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MEASURING THE EFFICIENCY OF SERBIAN INSURANCE COMPANIES

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The transition period, and the still ongoing economic crisis, amplify the volatility in the domestic insurance market and forces the management of insurance companies to continuously monitor changes in the market, i.e. to identify risks and opportunities, and therefore to undertake certain activities. The focus of the business of insurance companies is based on satisfying the needs of existing and potential clients. Respecting the current situation in the insurance market in anticipation of future events, the management of insurance companies must create and implement the optimal strategy in line with the company's capabilities. For this purpose it is necessary to measure the efficiency of the business, which is the subject of this paper where the Data Envelopment Analysis (DEA) method is applied to the case of insurance companies operating in Serbia.

Keywords: data envelopment analysis, efficiency, insurance company, financial information, Serbia

JEL classification indices: C44, G22, M41

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INTRODUCTION

Insurance companies obtain funds by selling insurance policies and placing them financially differently. Labour costs have a significant share in the total costs and it is therefore very important to measure business efficiency. However, due to the specific nature of the insurance companies, it is very difficult to define a quantitative measure of the achieved results towards the input equity, business assets, etc. The emphasis in this paper is on the measurement of efficiency, based on information from financial statements using the DEA method.

Generally, the principle of efficiency is achieved if there are larger economic effects of output with less economic investment (input). According to the classical economic theory, efficiency is measured as the ratio of output and input. In practice, business units have a variety of inputs and outputs. There is a problem if the inputs and outputs cannot be reduced to the same unit of measurement.

In Serbia, the number of insurance companies has increased year over year *(Table 1* and *Figure 1).* Only 4 companies deal with reinsurance and other companies deal only with insurance business such as life and/or non-life insurance. According to the ownership capital structure in the first quarter of 2012, only 7 companies are in a majority domestic ownership.

Table 1

Number of insurance companies in Serbia, 2005–2012

Year	2005	2006	2007	2008	2009	2010	2011	2012
Number of insurance companies	17	17	20	24	26	26	27	28

Source: National Bank of Serbia, www.nbs.rs

The following types of insurances are present in the *total insurance premiums:* accident, health, car insurance, goods in transit, fire and other dangers, other property insurance, automobile liability insurance, general liability, other non-life insurance, and life insurance. The share of life insurance is very low, so there is no sense in inquiring into the relationship between insurance premiums for life and non-life insurance.

The largest increases in market share were achieved by Delta Generali, Wiener Stadtische, and Uniqa, which within three years moved from mid-ranking insurance companies into the top five. Although these companies currently do not

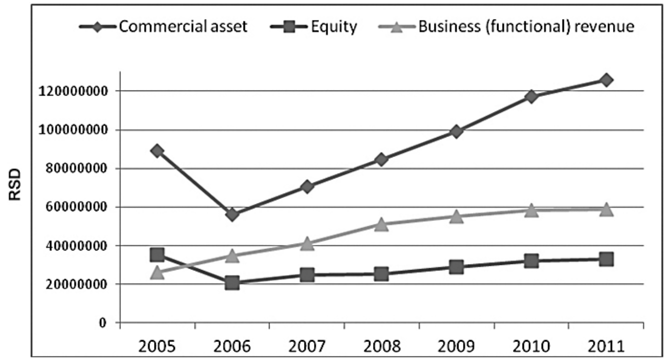

Figure 1. The commercial assets, equity and business revenue of insurance companies in Serbia, Dinar, 2005–2011

Source: Author's calculation based on data of National Bank of Serbia.

threaten the leaders, if their growth continues at this rate, they are expected to become serious competitors. The order of the insurance companies by participation in settled claims with minor deviations follows the order of the gross premium, which is expected, given the fact that the quantity of damage is directly related to the size of the portfolio.

