LIBERALIZATION AND MARKET CONCENTRATION IN THE INSURANCE INDUSTRY: CASE OF CROATIA

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ABSTRACT

This paper analyzes market concentration on the market of insurance companies in Croatia. For a very long time, Croatian insurance market was dominated by one company. After the liberalization, the number of insurance companies on the market began to increase, which led to a significant fall in levels of market concentration. The paper analyzes various indicators of market concentration, and for each indicator there is a calculated value which should help to see the trend. From all the analyzed indicators of market concentration, three were selected for the estimation of econometric models trend. The aim of these models is to predict the movement of market concentration on the insurance market in the next few years. The analysis shows that in the near future we can expect a further reduction in the level of concentration on Croatian insurance market companies, as well as the transition to less concentrated market structures.

Keywords: market concentration, insurance industry, the trend model

JEL: D49, L84

1. INTRODUCTION

Croatian financial system, as well as financial systems in other transition economies, has in the last two decades been strongly influenced by the globalization process taking place under the auspices of the WTO. At the outset of the World Trade Organization over 70 members took on some obligations, out of which about 60 members for the liberalization of the banking sector and 10 for the insurance industry. Liberalisation of the financial sector is achieved through external and internal liberalization over time i.e. through several stages with the possibility of retaining a certain degree of restriction. For each country this process had its individual course, but the goals were, with no doubt, to reduce the restrictions in this sector, to abolish monopolies, to increase competition which consequently contributes to faster economic growth in the national economy, and to ensure an efficient allocation of resources. However, the process of liberalization should be carefully combined with the strengthening of regulation and better supervision of financial sector in order to avoid system instability, and financial crisis. Liberalization should not be done just in order to carry it out; its aim should be to create stable sector, in this case of insurance, and to improve the position of consumers through greater competition.

Regarding the benefits of liberalization, it was found that they come not only due to access to external capital, but also because of the reduction of domestic externalities and distortions. Although in most countries liberalization has brought a faster economic growth, some countries experienced negative consequences: the free movement of capital led to a

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volatile exchange rate or rise in domestic interest rates. In addition, it appeared that improved access to capital generally lead to an increase in investment and higher growth rates during a period of five years after which the growth rates are significantly lowered (Grgić et al. 2006).

Some authors have already analyzed concentration in the insurance industry. They have concluded that until the beginning of the 1990s the insurance markets of the transition countries of Central and Eastern Europe were highly concentrated, which means that one or only a few state-owned insurance companies operated on the market, with the market share of the leading company higher than 90% (Tipurić, Pejić Bach & Pavić 2008). In the mentioned paper the authors examined the influence of the purchasing power of the population on the development of the insurance market and considered the potential scenario of development of the insurance market in the future. Some other researchers have analyzed market concentration of just one segment of insurance market, as examining market structure, liberalisation and performance relationship for the non-life insurance industry in the ex-Yugoslavia region (Njegomir et al. 2011). This research indicated strong influence of market structure and liberalisation on market profitability. There are also more specific analyses of concentration in the insurance market. One of these is Competition in health insurance, which has the aim to identify problem markets where competition is diminished and to prompt discussion about the long-term impact of consolidated health insurance markets on the health care system and find solutions (Deem et. al. 2007).

This paper analyzes the effects of the liberalization process in the insurance market through research of the market concentration and performance of economic subjects. The financial sector is represented in Croatia with a share of 21.3% (2009) and it includes banking, foreign exchange system, insurance and securities trading. The share of insurance business in the total financial sector assets in 2009 was around 5.5%, i.e. in total GDP this activity, as viewed through the assets, it accounted for 8.3%. Undoubtedly the process of liberalization and entry of foreign investors in this market contributed to the development of the sector, increasing the competitiveness of Croatian insurance companies, and improving the quality and diversity of products and insurance services. The aim of this paper is to assess the further development of this sector in terms of a possible entry of new firms.

2. METHODOLOGY

This paper consists of theoretical and empirical sections. The theoretical part analyzes the state of the insurance companies market in the Republic of Croatia, with a special emphasis on the effects of market liberalization. It also lists indicators of market concentration that will be used in the analysis later on. The method of calculation and analysis of limits within which one can find the calculated values are explained for each indicator.

The empirical part starts by calculating the indicators of market concentration of insurance, whose aims are to establish the level of market concentration and direction of its movement. Data that will be used are taken from the Croatian Financial Services Supervisory agency and the Croatian Insurance Bureau. Based on data on the size of the gross premiums of each insurance company the value of indicator of market concentration will be determined, and then for three selected indicators (Herfindahl-Hirschman index, concentration ratio CR_4 and Gini coefficient) econometric trend models will be assessed. Based on these models it is possible to estimate the future trends of the level of

market concentration on the Croatian market of insurance companies.

