

Comparative Analysis of Concentration in Insurance Markets in New EU Member States

T. Pavic Kramaric, M. Kitic

Abstract—The purpose of this article is to analyze the market structure as well as the degree of concentration in insurance markets in new EU member states. The analysis was conducted using several most commonly used concentration indicators such as concentration ratio, Herfindahl-Hirschman index and entropy index. These indicators were calculated for the 2000-2010 period on the basis of total gross written premium as the most relevant indicator of market power in insurance markets. The results of the analysis showed that in all observed countries the level of concentration decreased, though with significantly different intensity. Yet, in some countries, the level of concentration remains very high.

Keywords—insurance market, concentration, new EU member states

I. INTRODUCTION

THE EU was found in 1957 by six countries that signed the Treaty of Rome. Since then, several successive enlargements have followed. On 1 May 2004, the biggest single enlargement of the EU took place when Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovakia and Slovenia (mainly former socialist countries of the Central and Eastern Europe) joined the EU. In 2007, the fifth enlargement was completed with the accession of Romania and Bulgaria on 1 January 2007. The purpose of our paper was to investigate the level of concentration in these post transition countries that have joined the EU in the last decade (Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovakia and Slovenia) to see how the level of concentration had been changing.

Prior to the nineties of the last century, economies of these countries were centrally-planned, therefore, insurance markets were under direct supervision of the state as well. Insurance markets were dominated by a very small number of insurance companies, or by even only one insurance company. The state was providing for the insurance services mostly thorough only one insurance company which had guaranteed monopolistic position (e. g. in Poland it was insurance company PZU s. a., in Czech Republic Česká pojišťovna a.s., in Slovakia Slovenská poisťovňa, in Slovenia Zavarovalnica Triglav d.d., in Hungary Hungaria). As the consequence, we can expect that the level of concentration in these countries is still moderately high. However, along with the accession came a number of changes to the regulatory structure in order to harmonize local legislation with the EU requirements.

Tomislava Pavic Kramaric is with the University Department of Professional Studies in Split, University of Split, Centre Zagreb, 10000 Zagreb, Heinzelova 55, Croatia (phone: +385989195555; e-mail: tpavic@oss.unist.hr).

Maja Kitic is with the University Department of Professional Studies in Split, University of Split, Centre Zagreb, Croatia (email: mkitic@oss.unist.hr)

Specifically, regulatory changes in terms of liberalization and deregulation, with the aim of creating single financial services market, led to very fierce competition. Therefore, we wanted to find out the dynamics how the level of concentration changed. According to the data availability the sample consisted of eight countries, i. e. Bulgaria, Czech Republic, Estonia, Hungary, Poland, Romania, Slovakia and Slovenia. The data were obtained directly from the regulatory agencies supervising insurance markets in the observed countries. The paper is organized in the following manner. The first part relates to the introduction which is followed by the section including the basic indicators of the level of development of the insurance markets in the new EU member states. The third section deals with measures of market concentration where theoretical characteristics of market concentration measures used in the paper are discussed. In the fourth part of this paper we present and explain the values of concentration for the insurance industry in the new EU member states. The references follow after the concluding remarks.

II. LEVEL OF DEVELOPMENT OF INSURANCE MARKETS IN NEW EU MEMBER STATES

These eight new countries that joined EU had varying but considerably lower levels of financial development than was the case in the EU15 or EU27. In a similar way to other member states, the financial systems of new member states are largely bank-based, while other financial sectors, i. e. insurance sectors are still small, but developing fast. The transition of their economies during the past years has taken place with considerable openness towards foreign entry and insurance industries of the countries covered by the sample experienced strong and progressive growth throughout the last two decades.

