

THEORETICAL AND PRACTICAL APPROACH REGARDING DENSITY AND PENETRATION INSURANCE ON ACCIDENT & HEALTH PREMIUMS

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In this paper is realized an theoretical and empirical approach regarding density and penetration on accident & health premiums. The analysis is performed on a sample of 33 countries and a horizon of 5 years (2004, 2005, 2006, 2007 and 2008), being tested 2 linear regression models. The results of study confirm a relationship between level of economic development and accident & health insurance activity insurance, but exclude the existence of the relationship between penetration factor and this type of insurance.

Keywords: insurance, accident & health premiums, density, penetration

JEL codes: G22, H51, H89

1. Introduction

The impact of the economic crisis has materialized in the stagnation of the volume of subscribed insurance premiums in general, and of accident & health insurance premiums especially. The most pressing problems are those related to legislation at the European and national level. Also, the implementation of health reform in some countries, the continuation of pension reforms, insurance deductibility and solvency requirements are a few of the other problems which must be solved in the future.

According to the Solvency II Directive, the Solvency Capital Requirements (SCR) correspond to the economic capital needed to limit the probability of ruin to 0,5%. That's why, insurance and reinsurance undertakings must identify their overall loss distribution. In order to determine the Solvency II economic capital, each company can use the standard formula or an internal model (global or partial). Internal model, calibration of SCR, MCR (Minimum Capital Requirement) and technical provisions, different set of premium and reserve risk etc. represent major problems for the European Commission (EC). That's why, on April 15, 2010 the EC released a draft technical specification for QIS 5 (Fifth Quantitative Impact Study), in which Romania was invited to participate (after its participation on QIS 4).

On April 8, 2010 the Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS) provided Consultation Paper 72 "Draft Level 2 Advice on Calibration of the health underwriting risk" defines efficiency indicators for health insurance. This paper supplied the propose calibration of the health underwriting risk module (premium and reserve sub-module). With this consultation paper, CEIOPS has endeavored to establish the increased market transparency through greater disclosure and reporting requirements, according Pillar III of Solvency II.

The preparations made by the Romania for the implementation of the health reform and the importance of insurance sector to economic growth represent the two main arguments of our

choice for the subject of this paper. In addition, EC considered that the premium risk and reserve risk stresses for accident and sickness obligations remain higher on European level.

2. Fundamental concepts of insurance density and penetration

The situation of the insurance market can be appreciated by using quantitative and qualitative indicators, among the latter the most important being the density and penetration.

Insurance density is expressed as the ratio between the total direct gross premiums collected and the total number of the inhabitants (population) of that country, expressing the average per capita.

Penetration of insurance is a synthetic indicator. It shows the contribution of insurance sector to the creation of GDP (gross domestic product). It is calculated as the ratio between the amount of direct gross premiums and GDP.

So, density and penetration ratios are two important indicators which demonstrate the efficiency of the insurance in general. We propose to use these indicators for the field of health insurance. In order to determine their values we use only accident & health premiums, GDP and population on the level of one country in a certain year under study. Several studies were conducted to uncover the relationship between them and other factors. The results were influenced by the application of health reform in some countries. Also, the development of insurance industry and wage changes influenced the conclusions made by the specialists. We present some of these studies available to us in the next section.

3. Literature review

Density and penetration insurance continues to be interesting subjects for specialist's researches.

For example, Enz (2000) proposed the S-curve relation between per-capita income and insurance penetration. The results of Ma & Pope (2008) study show a positive relationship between international insurer participation and increased insurance penetration and density. Their empirical results imply that a strong presence of international insurers may enhance the importance of the insurance industry and increase the demand for insurance products within a given national market.

On the other hand, Zheng *et al.* (2009) proposed a new method, Benchmark Ratio of Insurance Penetration (BRIP) for comparing insurance growth across different countries, which not takes into account the overall scale of the insurance market of each country but also considers the population, economy and the relationship between the insurance penetration and stage of economic development.

Regarding our country, Badea & Novac (2008) believes that the continuous improvement of the insurance premiums, the insurance density and the insurance penetration rate support the importance of this sector of activity in the total economy. As the Romanian market became more sophisticated, the offer became more stable and the concentration of the market began to reduce itself as a response to the European insurers that entered our market.

The growth of health insurance is strongly correlated to the health reform applied in different countries. The appearance of health private insurance and the application of different characteristic schemes were generated and led to amendments and wage changes. These problems were also investigated by the specialists.

Buchmueller & Liu (2006) explored the effect of state-level underwriting reforms on health maintenance organizations (HMO) penetration in the small group health insurance market. They identified reform effects by exploiting cross-state variation in the timing and content of reform legislation and by using mid-sized and large employers, which were not affected by the legislation, as within-state control groups. The results of their study suggest a positive relationship between insurance market regulations and HMO penetration.

Danuletiu & Danuletiu (2006) inquired the evolution of Romanian insurance market and highlighted trends that characterized it (such as density and penetration ratio). Vistnes *et al.*

(2006) has explored the nature of employer decisions with respect to the employee premium contributions used for family health insurance coverage.

Scintee and Vladescu (2006) examined the health financing reform in Romania in order to find out to what extent the expected results were achieved, what were the main factors that influenced the reform process and in what way the main unsolved problems are to be sorted out.

Knott & Rich (2006) provide an overview of the development of the private-public, segmented health care system in the United States. They examined health policy by analyzing political values and institutions, which allows them to assess the strengths and weaknesses of the health care system and serves as a basis for recommending politically feasible options for reform in the future.

Schneider *et al.* (2007) quantify the extent of market concentration among physician organizations (POs) and health plans (HPs) and examine the relationship between concentration and prices.

