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## **DEVELOPMENT OF LONG-TERM SCENARIOS FOR HEALTH CARE EXPENDITURE IN BULGARIA**

The main objective of the study is to explore the interrelations between the most important demographic and macroeconomic indicators related to the health care expenditure in Bulgaria in a long-term perspective up to 2050 by using a model of the International Labor Organization (ILO). The study presents the basic features of the ILO model, specificity of the data used, assumptions made about the future behavior of different variables and outlines the major results.

JEL: J00, H5, I18, C32, C53

The expenditures on health care in the countries from Central and Eastern Europe (CEE), new members of the EU have never been based on the model of inter-dependence of socio-economic factors of the health state and the changes in the structure of population. The study is connected with the preparation of the country report for Bulgaria in the Work Package (WP) IX entitled "Development of Scenarios for Health Expenditure in the Accession Economies" within the project "Ageing, Health Status and Determinants of Health Expenditure" (AHEAD) under the Sixth Framework Program of the European Commission. Eighteen research units from thirteen countries in Europe participate in this project; Bulgaria, Estonia, Hungary, Poland and Slovakia are included in WP IX.

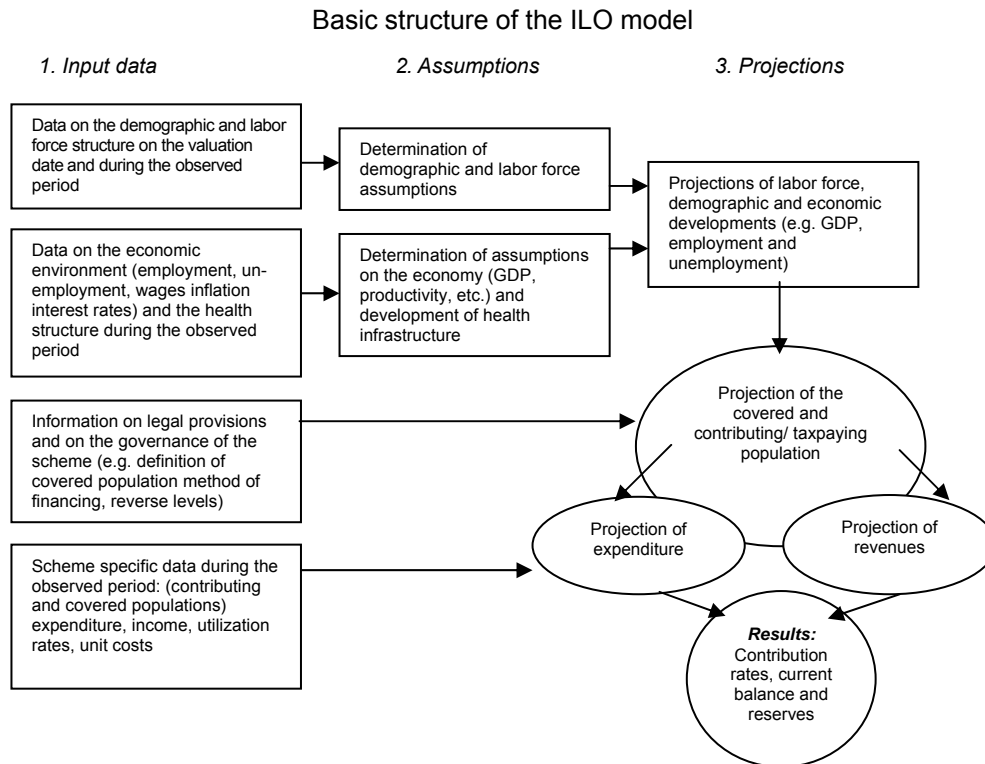
### **General Description of the ILO Health Budget Model**

The basic features of the applied ILO model could be found in the book by Cichon, M. et al. (1999).<sup>1</sup> According to the authors, the most important advantage of this model is that it covers a vast majority of social activities, responsible for the specification of the health policy goals and strategies. The main relationships between the basic factors determining health expenditure and revenues are shown in Figure 1.

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<sup>1</sup> *Cichon, M. et al.* Modelling in Health Care Finance. A compendium of quantitative techniques health care financing. International Labour Organisation. International Labour Office – Geneva, 1999.

Figure 1



The formal realization of this model contains four main modules and they are as it follows:

*The economic and demographic module* provides a projection (simulations) in perspective of the population and labor force number, level of employment, and other economic indicators needed as input data for calculation of the expenditure and revenues in the health care system. In view of obtaining more precise results, the labor force data are disaggregated to general subgroups by activity sectors and by employed/self-employed.

*The income module* projects the assessment base for contributions by using the economic and demographic country characteristics. The contributors are divided into the following subcategories: employed persons, self-employed persons, contributing pensioners, voluntarily insured persons.

*The expenditure module* projects expenditure in various benefit categories, administrative and other expenditure on the basis of the projection of the covered population and assumptions for the future utilization and cost developments.

*The result* module calculates the annual balance of income and expenditure.

To summarize, the ILO model includes a wide range of the most important national variables like indicators for population development, employment, insurance system, government budget, GDP, inflation etc. which are related to the health care expenditure in their combined influence on it. This approach makes the model very valuable as a useful tool for theoretical reasoning and for practical decisions. At the same time, like in any other model there are some restrictions regarding the results, which should be taken into consideration (Box 1).

Box 1

#### The capabilities and limitations of the ILO model

<i>Capabilities:</i>	<i>Limitations:</i>
<ul style="list-style-type: none"> <li>●The model is based on a good set of basic national demographic, labor market and economic variables; they have a combined influence on the projections</li> <li>●Projections cover both revenues and expenditures side of the health care budget</li> <li>●The model allows to obtain the best fit for insurance estimates revenues</li> <li>●The results are policy oriented and concentrated on insurance system balance and sustainability; thus advantages and disadvantages of a given policy regarding health care expenditure could be analyzed.</li> </ul>	<ul style="list-style-type: none"> <li>●Projections of variables depend only on assumptions about the country's (internal) reality. The model does not include the rest of the world, for example the process of migration, external sources of revenues, etc.</li> <li>●The model does not cover in much details the budgetary revenues (for example, from general taxes)</li> <li>●Although the model allows obtaining the best fit for insurance revenues, at present the health insurance system in the CEE countries, including Bulgaria is still underdeveloped.</li> </ul>

#### Problems Related to the Data Collection

The data sources in the study are the main institutes, ministries and governmental organizations responsible for the data collection in the relevant fields. For the Republic of Bulgaria these are: National Statistical Institute (NSI); Employment Agency (EA) at the Ministry of Labor and Social Policy; National Health Insurance Fund (NHIF); National Center for Health Information (NCHI) at the Ministry of Health; Bulgarian National Bank (BNB) etc.