TABLE IA
LEVEL OF DEVELOPMENT OF INSURANCE MARKETS

| Country | Total premiums to GDP ratio | Average total premiums per capita (in EUR) |
|----------------|-----------------------------|--|
| Bulgaria | 2.26% | 108.33 |
| Czech Republic | 3.90% | 552.93 |
| Estonia | 2.97% | 317.16 |
| Hungary | 3.15% | 306.73 |
| Poland | 3.83% | 354.95 |
| Romania | 1.63% | 92.84 |
| Slovakia | 3.14% | 380.31 |
| Slovenia | 5.91% | 1,021.46 |
| EU15 | 8.88% | 2,513.65 |
| EU 27* | 8.47% | 2,073.34 |

Source: authors' calculation according to Reference [1] *excluding Lithuania

TABLE IB
LEVEL OF DEVELOPMENT OF INSURANCE MARKETS

| Country | Life insurance premium to total premium ratio | Non-life insurance premium to total premium ratio |
|----------------|---|---|
| Bulgaria | 13.53% | 86.47% |
| Czech Republic | 44.64% | 55.36% |
| Estonia | 42.82% | 57.18% |
| Hungary | 52.43% | 47.57% |
| Poland | 58.01% | 41.99% |
| Romania | 19.52% | 80.43% |
| Slovakia | 54.48% | 45.52% |
| Slovenia | 31.33% | 68.67% |
| EU15 | 62.04% | 37.96% |
| EU 27* | 61.63% | 38.37% |

Source: authors' calculation according to Reference [1] *excluding Lithuania

However, as measured by relative indicators as shown in Table I such as *total premiums to GDP ratio* (the total premium income of a country divided by the gross domestic product of a country), *premium per capita* (the total premium income of a country divided by the number of inhabitants in each country) and *share of life insurance premium*, the values of these indicators vary greatly between EU15 member states and new EU member states. The highest level of development of insurance market in the new EU member states was reported in Slovenia, while the lowest level of development was registered in Romania.

III. MEASURES OF MARKET CONCENTRATION

As a measure of market concentration different indicators are used. Among those which are most commonly used are certainly the Concentration Ratio (CR) and Herfindahl-Hirschman Index (HHI). Other measures of concentration such as the Gini Coefficient, the Lerner Index, Hall-Tideman or measure of entropy have been applied very scarcely in the empirical literature, especially in the empirical insurance literature. Therefore, in our paper we have decided to employ concentration ratios, HHI and entropy index. Concentration ratio is a simple measure of industrial concentration and is based on calculation of the size of the market share of n largest firms in the industry. In the example of insurance market it shows the share of gross written premiums that was achieved by the greatest competitors in relation to the total gross written premium that was achieved by the entire insurance industry in the respective year. In practice the n variable usually takes a value of 4, 8 or 12, but may take other values as well. More specifically, depending on the characteristics and requirements facing some empirical researches, and depending on the available data and subjective estimates of analysts, it determines the specific number of the largest companies in the industry that will be in the focus of discussion.

Summing only over the market shares of the n largest companies in the market, it takes the form:

$$CR_n = s_1 + s_2 + s_3 + \dots + s_n = \sum_{i=1}^n s_i \quad (1)$$

where n denotes the number of insurance companies whose shares are calculated, s_i denotes share of the i th insurance

company, i. e. $s_i = \frac{x_i}{X} \cdot 100$. In this calculation x_i denotes total gross written premium of the insurance company, while X denotes total gross written premium of the industry.

Concentration ratio ranges between zero and 100. It approaches zero for an infinite number of equally sized companies (given that the n chosen for the calculation of the concentration ratio is comparatively small as compared to the total number of companies) and it equals 100 if the companies included in the calculation of the concentration ratio make up the entire industry.

Reference [2] states that the most important axioms that a concentration measure should satisfy are as follows:

1. If one firm augments its market share with a resulting reduction of another firm's market share then the concentration should increase.
2. If entry of a new firm occurs concentration should decrease.
3. If mergers occur concentration should increase.

These assumptions are not met by the concentration ratio because it does not comprise all companies in the industry.

Unlike the concentration ratio, Herfindahl-Hirschman index (HHI) includes all companies in an industry and meets all the above assumptions. Therefore, it is superior indicator of concentration in relation to the concentration ratio as well as an alternative and widely used measure. Defined as the sum of the squared market shares of all firms:

$$HHI = s_1^2 + s_2^2 + s_n^2 \quad (2)$$

where S_i denotes the market share of firm i and n denotes the number of firms. According to Reference [3] the HHI index ranges between 10,000 for a pure monopolist (with 100% of the market) to zero for an infinite number of small firms.

