

**Financial and Banking Services Market**

Lada SHIRINYAN

**COMPETITION AT GERMAN INSURANCE  
SERVICE MARKET  
OVER PERIOD 1999–2010****Abstract**

Author investigates the competitiveness in the German insurance industry of last decade in details, based on the multifactorial determination of the indexes of insurance market. It is compared the data and quantitative indexes for insurance markets of different countries. The results of the analysis indicate that German insurance market has high economic performance and at the same time it is not perfectly structured and distributed. The developed method represents the scientific approach application in the efficient monitoring system of authorized bodies. Work is the result of scientific fellowship of the author in Germany within the framework of the Ukrainian-German collaboration.

**Key words:**

Insurance market, competition, Herfindahl–Hirshman index, concentration, competitiveness, saturation degree, capitalization limits.

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## 1. Introduction

The major economic objective of the European Union (EU) is the creation of a single European market for financial services where the insurance is one of the major economic activities which represent nearly 5–10% of GDP in most European countries. The aim is to allow people, goods, services and capital to move freely among the Member States [1].

Despite the mentioned importance, the problem of complex assessment of competitiveness level in the world insurance markets is still insufficiently investigated. The scientific literature has a lack of studies concerning this issue in a complete form. In most existing economic analyses, only the development of specific aspects of this science problem are discussed: the effect of globalization on international insurance markets [2–3], relative importance of an insurance market to an economy [4], international insurers' participation in foreign markets [5], market concentration on Herfindahl–Hirshman index [6], the dependence of the demand for insurance on the demographics and gross domestic product per capita [7], competition based on premium income, insurance density and penetration [8], barrier relevant to both interstate and international insurance [9], competition of insurance industry based on assets structure [10], intercountry comparisons [11], market structure [12–13], regulation change [14], scale and slope economy [15–16].

It is worth noting that there are many other implications. For example, one of the problems is that the different country (and EU) supervisors define the competitiveness on different bases, resulting in different interpretations. This leads to multiplication of effort and confusion, which means that the EU regulatory structure is not enough efficient. To solve them, one must have real picture of the market competition. In this respect the problem is similar to the one for Ukrainian insurance market. For Ukraine the problem was partially discussed by scientists: G. Azarenkov, L. Antonyuk, A. Galshinsky, O. Gamankova, V. Geets, A. Poruchnik and others [17–18]. Without objecting to the significance of available research results, one can certify that there is no generally accepted system approach of European authority. It is necessary to develop the modern methods of the assessment of insurance market competitiveness and to give practical recommendations as to the possible usage of the unified methodology for the application of efficient strategy of subjects' interaction in the insurance service market. Our paper is based on descriptive statistics and is applied for German insurers. We aim to give the complex estimation of the competitiveness of German insurance market.

## 2. The methodology of competitive environment assessment

In present work we developed unified method the system of quantitative estimates and criteria which include such approaches [19]: the territorial aspect and scales of insurance service market, the determination of insurers' density and compactness of branches; the analysis of the openness character of insurance services; the investigation of the penetration/capacity and service importance; the analysis of insurance premium density, specific and average insurance premiums; the analysis of the monopoly state of insurers; the analysis of the competitiveness degree; the integrated competitiveness assessment; the study of the saturation degree; the determination of the entry and exit barriers; the determination of the insurers' capitalization limits.

The unified method may be considered for «life» and «non-life» insurance separately and jointly. The traditional way is to separate «life» and «non-life» insurances. As for Germany shown here as example country we discuss the «non-life» insurance consisting of two subgroups: 1) property and casualty insurance (motor, property, liability, accident, legal expenses, marine, nuclear) and 2) health insurance. The German «life» insurance in our case is seen in traditional narrow sense, that is without pensionskassen, death benefits funds, pension funds. The data and calculations for whole German insurance market, called in the text «total», include all existing activities and the reinsurers. Hereby the all presented results are related to the companies under the federal and state supervisions (excluding German land supervisions).

We took data for Germany from different sources including annual/official reports of the companies, government authorities official data (such as Federal Statistical office, Federal Financial Supervisory Authority called BaFin, Deutsche Bundesbank called in the following DBank and others), websites of research companies, independent and companies experts (mainly investor relation departments), scientific publications and industry profiles (due to German Insurance Association called in present work as GDV) and market research firms (such as private publishing companies Hoppenstedt and Datamonitor specialized on collecting business data and basic information and balance sheet data for individual companies) as well as special committee of European Union of cooperation and development (OECD).

**Territorial aspect and insurance scale.** A measure of the premium income size of the ten/twenty biggest insurers in country's insurance industry is indicative for competition inside the country and scale effect in the insurance field. Hereby, we present only German part of premiums of each group in 2010 (in billions of euro): ALLIANZ Deutschland (27,74), GENERALI Deutschland (14,85),

ERGO Versicherung (13,92), DEBEKA Gruppe (11,52), AXA Gruppe (10,26), R+V Gruppe (9,45), TALANZ AG (8,79), BAYERN Versicherungskammer (6,30), ZURICH Gruppe Deutschland (6,14). In terms of premiums the first biggest groups are ALLIANZ Deutschland, ERGO Versicherung, GENERALI Deutschland and DEBEKA.