##### *Problems and Limitations*

- Because of the ongoing transition period in Bulgaria during the last over 15 years, there is a very fast change in the economic indicators. That is why, it is difficult to accept the current data as pre-determining a too long-term

perspective of nearly a half century. Taking 2003 as the base year is a good decision because it reflects more stable economic condition in Bulgaria.

- The health insurance system in Bulgaria was introduced several years ago, and the past years were a period of mastering the process of the system adjustment. This process in Bulgaria was combined with (and hampered by) the high unemployment rate, shadow economy, including hidden employment, as well as frequently changing regulations of the insurance system.

- Because of the late-started health reform in Bulgaria (July 1<sup>st</sup> 2000), along with a wide-spread people's disapproval and the very questionable data of the health statistics (health care utilization, revenue and expenditure, etc.), the latter are not a reliable base for a too long-term perspective projection.

- Anyway it is impossible in a unified international study like this to avoid some adjustments in the process of working with the explanatory variables and the prognoses for their future behavior.

## **Assumptions on Variables Development**

### *Development of the Demographic Variables*

It is clear that the first and most important variable in the ILO is the number of population, its basic characteristics and their development over the projection period. Analysts perhaps most often use the population projections periodically performed by the UNs. In this study the middle variant of the last published projections has been selected.<sup>2</sup>

There are other population projections produced by international organizations (for example EUROSTAT), national institutions<sup>3</sup> or individual authors<sup>4</sup> in Bulgaria. All these projections show that the process of population

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<sup>2</sup> The UN estimations started from 1950. They use well developed methodology for calculations of these projections including wide number of estimated countries (nearly 250). Most of the estimates presented there are derived from available national data that have been evaluated and adjusted (by raising the real figures). Such adjustments are obviously taken into account by the UN's experts. For example, according to the 1996 revision of the Bulgarian population projection the number will be 6,690 thousand in 2050, yet according to the latest issue this figure is reestimated to be 6,068 thousand but not 6,690 thousand as it is in the 1996 issue (see *The Sex and Age Distribution of the World Population. UN World Population Prospects. The 1996 Revision.* Department of Economic and Social Affairs. Population Division, New York, p. 237-240.). In the current paper the 2001 revision has been used.

<sup>3</sup> At present the NSI together with the Bulgarian Academy of Sciences work on National Strategy for Population Development in Bulgaria, which includes new population projections for the period up to 2050.

<sup>4</sup> Донков, К. Прогноза за населението на България през периода 1997-2050 г. (*Donkov, K. Projections for Bulgaria's Population in the Period 1997-2050*). - Статистика, 1999, N 2, с. 18-42.

ageing in Bulgaria will deepen. Projections for the Bulgarian population for the purpose of the ILO model realization are taken from the described UNs source and set the following figures (Table 1).

Table 1

Bulgaria: Bio-demographic variables, 2005-2050

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total number of population (thousand), including:	7848	7707	7539	7348	7138	6919	6704	6493	6279	6058
Male	3800	3730	3656	3571	3472	3366	3261	3158	3054	2945
Female	4048	3977	3882	3777	3666	3553	3444	3335	3225	3113
Total Fertility Rate (TFR)	1.27	1.38	1.49	1.59	1.67	1.75	1.81	1.85	1.88	1.89
Estimated life expectancy at birth, years - total	72.5	73.6	74.7	75.6	76.5	77.3	78.0	78.6	79.1	79.6
Male	69.2	70.4	71.5	72.5	73.4	74.2	75.0	75.7	76.2	76.7
Female	75.7	76.7	77.7	78.6	79.4	80.2	80.9	81.4	81.9	82.4
Birth Rate, per 1000	8.9	9.4	9.3	8.7	8.2	8.3	8.9	9.4	9.5	9.4
Death Rate, per 1000	11.9	13.4	13.9	14.0	14.2	14.6	15.2	15.9	16.4	16.7
Rate of Natural Increase, per 1000	-5.7	-4.0	-4.6	-5.3	-5.9	-6.3	-6.3	-6.5	-6.8	-7.4
Population growth,%	-0.30	-0.39	-0.47	-0.54	-0.60	-0.63	-0.63	-0.65	-0.68	-0.74
Population age structure (%), including:										
Population aged 0-14	14.4	12.9	13.4	13.9	13.6	13.1	12.9	13.4	14.2	14.7
Population aged 15-65	70.3	70.7	68.9	66.8	65.8	65.0	64.0	61.9	59.0	56.8
Population aged 65 and over	15.3	16.5	17.7	19.2	20.6	21.9	23.1	24.7	26.8	28.5

According to the projections the number of Bulgaria's population will decrease by roughly 2 million – from nearly 8 million in 2003 to nearly 6 million to 2050. The proportion male/female will keep in favor of female population. The depopulation process will be accompanied by continuing ageing. Even in 2003<sup>5</sup> the proportion of the group of the young population (0-14 years of age) in total population is lower than that of the old population (65 years and over) and the ratio is expected to get twice bigger in 2050 (Figure 2). Another unfavorable change in the age structure in Bulgaria is the considerable reduction in the working-age population (Figure 3).

<sup>5</sup> See *Rangelova, R. and S. Zlatanov. Ageing and Health Status of Bulgaria's Population. - South-East Europe Review for Labour and Social Affairs, 2005, Vol. 8, N 2, p. 71-94.*

Figure 2

Projection of the population number by age in Bulgaria, young (0-14 years of age) and old people (65 and over), 2003-2050