According to Reference [4, p. 325] markets with HHI higher than 1800 refer to highly concentrated markets, markets with HHI ranging between 1000 and 1800 refer to moderately concentrated markets, while markets with HHI lower than 1000 belong to low concentrated markets.

However, Reference [5] classifies markets into three types:

- Unconcentrated Markets: HHI below 1500
- Moderately Concentrated Markets: HHI between 1500 and 2500
- Highly Concentrated Markets: HHI above 2500

The HHI has a number of noteworthy properties over the concentration ratios such as: the index counts the market shares of all firms, not merely the top four or eight; the more unequal the market shares of a collection of firms, the greater

is the index because the shares are squared, and, *ceteris paribus*, the more numerous the firms, the lower is the index.

The latter two indices are also often used as proxies for the market structure in structural approaches to measure competition, i.e. the Structure-Conduct-Performance (SCP) paradigm. For example, according to Reference [6] loose oligopoly occurs with many firms with a combined four-firm share below 40%. Loose oligopoly together with monopolistic competition and perfect competition belong to the category known as effective competition, while in a tight oligopoly, the concentration ratio for the largest four firms is over 60%. Finally, a firm is dominant when its market share ranges from 40% to 99%.

The next concentration measure used in the paper is entropy index which takes the form:

$$E = -\sum_{i=1}^n s_i \log s_i \quad (3)$$

The index ranges between 0 and $\log n$, and is therefore not restricted to $[0, 1]$, as most of the other measures of concentration presented above. The value of the entropy varies inversely to the degree of concentration. According to Reference [7] it approaches zero if the underlying market is monopoly and reaches its highest value, $E = \log n$, when market shares of all firms are equal and market concentration is lowest.

IV. LEVEL OF CONCENTRATION IN NEW EU MEMBER STATES

Table IIa and 2b show the market shares of four largest insurance companies operating in the insurance markets in eight new EU member states in the 2000-2010 period. Falling trend of the degree of concentration is observed in major part of eight countries covered by the sample but it was substantially interrupted in Slovakia in 2003 as well as in Estonia in 2004 and 2009. This was primarily due to mergers and acquisitions. More specifically, the concentration ratio of the four leading Slovakian insurance companies indicates a continuous downward movement with the exception of 2003. That year an increase in the level of concentration by almost 5 percentage points was registered. This upturn in the degree of concentration can be explained by the merger of *Slovenská poisťovňa* with *Allianz*. *Slovenská poisťovňa*, which had been a state-owned company, was privatized in a merger with *Allianz*. *Allianz* was the third company by value of gross written premium in 2002, with a market share of 12.25%. The combined entity increased its market share by almost 10 percentage points.

The level of concentration in Estonia also does not fall into pattern of continuous and steady downward trend in the level of concentration. The analysis in greater detailed showed that increase in concentration in the years 2004 and 2009 was partly due to merger and acquisition activities. More specifically, in 2004 the 1st and the 4th ranked companies in life insurance segment increased their market shares by five percentage points altogether due to active sales of unit-linked life insurance products. Moreover, in the non-life insurance

segment the company *Zürich Kindlustuse Eesti AS* transferred its insurance portfolio to *AS If Eesti Kindlustus* (the 1st ranked company in non-life insurance segment) which increased its market share by 4 percentage points. Furthermore, in 2009 *Fennia Mutual Company Estonian Branch* transferred its Estonian insurance portfolio to the 1st ranked company in non-life insurance segment *If P&C Insurance AS*. It also acquired its Latvian and Lithuanian related companies and turned them into branches. Despite the downward trend in the level of concentration in most of the countries included in the sample, it varies significantly between countries. The Estonian and Slovenian insurance markets are highly concentrated — four companies have market share totaling 69.30% and 76.10% respectively. Because of the values of variable CR₄ above 60%, Estonian and Slovenian insurance markets can be characterized as tight oligopoly. Values of concentration ratio CR₄ in Poland and Romania are close to the critical level of 40% after which market structure of insurance markets in these countries could be described as an effective competition.