In absolute values UK's and Germany's property/casualty insurance sectors are the largest in Europe. At the European level Germany has nearly 16% of volumes in absolute premium income and ranks the fourth position [20].

Despite the difficult capital market conditions seen in 2008 and 2009, the German insurance sector remained very stable. The effects of the financial and economic crisis on premium income were relatively slight and can be seen only for one group called Talanz AG. Data yields the nominal increase of premiums in last decade: the growth rate for whole German insurance market is found nearly 2.1% every year (from 150 millions euro in 2003 up to 179 millions euro in 2010), the average inflation rate per year was 1.5% for the same period [21–26]. For example, in 2010 German insurers generated nearly 90.4 billion euro in premium income in the «life» sector, 33.3 billion euro – in the health sector and 55.3 billion euro in the property/casualty one [26].

Premium income sizes of each country's insurance industry may be indicative of the existence of economies of scale which will allow the industry to operate with lower unit costs. That is why the analysis includes as well the distribution of the whole world and European markets of insurance services and place of Germany in them. At present time it is following: America – 34.9%, Europe – 41.4%, Asia – 20.7%, Africa – 1.5%, Oceania – 1.6%. The distribution for leading countries is following: USA – 30% of all world insurance premiums, UK – 11%, Japan – 10%, Germany – 7%, France – 5%, Italy – 3%, Canada – 3% of world volumes.

**Density of insurers.** The main qualitative feature of competition is the availability of a wide choice provision of insurance services for a customer and the availability of a wide range of insurance products being offered by insurers. The main integrated index showing this is the density of insurers. We consider the density of insurers to be the ratio of company and population numbers in the country. Let us see it on the fact figures and compare them with corresponding data of the leading insurance countries. Let's count the density of companies in the insurance market as:

$$\rho = N / N_{pop}, \quad (1)$$

Here  $\rho$  – the density (number of companies per capita),  $N$  – the total number of insurers in the country,  $N_{pop}$  – the number of population of a country. The higher is the density the better is the competition in a country.

In average there are 10000 insurance companies in the USA, 850 companies in UK, about 800 companies in Russia, about 620 companies being regu-

lated by the federal control bodies in Germany, 480 in France, about 450 companies in Ukraine and 109 companies in China, 48 companies in Japan, 41 companies in Kazakhstan. The average values of density are: the USA – 1 : 28000, UK – 1 : 72500, Germany – 1 : 125000, France – 1 : 131000, Ukraine – 1 : 102500, Russia – 1 : 178000, Kazakhstan – 1 : 390000, Japan – 1 : 2000000, China – 1 : 12000000. Thus the simple algebra gives that there is a one company for 125 thousand persons in Germany. Although there are a large number of insurance companies operating in the EU, consolidation takes place. The number of companies had fallen from approximately 5000 to 4300 in the period 1990–2012. Further consolidation can be expected as a result of industry pressures. This has led companies to refocus and concentrate their business strategies. Such behaviour is also observed in Germany: the number of insurance companies under federal and state supervisions has fallen from 750 in 1990 to 716 in 2000 and then to 618 in 2010. The total number of all German companies under federal and limited to a particular region land supervisions had changed from 2700 in 1990 to 1480 in 2010.

**Openness character of the market.** Peterson and Barras discussing the General Agreement on Tariffs and Trade in the late eighties proposed that a country's competitiveness in a particular product could be indicated by the country's part in total of exports of the service product [27–28]. In a similar way one can define the import/export share in a insurance product. One can say that it is the premium-based index:

$$\varphi_Q = Q_{ex} / Q_{gen} \cdot 100 \%, \quad (2a)$$

Here  $\varphi_Q$  – the openness degree of insurance service market (in per cent),  $Q_{ex}$  – general volume of service import from the territories of other markets in terms of premium written,  $Q_{gen}$  – general volume of premiums in the insurance sector of a country.

Another coefficient of the international insurers' market share used here is the ratio of international insurers number  $N$  to whole insurers number  $N$  operating in the country:

$$\varphi_N = N_{in} / N \cdot 100 \%, \quad (2b)$$

Here  $\varphi_N$  – the openness degree based on the number of companies,  $N_{in}$  – total number of foreign companies at the market.

The indexes  $\varphi_Q$  and  $\varphi_N$  have definite criteria that allow to make an inference about the market state: for  $\varphi_Q$  and  $\varphi_N$  less than 10% the market is isolated.