3. THE PROCESS OF LIBERALIZATION IN THE INSURANCE INDUSTRY

The Washington Consensus adopted for the economies in transition represents the agreement between the Governments of the debtor countries and international institutions on the implementation of neo-liberal approach to administering the country, which means greater emphasis on the free functioning of markets and price without the influence of the government, liberalization of foreign trade sector and overall reduction of government importance in the national economy. The neoliberal approach meant liberalization and deregulation of all segments of the economy. As part of the consensus the importance of privatization, liberalization and stabilization is emphasized, and through these processes and application of appropriate restrictive monetary and fiscal policies governments should have balanced their budgets. In the liberalization part the crucial role was played by World Trade Organization (WTO), under whose auspices these processes were carried out. As this article deals with the financial sector, then the General Agreement on Trade in Services (GATS) was crucial for the process of liberalization. Financial systems of many countries have gradually opened up, abolishing the obstacles to free movement of capital between countries through several stages, from external to internal liberalization (Radošević, 1999).

Liberalization processes have equally involved the developed, as well as the developing countries, but with different dynamics. Liberalization depends on the achieved level of development of the country itself, but also on the bargaining power within the WTO, and the organizational form of the state itself and its economic development strategies. In the transition process, Croatia decided for "progressive, but multi-phase liberalization", which means that liberalization took place gradually, with certain concessions and delays which Croatia could have used for better preparation for the adoption of WTO requirements.

Financial sector assets in Croatia represent about 150% of GDP (Osiguranje 2007). Among all parts of the financial system the liberalization of the sector of insurance services was the slowest. The obligation of insurance and reinsurance of people and property existed for domestic insurance companies while insurance abroad was approved only for very specific tasks (export contracts, shipbuilding). Foreign insurance and reinsurance companies had bans on branching in Croatia, which is contrary to WTO rules, and there was a possibility of only founding the insurance companies as limited companies.

The reason for a relatively slow liberalization process of the insurance sector lies in the fact that several laws needed to be respected, i.e. access to the insurance industry was not regulated solely by the Insurance Act, but also by some provisions of the Companies Act. The Law on Amendments to the Insurance Act finally solved the problem of establishing branches of foreign insurers, in a way that foreign company may establish a subsidiary in Croatia under the condition of reciprocity. If the insurance company has its headquarters in a WTO member state, the establishment of subsidiaries is possible without restrictions. Liberalization of the legal framework resulted in an increasing number of companies in this sector, which has been directed from a predominantly monopolistic market towards more oligopolistic market structure, implying the need to strengthen the regulatory body. Competition policy is the most important instrument used in developed countries to eliminate irregularities and imperfections in the market caused by the cooperation of enterprises that have great

market power. In the EU accession process, Croatia had to harmonize its legislation with the *acquis communautaire*, and thus with two key conditions including provisions for the protection of competition in Article 81 and 82 of the European Community Treaty. Article 81 prohibits restrictive agreements and decisions concerning the merging of companies and their practices, which affect trade between the Member States and prevent or distort competition within the common market. Article 82 prohibits the abuse of market power of one or more companies, which may affect the trade between the Member States. The third instrument of competition protection is the Regulation no. 4064/89, which prohibits those concentrations that have the effect of creating or maintaining a dominant market position (Šoljan 2004).

The liberalization must be implemented in combination with the strengthening of regulation and supervision of financial markets. Specifically, it is necessary to avoid instability of the financial sector and the possible occurrence of financial crisis like the one that hit the world in 2008. The lack of regulation has been determined to be its main cause.

4. ANALYSIS OF INSURANCE INDUSTRY IN CROATIA

The insurance industry has a significant impact on the development of each economy; particularly it has the significant effect when a country is moving away from being less developed economy, and is a significant factor in the stability of both the financial sector, and macroeconomic stability. The development of the insurance sector in Croatia has shown a strong correlation with the general economic development. This was particularly evident in the last decade, when the gross premiums grew up to the rate of 15% in comparison to previous years. The peak was reached in 2008, when the gross premiums amounted to HRK 9,672,678,854 (Croatian Insurance Bureau). A relatively weak impact of the financial crisis in 2008 can be explained by a strong growth in premiums for non-life insurance, which has a dominant share in the total premiums. The important fact is that Croatian insurers had a negligible share of crisis sensitive types of insurances, such as covering risks associated with the banking crisis, or swaps. However, that year marked only 6.9% growth in premiums, compared with several years of previous double-digit growth. Assets of the Croatian insurance companies amounted to HRK 22.4 billion in 2007, 25.7 billion in 2008 and 27.9 billion in 2009 which was 5.7% of the financial sector assets. This percentage in 2007 was 5.1%, and in 2008 5.4%, which means that the insurers were able to increase total assets and share in the financial sector, while others e.g. banks lost their market share. The financial sector was developing faster than the real sector, so it grew even in times of crisis, although at a much lower rate. In 2008, growth amounted to 2.2%, in 2009 it reached considerable 4.3% with 490 billion kunas (Andrijanić & Stahuljak 2009).

