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DETERMINANTS OF BUSINESS PERFORMANCE OF NON-LIFE INSURANCE COMPANIES IN SERBIA*

Determinante poslovnih performansi kompanija za neživotno osiguranje u Srbiji

Abstract

The possibilities for growth of the insurance sector and its contribution to the development of the national economy are conditioned by business performance of insurance companies. This paper presents results of the assessment of performance of companies engaged in non-life insurance business in Serbia. Empirical research was conducted on the basis of financial statements of non-life and composite insurers during the period 2006-2013 by using CARMEL indicators and multiple regression analysis. The estimated model with individual fixed effects on panel data indicates a significant and negative influence of the combined ratio, financial leverage and retention rate on the profitability of non-life insurers, as measured by the return on assets (ROA), while the influence of the written premium growth rate, return on investment and company size is significant and positive. Conducted research enriches the information basis for the creation of business strategy and formulation of business policy of non-life insurers in Serbia.

Key words: *non-life insurance, business performance, profitability, solvency, liquidity, CARMEL*

Sažetak

Mogućnosti rasta sektora osiguranja i njegovog doprinosa razvoju nacionalne ekonomije opredeljene su performansama poslovanja osiguravajućih kompanija. U radu su prezentovani rezultati ocene performansi kompanija koje se bave poslovima neživotnih osiguranja u Srbiji. Empirijsko istraživanje je sprovedeno na osnovu finansijskih izveštaja neživotnih i kompozitnih osiguravača tokom vremenskog perioda 2006-2013. godine, primenom CARMEL pokazatelja i višestruke regresione analize. Ocenjeni model individualnih fiksnih efekata na podacima panela ukazuje na značajan negativan uticaj kombinovanog racija, finansijskog levridža i stope samopridržaja na profitabilnost neživotnih osiguravača, merene stopom prinosa na aktivu (ROA), dok je uticaj stope rasta fakturisane premije, stope investicionog prinosa i veličine kompanije značajan i pozitivan. Sprovedenim istraživanjem se obogaćuje informaciona osnova za kreiranje poslovne strategije i formulisanje politike poslovanja neživotnih osiguravača u Srbiji.

Ključne reči: *neživotno osiguranje, performanse poslovanja, profitabilnost, solventnost, likvidnost, CARMEL*

Introduction

The performance of insurance companies is in the focus of interest of various stakeholders, including management, current and potential policyholders, shareholders and future investors, creditors and supervisory authority for the insurance market. Subject of the analysis is a comprehensive evaluation of the performance of non-life insurance companies in Serbia. In general, business performance of the insurance companies is conditioned by the influence of a number of factors which can be internal or external by their nature. Internal factors relate to the specific characteristics of individual companies, such as the structure of the insurance and investment portfolios, financial structure, size, and age of the company. On the other hand, external factors include characteristics of the macroeconomic environment that are beyond the impact of insurers, such as the level of development of the national economy and financial market as well as the relevant legal regulations. Due to their systematic or systemic character, external factors affect the performance of the overall insurance sector (or its segments) to a greater or lesser extent. However, the differences in performance between individual companies operating within the same insurance sector can be explained by the influence of internal factors that are specific for each of them.

The aim of the study is to identify the key factors of business performance of non-life insurance companies in Serbia and to measure their effects. The principles of safety, liquidity and profitability represent postulates of functioning of each insurance company as well as of entities in other business areas. Since the primary function of insurance is reflected in providing economic and social protection from risks, it is logical that the security principle appears as a crucial guideline for decision-making in all aspects of insurer's operations. A timely fulfilment of obligations towards policyholders imposes preservation of solvency, i.e. long-term financial security as an imperative for the business policy of insurers. Long-term earning capacity of a business entity is a safe indicator of its long-term financial security. Therefore, profitability is a key indicator of insurance company's business performance and the primary objective of its management. In the long-term perspective, profit is not only a prerequisite of insurer's solvency, but also has an important role to "persuade" policyholders and shareholders to entrust their available funds to an insurance company. Insurers' profit margins become narrower with intense market competition and unfavourable macroeconomic environment. Under such conditions, knowledge of the direction and intensity of impact of various internal factors on the profitability of insurers becomes an important pillar of the process of making business and strategic decisions.