Institute for Insurance Science of the University of Cologne determined the foreign share in 2000, that are the companies which are majority-owned by foreign companies and foreign branch offices in the German insurance market: 19.6% for the whole market (16.9% in 1993), 22.6% in «life» assurance (14.0%

in 1993), 13.9% in health sector assurance (23.1% in 1993) and 17.9% in property/casualty insurance (17.7% in 1993) [26].

Our calculations give the following: Due to GDV, DBank and BaFin premium-based data we should state the close character of the whole German insurance market. At the same time BAFin 2008 data based on the number of companies give the open degree  $\varphi_N$  balancing near 15% which can fall down the boundary of 10%. Different behaviour is observed by comparing the results based on DBank and OECD data: first gives the decrease of the openness from 11% in 2001 to 5.4% in 2007 whereas the second resumes increase the openness level from 14% to 21% for the same period [29]. The situation looks much more better if one researches the open degree  $\varphi_N$  of the «life» and «non-life» markets due to BaFin data whereas for whole insurance market we have the close type of the market in last two years. Most data give the common consent that influence of foreign sellers and providers is low.

**Penetration/capacity and importance of services.** Following Hardwick and Dou, we also propose to adjust the measure to remove distortions caused by differences in country sizes and degrees of openness to international trade. One can find the insurance penetration as a part of insurance market volume with respect to general GDP of the country [27]:

$$\eta = Q_{\text{gen}}/BB\Pi \cdot 100 \%. \quad (3)$$

Here index  $\eta$  is also called the level of insurance market capacity (in per cent).

Using the official statistic data for the latest decade the insurance penetration is found as about 7% for the whole German insurance market (Table 1). It shows that the insurance has significant influence on the regulation of risk situation in the country and is for this reason of great importance. One can see that the relation between premium revenue and gross domestic product decreased slightly in the period of 2006–2008. Total insurance penetration in Germany is above the figures of previous decades and the three time greater than in Ukraine, where  $\eta = 2\%$  in 2010 [19].

Table 1

Insurance penetration level (in per cents) in Germany versus time\*

Insurance branch	Year									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
«life»	2,96	2,95	3,02	3,11	3,08	3,17	3,17	3,07	3,03	3,31
«non-life»	3,40	3,59	3,71	3,81	3,84	3,84	3,73	3,61	3,58	3,78
Total	6,36	6,54	6,73	6,92	6,92	7,01	6,90	6,68	6,61	7,10

\* Source: own calculations based on official data [21–26].

For comparison, here are some values of insurance penetration of the world insurance markets for 2010: the highest capacity is in the South Africa – 15%, the lowest one is in Latin America – 2.4%. Many countries with transitional economics have much lower penetrations (Table 2). Thus, Germany's insurance penetration is average compared to other countries.

Table 2

**The penetration level in the different insurance markets of the World in 2010\***

Country	$\eta$ (%)	Country	$\eta$ (%)	Country	$\eta$ (%)	Country	$\eta$ (%)
Taiwan	14.2	Belgium	8.0	Spain	5.7	Mexico	2.1
UK	13.5	Italy	7.9	Poland	3.6	Georgia	2.1
Switzerland	10.5	Canada	7.5	China	2.7	Latvia	2.1
France	10.4	Germany	7.1	Russia	2.5	Lithuania	1.9
Japan	10.1	Australia	6.7	Ukraine	2.2	Kazakhstan	1.1

\* Source: own calculations based on the official data of countries and data [29–31].

**Insurance premium density.** The development level of insurance markets may be characterized with insurance premium sum being accounted per person or per insurer or per contract. In the first case, the index is called insurance premium density or premiums per capita and usually found by the formula:

$$\alpha = Q_{gen} / N_{pop}; \quad (4a)$$

The second index is the specific insurance premium value per insurer (the volume of insurance premiums divided by the number of the insurers):

$$\beta = Q_{gen} / N; \quad (4b)$$

The third index is the average insurance premium value per one contract (the volume insurance premiums divided by the number of contracts):

$$\gamma = Q_{gen} / N_{pol}. \quad (4b)$$

Here  $N_{pol}$  – the number of insurance policies at the market.

Nowadays under such conditions German residents spend an average 2000 euro on insurance each year, the price of the one «life» contract is nearly  $\gamma = 800$  euro, health contract –  $\gamma = 480$  euro and property/casualty one –

$\gamma = 200$  euro, most «life» insurers have premiums at the level of  $\beta = 740$  millions euro, health insurance undertakings –  $\beta = 620$  millions euro and property/casualty insurers –  $\beta = 260$  millions euro. The premium insurance density  $\alpha$  is found:  $\alpha = 980$  euro for «life» insurance;  $\alpha = 380$  euro for health insurance;  $\alpha = 725$  euro for property/casualty insurance [32].