Table 4.1. Trends in total gross written premiums 2003 to 2010

Year	Gross written premiums in 000 HRK	Index
2003	6,067,042	-
2004	6,626,867	1092
2005	7,350,074	110.9
2006	8,180,156	111.3
2007	9,064,932	110.8
2008	9,686,102	106.9
2009	9,411,336	97.2
2010	9,244,459	98.2

Source: *Croatian Insurance Bureau*

However, 2009 brought a decline in total premiums of insurance companies, for the first time since 2004. Both life and non-life insurance premiums recorded a decrease. On the other hand, claims have increased, so the insurers in this segment recorded a negative result. But investment of reserves still went into safe bank deposits and securities issued by the government, so the overall result of the insurers was positive. Furthermore, in 2010 there was still no increase in gross premiums, and they fell to levels from 2007 (Croatian Insurance Bureau). Almost all insurers reported declining premiums from a year earlier, which means that the poor state of the economy had a large influence on the decisions of consumers on whether to use insurance services.

Conservative investment, which saved insurers during the crisis, is now not enough to make profit, so economic growth is expected in order to generate growth in demand for insurance. There is a high correlation between GDP growth and the insurance premium, and hence overall economic recovery is essential for the recovery of the insurance sector.

The insurance industry in Croatia represents 2.76% of GDP which is significantly lower compared with the average of the European Union of 8.45%. According to the Croatian Insurance Bureau, in 2010 average premium per capita was around HRK 2,100.00, and the citizens have contracted 7,852,256 insurance policies. Thus in Croatia every adult citizen has on average about 2.2 insurance policies. In Croatian insurance industry there are currently 25 insurance companies and two reinsurance companies, and the Croatian pool for insurance and reinsurance of nuclear risks. Six insurance companies deal with life insurance affairs, 9 companies deal with non-life insurance, while only 10 performs both type of insurance. Another 29 companies operate in this sector as insurance brokers, and over 300 companies as insurance agents.

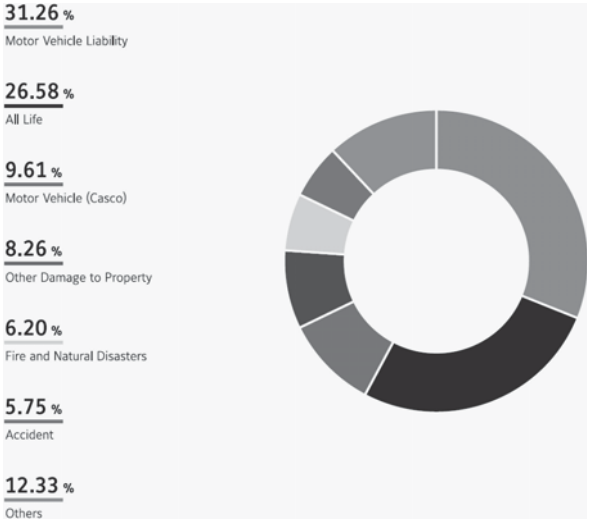

Figure 4.1. Structure of insurance premiums by type (for 2010)

Figure 4.1 shows that in the structure of insurance premiums paid the largest share goes to motor vehicle liability insurance. This position stems from the fact that it is a compulsory insurance that applies to more than 2 million vehicles as the Central Bureau of Statistics registered on the Croatian roads. A quarter of all premiums goes to life insurance, and all other lines of insurance are involved with less than 10%.

5. THE POSITION OF COMPANIES IN THE INSURANCE INDUSTRY

Market structure can be studied according to the number of enterprises in the market, the degree of product differentiation, conditions of entry and exit, and the degree of vertical integration of enterprises. Most commonly market structure is deferred to the degree of market concentration, i.e. the number of companies and their market shares. Indicators of market concentration seek to identify how the product is allocated between different companies. In accordance with the neoclassical theory, the greater the number of firms in the market the more likely it is that there are smaller differences in the company size and a higher degree of competitiveness.

The most important source for the analysis of market structure of certain sectors are market shares, which provide useful insights into market structure and market importance of both major participants and their competetors. Market shares are the basis for determining concentration indicators, which are briefly described below.

If there are *n* companies in some industry whose aggregate production is *Q*, where q_i is the amount of production of each firm (i = 1,2,3 ... n), the following applies:

$$Q = \sum_{i=1}^{n} q_i \qquad (5.1)$$

The share of production of a company is obtained as

$$s_i = \frac{q_i}{Q} \qquad (5.2)$$

Concentration index is calculated as

$$S_i = 100 \cdot s_i = 100 \cdot \frac{q_i}{Q} \qquad (5.3)$$

Concentration index varies between *0*, in case of a perfectly competitive market, and *100* in the case of monopoly ($0 \leq S_i \leq 100$). It is also the proportion of enterprises in the entire market, and thus this indicator is sometimes referred to as market share. This indicator is most often applied in the form of **concentration ratio,** which shows the percentage (share) of the four largest firms, and is calculated as:

$$CR_4 = \sum_{i=1}^{4} S_i \qquad (5.4)$$

The drawback of this indicator is that it only takes into account the share of the four largest firms, and will be the same for the industry where the top four companies each have a 20% share and the industry in which out of the four largest companies, one company has 65%, while the other three have 5% share, although the degree of concentration of these markets is not equal. This indicator linearly measures the proportion of each company, and makes no distinction between different sizes of enterprises. Likewise, criticism related to this indicator is reduced to an arbitrary choice of the number of enterprises, where according to some economists, the index takes the four largest firms, according to others five, seven or eight. An uneven choice of the number of businesses will certainly give different information on concentration in particular industries.

