DETERMINATION OF THE OPTIMAL PREMIUM FOR THE ECONOMICALLY ACTIVE AND INACTIVE POPULATION IN HEALTH INSURANCE IN SLOVAKIA

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Abstract

Health insurance in the Slovak Republic is the main source of the health system funding. It consists of contributions from employees, employers, self-employed, by the voluntary insured person and the state from the state budget for economically inactive population. These contributions are set by the assessment bases and corresponding percentage rates. For employees and employers, the assessment basis corresponds to employee's gross salary, for self-employed this basis is determined by the income, for the voluntarily insured person and for state insured persons the basis of assessment is defined by the average gross salary in the national economy. Due to cumulated debt in the health system of Slovak Republic, which may continue to arise as a result of lack of financial resources and continually rising expenses, there is a need for persistent reevaluation of these resources. The increase of the health insurance payments is undesirable for economically active population. For this reason, our aim is to determine the optimal percentage rate, so the optimal state conscription from the state budget for the state insured (economically inactive) and also for economically active population.

1. Introduction

After November 1989, social, political, economic and social changes took place in Slovakia. The payments for health care services were still funded directly from the state budget.

The crucial decision in the sector of health care service after the "Velvet Revolution" was the adoption of the principles for the reform of structure, management and financing of health care services in Slovakia by the Slovak Government in December 1990. In addition to the changes in the structure, management, health care and research activities, they also dealt with

the establishment of a health insurance company. Based on this principle of a compulsory health insurance, the health care model should provide equivalent necessary health care services for all citizens, the free choice of a doctor and health care facilities, regulated competition between health care providers, a better relationship between health care professionals and their patients, the calculation of the price of health care services, financing of health care services by actual performance and thus change the previous system that funded health care services ex-ante based on capacities. This new system should ensure usage of insurance contributions exclusively for the purposes for which they should be used. It should also eliminate the possibilities for the use of these sources according to subjective criteria in the distribution of the state budget. These principles were a good and comprehensive starting point for introducing a new health insurance system.

The Institute for the Introduction of Health Insurance in Slovakia, established by the Ministry of Health of the Slovak Republic in 1992 has two main tasks to fulfill:

- prepare the introduction of a compulsory health insurance scheme, including the organization of a health insurance company,
- take over the financing of the most health care facilities from the Ministry of Health of the Slovak Republic.

In 1993, in the first year of the independent state of the Slovak Republic, the National Insurance Company, the Health Insurance Fund Administration, together with the 38 regional administrations of the Health Insurance Fund, was established as a public institution - budget organization. During 1993 and 1994, it arranged mandatory health, sickness and pension insurance. The main subject of its activities was the introduction of a health care insurance system, the financing of health care services and building of the organizational structure of the Health Insurance Fund. The General Health Insurance Company was created in 1995 by the transformation of the National Insurance Company based on the Act of the National Council of the Slovak Republic no. 273/1994 Coll. On health insurance as amended, which regulated the contribution rates of employees and the bases of assessment.

Expectations of the new pluralist mandatory health insurance system have not been fulfilled. The increasing deficit of funds to finance the legally guaranteed free medical services, as well as the deficiencies in their appreciation limited the extent and especially the quality of the provided health care services. The reason was also the creation of 14 health insurance companies as an unsustainable market with a small insurance tribe, which is the Slovak Republic with about 5 million inhabitants. Currently there are 3 health insurance companies as joint-stock companies in Slovakia. One of them is owned by the state and two are privately owned.

The level and stability of health care services was negatively affected by the way how they were funded with the so-called "open end", which was applied until the end of 1998 and led to the uncontrolled growth of costs. Only in 1999, the Ministry of Health of the Slovak Republic adopted measures that concluded the way of financing the health services.

The current state of health insurance in the Slovak Republic is as follows. The Act of the National Council of the Slovak Republic no. 580/2004 Coll. On health insurance is one of the six reform laws in the health care system of the Slovak Republic and has modified the system of health insurance to a system that can be made up of public health insurance and individual health insurance. Public health insurance is a compulsory insurance under which health care services are provided for the insured to the extent stipulated by the Act of the National Council of the Slovak Republic no. 577/2004 Coll. On the scope of health care on the basis of health insurance and on the refunds for the health care services. Individual health insurance is an insurance under which individual health care stated by the contract is provided to policyholders.