Let's count the average values of insurance premium densities  $\alpha$  dated 2010 in some selected countries: the Netherlands – 4500 euro, USA – 2500 euro, France and UK – 3000 euro, Japan – 2800 euro, Germany – 2000 euro, Spain – 1300 euro, Poland – 300 euro, Turkey – 80 euro, Ukraine – 10 euro. Hereby the statistical data for 2009 yield the densities  $\beta$ : Japan – 7500 million euro; France, UK and Germany – 270 million euro, USA – 82 million euro; Ukraine – 5 million euro. However, Germany does not rank very highly on the international scale and corresponds to the average position.

Comparing the results of calculations for different branches and years and having in mind the growth rate of German *GDP* one can conclude: i) the increase of premiums as well and ii) the existence of nearly proportional dependence between the quantities  $Q_{gen}$  and *GDP*, iii) nearly zero effect of last financial crisis on German insurance industry in term of premiums. Concerning the last conclusion, one can note that whereas the number of contracts and premiums increase every year in each insurance branch the nominal cost of «non-life» contracts has been decreased starting 2004. It is worth noting that a main channel through which German insurance undertakings were affected by the last financial crisis was via their asset side investments: in 2008 the total «life» and «non-life» industry assets fell in the range of –8% and –5%, accordingly. Total aggregate premiums written in the «non-life» sector of most European countries had similar behaviour that is increased on average whereas five countries, namely Australia, Hungary, Ireland, Italy and Luxembourg, experienced a sharp drop of premiums in their «life» segment. Australia and Belgium reported as well in 2008 the highest decrease in assets in the «life» segment, down by 14% and 50% respectively [33].

**Monopolization degree.** Usually the concentration factor *CR* is used, being determined for the first three, four, five or ten the most powerful insurers of the market. For top four insurance undertakings:

$$CR_4 = K_1 + K_2 + K_3 + K_4, \quad (5)$$

Here  $K_i$  – the part of insurance premiums of *i*-th insurer (according to a number).

Ma and Pope discussed the presence of international insurers share and showed the statistical significance of the market concentration  $CR_5$  and the level of liberalization in a country's economy [7].

Under the condition of homogeneous distribution of the insurance services and equal sizes of *N* insurers operating on the market the theoretical approach defines the concentration  $CR_m$  as:



$$CR_{m,opt} = 100m / N, \quad (6)$$

Here  $CR_{1,opt} = 100/N$  for  $m = 1$ ,  $CR_{4,opt} = 400/N$  for  $m = 4$  and so on.

From this one can find the deviation of the real values of concentration from theoretical (shown further).

We calculated the concentrations in the German insurance market for the latest years in details and separately:

- for whole insurance market on group basis (Table 3A);
- for «life», health and property/causality insurances on individual company basis (Table 3B).

As one can see from Table 3A during the last decade the five largest insurance groups have the market share about 45 % and nearly 85 % of the German insurance market is covered by which twenty groups. Detailed calculations yield the results: 1) most concentrations are increasing functions of time (except  $CR_{50}$  after 2008); 2) more than 50% of the «life» insurance market is covered by first ten «life» insurers and 15 (50) «life» insurers take nearly 65% (95%) of the «life» insurance market. The data give the deviation of concentrations from theoretical approach: optimal  $CR_7$  should be 0.92 ( $N = 109$  in formula (7)) whereas the real value is found as  $CR_7 \approx 17.75$  for 2009.

The top five health insurance undertakings select 50.2% of the health premiums and the whole health market is covered by 45 health insurers from 51 existing in 2009 (Table 3B). The deviation of real value  $CR_7 \approx 14.2$  from the optimal one  $CR_{7,opt} \approx 2.0$  also exists. Thus, there exists the effect of asymmetric distribution of risks and premiums in Germany.

For comparison, the available official data of the authorized bodies of corresponding countries enables to get following values. Market share by premium volume of the top companies in France in 2003 was:  $CR_1 = 11$ ,  $CR_5 = 44.3$  and  $CR_{10} = 64.2$  in «life» sector,  $CR_1 = 10.8$ ,  $CR_5 = 38.9$  and  $CR_{10} = 56.7$  in property/casualty insurance. According to the Insurance Information Institute in USA the top companies by direct premiums written in 2009 gave such results:  $CR_1 = 10.6$ ,  $CR_5 = 32.6$  and  $CR_5 = 48.8$  in property/casualty insurance;  $CR_1 = 16.6$ ,  $CR_5 = 39.8$  and  $CR_5 = 56.6$  in «life»/health insurance [34]. One can also obtain following results: in Japan –  $CR_3 = 8$ ; in Latvia –  $CR_1 = 24.1$ ,  $CR_3 = 48$ ,  $CR_4 = 54$ ,  $CR_5 = 60$ ; in Kazakhstan –  $CR_1 = 17.2$ ,  $CR_5 = 43.5$ ; in Georgia –  $CR_1 = 18.3$ ; in Ukraine –  $CR_1 = 3.7$ ,  $CR_3 = 11.2$ ,  $CR_4 = 12.7$ ,  $CR_{10} = 29.3$  – for «non-life» insurance and  $CR_1 = 21.2$ ,  $CR_3 = 54.3$ ,  $CR_4 = 60.1$ ,  $CR_{10} = 80.9$  – for «life» insurance [19]. The average assessment of World Bank experts for 100 countries with transitional economics turned to be rather interesting: «non-life» insurance –  $CR_3 = 49$ ,  $CR_5 = 63$ , «life» insurance –  $CR_3 = 62$ ,  $CR_5 = 75$  [6].