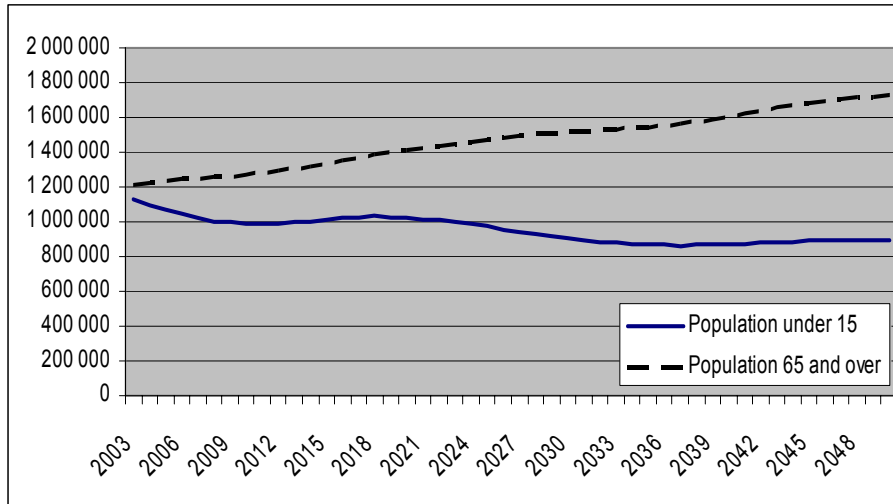
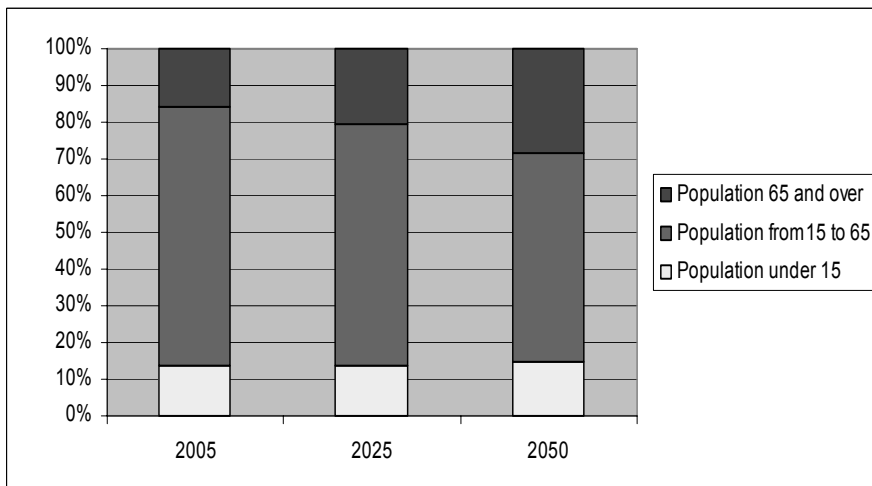


Figure 3

Age structure of Bulgarian population for 2003 and its projections for 2025 and 2050



An interesting detail of the population development projection is the expected increasing total fertility rate in the context of the decreasing number of women in fertility age. This implies that an increase in the intensity of the people's reproduction is outlined: from average 1.23 children per woman in fertility age in 2003 to 1.89 in 2050 (Table 1).

During the period 2003-2005 the average life expectancy at birth in Bulgaria is 72 years for both sexes and the life expectancy of females is higher by nearly 7 years in comparison with that of males. The ILO model allows calculating three variants assuming different extent of improvement of life expectancy – fast, middle and slow (Table 2). According to the first variant (fast improvement) the life expectancy for both sexes will increase by nearly 9 years, and according to the third variant (slow improvement) – by less than 6 years. The three variants indicate that the female life expectancy will overpass 80 years, and that of male will approach 80 years only in the first variant, and will reach the current level of female life expectancy in the third variant.

Table 2

Bulgaria: Projected variants of Life Expectancy in Bulgaria, 2005-2050

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
<i>I variant - fast improvement of life expectancy</i>										
Both sexes combined	72.6	73.9	75.1	76.1	77.1	78.1	79.0	79.8	80.5	81.1
Male	69.3	70.7	71.9	73.0	74.0	75.0	75.9	76.7	77.5	78.2
Female	75.8	77.0	78.1	79.1	80.1	81.0	81.8	82.6	83.3	83.8
<i>II variant - middle improvement of life expectancy</i>										
Both sexes combined	72.5	73.6	74.7	75.6	76.5	77.3	78.0	78.6	79.1	79.6
Male	69.2	70.4	71.5	72.5	73.4	74.2	75.0	75.7	76.2	76.7
Female	75.7	76.7	77.7	78.6	79.4	80.2	80.9	81.4	81.9	82.4
<i>III variant – slow improvement of life expectancy</i>										
Both sexes combined	72.5	73.4	74.2	74.9	75.6	76.2	76.7	77.2	77.6	78.0
Male	69.1	70.1	71.0	71.8	72.6	73.3	73.8	74.3	74.8	75.2
Female	75.6	76.4	77.2	77.9	78.4	78.9	79.4	79.9	80.3	80.6

#### *Development of the Labor Market Variables*

The second important group of variables presents the development of the labor market in Bulgaria (Table 3). After the population has been projected (from where one can calculate the future health expenses), the next step is to model the necessary labor market activity in order to outline the people's resource that will ensure economic performance in the country and respectively, the revenues which have to meet the required health expenditure.

Table 3

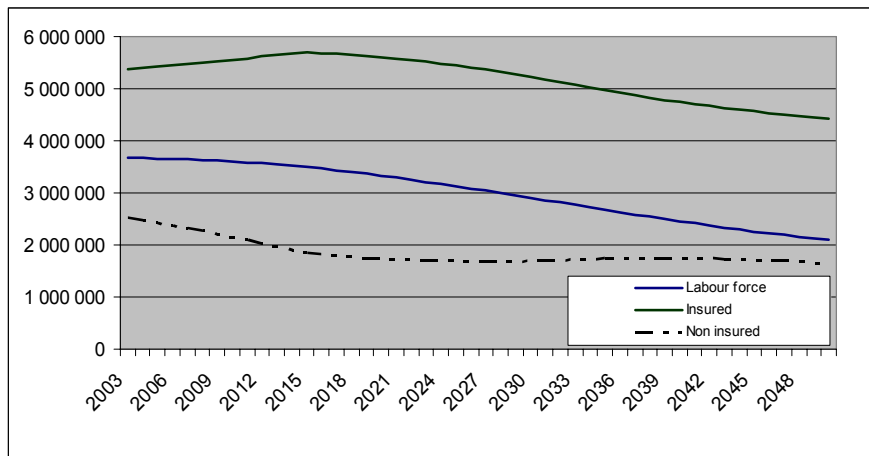
## Bulgaria: Labor market variables, 2005-2050

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Labor force (number)	3662	3601	3492	3328	3126	2907	2677	2455	2258	2107
Labor force, growth, %										
Employment growth total, %	0.18	1.11	-0.66	-1.02	-1.24	-1.47	-1.65	-1.67	-1.56	-1.12
Male	0.27	1.20	-0.58	-0.93	-1.15	-1.46	-1.63	-1.65	-1.54	-1.10
Female	0.08	1.01	-0.76	-1.12	-1.34	-1.49	-1.67	-1.69	-1.58	-1.14
Unemployment rate total, %	13.15	8.39	6.04	5.64	5.24	4.92	4.72	4.52	4.32	4.12
Male	13.36	8.91	6.49	5.77	5.12	5.24	5.84	5.95	5.70	4.84
Female	12.91	7.78	5.51	5.48	5.38	4.53	3.33	2.73	2.60	3.23
Insured (number)	5598	5681	5681	5599	5444	5230	4966	4738	4569	4421
Non insured, % of total population	28.7	26.3	24.6	23.8	23.7	24.4	25.9	27.0	27.2	27.0

The declining number of the total population in Bulgaria is accompanied by a decreasing number of the labor force – from 3'670 thousand in 2003 to 2'107 thousand in 2050 (see the middle line in Figure 4). The other two lines in the same figure present the development of the total number of insured people in Bulgaria (the upper line) and that of the total number of non-insured people (the dotted line). In general they reflect the process of including gradually more people in the insurance system up to the middle of the projection period (Table 3).