Insurance contributions are paid by the employees, employers, self-employed, by the voluntary insured person and the state. According to the Act of the National Council of the Slovak Republic no. 595/2003 Coll. income tax is payable by every policyholder if he / she has an income subject to income tax. The state pays from the state budget the contributions for economically inactive population. The assessment base for the calculation of the insurance contributions for each type of insured is regulated by section 13 of the Act of the National Council of the Slovak Republic no. 580/2004 Coll.

Table 1: Rates of health insurance from the assessment bases

Type of insured	The rate of the assessment bases
employee	4%
employer	10%
self-employed	14%
voluntary insurer	14%
state	4%

Source: the author's work based on the Act no. 580/2004 Coll.

Despite all efforts in the financial area of the health care system, the debt in the health care facilities within the scope of the Ministry of Health of the Slovak Republic in 2016 reached 589.94 million euros. The permanent rise of operating losses can be considered as the main reason for the ongoing increase in the indebtedness of health care facilities. These facilities provide the largest range of financially demanding health services. The situation also complicates high share and increase in personnel costs in relation to revenues from insurance companies and a significant share of the cost of medicines and medical supplies in the total cost of health care facilities.

The tax burden on the economically active population in terms of both health and social contributions or income taxes is no longer possible to increase. It is generally at about 48% of income, so other resources should be found to cover the debt. We can, therefore, analyze the state contribution for the economically inactive population, whose percentage on the basis of assessment is relatively low compared to the percentages of income of the economically active population.

The main aim of our paper is to find a methodology that would serve to calculate the optimal health care premium rate of the state contribution for the economically inactive population from the average salary in Slovakia in order to cover all medical expenses. In other words, to find a methodology that would ensure that the created financial resources will cover the expenses without debt generation.

This paper is divided into four parts. In Section 2, we introduce our methodology determining the health insurance premium rate for economically inactive and active population. Section 3 contains tables with corresponding data for reference years 2010 - 2016. Moreover, this section contains our main result – the calculation of appropriate combinations of health care premium rates for both economically inactive and economically active population. At the end, in the Section 4, we give conclusions and some remarks and schemes of our further investigation.

2. Methodology Determining the Health Insurance Premium Rate for Economically Active and Economically Inactive Population

For clear explanation, firstly, we give basic notations. Throughout the paper, we use following notations:

- TE - total expenditure on health care, which includes private and public resources,
- TE_{Public} - total expenditure on health care, which includes only public resources,
- $TE_{Private}$ - total expenditure on health care, which includes only private resources,
- GS - yearly average gross salary,
- TPo - total population,
- APo - economically active population,
- IPo - economically inactive population,
- I - health insurance premium rate as a % from average gross salary,
- $I_{L(APo)}$ - health insurance premium rate for economically active population with respect to the Act no. 580/2004 Coll., at present 14 % from average gross salary,
- $I_{L(IPo)}$ - health insurance premium rate for economically inactive population with respect to the Act no. 580/2004 Coll., at present 4 % from average gross salary,
- THP - total health insurance premium,
- THP_{APo} - total health insurance premium of economically active population,
- THP_{IPo} - total health insurance premium of economically inactive population.

All data sets which are mentioned above can be found in Tables 2, 3 and 4 for all reference years from 2010 to 2016 gradually for $i = 1, 2, …, 7$.

In our methodology, we consider cash-flows from economically active population and from state budget for the state insured, i.e., economically inactive population. Total health insurance premium consists of contributions from both cash-flows, what is expressed by the equivalence equation

$$GS_{i-2} \cdot \frac{I_{L(APo)}}{100} \cdot APo_i + GS_{i-2} \cdot \frac{I_{L(IPo)}}{100} \cdot IPo_i = THP_i. \tag{1}$$

Based on Act no. 580/2004 Coll. On health insurance described above, yearly average gross salary from two years ago is used in formula (1). Based on the data from the Statistical office of the Slovak Republic, we found out that the quotient of the total health insurance premium to the total expenditure on health care, which includes only public resources is greater than 1. Hence, we can write this quotient by

$$\frac{THP_i}{TE_{Public}} = 1 + \frac{q_i}{100}, \tag{2}$$

where q_i represents percentage increase of total health premium against to total expenditure.