Table 3A

**Group-based market concentrations (in per cents)  
in the German insurance industry\***

Year	CR <sub>1</sub>	CR <sub>2</sub>	CR <sub>3</sub>	CR <sub>4</sub>	CR <sub>5</sub>	CR <sub>10</sub>	CR <sub>15</sub>	CR <sub>20</sub>
2005	16.77	25.20	33.18	38.89	43.94	61.42	72.88	80.15
2006	15.97	24.38	32.73	38.82	44.05	63.21	74.82	82.09
2007	15.97	24.43	32.77	38.81	44.78	65.37	76.65	82.51
2008	15.80	24.47	32.67	39.14	45.12	66.17	77.45	83.49
2009	16.19	24.86	32.99	39.72	45.71	66.82	78.18	84.53

\* Source: own calculations based on the annual reports of insurance groups.

Table 3B

**Market share (in per cents) in premiums written  
of the German top insurance companies\***

Year	CR <sub>1</sub>	CR <sub>2</sub>	CR <sub>3</sub>	CR <sub>4</sub>	CR <sub>5</sub>	CR <sub>10</sub>	CR <sub>20</sub>	CR <sub>50</sub>
«life» insurance sector								
2006	16.98	21.99	26.90	31.42	35.39	50.24	70.18	92.63
2007	17.05	22.25	27.05	31.84	36.31	52.13	72.54	96.54
2008	17.17	22.63	27.58	32.41	37.16	52.77	72.82	97.05
2009	17.75	23.05	28.25	33.07	37.75	52.99	72.80	95.46
health insurance sector								
2006	14.20	27.03	37.87	44.84	50.63	69.14	89.03	94.23**
2007	13.97	26.60	37.19	43.95	49.78	68.23	88.75	93.91**
2008	13.98	26.44	36.73	43.63	50.25	71.62	93.45	98.94**
2009	14.71	27.69	36.73	43.70	50.17	72.24	94.06	99.96**
property/causality insurance sector								
2006	16.24	20.78	24.82	28.82	31.61	43.66	60.86	81.06
2007	15.99	20.88	25.53	29.69	33.49	46.21	64.05	86.18
2008	15.76	20.47	24.73	28.97	32.47	45.08	62.96	85.18
2009	15.34	21.29	25.68	29.93	33.36	45.93	63.99	85.59

\* Source: own calculations based on the annual reports of companies and official data [21–26].

\*\* Calculations have been done for 45 health insurance undertakings.

**Competitiveness.** The concentration coefficient (5) is found to have essential lack – it characterizes not all the insurers in the market, but only the biggest among them. Therefore, the index for the whole market – Herfindahl or Herfindahl–Hirshman index  $HI$  has been used in the world in the latest decades:

$$HHI = \sum_{i=1}^N K_i^2, \quad (7a)$$

where, again,  $N$  – total number of insurers at the market.

Under the simple assumption of finite number of insurance undertakings and zero deviations from the uniformly distributed market between  $N$  participants one can write the analytical function for the  $HI$  index:

$$HHI_{opt} = 10000 / N. \quad (7b)$$

In the following we present the results over time dynamics (Table 4). The calculation of  $HI$  index for 50 insurance companies is presented in figure 1.

The brief comparison with other countries yields: for instance,  $HI$  oscillates at value 1000 in Mexico; it is nearly 500 – for «non-life» insurers and 1500 – for «life» insurers in Malaysia, Singapore and Brasilia; it has decreased from 6000 till 2000 in Poland for the latest 10 years; it was 1400 in Serbia in 2009; 400 in average – in Argentina; 1000 – for «non-life» insurers and 700 – for «life» insurers in Chili [6]. For Ukraine  $HI$  calculation based on gross insurance premiums gives average values for the latest five years: for «life» insurance market –  $HI = 1350$  (with  $N = 72$ ); for «non-life» insurance market –  $HI = 175$  (with  $N = 378$ ) [19]. So German indexes are one of the smallest.

**Competitiveness integrated assessment.** The integral competitiveness index for the reductive assessment of the competitiveness state of the insurance market takes into account the simultaneous behaviour of both  $CR_4$  and  $HI$  and may be calculated according to the different formulae [19]:

$$IC = \sqrt{CR_4 \cdot HHI}. \quad (8a)$$

The theoretically optimal integral competitiveness index for proportionally distributed market is determined according to the following simple dependence:

$$IC_{opt} = 2000 / N. \quad (8b)$$

The simple algebra of the integral competitiveness index (9a) for the German insurance market in 2010 gives such results:  $IC \approx 156.9$  – for group-based analysis,  $IC \approx 131.6$  – for «life» insurance,  $IC \approx 175.9$  – for health insurance;  $IC \approx 109.7$  – for property and casualty insurance. Thus we get values for first «good» level of the competitiveness state in all insurance branches [19]. The best situation is in the property and casualty insurance market.