Efficiency shows the degree of effectiveness of the companies that have specific inputs (capital and reserves, deposits, borrowings, engaged funds, property) for the production or services to obtain the output values, e.g. revenues and profit. Partial efficiency is defined as the ratio of one output and one input. This definition of efficiency is most frequently used by financial analysts to measure productivity, efficiency, and profitability. The ratio coefficients are well-known and are useful as a measurement of operational efficiency, but show partial efficiency (Knežević et al. 2011).

1. FINANCIAL INFORMATION AS A BASIS FOR MEASUREMENT OF THE EFFICIENCY IN INSURANCE COMPANY

The reality of the financial statements is particularly affected by the following important aspects:

- Proper evaluation of receivables;
- Adequate capital formation;
- Realistically reported technical reserves; and
- Complete inclusion of liabilities in the accounting books.

In accordance with International Financing Reporting Standards (IFRS) 4 there is a need to apply the liability adequacy test, which is based on certain assumptions, estimates of cash flows that are related to contracts of life insurance portfolio and correlated with expected future cash flows, relating, at the same time, to cash flows arising from guarantees in life insurance.

Certified actuary gives the opinion whether he/she agreed with the method and manner of the calculation of unearned premiums, outstanding claims, reserves for risk, and the calculated gain of mathematical reserves. The Solvency II Directive has a major impact on risk management in insurance companies and in the realm of solvency regulation at the EU level, whereby the following factors are incorporated: credit risk, market risk, insurance risk, and operational risk.

2. BACKGROUND INFORMATION ON THE DEA METHOD

DEA method

Data envelopment analysis (DEA) is a specifically defined procedure for measuring the efficiency of complex units of business system with a variety of inputs and outputs (for a detailed description, see Charnes et al. 1978). Decision Making Unit (DMU) is the standard name for the business units (here, insurance companies) that are included in the efficiency analysis. DEA gives the results on DMU in terms of efficiency and inefficiency, as well as how much is necessary to reduce a certain input and/or increase a certain output to make a particular DMU effective.

The implementation of the DEA method goes through phases, each with its own assumptions (Cooper et al. 2006). *Firstly,* the input/output values have to be higher than or equal to zero. *Secondly,* the property of isitonosity means that the increase in an input causes the increase in an output without reducing any other input. The property of isitonosity can be proved through a correlation analysis of the given inputs and outputs. The minimum number of DMUs is 3 and, according to the literature, the number of DMUs should be larger than the total number of inputs and outputs, since it is the aim of the DEA to present every DMU as efficient as possible. The weighting factors developed by the DEA method serve the stated purpose, i.e., to try to present every DMU as efficient as possible in comparison with the other DMU in the set of units under study. Some restrictions to weights, however, can be introduced. *Thirdly,* the assumption of homogeneity of the DEA method means that the set of DMUs is relatively homogenous when the units included are uniform (similar), i.e., when they share at least one common feature. The larger the number of their common features, the more homogenous the set.

Besides, the set of DMUs should be differentiated and complete. The DMU set is differentiated when the units under study are uniform, but not identical. The aim of the analysis is to test the differentiation and quantify the efficiency of DMUs included in the set. The set of DMUs is complete if it includes all individual cases of the phenomenon under study in time and in space.

The first approach, the efficiency of a DMU, is defined as a ratio of output to input, and shows partial efficiency of DMU. This is a parametric test. The second approach is nonparametric and is based on the fact that the evaluation of the efficiency of the unit, especially the non-profit one, usually must consider multiple inputs and outputs, which are diverse by their nature (financial, technical, technological, social, etc.), and which are in different measurement units. In such cases, one cannot draw a conclusion about the level of efficiency based on partial efficiency indicators that measure the efficiency of certain elements of the unit. Therefore, it is necessary to define a summarised synthetic indicator of the unit efficiency that would take into account all important elements of inputs and outputs in the whole, which have been used to achieve them. As a non-parametric method, we use the DEA method to measure efficiency.