Herfindahl-Hirschman index is another indicator of concentration, and is calculated as the sum of squared market shares according to the formula:

$$HHI = \sum_{i=1}^{n} S_i^2 \qquad (5.5)$$

Comparing to concentration index, this is a better indicator because it gives greater weight to bigger companies and smaller weight to smaller companies, so the picture of concentration of an industry is more realistic.

Although the absolute level of HHI can provide a first insight into the pressures on the market after the implementation of concentration, the change in index (called the "delta") is a useful surrogate measure of changes in concentration occurred as a direct result of concentration. In the European Regulation on the control of concentrations 139/2004 HHI is mentioned as a measure for concentration, where there is no negative effects of mergers and strengthening of concentration below a certain level. The market with a HHI below 1000 is considered non-concentrated, while for the markets which have HHI between 1000 and 2000 (delta is less than 150), there is no concern that there will be adverse effects on competition. Clearly, in the case of higher-level HHI, further analyses are counted to

accurately determine whether an improper concentration exists. (Pecotić-Kaufman 2009).

Tideman-Hall concentration **index** (HTI), in contrast to Herfindahl-Hirschman index, emphasizes the importance of the absolute number of companies when calculating concentration. Specifically, HHI is also dependent on the relative number of enterprises, and is growing very rapidly only with a change in market share, but not with the entry of new small firms in the industry (Foldvary 2011). The advantage of the inclusion of the absolute number of firms in the calculation is that this number can express the entry of a new company in the industry, and it is assumed that the market entry is easier if there are already a number of companies operating in that market. HTI is calculated using the formula:

$$HTI = \frac{1}{2\sum_{i=1}^{n} i \cdot s_i - 1} \qquad (5.6)$$

where the market share of each company is multiplied by the corresponding rank. HTI value ranges from *1/n* to *1*, where the values close to *0* indicate perfect competition, while the other extreme, a monopoly, takes the value *1* (Foldvary 2006).

Rosenbluth index (RI) is very similar in shape to Hall-Tideman index. They differ only by ranking companies. Specifically, Rosenbluth index gives smaller companies a higher rank, so it has more influence on the indicator itself than on the large enterprise. It is calculated using the formula:

$$RI = \frac{1}{2\sum_{j=1}^{n} j \cdot s_j - 1} \qquad (5.7)$$

The assumption is that companies are sorted from the smallest to largest, in contrast to the previous indicator. From this it follows that RI gives great importance to small businesses. Similar to HHI, the value ranges from *1/n* and *1*, where *1* denotes a monopoly on the market, and value close to *0* indicates a perfectly competitive market (Moschandreas 2000).

Comprehensive Concentration Index - CCI was designed as a combination of two types of indicators, and at the same time it shows the relative dispersion between firms, but also the absolute number of firms. It is calculated by adding the market share of the largest company to the aggregate index that covers the reminder of firms in the industry.

The formula for calculating is the following:

$$CCI = s_1 + \sum_{i=1}^{n} s_i^2 \left(2 - s_i\right) \qquad (5.8)$$

The share of the largest companies is set aside from the calculation, but is later on added to the sum which indicates concentration of the rest of the industry. CCI index ranges from *0* to *1*, and gives a value of *0* for perfect competition, and *1* for monopoly (Moschandreas 2000).

Hannah and Key (1977) in their book suggested another indicator of concentration which is very similar to HHI, but with a difference in the weights assigned to large enterprises.

The formula for calculating is the following:

$$HKI = \left(\sum_{i=1}^{n} s_i^{\alpha}\right)^{\frac{1}{1-\alpha}}, \qquad \alpha > 0, a \neq 1 \qquad (5.9)$$

where a change of the parameter α denotes various levels of criteria which are met by the parameter. Where *α>0* and *α* is different from *1*, it represents an arbitrarily set elasticity parameter. For example, lower values of α emphasize the impact of small businesses, while larger values take more into account the impact of large enterprises on concentration. Most commonly used values for *α*

are: *0.005, 0.25, 5* and *10*. As HKI is very sensitive to the determination of parameter α, the index value at low α will move like the number of companies in the market, and will be approximately equal. The result of the HKI index with these parameter values should be taken with caution, as in the case of reducing the number of firms, the value of the index will reduce as well, but this does not necessarily mean a decrease in concentration of the market.