Table 4A

**Group-based Herfindahl-Hirshman index of the German insurance industry\***

Year	<i>N</i> = 5	<i>N</i> = 10	<i>N</i> = 15	<i>N</i> = 20
2005	474.1	536.1	562.8	573.9
2006	459.9	535.4	562.8	573.8
2007	468.2	557.4	583.4	591.8
2008	469.7	563.4	589.5	598.1
2009	484.6	576.4	605.3	614.3

\* Source: own calculations based on the on the annual reports of groups, their companies.

Table 4B

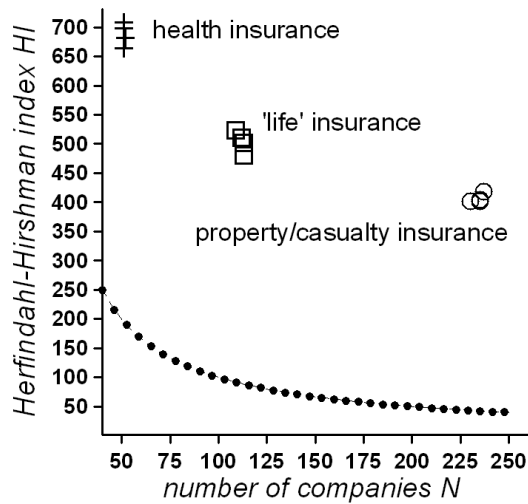
**Herfindahl–Hirshman index of the German insurance industry\***

Year	<i>N</i> = 10	<i>N</i> = 20	<i>N</i> = 30	<i>N</i> = 40	<i>N</i> = 50
<i>HI</i> for «life» insurance sector					
2006	418.5	459.4	472.7	477.6	479.4
2007	435.2	478.3	494.0	499.2	501.3
2008	445.0	486.5	502.4	507.6	509.9
2009	462.9	502.8	516.7	521.4	523.4
<i>HI</i> for health insurance sector					
2006	634.8	677.8	680.1	681.0	681.4
2007	615.8	660.3	662.8	662.8	663.2
2008	643.9	693.3	698.0	698.0	698.3
2009	653.6	702.9	707.5	707.6	707.8
<i>HI</i> for property/causality insurance sector					
2006	353.5	383.7	393.4	397.0	399.1
2007	365.5	397.9	410.1	414.4	416.7
2008	351.1	383.5	395.5	399.9	402.3
2009	351.8	382.9	394.1	398.2	400.5

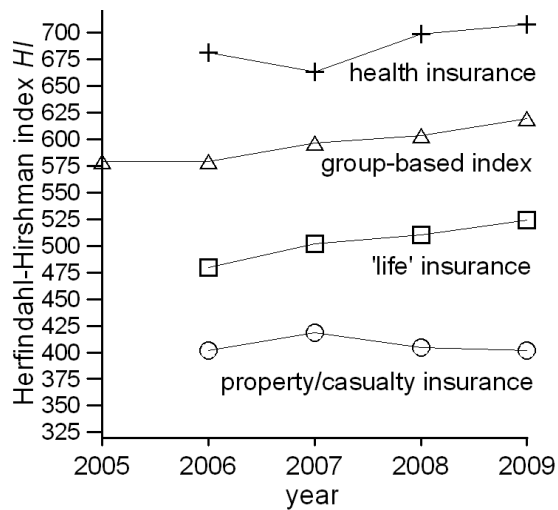
\* Source: own calculations based on the annual reports of companies.

Figure 1

(a) – Real values of Herfindahl-Hirshman indexes in 2006–2009 and theoretical function  $HI_{opt} = 10000/N$  («•» symbols) for proportionally distributed insurance market when all the participants have the same part.



(b) – Evolution of Herfindahl-Hirshman indexes during the last five years



**The saturation degree.** The index may be calculated due to two ways [19]. First one is the index of saturation degree for number of insurers in the market:

$$\varepsilon_N = \Delta N / N_{opt} = (N - N_{opt}) / N_{opt}. \quad (9a)$$

It represents the specific deviation of the number of insurers  $N$  from optimal number  $N_{opt}$ , which corresponds to theoretical index  $HI_{opt}$  for homogeneous distribution of the market among the participants under the condition when  $HI_{opt}$  and real value  $HI$  are coinciding:  $HI = HI_{opt}$ . The bigger is the saturation degree the more far is the market from the optimal state.