Figure 4

## Projections of number of labor force, insured and non-insured people, 2003-2050





Concerning the employment growth, it is expected to be positive somewhere in 2010-2015 and this is connected with the effort to diminish the high unemployment rate at the beginning of the new century, as well as the process of engaging more people in working activities. The labor market authorities are discussing the necessity of importing labor force in the next few years. After that, however, there will be comparatively high and constant decrease and the highest decrease is expected during the third and the fourth decade of the current century. This tendency could be connected mainly with the decreasing number of the total population and particularly the number of working-age population.

The official unemployment rate in Bulgaria for the base 2003 year was high (13 percent). In fact, however, regarding the unemployment we should take account also the so-called discouraged unemployed, who are a considerably high number (434.5 thousands in 2003). Due to anticipated implementation of a more flexible labor market policy and development of adequate labor market regulations, as well as the faster economic development connected with the EU full-membership, we could expect in the near future a sharp reduction in the registered unemployment and the hidden employment too. In 2006 the unemployment rate is already under 9 percent (which is on a par with the average of the EU countries) and continues to decline. According to the projections, the unemployment rate is likely to decrease significantly and could reach a little above 3 percent by the end of the projected period. Considering the unemployment rate by gender, it turns out that the female unemployment will decrease more rapidly than the male unemployment, in particular after 2030.

One natural consequence of the countryside depopulation is the decrease in the number of insured people. Despite that the number of total population is expected to decrease by 23 percent from 2003 to 2050 (according to the UN projections), and the number of labor force by nearly 42 percent, the number of insured is expected to decline only by 18 percent. This implies that, other things being equal, we could expect relative growth in the share of insured people. One confirmation of these speculations could be found in the estimates for non-insured people, whose share decreases from nearly 30 percent in 2003 to 27 percent in 2050. Obviously these estimates are influenced by the ageing population process, as well as specific labor market regulations in Bulgaria, including the policy of rising the age of retirement. It is carried out in order to harmonize the national labor legislation with that of the EU member countries and to implement the common for the Union labor policy.

According to data of the National Insurance Institute the largest share of the revenue for 2003 is coming from contributions of employers for workers and employees (73 percent), followed by personal contributions of workers and employees (19 percent), contributions of self-employed insured (5 percent) and the smallest share is coming from others (3 percent). This structure shows that

currently employers have a dominate role in accumulating insurance revenue, which in its own turn suggests the importance of the macroeconomic and business development in Bulgaria for the future increase in the insurance revenue.

#### *Development of the Macroeconomic Variables*

The third and a very important group of variables are connected with the macroeconomic performance in Bulgaria during the projected period. Variables like GDP, labor productivity, real wage, etc. are included in this group. These are the most aggregate indicators for the national economy pre-determining the revenue side of the research issue and the expected development in the health expenditure in the long run in Bulgaria. That is why, the dynamics of GDP growth in the future, foreseen by us is, of utmost importance because of its capacity of an independent variable in the model. We step on the estimates of I. Angelov until 2030<sup>6</sup> and try to extrapolate them using our own expert speculations (Table 4).

*Table 4*

Bulgaria: Economic variables, 2005-2050

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Real GDP growth, %	4.4	4.3	4.2	4.0	3.9	3.7	3.6	3.5	3.4	3.2
Real GDP growth per capita, %	4.8	4.7	4.6	4.6	4.5	4.4	4.2	4.1	4.0	3.9
Labor productivity growth, %	4.3	3.2	2.5	2.5	2.5	4.0	3.8	3.6	3.4	3.1
GDP deflator, %	2.2	2.0	1.7	1.5	1.3	1.2	1.4	1.6	1.7	1.9
CPI (inflation), average yearly, %	5.4	4.8	4.3	3.7	3.1	2.7	2.6	2.5	2.3	2.2
Real wage growth, %	6	5	5	4	3	3	3	3	3	3
Average gross monthly wage (BGN)	354	591	933	1392	1962	2625	3453	4490	5770	7329
Labor cost (BGN)	479	776	1189	1720	2378	3182	4186	5442	6993	8882
Labor cost (share of GDP), %	45	55	63	66	67	65	62	58	53	49

<sup>6</sup> *Ангелов, И.* Конкурентоспособността – най-голямото икономическо предизвикателство пред България в Европейския съюз (Макроикономически поглед). Основен доклад на научно-практическата конференция "Интеграцията на България в Европейския съюз – предизвикателства на конкурентоспособността" (*Angelov, I. Competitiveness – the Greatest Challenge for Bulgaria in the EU (Macroeconomic View). Key paper at the scientific and applied conference "Integration of Bulgaria into the European Union: Challenges of the Competitiveness"*). Sofia, Institute of Economics, Bulgarian Academy of Sciences, March 16<sup>th</sup>, 2005.

