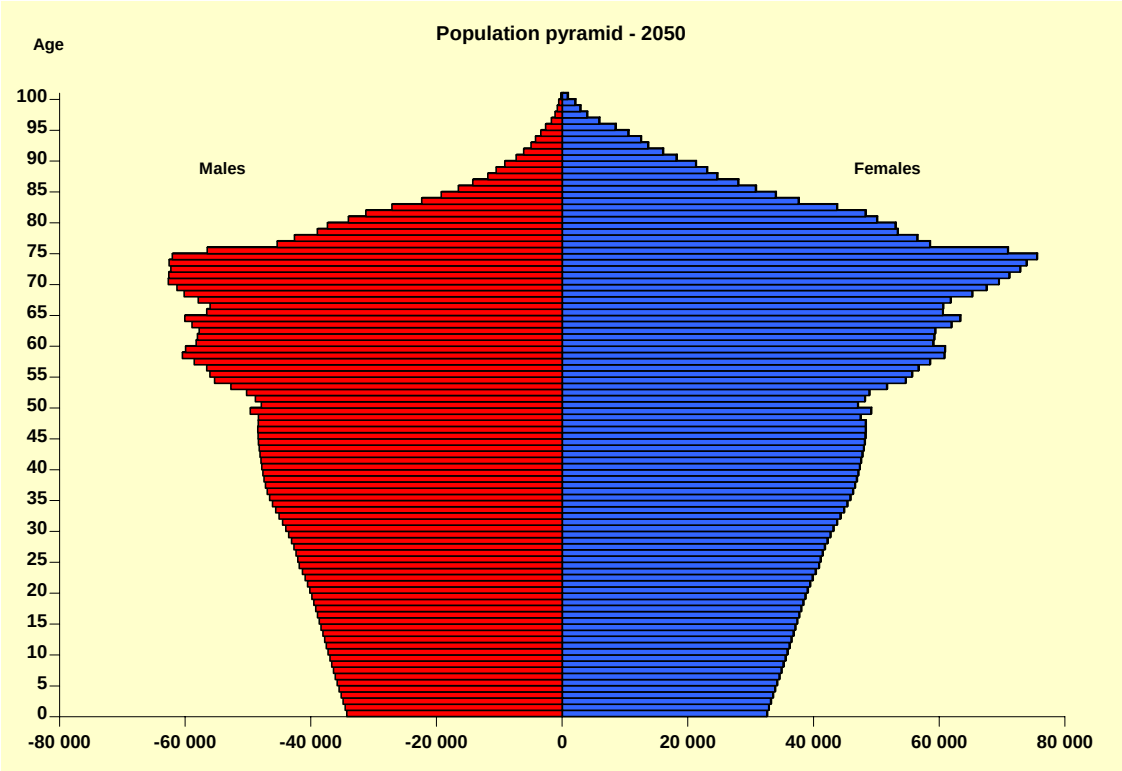
Notes. Assumptions on TFR, migration and life expectancy for both sexes were taken from Hablicsek (2003).

Figure 2. Population histogram – 2002



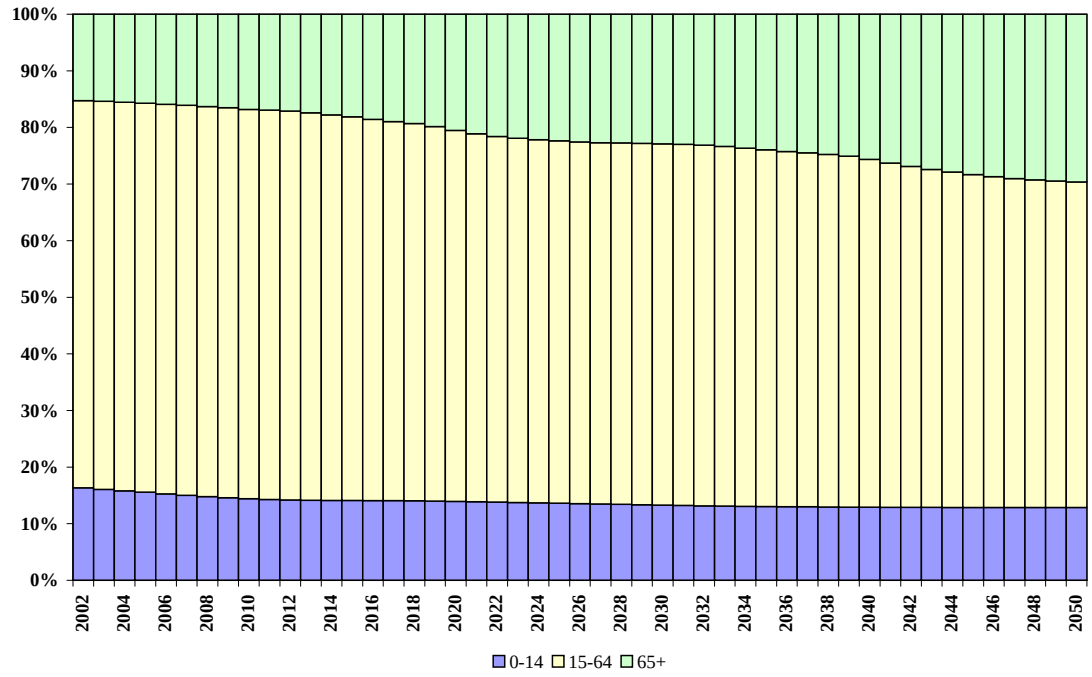
Source: Own calculation based on HCSO data and ILO model.

Figure 3. Population histogram – 2050



Source: Own calculation based on HCSO data and ILO model.

Figure 4. Projected age structure of population, 2003-2050



Source: Estimation of the model.

4.2 Labour supply

Input data for the labour supply module are provided by HCSO. The 'Input' worksheet of the module consists of two main parts. First, data and targets on participation rates by age and sex are required for the model. Second, different inputs and targets on employment structure and social insurance coverage are needed. The labour supply module is connected to the demographic module, population by age and sex being an input for the former.

Participation rates by age and sex for the year 2003 were provided by a Hungarian government agency to ILO. The economically active population calculation based on these participation rates and population data by age and sex differed slightly from that published by HCSO for 2003. We corrected the calculated data in order to perfectly fit the official HCSO data. These inputs were used as a starting point to estimate similar information for 2002. Participation rates for 2003 were multiplied by an index that took into account the differences in aggregate activity rates by sex between 2002 and 2003. As a next step, the distribution of participation rates was again corrected for the differences in the estimated number of the economically active population by sex and statistical data published by HCSO. Separate distribution was estimated for three different years (2010, 2020, 2050) for both sexes. The starting points for these estimations were targets on overall activity rates by sex. We extracted these targets for the years 2010, 2020 and 2050 from the latest Convergence Program prepared by the Hungarian Government in September 2006.[7] The input data for 2002 and targets for 2010, 2020 and 2050 are summarized as follows:

[7] http://www1.pm.gov.hu/

- activity rate males:
  - base year 2002: 67.1%
  - 2010: 69.1% (target from the Convergence Program)
  - 2020: 73.6% (target from the Convergence Program)
  - 2050: 71.5% (target from the Convergence Program)
- activity rate females
  - base year 2002: 52,7%
  - 2010: 57.6% (target from the Convergence Program)
  - 2020: 61.5% (target from the Convergence Program)
  - 2050: 61.3% (target from the Convergence Program)

The condition raised against the estimations was that overall activity rates by sex should coincide with the targets presented above. The correction index was the same for all ages, but the condition of not to exceed 100% was applied. It must be mentioned however, that by using the same factor for all ages, we introduced an additional bias in the model.

While the Hungarian public health system is insurance-based, every citizen is eligible for all health services as a basic right. On the other hand, not all individuals employed pay social insurance contribution. Recent governmental estimations put the number of people avoiding contributions at 500,000, while the number of contributors was given as 3.5 million.[8] There are no estimations for the share contributors by activity categories as it is required by the model. Therefore related data of the table are our assumptions, resulting from approximately 3.5 million contributors in total.

The development of variables from the labour module of the ILO model is shown in Table 4.

[8] Green book of Hungarian health care. http://www.magyarorszag.hu/zoldkonyv/

Table 4. Labour force variables as input to the model

	2002 (base year)	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Labour force – total	4,160,709	4,203,293	4,341,511	4,376,405	4,347,215	4,252,909	4,099,179	3,882,485	3,631,412	3,409,259	3,234,504
Labour force – male	2,282,484	2,330,424	2,364,800	2,376,250	2,360,286	2,284,372	2,185,950	2,060,693	1,922,830	1,808,831	1,716,254
Labour force – female	1,880,764	1,938,601	2,005,081	1,991,430	1,968,918	1,912,965	1,832,435	1,721,954	1,613,606	1,526,470	1,457,144
Labour force growth		1.02%	3.29%	0.80%	-0.67%	-2.17%	-3.61%	-5.29%	-6.47%	-6.12%	-5.13%
Labour force participation	59.8%	61.3%	63.3%	65.0%	67.6%	68.3%	67.0%	65.5%	64.7%	65.9%	66.4%
Labour force participation – male	66.9%	67.9%	69.1%	71.0%	73.6%	74.0%	72.5%	71.0%	70.0%	71.1%	71.5%
Labour force participation – female	53.0%	54.9%	57.6%	59.0%	61.5%	62.5%	61.4%	60.0%	59.4%	60.7%	61.3%
Employed – total	3,850,400	3,927,218	4,055,249	4,088,326	4,121,402	3,938,014	3,754,626	3,571,238	3,387,851	3,204,463	3,021,075
Employed – male	2,100,400	2,146,318	2,222,848	2,235,327	2,247,806	2,147,786	2,047,767	1,947,748	1,847,728	1,747,709	1,647,689
Employed – female	1,750,000	1,780,900	1,832,401	1,852,999	1,873,596	1,790,228	1,706,859	1,623,491	1,540,123	1,456,754	1,373,386
Employment growth		2.00%	3.26%	0.82%	0.81%	-4.45%	-4.66%	-4.88%	-5.14%	-5.41%	-5.72%
Employment rate – total	55.3%	56.4%	58.7%	60.8%	64.3%	64.0%	62.6%	61.9%	62.0%	63.4%	63.2%
Unemployment rate – total	7.5%	8.0%	7.2%	6.4%	4.8%	6.2%	6.6%	5.6%	4.2%	3.9%	4.8%
Unemployment rate – male	8.0%	7.9%	6.0%	5.9%	4.8%	6.0%	6.3%	5.5%	3.9%	3.4%	4.0%
Unemployment rate – female	7.0%	8.2%	8.6%	7.0%	4.8%	6.4%	6.9%	5.7%	4.6%	4.6%	5.7%
Insured population	8,693,145	8,879,277	9,377,733	9,505,385	9,541,657	9,315,534	9,005,647	8,684,536	8,401,906	8,064,049	7,689 936
Share of insured (%)	85%	88%	93%	96%	98%	97%	96%	95%	95%	94%	93%
Contributors	3,529,050	3,666,793	3,824,874	3,895,923	3,963,612	3,848,164	3,685,455	3,466,050	3,235,954	3,051,123	2,905,548

4.3 Economy

Data serving as inputs for the economic module are almost exclusively provided by HCSO. The development of the macroeconomic situation presents serious challenges in the period following 2002. Sometimes the changes in the parameters of the model showed adverse tendencies from one year to another, while in other cases extreme variances in the magnitude of these variables could be observed. As an example, the real wage growth in 2002 was 13.4%, in 2003 9.2%, the following year –0.1%, while it increased considerably the following year by 6.3%. A similar roller-coaster characterised the CPI. In these circumstances, it was problematic to decide whether it was a good choice to directly extrapolate from data of the year 2002, when we are in the possession of the recent data which shows a very different picture of the Hungarian economy. Moreover, the expectations toward the mid-term development of these basic parameters started to become more and more uncertain, since the Convergence Program (CP) was revised several times. Finally we decided to include in the basic model data already available between 2002 and 2005 as well and to extrapolate trends starting from 2005. In this regard the base year data presented in Table 5 are informative only - they do not serve as starting points for the period lasting until 2020.

We also faced serious problems in finding reliable mid-term and long-term forecasts. One of the handholds was obviously the Convergence Program of Hungary, presented for the European Committee in September 2006 and updated in December 2006.[9] The actualised Program includes a short-term forecast (until 2010) for almost all variables, while mid-term (until 2020) or long-term (until 2050) forecasts for only two input variables: GDP growth and labour productivity growth. The Hungarian Government expects that the economy will grow further but by a slowing cadence. This means that the real GDP growth will hit 4.1% by 2010, 3% by 2020 and 1.1% at the end of the period, by 2050. The improvement of labour productivity is expected to have a similar trend and slightly higher value in target years.

For real wages, we assumed here that real wage growth will raise increase faster than real GDP until 2020 (in the model this is assured by a higher value of the real wage growth in the base year, while the target values in 2020 are the same) and by almost the same rate in the period between 2020-2050 (same starting value in 2020 and 0.1 percentage point lower real wage growth in 2050 compared to real GDP growth in the same year). The rationale behind these assumptions was that Hungarian wages will converge to the European average, but they cannot exceed the increase in real GDP growth for the whole period because these trends would result in an overheated economy and in an unsustainable development of incomes. Improvement of labour productivity will experience a slowing trend according to the CP.

[9] http://www1.pm.gov.hu/web/home.nsf/(PortalArticles)/57B7AA5F7E58DCCBC125723700572203/$File/KP_2006_december_final_hu.pdf?OpenElement

Table 5. Economic variables as inputs to the model

	2002 (base year)	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
GDP, current prices (bln HUF)[1]	17,204	22,027	32,690	46,089	61,715	79,734	100,449	123,387	147,773	172,540	196,391
GDP/capita growth (nominal)		28%	48%	41%	34%	29%	26%	23%	20%	17%	14%
GDP per capita (HUF)	1,690,809	2,173,639	3,256,713	4,645,884	6,312,364	8,301,894	10,686,069	13,472,502	16,623,752	20,058,401	23,641,594
Nominal GDP growth	12.6%	6.3%	7.8%	6.7%	5.6%	5.0%	4.5%	4.0%	3.5%	2.9%	2.4%
Inflation (GDP deflator)[1]	8.9%	4.6%	4.1%	3.5%	3.0%	2.7%	2.4%	2.2%	1.9%	1.6%	1.3%
Real GDP growth[1]	4.3%	4.1%	3.6%	3.0%	2.5%	2.3%	2.0%	1.8%	1.6%	1.3%	1.1%
Real wage growth[1]	13.4%	6.3%	5.0%	3.8%	2.5%	2.2%	2.0%	1.7%	1.4%	1.2%	0.9%
Labour productivity growth[1]	4.2%	4.0%	3.6%	3.3%	2.9%	2.7%	2.5%	2.3%	2.1%	1.9%	1.7%
Inflation (CPI), average over the year[1]	5.3%	3.6%	3.4%	3.2%	3.0%	2.8%	2.7%	2.5%	2.3%	2.2%	2.0%
Average gross monthly wage (HUF)[1]	122,482	158,315	245,967	356,296	480,835	622,730	789,618	980,231	1,191,278	1,417,263	1,650,515
SI contribution paid by employee	11%	11%	15%	15%	15%	15%	15%	15%	15%	15%	15%
SI contribution paid by employer	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%
Base of contribution	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Labour cost	158,002	204,226	317,297	459,622	620,278	803,321	1,018,607	1,264,498	1,536,749	1,828,270	2,129,165
Labour cost (share of GDP)	40.9%	42.2%	45.8%	47.7%	48.7%	46.7%	44.8%	43.0%	41.4%	39.9%	38.5%
Real interest rate[2]	3.7%	3.9%	3.5%	3.2%	2.8%	3.0%	3.2%	3.4%	3.6%	3.8%	4.0%

Notes: 1 – Parameters for base year are figures derived from HCSO. 2 – Data was taken from the Hungarian National Bank, www.mnb.hu.

4.4 Policy changes

The system of social insurance contribution changed in 2006. Previously the contributions were paid in the following ways:

- employer: 29%, of which 18% pension contribution and 11% health contribution;
- employee: 11% of which 8% pension contribution and 3% health contribution.

Starting from September 2006 the rules changed to:

- employer: unchanged;
- employee: 14% of which 8% pension contribution and 6% health contribution.

As from January 2007 the rules became:

- employer: 29%, of which 21% pension contribution and 8% health contribution;
- employee: 15% of which 8% pension contribution and 7% health contribution.

These changes were incorporated in the model. We did not take into account the short period between September and December 2006, we calculated only with the rules valid from January 2007. Consequently, the social insurance contribution paid by employer is maintained at 29% for the whole period captured by the model, while the contribution paid by employee rises from 11% to 15% from 2006 to 2007 and remains unchanged thereafter. At the same time total health contribution shifts from 14% to 15% between 2006 and 2007, whilst the health contribution paid by employers falls and that paid by employees increases.

