



European Network of Economic Policy  
Research Institutes

# HEALTH AND MORBIDITY IN THE SLOVAK REPUBLIC

VLADIMÍR KVETAN & VILIAM PÁLENÍK

ENEPRI POLICY BRIEF NO. 6

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**Extracting the Policy Implications from**  
*HEALTH AND MORBIDITY IN THE ACCESSION COUNTRIES*  
*COUNTRY REPORT – SLOVAK REPUBLIC*  
**ENEPRI RESEARCH REPORT NO. 30/ DECEMBER 2006**  
**PREPARED AS WORK PACKAGE IX OF THE AHEAD PROJECT**  
**(HEALTH EXPENDITURE SCENARIOS IN THE NEW MEMBER STATES)**

**ENEPRI Policy Briefs** present the policy implications of research carried out by member institutes of the European Network of Economic Policy Research Institutes. Initiated by CEPS in 1999, ENEPRI conducts research on welfare and employment issues with the aim of diffusing existing research, coordinating research plans and increasing the awareness of the European dimension in national problems. The research presented in this Policy Brief was conducted under the AHEAD project (Ageing, Health Status and the Determinants of Health Expenditure), which was funded for a three-year period by the European Commission under the 6<sup>th</sup> Research Framework Programme (contract no. SP21-CT-2003-502641). The research, carried out by a CEPS-led consortium of 18 partner institutes, was organised into nine Work Packages, the results of which have been published in the ENEPRI Research Report series and are available for free downloading on the CEPS online bookshop (<http://shop.ceps.eu>) and from the ENEPRI website (<http://www.enepri.org>).

A brief description of the AHEAD project and a list of its partner institutes and publications can be found on the last pages of this Policy Brief.

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### Introduction

Income and expenditure on health systems have tended to rise as a proportion of national income throughout the European Union. A particular concern is that, with an ageing population and therefore the prospect of more old people around, the pressures for expenditure on health care will increase further. The AHEAD (Aging, Health Status and Determinants of Health Expenditure) project set out to refine existing estimates of the links between aging, reported states of health and use of medical services. The Slovak country report calculated, analysed and discussed health expenditure scenarios in Slovakia.

After the social changes in 1989, the Slovak economy passed through decades of transformation from a directed economy to a free market economy. Similarly, as in other transition economies, the Slovak economy was not able to avoid recession. Two negative effects have been combined in the Slovak health system:

- the transition recession adversely hit the financial perspective of the health system and
- the traditional public sectors – the health system is a typical example – did not undergo the transition process at all, or only made partial changes and were the last sectors to experience the transformation process.

As a consequence, the national healthcare systems in transition economies have not benefited from the transition process. That is reason why the transition to market-oriented healthcare system by privatisation and liberalisation has lagged behind in these countries. The Slovak health care system entered the 21<sup>st</sup> century:

- in a poor financial state corresponding to the economy after the transition recession,
- with a socialist internal organisation,
- with a fully liberalised world of pharmaceutical and medical equipment markets,
- with an aging population problem and
- with high unemployment and low employment rates.

This situation brings many challenges for the healthcare system of Slovakia. One of the challenges for the future is in the basic establishment of receipts and expenditures of the healthcare system (especially with the best healthcare available for citizens).

The goal of this work was to construct a macroeconomic model of revenues and expenditures of the healthcare system and to apply this model to quantify the basic forecast of the country's healthcare budget and for sensitivity analysis. The work is based on predictions of:

- life expectancies,
- real wage projections and
- employment rate projections.