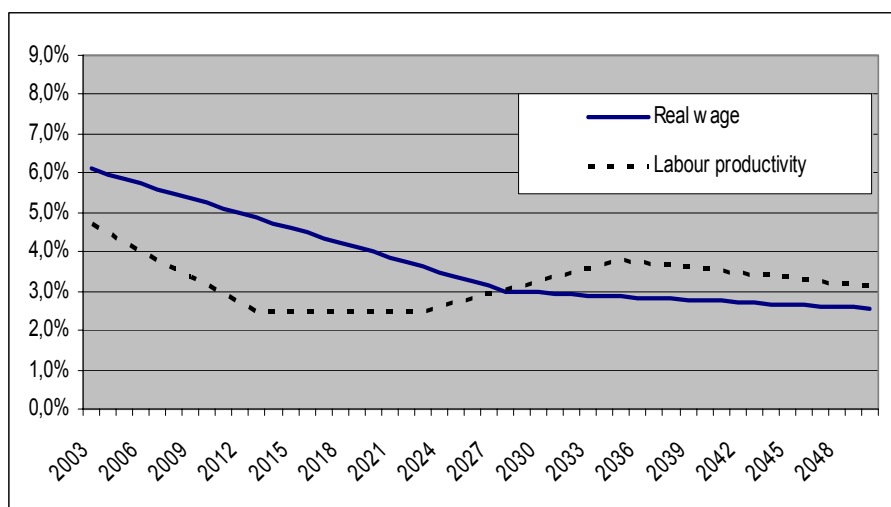
The estimates suggested by I. Angelov are higher in comparison with other similar projections known both in Bulgaria and abroad. They reflect, on the one hand, the low level of the base year GDP, which means that in the following years the dynamics should be shown as faster. On the other hand, they reflect the potential expected as a result of continuing the current stable economic progress, including the full membership in the EU (since January 1<sup>st</sup> 2007) and the utilization of structural and other funds, as well as a more intensive inflow of FDI in the country, etc. We support this thesis, foreseeing however some lower stabilized GDP growth rates in the last two decades of the projected period.

Those assumptions for the GDP dynamics affect all the other macro-economic variables, as well as the model result variables and more precisely – the health care expenditures in the long run.

One of the most debated macroeconomic relationships is that between the dynamics of the labor productivity and the real wage. Theoretically these two curves should change more or less in parallel and labor productivity growth should outrun the one of the real wage increase (see Figure 5).

Figure 5

Projections of labor productivity and real wage growth rates, 2003-2050



The extrapolation is tracing out the reduction in wages and labor productivity growth rates, as well as the remaining real wage growth dynamics. A good explanation of that fact could be found in the model specifics and maybe in the relatively high rates of real wage growth, set by the authors,

which can not turn out the whole tendency, even when combined with significant GDP growth and low inflation ratios. In principle, only a GDP growth based upon higher labor productivity can ensure later an increase in the wage level, yet such a tendency is not presented in our country. On the other hand, however, Bulgaria is in the last position among the EU-member states by income level and even the growth rates foreseen in the model would not change the situation very much. In the context of our projections it means that the low real average wage observed in the country could not ensure higher level of insurance contribution or could limit spending on other health expenditures. Given the current structural changes in the country mainly in favor of labor-intensive branches with low valued added, it is likely that the productivity growth will keep its declining trend. This is why, during the next several years we could not expect a change in the dynamics both of the labor productivity and the real wage. Regarding a farther perspective and taking account the modern technological progress, we foresee a more significant increase in the productivity growth rates, which will contribute to reverse the discussed tendency.

### **Projections and Sensitivity Analysis of Given Variables**

Some idea about the structure of the Government (public) expenditures in the base year 2003 one can receive from Table 5. The biggest share of the public expenditure is connected with the administration costs. Both sectors have such a level of expenditure in hospitals, which consumes about a half of the insurance funds. The total share of capital expenditures is relatively small. The latter shows a non-effective structure of expenditures where the problems of renewal and modernization of the health care system are postponed for the future.

*Table 5*

Structure of the government and health insurance fund  
expenditure in 2003, %

	Government expenditure	Health insurance fund expenditure
Hospitals	37	50
Outpatient	14	27
Administration costs	40	16*
Capital expenditure	7	5
Total other costs	2	2

\* Technical maintenance

Development of Long-term Scenarios for Health Care Expenditure in Bulgaria

As a result of the ILO model implementation we have obtained data for the volume of the total health expenditure for three scenarios. The basic assumptions for the health care expenditure development in the three scenarios are the following:

- *Scenario I* Health care expenditures increase separately for wage and non-wage shares
- *Scenario II* Health care expenditures increase with the same rate as GDP/Capita (EU I)
- *Scenario III* Health care expenditures increase with the same rate as GDP/Employment (EU II)

Table 6

Projections for the total health revenue and health system balance by three scenarios, base year 2003 and 2004-2050 (bln. BGN)

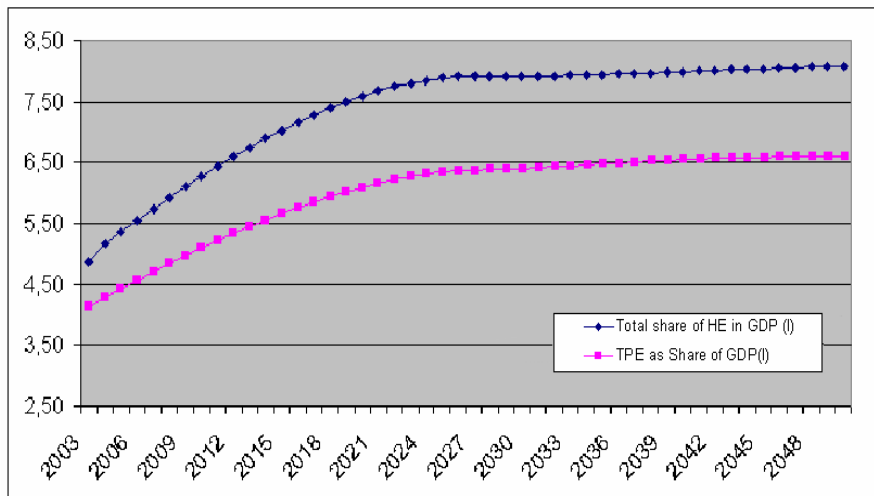
	2003	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Revenue	1.416	1.808	3.004	4.473	6.234	8.790	11.210	14.038	17.408	21.432	26.326
<i>Life expectancy SCENARIO:Middle //Component Scenario I</i>											
Total Health Expenditure	1.682	2.072	3.363	5.211	7.722	10.941	14.852	19.868	26.236	34.118	43.632
Deficit bln. BGN	-0.265	-0.264	-0.360	-0.738	-1.488	-2.150	-3.642	-5.829	-8.828	-12.686	-
Deficit as share of real GDP, %	-0.8	-0.7	-0.7	-1.0	-1.5	-1.7	-2.3	-2.9	-3.4	-3.8	-4.0
<i>Life expectancy SCENARIO:Middle //Component Scenario II</i>											
Total Health Expenditure	1.682	1.988	2.938	4.213	5.881	7.997	10.601	13.959	18.275	23.766	30.697
Deficit bln. BGN	-0.265	-0.180	0.065	0.259	0.353	0.793	0.609	0.080	-0.867	-2.334	-4.370
Deficit as share of real GDP, %	-0.8	-0.5	0.1	0.4	0.4	0.6	0.4	0.0	-0.3	-0.7	-1.0
<i>Life expectancy SCENARIO:Middle //Component Scenario III</i>											
Total Health Expenditure	1.682	1.977	2.815	4.000	5.657	7.839	10.644	14.460	19.596	26.333	34.781
Deficit bln. BGN	-0.265	-0.169	0.188	0.473	0.577	0.952	0.566	-0.421	-2.189	-4.901	-8.455
Deficit as share of real GDP, %	-0.8	-0.4	0.3	0.7	0.6	0.8	0.4	-0.2	-0.8	-1.5	-2.0

