DENSITY AND PENETRATION INSURANCE ON ACCIDENT & HEALTH PREMIUMS IN FUTURE IMPLEMENTATION OF SOLVENCY II – EMPIRICAL STUDY

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Abstract
The purpose of this paper is to present an empirical study regarding density and penetration on accident & health premiums. At the beginning, we have presented the motivations of this research, highlighting and explaining the specific factors which influence the density and insurance penetration. Implementation of Solvency Directive at European level, in the field of insurance is through specific consequences. The changes made to accounting legislation at national, European and international level, with consequences on specific information presented in the financial statements of insurance companies, was another reason of our research. The appearance of the IFRS 4 “Insurance contracts”, followed by its evolution phases allowed the creation of XBRL’s in as the international standard of publication, exchange and financial analysis of data reported. Also, we cannot forget that the legislative changes in accounting have interesting consequences on economic risk management specific to this field, in terms of huge efforts from national and European supervisory authorities to control and prevent the bankruptcy of its firms. For planning and implementation of supervisors’ measures, the important tasks were established by the quantitative impact studies, the stress tests and the analyses of different scenarios, all performed in insurance companies. Thus, we conduct an analysis on a sample of 32 countries and a horizon of 10 years (2004-2013), being tested 2 linear regression models. The results will confirm the link between level of economic development and accident & health insurance activity, but exclude the relationship between penetration factor and this type of insurance.

Key words: Insurance, Accounting, Time-series models, Government expenditures and health, Financial risk and risk management

JEL Classification: G22, M41, C32, H51, G32

1. Introduction
The actual economic and financial crisis has substantially reduced the volume of gross written and earned premiums in general, accident and health premiums in particular. This result is amplified by problems at national, European and international level such as: legislation, health reform, pensions reform, insurance deductibility, solvency requirements, bankruptcy of companies. The Solvency Capital Requirements (SCR) correspond to the economic capital needed to limit the probability of ruin to 0.5% (according to the Solvency II Directive). So, 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). The EC has nominated CEIOPS (the Committee of European Insurance and Occupational Pensions Supervisors) - replaced by EIOPA (European Insurance and Occupational Pensions Authority) in January 2011 - as responsible for the development of the standard model calibration exercises. The purpose of these quantitative impact studies (QIS), started since 2005 and in which insurers are invited to participate on a voluntary basis, is to stimulate the calculation of solvency capital through the Solvency II standard model. There were 5 Quantitative Impact Studies and Romania participated in the last two.

Meanwhile, legislative changes on accounting and financial statements for the companies from this field took an important role. In fact, the consequences of these legislative changes have resulted in the accounting recording and disclosure required by supervisors, in order to maintain the needed solvency. Besides, EC considered that the premium risk and reserve risk stresses for accident and sickness obligations remain higher on European level.
Regarding Romania, the implementation of the health reform, of the IFRS 4 named "Insurance contracts" and all the accounting and fiscal legislation related to it, the importance of insurance sector to economic growth are the main arguments of our choice for the subject of this paper. In fact, this study is a continuation of our work started in 2009.

2. **Fundamental concepts of density and penetration insurance**

Quantitative and qualitative indicators can be used to appreciate the situation of the insurance market. Among of all, the most important are the density and penetration insurance. 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. Because density and penetration ratio demonstrate the efficiency of the insurance in general, we want to use these indicators for the field of health insurance. For the determination of their values, we use accident and health premiums, GDP, population and health benefit paid on the level of one country in a certain year under study. Many studies were conducted to reveal the relationship between them and other factors. The results of these studies were influenced by the implementation of health reform, the laws modifications, etc… We will present some of these studies useful to us in the next section.