The second new index is the saturation degree for value Herfindahl–Hirshman index at the market:

$$\varepsilon_{HI} = \frac{\Delta HI}{HI_{opt}(N_1)} = \frac{HI_{real}(N_1) - HI_{opt}(N_1)}{HI_{opt}(N_1)} \quad (9b)$$

The data for 2009 year yield for Germany:  $\varepsilon_{HI} = 4.7$  in «life» insurance,  $\varepsilon_{HI} = 2.6$  for health insurance and  $\varepsilon_{HI} = 8.3$  for property/casualty insurance (Table 5). For example, the data for Ukraine for year 2009 yield: for «life» insurance  $\varepsilon_{HI} = 95$  (the deviation from optimal value is 95 times bigger than the optimal value), for «non-life» insurance  $\varepsilon_{HI} = 5$ .

Table 5

**The saturation degrees at German insurance market\***

Year	«Life» insurance		Health insurance		Property / casualty insurance	
	$\varepsilon_N$	$\varepsilon_{HI}$	$\varepsilon_N$	$\varepsilon_{HI}$	$\varepsilon_N$	$\varepsilon_{HI}$
2006	4.38	4.42	2.47	2.54	8.40	8.44
2007	4.65	4.67	2.19	2.38	8.88	8.92
2008	4.60	4.72	2.40	2.56	7.39	8.50
2009	4.45	4.71	2.40	2.61	7.21	8.25

\* Source: own calculations based on results of tables 3,9-10 and the official data [21–26].

The behaviour of saturation indexes is correlated with the behaviour of Herfindahl–Hirshman index and the number of companies. The biggest saturation 8.9 is found for property and casualty insurance in 2007 and the smallest one 2.2 – for health insurance in 2007. We also see that the values  $\varepsilon_N$  and  $\varepsilon_{HI}$  are nearly the same for Germany.

For Ukrainian insurance market we have the values:  $\varepsilon_N = 8$  and  $\varepsilon_{HHI} = 95$  for life insurance sector;  $\varepsilon_N = 6$  and  $\varepsilon_{HHI} = 5$  for non-life insurance sector.

**The entry and exit barriers.** The other entry/exit barrier index represents the increase/decrease of insurance participants number or the rate of insurer number increase for a year/period:

$$\delta(\text{period}) = \frac{N(\text{at the end of a period}) - N(\text{at the beginning of a period})}{N(\text{at the beginning of a period})} \cdot 100\%. \quad (10)$$

We consider the market without barriers when the changes of entry/exit barrier index for the period of more than five years appears frequent alternating (positive and negative changes) with amplitude more than 10%. Such criterion is chosen so that the index  $\delta$  deviations should represent the fluctuations in time dynamics for the stable market.

Our calculations over period 1999-2010 do not give oscillations and from this point of view one should state the entry/exit barriers. In last decade the most favourable year for Germany was 1999: there is a maximum dynamics of insurers increase both for «life» insurance ( $\delta = 4.5\%$ ) and «non-life» insurance ( $\delta = 1.2\%$ ). German insurance market reached its saturation in 1999 and starting from 2000 the negative values of the index  $\delta$  have been observed. A small slowdown was in 2007.

**Capitalization limits.** Capitalization limits assessment of an insurance market is related to the effect of company sizes on their work, performance and the level of state requirements to insurers. Hereby two problems are important: i) low capitalization limits and ii) up limit of capitalization.

The requirements according to the Directive of EU №2002/13/EU March, 5, 2002 were established as to the low limit of capitalization in most EU countries nowadays. In Germany and most European countries the legal rules concerning current capital requirements depend on the specific insurance business and its risk. Thus the first problem is already solved in different ways and has its implementation. In this respect it is worth noting that the new approach (so-called «up-stairs method») for determining the size of minimum statutes fund of a new-forming insurer when the size of statutes fund being increasing in time every 5 years depending on the activity type chosen by an insurer, has been already proved and offered [35].

The last finance crisis revealed a new problem, namely the biggest world financial institutions, commercial banks have grown to such a size that their bankruptcy is impossible without damage of financial system in general (so called principle «too big to fail»). For instance, the USA government had to spend hundreds of billion dollars for financial corporation AIG («life» insurer) considering its failure to bring much more destructive effect for financial sector and economics in

general. Thus, big sizes may be a real threat not only for insurance market but for the whole economics and competitive environment of the country.

The idea of such proposition related to the entry/exit barriers, may be applied to every country and has two aspects: 1) external (with respect to non-resident insurer); 2) internal (with respect to resident insurer).

Concerning the internal aspect, the priority proposition may be formulated as follows: assets of any resident insurer operating at the insurance market of a country should be smaller than assets-based concentration  $CR_1 = 30\%$ . In Germany the largest company Allianz Lebensversicherungs AG had assets 143 billion euro in 2010 which makes approximately 10% of whole German market share in assets.