## Methodology

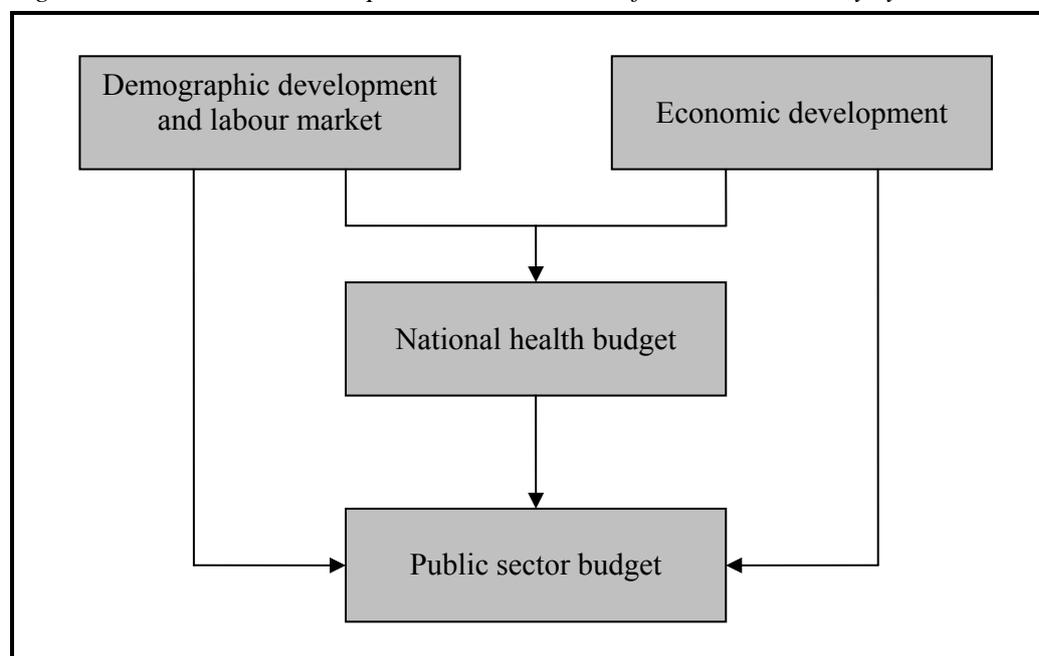
### *Health care expenditure models in Slovakia*

For the purpose of quantifying revenues and expenditures of the Slovak Republic (SR) health system at the macroeconomic level, we have constructed an econometric model (see Figure 1).

The only publication that is close to healthcare modelling is based on an econometric model of the Slovak economy (Páleník et al., 2005). This model is based on modifications of macroeconomic models that were constructed by the Institute for Economic Research, Slovak Academy of Sciences.

At the core of this model is a description of the impact and mutual dependence of macroeconomic variables in the real economy. The model consists of eight blocks of equations describing particular parts of the economy. In the block of prices and deflators, the main prices (CPI, PPI) and deflators of GDP components are described. The labour market block consists of equations for demand and supply of the labour force. The labour force supply is based on demographic forecasts. Blocks of population describe micro-macro relations. The nominal wages and employment (micro level) are combined with labour and other income resulting in disposable household income, which is spent for consumption or kept as savings. In the block of foreign trade, the prices and values of Slovak exports and imports are calculated. The main indicators – GDP and components of use – are calculated in a block of GDP. The monetary block describes the interactions between monetary policy and the real economy. The state budget income and expenditures are calculated in a block of state budget.

*Figure 1. Basic relations in expenditure in a model of the health security system*



A model of the healthcare system of the SR was created by modifying and extending the macroeconomic model used by researchers. Relevant modules of the model focus on labour market, demand of health services and healthcare budget and macroeconomics. The expenditure model of the health security system consists of four mutually interconnected modules describing relations between demographic development and the labour market together with the overall economic situation in SR and their interface with the health security system and the public sector budget.

### ***Data source for model***

The main economic indicators are based on the national accounts. They are provided by the Statistical Office of the Slovak Republic. The compilation of the national accounts of the Slovak Republic is based on the European System of Accounts 95 (ESA 95). Other data, for example consumption price index, real wage growth data, etc. are also published by the Slovak Statistical Office on a quartile basis and are compiled with ESA 95 methodology.

The main indicators of economic performance of the health care system are provided by the Health Statistic Yearbook. This publication provides an annual overview of health services and health status of the Slovak Republic's population. It is issued by the National Centre of Health Information (formerly called the Institute of Health Information and Statistics) in Bratislava. The data for the health care budget are based on the OECD national health data.