The formula for the application of DEA efficiency is as follows:

$$\text{DEA } \mathit{efficiency} = \frac{\mathit{weighted\ sum\ of\ outputs}}{\mathit{weighted\ sum\ of\ inputs}}$$

The above definition of DEA efficiency allows the aggregation of observed inputs and outputs into a single virtual input and virtual output as a ratio of the sum of the product weight coefficients and values of the input and the sum of the product weight coefficients and values of the output.

The DEA method estimates every DMU as relatively efficient or relatively inefficient. DEA estimates the efficiency of a DMU by maximising the ratio of the weighted sum of outputs over the weighted sum of inputs. This ratio is between 0 and 1; if it equals 1, then it indicates an efficient unit. For every inefficient DMU, the DEA method identifies the level and content of inefficiency for each input and output. That level of inefficiency is determined by comparison with a reference DMU or with a convex combination of other referent DMUs located on the efficiency frontier and which use proportionally the same level of input, and produce proportionally the same or the higher level of output.

The DEA method has different models depending on the approach to the input and output analysis. The model results have different economic interpretations depending on the approach and they can still serve for the management of efficient and inefficient units.

Barros et al. (2010) have analysed technical efficiency in a representative sample of Greek insurance companies during the period from 1994 to 2003. Also, the analysis is based on a two-stage procedure proposed by Simar – Wilson (2007).

Cummins et al. (2010) have analysed whether it is valuable for insurers to offer both life-health and property-liability insurance, or to specialise in one major industry segment.

Basic models of the DEA method

MODEL D1. Let x_{ij} be the observed input value of i-th class for DMU$_j$ ($x_{ij} > 0$, $i = 1,2, \ldots, m$, $j = 1,2, \ldots, n$), and the observed output value of r-th class for DMU_j ($y_{rj} > 0$, $r = 1,2, \ldots, s$, $j = 1,2, \ldots, n$).

Charnes et al. (1978) have proposed that for each DMU$_k$, $k = 1, 2, \ldots, n$, the optimization problem should be solved in the following form (known as the CCR ratio model):

$$\max h_k(u,v) = \sum_{r=1}^{s} u_r y_{rk} / \sum_{i=1}^{m} v_i x_{ik}$$

under conditions

$$\sum_{r=1}^{s} u_r y_k \ / \sum_{i=1}^{m} v_i x_k \ \leq 1, u_r \geq 0, v_i \geq 0,\ r = 1, 2, ..., s, j = 1, 2, \ldots,\ m,$$

where h_k is a the relative efficiency of k-th DMU, n is the number of observed DMUs, m is the number of inputs and s the number of outputs, u_r is a weighting coefficient for output r and v_i weighting coefficient for input i. Weighting coefficients u_r and v_i are the unknown variables in the model that are determined by optimisation and they construct a virtual input and virtual output. So DMU$_k$ chooses weight values (weights) for inputs and outputs so that its efficiency is maximised and the value of weight must be permissible to all DMUs involved in measuring the efficiency, so that for each DMU, the ratio of weighted sum of outputs and weighted sum of inputs is less than or equal to one. The condition that $\sum_{r=1}^{s} u_r y_{rk} / \sum_{i=1}^{m} v_i x_{ik} \leq 1$ means that each DMU lies on or below the efficiency.

From the above it can be concluded that $0 \leq h_k \leq 1$. If h_k equals 1, then k-th DMU is relatively efficient, meaning that no other DMU can achieve higher value of output for the given input. Efficient k-th DMU has the optimum values for the weighting coefficients. If h_k is less than 1, then k-th DMU is relatively inefficient and the value h_k indicates for how many percentages k-th unit needs to reduce its inputs (Cooper et al. 2006). Weighting coefficients u_r and v_i indicate the level of importance of every input and output for each DMU, so that each DMU can be as efficient as possible. This model is non-linear, non-convex with a linear fractured goal function and constraints.