TABLE IIA
LEVEL OF CONCENTRATION RATIO OF FOUR LEADING INSURANCE COMPANIES (CR₄)

| Country | 2000 | 2001 | 2002 | 2003 | 2004 |
|----------------|-------|-------|-------|-------|-------|
| Bulgaria | n. a. | n. a. | n. a. | n. a. | n. a. |
| Czech Republic | 74.06 | 71.09 | 70.04 | 69.46 | 71.20 |
| Estonia | n. a. | n. a. | 71.24 | 70.53 | 80.87 |
| Hungary | 73.50 | 71.04 | 69.29 | 67.02 | 65.34 |
| Poland | 70.16 | 70.07 | 68.39 | 63.71 | 59.56 |
| Romania | n. a. | 61.65 | n. a. | 52.88 | 49.79 |
| Slovakia | 72.33 | 72.22 | 69.46 | 74.00 | 72.79 |
| Slovenia | 86.56 | 86.70 | 86.73 | 85.67 | 83.68 |

Source: authors' calculations based on data on gross written premium obtained from regulatory agencies of observed countries (see Reference list)

TABLE IIB
LEVEL OF CONCENTRATION RATIO OF FOUR LEADING INSURANCE COMPANIES (CR₄)

| Country | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|----------------|-------|-------|-------|-------|-------|-------|
| Bulgaria | 74.36 | 59.42 | 43.41 | 41.29 | 43.28 | 40.05 |
| Czech Republic | 71.84 | 70.20 | 66.87 | n. a. | 63.36 | 59.53 |
| Estonia | 71.53 | 67.59 | 63.88 | 60.22 | 68.99 | 69.30 |
| Hungary | 64.00 | 60.12 | 57.23 | 56.76 | 55.89 | 55.77 |
| Poland | 56.29 | 52.12 | 48.39 | 49.20 | 41.64 | 43.42 |
| Romania | 47.71 | 43.87 | 43.43 | 42.36 | 41.67 | 43.83 |
| Slovakia | n. a. | n. a. | n. a. | n. a. | n. a. | n. a. |
| Slovenia | 85.81 | 82.18 | 78.99 | 78.30 | 78.09 | 76.10 |

Source: authors' calculations based on data on gross written premium obtained from regulatory agencies of observed countries (see Reference list)

The average values of concentration in the 2000-2010 shown by Figure 2, show that Slovenia has a significantly higher concentration rate than the other new EU member states.

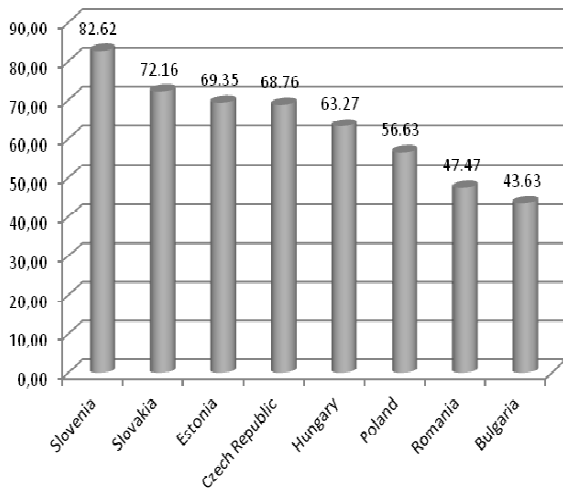


Fig. 1 Average values of CR4 ratio in the 2000-2010 period

Source: authors' calculations based on data on gross written premium obtained from regulatory agencies of observed countries (see Reference list)

As shown in Tables IIIA and IIIB the degree of concentration in new EU member states varies across observed countries. However, decreasing trend in the level of concentration measured by HH index is observed in all countries, but despite this falling trend the values of HHI index remain above the critical level of 1500 in Estonia and Slovenia meaning that these countries belong to the group with moderately concentrated insurance markets. On the other side, Bulgaria, Czech Republic, Hungary, Poland and Romania are characterized by unconcentrated insurance markets.

The substantial increase in HHI is registered in Slovakia in 2003 as well as in Estonia in 2004 and 2009 similarly to increase in the level of concentration measured by CR4 due to M&A activities.