Hause index (H) is an indicator of concentration dependent on the parameter which indicates the degree of collusion or agreement between the enterprises. In actual circumstances, it is difficult to prove that the companies secretly collaborate for illicit goals, but it is still necessary to choose several parameters in order to cover this case as well. The index is calculated using the formula:

$$H = \sum_{i=1}^{n} s_i^{2-\left(s_i\left(HHI-s_i^2\right)\right)^{\alpha}} \qquad (5.10)$$

where the parameter α indicates the degree of collusion between the companies. Parameter values are inversely related to the degree of collusion, so the smallest parameter *α =0.25* indicates the industry with high degree of tacit bargaining. The index H is equal to *0* for perfect competition, while in the case of monopoly it is equal to *1*. An important implication of involving collusion in the calculation is that in the case of tacit cooperation between firms, a new firm entering the market does not result in a significant increase in competition in the market.

Entropy is an inverse measure of concentration and it gives weights to the market shares using the logarithms and then summarizes them (Jacquenim and de Jong, 1977). The formula is:

$$E = \sum_{i=1}^{n} s_i \ln\left(\frac{1}{s_i}\right) \qquad (5.11)$$

This index takes the value *0* in conditions of monopoly because *ln n = 0*, and *n* is *1* for monopoly. On the other hand, its value in conditions of perfect competition is *ln n.* Here it is possible, instead of the natural logarithm, to use other types of logarithms, but in this case the maximum value that indicator can achieve changes as well.

Lorenz curve puts in relation cumulative percentage of companies in the industry, starting from the smallest, and the cumulative percentage of the value of manufacturing revenues or size. If industry revenue was equally distributed, the distribution of income would be presented with a line of absolute equality (line at an angle of 45 degrees), which is diagonal regardless of the number of firms in the market. In the case of uneven distribution, the Lorenz curve lies below the diagonal line. The further away this curve is from the 45 degrees line the greater is the inequality in the industry. Numerical measure of concentration based on the Lorenz curve is called **Gini coefficient** (G). The value of Gini coefficient actually reflects the area between the Lorenz curve and the absolute equality line. Therefore, the value of G is between *0* and *1*, where the minimum value indicates perfect competition, and value of *1* means a monopoly. The formula for calculating it is:

$$G = \frac{2\sum_{i=1}^{n} i \cdot x_i - (n+1)\sum_{i=1}^{n} x_i}{n\sum_{i=1}^{n} x_i} \qquad (5.12)$$

where *n* represents the number of firms in the industry. The downside of this measure is that it gives only information about the distribution, so one would get the same result if there were four companies with roughly the same size, or twenty companies with the same size (Moschandreas, 2000).

Table 5.1. Indicators of concentration in the insurance industry in the Republic of Croatia from 2004 to 2010

Name of index	*Label*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Concentration ratio	CR_4	67.65	67.54	65.49	64.06	63.39	60.84	59.79
	CR_8	85.59	86.31	84.53	82.90	81.41	80.02	78.44
Herfindahl-Hirschman index	HHI	2052.5	1882.9	1721.3	1605.4	1553.3	1457.8	1397.7
Hall-Tideman index	HTI	0.140	0.139	0.132	0.125	0.118	0.113	0.108
Rosenbluth index	RI	0.024	0.024	0.024	0.023	0.024	0.024	0.024
Comprehensive index of industrial concentration	CCI	0.479	0.461	0.441	0.425	0.417	0.402	0.393
Hannah-Kay index	HKI1 $\alpha = 0.005$	23.853	22.871	19.912	20.901	24.851	22.894	24.861
	HKI2 $\alpha = 0.25$	17.884	17.527	16.227	16.940	19.181	18.554	19.593
	HKI3 $\alpha = 5$	3.022	3.301	3.571	3.813	3.908	4.106	4.248
	HKI4 $\alpha = 10$	2.674	2.893	3.104	3.293	3.366	3.517	3.625
Hause index	H1 $\alpha = 0.25$	0.317	0.303	0.284	0.269	0.261	0.247	0.238
	H2 $\alpha = 1$	0.208	0.192	0.175	0.163	0.158	0.148	0.142
	H3 $\alpha = 2$	0.205	0.188	0.172	0.160	0.155	0.145	0.139
Entropy	E	2.150	2.201	2.253	2.311	2.370	2.407	2.453
Gini coefficient	G	0.702	0.700	0.685	0.680	0.661	0.648	0.630

Source: *Author's calculations based www.huo.hr*

competitor, and it gives that company market share of 31.37%. The second largest company is Euroherc, which charged 1,002,519,009 HRK of gross premiums, and has 10.84% of market share. Next is Allianz Zagreb, with 983,967,954 HRK gross written premium and 10.64% market share, and the fourth-largest insurer is Jadransko osiguranje, with 641,325,657 HRK of premiums written, and 6.94% of total market share.[2]

6. ANALYSIS OF INDICATORS OF MARKET CONCENTRATION IN THE CROATIAN INSURANCE INDUSTRY

Below, we analyze the market concentration in the insurance sector in Croatia. Gross written premiums were used as basis for calculating market share. This information is the best measure of business performance of an insurance company, so it is recommended to use exactly the gross written premiums as the basis for calculating the market shares of companies in the insurance market.[1]