MODEL D2. Model D1 can be reduced to a linear model in the following way (for a detailed description, see Cooper et al. 2006)

(A) $\max z = \sum_{r=1}^{s} u_r y_{rk},$

with conditions $\sum_{i=1}^{m} v_i x_{ik} = 1, u_r \geq 0, v_i \geq 0, \sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ik} \leq 0, j = 1,2,\ldots,n,$

$u_r \geq \varepsilon, v_i \geq \varepsilon$, where ε is a low positive value, that is, $\varepsilon > 0$, r = 1, 2, …, s, j = 1,2,…,m,

Model D2 maximizes the virtual output provided that its virtual input equals 1. Data limitations mean that the optimal weight for the k-th DMU must satisfy the condition that for each n DMU, its virtual output cannot be greater than its virtual input. If the value of the objective function equals to 1, then all remaining units of their virtual output will be less than the virtual input. If the value of the objective function is less than 1, then the units in which their virtual output is equal to their virtual input form reference units for the k-th DMU, that is facet form (edge border of efficiency) compared to that measured in its level of efficiency.

For the model (A) dual linear programming problem is

(B) $\theta = \min z,$

with conditions that

$$\sum_{j=1}^{n} \lambda_j x_{ij} \leq \theta x_{ik}, i = 1,2,...,m, \qquad \sum_{j=1}^{n} \lambda_j y_{rj} \geq y_{rk}, r = 1,2,...,s, \qquad \lambda_j \geq 0, j = 1,2,...,n.$$

These are known as CCR models (Charnes–Cooper–Rhodes 1978) as they assume a constant return to scale (Constant Returns to Scale Model). If we add the condition that $\sum_{j=1}^{n} \lambda_j = 1$, then we receive models known as the BBC models (Banker–Charnes–Cooper 1984) or VRS models (The Variable Returns to Scale Model), depending on the literature used. The efficiency frontier provided by CCR models in the form of a convex cone (cone convex).

The relative efficiency of the CCR model is always less than or equal to the relative efficiency given by the BCC model (VRS), i.e.

$$CRS\ efficiency\ score \leq VRS\ efficiency\ score.$$

The CCR model estimates the total technical efficiency (TTE) of a DMU unit that includes pure technical efficiency (PTE) and scale efficiency (SE). If the CCR model is input-oriented, then the goal is to minimize inputs for given outputs. In contrast to the input-oriented model, the output-oriented model's goal is to maximise the outputs for a given level of inputs. In the input-oriented model, efficiency improves with a proportional reduction in inputs, and outputs or orientation requires a proportional increase in outputs. The results of the input- and output-oriented CCR models are interrelated and their product is equal to one.

The CCR model estimates the total technical efficiency of DMU*k*-th unit, while the BCC model estimates the pure technical efficiency (PTE) showing how much an insurance company can radically increase its outputs when projected to VRS frontier while still remaining at the same input level, i.e. it gives an estimate of efficiency that ignores the effect of the size of business by *k*-th DMU compared only with other units of similar size.

The scale efficiency (SE) can be calculated if the measure of efficiency obtained by the CCR model is divided by the measure of efficiency obtained by the BCC model,

$$SE = Scale\ efficiency\ = \frac{CRS\ efficiency\ score}{VRS\ efficiency\ score} = \frac{TTE}{PTE} \text{ and } SE \leq 1\,.$$

SE shows that the observed unit (the insurance company) operates with optimum volume operations. If SE is equal to 1, then the insurance company is already at its optimum scale size in period *t*.

3. APPLICATION OF THE DEA MODEL TO INSURANCE COMPANIES

In the remainder of this paper, we will present the implementation of the CCR input-oriented DEA method. The above method is applied because of the elections and the behaviour of input and output values. As the number of insurance companies has changed from period to period, we chose the years 2009, 2010 and 2011 due to the comparability of data for analysis (see *Table 1*).