### ***Basic assumptions of the forecast***

The forecast of variables (both economic and demographic) is based on three basic assumptions:

1. The size of government, measured as total government expenditures as a share of gross domestic product (GDP), will be stable through the years 2005-50. This assumption is based on the fact that there are no indications that the current government will raise taxation and increase the size of government by additional spending. Since the government aims to meet the Maastricht criteria and participate in the Stability and Growth Pact, it is limited by these criteria especially by annual deficit below 3% of GDP.
2. The economic growth, measured by real GDP growth, will converge to the average growth of the European Union and the Slovak economy will converge to the European Union average, measured as GDP per capita, between years 2030 and 2040. After this convergence period, however, the Slovak economy will lose some of its comparative advantages and therefore we are assuming that the growth of economy will average around the EU growth, which we forecast at 2.5% of annual real GDP growth.
3. The structure of the population will dramatically change because of population ageing and a low birth ratio. This change will mainly impact the labour market. The drop in the birth ratio and total fertility rate between 1990 and 2005 is a result of the transition from a planned economy to a free market, mixed economy. As the result of these development trends, the current population age groups between 5 and 20 years old are substantially lower than before and in long-term, this will lead to a smaller share of the work force from the total population.
4. The participation rate of the labour force, unemployment rate, productivity and wage growth as well as real GDP growth rate are the main variables that have impact on revenues of health budget as well as total government revenues. Population ageing and population structural changes, birth ratio, wage growth of medical staff, utilisation of health facilities and medical staff are the main variables that affect expenditures of the health budget, along with the social security system and real interest rates and total expenditures of government.

## **Main results**

### ***Demographic variables***

Between the years of 2003 and 2015, we are expecting 0.06% average annual growth rate of the total population. After 2015, death rates will be permanently higher than birth rates and therefore between the years 2015 and 2030, we expect a -0.2% average annual growth rate of the total population and after 2030, a -0.5% average annual growth rate of the total population.

The total fertility rate (TFR) for the Slovak population has been dropping since 1980, and we expect that this trend will continue until 2010, hitting a low of 1.19. The main reason for this development was the recession and a huge drop of real gross domestic product and real income per capita after the fall of communism and the planned economy between 1989 and 1993. Unstable economic development, high unemployment, and the reform and transition of the economy to a free market, mixed economy after 1990 were other crucial elements of the TFR drop. We expect that the increase of real income of population and high economic activity between 2005 and 2015 will lead to a change in this trend, and that after 2010, the TFR will gain slowly. Between 2010 and 2030, we expect a rise in the TFR from 1.19 to 1.43 and until 2050, it will grow to 1.71 (Table 1).

*Table 1. Demographic variables*

	2003 (base year)	2010	2015	2020	2025	2030	2035	2040	2045	2050
Growth rate – total	0.10%	0.07%	0.01%	-0.11%	-0.25%	-0.35%	-0.44%	-0.53%	-0.61%	-0.68%
Total fertility rate (TFR)	1.29	1.19	1.22	1.29	1.36	1.43	1.50	1.57	1.64	1.71
Life expectancy (LE) – males	70	72	73	74	74	75	76	76	77	77
Life expectancy (LE) – females	78	79	80	80	81	82	82	83	83	83
Sex ratio (males : females)	0.944	0.949	0.951	0.952	0.950	0.948	0.945	0.941	0.938	0.935

### **Labour market variables**

Development of the labour market will be affected mainly by population growth and high economic growth. High long-term unemployment is one of the main problems of the Slovak labour market. We assume that the fight against long-term unemployment will be a rather slow process, due to the low education and mobility of the long-term unemployed.

We are expecting employment growth at 1.35% per annum between 2005 and 2015, because of high economic growth and high demand on the labour market. After 2015, we assume a drop in the employment growth and after 2020, we expect negative growth of employment. This development is based on structural changes of the population after 2015, which will lead to a fall in the share of the workforce as a percent of the total population (see Table 2).