TABLE IIIA
VALUES OF HERFINDAHL HIRSCHMAN INDEX

| Country | 2000 | 2001 | 2002 | 2003 | 2004 |
|----------------|-------|-------|-------|-------|-------|
| Bulgaria | n. a. | n. a. | n. a. | n. a. | n. a. |
| Czech Republic | 2048 | 1970 | 1883 | 1849 | 1962 |
| Estonia | n. a. | n. a. | 1606 | 1646 | 2138 |
| Hungary | 1591 | 1577 | 1560 | 1480 | 1354 |
| Poland | 1788 | 1755 | 1650 | 1447 | 1281 |
| Romania | n. a. | 1221 | n. a. | 895 | 850 |
| Slovakia | 2575 | 2431 | 1732 | 2412 | 2180 |
| Slovenia | 2517 | 2547 | 2566 | 2529 | 2495 |

Source: authors' calculations based on data on gross written premium obtained from regulatory agencies of observed countries (see Reference list)

TABLE IIIB
VALUES OF HERFINDAHL HIRSCHMAN INDEX

| Country | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|----------|------|------|------|-------|------|------|
| Bulgaria | 1721 | 1344 | 699 | 693 | 716 | 659 |
| Czech | 1944 | 1819 | 1641 | n. a. | 1458 | 1315 |

| Republic | | | | | | |
|----------|-------|-------|-------|-------|-------|-------|
| Estonia | 1571 | 1432 | 1318 | 1207 | 1522 | 1517 |
| Hungary | 1308 | 1145 | 1072 | 1077 | 1041 | 1026 |
| Poland | 1152 | 1005 | 819 | 889 | 726 | 705 |
| Romania | 793 | 765 | 743 | 712 | 687 | 707 |
| Slovakia | n. a. | n. a. | n. a. | n. a. | n. a. | n. a. |
| Slovenia | 2489 | 2292 | 2128 | 2119 | 2055 | 1954 |

Source: authors' calculations based on data on gross written premium obtained from regulatory agencies of observed countries (see Reference list)

The average values of Herfindahl-Hirschman index calculated for the 2000-2010 period shown by Fig. 2 suggest that the degree of concentration in the Slovenian insurance sector is one of the highest in new EU member states covered by the sample.

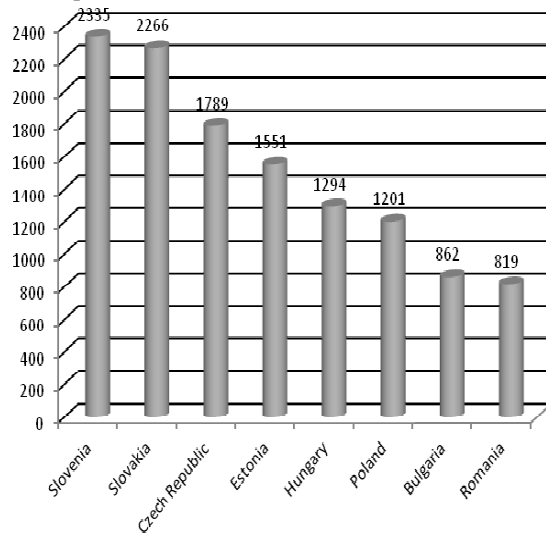


Fig. 2 Average values of HH index in the 2000-2010 period

Source: authors' calculations based on data on gross written premium obtained from regulatory agencies of observed countries (see Reference list)

In terms of concentration degree and its trend, almost identical picture was obtained by entropy index as well. The upward trend is detected in major part of the sample suggesting the decrease in concentration. Once again, the highest level of concentration is achieved in Slovenia, whilst Poland and Romania are characterised by lowest degree of concentration among new eight EU member states.