Sen & Madheswaran (2007) shows in their study that GDP and Per capita GDP are often highly correlated with the proxy variables measuring insurance demand – density and penetration.

4. Hypotheses, variables and data sources

As we explained in the previous section, the level of economic development is connected to the health insurance market. Therefore we issue the following hypothesis:

H: The level of economic development is positively associated with health insurance.

Since we are interested on the effect of several economic factors on life insurance activity, we developed the following variables:

- Proxies for insurance activity: *density of accident and health premiums* computed as Accident and health premiums subscribed / Population (EUR/inhabitant) and *penetration of accident and health premiums* computed as Accident and health premiums subscribed / GDP (%)

- Proxy for level of economic development: *GDP per capita* (EUR/inhabitant).

The underlying econometric model is:

$$\text{Insurance activity} = \alpha_0 + \alpha_1 \text{Level of economic development} + \varepsilon$$

which can be expressed in the following two models:

$$\text{Density} = \alpha_0 + \alpha_1 \text{GDP per capita} + \varepsilon \quad (\text{Model 1})$$

$$\text{Penetration} = \alpha_0 + \alpha_1 \text{GDP per capita} + \varepsilon \quad (\text{Model 2})$$

Our sample comprises 33 European countries. To enhance the robustness of the research we collected data for 5 years (from 2004 to 2008) the source of data being <http://www.cea.eu>.

5. Data Analysis and Discussion of Results

For the analysis of our data we used SPSS 16.0 software. Since we lack the necessary space here to discuss the technical issues related to the analysis (please see Table 1 for these details), we explain the steps as we generated the findings.

According to our findings, GDP per capita is positively associated with the insurance activity proxies on various significance levels as t-values are positive, but the computed significance is acceptable only in years 2004 and 2005, as Panel A and B shows below. This influence cannot be statistically proved in the years to come (2006, 2007 and 2008) due to the scattered data; the reason we believe is the sample size, which is too small for this type of analysis.

Table 1. Results generated

Panel A. Model 1					
	2008	2007	2006	2005	2004

<i>Adj R²</i>	0.041	0.031	0.040	0.156	0.184
<i>t</i>	1.516	1.406	1.514	2.597	2.826
<i>(Signif.)</i>	(0.140)	(0.170)	(0.140)	(0.014)	(0.008)
<i>Expected sign</i>	+	+	+	+	+

Panel B. Model 2

	2008	2007	2006	2005	2004
<i>Adj R²</i>	0.005	0.002	0.003	0.048	0.072
<i>t</i>	1.079	0.955	1.046	1.600	1.850
<i>(Signif.)</i>	(0.290)	(0.347)	(0.304)	(0.120)	(0.074)
<i>Expected sign</i>	+	+	+	+	+

According to model 1 GDP per capita is associated with Density. Our findings confirm that the relationship is positive in the entire period as expected ($t > 0$), but the significance of this relationship can be proved only for the years 2004 and 2005 (level of significance is 0.014 and 0.008 respectively). Based on this model the hypothesis may be accepted.

Model 2 expresses the relationship between penetration and GDP per capita. Our findings suggest there is some relationship between these factors, but the strength of this influence is rather low. The results show that only in year 2004 there is an acceptable significance level for the t-value (0.074). Therefore, this model does not provide empirical evidence for our hypothesis, which should be rejected based on these results.

However, on the basis of model 1 we accept the hypothesis that the level of economic development is positively associated with accident & health insurance with the amendment, that this relationship must be more deeply explored in the last three years in order to obtain more relevant statistical data.

6. Conclusions

The current financial crisis shows that the parameters for certain risk categories need to be adjusted, complex corporate structures and investment strategies examined in detail. Insurance domain is influenced by this crisis.

Financial services organizations face yet another major challenge in the European Union's new directive for insurers. Solvency II will have a profound influence on capital budgeting and risk management for these undertakings. Insurers should perform additional multi-period calculations for truly optimize their risk, because solvency capital requirements become higher according to substantially stress parameters proposed by QIS 5.

Implementation of health reform in some European countries transforms accident & health insurance in the European topical issue at this moment. Even if, nowadays, it represents an insignificant part of insurance activity, we believe that it will have a positive evolution in the future. For define efficiency in insurance activity we can use some indicators, among which density and penetration are very important.

According to Consultation Paper of CEIOPS 72 "Draft Level 2 Advice on Calibration of the health underwriting risk" insurance penetration is used to measure the degree that a certain insurance product (covering individual or group risk) is acquired in the population. Health underwriting risk are split into 3 categories:

- Health insurance obligations pursued on a similar basis to that of life insurance (SLT Health);
- Health insurance obligations not pursued on a similar basis to that of life insurance (Non SLT Health);
- Health insurance obligations Catastrophe risk (Health CAT).

Differences in laws and in organization between public and private health systems across Europe have consequences on the variety of the types of products offered in each member state. These country specificities would be best captured by the allowance of entity specific parameters in the calculation of the health risk charge.

CEIOPS is aware of the diversity that characterizes health system across Europe. That's why it is taking into account the specificities of the different regimes. The result of this understanding is the comprehensive pool in health insurance.

In our study, we proposed to analyze the relationship between level of economic development and accident & health insurance activity. Our empirical findings suggest that there is a positive relationship between these factors (results for model 1 in Table 1). The results however could not be confirmed by model 2 for the penetration factor (which is another proxy for accident & health insurance activity), which is obviously one of the limits of this paper. We are aware that this study must be extended to other countries, possibly other years in order to increase the robustness of the conclusions, which is also our recommendation for further research.

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