*Table 2. Labour market variables*

	2003 (base year)	2010	2015	2020	2025	2030	2035	2040	2045	2050
Participation rate – total	69.5%	70.0%	71.1%	72.4%	73.2%	73.1%	71.9%	71.4%	71.7%	72.1%
Participation rate – males	76.3%	76.4%	77.0%	77.5%	77.5%	76.9%	75.5%	74.9%	75.0%	75.3%
Participation rate – females	57.3%	59.3%	60.8%	62.4%	63.9%	64.4%	63.7%	63.3%	63.4%	63.7%
Employment growth	0.8%	0.8%	0.5%	-0.4%	-0.4%	-0.7%	-1.1%	-1.3%	-1.4%	-1.2%
Unemployment rate	18.8%	11.7%	8.9%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Employment rate 15-64 – total	57.6%	62.0%	65.2%	68.6%	69.4%	69.3%	68.3%	68.0%	68.4%	68.9%
Employment rate 15-64 – males	63.0%	67.8%	70.6%	73.5%	73.6%	73.1%	71.9%	71.6%	72.0%	72.4%
Employment rate 15-64 – females	52.2%	56.2%	59.7%	63.6%	65.2%	65.5%	64.6%	64.4%	64.8%	65.5%

### **Economic variables**

The assumed development of the economic variables is based on an economic forecast of the ECM-ISWE06q1 econometric error-correction model for the years 2006 to 2013. The forecast is based on the assumption that economic development will peak in 2007 and between 2006 and 2008, at 6.5 – 6.8% real GDP growth. This assumption is based on high investment activities in the economy as a result of direct foreign and domestic investment and growth of personal consumption as a result of increasing real wage growth. After 2012 we are assuming a slight slowdown in the growth of the economy and after 2015, we forecast growth of real GDP under 5% per annum. This slowdown is based on the assumption that the Slovak economy will lose its comparative advantages, for example its relatively cheap but highly educated work force, as it converges towards the average of the EU. Until 2030 we expect an annual average real GDP growth rate above 3%. Because of the high uncertainty after 2030, we forecast a slowdown and convergence of the economy's expansion to only 2.5% per annum of real GDP growth (see Table 3).

*Table 3. Economic variables*

	<b>2003 (base year)</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>	<b>2040</b>	<b>2045</b>	<b>2050</b>
Real GDP growth rate	4.5%	6.2%	5.1%	4.1%	3.2%	3.1%	2.9%	2.8%	2.6%	2.5%
GDP deflator	5.1%	2.9%	3.0%	2.9%	2.8%	2.6%	2.5%	2.3%	2.2%	2.0%
Nominal GDP per capita growth	9.0%	9.2%	8.3%	7.2%	6.3%	6.1%	5.9%	5.7%	5.5%	5.3%
Labour productivity growth	3.6%	5.3%	4.6%	3.7%	3.0%	2.9%	2.7%	2.6%	2.4%	2.3%
Real wage growth	-2.1%	4.3%	4.0%	3.4%	2.9%	2.8%	2.6%	2.5%	2.3%	2.2%
Inflation, CPI	8.6%	2.7%	3.1%	3.0%	3.0%	2.8%	2.6%	2.4%	2.2%	2.0%
Real interest rates	-1.0%	2.4%	2.2%	2.7%	3.0%	2.9%	2.8%	2.7%	2.6%	2.5%