We used data on commercial assets, wages, salaries and other personnel costs, and equity as inputs, and business functional revenue before tax (EBT) for the output. The equity of the insurance company is a starting component, as well as the assets for the efficient insurance company operations. The number of employees was not available, thus we have taken wages, salaries, and other personnel costs. There is a strong relation between the total revenue (financial, business, and other) and total assets that an insurance company uses in order to achieve its business goals.

Medved – Kavčić (2012) analysed the efficiency of the Croatian and Slovenian insurance market using DEA. Although they used the CCS model, their results are not comparable for the analysis of the Serbian insurance market because they used different inputs and outputs. In their work, an intra- and inter-state analysis of the efficiency was performed, meaning that it focused on testing the effectiveness of the Croatian and Slovenian insurance market and not the individual insurance companies.

The variables of inputs considered in our study are Assets (X1), Amount of Labour (X2), and Equity Capital (X3).

- Assets (X1): Assets of insurance companies is characterised by a high share of investments, so that they represent important institutional investors in the financial market. The assets structure of insurance companies is to a significant extent determined by the legislation in the function of protection from risky placements and of ensuring the liquidity and solvency of the company.
- Amount of Labour (X2): Labour is the most important input in the financial service industry.
- Equity Capital (X3): Capital has the function of protection (from financial and operational losses due to unexpected events) and the function of guarantee. Equity capital is the second indicator of input.

The variables of outputs considered in the present study are Revenues (Y1) and EBT (Y2).

- Revenues (Y1) represent a key expression of the insurance company's successful business and sales policy and are one of the key terms of the society funds management efficiency.
- EBT – Profit before tax (Y2) is an expression of the ability of the management to effectively dispose of and manage an insurance company's assets. The profit of insurance companies is mostly influenced by the earned premiums, interest and dividends on invested assets on the one hand and paid compensatory damage claims on the other hand. Increased productivity and profitability of insurance companies positively affects the strength of their competition in the competition services market.

The total efficiency of Serbian insurance companies were calculated using Excel Solver to set appropriate conditions of model D2 (B). The results are shown in *Table 2*.

Table 2

The relative efficiency scores for 2009, 2010 and 2011

Insurance companies	CRS efficiency score – Ck			Chain indices – L_k		The average efficiency
	2009	2010	2011	2010/2009	2011/2010	
AIG LIFE	7.84%	14.82%	16.49%	189.03	111.29	12.42%
AMS	100.00%	100.00%	100.00%	100.00	100.00	100.00%
AS NEŽIVOT	35.16%	82.49%	76.70%	234.59	92.99	60.59%
BASLER NEŽIVOTNO	8.35%	6.36%	13.93%	76.20	218.95	9.04%
BASLER ŽIVOT	5.99%	10.54%	15.46%	175.98	146.76	9.92%
CREDIT AGRICOLE LIFE (AHA)	39.85%	48.47%	31.66%	121.63	65.31	39.40%
AHA NEŽIVOT	–	–	0.11%	–	–	0.11%
DDORNOVI SAD	100.00%	100.00%	97.77%	100.00	97.77	99.25%
DDORRE	0.00%	0.00%	22.06%	–	–	0.00%
DELTA ĐENERALI OSIGURANJ	100.00%	100.00%	100.00%	100.00	100.00	100.00%
DELTA ĐENERALI REOSIGURANJ	100.00%	100.00%	36.05%	100.00	36.05	71.17%
DUNAV OSLGURANJE	82.22%	77.50%	77.45%	94.27	99.93	79.03%
DUNAV-RE	100.00%	100.00%	46.92%	100.00	46.92	77.71%
ENERGOPROJEKT GARANT	100.00%	100.00%	30.21%	100.00	30.21	67.10%
GLOBOS OSLGURANJE	36.46%	36.46%	49.80%	100.00	136.58	40.46%
GRAWE	100.00%	100.00%	59.77%	100.00	59.77	84.24%
MERKUR OSLGURANJE	63.96%	63.96%	75.51%	100.00	118.06	67.60%
MILEN IJUM	100.00%	100.00%	88.88%	100.00	88.88	96.14%
SAVA	100.00%	100.00%	100.00%	100.00	100.00	100.00%
SAVA ŽIVOT	1.43%	1.43%	32.20%	100.00	2250.87	4.04%
SOCIETE GENERALE	0.00%	0.00%	38.29%	–	–	–
TAKOVO	93.91%	93.91%	100.00%	100.00	106.48	95.90%
TRIGLAV KOPAONIK	94.76%	88.17%	100.00%	93.05	113.41	94.19%
UNIQA NEŽIVOTNO OSIGURA	73.12%	73.12%	100.00%	100.00	136.77	81.16%
UNIQA ŽIVOTNO OSIGURANJ	64.69%	58.32%	41.34%	90.15	70.87	53.83%
WIENER RE	100.00%	70.25%	75.86%	70.25	107.98	81.07%
WIENER STÄDTISCHE	100.00%	99.59%	100.00%	99.59	100.41	99.86%