3. **Literature review**

Density and penetration insurance are interesting topics addressed by specialists in the field. For example, Enz (2000) [8] proposed the S-curve relation between per-capita income and insurance penetration. The problems regarding insurance penetration are treated through the definition of this concept. So, life insurance penetration, defined as the ratio of premium volume to GDP, measures insurance activity relative to the size of the economy. Because it is the product of quantity and price, it is not a perfect measure of consumption. A larger premium volume might reflect a large quantity, a higher price, or a difference in the mix of mortality risk, savings, and annuity elements purchased. Lack of competition and costly regulation might increase the amount spent on insurance by raising its price, without implying higher insurance consumption. Closely related to insurance penetration is another concept, (life) insurance density, which is defined as premiums per capita. This measure shows how much each inhabitant of a country spends on insurance on average, expressed in constant dollars. Although both life insurance penetration and life insurance density use gross premiums, important differences remain between the two measures: life insurance penetration measures life insurance consumption relative to the size of the economy, whereas life insurance density compares life insurance consumption across countries without adjusting for income. That is why, Beck and Webb (2003) [1] considered that consumers who purchase life insurance policies to insure their dependents against mortality risk will potentially buy more coverage and thus a higher face value in richer countries, because the death benefit has to replace a large income. Life insurance is a form of insurance coverage that pays out premiums to the insured or their specified beneficiaries upon a certain event, for instance, the death of the individual who is insured. The development of the life insurance market is playing an increasingly substantial role within the insurance industry. Chen et al. (2005) [4] have found that there is a relationship between the development of the life insurance market (using penetration and density measures) and economic growth within the context of various conditional factors that possibly have the potential to influence such relationships.

Besides this relationship, some specialists explored the effect of state-level underwriting reforms on health maintenance organizations (HMO) penetration in the small group health insurance market. The results of study made by Buchmueller and Liu (2006) [3] suggest a positive relationship between insurance market regulations and HMO penetration. Romanian researchers examined the evolution of Romanian insurance market through density and penetration ratio (Danuletiu and Danuletiu, 2006) [7], while others (Scintee and Vladescu, 2006) [19] analyses 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. Insurance problems studied through density and penetration affected other countries. Thus, China is in the midst of the transition from planned to market economy, from closed economy to open economy. Regarding life insurance, such variables as population count, per capita GDP, total savings deposit, education attainment, telephone ownership per capita, social welfare expenditure and young dependency ratio are found significantly related to the life premium volume written in a given city. The insurance density is verified to be significantly affected by the following factors as population size, per capita GDP, wage level per capita, private savings deposit per capita, number of telephones per capita, young dependency ratio and aged dependency ratio. For the coastal, the central and the western areas in China, Zhang and Zhu (2008) [21] believed that the insurance penetration is significantly influenced by market structure and social welfare expenditure. On the other hand, Subir (2008) [20] considered that GDP and Per-capita GDP are often highly correlated with the proxy variables measuring insurance demand: insurance density and penetration. Beck and Webb (2008) [2] appreciated that life insurance in force is a stock variable, indicating the outstanding face amounts plus dividend additions of life insurance policies, while life penetration and density are flow variables, indicating the amount spent on life insurance premiums, relative to GDP or per capita.
A large body of literature attempts to explain the determinants of life and non-life insurance purchase across nations. Researchers have mostly focused on economic, demographic and institutional variables and shown – like Park and Lemuire (2009) [18] - that high income per capita, low inflation, political stability, a developed banking sector and good protection of investors and creditors, are conducive to higher demand for insurance. Every step taken in insurance evolution is closely tied by legislation. Differences in laws and in organization between public and private health systems across Europe have consequences on the variety of types of products offered in each member state. That is why, Fekete et al (2010) [9] concluded that these country specificities would be best captured by the allowance of entity specific parameters in the calculation of the health risk charge. Economic and financial events taking place in the world affects the evolution of insurance. It is mainly the current financial and economic crisis that we all go through. The global financial crisis did not have a direct negative impact on the insurance market in Montenegro, but rather the indirect one that may be identified in purchasing power of citizens, decrease in the lending activity of the banks and through possible recession. In this regard, Novosić et al (2011) [17] believed that the development of Montenegro insurance market depends primarily on macroeconomic and social indicators, such as insurance penetration and insurance density, which recorded permanent growth in the period 2002–2009.