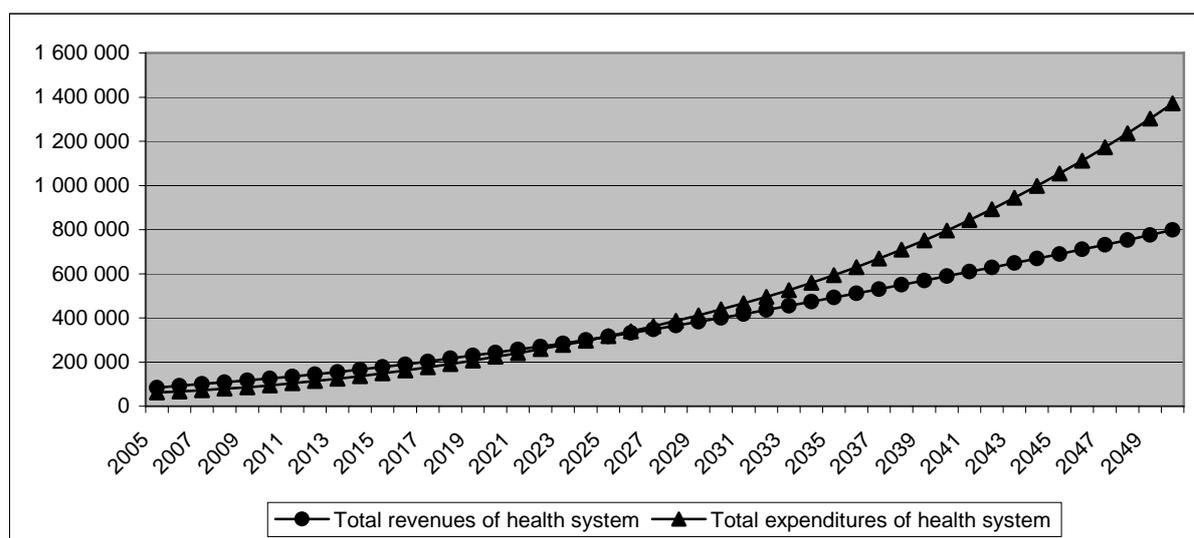
### **Results of projection**

Baseline scenario results indicate that current adjustment of the health system will show a mild decreasing surplus until 2025. After 2025, the health budget will run a growing deficit with an average deficit of a 1.2% share of GDP per annum, rising from a balanced budget to a deficit of 2.35% in 2050. Expenditures of the health system will grow by an average of 9.2% between 2005 and 2015. After an assumed slowdown of economic growth, expenditures of the health system will grow at an average 7.2% annual rate between 2015 and 2035, and after 2035, the annual average growth rate of health expenditures will be 5.7%. Revenues of health system will grow at an average annual growth rate of 7.8% between 2005 and 2015. After an assumed slowdown of economic growth, revenues of the health system will grow at an average annual growth rate of 5.2% between 2015 and 2035. After 2035, the average growth rate of health revenues will be 3.3% per year. The higher growth rate of expenditures in the forecasting period is mainly due to population aging (see Table 4 and Figure 2).

Table 4. Projection of health budget revenues and expenditures and health system deficit/surplus

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total health expenditures as share of GDP	4.8%	5.0%	5.1%	5.4%	5.6%	5.8%	6.1%	6.4%	6.6%	6.9%
Deficit/surplus of health system as share of GDP	1.5%	1.4%	0.8%	0.4%	0.0%	-0.4%	-0.9%	-1.4%	-1.9%	-2.3%
Deficit/surplus of expenditures and revenues of health system (mil. Skk)	22.1	31.9	28.7	19.7	-1.9	-38.7	-101.0	-207.1	-364.5	-573.8
Total health expenditures as share of total government expenditures	10.7%	10.9%	11.4%	12.0%	12.5%	13.0%	13.5%	14.0%	14.6%	15.1%
Total government expenditures as share of GDP	39.0%	38.2%	37.6%	37.4%	37.4%	37.3%	37.3%	37.2%	37.2%	37.2%
Total government deficit/surplus as share of GDP	-2.5%	-1.7%	-1.1%	-0.9%	-0.9%	-0.8%	-0.8%	-0.7%	-0.7%	-0.7%
Total government public debt as share of GDP	34.5%	32.2%	26.2%	22.4%	20.5%	19.4%	18.5%	17.6%	17.1%	16.9%

Figure 2. Comparison of total revenues &amp; expenditures of health system (mil. Skk)