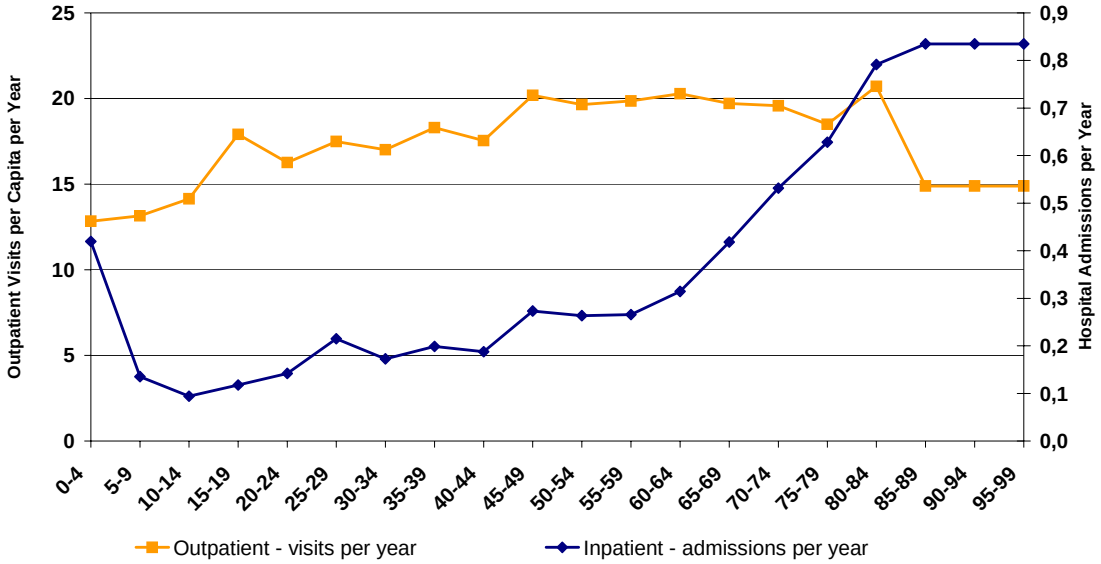
4.5 Health care utilisation

Utilisation and average health costs patterns by age groups were estimated using a 0.5 percent sample of population provided by the NHIF including information for the base year of the model. The dataset was described in Section 3.2. Utilisation rates were calculated separately for inpatient and outpatient care. Crude estimates were corrected for the macro values that were calculated as a ratio of total hospital days in the base year (23.2 million in 2002) and average length of stay in the same year (8.5 days). Figure 5 presents these results. Health costs were estimated by age groups and sex and were normalised using GDP per capita (Figure 6).

One can observe that the utilisation pattern for inpatient care reproduces the so-called j-curve form, which is observed by empirical researchers worldwide. Hospital admission per year among children aged 0-4 is relatively high, at around 0.4 visit/capita. Hospital utilisation is only a third of this value in the next group and then continuously increasing until the age 85. Results indicate that about 0.8 admission per capita characterize this age group. The number of people in the age groups 85 or above was relatively small, and this included some disturbance in the results. Therefore we decided to merge three age groups: 85-89. 90-94 and 95-99, the last group included a few individuals aged 100+. As a result, the same admission rates can be seen on the figures for the previously mentioned age groups.

The J-form of the curve does not manifest when outpatient care utilisation is plotted against age. The number of visits per capita in 2002 shows a slow increase from about 13 at birth to 20 at age 45-49. The curve is surprisingly flat between ages 45-49 and 80-84, only small variation can be observed on this section. Utilisation decreases considerably among people aged 85 or above.

Figure 5. Health care utilisation by age groups



Source: Own calculations based on NHIF dataset.

4.6 Alternative assumptions

A set of alternative models was run for Hungary in order to carry out sensitivity analyses for the baseline scenario. These models can be classified in three main groups based on the type of parameter which is calibrated (all others holding constant): expenditure side, revenue side and other scenarios. The effect of alternative employment rates and wages are analysed on the revenue side, where positive and negative scenarios are taken into account. On the expenditure side alternative assumptions on fertility and life expectancy are examined. In both cases low and high variants are tested. Still on the expenditure side, a death cost analysis is carried out to control for the concentration of expenditure during the last period of life before death.[10] As for other assumptions, a hypothetical situation when cash transfers were out of NHIF budget is considered.

4.6.1 Revenue side

The development of employment rates and of wages has a crucial effect on health care revenues; therefore sensitivity analyses should take them into account. We consider positive and negative alternative assumptions relative to the baseline scenario on employment as well as on wages.

[10] For a survey of the related literature see Raitano, M. (2006): The impact of death-related costs on health-care expenditure. ENEPRI Research Report No. 17. (AHEAD WP7). http://www.enepri.org/. For empirical results from Italy see Gabriele, S. et al. (2006): demographic factors and health expenditure profiles by age: the case of Italy. ENEPRI Research Report No. 18. (AHEAD WP7). http://www.enepri.org/. For Hungary see Orosz, É. (2004): The health care system and the life-cycle: claiming patterns (In Hungarian). Report on research for National Research and Development Program (NKFP 200265/62.)

4.6.1.1 Activity rate

The activity rate influences the revenue side by defining the volume of payments subject to social insurance contribution, including health. On the expenditure side, the development of the activity rate affects the share of insured population. Two scenarios are tested here, a positive and a negative one.

Alternative scenario 1.1.

The positive scenario on labour activity assumes that Hungary fulfils the Lisbon targets related to economic activity for the population until 2010. Henceforth, further increases in activity rates are supposed.

Assumptions:

- activity rate among men:
  - 2010: 73.2% (official target from the NAP employment)
  - 2020: 78.0%
  - 2050: 83.0%
- activity rate among women:
  - 2010: 60.0% (official target from the NAP employment)
  - 2020: 68.0%
  - 2050: 73.2%

Alternative scenario 1.2.

The negative scenario on economic activity assumes that Hungary does not fulfil the Lisbon targets before 2050. We assume that no increase in activity rates will take place until 2010. A very slow growth is expected until 2020, but subsequently no further growth.

Assumptions:

- activity rate among men:
  - 2010: 67.6%
  - 2020: 67.6%
  - 2050: 67.6%
- activity rate among women:
  - 2010: 53.9%
  - 2020: 53.9%
  - 2050: 53.9%

4.6.1.2 Wages

Changes in earnings can strongly influence the revenue side by setting the volume of payments subject to social insurance contribution, including health (together with activity rates). On the expenditure side, wages affect staff-costs. Again two scenarios are tested here, a positive and a negative one.

Alternative scenario 2.1.

The positive scenario assumes considerable growth (above 3%) in real wages for the whole period under analysis.

Assumptions:

- GDP growth: (2020, 2050): target for year 2020: 3.0%, for year 2050: 2.0%;
- wages: target for year 2020: 3.5%, for year 2050: 2.5%;
- labour productivity: target for year 2020: 3.5%, for year 2050: 2.5%.

Alternative scenario 2.2.

The negative scenarios assumes no growth in real wages in 2007, and a smaller than 2% increase in real wages for the rest of the period of analysis.

Assumptions:

- GDP growth: (2020, 2050): target for year 2020: 1.0%, for year 2050: 1.0%;
- wages: 0% growth for year 2007[11]; target for year 2020: 0.5%, for year 2050: 0.5%;
- labour productivity: target for year 2020: 1.0%, for year 2050: 1.0%;.

4.6.2 Expenditure side

Alternative scenarios on the expenditure side aim to control for uncertainties in demographic trends. Population size and the population's age structure are determined by fertility, mortality and migration processes. Migration is not discussed for sensitivity purposes. Next to our assumptions on fertility and life expectancy, a death cost scenario is also tested for Hungary.

4.6.2.1 Fertility

Fertility trends strongly affect the population size as well as the age structure of the population. Negative fertility trends are one of the main causes of the ageing of European societies. Considering the strong correlation between age and health care expenditures, we expect that an improvement in fertility behaviour would reduce health expenditures via a more balanced age structure in the long run. It would also lead to an improvement in dependency ratios and therefore lead to a reduced burden on the active population. However, a steadily low or a further decreasing fertility would have an opposite effect on the health budget.

The population projection of the HCSO IPR assumes a relatively fast recovery of fertility rates in the first half of the period. The expected value of 1.6 for the Hungarian TFR in year 2025 is very close to what the AWG population scenario assumes for the EU-15 countries around 2020. However, the AWG model based on the convergence tendencies among European countries, assumes a slower recovery among EU-10, predicting for this group of countries a 1.4 level TFR in 2020 and 1.6 only around 2050. (EUROSTAT, 2004, 2005) New Member states are therefore, close to both a positive and a negative scenario. We tested a third scenario for the Hungarian fertility development, which assumes that the value of 1.6 of TFR, which is predicted to be achieved by 2025 in the baseline scenario, will be achieved by the Hungarian population only at the end of the period in analysis, by a linear increase.

Alternative scenario 3.1. High variant of fertility development as in the ILO the model.

Assumption: TFR=2.10 for the year 2025 with a linear increase, then subsequently no change.

Alternative scenario 3.2. High variant of fertility development as in the ILO the model.

Assumption: TFR=2.10 for the year 2025 with a linear increase, then subsequently no change.

Alternative scenario 3.3. Alternative assumptions for the medium variant of fertility development as in the ILO the model.

Assumption: TFR=1.6 for the year 2050 with a linear increase thereafter.

[11] Forecast of KOPINT-DATORG.

4.6.2.2 Life expectancy

Improving life expectancy is a characteristic of developed societies, including Hungary. This trend results in a growth of the proportion of elderly people in these societies, which further increases health care expenditure.

Alternative scenario 4.1. Fast variant of life expectancy improvement as in the ILO model.

Alternative scenario 4.2. Slow variant of life expectancy improvement as in the ILO model.

4.6.2.3 Death cost analysis

Alternative scenario 5.

Findings of the empirical literature show that per capita health care expenditure is considerably higher in the period before death than in the preceding years. Therefore, in estimating trends in health expenditures one should consider the problem of increased near-death costs. We already noted that the sample provided by NHIF allow us to estimate health care costs separately for survivors and deceased. While the baseline scenario does not consider the assumption of increased expenditures in the last period of life, we run alternative scenario 5. in order to control for this effect. Related methodological considerations are described and basic figures are presented in Annex 1.

4.6.3 Other scenarios

Alternative scenario 6. Cash transfers out of NHIF budget

As was discussed earlier, the budget of NHIF includes expenditures on cash transfers such as sick-pay, disability pension, earnings-related maternity benefits, etc. While the NHIF budget shows a considerable deficit at the beginning of the present decade, without the above-mentioned cash transfers the budget would be balanced or even positive. We tried to take into account this specific aspect of the Hungarian case. Therefore, the baseline scenario is modified at one point only: we assume that cash transfers paid by the NHIF are out of the budget and are fully financed by the central budget.

5. Results of projections and sensitivity analysis to given parameters

Section 4. discussed the development of parameters for the Hungarian baseline scenario together with assumptions of alternative scenarios run as sensitivity tests for the baseline scenario. Here in Section 5. the results of analyses are presented. First, we will discuss the baseline scenario and then the same will be done for the respective alternative scenarios. These results have the same structure for all scenarios: expenditure, revenues and the balance of the health budget is shown for total public health care and separately for the social insurance system. Level of premium required to close the revenue and expenditure gap will also be discussed.

5.1 Baseline scenario

Results of the baseline scenario are presented in Table 6 as well as in figures 6 and 7. Before discussion we should remember that 2002 was considered as the base year for the model, the economic module of the baseline model was refilled with HCSO data and forecasts of the Convergence Program for later years. The reason for this procedure lies in the changing and somewhat hectic economical environment over these years. The revenue side of the public health care system also faced important changes which we did not intend to leave out of the

study. Using statistical data and forecasts external to the model as inputs caused the roughness in shape at the beginning of revenue curve.

Total public health expenditures exceed HUF 940 billion in Hungary in 2002. This amount represented 5.5% of country's GDP. At the same time the health system received cca. 748 billion HUF of revenue from contributions and transfers from the central budget, which accounted for 4.3% of GDP. Consequently, the deficit in the base year was HUF 192 billion, which represented 1.1% of GDP, 20.5% of health expenditures and 25.7% of revenues (Table 6).

The social insurance system characterises the Hungarian total public health care. The amount of expenditure related to the insurance system was HUF 776 billion in the base year of the model, accounting for 4.5% of GDP. HUF 612 billion represented the revenue side of the system in 2002 (3.6% of GDP). The deficit of the social insurance system was HUF 164 billion (1% of GDP, 21.1% of expenditures, 26.7% of revenues). Compared to the 14% level of the insurance premium in the base year, a 17% health contribution would have been needed to bridge the gap between revenue and expenditure (Table 6).

Looking at total health expenditure, the model estimates a 1.2 percentage point increase relative to GDP (from 5.5% to 6.7%) between 2002 and 2050. The level of expenditure will attain 6.0% by 2030 and 6.5% by 2045. Expenditure inside the insurance system will grow from 4.5% GDP share to 6.1% between 2002 and 2050. Therefore we expect to have about a 35% increase in expenditure relative to GDP during this period. Assuming the same institutional and financial environment, the increase in expenditure is mainly driven by demographic trends.

On the revenue side of total public health care, the initial level of 4.3% relative to GDP is expected to decrease to 3.4% by 2050. Considering the assumptions of the model, incomings funds will fall to under 4% of GDP very rapidly, even before 2010. After this point in time, the magnitude of revenues relative to GDP will increase slowly to 4.3% in 2020 and then again start to fall, steady through to 2050. The temporary recovery of revenues between 2010 and 2020 can be attributed the presence of the baby-boom generations born in the middle of 1970s which will then become active on the labour market. A similar shaped trend is observed for the insurance system. The fall in revenues is also determined by demographic processes combined with a low share of contributors relative to the insured population.

While the magnitude of the NHIF deficit is considerable in the base year, our model predicts that the Hungarian health system faces further increases to its deficit over the next decades. The initial deficit in the total public health care system is expected to grow to 3.4% of GDP up to 2050. This means that the deficit will be equivalent to half the expenditures and will reach the amount of revenues. Setting aside central budget transfers, the insurance system will face the same rise in deficit.

At the beginning of the period under analysis, health insurance contributions paid by both employers and employees represented 14% of gross wages. Model estimates indicate that a health insurance contribution fixed at 17% of employers wages would have balanced the system's budget. The level of insurance premium will increase to 15%, starting from the year 2007. The level of premium needed to close the gap between total revenues and expenditure will exceed the actual level by 5 percentage points by 2010 (20%) and will have to be increased to 28% by 2050 to offset the deficit, where everything else remains constant.

Table 6. Results of the baseline scenario – total public health care and social insurance system

	2002	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Public Health Care											
Health Expenditure (million HUF)	940,337	1,206,224	1,800,780	2,585,365	3,551,438	4,721,802	6,100,500	7,686,667	9,451,423	11,313,149	13,242,687
Health Expenditure (Share of GDP)	5.5%	5.5%	5.5%	5.6%	5.8%	5.9%	6.1%	6.2%	6.4%	6.6%	6.7%
Revenues (million HUF)	747,988	882,626	1,281,977	1,899,128	2,645,109	3,265,658	3,940,707	4,646,220	5,350,424	6,015,458	6,600,149
Revenues (Share of GDP)	4.3%	4.0%	3.9%	4.1%	4.3%	4.1%	3.9%	3.8%	3.6%	3.5%	3.4%
Deficit/surplus (million HUF)	-192,350	-323,598	-518,803	-686,237	-906,329	-1,456,144	-2,159,794	-3,040,447	-4,100,999	-5,297,691	-6,642,538
Deficit/surplus (Share of GDP)	-1.1%	-1.5%	-1.6%	-1.5%	-1.5%	-1.8%	-2.2%	-2.5%	-2.8%	-3.1%	-3.4%
Deficit/surplus (Share of expenditures)	20.5%	26.8%	28.8%	26.5%	25.5%	30.8%	35.4%	39.6%	43.4%	46.8%	50.2%
Deficit/surplus (Share of revenues)	25.7%	36.7%	40.5%	36.1%	34.3%	44.6%	54.8%	65.4%	76.6%	88.1%	100.6%
Social Insurance System											
Health Expenditure (million HUF)	775,631	1,011,549	1,561,841	2,305,889	3,241,077	4,315,688	5,547,834	6,960,966	8,596,458	10,296,022	12,021,437
Health Expenditure (Share of GDP)	4.5%	4.6%	4.8%	5.0%	5.3%	5.4%	5.5%	5.6%	5.8%	6.0%	6.1%
Revenues (million HUF)	612,103	729,886	1,060,129	1,570,481	2,187,368	2,700,530	3,258,761	3,842,184	4,424,524	4,974,473	5,457,982
Revenues (Share of GDP)	3.6%	3.3%	3.2%	3.4%	3.5%	3.4%	3.2%	3.1%	3.0%	2.9%	2.8%
Deficit/surplus (million HUF)	-163,528	-281,663	-501,712	-735,409	-1,053,709	-1,615,157	-2,289,073	-3,118,782	-4,171,934	-5,321,549	-6,563,454
Deficit/surplus (Share of GDP)	-1.0%	-1.3%	-1.5%	-1.6%	-1.7%	-2.0%	-2.3%	-2.5%	-2.8%	-3.1%	-3.3%
Deficit/surplus (Share of expenditures)	21.1%	27.8%	32.1%	31.9%	32.5%	37.4%	41.3%	44.8%	48.5%	51.7%	54.6%
Deficit/surplus (Share of revenues)	26.7%	38.6%	47.3%	46.8%	48.2%	59.8%	70.2%	81.2%	94.3%	107.0%	120.3%
Level of actual insurance premium	14%	14%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Level of premium needed to close revenues and expenditures gap	17%	18%	20%	20%	20%	21%	22%	24%	25%	26%	28%