The first section of the paper reviews results of the previous empirical studies of determinats of insurance companies' performance. After an elaboration of data and methodology used in this study, insurers' performance will be assessed through calculation of relevant quantitative indicators, with a special emphasis on the dispersion of their values between companies, as well as demonstrated trends of their movements over time on the level of the non-life insurance sector. A concrete empirical model which describes the impact of key internal factors on the profitability of non-life insurers in Serbia will be defined and estimated in the rest of the paper.

Literature review

The concept of performance of financial institutions has an important place in financial theory in recent decades. The financial sectors in developing countries are becoming opened for foreign capital entry in the current conditions of financial internationalization, integration, and liberalization. Due to intensified market competition, there is a need to examine the factors that determine the performance of participants in the sector of financial services. Contemporary literature abounds with examples of studies of determinants of banks' performance [24], [12], [3], while research papers on performance of insurance companies are relatively scarce and more recent.

Lee [19] conducted a study of relationship between performance of insurance companies and the relevant internal and external factors on a sample of 15 non-life insurers in Taiwan using the panel data over the period 1999-2009. The return on assets and operating ratio were used as performance indicators of insurers. Both indicators

are subject to the negative impact of loss ratio, expense ratio and retention rate, as well as the positive impact of investment return and market share of insurers. Although the use of financial leverage reduces the need for capital, its overly high value is reflected in the lower market value of the company, thus reducing its profitability (measured by the return on assets) and leading to insolvency problems in the future. Rate of economic growth has a significant impact on the operating ratio, but not on the return on assets of insurers, while the impact of the inflation rate is insignificant in both cases.

Bawa & Chattha [4] investigated interdependence of profitability of insurance companies and relevant indicators of their size, liquidity, solvency and financial leverage. The research was based on the case of 18 life insurance companies in India during the period 2007-2011. The estimated regression model revealed positive impact of liquidity and size of surveyed companies on their profitability. Browne et al. [6] also empirically demonstrated that insurer's size is directly linked to its profitability, on the example of life insurance companies in the United States. However, the size of the company was not found to be an important determinant of business performance of companies on the Bermuda insurance market according to Adams & Buckle [1].

Similarly, Shiu [29] found a statistically significant relationship between liquidity and performance of non-life insurance companies in the UK, measured by their investment yield, percentage change in shareholders' funds and return on shareholders' funds. However, using investment yield as a performance measure, Ismail [15] proved the opposite – increase in the share of liquid instruments in the structure of insurer's assets leads to a reduction in profitability due to the relatively lower risk and, consequently, lower yield compared with long-term investments.

Burca & Batrînca [7] observed the return on assets of insurers, as a proxy of their financial performance, as a function of 13 explanatory variables, including the specific characteristics of insurers but also of their macroeconomic environment, within the panel model with fixed effects. Their investigation was performed on the data for 21 insurance companies operating in Romania during the period 2008-2012. According to the gained results, the company's size, solvency margin and the degree of risk retained in own coverage positively influence its financial performance. On the other hand, the effect of combined ratio, financial leverage and rate of written premium growth on insurers' return on assets is negative. Bilal et al. [5] also proved that financial leverage is negatively correlated with the profitability of insurers.

On the example of eight companies that dealt with life insurance business in Tunisia during the period 2005-2012, Derbali [11] found that the most important determinants of insurers` performance, measured by the return on assets, are the size, age and growth rate of insurance premium. Estimation of regression model on panel data indicates that smaller life insurers are relatively more efficient than large companies. Maturity at the same time has a positive effect on insurer's profitability, on the basis of more experience, reputation and recognized brand. The written premium growth also contributes to the profitability of insurance business, through intensified underwriting activities and market expansion. On the other hand, Mehari & Aemiro [23] found that the size of the insurance company positively affects its performance while Malik [21] claims that there is no empirical evidence of the significant impact of age on the performance of insurers.