In the case, if we assume that this percentage increase can be reduced, we can modify (2) as follows:

$$\frac{\left(1 - \frac{k_i}{100}\right) \cdot THP_i}{TE_{Public_i}} = 1 + \frac{q_i^*}{100}, \tag{3}$$

whence

$$k_i = 100 \cdot \left(1 - \frac{\left(1 + q_i^*\right) \cdot TE_{Public_i}}{THP_i}\right). \tag{4}$$

If we admit that it is appropriate to change total health premium, more precisely, to reduce it, it is possible to modify equivalence equation (1) as follows:

$$GS_{i-2} \cdot \frac{I^*_{L(APo)_i}}{100} \cdot APo_i + GS_{i-2} \cdot \frac{I^*_{L(IPo)_i}}{100} \cdot IPo_i = \left(1 - \frac{k_i}{100}\right) \cdot THP_i, \tag{5}$$

where $I^*_{L(APo)_i}$ and $I^*_{L(IPo)_i}$ are our proposed alternatives of health insurance premium rates for economically active and for economically inactive population, respectively.

We define optimal premium is a premium covering all medical expenses and administrative costs of the insurance companies without debt generation. Based on equation (5), we can investigate mutual proportion of these health insurance premium rates.

Whence we can express health insurance premium rate for economically active or for economically inactive population, respectively.

It follows that health insurance premium rate for economically active population we can express by formula

$$I^*_{L(APo)_i} = \frac{\left(1 - \frac{k_i}{100}\right) \cdot THP_i - GS_{i-2} \cdot \frac{I^*_{L(IPo)_i}}{100} \cdot IPo_i}{IPo_i \cdot GS_{i-2}} \cdot 100, \tag{6}$$

and for economically inactive population by formula

$$I^*_{L(IPo)_i} = \frac{\left(1 - \frac{k_i}{100}\right) \cdot THP_i - GS_{i-2} \cdot \frac{I^*_{L(APo)_i}}{100} \cdot APo_i}{IPo_i \cdot GS_{i-2}} \cdot 100, \tag{7}$$

Expressions described above will be used in the following section for the calculation of our proposed optimal health insurance premium rate.

3. Analysis of health care premium rate

Table 2: Gross Salary, economically active and inactive population in Slovakia

i	Year	Average Yearly Gross Salary (euro) GS_i	Economically Active Population APo_i	Economically Inactive Population IPo_i
1	2010	9 228	2 706 000	2 715 000
2	2011	9 432	2 680 000	2 712 000
3	2012	9 660	2 706 000	2 698 000
4	2013	9 888	2 715 000	2 695 000
5	2014	10 296	2 721 000	2 694 000
6	2015	10 596	2 738 000	2 683 000
7	2016	10 944	2 758 000	2 668 000

Source: the author's work on the basis of the Statistical Office of the Slovak Republic

In this part, we describe data sets we used to determine appropriate amounts of health care premium rates. The following data sets we obtained from the same resource - the web page of the Statistical Office of the Slovak Republic (Statistical Office of the Slovak Republic, 2017a, 2017b).

Table 3: Total population and total expenditure in Slovakia

i	Year	Total Population TPo_i	Total Expenditure on Health Care (euro) TE_i	Total Expenditure on Health Care only from Private resources (euro) TE_{Private_i}	Total Expenditure on Health Care only from Public resources (in the following section) TE_{Public_i}
1	2010	5 421 000	5 589 798 000	1 798 979 000	3 790 819 000
2	2011	5 392 000	5 239 359 000	1 373 742 000	3 865 617 000
3	2012	5 404 000	5 550 071 000	1 544 622 000	4 005 449 000
4	2013	5 410 000	5 583 370 000	1 440 214 000	4 143 156 000
5	2014	5 415 000	5 256 334 000	1 039 322 000	4 217 012 000
6	2015	5 421 000	Unknown data		
7	2016	5 426 000	Unknown data		

Source: extracted from the Statistical Office of the Slovak Republic

Table 4: Total Health Premium based on the Act no. 580/2004 Coll.