Figure 6. Results of the baseline scenario – total public health care

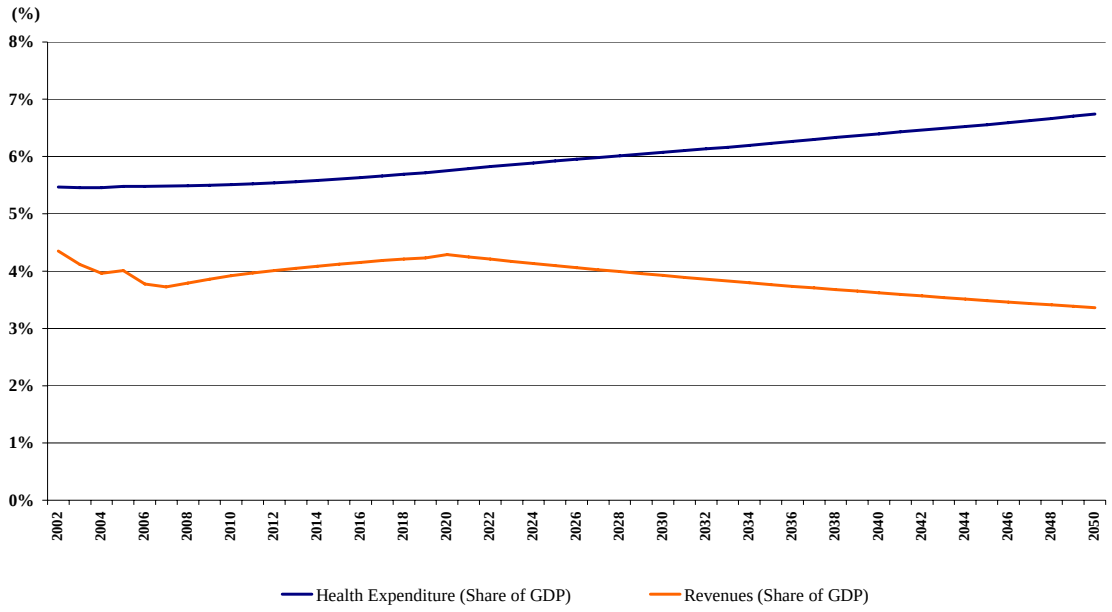
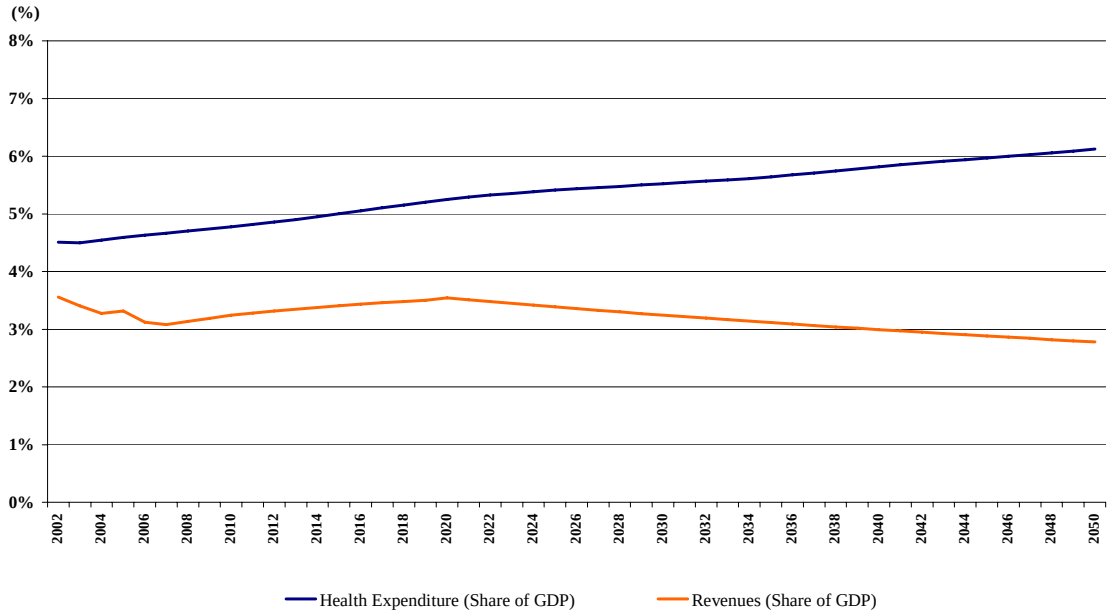


Figure 7. Results of the baseline scenario – social insurance system



5.2 Sensitivity analyses

5.2.1 Revenue side

As was described in the previous section, alternative scenarios on activity rates and wages were tested on the revenue side. We present results of positive as well as negative alternative scenarios for both factors.

5.2.1.1 Activity rate

Two scenarios were tested here, a positive and a negative one.

Alternative scenario 1.1.

Recalling the description of this scenario, we assume that Hungary fulfils the Lisbon targets related to economic activity of the population until 2010. Subsequently, a further increase in activity rates is supposed. Table A.2.1 of Annex 2. includes results of this scenario.

Alternative scenario 1.2.

The negative scenario on employment assumes that no increase in activity rates will take place during the period under analysis. The main figures of the negative scenario are presented in Table A.2.2.

Joint results of scenarios 1.1. and 1.2. are shown in figures A.2.1 and A.2.2 respectively, together with the baseline scenario. Based on these results, we summarise our findings related to the total health care budget and separately for the social insurance system.

- Based on the positive scenario for employment, revenues of the total health care system would remain in the range between 4% and 5% of the GDP during the whole period: the highest values are expected in the period around 2020, while the lowest values would be expected at the end of the period under study.
- Revenues of the total health care system will decrease continuously until 2015 (from 4.3% to 3.8%), after which we expect a short recovery (3.9% by 2020) and finally during the following period a falling off in revenues is likely, when the negative scenario is applied. The amount of revenues relative to GDP is estimated at 3.1% by 2050.
- The same shape of curves can be observed, but at a lower level when the social insurance system is analysed.
- The development of activity rates affects not only the revenue side, but expenditures as well via the insured population ratio. Changes in expenditure attain the same magnitudes as for revenues when the alternative scenarios are run.
- The deficit of the total health care system increases continuously throughout the period in analysis, from 1.1% (2002) to 2.8% (2050) relative to GDP in the case of the positive scenario and the deficit would be equivalent to two third of the revenues. The deficit at the end of the period would rise to 3.6% of GDP if the negative scenario were to take place. The deficit would overrun the magnitude of total revenues in this case (105%).
- The level of premium required to close the revenue and expenditure gap for the social insurance system would be a rise to 26% percent for the positive scenario and to 29% for the negative scenario.
- To summarize, the development of activity rates has a moderate effect on the revenues of health care system. To put it other way around, the Hungarian health care system could not expect an improvement out of its currently expected financial problems solely from increasing activity rates.

5.2.1.2 Wages

For wages also two scenarios were tested here, both a positive and a negative one.

Alternative scenario 2.1.

As was described in Section 4., the positive scenario assumes considerable growth in real wages, above 3% for the whole period of analysis. Table A.2.3 of Annex 2. includes results for this scenario.

Alternative scenario 2.2.

The negative scenarios assumes no growth in real wages in the year 2007, and only a growth of 0.5% for the rest of the duration of analysis. The main figures of the negative scenario are presented in Table A.2.4.

Joint results of scenarios 2.1. and 2.2. are shown on Figures A.2.3 and A.2.4, together with the baseline scenario. Based on these results, our findings related to the total health care budget and separately for the social insurance system, can be summarized as follows.

- Looking at the positive scenario for wages, revenues of the total health care system would stay slightly above 4% of GDP during the whole period: dropping below this value only around 2010.
- As for the negative scenario, revenues of the total health care system will decrease slightly until 2010 (from 4.3% in 2002 to 3.9% in 2010), followed by a short recovery (4.1% by 2020). A continuous and relatively fast decrease in revenues is expected for the second half of the period (to 2.9% in 2050).
- The same shape of curves can be observed, but at a lower level when the social insurance system is analysed.
- Similarly to the activity rates, wages also influence not only the revenue side, but expenditures as well. Alternative assumptions on development of wages affects personal costs in health care as well as the magnitude of GDP. Since these effects are opposite, their joint outcome for health expenditures are very close when comparing the alternative scenarios. However, looking at the total nominal health expenditures, the positive scenario results in a 1.8 times higher value at the end of the period than the negative one, health costs relative to GDP being just about the same (6.7%, respective 6.8%).
- The deficit of the total health care system increases almost continuously during the period under analysis (excepting a short recovery in the 2020s), from 1.1% (2002) to 2.5% (2050) relative to GDP in the case of the positive scenario, where the deficit would account for the three fifth of the revenues. The deficit at the end of the period would rise to 3.9% of GDP if the negative scenario were to take place and it would overrun the magnitude of total revenues from 2040. Compared to the deficit of 3.4% of the baseline scenario, the differences observed between the deficit of the baseline and alternative scenarios are considerable, but not overwhelming.
- The level of premium necessary to close the revenue and expenditure gap for the social insurance system would need to rise to 23% percent for the positive scenario and to 32% for the negative one.
- Concluding for the alternative scenarios 2.1 and 2.2 for wages, we can state that this factor has also a moderate effect. This can be partly attributed to a quite complex mechanism through which wages affect the deficit.

5.2.2 Expenditure side

Alternative development of two demographic variables (fertility and mortality) are analysed here. Alongside assumptions on fertility and life expectancy, a death cost scenario is also tested for Hungary.

5.2.2.1 Fertility

Alternative scenario 3.1.

A high variant of fertility development was considered as it is built-in to the ILO the model. This assumption supposes that a TFR of value 2.10 will be achieved by the year 2025 via a linear increase, but with no change thereafter.

Alternative scenario 3.2.

A low variant of fertility development was assumed in this case, that is a TFR equal to 1.20 by the year 2025 with a linear decrease, with no change thereafter.

Alternative scenario 3.3.

An alternative assumption for the medium variant of fertility development was applied here, with a TFR equal to 1.6 in year 2050 with a linear increase.

Joint results of scenarios 3.1., 3.2. and 3.3. are shown in Figures A.2.5 and A.2.6, together with the baseline scenario. Based on these results, our findings related to the total health care budget and separately for the social insurance system, can be summarized as follows.

- The positive scenario for fertility shows a slower increase in health expenditure compared to the baseline scenario over the period under analysis. Based on this scenario, expenditures of the total public health care system relative to GDP are expected to follow the baseline scenario's figures after 2020. Expenditures relative to GDP will increase from 5.5% to 6.4% in total during the period of analysis. The social security system will experience a similar trend, growing from 4.5% in 2002 to 5.5% in 2050.
- Assuming a negative scenario, we would observe similar, but opposite trends compared to the baseline scenario. Lower fertility rates would result in higher expenditures relative to GDP. Expenditure of the total public health care system would rise from 5.5% (2002) to 7.0% (2050). The deviation from the baseline scenario starts by 2020, as it does in the case of the positive scenario. The trend in expenditure is similar again for the social security system.
- Fertility affects not only expenditure, but revenue as well. Higher fertility rates mean higher revenues in long-run, due to a higher ratio of people in their active ages and therefore having higher activity rates. Revenues of the total public health care system accounting for 4.3% of GDP in the base year would decrease to 3.8% by the end of the period if the positive scenario were applied and to 3.0% if the negative scenario applied.
- If we run the positive scenario for fertility, the deficit of the public health care system would be expected to grow from 1.1% of GDP in the base year to 2.7% of GDP at the end of the period of analysis. The deficit would account for almost three quarters of revenues in this case. If the negative scenario came about, the deficit would be 4.0% of GDP in 2050, accounting for 130% of revenues.
- The level of premium needed to close the revenue and expenditure gap for the social insurance system would be expected to reach 23% percent for the positive scenario and 33% for the negative one.
- The alternative medium variant scenario shows a very small deviation from the baseline scenario both on the expenditure and revenue side, predicting a higher deficit in long-run.

5.2.2.2 Life expectancy

Alternative variants for the development of life expectancy were tested on the expenditure side of the model.

Alternative scenario 4.1.

Fast variant of life expectancy improvement as compared with the ILO model.

Alternative scenario 4.2.

Slow variant of life expectancy improvement as compared with the ILO model.

Joint results of scenarios 4.1. and 4.2. are shown in Figures A.2.7 and A.2.8, together with the baseline scenario. Based on these results, our findings related to total health care budget and separately for the social insurance system, can be summarized as follows.

- Alternative scenarios of life expectancy based on built-in variants of the model show very small deviations from the baseline scenario.
- The positive scenario would lead to slightly higher health expenditure for both the total public health system and the social insurance system, while the negative scenario would have the opposite effect on expenditure.
- The total public health care's deficit is expected to rise from 1.1% of GDP in the base year to 3.5% of GDP at the end of the period, relying on the positive scenario. While this deficit counts for only a quarter of all revenue and for one fifth of expenditure in 2002, it will rich the magnitude of the revenues (103%) and the half of total expenditure in 2050. By running the negative scenario, one could deduce that the deficit of total public health system rises from 1.1% of GDP (2002) to 3.3% of GDP during the period under analysis.
- The level of premium needed to close the revenue and expenditure gap for the social insurance system would be expected to reach 28% percent for both the positive and the negative scenarios.

5.2.2.3 Death cost analysis

Alternative scenario 5.

When the assumption of increased expenditure in the period prior death is considered, only the expenditure side is affected. Total health care expenditure is separated into deceased's costs and survivors' costs. Estimations were made for the base year, using the 0.5% population sample of NHIF. We calculated average expenditures by age groups and sex (Figure A.1.1 and Figure A.1.2) and assumed that they will increase by the same rate per capita GDP throughout the period of analysis.

The results of the death cost scenario are shown in Table A.2.10 and in Figure A.2.9, together with the baseline scenario. Estimations were made for the total public health care system, but not for the social security system separately.

Considering increased costs for the last year of life, the total expenditure of the health care system would increase from 5.5% to 6.2% relative to GDP by the end of the period under analysis. This is a considerably lower increase in expenditure than the baseline scenario predicts, the difference is 0.7 of a percentage point. Consequently, we would expect a 2.8% deficit of the public health care system instead of 3.2% of the baseline scenario by 2050 if the death cost scenario were to be actual.

5.2.3 Other scenarios

Alternative scenario 6. Cash transfers out of the NHIF budget

As it was presented in paragraphs 3.1 and 4.6.3, the budget of the NHIF includes expenditures on cash transfers. The baseline scenario is modified here only at one point: we assume that cash transfers paid by the NHIF are out of the budget and are fully financed by the central budget. Consequently, health contributions are exclusively spent on health care.

The results of scenario 6. are shown in Table A.2.11 and in Figures A.2.10 and A.2.11, together with the baseline scenario. Based on these results, our findings related to the total health care budget and separately for the social insurance system, can be summarized as follows.

- If the NHIF budget were alleviated of the cash transfers, a small surplus would have characterized both the budget of total public health care system and of the social insurance system in the base year (2002). The revenues of the total health care system would have reached 5.7% of the GDP, overrunning the level of expenditure. As for the social insurance system, revenues would have accounted for 4.9% of GDP, while expenditures for 4.5% of GDP.
- However, even under these assumptions, the base year 2002 is the only one for which the model demonstrates a surplus in the budget. While expenditure is expected to increase continuously during the period of analyses (as was presented for the baseline scenario), revenues of total public health care relative to GDP will fluctuate over this period. After an initial decrease between 2002 and 2007, revenues will slightly increase until 2020, and will gradually decrease thereafter.
- While the shape of the curve is very similar to that of the baseline scenario, the level of revenues is higher by slightly more than 1 percentage point relative to GDP. This is obvious, since we assumed that the whole quantum of health contributions is allocated for health care services in the model.
- The deficit of both the total public health care system and the social insurance system is the smallest in this case compared with other scenarios that were run and presented previously. However, even under these circumstances, the deficit both of the total public health care system and the social insurance system would account for 2.4% of the GDP at the end of the period of analysis. Consequently, the ratio of the deficit relative to revenues is expected to reach 54% by 2050.
- When relying on this scenario, the level of premium needed to close the revenue and expenditure gap for the social insurance system would be 24 percent by 2050.

6. Summary of results and conclusions

Running effective and sustainable public health care systems is a high priority challenge for European countries, including Hungary and for the European Union as a whole. Using an adjusted version of the ILO social budget model, WP IX of the AHEAD project aimed to present a forecast for the next half century (until 2050) on the development of both expenditures and revenues for public health care for five of the new EU member countries. Firstly, we present our main assumptions and then we summarize the main conclusions of the Hungarian model, including the sensitivity analyses.

- We tried to collect as comprehensive and reliable body of information as possible concerning to the development of main variables of the model. The Convergence Program presented by the Hungarian government during the fall of 2006 was the main source in this respect. Health reforms are on the agenda of the Hungarian government also, and the first

steps have already been taken during the second half of this year, which are expected to come into effect from 2007. While our model presented in earlier sections of this report chose 2002 as the base year, some elements of this reform were incorporated in our assumptions.

- The *demographic* input module of the base scenario for our model assumes that TFR will increase linearly between 2002 and 2025 from 1.31 to 1.6 and will stay constant for the remaining period. Life expectancy will improve considerably among both men (from 68.3 year to 76.4 year) and women (from 76.6 year to 83.0 year). Migration is assumed to be stable for the whole period in terms of number of migrants (an immigration of 12,000 persons each year, comprised of men and women in an equal number). Under these assumptions, the Hungarian population is expected to decrease by about 1.5-2 million people by 2050. The age structure of the population will experience considerable changes, implying a deepening of dependency ratios: the share of age group 15-64 years will decrease from 68% to 58%, while that of age group 65 years and above will grow from 15% to 30% during the period under study.
- The *labour supply* module of the model uses the figures of the Hungarian Convergence Program for the development of participation rates among men and women. According to CP participation rates will slowly increase until 2020 and will stabilise at that level or even a slight decrease is possible. These assumptions result in highest expected participation rates between the years 2020-2025 with slightly reduced participation rates thereafter.
- The main *macroeconomic* variables of the model are expected to improve for the whole period under analysis, although this development will slow down as time goes on. For example, real GDP growth is expected to be highest in year 2010 (4%) and only 1.1% at the end of the period. The consumer price index is the only variable likely to improve continuously during the period under analysis, that is: 5.3% in 2002 and 2.0% in 2050.
- Based on microdata provided by the NHIF, utilisation patterns by age groups were estimated for modelling purposes. The utilisation pattern for inpatient care reproduce the so-called j-curve form, which is observed by empirical researchers worldwide. However, the j-form of the curve does not manifest when outpatient care utilisation is plotted against age. The number of visits per capita in 2002 shows a slow increase from about 13 at birth to 20 between the ages 45-49 years. The curve is surprisingly flat between ages 45-49 and 80-84 years, and only small variations can be observed on this section. Utilisation decreases considerably among people aged 85 years and above.

Here we summarise the main findings and conclusions of the Hungarian baseline scenario.