Source: Authors's calculation based on the data of the National Bank of Serbia, for companies engaged in non-life and life insurance and combined.

If C_k equals 100, the *k*-DMU (the insurance company) is relatively efficient and if C_k is below 100, the *k*-DMU (the insurance company) is relatively inefficient. The efficiency score in percentages indicates the relative position of the insurance companies in the set of banks in relation to the efficient frontier of the Serbian insurance sector for each year. Over the years, some of the observed companies have changed their efficiency. The insurance companies with a value

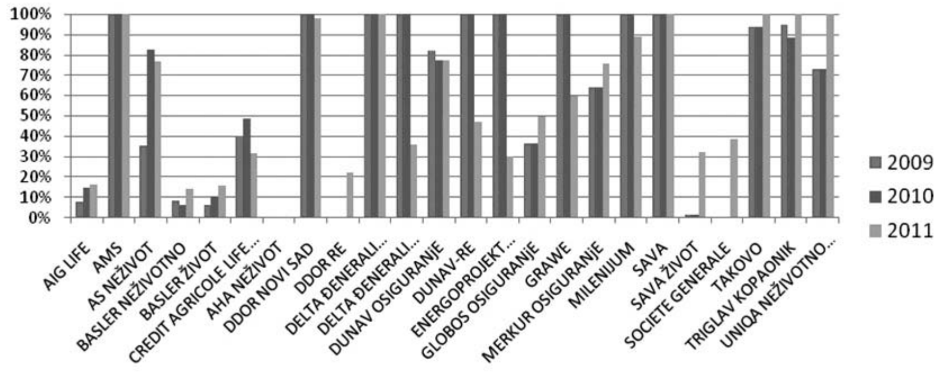

Figure 2. CCR efficiency indices of insurance companies for 2009, 2010 and 2011

Source: Authors's calculation.

of efficiency index of 100% are reaching the efficient frontier. For example, for the year 2011, only 7 insurance companies have reached the efficient frontier. Only 4 companies (AMS, Delta Generali, SAVA, and WIENER STADTISCHE) had 100% efficiency in all observed years, while DDOR Novi Sad had a 100% efficiency in 2009 and 2010 only.

Table 2 shows that some companies have very low efficiency: AHA NEZIVOTNO, DDOR RE, and SOCIETE GENERALE. At the same time AIG LIFE, BASLER NEŽIVOTNO, BASLER ŽIVOTNO, GLOBOS OSIGURANJE, and

Table 3

Descriptive statistics per year for insurance branch

CCR efficienty - Descriptive statistics			
	2009	2010	2011
Mean	63.25%	63.90%	60.24%
Geometric mean	50.13%	37.24%	41.84%
Standard error	0.08	0.08	0.07
Standard deviation	0.41	0.40	0.34
Sample variance	0.17	0.16	0.11
Kurtosis	–1.47	–1.24	–1.49
Skewness	–0.56	–0.66	–0.13
Range	100.00%	100.00%	99.89%
Count	27	27	27

Source: Authors's calculation.