Gupta (2011) [10] considered that a study of general insurance penetration and density reveal that on an international platform, the developed nations are the pioneers. At the same time an evident market saturation of developed countries reflect the need of innovation for such a market. Kharbeswar and Rajeswari (2012) [11] observed that societies in which the standard of living has been steadily improving experience a higher insurance penetration. Market competition exerts a very positive influence on market expansion, life insurance penetration as well as insurance density. In India, while the economy in general have registered significant growth, life insurance is not left behind with a strong positive correlation between GDP and life insurance penetration and between GDP and life insurance density. Life insurance penetration and life insurance density increase (in 14 countries in Central and South-Eastern Europe over the period 1998–2010) with higher per-capita income. The results imply that real interest rates do not have a robust link on life insurance density. Positive impact of real interest rate on the life insurance penetration in the selected countries may indicate the awareness of potential consumers about the benefits of life insurance and negligence to the mortality risk coverage. Inflation appears to have a negative influence on life insurance demand, which is widely supported by previous researchers. Therefore, Kjosevski (2012) [12] demonstrated that the macroeconomic stability plays an important role in the development of life insurance market. From the demographic factors it is find that higher level of education lead to a higher life insurance penetration and higher life insurance density.

Matei and Mihart (2012) [15] appreciated that the penetration degree of private health insurance in Romania was expected in 2012 to reach the average value in Europe of 0.72% (CEA, 2008), outrunning the penetration degree in countries as Austria, France, Italy and Great Britain. Also, the density of private insurance was 172, 82 lei, representing 804% (INSSE) of the gross average yearly income, a value which were not expected to have a negative impact on personal expenditure. The insurance penetration and density rate in Malaysia is relatively low compared to other Asian countries. Given the different effects of socio-demographic and economic factors on the likelihood of purchasing life insurance and the quantity of life insurance policies, Loke and Goh (2012) [13] believed that the insurers will have to strategize their market expansion and penetration plans differently. Nagy (2012) [16] revealed that the latest trends in the evolution of developed countries that are members of the EU (Germany, England, France, and Spain) have demonstrated that the strengthening of the insurance market can be done only by reforming the public health insurance and pensions systems. In Romania it began with reforming the pension system, the health system being delayed, trying to strengthen the public health insurance system. Due to these factors we may say that we have the lowest penetration degree of life insurance in the EU. Ćurak et all (2013) [6] demonstrated in their study that the life insurance demand is influenced by various economic, institutional, social and demographic factors. According to the main indicators, life insurance market in Croatia is still underdeveloped compared to the market of Western Europe. However, life insurance penetration and density were higher than in Central and Eastern Europe, in the last year. Manoj (2014) [14] believed that, after reforms, India's life insurance industry grew at more than tenfold in terms of business, number of new policies etc. Even the Indian insurance penetration has increased in 2010, the insurance density in India was very low in the comparison of developed nations.

For the insurance field, Ciottina (2014) [5] considered that the obvious effects of the crisis, besides the financial problems, consisted in higher liquidity and insolvency risks. These aspects are approached based on the principles that constitute the regulations of Solvency II. After multiple delays, Solvency II will be compulsory for the entire Romanian market and will determine numerous changes for insurance companies.

4. Solvency Directive and IFRS 4 "Insurance contracts"

In 2004, the European Committee of regulators and supervisors from insurance and occupational pensions (EIOPC) proposed draft directive on solvency. This directive 2009/138/EC named Solvency Directive was approved by European Parliament on 22 April 2009, and on 5 May 2009 by the ECOFIN Council (Economic and Financial Affairs Council). The purpose of Solvency was to identify solvency requirements to reflect risks specific to insurance companies. The new solvency of insurance companies is intended to be a guarantee of the existence of the minimum capital to support the activities undertaken during the economic-financial crisis of recent years. Because the solvency calculation taking into account the risks related to the company's assets and liabilities, provisions made, is or not
deductible expenses when estimating the taxable income according to the legal regulations of that time period. Solvency Directive has two phases. Compare to Solvency I which used retrospective approach, new Solvency II regime is used the risk-based approach. The transition from Solvency I to Solvency II generates significant changes for both the insurer and the insured, which are shown in the figure below (Figure no 1). We emphasize that the differences between Solvency I and II are shown only through the information on specific assets and liabilities.