- The level of health expenditure as well as of the health budget deficit is already high in Hungary and is expected to grow further over the next decades. Therefore, the burden on the presently active and future generations is expected to increase considerably.
- Total public health expenditures exceeded HUF 940 billion in Hungary in the year 2002. This amount represented 5.5% of country's GDP. At the same time the health system gained cca. HUF 750 billion of revenues from contributions and transfers from the central budget, which accounted for 4.3% of GDP. Consequently, the deficit in the base year was HUF 190 billion, which represented 1.1% of GDP, 20.5% of health expenditure and 25.7% of revenues. (Table 6)
- The model estimates a 1.2 percentage point increase in the total health expenditure relative to GDP (from 5.5% to 6.7%) between 2002 and 2050. On the revenue side, the initial level of 4.3% relative to GDP is expected to decrease to 3.4% by 2050.

- While the magnitude of the NHIF deficit is considerable in the base year, our model predicts that the Hungarian health system faces a further increase in its deficit over the next decades. The initial deficit of the total public health care system (1.1.% of GDP) is expected to grow to 3.4% of GDP by 2050.
- At the beginning of the period under analysis, health insurance contributions paid by both employers and employees represented 14% of gross wages. The model estimates indicate that a health insurance contribution fixed at 17% of employers wages would have balanced the system's budget. The level of insurance premium was 15% in 2007. The level of premium needed to close the gap between revenues and expenditure will exceed the actual level by 5 percentage points by 2010 (20%) and will have to be increased to 28% by 2050 to offset the deficit, where everything else is held constant.

Our sensitivity analyses also allow us to draw the conclusions summarised in Tables A.2.12 and A.2.13 which shows the results of alternative scenarios comparing them to the findings of the baseline scenario.

- The growth of the deficit is caused by trends influencing both expenditure and revenue sides. On the revenue side, the development of activity rates has a moderating effect on the revenues of the health care system. To put this another way, the Hungarian health care system can not expect any solution to its predicted financial problems through increasing activity rates. At the same time, alternative scenarios for wages also show only moderate effects. This can be partly attributed to a quite complex mechanism by which wages affect the deficit.
- On the expenditure side, demographic variables have even smaller effects than was observed on the revenue side. While huge variations of TFR were tested, the results of these estimations have shown on small deviations in the expenditures compared to the baseline scenario. The model's built-in variants for life expectancy development lead to almost unobservable changes in predicted revenue levels. Considering increased costs in the last year of life, the total expenditure of the public health care system would show a considerably smaller increase than the baseline scenario predicts: the difference is 0.6% of a percentage point relative to GDP.
- Even when all cash transfers are assumed to be out of the NHIF budget and therefore all revenues of the Fund would be spent exclusively on health care services, the base year 2002 is the only year for which the model demonstrates a surplus in the budget. While expenditure increases continuously during the period of analyses (as was presented for the baseline scenario), revenues of the total public health care system would decrease considerably until 2020 and essentially would stay the same for the rest of the period.

7. Policy recommendations

Modelling long-term expenditures and revenues of the Hungarian public health care system are not only of academic interest: the most important findings could be useful for policy-makers as well. The applied ILO model allows us to formulate policy recommendations for both the expenditure side and revenue side of the public health care system.

One of our main conclusions based on the model presented earlier in this report and used for long-term forecasts was that even extreme (and thus unlikely) developments in fertility and life expectancy would have a limited effect on public health care *expenditures*. These findings imply that a structural reform is inevitable in order to increase the cost-effectiveness of the Hungarian system, including certainly preventive health care measures. However, the results of death cost analysis indicate that relying on healthy life expectancy would predict lower expenditure levels

of the public health care system. It must be noted here, that intensive debates on health care reform are currently on the public agenda in Hungary and the first steps have already being made in Hungary since the second half of 2006.

On the *revenue* side policies must aim to increase the volume of taxable income. The results of our model do not suggest any special intervention, but a complex set of policies, including demographic (fertility, migration), labour market (activity rates), economic (productivity) or administrative efficiency (contribution compliance) means. The need for a complex design is highlighted also by the estimations of the model regarding the magnitude of contribution rates needed to close the gap between expenditures and revenues. The tax and contribution burden on the employed is already so high that it strongly affects the country's competitiveness in the region.

Still related to the revenue side, it would be fruitful to consider the possibility of detaching cash benefits (e.g. maternity benefits, sickness-pay) from the National Health Insurance Fund's budget. This solution would allow for a more transparent NHIF budget from the viewpoint of the health care system.

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Annex 1. Methodology for estimation of death-related costs[12]

As a first step, average per capita expenditures were estimated by sex and age, separately for survivors and deceased using a 0.5 percent sample of population provided by the National Health Insurance from 2002 and described in details in Section 3.2. While the dataset contains more than 50,000 cases in total, the number of deceased in 2003 and 2004 is only about 1,300. That allowed us to form only 10-year age groups, 10 in total.

$$\overline{AE}^{l}_{a,p,2002} = \frac{\overline{TE}^{l}_{a,p,2002}}{N^{l}_{a,p,2002}}$$

where: $l \in \{s, d\}$, status of a person: *s* – survivor, *d* – deceased

$a \in \{1,..,10\}$, 10-years age cohort;

$p \in \{m, f\}$, sex: *m* – male, *f* – female;

$\overline{AE}^{l}_{a,p,2002}$ – average per capita expenditures for a person of ***l*** status, age cohort ***a*** and sex ***p*** in the year 2002;

$\overline{TE}^{l}_{a,p,2002}$ – total expenditure for ***l*** status, age cohort **a** and sex ***p*** (according to National Health Fund data in the year 2002);

$N^{l}_{a,p,2002}$ – number of persons with ***l*** status (deceased in the given year or survivors) in age cohort ***a*** and sex ***p*** in the year 2002 (according to the demographic projection used in the ILO model).

We assume that per capita expenditures are growing by the same measure as nominal GDP per capita. Therefore:

$$AE^{l}_{a,p,n} = AE^{l}_{a,p,n-1} \cdot (1 + r_n)$$

where: *n* – following year of projection;

r_n – GDP per capita growth rate in year *n.*

Total expenditures by ***l*** status are calculated as follows:

$$TE^{s}_{n} = \sum_{a=1}^{10} AE^{s}_{a,m,n} \cdot N^{s}_{a,m,n} + \sum_{a=1}^{10} AE^{s}_{a,f,n} \cdot N^{s}_{a,f,n},$$

$$TE^{d}_{n} = \sum_{a=1}^{10} AE^{d}_{a,m,n} \cdot N^{d}_{a,m,n} + \sum_{a=1}^{10} AE^{d}_{a,f,n} \cdot N^{d}_{a,f,n},$$

where: TE^{s}_{n}, TE^{d}_{n} are total expenditures in year n for survivors (*s*) and deceased (*d*).

Consequently, total public health expenditure is composed as sum of expenditures for deceased and for survivors:

$$TE^{e}_{n} = TE^{s}_{n} + TE^{d}_{n},$$

[12] Notations in this section are similar to those used in the WPIX Poland country report.

TE_n^e being total expenditure in year *n* estimated using a sample of the NHIF.

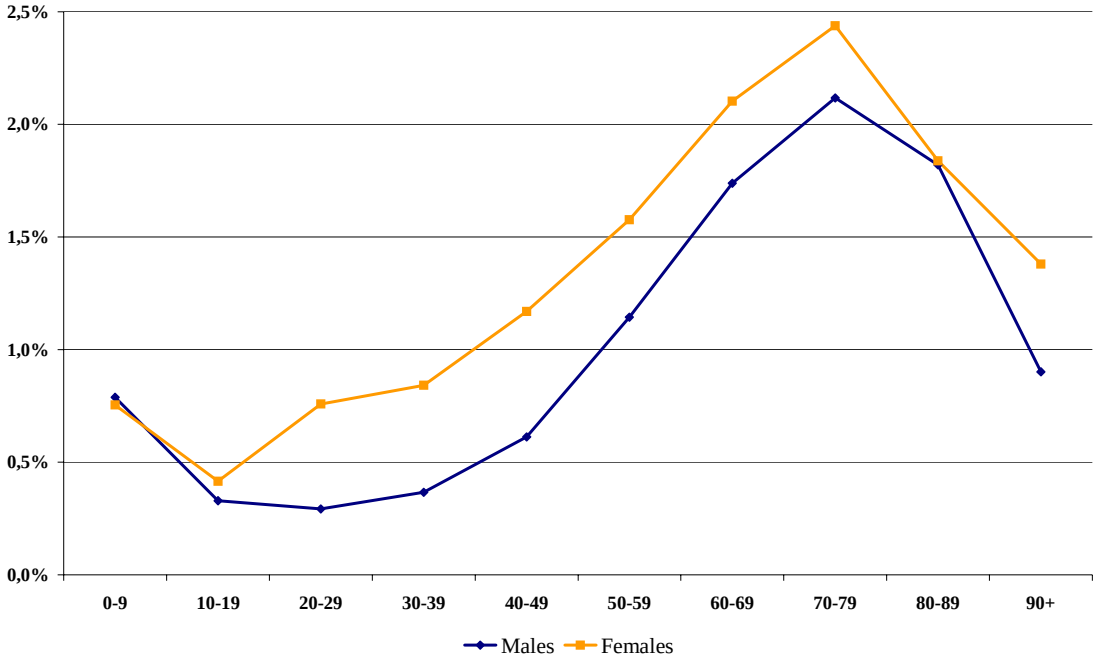
Figures of total public health care expenditures estimated using the NHIF sample are lower than those published in the NHAs. We can note that the total lack of information about GPs is one of the main reasons for this underestimation. In order to overcome this problem, we defined a factor ***c*** that corrects for the difference:

$$c = TE_n^{NHA} / TE_n^e$$

TE_n^{NHA} being total expenditures in year *n* published in NHAs.

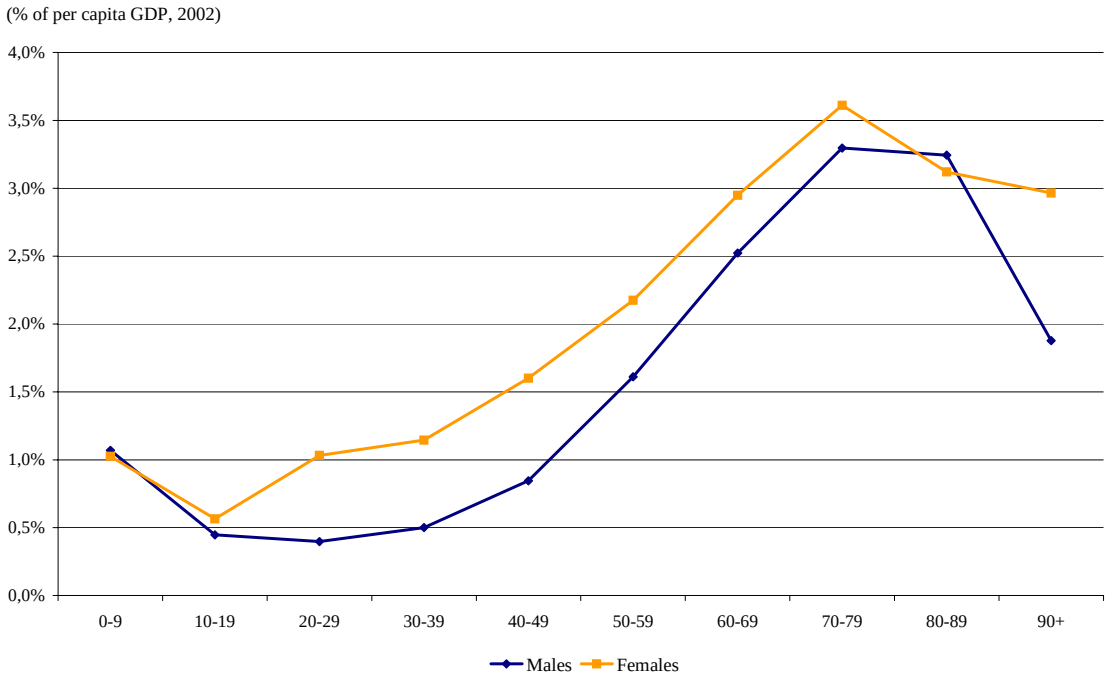
Factor ***c*** is kept constant for the whole period under analysis.

Figure A.1.1 Average health cost per capita as percentage of GDP per capita, 2002 – by sex and age groups (%)



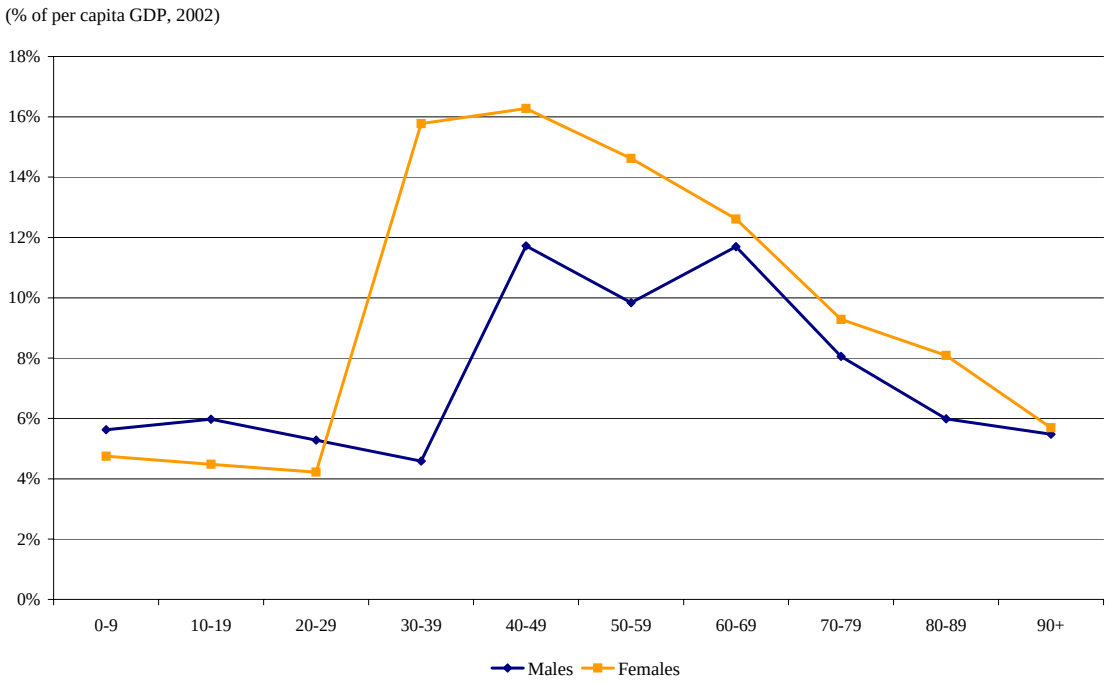
Source: Own calculations based on NHIF dataset.

Figure A.1.2 Average health cost per capita as percentage of GDP per capita, 2002 – survivors (%)



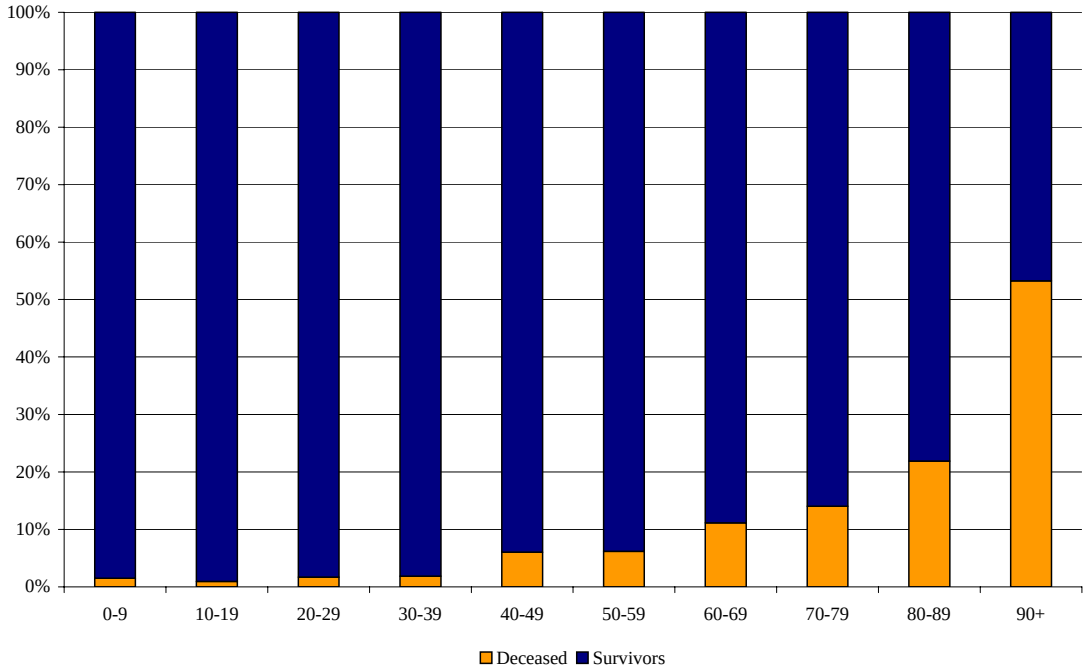
Source: Own calculation based on NHIF sample.