Table 4

The scale efficiency for 2009, 2010 and 2011

Insurance companies	Scale efficiency – SE			Geometric mean
	2009	2010	2011	
AIG LIFE	8.44%	20.89%	29.26%	17.28%
AMS	100.00%	100.00%	100.00%	100.00%
AS NEŽIVOT	55.70%	90.55%	87.79%	76.22%
BASLER NEŽIVOTNO	10.51%	9.66%	19.61%	12.58%
BASLER ŽIVOT	5.99%	10.54%	16.64%	10.16%
CREDIT AGRICOLE LIFE (AHA ŽIVOT)	45.07%	48.47%	50.70%	48.02%
AHA NEŽIVOT	–	–	–	–
DDOR NOVI SAD	100.00%	100.00%	97.77%	99.25%
DDOR RE	0.00%	0.00%	22.06%	0.00%
DELTA ĐENERALI OSIGURANjE	100.00%	100.00%	100.00%	100.00%
DELTA ĐENERALI reosiguranje	100.00%	100.00%	47.38%	77.96%
DUNAV OSIGURANjE	82.22%	77.50%	77.45%	79.03%
DUNAV-RE	100.00%	100.00%	87.84%	95.77%
ENERGOPROJEKT GARANT	100.00%	100.00%	34.07%	69.84%
GLOBOS OSIGURANjE	66.81%	56.06%	67.26%	63.16%
GRAWE	100.00%	100.00%	74.73%	90.75%
MERKUR OSIGURANjE	63.96%	63.96%	75.51%	67.60%
MILENIJUM	100.00%	100.00%	90.30%	96.66%
SAVA	100.00%	100.00%	100.00%	100.00%
SAVA ŽIVOT	1.56%	1.43%	32.20%	4.16%
SOCIETE GENERALE	–	0.00%	38.45%	–
TAKOVO	93.91%	96.03%	100.00%	96.61%
TRIGLAV KOPAONIK	99.28%	88.17%	100.00%	95.66%
UNIQA NEŽIVOTNO OSIGURANjE	83.77%	74.43%	100.00%	85.43%
UNIQAŽIVOTNO OSIGURANjE	85.53%	71.58%	77.68%	78.06%
WIENER RE	100.00%	70.25%	76.64%	81.35%
WIENER STÄDTISCHE	100.00%	99.59%	100.00%	99.86%

Source: Authors's calculation.

SAVA ŽIVOT show a slow increase in efficiency from year to year for the reference period, which was from the beginning of a very low intensity.

Chain indices L_k or Technical efficiency change are showing relative changes. If $L_k > 100$, it means positive relative change (increase) of efficiency compared to the previous year, while if $L_k < 100$, it means a reduction of efficiency (decrease). For $L_k = 100$ means that the DMUs have maintained the same relative level.

It can be observed based on *Table 2* that efficiency varied from year to year and from company to company: some had an upward and some a downward trend. For example, DUNAV OSIGURANJE has been recording a decrease in ef-