Empirical findings regarding the relationship between performance of insurers and the degree of diversification of their portfolios are also contradictory. Fiegenbaum & Thomas [13] show that insurers who follow a product diversification strategy have combined ratio that is lower than market average. However, using a Herfindahl Index-derived measure of product diversification, Tombs & Hoyt [31] reported that diversified insurers generate relatively lower risk-adjusted returns. Based on sample of 321 life insurers in the United States over the period 1990 to 1995, Meador et al. [22] proved that companies who are diversified across multiple product lines are more efficient than those that are focused on one or a small number of lines of business. On the other hand, using a 10-year sample (1995 to 2004) of 914 insurance companies, Liebenberg & Sommer [20] found that undiversified companies outperform those that are diversified. Lee [19] empirically proved that the

influence of insurance portfolio concentration on company's performance, although negative, is not significant.

Data and methodology of analysis

Recording premium income of approximately RSD 49.9 billion in 2013, non-life insurance sector achieves a dominant share (of 78.0%) in the overall insurance portfolio on the Serbian insurance market. Non-life insurance activities are dealt with a total of 17 insurance companies in 2013, of which 11 companies are engaged solely in non-life, and the remaining 6 companies in both life and non-life insurance [27, p. 7]. However, units of observation in the analysis of non-life insurance sector performance in Serbia were only companies that operated continuously during the period covered by analysis, in order to increase generalization capabilities of its conclusions. These are 12 insurance companies that were involved in non-life insurance over the previous eight year period (2006-2013), which formed the sample of 96 observations for each of the variables. According to data from 2013, cumulative absolute market share of these companies in the non-life insurance sector amounts to 90.1% [25], due to which given sample can be considered representative.

Performance analysis of non-life insurers is carried out using a set of ratio indicators that are developed by the International Monetary Fund, in the function of measuring weights and vulnerabilities of the insurance sector, as one of the parts of the entire financial system. These indicators are classified into six categories: Capital Adequacy, Asset quality, Reinsurance and actuarial issues, Management soundness, Earnings and profitability and Liquidity, which is why the generally accepted acronym CARMEL is used for their labelling. Proceeding from the financial statements of insurance companies, CARMEL framework allows assessment of their financial position and earning capability, as well identification, analysis and monitoring of a wide range of risks that jeopardize their operating. Respecting limitations in terms of the data availability, 22 CARMEL indicators were used as basic research variables. The analysis is conducted on the basis of the descriptive statistics (measures of central tendency and dispersion) of calculated indicators per unit

of observation in the previous year and also through the monitoring of the movements of their average values for the overall non-life insurance sector during the covered period.

Determinants of performance in non-life insurers are identified and the impact of each of them estimated in the study through multiple regression analysis. The returns on assets, as a summary measure of insurer's profitability, is used in the function of dependent variable, while the choice of explanatory variables is based on an examination of relevant literature and previous empirical studies in the given area. Functional relationship of variables is described by linear panel model in the following general form:

$$ROA_{it} = \beta_{1it} + \beta_2 AGE_{it} + \beta_3 COMBINED_{it} +$$
$$+ \beta_4 GROWTH_{it} + \beta_5 HHI_{it} + \beta_6 INVESTMENT_{it} +$$
$$+ \beta_7 LEVERAGE_{it} + \beta_8 LIQUIDITY_{it} +$$
$$+ \beta_9 REINSURANCE_{it} + \beta_{10} SIZE_{it} + u_{it}$$

where:

ROA_{it} – rate of return on assets of company i in year t,

$\beta_{1it}, \beta_2,..., \beta_{10}$ – intercept and slope coefficients,

AGE_{it} – number of years since the company i operates in the Serbian insurance market observed in year t,

$COMBINED_{it}$ – combined ratio of the company i in year t, as a percentage share of net claims incurred and operating expenses in net earned premium,

$GROWTH_{it}$ – percentage growth rate of written premium of company i in year t compared to a year (t-1),

HHI_{it} – Herfindahl - Hirschman index as a measure of concentration degree of insurance portfolio of company i in year t, in the form of the sum of squares of shares of individual business lines in the total written premium,

$INVESTMENT_{it}$ – investment ratio of company i in year t, as a percentage share of investment return in net earned premium,

$LEVERAGE_{it}$ – leverage of company i in year t, as a percentage ratio of technical reserves and capital,

$LIQUIDITY_{it}$ – liquidity ratio of company i in year t, as a percentage ratio of current assets less inventories and current liabilities (including unearned premiums and claim provisions),

$REINSURANCE_{it}$ – retention rate of company i in year t, as a percentage ratio of net earned premium and gross earned premium of the company,

$SIZE_{it}$ – size of the company i in year t as natural logarithm of a written premium of the company,

u_{it} – disturbance term, $i = 1,...,12$, $t = 1,...,8$.

Calculation of all indicators is founded on the balance sheets, income statements and notes to the financial statements of insurance companies, published on the websites of the National Bank of Serbia and the Serbian Business Registers Agency [25], [28]. The National Bank of Serbia databases and publicly available annual reports on insurance sector supervision were used as additional data sources. The data were previously adapted to the needs of the given analysis. Namely, there are five composite insurance companies encompassed among the units of observation, for which only the total values of operating expenses, as well as claim settlement expenses and reimbursement revenues are known. A part of operating expenses of these companies that refers only to non-life insurance is approximated on the bases of the assumption of proportional share of life and non-life insurance operations in their premium revenues and operating expenses. In a similar manner claim settlement expenses and reimbursement revenues are distributed in proportion to the known ratio of claim payments in life and non-life insurance operations of these composite companies [16, p. 341].

Performance assessment of non-life insurers in Serbia

In order for the insurance company to be continuously able to settle its obligations to policyholders in accordance with the agreed dynamics, it is necessary to consider all the risks that threaten its operating and to manage them in an adequate way. In addition to typical financial risks that other types of financial institutions are endangered with (market and investment risks, credit risk, liquidity risk, etc.), insurance companies face risks that are specific to the insurance industry, such as the risk of insufficient premiums and technical reserves (or claim provisions), reinsurance risk, the risk of catastrophic events, etc. Finally, as well as all business entities, regardless of their specific activity, insurers are exposed to the broad range of risks included in the operational risk category.

Resilience of financial institution to "shocks" that affect its balance sheet is ultimately determined by the adequacy of its capital [30, p. 15]. For the insurance company, the capital is the absorber in the last instance of adverse consequences of realizations of the all threatening risks. Appropriate categories presenting exposure to insurance risks are net insurance premiums (in the case of non-life) and technical reserves (in the case of life

Table 1: Capital adequacy indicators of non-life insurers in Serbia in 2013

Indicator	Average value	Median	Min. value	Max. value	Relative st. dev.
Net premium / Capital (C1)	194.0%	213.2%	13.9%	1684.0%	75.9%
Capital / Total assets (C2)	21.7%	21.2%	4.5%	73.9%	119.8%
Guarantee reserve / Required solvency margin (C4)	203.0%	142.3%	17.5%	310.8%	180.7%

Source: Authors' calculation on the basis of [25], [28]