Figure A.1.3 Average health cost per capita as a percentage of GDP per capita, 2002 – deceased (%)



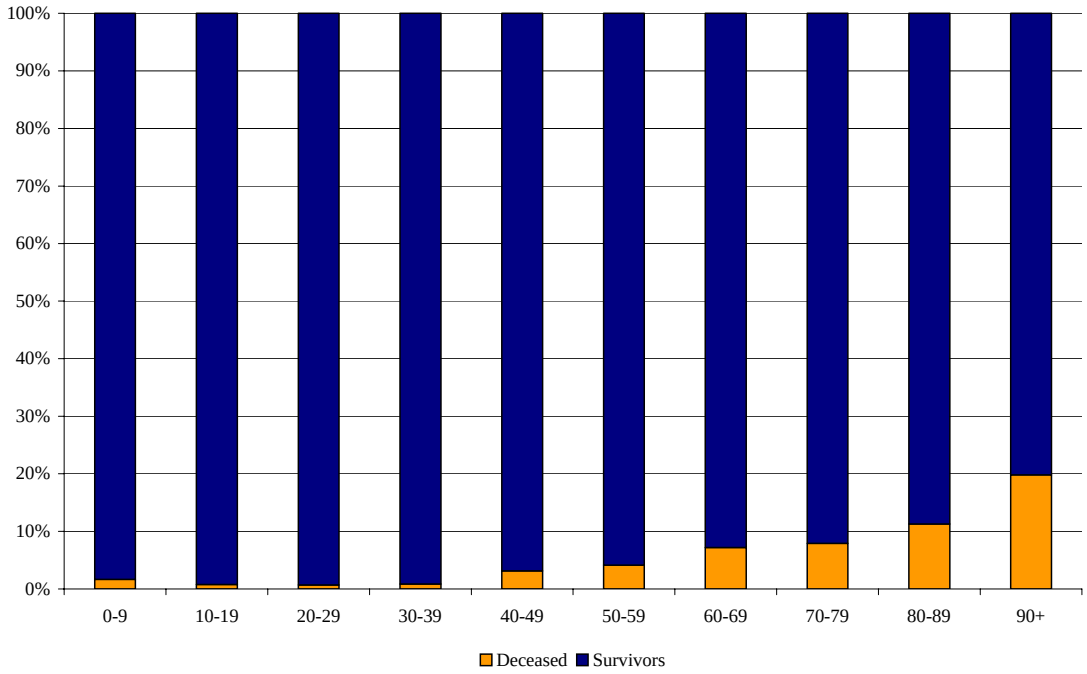
Source: Own calculation based on NHIF sample.

Figure A.1.4 The distribution of health care costs between deceased and survivors by age groups – males, 2002 (%)



Source: Own calculation based on NHIF sample.

Figure A.1.5 The distribution of health care costs between deceased and survivors by age groups – females, 2002 (%)



Source: Own calculation based on NHIF sample.

Annex 2. Tables and figures related to Section 5. Results of projections and sensitivity analysis to given parameters

Table A.2.1 Results of alternative scenario 1.1. – total public health care and social insurance system

	2002	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Public Health Care											
Health Expenditure	940,337	1,208,347	1,808,772	2,599,470	3,574,015	4,755,563	6,148,503	7,750,543	9,529,841	11,405,419	13,347,827
Health Expenditure (Share of GDP)	5.5%	5.5%	5.5%	5.6%	5.8%	6.0%	6.1%	6.3%	6.4%	6.6%	6.8%
Revenues	747,988	897,248	1,347,652	2,024,600	2,858,488	3,568,952	4,359,487	5,208,612	6,085,651	6,951,827	7,762,575
Revenues (Share of GDP)	4.3%	4.1%	4.1%	4.4%	4.6%	4.5%	4.3%	4.2%	4.1%	4.0%	4.0%
Deficit/surplus	-192,350	-311,099	-461,120	-574,870	-715,528	-1,186,611	-1,789,016	-2,541,931	-3,444,190	-4,453,592	-5,585,252
Deficit/surplus (Share of GDP)	-1.1%	-1.4%	-1.4%	-1.2%	-1.2%	-1.5%	-1.8%	-2.1%	-2.3%	-2.6%	-2.8%
Deficit/surplus (Share of expenditures)	20.5%	25.7%	25.5%	22.1%	20.0%	25.0%	29.1%	32.8%	36.1%	39.0%	41.8%
Deficit/surplus (Share of revenues)	25.7%	34.7%	34.2%	28.4%	25.0%	33.2%	41.0%	48.8%	56.6%	64.1%	72.0%
Social insurance system											
Health Expenditure	775,631	1,025,272	1,616,347	2,407,052	3,410,781	4,581,872	5,948,987	7,533,115	9,354,137	11,266,821	13,234,865
Health Expenditure (Share of GDP)	4.5%	4.7%	4.9%	5.2%	5.5%	5.7%	5.9%	6.1%	6.3%	6.5%	6.7%
Revenues	612,103	741,978	1,114,438	1,674,239	2,363,822	2,951,339	3,605,071	4,307,253	5,032,519	5,748,801	6,419,249
Revenues (Share of GDP)	3.6%	3.4%	3.4%	3.6%	3.8%	3.7%	3.6%	3.5%	3.4%	3.3%	3.3%
Deficit/surplus	-163,528	-283,294	-501,909	-732,813	-1,046,960	-1,630,533	-2,343,916	-3,225,861	-4,321,618	-5,518,019	-6,815,616
Deficit/surplus (Share of GDP)	-1.0%	-1.3%	-1.5%	-1.6%	-1.7%	-2.0%	-2.3%	-2.6%	-2.9%	-3.2%	-3.5%
Deficit/surplus (Share of expenditures)	21.1%	27.6%	31.1%	30.4%	30.7%	35.6%	39.4%	42.8%	46.2%	49.0%	51.5%
Deficit/surplus (Share of revenues)	26.7%	38.2%	45.0%	43.8%	44.3%	55.2%	65.0%	74.9%	85.9%	96.0%	106.2%
Level of actual insurance premium	14%	14%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Level of premium needed to close revenues and expenditures gap	17%	18%	20%	20%	20%	21%	22%	23%	24%	25%	26%

Table A.2.2 Results of alternative scenario 1.2. – total public health care and social insurance system

	2002	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Public Health Care											
Health Expenditure	940,337	1,204,519	1,794,372	2,570,035	3,523,306	4,687,302	6,060,202	7,641,981	9,403,731	11,263,556	13,192,093
Health Expenditure (Share of GDP)	5.5%	5.5%	5.5%	5.6%	5.7%	5.9%	6.0%	6.2%	6.4%	6.5%	6.7%
Revenues	747,988	870,900	1,229,309	1,764,211	2,379,227	2,943,960	3,561,200	4,210,068	4,862,585	5,485,049	6,040,414
Revenues (Share of GDP)	4.3%	4.0%	3.8%	3.8%	3.9%	3.7%	3.5%	3.4%	3.3%	3.2%	3.1%
Deficit/surplus	-192,350	-333,619	-565,063	-805,824	-1,144,079	-1,743,341	-2,499,002	-3,431,913	-4,541,146	-5,778,507	-7,151,679
Deficit/surplus (Share of GDP)	-1.1%	-1.5%	-1.7%	-1.7%	-1.9%	-2.2%	-2.5%	-2.8%	-3.1%	-3.3%	-3.6%
Deficit/surplus (Share of expenditures)	20.5%	27.7%	31.5%	31.4%	32.5%	37.2%	41.2%	44.9%	48.3%	51.3%	54.2%
Deficit/surplus (Share of revenues)	25.7%	38.3%	46.0%	45.7%	48.1%	59.2%	70.2%	81.5%	93.4%	105.4%	118.4%
Social insurance system											
Health Expenditure	775,631	1,000,524	1,518,128	2,195,937	3,029,632	4,043,666	5,211,067	6,560,710	8,135,653	9,774,244	11,437,528
Health Expenditure (Share of GDP)	4.5%	4.5%	4.6%	4.8%	4.9%	5.1%	5.2%	5.3%	5.5%	5.7%	5.8%
Revenues	612,103	720,189	1,016,575	1,458,911	1,967,498	2,434,503	2,944,929	3,481,508	4,021,106	4,535,852	4,995,111
Revenues (Share of GDP)	3.6%	3.3%	3.1%	3.2%	3.2%	3.1%	2.9%	2.8%	2.7%	2.6%	2.5%
Deficit/surplus	-163,528	-280,335	-501,554	-737,026	-1,062,134	-1,609,163	-2,266,138	-3,079,202	-4,114,547	-5,238,391	-6,442,417
Deficit/surplus (Share of GDP)	-1.0%	-1.3%	-1.5%	-1.6%	-1.7%	-2.0%	-2.3%	-2.5%	-2.8%	-3.0%	-3.3%
Deficit/surplus (Share of expenditures)	21.1%	28.0%	33.0%	33.6%	35.1%	39.8%	43.5%	46.9%	50.6%	53.6%	56.3%
Deficit/surplus (Share of revenues)	26.7%	38.9%	49.3%	50.5%	54.0%	66.1%	77.0%	88.4%	102.3%	115.5%	129.0%
Level of actual insurance premium	14%	14%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Level of premium needed to close revenues and expenditures gap	17%	19%	20%	20%	21%	22%	23%	24%	26%	27%	29%

Figure A.2.1 Joint results of scenarios 1.1. and 1.2. – total public health care

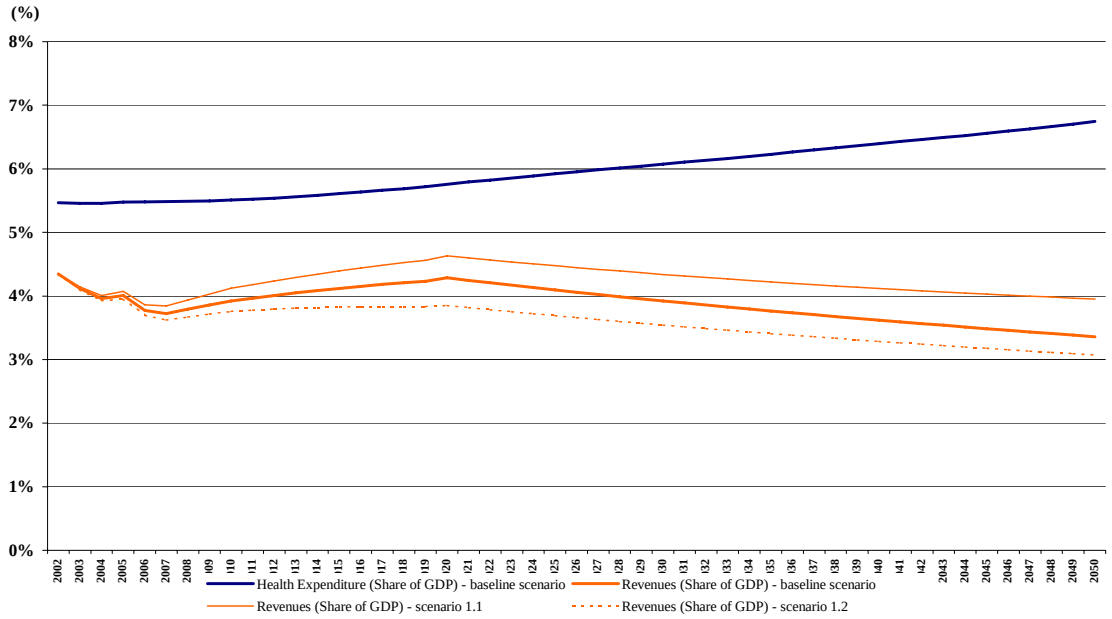


Figure A.2.2 Joint results of scenarios 1.1. and 1.2. – social insurance system

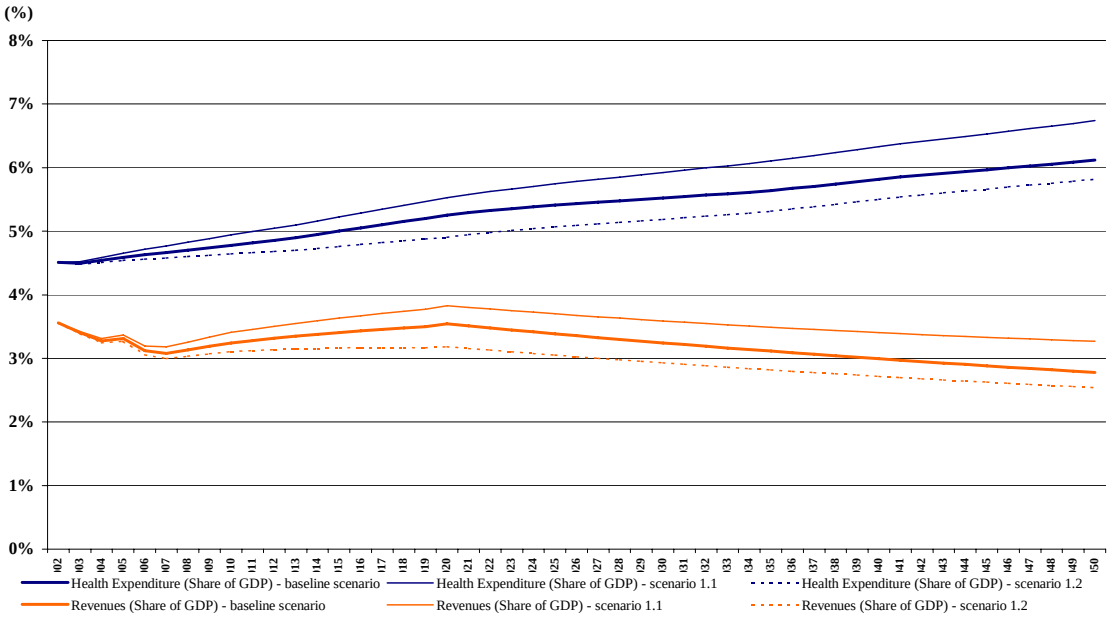


Table A.2.3 Results of alternative scenario 2.1. – total public health care and social insurance system

	2002	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Public Health Care											
Health Expenditure	940,337	1,206,224	1,808,769	2,628,549	3,684,086	5,024,087	6,680,429	8,691,893	11,072,391	13,775,290	16,813,663
Health Expenditure (Share of GDP)	5.5%	5.5%	5.5%	5.6%	5.7%	5.9%	6.0%	6.2%	6.4%	6.5%	6.7%
Revenues	747,988	882,626	1,293,844	1,965,179	2,852,077	3,704,709	4,727,493	5,924,262	7,287,914	8,797,664	10,416,946
Revenues (Share of GDP)	4.3%	4.0%	3.9%	4.2%	4.4%	4.4%	4.3%	4.2%	4.2%	4.2%	4.1%
Deficit/surplus	-192,350	-323,598	-514,925	-663,370	-832,009	-1,319,379	-1,952,937	-2,767,632	-3,784,478	-4,977,626	-6,396,717
Deficit/surplus (Share of GDP)	-1.1%	-1.5%	-1.6%	-1.4%	-1.3%	-1.6%	-1.8%	-2.0%	-2.2%	-2.4%	-2.5%
Deficit/surplus (Share of expenditures)	20.5%	26.8%	28.5%	25.2%	22.6%	26.3%	29.2%	31.8%	34.2%	36.1%	38.0%
Deficit/surplus (Share of revenues)	25.7%	36.7%	39.8%	33.8%	29.2%	35.6%	41.3%	46.7%	51.9%	56.6%	61.4%
Social insurance system											
Health Expenditure	775,631	1,011,549	1,569,037	2,345,630	3,365,438	4,598,516	6,086,317	7,888,768	10,097,569	12,576,211	15,319,414
Health Expenditure (Share of GDP)	4.5%	4.6%	4.8%	5.0%	5.2%	5.4%	5.5%	5.6%	5.8%	5.9%	6.1%
Revenues	612,103	729,886	1,069,942	1,625,102	2,358,520	3,063,603	3,909,392	4,899,058	6,026,728	7,275,214	8,614,276
Revenues (Share of GDP)	3.6%	3.3%	3.3%	3.5%	3.7%	3.6%	3.5%	3.5%	3.5%	3.4%	3.4%
Deficit/surplus	-163,528	-281,663	-499,095	-720,529	-1,006,918	-1,534,913	-2,176,924	-2,989,709	-4,070,841	-5,300,997	-6,705,138
Deficit/surplus (Share of GDP)	-1.0%	-1.3%	-1.5%	-1.5%	-1.6%	-1.8%	-2.0%	-2.1%	-2.3%	-2.5%	-2.7%
Deficit/surplus (Share of expenditures)	21.1%	27.8%	31.8%	30.7%	29.9%	33.4%	35.8%	37.9%	40.3%	42.2%	43.8%
Deficit/surplus (Share of revenues)	26.7%	38.6%	46.6%	44.3%	42.7%	50.1%	55.7%	61.0%	67.5%	72.9%	77.8%
Level of actual insurance premium	14%	14%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Level of premium needed to close revenues and expenditures gap	17%	18%	20%	20%	20%	20%	21%	21%	22%	23%	23%

Table A.2.4 Results of alternative scenario 2.2. – total public health care and social insurance system

	2002	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Public Health Care											
Health Expenditure	940,337	1,206,224	1,776,990	2,459,758	3,180,655	3,966,391	4,857,222	5,863,954	6,985,047	8,191,138	9,499,669
Health Expenditure (Share of GDP)	5.5%	5.5%	5.5%	5.6%	5.8%	6.0%	6.1%	6.3%	6.5%	6.7%	6.8%
Revenues	747,988	882,626	1,258,498	1,772,944	2,272,550	2,566,778	2,869,503	3,174,448	3,474,223	3,760,464	4,024,050
Revenues (Share of GDP)	4.3%	4.0%	3.9%	4.1%	4.1%	3.9%	3.6%	3.4%	3.2%	3.1%	2.9%
Deficit/surplus	-192,350	-323,598	-518,491	-686,814	-908,105	-1,399,614	-1,987,720	-2,689,507	-3,510,824	-4,430,674	-5,475,619
Deficit/surplus (Share of GDP)	-1.1%	-1.5%	-1.6%	-1.6%	-1.7%	-2.1%	-2.5%	-2.9%	-3.3%	-3.6%	-3.9%
Deficit/surplus (Share of expenditures)	20.5%	26.8%	29.2%	27.9%	28.6%	35.3%	40.9%	45.9%	50.3%	54.1%	57.6%
Deficit/surplus (Share of revenues)	25.7%	36.7%	41.2%	38.7%	40.0%	54.5%	69.3%	84.7%	101.1%	117.8%	136.1%
Social insurance system											
Health Expenditure	775,631	1,011,549	1,540,409	2,190,296	2,893,459	3,608,898	4,393,410	5,278,644	6,312,451	7,404,727	8,564,570
Health Expenditure (Share of GDP)	4.5%	4.6%	4.8%	5.0%	5.3%	5.4%	5.6%	5.7%	5.9%	6.0%	6.2%
Revenues	612,103	729,886	1,040,713	1,466,133	1,879,281	2,122,593	2,372,930	2,625,104	2,873,003	3,109,710	3,327,681
Revenues (Share of GDP)	3.6%	3.3%	3.2%	3.4%	3.4%	3.2%	3.0%	2.8%	2.7%	2.5%	2.4%
Deficit/surplus	-163,528	-281,663	-499,695	-724,163	-1,014,178	-1,486,305	-2,020,480	-2,653,540	-3,439,448	-4,295,018	-5,236,888
Deficit/surplus (Share of GDP)	-1.0%	-1.3%	-1.6%	-1.7%	-1.8%	-2.2%	-2.6%	-2.9%	-3.2%	-3.5%	-3.8%
Deficit/surplus (Share of expenditures)	21.1%	27.8%	32.4%	33.1%	35.1%	41.2%	46.0%	50.3%	54.5%	58.0%	61.1%
Deficit/surplus (Share of revenues)	26.7%	38.6%	48.0%	49.4%	54.0%	70.0%	85.1%	101.1%	119.7%	138.1%	157.4%
Level of actual insurance premium	14%	14%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Level of premium needed to close revenues and expenditures gap	17%	18%	20%	20%	21%	22%	24%	26%	28%	30%	32%