The projected variables for the total health revenues and the health finance system balance are presented in Table 6. It turns out that in the three scenarios the total health expenditure is much higher than the total health revenue, which determines substantial deficit in all of them. The magnitude of the deficit in 2003 base year is 0.92 BLN and it changes to 28 BLN in 2050 in Scenario I, to 20 BGN in Scenario II and 26 BLN in Scenario III, which means that the deficit will grow from about 2.7 percent of GDP in 2003 up to 5 percent (scenario I), or 4.5 percent (scenario III) and 3.5 percent (scenario II). The specifics of the current conditions, as well as the foreseen economic development establishes the highest level of health expenditure (as a share of GDP) to be upon the first scenario and the lowest level upon the second scenario. The second one remains in the middle, so this arrangement comes to underline the important role of the low level of local per capita incomes.

The projected behavior of the total health expenditure and the public expenditure in the period 2003-2050 in Figure 6 shows almost parallel changes in the two variables which supposes more active participation of other sources of financing. However, it is very likely the share of public sector to remain unchanged and to be the highest one compared to the other countries in Central and Eastern Europe (Figure 7).

Figure 6

Dynamics of the projected share of total expenditure in GDP and total public expenditure in GDP



In order to apply sensitivity tests we use the three already described variants of life expectancy at birth (assuming fast, middle and slow improvement respectively – see Table 7) and calculate the three scenarios presented above. The main conclusion is that the faster life expectancy improvement would lead up to higher health expenditures and hence, to larger deficit in our health care system.

Table 7

Sensitivity test: Projections for the total health expenditure by three variants of life expectancy improvement each one including the three scenarios of a health care expenditure (HE) increases, 2003-2050

	2003	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
<b>Variant I - Fast Life Expectancy Improvement</b>											
<i>Scenario I</i>											
Total health expenditure, bin BGN	1.682	2.072	3.365	5.220	7.752	11.010	14.986	20.099	26.627	34.798	44.747
Total proportion of HE in GDP, %	4.9	5.3	6.2	7.2	8.1	8.8	9.4	9.9	10.2	10.4	10.3
Total revenues in SIF*	1.416	1.808	3.004	4.475	6.241	8.807	11.241	14.088	17.483	21.557	26.527
Proportion of the revenues in GDP, %	4.1	4.6	5.6	6.2	6.5	7.1	7.0	6.9	6.7	6.4	6.1
<b>Percent of deficit in GDP, %</b>	<b>-0.8</b>	<b>-0.7</b>	<b>-0.7</b>	<b>-1.0</b>	<b>-1.6</b>	<b>-1.8</b>	<b>-2.3</b>	<b>-2.9</b>	<b>-3.5</b>	<b>-3.9</b>	<b>-4.2</b>
<i>Scenario II</i>											
Total health expenditure, bin BGN	1.682	1.989	2.939	4.216	5.891	8.018	10.639	14.022	18.380	23.949	30.999
Total proportion of HE in GDP, %	4.9	5.0	5.4	5.8	6.1	6.4	6.7	6.9	7.0	7.1	7.2
Total revenues in SIF*	1.416	1.808	3.004	4.475	6.241	8.807	11.241	14.088	17.483	21.557	26.527
Proportion of the revenues in GDP, %	4.1	4.6	5.6	6.2	6.5	7.1	7.0	6.9	6.7	6.4	6.1
<b>Percent of deficit in GDP, %</b>	<b>-0.8</b>	<b>-0.5</b>	<b>0.1</b>	<b>0.4</b>	<b>0.4</b>	<b>0.6</b>	<b>0.4</b>	<b>0.0</b>	<b>-0.3</b>	<b>-0.7</b>	<b>-1.0</b>
<i>Scenario III</i>											
Total health expenditure, bin BGN	1.682	1.977	2.817	4.004	5.673	7.875	10.715	14.589	19.834	26.770	35.523
Total proportion of HE in GDP, %	4.9	5.0	5.2	5.5	5.9	6.3	6.7	7.2	7.6	8.0	8.2
Total revenues in SIF*	1.416	1.808	3.004	4.475	6.241	8.807	11.241	14.088	17.483	21.557	26.527
Proportion of the revenues in GDP, %	4.1	4.6	5.6	6.2	6.5	7.1	7.0	6.9	6.7	6.4	6.1
<b>Percent of deficit in GDP, %</b>	<b>-0.8</b>	<b>-0.4</b>	<b>0.3</b>	<b>0.6</b>	<b>0.6</b>	<b>0.7</b>	<b>0.3</b>	<b>-0.2</b>	<b>-0.9</b>	<b>-1.6</b>	<b>-2.1</b>
<b>Variant II - Middle Life Expectancy Improvement</b>											
<i>Scenario I</i>											
Total health expenditure, bin BGN	1.682	2.072	3.363	5.211	7.722	10.941	14.852	19.868	26.236	34.118	43.632
Total proportion of HE in GDP, %	4.9	5.3	6.2	7.2	8.0	8.8	9.3	9.7	10.0	10.2	10.1
Total revenues in SIF*	1.416	1.808	3.004	4.473	6.234	8.790	11.210	14.038	17.408	21.432	26.326
Proportion of the revenues in GDP, %	4.1	4.6	5.6	6.2	6.5	7.0	7.0	6.9	6.7	6.4	6.1
<b>Percent of deficit in GDP, %</b>	<b>-0.8</b>	<b>-0.7</b>	<b>-0.7</b>	<b>-1.0</b>	<b>-1.5</b>	<b>-1.7</b>	<b>-2.3</b>	<b>-2.9</b>	<b>-3.4</b>	<b>-3.8</b>	<b>-4.0</b>