The largest insurer by gross written premiums is Croatia osiguranje, which has been holding the first place in the Croatian insurance industry for years. According to data for 2010, Croatia osiguranje charged 2,899,925,865 HRK of gross premiums, which is three times more than its closest

The four leading insurance companies together control nearly two-thirds of the market, with a slight decreasing tendency in their concentration from 67.65% in 2004 to 59.79% in 2010. If one analyzes the shares of eight largest insurance companies, the previous list needs to be enlarged by adding Kvarner Vienna Insurance Group, Triglav osiguranje, Basler osiguranje Zagreb and Grawe. It is evident from Table 5.1 that the above companies together have a substantial market share, which is also in decline from 85.59% in 2004 to 78.44% in 2010. Interpretation of data at a glance tells us this is a fairly concentrated market, because

the first four companies occupy almost 60% of the market, and the first eight companies hold almost 80% of the market, with emphasis on the leadership of Croatia osiguranje.

Herfindahl-Hirschman index also indicates that it is a concentrated market, although to a lesser extent. This index for the past seven years ranged from 2052.5 in 2004 to 1397.7 in 2010, with a constant decreasing tendency. The reason for the reduction is greater competition, which lead to a decrease in market share of leading insurance companies.[3] Hall-Tideman index has a constant decrease from 0.140 in 2004 to 0.108 in 2010, while the value of Rosenbluth index is almost constant. The value of an extensive index of industrial concentration also declined in a given time period, from 0.479 to 0.393.

Hannah-Kay index is defined in this paper with the four parameters α, and they mostly give expected results. For smaller α the index value is similar to the number of insurance companies in the industry, reflecting the importance of the total number of companies, while for larger values of α, values of HKI are much lower, reflecting the greater importance of large companies. As HKI1 is defined by the parameter α = 0.005, negatively correlated with other indices, the increase in its value actually indicates a decrease of concentration. However, this increase in value is not constant, much like with HKI2, and thus this indicator is not capable of clearly determining the movement of market concentration. With higher values of parameter α, the index is also inverse, so the increase in value should also indicate a decline in concentration in the industry, especially of large companies. Therefore, there is a slight rise in the index over time.

If we consider Hause index, concentration movement generally corresponds to the indices previously shown, that is it indicates a decrease in market concentration in the industry. Since this index is determined by three parameters, which determine the level of collusion between companies, the results vary depending on the degree of collusion. Thus, for the parameter α= 0.25, which indicated a high degree of collusion, index value is considerably higher, which corresponds to the situation closer to monopoly, than with the remaining parameters, which assume that there is no collusion. Keeping in mind that ownership links between companies are quite strong in Croatia, it is more appropriate to use higher-level collusion parameter.[4]

The measure of entropy also confirms the results of the indicators mentioned above, which is that the market concentration decreases over the years. The measure of entropy is shown as an inverse indicator to others, and increase in its value actually means moving towards a more competitive market. The maximum value of the measure is the natural logarithm of *n,* which in the case of overall insurance industry is 3.21. Gini ratio is quite high, which means that the Lorenz curve is rather far from 45 degrees line, but the trend is towards the reduction of this value.

7. ESTIMATING MODELS OF CONCENTRATION INDICATORS TREND IN INSURANCE INDUSTRY IN CROATIA

Based on the calculated indicators of market concentration, it is possible to estimate the trend model of their movement in time. In order to do that, the method of regression analysis applied to the movement in time will be used. The basis for estimating the parameters in each model is the least squares method in which the difference between actual and expected values of the dependent variable is the smallest possible (Maddala, 2006). This method was chosen because in a linear regression model in which the errors have expectation zero and are uncorrelated and have equal variances, the best linear

unbiased estimator (BLUE) of the coefficients is given by the ordinary least squares estimator. In this sense, "best" means giving the lowest possible mean squared error of the estimate.

In each of the models that will be estimated the dependent variable is the indicator of concentration to be evaluated, and the independent variable is time. Thus the objective of this analysis is to determine the average annual change in the movement of selected indicators of market concentration. Models will be evaluated for three indicators of concentration: Herfindhal-Hirschman index, CR_4 concentration ratio and Gini coefficient. The reason for choosing these three indicators to assess the trend stems from two facts. First, the previous analysis showed that all indicators of concentration in the Croatian insurance market are moving in the same direction. Secondly, it is these three indicators that are most commonly used in the analysis of market concentration, and therefore they are the most user-friendly to the readers.

Table 7.1. Trend model of HHI

Dependent Variable: HHI				
Method: Least Squares				
Sample: 1998 2010				
Included observations: 13				
HHI = C(1) + C(2)*T				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	3436.997	102.2512	33.61327	0.0000
C(2)	-176.3543	12.88244	-13.68952	0.0000
R-squared	0.944557	Mean dependent var		2202.516
Adjusted R-squared	0.939517	S.D. dependent var		706.6707
S.E. of regression	173.7936	Akaike info criterion		13.29425
Sum squared resid	332246.3	Schwarz criterion		13.38117
Log likelihood	-84.41264	Hannan-Quinn criter.		13.27639
F-statistic	187.4029	Durbin-Watson stat		0.438078
Prob(F-statistic)	0.000000			

Figure 7.1. Actual and estimated values of HHI

According to this model the average annual decline of Herfindahl-Hirschman index is 176.35. This indicates a significant annual decline in concentration in the Croatian insurance market. The model is significant at a significance level of 1%, as evidenced by p-values.