Figure A.2.3 Joint results of scenarios 2.1. and 2.2. – total public health care

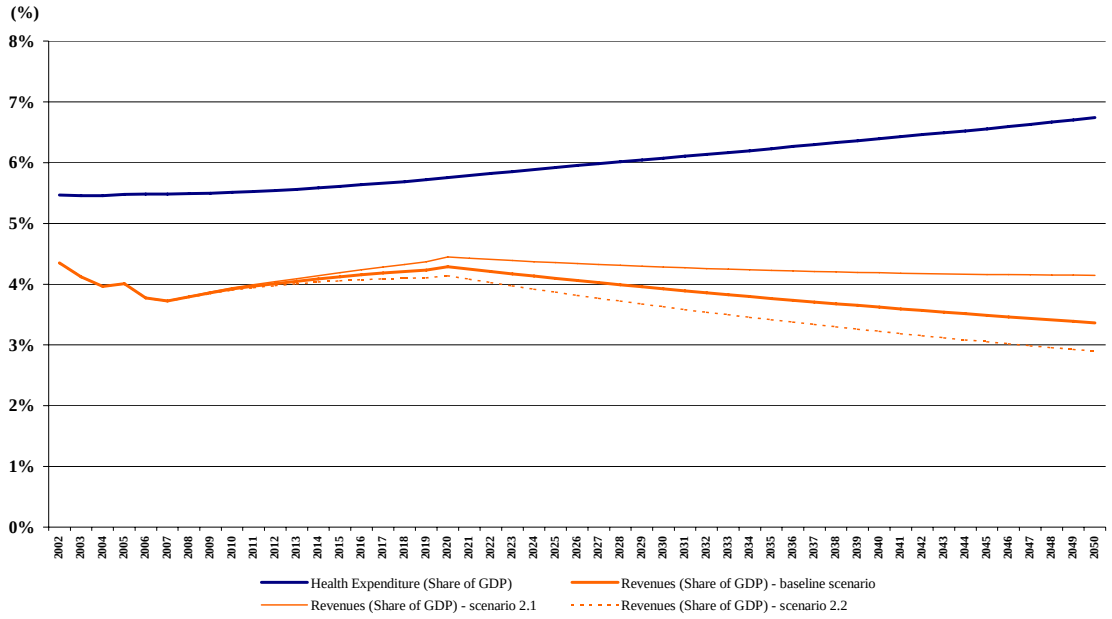


Figure A.2.4 Joint results of scenarios 2.1. and 2.2. – social insurance system

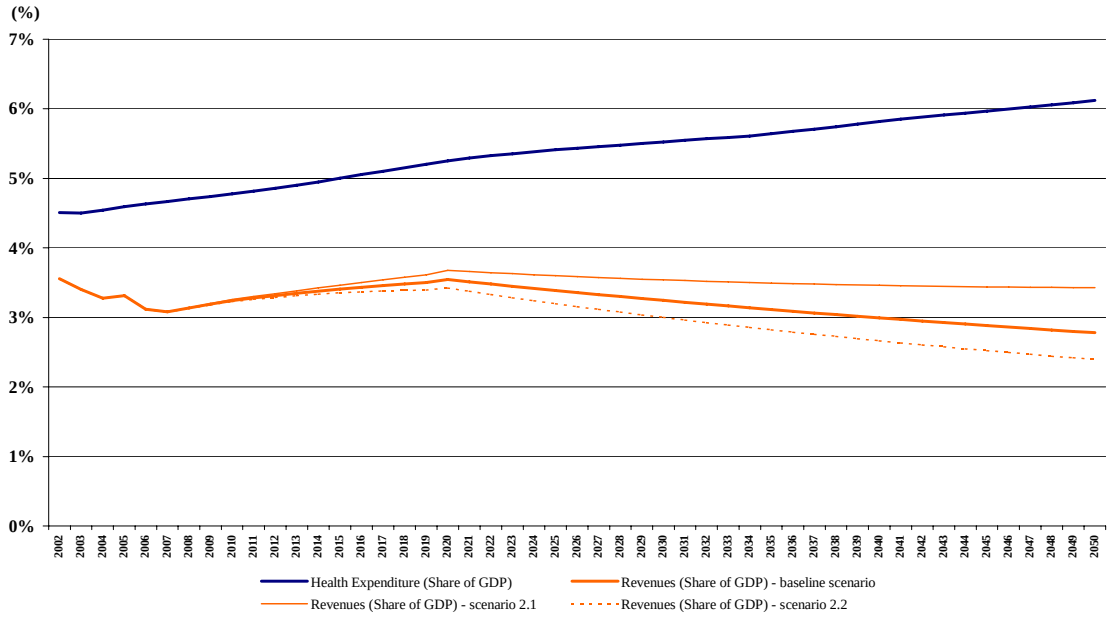


Table A.2.5 Results of alternative scenario 3.1. – total public health care and social insurance system

	2002	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Public Health Care											
Health Expenditure	940,337	1,206,325	1,801,446	2,582,094	3,532,813	4,670,804	5,996,957	7,508,535	9,171,411	10,899,796	12,655,372
Health Expenditure (Share of GDP)	5.5%	5.5%	5.5%	5.6%	5.7%	5.9%	6.0%	6.1%	6.2%	6.3%	6.4%
Revenues	747,988	882,626	1,281,977	1,899,132	2,645,119	3,314,703	4,064,838	4,877,015	5,723,964	6,570,456	7,375,230
Revenues (Share of GDP)	4.3%	4.0%	3.9%	4.1%	4.3%	4.2%	4.0%	4.0%	3.9%	3.8%	3.8%
Deficit/surplus	-192,350	-323,699	-519,469	-682,962	-887,694	-1,356,101	-1,932,120	-2,631,520	-3,447,446	-4,329,340	-5,280,142
Deficit/surplus (Share of GDP)	-1.1%	-1.5%	-1.6%	-1.5%	-1.4%	-1.7%	-1.9%	-2.1%	-2.3%	-2.5%	-2.7%
Deficit/surplus (Share of expenditures)	20.5%	26.8%	28.8%	26.4%	25.1%	29.0%	32.2%	35.0%	37.6%	39.7%	41.7%
Deficit/surplus (Share of revenues)	25.7%	36.7%	40.5%	36.0%	33.6%	40.9%	47.5%	54.0%	60.2%	65.9%	71.6%
Social insurance system											
Health Expenditure	775,631	1,011,274	1,557,263	2,281,924	3,167,918	4,151,862	5,252,551	6,498,194	7,919,074	9,363,722	10,793,940
Health Expenditure (Share of GDP)	4.5%	4.6%	4.8%	5.0%	5.1%	5.2%	5.2%	5.3%	5.4%	5.4%	5.5%
Revenues	612,103	729,886	1,060,129	1,570,484	2,187,377	2,741,088	3,361,411	4,033,039	4,733,423	5,433,428	6,098,934
Revenues (Share of GDP)	3.6%	3.3%	3.2%	3.4%	3.5%	3.4%	3.3%	3.3%	3.2%	3.1%	3.1%
Deficit/surplus	-163,528	-281,388	-497,134	-711,441	-980,541	-1,410,774	-1,891,140	-2,465,155	-3,185,652	-3,930,294	-4,695,005
Deficit/surplus (Share of GDP)	-1.0%	-1.3%	-1.5%	-1.5%	-1.6%	-1.8%	-1.9%	-2.0%	-2.2%	-2.3%	-2.4%
Deficit/surplus (Share of expenditures)	21.1%	27.8%	31.9%	31.2%	31.0%	34.0%	36.0%	37.9%	40.2%	42.0%	43.5%
Deficit/surplus (Share of revenues)	26.7%	38.6%	46.9%	45.3%	44.8%	51.5%	56.3%	61.1%	67.3%	72.3%	77.0%
Level of actual insurance premium	14%	14%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Level of premium needed to close revenues and expenditures gap	17%	18%	20%	20%	20%	20%	21%	22%	22%	23%	23%

Table A.2.6 Results of alternative scenario 3.2. – total public health care and social insurance system

	2002	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Public Health Care											
Health Expenditure	940,337	1,206,144	1,800,236	2,587,996	3,566,865	4,765,347	6,191,842	7,847,791	9,708,551	11,696,588	13,794,226
Health Expenditure (Share of GDP)	5.5%	5.5%	5.5%	5.6%	5.8%	6.0%	6.2%	6.4%	6.6%	6.8%	7.0%
Revenues	747,988	882,626	1,281,977	1,899,125	2,645,100	3,226,861	3,842,514	4,463,652	5,054,938	5,576,432	5,987,028
Revenues (Share of GDP)	4.3%	4.0%	3.9%	4.1%	4.3%	4.0%	3.8%	3.6%	3.4%	3.2%	3.0%
Deficit/surplus	-192,350	-323,518	-518,259	-688,871	-921,765	-1,538,486	-2,349,328	-3,384,139	-4,653,613	-6,120,156	-7,807,197
Deficit/surplus (Share of GDP)	-1.1%	-1.5%	-1.6%	-1.5%	-1.5%	-1.9%	-2.3%	-2.7%	-3.1%	-3.5%	-4.0%
Deficit/surplus (Share of expenditures)	20.5%	26.8%	28.8%	26.6%	25.8%	32.3%	37.9%	43.1%	47.9%	52.3%	56.6%
Deficit/surplus (Share of revenues)	25.7%	36.7%	40.4%	36.3%	34.8%	47.7%	61.1%	75.8%	92.1%	109.8%	130.4%
Social insurance system											
Health Expenditure	775,631	1,011,770	1,565,521	2,325,441	3,302,119	4,456,177	5,807,689	7,375,070	9,206,502	11,135,064	13,125,069
Health Expenditure (Share of GDP)	4.5%	4.6%	4.8%	5.0%	5.4%	5.6%	5.8%	6.0%	6.2%	6.5%	6.7%
Revenues	612,103	729,886	1,060,129	1,570,478	2,187,361	2,668,447	3,177,560	3,691,210	4,180,173	4,611,421	4,950,963
Revenues (Share of GDP)	3.6%	3.3%	3.2%	3.4%	3.5%	3.3%	3.2%	3.0%	2.8%	2.7%	2.5%
Deficit/surplus	-163,528	-281,883	-505,392	-754,963	-1,114,758	-1,787,730	-2,630,128	-3,683,860	-5,026,329	-6,523,642	-8,174,106
Deficit/surplus (Share of GDP)	-1.0%	-1.3%	-1.5%	-1.6%	-1.8%	-2.2%	-2.6%	-3.0%	-3.4%	-3.8%	-4.2%
Deficit/surplus (Share of expenditures)	21.1%	27.9%	32.3%	32.5%	33.8%	40.1%	45.3%	50.0%	54.6%	58.6%	62.3%
Deficit/surplus (Share of revenues)	26.7%	38.6%	47.7%	48.1%	51.0%	67.0%	82.8%	99.8%	120.2%	141.5%	165.1%
Level of actual insurance premium	14%	14%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Level of premium needed to close revenues and expenditures gap	17%	18%	20%	20%	20%	22%	24%	25%	28%	30%	33%

Table A.2.7 Results of alternative scenario 3.3. – total public health care and social insurance system

	2002	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Public Health Care											
Health Expenditure	940,337	1,206,193	1,800,557	2,586,418	3,557,583	4,739,304	6,137,561	7,749,869	9,544,522	11,438,790	13,406,415
Health Expenditure (Share of GDP)	5.5%	5.5%	5.5%	5.6%	5.8%	5.9%	6.1%	6.3%	6.5%	6.6%	6.8%
Revenues	747,988	882,626	1,281,977	1,899,127	2,645,105	3,249,943	3,900,933	4,572,269	5,230,734	5,837,626	6,351,798
Revenues (Share of GDP)	4.3%	4.0%	3.9%	4.1%	4.3%	4.1%	3.9%	3.7%	3.5%	3.4%	3.2%
Deficit/surplus	-192,350	-323,567	-518,579	-687,291	-912,478	-1,489,361	-2,236,628	-3,177,600	-4,313,787	-5,601,163	-7,054,616
Deficit/surplus (Share of GDP)	-1.1%	-1.5%	-1.6%	-1.5%	-1.5%	-1.9%	-2.2%	-2.6%	-2.9%	-3.2%	-3.6%
Deficit/surplus (Share of expenditures)	20.5%	26.8%	28.8%	26.6%	25.6%	31.4%	36.4%	41.0%	45.2%	49.0%	52.6%
Deficit/surplus (Share of revenues)	25.7%	36.7%	40.5%	36.2%	34.5%	45.8%	57.3%	69.5%	82.5%	95.9%	111.1%
Social insurance system											
Health Expenditure	775,631	1,011,636	1,563,317	2,313,750	3,265,712	4,372,564	5,650,915	7,115,651	8,802,364	10,542,816	12,298,649
Health Expenditure (Share of GDP)	4.5%	4.6%	4.8%	5.0%	5.3%	5.5%	5.6%	5.8%	6.0%	6.1%	6.3%
Revenues	612,103	729,886	1,060,129	1,570,480	2,187,365	2,687,535	3,225,870	3,781,030	4,325,547	4,827,416	5,252,609
Revenues (Share of GDP)	3.6%	3.3%	3.2%	3.4%	3.5%	3.4%	3.2%	3.1%	2.9%	2.8%	2.7%
Deficit/surplus	-163,528	-281,749	-503,188	-743,271	-1,078,347	-1,685,029	-2,425,045	-3,334,621	-4,476,817	-5,715,400	-7,046,040
Deficit/surplus (Share of GDP)	-1.0%	-1.3%	-1.5%	-1.6%	-1.7%	-2.1%	-2.4%	-2.7%	-3.0%	-3.3%	-3.6%
Deficit/surplus (Share of expenditures)	21.1%	27.9%	32.2%	32.1%	33.0%	38.5%	42.9%	46.9%	50.9%	54.2%	57.3%
Deficit/surplus (Share of revenues)	26.7%	38.6%	47.5%	47.3%	49.3%	62.7%	75.2%	88.2%	103.5%	118.4%	134.1%
Level of actual insurance premium	14%	14%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Level of premium needed to close revenues and expenditures gap	17%	18%	20%	20%	20%	22%	23%	24%	26%	28%	29%

Figure A.2.5 Joint results of scenarios 3.1., 3.2. and 3.3. – total public health care

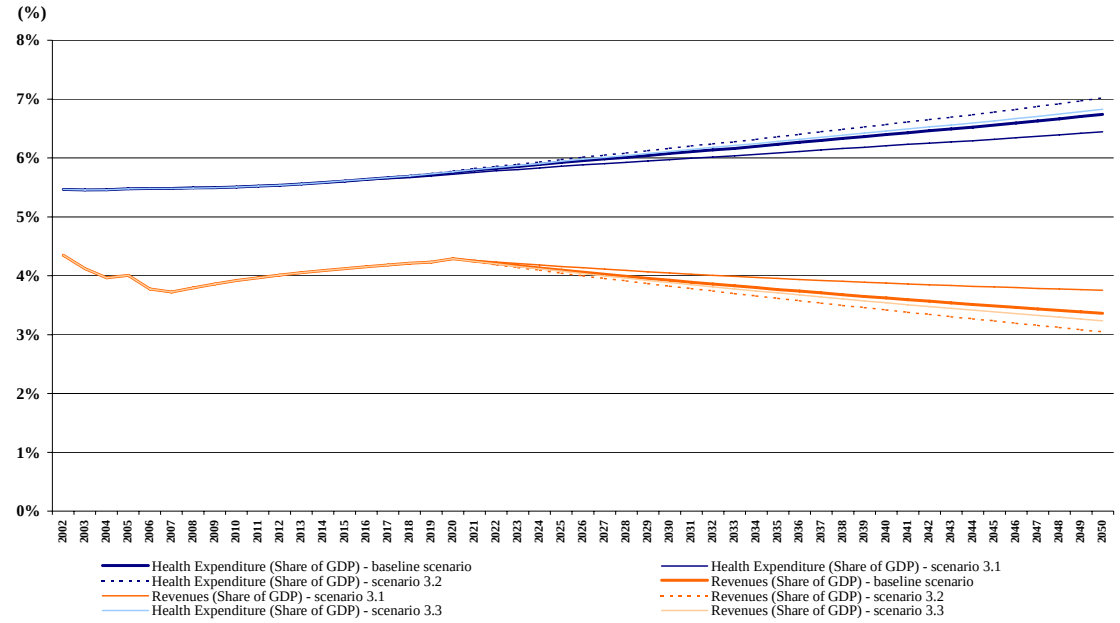


Figure A.2.6 Joint results of scenarios 3.1., 3.2. and 3.3. – social insurance system