Solvency II, as a risk-based solvency framework, covers quantitative financial requirements, supervision and disclosure. It has three pillars which are presented on the figure below (Figure no 2).

These pillars of Solvency II was prepared by EIOPA and the valuation principles of Solvency II Directive are intended to be extend according to developments of international accounting. In 2013, EIOPA cooperated with ESMA (European Securities and Markets Authority or the European Securities and Markets Authority) and EBA (European Banking Authority) for shaping the vision of the common cross-cutting issues related to accounting and IFRS implementation. Supervision of accounting developments affecting insurers, reinsurers, insurance intermediaries,
occupational pension providers and financial conglomerates, allows EIOPA involvement in EFRAG work in accounting for insurance contracts, financial instruments and consolidations of specific investment entities. All with EFRAG activity is based on observations and proposals made by the IASB, on its projects.

The exercise for 2015 commenced with an assessment of EIOPA’s strategy, which was restructured into five strategic goals [22], which are:

- to ensure transparency, simplicity, accessibility and fairness across the internal market for consumers (in order to achieve these, two important legislative files will dominate the work, namely the regulatory requirements related to the recast Insurance Mediation Directive “IMD2” and the Regulation on Product Information Documents for packaged retail and insurance-based investment products “PRIIPs” and the associated request(s) for advice on delegated acts and/or drafting of regulatory technical standards);
- to lead the development of sound and prudent regulations supporting the EU internal market (in order to achieve this, EIOPA together with the International Association of Insurance Supervisors - IAIS - will develop of high quality common standards and practices contributes to a common supervisory culture and to the development of a single rulebook in the field of insurance);
- to improve the quality, efficiency and consistency of the supervision of EU insurers (in order to achieve this, EIOPA will enhance the quality and consistency of national supervision, strengthening oversight of cross-border groups and helping national supervisors to deliver effective supervision);
- to identify, assess, mitigate and manage risks and threats to the financial stability of the insurance and occupational pensions sectors; and
- EIOPA to act as a modern, competent and professional organisation, with effective governance arrangements, efficient processes and a positive reputation.

In the field of insurance accounting, in 2005, EU implemented the use of IFRS (International Financial Reporting Standards) for exchange-listed companies. EIOPA - European Body watched and worked with the European Financial Reporting Advisory Group (EFRAG) to implement IFRS, thereby supporting the IASB (International Accounting Standards Board) activity on accounting. So, all major economies have committed to adopt IFRS and/or worked to convergence to it. In 2009, G-20 leaders emphasized their support to a global accounting standard, so this is why the IASB (International Accounting Standards Board that develops IFRS) and its counterpart in USA (FASB) started a substantial convergence work. IFRS 4 "Insurance Contracts" (Phase 1 and Phase 2) and IFRS 9 "Financial instruments” are two standards that are currently under development by IASB and has and will have a major impact on insurance domain. So, in the figure below (Figure no 3) we present the main accounting standards compared to solvency regulations.

Figure no. 3 Main accounting standards and risk-based solvency/funding regulations
(Source: [25]