### Sensitivity tests and scenarios

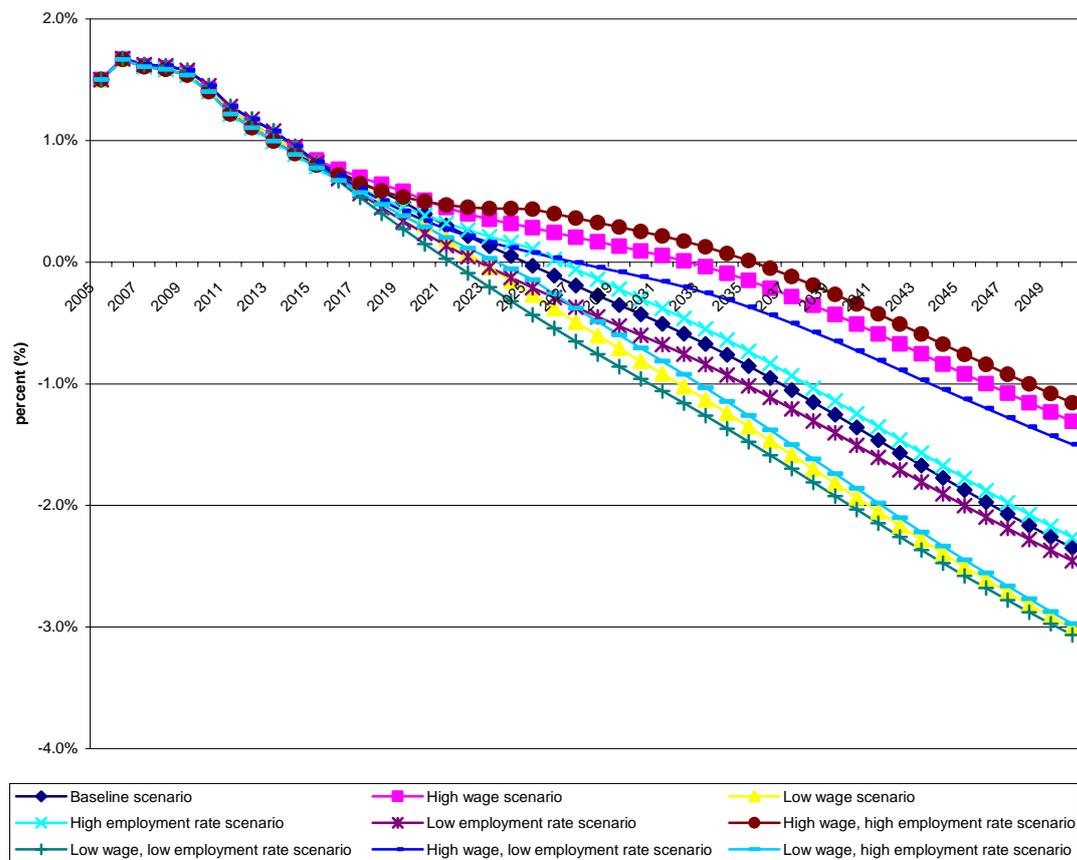
For a deeper understanding of the mechanisms at work within the health care system, the sensitivity scenarios were developed. The scenarios are based on possible deviations of wages and the employment rate compared to the baseline scenario.

The scenarios are built on different assumptions of the labour market and general economic trends. The scenarios present a comparison of the impacts of development in the economic environment to the sustainability of the health care system. The baseline scenario presents the most likely trend. Comparative scenarios present possible trends of both an optimistic and pessimistic nature (see Figure 3).

### Migration

The official demographic forecasts assume the balance in migration in the year 2050 in an interval between 600 (very low scenario) and 9,000 (very high scenario) per year. The most probable demographic forecast is the middle scenario, which assumes approximately 3,000 persons per year in the year 2050. We assume that most of those immigrating (whether on a temporary or permanent basis) will be from younger age groups (25-45). Even so, the modelling results indicate changes in the level of the model statistical errors. We consider that migration will play only a marginal role with respect to financing of the health care system.

Figure 3. Deficit (-) and surplus (+) of the health system as share of GDP



## Conclusions

In a basic scenario, we quantify the most probable development of revenues and expenditures of the healthcare system to year 2050. The basic assumption based on this scenario is that until 2025, the healthcare system will be in surplus. After 2025, the system will begin to run a deficit with an average deficit of 1.2% of GDP.

This development will be caused by lower dynamics between budget revenues and expenditures, which is explained by different dynamics of particular exogenous variables.

Revenues will experience high growth dynamics in the first decade, between 2006 and 2016. This development is due to the high economic growth. After the Slovak economy reaches a higher economic level in 2015, the dynamics of economic growth will decline accompanied by a decline in the share of the population engaged in the workforce. The growth of revenues of the health system will also fall.