	2003	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
<b>Scenario II</b>											
Total health expenditure, bin BGN	1.682	1.988	2.938	4.213	5.881	7.997	10.601	13.959	18.275	23.766	30.697
Total proportion of HE in GDP, %	4.9	5.0	5.4	5.8	6.1	6.4	6.6	6.8	7.0	7.1	7.1
Total revenues in SIF*	1.416	1.808	3.004	4.473	6.234	8.790	11.210	14.038	17.408	21.432	26.326
Proportion of the revenues in GDP, %	4.1	4.6	5.6	6.2	6.5	7.0	7.0	6.9	6.7	6.4	6.1
<b>Percent of deficit in GDP, %</b>	-0.8	-0.5	0.1	0.4	0.4	0.6	0.4	0.0	-0.3	-0.7	-1.0
<b>Scenario III</b>											
Total health expenditure, bin BGN	1.682	1.977	2.815	4.000	5.657	7.839	10.644	14.460	19.596	26.333	34.781
Total proportion of HE in GDP, %	4.9	5.0	5.2	5.5	5.9	6.3	6.7	7.1	7.5	7.8	8.0
Total revenues in SIF*	1.416	1.808	3.004	4.473	6.234	8.790	11.210	14.038	17.408	21.432	26.326
Proportion of the revenues in GDP, %	4.1	4.6	5.6	6.2	6.5	7.0	7.0	6.9	6.7	6.4	6.1
<b>Percent of deficit in GDP, %</b>	-0.8	-0.4	0.3	0.7	0.6	0.8	0.4	-0.2	-0.8	-1.5	-2.0
<b>Variant III - Slow Life Expectancy Improvement</b>											
<b>Scenario I</b>											
Total health expenditure, bin BGN	1.682	2.072	3.362	5.205	7.690	10.850	14.663	19.521	25.673	33.288	42.422
Total proportion of HE in GDP, %	4.9	5.3	6.2	7.2	8.0	8.7	9.2	9.6	9.8	9.9	9.8
Total revenues in SIF*	1.416	1.808	3.004	4.471	6.226	8.768	11.165	13.961	17.289	21.272	26.111
Proportion of the revenues in GDP, %	4.1	4.6	5.6	6.2	6.5	7.0	7.0	6.8	6.6	6.3	6.0
<b>Percent of deficit in GDP, %</b>	-0.8	-0.7	-0.7	-1.0	-1.5	-1.7	-2.2	-2.7	-3.2	-3.6	-3.8
<b>Scenario II</b>											
Total health expenditure, bin BGN	1.682	1.988	2.938	4.212	5.871	7.970	10.546	13.861	18.121	23.542	30.365
Total proportion of HE in GDP, %	4.9	5.0	5.4	5.8	6.1	6.4	6.6	6.8	6.9	7.0	7.0
Total revenues in SIF*	1.416	1.808	3.004	4.471	6.226	8.768	11.165	13.961	17.289	21.272	26.111
Proportion of the revenues in GDP, %	4.1	4.6	5.6	6.2	6.5	7.0	7.0	6.8	6.6	6.3	6.0
<b>Percent of deficit in GDP, %</b>	-0.8	-0.5	0.1	0.4	0.4	0.6	0.4	0.0	-0.3	-0.7	-1.0
<b>Scenario III</b>											
Total health expenditure, bin BGN	1.682	1.977	2.815	3.997	5.640	7.791	10.544	14.270	19.271	25.814	33.965
Total proportion of HE in GDP, %	4.9	5.0	5.2	5.5	5.9	6.2	6.6	7.0	7.4	7.7	7.9
Total revenues in SIF*	1.416	1.808	3.004	4.471	6.226	8.768	11.165	13.961	17.289	21.272	26.111
Proportion of the revenues in GDP, %	4.1	4.6	5.6	6.2	6.5	7.0	7.0	6.8	6.6	6.3	6.0
<b>Percent of deficit in GDP, %</b>	-0.8	-0.4	0.3	0.7	0.6	0.8	0.4	-0.2	-0.8	-1.4	-1.8



### Comparison of the Main Projections of the Partner-countries from CEE

The partners from the other CEE countries included in the AHEAD project (Bulgaria, Hungary, Poland and Slovakia) have produced parallel scenarios reflecting the demographic and economic specificity of each individual country.

Since one of the basic variables in the ILO model is the GDP growth it is interesting to follow the differences in the assumptions made by the countries in the long run (Table 8).

Table 8

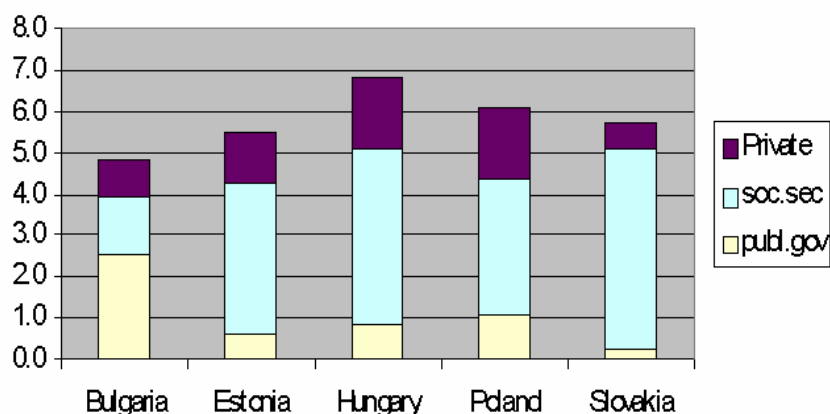
GDP growth rates in 2005 and assumptions for the future change in the four countries, 2005-2050 (%)

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Bulgaria	4.5	4.7	4.8	4.9	5.0	4.9	4.6	4.2	3.7	3.2
Hungary	5.6	4.7	4.1	3.8	3.2	2.9	2.8	2.6	2.5	2.4
Poland	5.2	3.1	3.3	3.5	3.4	3.2	3.0	2.9	2.7	2.5
Slovakia	6.0	6.2	5.1	3.9	3.0	2.8	2.6	2.4	2.2	2.0

Comparison of the growth rates for the four countries shows that the highest is the rate assumed for the future development in Bulgaria. We have our own arguments justifying that but what is more important is the GDP growth rates influence on the dynamics of the other related variables in the ILO model.