The model explained 94% of variance. Despite the Durbin-Watson test, which indicates the existence of positive autocorrelation, other tests showed that at significance level of 5% there is no problem of autocorrelation. If this movement continues in the future, we can expect a further drop in the level of market concentration in the insurance market as measured by Herfindahl index.

Using this model of prediction, the insurance market should fall below 1000 (HHI) in the period of the next few years. Specifically, the model shows that as early as in 2011 the estimated value of HHI is expected to be 968.04, in 2012 791.68, and in 2013 615.33. However, it is realistic to expect that this trend of falling concentration will alleviate, which is reflected in the period after 2007, so in reality one could expect that the levels of HHI are actually a little bit higher than predicted. But certainly in the period of the next three years the level of concentration measured by Herfindahl-Hirschman index will fall below 1000 and according to HHI this market will be considered low-concentrated.

Table 7.2. Trend model of CR_4

Dependent Variable: CR4				
Method: Least Squares				
Sample: 1998 2010				
Included observations: 13				
CR4 = C(1) + C(2)*T				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	75.85115	0.538944	140.7404	0.0000
C(2)	-1.203352	0.067901	-17.72227	0.0000
R-squared	0.966162	Mean dependent var		67.42769
Adjusted R-squared	0.963086	S.D. dependent var		4.767741
S.E. of regression	0.916028	Akaike info criterion		2.803099
Sum squared resid	9.230186	Schwarz criterion		2.890015
Log likelihood	-16.22015	Hannan-Quinn criter.		2.785234
F-statistic	314.0789	Durbin-Watson stat		1.398739
Prob(F-statistic)	0.000000			

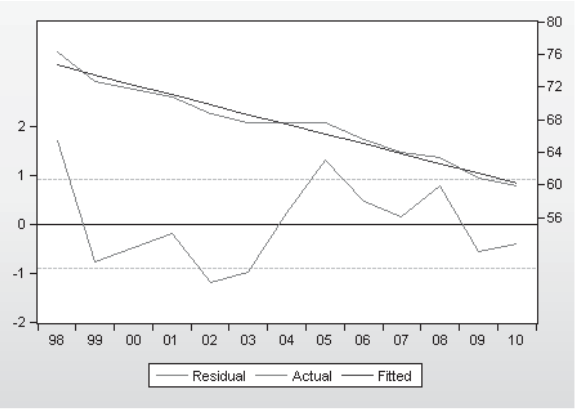

Figure 7.2. Actual and estimated values of CR_4

This model shows that the market share of four largest insurance companies in Croatia annually decreases by 1.20%. The model is significant at a significance level of 1%. The model explained 97% of the variance, and analysis of residuals indicated the adequacy of the model. If the trend continues, in the next few years, concentration ratio CR_4 in the Croatian insurance market should continue to decline. The expected strengthening of competition and greater dispersion between the insurance companies should certainly contribute to improving the position of consumers. The expected values of CR_4 based on the model are 59.00 in 2011, 57.80 in 2012 and 56.60 in 2013.

Table 7.3. Trend model of G

Dependent Variable: G				
Method: Least Squares				
Sample: 1998 2010				
Included observations: 13				
G = C(1) + C(2)*T				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.772538	0.004391	175.9558	0.0000
C(2)	-0.010341	0.000553	-18.69399	0.0000
R-squared	0.969484	Mean dependent var		0.700154
Adjusted R-squared	0.966710	S.D. dependent var		0.040900
S.E. of regression	0.007462	Akaike info criterion		-6.817225
Sum squared resid	0.000613	Schwarz criterion		-6.730310
Log likelihood	46.31196	Hannan-Quinn criter.		-6.835090
F-statistic	349.4651	Durbin-Watson stat		1.359819
Prob(F-statistic)	0.000000			

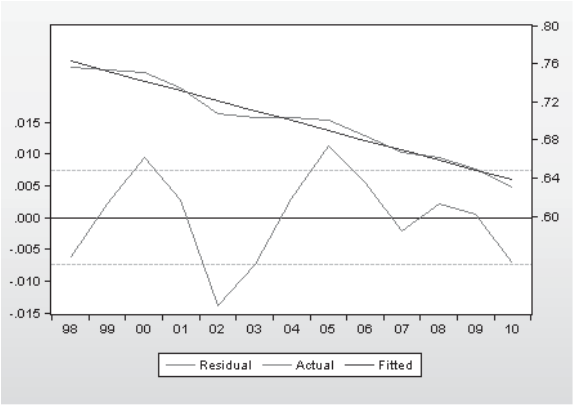

Figure 7.3. Actual and estimated values of G

The estimated model of Gini coefficient shows that its value in the Croatian insurance market annually decreases on average by 0.01. The model is significant at a significance level of 1%, and this model explained 97% of the variance. The analysis of residuals indicates the adequacy of the model. In the future the

level of Gini coefficient, if this trend continues, should continue to decrease. The prognostic value for 2011 is 0.6278, for 2012 0.6174, and for 2013 0.6071.