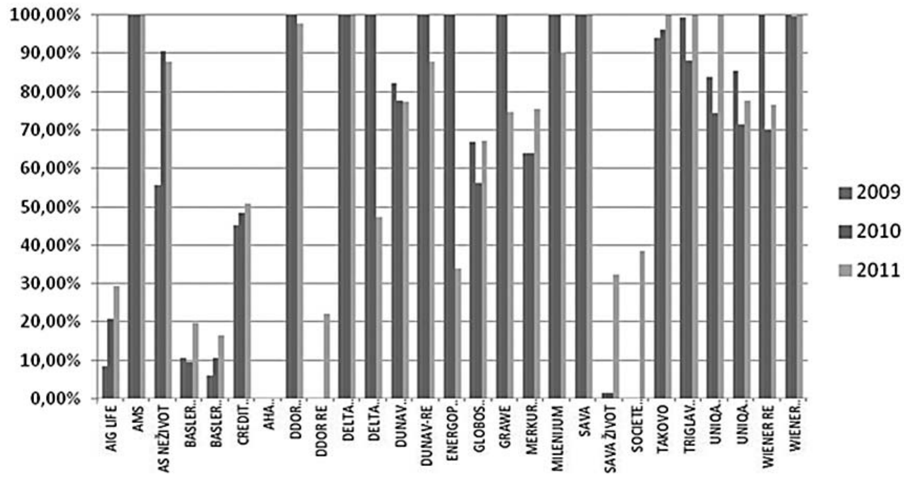

Figure 3. The scale efficiency of insurance companies for 2009, 2010 and 2011

Source: Authors's calculation.

ficiency from year to year, as had WIENER STADTISCHE. GRAWE insurance had a 100% efficiency for 2009 and 2010, while for 2011 it had only a 59.77% efficiency. Statistical parameters for CCR efficiency scores are given in *Table 3*.

In this paper, we focus on the use of the geometric mean because it is about relative numbers and it is observed that some authors use the arithmetic mean for the analysis of time series in their papers, which is unacceptable.

The average efficiency per year is different as the variability of efficiency.

The scale efficiency (SE) is equal to 100 for DELTA ĐENERALI OSIGURANJE and SAVA, meaning that the insurance companies are already at their optimum scale size for 2009, 2010 and 2011. It can be observed based on the *Table 4* and *Figure 3* that the scale efficiency varied from year to year and from company to company: some had an upward and some a downward trend.

4. CONCLUSIONS

To examine the relationship between strategy and performance of the insurance company, we need necessary information in order to measure the financial and non-financial performance. For this, it is necessary to identify goals and provide relevant information to monitor them in order to achieve work efficiency.

Financial information is necessary for the measurement of the financial results. The financial statements of insurance companies need to ensure public confidence in the insurance industry, and the protection of the insured by third parties as a key source of financial information (shareholders, government, and others). Details of the financial statements have to be monitored from year to year for comparison and improvement of work efficiency. The financial statements have a certain value for each of the potential users of this information. The owners of capital value a company in relation to how much profit they make, constantly scanning the environment in search for a more efficient use of capital, and to make good decisions necessary for high quality financial information. This paper is aimed at presenting a DEA method for testing the work efficiency of insurance companies using financial statement data. In practice, in the application of the DEA method, we have to choose inputs and outputs which are very important for testing the work efficiency levels of society. However, it should be noted that other up-to-date scientific methods should be also used to complement traditional financial statement analysis using known indicators of efficiency.

Key areas that the insurance companies operating in Serbia should specifically address at this point is raising the quality of corporate governance, which among other things includes a system of adequate internal controls, improving risk management, promoting investment assessment techniques, strengthening the reporting transparency, strengthening good business practices and fair treatment of clients, and activities to educate potential clients, which will contribute to the strengthening of trust and the creation of conditions for the development this segment of the financial system. Insurance companies as institutional investors are of particular importance on the Serbian financial markets.

The insurance market in Serbia (the indigenous sector) is still at a low level of development compared to neighbouring countries, taking into account the amount of the premiums per capita and the share premium in GDP. At first glance, Serbia appears to be an unexciting and unpromising market for insurance. In absolute terms, it is small. Non-life premiums have been stagnant. There is no obvious catalyst for non-life penetration to grow – except for joint initiatives between the government and the trade association to promote compulsory insurance lines in particular niches. Although Serbia is not, and is some way from becoming, a full member of the EU, the market is crowded with foreign players.

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