Figure 7

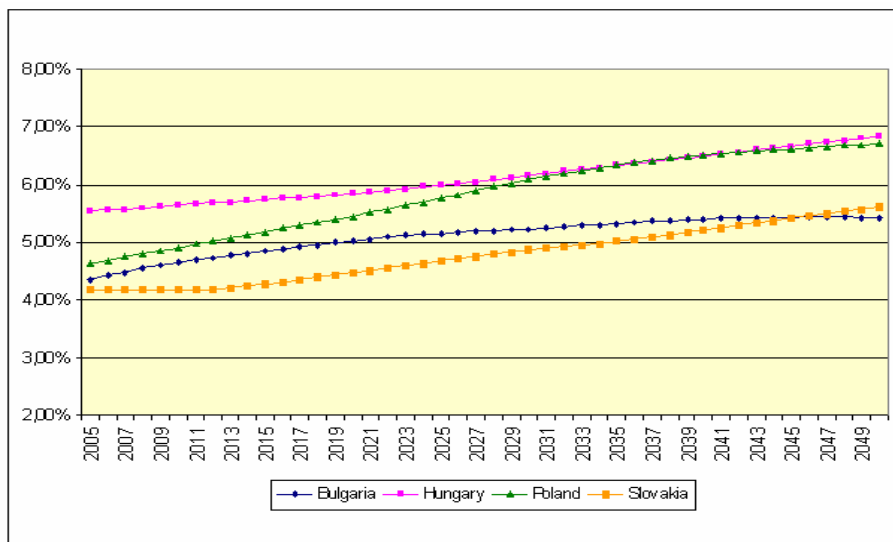
Breakdown of the health care expenditure in Bulgaria, Estonia, Hungary, Poland and Slovakia by sources, 2003



Another key variable is the composition of the health care expenditure in these countries by sources (see Figure 7). This breakdown shows the real situation in 2003 and implies ways for its probable and favourable changes in the future. It turns out that Slovakia has the smallest percentage of government expenditure, while the largest share is in Bulgaria, followed by Poland. Slovakia, followed by Hungary, has the highest share of social contribution amongst the countries under review. The percentage of the private sector is the highest in Hungary and Poland and the lowest – in Slovakia. It has already been noted that the year 2003 for Bulgaria was one of the initial years of health care reform and the observed not quite effective composition of the health care expenditure is explainable.

Figure 8

Total public expenditure as share of GDP in 4 CEE countries (Bulgaria, Hungary, Poland and Slovakia), 2005-2050



Hungary marks the highest share of public health care expenditure in GDP both at the base and final year of the projections. Comparatively high increase over the projection period is expected in Poland, followed by Slovakia. The improvement of this indicator for Bulgaria is outlined as the slowest, which is perhaps a consequence of the higher rate of economic development acknowledged for our country in the ILO model.

The final result of the developed scenarios has to present the possibility of each country to cover the health care expenditure with the health care revenues. It is indicative and not surprising that deficit of the public health care expenditure is outlined for all four countries. That is explainable taking into account their similar

unfavorable demographic and economic conditions.<sup>7</sup> Depending on the real indicators for the base year in a given country and the assumptions for the different independent variables' trends in the future, the largest deficit is likely to be observed in Slovakia, followed by Bulgaria and Hungary and the smallest one is in Poland.

In general, the basic findings for the four countries are the following:

- Systematic growth of health budget deficit in all countries in the study is expected. It reaches up to 60% of the expenses in Slovakia, 50% on Hungary and in-between 52-60% in Bulgaria (depending of the selected scenario);
- The growth of deficit is caused by trends of components (variables) influencing both the expenditure and revenue sides. A very limited increase in the revenues and a high dynamics of expenditures growth are observed;
- A strong influence of the rapid demographic changes in the compared countries is observed to the detriment of the revenue side but this influence is different in the individual countries and over time;
- Sustainability of the health care system financing strongly depends on the level and speed of economic development, in particular growth, labour market participation and wages;
- Because health care expenditures are strongly connected with health care services utilization and their costs, health budget sustainability is also indirectly depending on the effectiveness of the structural health care reform (expressed by institutional variables, such as the structure of expenditures divided by sources etc.).

\*

• The ILO model realization allows to produce different scenarios for the future change in the main economic and demographic indicators and thus to count their combined influence on the health care expenditure. However, due to the inevitable limitations of every model construction, as well as to the rather long period of nearly half a century projection when a wide spectre of changes in the economic, social and demographic life could happen, the results should be interpreted more likely as outlined tendencies, rather than as absolute values. These tendencies give useful implications for the policy decision makers in the field of health care finance.

• In such a long future period different phenomena in the economic development, both positive or/and negative, could happen and cannot be foreseen. For example, the national health care system budget would be supported by keeping sustainable economic growth, improving the effectiveness of the health

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<sup>7</sup> See Рангелова, Р. Стареене на населението в страните от Централна и Източна Европа. - В: Стареене на населението – реалности и последици, политики и практики (*Rangelova, R. Ageing Population in Central and Eastern European Countries. - In: Ageing Population: Realities and Consequences, Policies and Practices*). Sofia, Centre for the Population Studies at the Bulgarian Academy of Sciences and National Insurance Institute, 2006, p. 85-97.

care system, finding the external sources of health care financing and other similar factors. On the contrary, any eventual hardships could have their influence in the opposite direction. The reasons could be internal (for example financial sector crisis as a result of a wrong bank policy; abolishing the currency board in Bulgaria without having sufficiently stable financial conditions; new fiscal and monetary challenges which the country could face trying to enter the EMU; mass firm defaults because of their low competitiveness in EU market etc.) or external (caused by reasons related to unfavourable global or regional economic crises, conflicts and so on). Otherwise some positive tendencies could be reasoned by some of the global economy processes development. On the first place, the positive results of the sustainable global community development could be pointed out; the health status improvement (which is related to the technology and innovation progress that causes a considerable growth in the health expenses); in a social aspect one could point the positive effects of the health care system reforms.

- As a final result of the ILO model application an increasing gap between the total health revenue and the total expenditure in Bulgaria is outlined by the three scenarios. The increasing deficit could be discussed from two aspects: total health revenue and total health expenditure. A limited increase in the revenues combined with substantial growth of the expenditures is outlined. Considering the revenue side, if we take into account the lower living standard of the Bulgarian population compared with that of the other EU member states facing similar bio-demographic problems, even on the base of the rather high long-term economic growth rates, assumed by us, it is impossible to cumulate the necessary funds to cover the expected expenditure. Concerning the highly debated issue of the health premium, there are not many opportunities to increase it in Bulgaria, given the low income level of the population. In our view such a burden would be unbearable for the most part of the population within the next several years and will worsen the people's health status, which would lead consequently to further increase in health expenditures. Considering the expenditure side, it is evident that the process of ageing population demands more and more excessive healthcare funding. There is a potential for the total balance improvement by increase in the overall healthcare system effectiveness. That means: a new critical review upon the newly introduced system with recognising the public opinion; elaboration of strategies to improve health status of the population at an early age and conditions leading to significantly better health in later life; implementation of health information systems; development of professional health care management; administrative efficiency; professional management of health care establishments; effective cost control and drug policy.

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