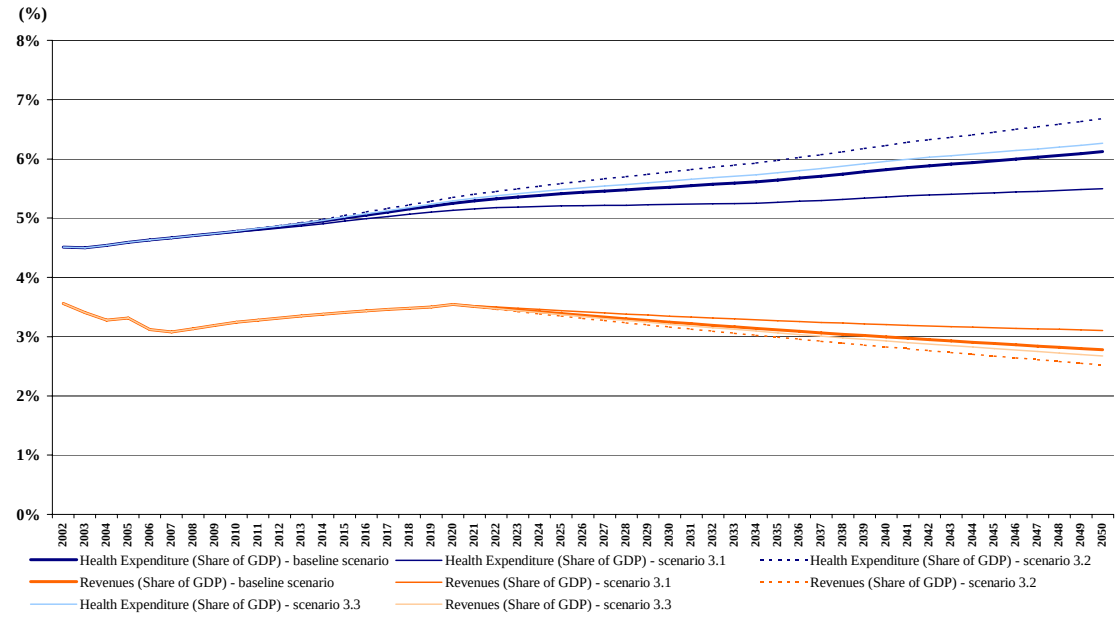


Table A.2.8 Results of alternative scenario 4.1. – total public health care and social insurance system

	2002	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Public Health Care											
Health Expenditure	940,337	1,206,312	1,801,935	2,589,651	3,561,831	4,741,182	6,133,229	7,741,659	9,535,917	11,432,502	13,406,375
Health Expenditure (Share of GDP)	5.5%	5.5%	5.5%	5.6%	5.8%	5.9%	6.1%	6.3%	6.5%	6.6%	6.8%
Revenues	747,988	882,723	1,282,411	1,900,741	2,648,684	3,270,757	3,947,767	4,655,724	5,362,873	6,031,340	6,619,895
Revenues (Share of GDP)	4.3%	4.0%	3.9%	4.1%	4.3%	4.1%	3.9%	3.8%	3.6%	3.5%	3.4%
Deficit/surplus	-192,350	-323,589	-519,523	-688,910	-913,147	-1,470,425	-2,185,462	-3,085,935	-4,173,044	-5,401,162	-6,786,480
Deficit/surplus (Share of GDP)	-1.1%	-1.5%	-1.6%	-1.5%	-1.5%	-1.8%	-2.2%	-2.5%	-2.8%	-3.1%	-3.5%
Deficit/surplus (Share of expenditures)	20.5%	26.8%	28.8%	26.6%	25.6%	31.0%	35.6%	39.9%	43.8%	47.2%	50.6%
Deficit/surplus (Share of revenues)	25.7%	36.7%	40.5%	36.2%	34.5%	45.0%	55.4%	66.3%	77.8%	89.6%	102.5%
Social insurance system											
Health Expenditure	775,631	1,011,655	1,563,185	2,310,894	3,253,348	4,338,572	5,586,296	7,024,497	8,691,990	10,430,272	12,206,406
Health Expenditure (Share of GDP)	4.5%	4.6%	4.8%	5.0%	5.3%	5.4%	5.6%	5.7%	5.9%	6.0%	6.2%
Revenues	612,103	729,966	1,060,488	1,571,814	2,190,325	2,704,747	3,264,599	3,850,043	4,434,819	4,987,607	5,474,311
Revenues (Share of GDP)	3.6%	3.3%	3.2%	3.4%	3.5%	3.4%	3.3%	3.1%	3.0%	2.9%	2.8%
Deficit/surplus	-163,528	-281,689	-502,697	-739,080	-1,063,023	-1,633,825	-2,321,697	-3,174,454	-4,257,171	-5,442,665	-6,732,095
Deficit/surplus (Share of GDP)	-1.0%	-1.3%	-1.5%	-1.6%	-1.7%	-2.0%	-2.3%	-2.6%	-2.9%	-3.2%	-3.4%
Deficit/surplus (Share of expenditures)	21.1%	27.8%	32.2%	32.0%	32.7%	37.7%	41.6%	45.2%	49.0%	52.2%	55.2%
Deficit/surplus (Share of revenues)	26.7%	38.6%	47.4%	47.0%	48.5%	60.4%	71.1%	82.5%	96.0%	109.1%	123.0%
Level of actual insurance premium	14%	14%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Level of premium needed to close revenues and expenditures gap	17%	18%	20%	20%	20%	21%	22%	24%	25%	27%	28%

Table A.2.9 Results of alternative scenario 4.2. – total public health care and social insurance system

	2002	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Public Health Care											
Health Expenditure	940,337	1,206,185	1,800,221	2,582,893	3,543,736	4,703,862	6,067,075	7,632,658	9,369,785	11,199,838	13,092,448
Health Expenditure (Share of GDP)	5.5%	5.5%	5.5%	5.6%	5.7%	5.9%	6.0%	6.2%	6.3%	6.5%	6.7%
Revenues	747,988	882,560	1,281,679	1,897,933	2,642,413	3,261,466	3,934,504	4,637,419	5,338,390	5,999,550	6,579,767
Revenues (Share of GDP)	4.3%	4.0%	3.9%	4.1%	4.3%	4.1%	3.9%	3.8%	3.6%	3.5%	3.4%
Deficit/surplus	-192,350	-323,625	-518,542	-684,960	-901,322	-1,442,396	-2,132,571	-2,995,238	-4,031,395	-5,200,288	-6,512,681
Deficit/surplus (Share of GDP)	-1.1%	-1.5%	-1.6%	-1.5%	-1.5%	-1.8%	-2.1%	-2.4%	-2.7%	-3.0%	-3.3%
Deficit/surplus (Share of expenditures)	20.5%	26.8%	28.8%	26.5%	25.4%	30.7%	35.1%	39.2%	43.0%	46.4%	49.7%
Deficit/surplus (Share of revenues)	25.7%	36.7%	40.5%	36.1%	34.1%	44.2%	54.2%	64.6%	75.5%	86.7%	99.0%
Social insurance system											
Health Expenditure	775,631	1,011,502	1,561,197	2,303,025	3,232,018	4,294,555	5,508,533	6,897,754	8,501,489	10,165,783	11,852,642
Health Expenditure (Share of GDP)	4.5%	4.6%	4.8%	5.0%	5.2%	5.4%	5.5%	5.6%	5.8%	5.9%	6.0%
Revenues	612,103	729,831	1,059,882	1,569,493	2,185,139	2,697,064	3,253,632	3,834,906	4,414,573	4,961,318	5,441,128
Revenues (Share of GDP)	3.6%	3.3%	3.2%	3.4%	3.5%	3.4%	3.2%	3.1%	3.0%	2.9%	2.8%
Deficit/surplus	-163,528	-281,671	-501,315	-733,533	-1,046,878	-1,597,491	-2,254,901	-3,062,847	-4,086,916	-5,204,466	-6,411,515
Deficit/surplus (Share of GDP)	-1.0%	-1.3%	-1.5%	-1.6%	-1.7%	-2.0%	-2.2%	-2.5%	-2.8%	-3.0%	-3.3%
Deficit/surplus (Share of expenditures)	21.1%	27.8%	32.1%	31.9%	32.4%	37.2%	40.9%	44.4%	48.1%	51.2%	54.1%
Deficit/surplus (Share of revenues)	26.7%	38.6%	47.3%	46.7%	47.9%	59.2%	69.3%	79.9%	92.6%	104.9%	117.8%
Level of actual insurance premium	14%	14%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Level of premium needed to close revenues and expenditures gap	17%	18%	20%	20%	20%	21%	22%	23%	25%	26%	28%

Figure A.2.7 Joint results of scenarios 4.1. and 4.2. – total public health care

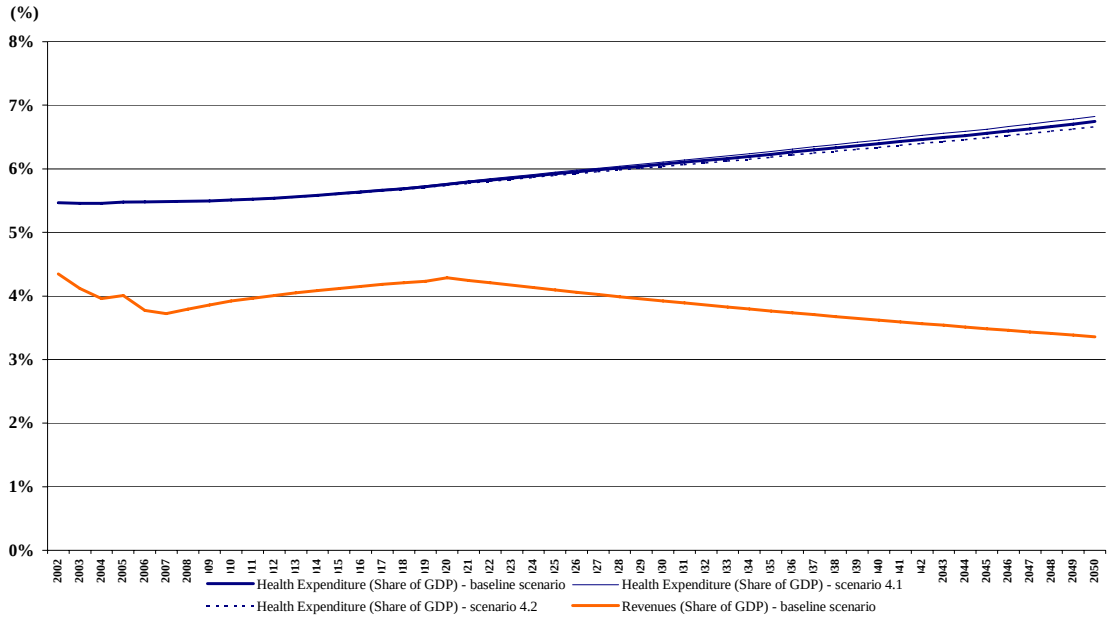


Figure A.2.8 Joint results of scenarios 4.1. and 4.2. – social insurance system

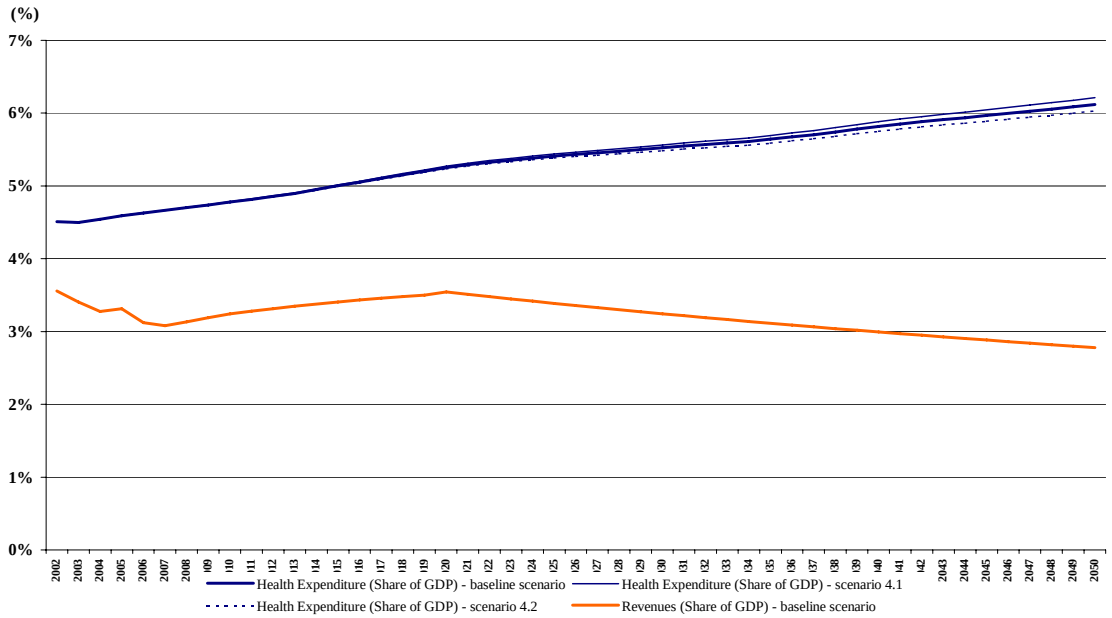


Table A.2.10 Results of alternative scenario 5. – total public health care

	2002	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Public Health Care											
Health Expenditure	940,337	1,199,753	1,780,257	2,538,368	3,457,588	4,551,887	5,851,924	7,295,273	8,896,062	10,545,465	12,153,375
Health Expenditure (Share of GDP)	5.5%	5.4%	5.4%	5.5%	5.6%	5.7%	5.8%	5.9%	6.0%	6.1%	6.2%
Revenues	747,988	882,626	1,281,977	1,899,128	2,645,109	3,265,658	3,940,707	4,646,220	5,350,424	6,015,458	6,600,149
Revenues (Share of GDP)	4.3%	4.0%	3.9%	4.1%	4.3%	4.1%	3.9%	3.8%	3.6%	3.5%	3.4%
Deficit/surplus	-192,350	-317,127	-498,279	-639,241	-812,479	-1,286,229	-1,911,218	-2,649,053	-3,545,638	-4,530,007	-5,553,226
Deficit/surplus (Share of GDP)	-1.1%	-1.4%	-1.5%	-1.4%	-1.3%	-1.6%	-1.9%	-2.1%	-2.4%	-2.6%	-2.8%
Deficit/surplus (Share of expenditures)	20.5%	26.4%	28.0%	25.2%	23.5%	28.3%	32.7%	36.3%	39.9%	43.0%	45.7%
Deficit/surplus (Share of revenues)	25.7%	35.9%	38.9%	33.7%	30.7%	39.4%	48.5%	57.0%	66.3%	75.3%	84.1%

Figure A.2.9 Result of scenario 5. – total public health care

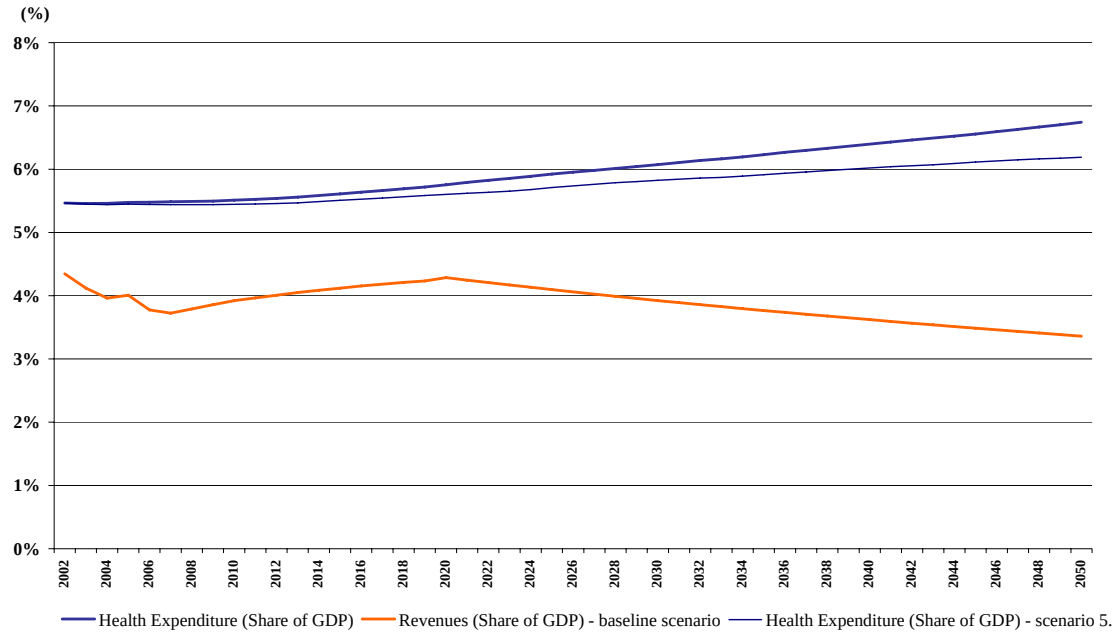


Table A.2.11 Results of alternative scenario 6. – total public health care and social insurance system