The high dynamics of expenditures in the health system are based on aging and this development will have a main impact between 2015 and 2035. Actual healthcare contributions paid from gross wages total 14%. To mark equilibrium in the healthcare budget, the current rate might be 9% and in 2050 it should be raised to 21%.

For purposes of examining the deviation of key exogenous explanatory variables, we have run some sensitivity tests. We found that the healthcare budget will sensitively respond to the aging of the population, wage growth and employment rate. On the other hand, the budget's response to different life expectations will be negligible.

The work aims to match the quantification of the basic scenario by sensitivity analysis on predetermined key variables from demographic developments and the labour market.

In future, there is high uncertainty in migration trends. The key migration trend will be emigration from Slovakia to states with higher developed economies in the first decade. After the Slovak economy reaches a higher economic level, this trend might change and Slovakia will experience immigration from states with less developed economies. The weight of these effects will be determined by the globalisation process within the EU and elsewhere and EU migration policies.

In the context of natural cyclical economic development, the labour market will also suffer. These cycles will influence revenues of the healthcare system. One solution might be to strengthen state policy-holders as an anti-cyclical factor of health revenues. Such questions are relevant topics of future research.

The alternative scenarios have shown that even under optimistic assumptions, the financing of the health care system is not sustainable in the long run. By the end of the year 2050, it will run a deficit at the level 1.2-1.5% of GDP. The analysis proved that the income of the system is most sensitive to changes in real wages as opposed to changes in the employment rate. A one percentage increase/decrease in real wage leads to approximately 0.6-0.7% additional growth/decline in income. A one percentage change in the employment rate will cause only 0.05% change in income. In the case of the most pessimistic scenario, the deficiency of the system will fall to 3% of GDP. Migration will not play an important role considering its marginal impact on the financing of the health care system.

## Policy recommendation

From an economic policy perspective, we conclude that after 2025 the health system will suffer from gradual deficit growth. It may be possible to soften the factors that cause this, but it will not fully solve the problem. It will be necessary to raise the contributions to healthcare from gross

wages. Eventually it will be necessary to raise other sources of revenue for the healthcare system. Financial participation of patients seems to be unavoidable to restrict ineffective fund allocation.

The health system is poorly reformed and systemic changes in its functioning are needed. The main goal of any reform effort might be to increase the system's efficiency with the sustainability of budget restrictions. Systemic changes are also necessary in the administration and management of the health system as well as in the organisation directed at lowering costs and raising efficiency. Such factors might be preventive long-term care, public health awareness campaigns and one-day surgery.

These activities will lead to a better health of the population and a rise in life expectancy. The main ethical purpose of the health system will be achieved by those effects. Simultaneously, expenditures on healthcare will rise and its economic stability will suffer. An ethical focus on raising the health of the population is contradictory with an economic focus on stable funding of healthcare. Quantitative analysis shows, however, that this contradiction is not crucial in the development of expenditures as an increase in life expectancy leads only to a negligible rise in health expenditures.

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- No. 15 *Health and Morbidity by Age and Socio-Economic Characteristics*, Richard Layte, Anne Nolan, Brian Nolan and Tom Van Ourti, November 2005
- No. 16 *The Influence of Supply and Demand Factors on Aggregate Health Care Expenditure with a Specific Focus on Age Composition*, Erika Schulz, November 2005
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- No. 35 *Health Status Transitions*, Maria M. Hofmarcher, Monika Riedel, Alexander Schnable and Gerald Sirlinger, June 2007

<b>AHEAD Work Packages</b>	
WPI	Health and Morbidity by Age and Socio-economic Circumstances
WP II	Health and Morbidity in the New Member States
WP III	Incidence of Poor Health and Long-term Care
WP IV	Health Status Transitions
WP V	Healthy Life Expectancy
WP VI	Determinants of Aggregate Health Care Expenditure focusing on age composition
WP VII	Health Costs Prior to Death
WP VIII	Development of Scenarios for Health Expenditure in European Union Countries
WP IX	Development of Scenarios for Health Expenditure in the New Member States



## About AHEAD

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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 Wirtschaftsforschung, DIW, Germany  
Economic and Social Research Institute, ESRI, Ireland  
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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  
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