With respect to external aspect for a foreign insurer operating at the insurance market one should take into account the GDP, total volume of premiums and the population so that the size effect may be introduced in a correct way. As the first approach one should use the EU Council Regulation C 275/07 dated 2004 on the control of concentrations between undertakings in which the market share post-merger of the new entity in each of the markets concerned should be below 30 % and the post-merger  $HI$  below 2000 [36].

### Concluding remarks

The publication contains complex financial economic description of the competitive state of German insurance services market over the past decades:

- the insurance sector has remained very stable in the last decade and in term of the gross written premiums there is no financial crisis effect (the demand for insurance increases) whereas German insurance undertakings were affected by the last financial crisis their asset side investments: in 2008 the total «life» and «non-life» industry assets fell in the range of -8% and -5%, accordingly;
- the first biggest insurance groups are ALLIANZ Deutschland, ERGO Versicherung, GENERALI Deutschland and DEBEKA;
- at the European level Germany has nearly 16% of volumes in absolute premium income and ranks fourth position;
- the density of companies is not high (one company for 125 thousand people) and corresponds to one in other leading countries;
- the number of insurance companies during the last decades has fallen from 750 in 1990 to 716 in 2000 and then to 625 in 2009; the «life» sector of insurance industry is more stabilized than the «non-life» one;



- insurance penetration reaches 7%, on an international scale corresponds to the average position and coincides with the mean value for the whole world for the latest 5 years;
- the insurance market has openness degree proxy 10-15%, influence of foreign sellers and providers is low;
- residents spend an average 2000 euro on insurance each year,
- the cost of one «life» contract is nearly 800 euro, health contract – 480 euro and property/casualty one – 200 euro;
- most «life» insurers have premiums at the level of 740 millions euro, health insurance undertakings – 620 millions euro and property/casualty insurers – 260 millions euro;
- the five largest insurance groups have the market share about 45 % and nearly 85 % of the German insurance market is covered by twenty groups;
- the distribution of the insurance groups is found uneven, the largest insurance group has concentration  $CR_1$  at the level of 16% whereas optimal value  $CR_1$  is estimated smaller than 5%;
- the insurance market is low concentrated and one of the least concentrated insurance market in the EU;
- in «life» sector there were 110 insurance undertakings in 2009, market concentrations are increasing functions of time and the market share of top «life» companies result in:  $CR_1 = 17.8\%$ ,  $CR_4 = 33.1\%$ ,  $CR_{10} = 53.0\%$ ,  $CR_{50} = 95.5\%$ ,
- in 2009 in property/casualty sector 230 insurers operated under the federal and state supervision, during the last five years  $CR_1$  is found as decreasing function of time, 33% of insurance premiums is accumulated by the first five insurers and fifty top insurers take about 86% of the market, the market share of top companies is determined as:  $CR_1 = 15.3\%$ ,  $CR_4 = 29.9\%$ ,  $CR_{10} = 45.9\%$ ,  $CR_{50} = 85.6\%$ ;
- in health insurance the top five health insurance undertakings select 50.2% of the premiums and 94% of whole health market is covered by 20 health insurers from 51 existing in 2009, the concentrations of top companies are following:  $CR_1 = 14.7\%$ ,  $CR_4 = 43.7\%$ ,  $CR_{10} = 72.2\%$ ,  $CR_{20} = 94.1\%$ ;
- there exists the effect of asymmetric distribution of risks and premiums inside the country.

- the Herfindahl–Hirshman index  $HI$  in 2009 for «life» insurance industry is examined as 524, for health insurance – 708 and property/casualty – 402, for group-based analysis – 620.
- the Herfindahl–Hirshman index for «life» insurance sector has increased in time whereas for property/causality insurance it has oscillated during the last years and had maximum in 2007 and for health it had minimum in 2007;
- the integral competitiveness indexes being at first level with the quality «good» in all insurance branches are characterized by the results:  $IC \approx 156.9$  – for group-based analysis,  $IC \approx 131.6$  – for «life» insurance,  $IC \approx 175.9$  – for health insurance;  $IC \approx 109.7$  – for property and casualty insurance;
- the best competitiveness is found in the property and casualty insurance market;
- deviation of the number of insurance undertakings and Herfindahl–Hirshman indexes from optimal give the saturation degree and it appears to be nonzero: the biggest saturation index 8.9 is found for property and casualty insurance in 2007 and the smallest one 2.2 – for health insurance in 2007;
- the average saturation in 2009 for «life» sector is nearly 4.5, for health sector – 2.5, for property and casualty sector – 7.7;
- there are entry\exit barriers for insurance industry;
- the largest company Allianz Lebensversicherungs AG had assets in 2009 which makes approximately 10% of whole market assets based share.

Thus we suggested the unified assessment of competitive environment at the insurance market with the aim of providing effective monitoring system of markets of insurance services by the central organs of executive power. The results and methodology will be possible for application by the government bodies of insurance control, specialists and experts of insurance market.

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