Order i	Year	Total Health Premium from Active Population (euro) THP_{APo_i}	Total Health Premium from Inactive Population (euro) THP_{IPo_i}	Total Health Premium from Whole Population (euro) THP_i	$\dfrac{THP_i}{TE_{Public_i}} = 1 + \dfrac{q_i}{100}$
1	2010				
2	2011				
3	2012	3 495 935 520	995 885 760	4 491 821 280	1.12
4	2013	3 585 103 200	1 016 769 600	4 601 872 800	1.11
5	2014	3 679 880 400	1 040 961 600	4 720 842 000	1.12
6	2015	3 790 268 160	1 061 180 160	4 851 448 320	
7	2016	3 975 491 520	1 098 789 120	5 074 280 640	

Source : the author's work

Table 5: Recommended combinations of percentage health care premium rates

Administrative costs q_j (%)	$I^*_{L(IPo)}$ (%) with $I^*_{L(APo)} = 14\,\%$	$I^*_{L(IPo)}$ (%) with $I^*_{L(APo)} = 13\,\%$	$I^*_{L(IPo)}$ (%) with $I^*_{L(APo)} = 12\,\%$
8	3.36	4.37	5.38
4	2.71	3.72	4.73

Source : the author's work

All data were processed by the same methodology so they are comparable and we can used them to derive the optimal premium.

Results of our calculations showed in tables 3 and 4 consider that total health premium was paid by all subjects in the full amount of 100 % like it is stated in the Act. From the last column, one can see that total described health insurance premium is 12 % higher than total health care expenditures from public resources.

Health insurance companies declared administrative costs at the level of approximately 4 % of total health premium in their annual reports.

Table 5 represents our main result as our recommendation on statement of health care premium rate. Based on these results, we suggest new, more suitable health care premium rate not only for economically inactive population, but also for economically active population. Individual numbers point out that percentage health premium rate would be lower as opposed to those currently in force.

For instance, if we assume administrative costs in the amount of 4 % (see Table 5, the 2nd row), we can suggest the first possibility of the insurance premium rate 14 % for economically active population and 2.71 % from the state budget for economically inactive population. The same, if we assume administrative costs in the amount of 8 % and the insurance premium rate of economically active population in the amount of 14 %, the state would be paid for economically inactive population the insurance premium rate in the amount of 3.36 %. Similarly, other appropriate possibilities are described in Table 5, in the 3rd and 4th column.

4. Conclusion

The main goal of our paper was, based on macroeconomic indicators, to identify appropriate health care premium rates for economically inactive, as well as for economically active population in Slovakia. Our paper represents preliminary discussion and our results have a recommendation character.

With respect to political and economic situation in Slovakia, we think that the situation which is described at the third column, where the premium rate for economically active population is in the amount of 13 % and for economically inactive population in the amount 3.72 %, would be feasible.

In the future, we plan deeper study and investigation of health care insurance. Our inspiration is in high level quality papers, for example Courtemanche, Ch., Marton, J., Ukert, B. et al. 2017, Burkhauser, R. V. Larrimore, J., Lyons, S. 2017, Newhouse, J. P., Normand, Sh. L. T. 2017, Reid, L. 2017 and Crowley, R., Kirschner, N., Dunn, A. S. et al. 2016.

Another issue that could be worth of our interest in future is modeling according to The International Journal of Health Care Quality Assurance (IJHCQA) that provides a forum for current thinking on the theoretical and practical aspects of quality and management in health care and helps to develop and continuously improve health care organisations. This journal offers a definition of quality within the context of health care, examines managerial and planning methods and discusses the implications of introducing and maintaining quality initiatives.

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