Based on the shown econometric trend models it is possible to give common conclusion. All three indicators, Herfindahl index, CR_4 concentration ratio and Gini coefficient show that the level of market concentration in the Croatian insurance market is decreasing. That is why in the next couple of years one can expect a further drop in the level of market concentration in the insurance market. This means that the insurance market is becoming more developed and more liberal, and leading insurance companies are slowly losing their market share in favour of smaller insurance companies, that is gross premiums are becoming more evenly distributed in the insurance market.

8. CONCLUSION

The rising competition in each market allows a greater and better choice for consumers, while businesses are forced to use all resources for development in order to retain the existing or to capture better market position. Typically there is a greater diversification of products, improvement in quality and more affordable prices. Liberalisation of financial markets is a key condition which Croatia must meet to be accepted into World Trade Organization and the European Union. The adjustment of the insurance market was especially difficult to perform, which was very closed and poorly competitive. This process opened the possibility of price liberalization, but the Croatian insurers have not taken advantage of it.

Alongside liberalization it is necessary to conduct proper regulation, to avoid adverse market situations. The most important thing is to protect competition from abuse, and prevent the creation of market structures like monopoly or cartels. Competition law of the European Community was developed primarily to prevent companies with large market power impede the free movement of goods and services in the European common market. Croatia has adopted similar legal provisions, and prohibits concentration that would have an adverse effect on competition. As a regulatory body the Croatian Competition Agency was established, which approves or rejects the proposed mergers on the relevant markets. The main method for measuring concentration of the market is usually market share, which best describes the market power in the industry. There are many concentration indices based on market share, and in this paper nine of those are used. The main indices used in practice are concentration coefficients (four and eight companies) and Herfindahl-Hirschman index.

The results of the research for the overall insurance industry pointed out a relatively concentrated industry in Croatia, which is dominated by several large companies, especially Croatia osiguranje which controls one third of the market. The four largest firms control about 60%, while eight of them control 80% of the total market. This means that out of 25 companies in the industry, only four of them control nearly two-thirds of the market, and eight control nearly four fifths of the market. Herfindahl-Hirschman index indicates moderate concentrations, and it ranged from 1605.47 in 2007 to 1397.75 in 2010. All calculated indices showed the same tendency of decreasing concentration in this sector in the period from 2004 to 2010. Should this sector be further divided into life and general insurance, then the non-life insurance industry is more concentrated than the whole sector, and lower concentration is present in the life insurance segment (based on HHI this part of the insurance sector can be considered as not concentrated because its value is below 1000). In both segments of the insurance

market as well as in the overall sector there is a downward trend in concentration, which indicates the success of the liberalization process. Liberalization in terms of the new companies and new products yielded satisfactory results. Continuing liberalization and entry of new firms in the next 3-5 years should transform this sector to a low-concentrated sector, where consumers would benefit the most. However, due to the crisis that currently exists in Croatia and the European Union, and the high correlation between this sector and the trend of economic growth, the estimates in terms of concentration are harder to come by, thus conclusions should be viewed with these limitations.

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NOTES

[1] COMMISSION REGULATION (EC) No 358/2003, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:053:0008:0016:EN:PDF [1.9.2011]. Gross written premium for non-life insurance policies includes all amounts that were contracted in the current accounting period of a year, while in life insurance it includes all premiums that are paid by the end of the accounting period, regardless of whether these amounts are wholly or partly related on the following accounting period. Every month insurance companies provide data on gross written premium to Croatian Insurance Bureau, which publishes them as monthly reports. It is best to use the data from the last month of the year, i.e. December, to cover premiums written throughout the year, which is very important because of the quarterly or annual maturities of certain premiums. The period from 2004 to 2010 was taken due to several reasons: more "aggressive" process of liberalization in this sector and with it better oversight, supervisory agencies were formed, and data were more available for this period.

[2] Authors' calculations according to HUO data; www.huo.hr , 01.10.2011.

[3] When HHI is below 1000 the industry is assessed as not concentrated, moderately concentrated if HHI is between 1000 and 1800, and highly concentrated if HHI is above the 1800.

[4] The industry consists of 17 groups of companies observed by ownership structure, where the first four (CR_4) occupy 77.29% of the market and the first eight 94.13% of the market in 2007. HHI is 2013.58, which is much more than when the industry is analyzed by individual companies. Even with this kind of indicator analysis there has been a decline in concentration, which means that smaller companies grew, while larger groups record falling market share. CR_4 dropped in 2010 to 73.56% and CR_8 to 89.99%. HHI declined to 1808.33, which is still high, but with the apparent decreasing trend.