	2002	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Public Health Care											
Health Expenditure	940,337	1,206,224	1,800,780	2,585,365	3,551,438	4,721,802	6,100,500	7,686,667	9,451,423	11,313,149	13,242,687
Health Expenditure (Share of GDP)	5.5%	5.5%	5.5%	5.6%	5.8%	5.9%	6.1%	6.2%	6.4%	6.6%	6.7%
Revenues	972,162	1,149,938	1,670,236	2,474,296	3,446,204	4,254,692	5,134,185	6,053,370	6,970,848	7,837,294	8,599,064
Revenues (Share of GDP)	5.7%	5.2%	5.1%	5.4%	5.6%	5.3%	5.1%	4.9%	4.7%	4.5%	4.4%
Deficit/surplus	31,825	-56,287	-130,545	-111,069	-105,234	-467,110	-966,315	-1,633,296	-2,480,575	-3,475,855	-4,643,623
Deficit/surplus (Share of GDP)	0.2%	-0.3%	-0.4%	-0.2%	-0.2%	-0.6%	-1.0%	-1.3%	-1.7%	-2.0%	-2.4%
Deficit/surplus (Share of expenditures)	3.4%	4.7%	7.2%	4.3%	3.0%	9.9%	15.8%	21.2%	26.2%	30.7%	35.1%
Deficit/surplus (Share of revenues)	3.3%	4.9%	7.8%	4.5%	3.1%	11.0%	18.8%	27.0%	35.6%	44.4%	54.0%
Social insurance system											
Health Expenditure	775,631	1,011,549	1,561,841	2,305,889	3,241,077	4,315,688	5,547,834	6,960,966	8,596,458	10,296,022	12,021,437
Health Expenditure (Share of GDP)	4.5%	4.6%	4.8%	5.0%	5.3%	5.4%	5.5%	5.6%	5.8%	6.0%	6.1%
Revenues	836,277	997,198	1,448,388	2,145,649	2,988,463	3,689,565	4,452,240	5,249,334	6,044,949	6,796,309	7,456,897
Revenues (Share of GDP)	4.9%	4.5%	4.4%	4.7%	4.8%	4.6%	4.4%	4.3%	4.1%	3.9%	3.8%
Deficit/surplus	60,647	-14,352	-113,453	-160,241	-252,614	-626,123	-1,095,594	-1,711,632	-2,551,509	-3,499,713	-4,564,539
Deficit/surplus (Share of GDP)	0.4%	-0.1%	-0.3%	-0.3%	-0.4%	-0.8%	-1.1%	-1.4%	-1.7%	-2.0%	-2.3%
Deficit/surplus (Share of expenditures)	7.8%	1.4%	7.3%	6.9%	7.8%	14.5%	19.7%	24.6%	29.7%	34.0%	38.0%
Deficit/surplus (Share of revenues)	7.3%	1.4%	7.8%	7.5%	8.5%	17.0%	24.6%	32.6%	42.2%	51.5%	61.2%
Level of actual insurance premium	14%	14%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Level of premium needed to close revenues and expenditures gap	13%	14%	16%	16%	16%	17%	19%	20%	21%	23%	24%

Figure A.2.10 Results of scenario 6. – total public health care

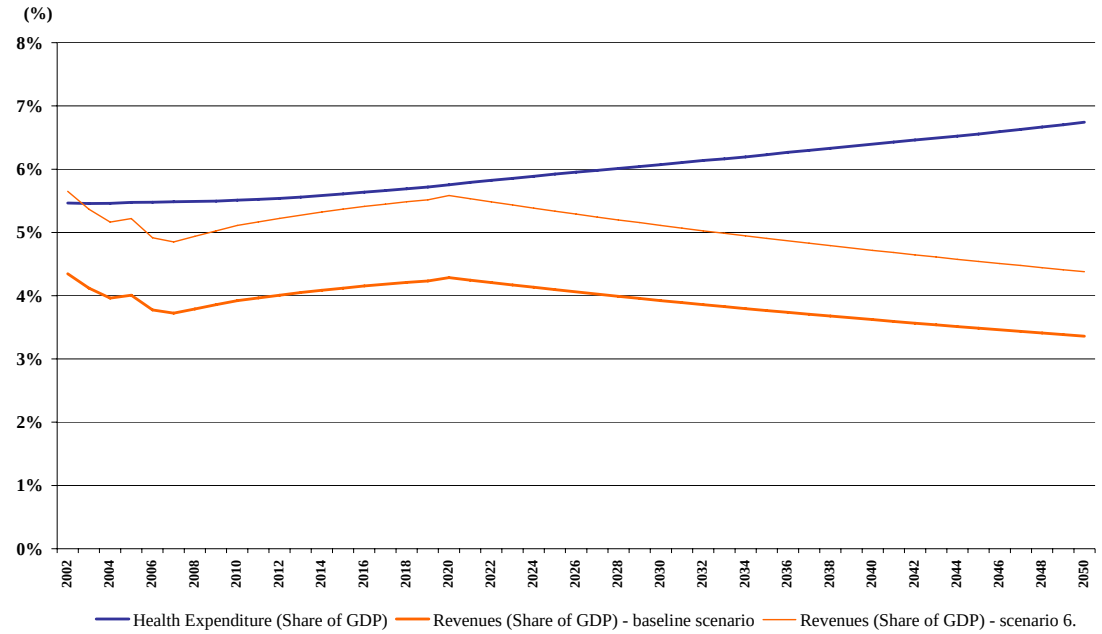


Figure A.2.11 Results of scenario 6. – social insurance system

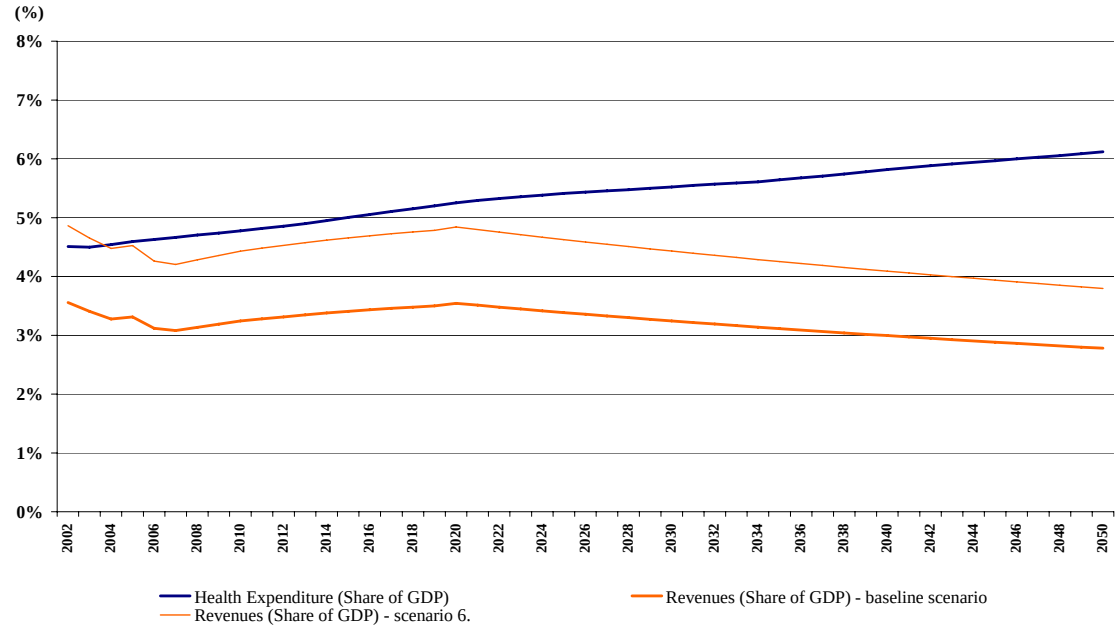


Table A.2.12 Summary tables of sensitivity analyses

		Expenditures			Revenues			Deficit		
		2002	**2025**	**2050**	**2002**	**2025**	**2050**	**2002**	**2025**	**2050**
Baseline		5.5%	5.9%	6.7%	4.3%	4.1%	3.4%	-1.1%	-1.8%	-3.4%
Scenario 1. Labour supply	high	5.5%	6.0%	6.8%	4.3%	4.5%	4.0%	-1.1%	-1.5%	-2.8%
	low	5.5%	5.9%	6.7%	4.3%	3.7%	3.1%	-1.1%	-2.2%	-3.6%
Scenario 2. Wages	high	5.5%	5.9%	6.7%	4.3%	4.4%	4.2%	-1.1%	-1.6%	-2.6%
	low	5.5%	6.0%	6.8%	4.3%	3.9%	2.9%	-1.1%	-2.1%	-3.9%
Scenario 3. Fertility	high	5.5%	5.9%	6.4%	4.3%	4.2%	3.8%	-1.1%	-1.7%	-2.7%
	low	5.5%	6.0%	7.0%	4.3%	4.1%	3.1%	-1.1%	-1.9%	-4.0%
	alt. medium	5.5%	5.9%	6.8%	4.3%	4.1%	3.2%	-1.1%	-1.9%	-3.6%
Scenario 4. Life expectancy	fast	5.5%	5.6%	6.8%	4.3%	4.1%	3.4%	-1.1%	-1.8%	-3.5%
	slow	5.5%	5.9%	6.7%	4.3%	4.1%	3.4%	-1.1%	-1.8%	-3.3%
Scenario 5. Death-related costs		5.5%	5.7%	6.2%	4.3%	4.1%	3.4%	-1.1%	-1.6%	-2.8%
Scenario 6. Cash transfers out of NHIF budget		5.5%	5.9%	6.7%	5.7%	5.3%	4.4%	0.2%	-0.6%	-2.4%

Table A.2.13 Summary tables of sensitivity analyses

		Expenditures					Revenues					Deficit				
		1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Baseline		0.1%	0.4%	0.5%	0.5%	0.5%	-1.2%	0.9%	-0.9%	-0.8%	-0.7%	4.9%	-0.8%	3.9%	2.6%	2.0%
Scenario 1. Labour supply	high	0.2%	0.5%	0.6%	0.5%	0.5%	-0.6%	1.2%	-0.6%	-0.5%	-0.4%	3.3%	-1.9%	4.4%	2.7%	2.0%
	low	0.1%	0.4%	0.6%	0.5%	0.5%	-1.7%	0.2%	-0.8%	-0.7%	-0.7%	6.0%	0.7%	3.0%	2.1%	1.7%
Scenario 2. Wages	high	0.1%	0.4%	0.5%	0.5%	0.5%	-1.2%	1.2%	-0.4%	-0.2%	-0.1%	4.7%	-1.9%	3.2%	2.1%	1.6%
	low	0.1%	0.5%	0.6%	0.5%	0.5%	-1.3%	0.6%	-1.3%	-1.2%	-1.1%	5.0%	0.3%	4.3%	2.6%	1.9%
Scenario 3. Fertility	high	0.1%	0.4%	0.4%	0.4%	0.4%	-1.2%	0.9%	-0.6%	-0.4%	-0.3%	4.9%	-1.0%	3.0%	1.9%	1.4%
	low	0.1%	0.5%	0.6%	0.6%	0.7%	-1.2%	0.9%	-1.1%	-1.1%	-1.1%	4.8%	-0.6%	4.6%	3.0%	2.4%
	alt. medium	0.1%	0.5%	0.6%	0.6%	0.6%	-1.2%	0.9%	-1.0%	-0.9%	-0.9%	4.8%	-0.7%	4.2%	2.7%	2.1%
Scenario 4. Life expectancy	fast	0.1%	0.5%	0.6%	0.6%	0.6%	-1.2%	0.9%	-0.9%	-0.8%	-0.7%	4.9%	-0.7%	3.9%	2.6%	2.0%
	slow	0.1%	0.4%	0.5%	0.5%	0.5%	-1.2%	0.9%	-0.9%	-0.8%	-0.8%	4.8%	-0.8%	3.8%	2.5%	2.0%
Scenario 5. Death-related costs		-0.1%	0.3%	0.4%	0.3%	0.3%	-1.2%	0.9%	-0.9%	-0.8%	-0.7%	4.3%	-1.5%	3.8%	2.4%	1.7%
Scenario 6. Cash transfers out of NHIF budget		0.1%	0.4%	0.5%	0.5%	0.5%	-1.2%	0.9%	-0.9%	-0.8%	-0.7%	19.8%	-8.1%	19.5%	5.7%	3.5%

Notes: 1 – 2003-2010; 2 – 2011-2020; 3 – 2021-2030; 4 – 2031-2040; 5 – 2041-2050

About AHEAD

In February 2004, a CEPS-led consortium of research institutes launched the implementation of a three-year project called AHEAD (Ageing, Health Status and the determinants of Health Expenditure). Most of the consortium's 18 partner institutes are members of the European Network of Economic Policy Research Institutes (ENEPRI – see http://www.enepri.org for details). As specified in the call for proposals, the main task of the project is to carry out an "Investigation into different key factors driving health care expenditures and in particular their interaction with particular reference to ageing" in the (enlarged) European Union.

The strategic objectives of AHEAD are to:

- assess pressures on health spending in the existing EU and in selected candidate countries, looking both at those arising directly from ageing and at those affected by changing incomes, social change and methods of expenditure control;
- develop models for projecting future health spending and
- estimate confidence limits for these projections.

Expenditure on medical treatment has tended to rise as a proportion of national income throughout the European Union. A particular concern is that an ageing population and therefore the presence of more old people will create further pressures for expenditure on health care. This issue is of concern both in its own terms and because of its fiscal implications. Rising health expenditures put pressure on the targets of the Stability and Growth Pact. They also raise the question whether budgetary targets should be tightened ahead of projected growth in public expenditures, so as to 'save up' for future spending and keep expected future tax rates reasonably constant.

This project has aimed to refine existing estimates of the links between reported states of health and use of medical services. As well as looking at the effects of ageing on health care, the research has taken account of the link between health expenditure and fertility rates and the demands on health services made by non-native populations. Particular attention is paid to the costs of care near death. One study examined factors other than demand (such as methods of financial control) that may influence health spending. An important aspect of this research is that the work is carried out so as to be able to provide not only the familiar projections and scenarios but also standard deviations and confidence limits for predictions of key variables, such as healthy life expectancy and demand-driven expenditure levels. These will allow policy-makers to judge not only possible outcomes but also the risks surrounding them and to assess their implications.

Participating Research Institutes

Centre for European Policy Studies, CEPS, Belgium
National Institute for Economic and Social Research, NIESR, UK
Netherlands Bureau for Economic Policy Research, CPB, The Netherlands
Deutsches Institut für Wirtschahftsforschung, DIW, Germany
Economic and Social Research Institute, ESRI, Ireland
Research Institute of the Finnish Economy, ETLA, Finland
Federal Planning Bureau, FPB, Belgium
Istituto di Studi e Analisi Economica, ISAE, Italy
Institute for Advanced Studies, HIS, Austria
Institute for Public Health, IPH, Denmark
Laboratoire d'Economie et de Gestion des Organisations de Santé, LEGOS, France
Personal Social Services Research Unit, PSSRU, UK
Fundación de Estudios de Economía Aplicada, FEDEA, Spain
Centre for Social and Economic Research, CASE, Poland
Institute of Slovak and World Economy, ISWE, Slovak Republic
Institute of Economics at the Bulgarian Academy of Sciences, IE-BAS, BG
Social Research Centre, TARKI, Hungary
Department of Public Health, University of Tartu, Estonia

About ENEPRI

The European Network of Economic Policy Research Institutes (**ENEPRI**) is composed of leading socio-economic research institutes in practically all EU member states and candidate countries that are committed to working together to develop and consolidate a European agenda of research. **ENEPRI** was launched in 2000 by the Brussels-based Centre for European Policy Studies (CEPS), which provides overall coordination for the initiative.

While the European construction has made gigantic steps forward in the recent past, the European dimension of research seems to have been overlooked. The provision of economic analysis at the European level, however, is a fundamental prerequisite to the successful understanding of the achievements and challenges that lie ahead. **ENEPRI** aims to fill this gap by pooling the research efforts of its different member institutes in their respective areas of specialisation and to encourage an explicit European-wide approach.

ENEPRI is composed of the following member institutes:

CASE	Center for Social and Economic Research, Warsaw, Poland
CEE	Center for Economics and Econometrics, Bogazici University, Istanbul, Turkey
CEPII	Centre d'Études Prospectives et d'Informations Internationales, Paris, France
CEPS	Centre for European Policy Studies, Brussels, Belgium
CERGE-EI	Centre for Economic Research and Graduated Education, Charles University, Prague, Czech Republic
CPB	Netherlands Bureau for Economic Policy Analysis, The Hague, The Netherlands
DIW	Deutsches Institut für Wirtschaftsforschung, Berlin, Germany
ESRI	Economic and Social Research Institute, Dublin, Ireland
ETLA	Research Institute for the Finnish Economy, Helsinki, Finland
FEDEA	Fundación de Estudios de Economía Aplicada, Madrid, Spain
FPB	Federal Planning Bureau, Brussels, Belgium
IE-BAS	Institute of Economics, Bulgarian Academy of Sciences, Sofia, Bulgaria
IER	Institute for Economic Research, Bratislava, Slovakia
IER	Institute for Economic Research, Ljubljana, Slovenia
IHS	Institute for Advanced Studies, Vienna, Austria
ISAE	Istituto di Studi e Analisi Economica, Rome, Italy
NIER	National Institute of Economic Research, Stockholm, Sweden
NIESR	National Institute of Economic and Social Research, London, UK
NOBE	Niezalezny Osrodek Bana Ekonomicznych, Lodz, Poland
PRAXIS	Center for Policy Studies, Tallinn, Estonia
RCEP	Romanian Centre for Economic Policies, Bucharest, Romania
SSB	Research Department, Statistics Norway, Oslo, Norway
SFI	Danish National Institute of Social Research, Copenhagen, Denmark
TÁRKI	Social Research Centre Inc., Budapest, Hungary

ENEPRI publications include three series: Research Reports, which consist of papers presenting the findings and conclusions of research undertaken in the context of ENEPRI research projects; Working Papers, which constitute dissemination to a wider public of research undertaken and already published by ENEPRI partner institutes on their own account; and thirdly, Occasional Papers (closed series) containing a synthesis of the research presented at workshops organised during the first years of the network's existence.

European Network of Economic Policy Research Institutes
c/o Centre for European Policy Studies
Place du Congrès 1 ▪ 1000 Brussels ▪ Tel: 32(0) 229.39.11 ▪ Fax: 32(0) 219.41.51
Website: http//:www.enepri.org ▪ E-mail: info@enepri.org