IASB, recognizing the importance of specific insurance activities decided its involvement in accounting in May 2002, in two phases. The first phase includes IFRS 4 "Insurance contracts" in extensive sense, IAS 32 "Financial Instruments - Presentation" and IAS 39 "Financial Instruments – Presentation and Evaluation". Instead, Phase 2 aimed mainly the liabilities evolution of the insurer. The International Financial Reporting Standard included accounting provisions apply to contracts of specific insurance companies, firms should submit the detailed financial reporting on these types of contracts. The implementation of IFRS 4 allows the creation of XBRL’s in as the international standard of publication, exchange and financial analysis of data reported. Because we appreciate that the accounting rules and solvency regulations has together an important role to the development of insurance sector, we present in our paper, summarily, these aspects. In Romania, in October 2006, the Insurance Supervisory Commission approved a new strategy (accepted by the Financial Reporting Council), which was imposed on companies (including insurance) listed or to be listed on the stock market as from 1 January 2007 to adopt IFRS in the insurance field. Regarding insurance premiums for accident & health and specific provisions, we must emphasize the need to establish and maintain their deductibility in accordance with tax regulations. In our country, many legislative changes relating to the deductibility discourage insured and reduce the volume of premiums written and collected, even when the insurance companies applying IFRS. These results generated the idea that against insurance business in general, density and penetration insurance in particular, operates a number of factors, summarized in the next section.
5. Specific factors which influence the density and penetration insurance

Upon density and penetration insurance operates several factors (at national, European and international level) such as:

- Economic factors that ensure economic security (gross domestic product per capita, inflation, unemployment, the level of foreign exchange reserves, external debt, quality of life, existence and the prevalence and specific development of computer and information systems, public access to communication, the extent to which insurance companies has their specific risks – at company, insurance market and economy levels);
- Other factors (urbanization, market concentration, education, environment, law, culture, religion, politics, demographics, etc…)

Since the purposes of our work not have been the explanation of specific factors which influence density and penetration insurance, we have not detailed the above presentation. The level of economic development is connected to the health insurance market. So, in the next section, we explain our hypotheses, variables and data sources.

6. Hypotheses, variables and data sources

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:

- Proxy 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:

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

this can be expressed in the following two models:

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

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

Our sample comprises 32 European countries and we collected data for 10 years (from 2004 to 2013) the source of data being http://www.insuranceeurope.eu/facts-figures/statistical-publications/european-insurance-in-figures [23]

The 32 states whose data were analyzed in our study were: Austria, Belgium, Bulgaria, Switzerland, Cyprus, Czech Republic, Germany, Denmark, Estonia, Spain, Finland, France, Greece, Croatia, Hungary, Ireland, Iceland, Italy, Liechtenstein, Luxembourg, Latvia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Sweden, Slovenia, Slovakia, Turkey, United Kingdom.

7. Data Analysis and Discussion of Results

For the analysis of our data we used SPSS 16.0 software and in Table 1 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 in years 2004 as Panel B shows below. This influence cannot be statistically proved in the years to come (2006, 2007, 2008, 2009, 2010, 2011, 2012 and 2013) due to the scattered data. That's why we believe is the sample size, which is too small for this type of analysis.

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<td>Adj R²</td>
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<td>0.041</td>
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<td>0.031</td>
<td>0.040</td>
<td>0.156</td>
<td>0.184</td>
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<td>t (Signif.)</td>
<td>1.503</td>
<td>1.521</td>
<td>1.523</td>
<td>1.528</td>
<td>1.489</td>
<td>1.516</td>
<td>1.406</td>
<td>1.514</td>
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<td>Adj R²</td>
<td>0.005</td>
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<td>0.005</td>
<td>0.002</td>
<td>0.003</td>
<td>0.048</td>
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<td>t (Signif.)</td>
<td>1.095</td>
<td>1.097</td>
<td>1.098</td>
<td>1.085</td>
<td>1.070</td>
<td>1.079</td>
<td>0.955</td>
<td>1.046</td>
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<td>(0.340)</td>
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<td>(0.344)</td>
<td>(0.310)</td>
<td>(0.277)</td>
<td>(0.290)</td>
<td>(0.347)</td>
<td>(0.304)</td>
<td>(0.120)</td>
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<td>Expected sign</td>
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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 0.008 and 0.014 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 in the year 2004, there is 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.

8. Conclusions, limitations and perspective of our research

In our study, we proposed to study 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 recognize the limitations of our study that is why we intend to extend our research to other states from different continents. We also want to issue another hypothesis regarding the connection could exist between health benefits paid and total insurers' investment portfolio.

9. Bibliographical references