TABLE IVA
VALUES OF ENTROPY INDEX

| Country | 2000 | 2001 | 2002 | 2003 | 2004 |
|----------------|--------|--------|--------|--------|--------|
| Bulgaria | n. a. | n. a. | n. a. | n. a. | n. a. |
| Czech Republic | 0.9086 | 0.9508 | 0.9602 | 0.9568 | 0.9387 |
| Estonia | n. a. | n. a. | 0.9130 | 0.9100 | 0.8097 |
| Hungary | 0.9188 | 0.9486 | 0.9612 | 0.9966 | 1.0411 |
| Poland | 1.0295 | 1.0368 | 1.0721 | 1.1418 | 1.2069 |

| | | | | | |
|----------|--------|--------|--------|--------|--------|
| Romania | n. a. | 1.1061 | n. a. | 1.2587 | 1.2789 |
| Slovakia | 0.8810 | 0.8994 | 0.9739 | 0.8790 | 0.8995 |
| Slovenia | 0.7327 | 0.7299 | 0.7277 | 0.7374 | 0.7528 |

Source: authors' calculations based on data on gross written premium obtained from regulatory agencies of observed countries (see Reference list)

TABLE IVB
VALUES OF ENTROPY INDEX

| Country | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|----------------|--------|--------|--------|--------|--------|--------|
| Bulgaria | 0.9614 | 1.1170 | 1.2632 | 1.2740 | 1.2654 | 1.2929 |
| Czech Republic | 0.9426 | 0.9410 | 0.9844 | n. a. | 1.0338 | 1.0701 |
| Estonia | 0.8917 | 0.9243 | 0.9562 | 0.9754 | 0.9016 | 0.9032 |
| Hungary | 1.0539 | 1.0994 | 1.1061 | 1.1215 | 1.1346 | 1.1401 |
| Poland | 1.2483 | 1.2788 | 1.3375 | 1.3065 | 1.3637 | 1.3878 |
| Romania | 1.2772 | 1.2781 | 1.2831 | 1.3004 | 1.3049 | 1.2835 |
| Slovakia | n. a. | n. a. | n. a. | n. a. | n. a. | n. a. |
| Slovenia | 0.7558 | 0.8051 | 0.8458 | 0.8484 | 0.8542 | 0.8770 |

Source: authors' calculations based on data on gross written premium obtained from regulatory agencies of observed countries (see Reference list)

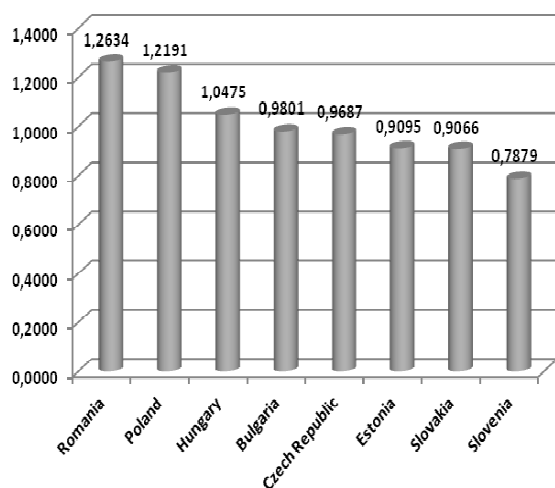


Fig. 3 Average values of entropy index in the 2000-2010 period

Source: authors' calculations based on data on gross written premium obtained from regulatory agencies of observed countries (see Reference list)

V. FINAL REMARKS

The transition of economies of the countries covered by the sample has taken place during the last two decades with considerable openness towards foreign entry and insurance industries of these countries experienced strong and progressive growth. Yet, the values of the main insurance indicators are still below the average of European countries.

Since the purpose of this paper was to analyze the market structure of the insurance market as well as the level of concentration in eight new EU member states (Bulgaria, Czech Republic, Estonia, Hungary, Poland, Slovakia, Slovenia and Romania) concentration ratios, Herfindahl-Hirschman index and the entropy index were computed for the 2000 – 2010 period.

The results of the analysis show that somewhat similar results were obtained by all three different concentration indicators used in the analysis. The downward trend of concentration is observed in major part of the countries included in the sample, although the level of concentration varies greatly among observed countries. More specifically, moderate concentration and presence of tight oligopoly were detected in Estonia and Slovenia, whilst Bulgaria, Czech Republic, Hungary, Poland and Romania can be described as unconcentrated insurance markets.

The reason for different degrees of concentration among observed countries can be found in a fact that these were centrally-planned economies where insurance services were provided mostly by one state owned company. Following the collapse of communism, some countries adopted free-market policies more quickly increasing the proportion of insurance companies operating in insurance markets, especially those with foreign capital which resulted in higher level of competition.

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