Figure 1: Trend of capital adequacy indicators of non-life insurers in Serbia (2006-2013)
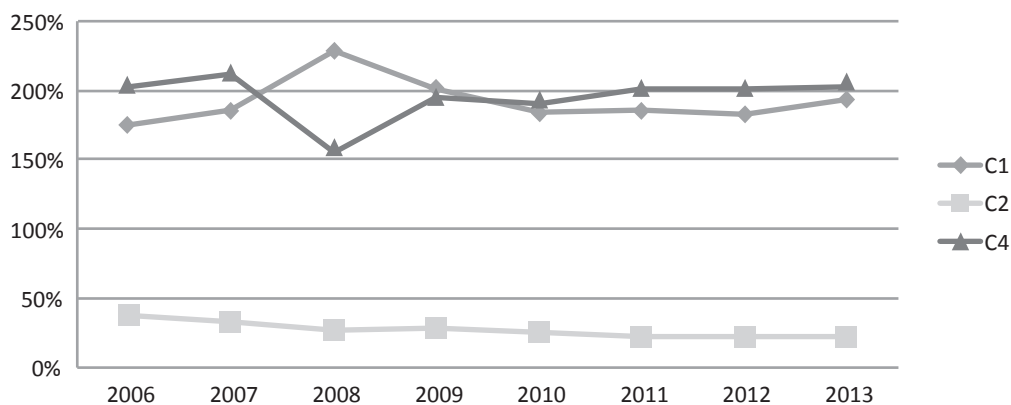
Source: Authors' calculation on the basis of [25], [28]

insurance). Their exceptionally high values relative to the capital base of the company imply a possible inability of timely settlement of assumed obligations to policyholders. The exposure to financial risks, on the other hand, can be roughly approximated by the value of total assets of insurers. Finally, a key measure of capital adequacy from the aspect of the supervisory body is ratio between the actually available capital (i.e. guarantee reserve) and the calculated minimum required amount of capital to cover the risks that endanger the insurance company (i.e. required solvency margin).

Available data for 2013 show that non-life insurers' retained premium exceeds their capital 1.9 times on average (see Table 1). Movements of average values of this indicator during time indicate an increase in the capital adequacy of considered companies with regard to the insurance risks assumed since the occurrence of the economic crisis in 2008/09 (see Figure 1). However, such a tendency is the result of premium income stagnation (given the unfavourable macroeconomic environment) and cautious policy of retaining taken risks in insurers' own coverage. During the same period, insurers' capital recorded a relatively slow growth and then a reduction in 2013 under the influence of the net result deterioration.

The average value of the ratio of capital to total assets in 2013 amounted to 21.7%, wherein variations between companies in terms of the given indicator are relatively high, given that its value, individually viewed, ranges from only 4.5% to as much as 73.9%. The gradual decline in the average value of C2 CARMEL indicator over time indicates a decline in adequacy of capital of non-life insurers to cover the financial risks as a result of relatively rapid growth of their balance sum. Guarantee reserve of insurers was, on average, twice as large as their required solvency margin in 2013, although the legal requirement for the value of C4 ratio to be larger than 100% [14, article 123] was not satisfied in the case of two insurance companies.

A more comprehensive insight into the level of exposure to investment, market and credit risks provide asset quality indicators that take into account the share in the total insurer assets of those instruments which are characterized by difficult marketability and/or possible overestimation in the financial statements. In the first place, that is the case with intangible assets, real estate, receivables, and placements in securities that are not traded on a regulated market. The average aggregate share of these instruments in the total assets of non-life insurers in Serbia was equal to 30.7% in 2013 (see Table 2). The dominant

Table 2: Selected asset quality indicators of non-life insurers in Serbia in 2013

Indicator	Average value	Median	Min. value	Max. value	Relative st. dev.
(Intangible assets + real estate + unquoted equities + receivables) / Total assets (A1)	30.7%	31.2%	0.8%	59.1%	171.8%
Equities / Total assets (A3)	4.2%	1.0%	0.1%	26.6%	54.8%

Source: Authors' calculation on the basis of [25], [28]

Figure 2: Trend of selected asset quality indicators of non-life insurers in Serbia (2006-2013)
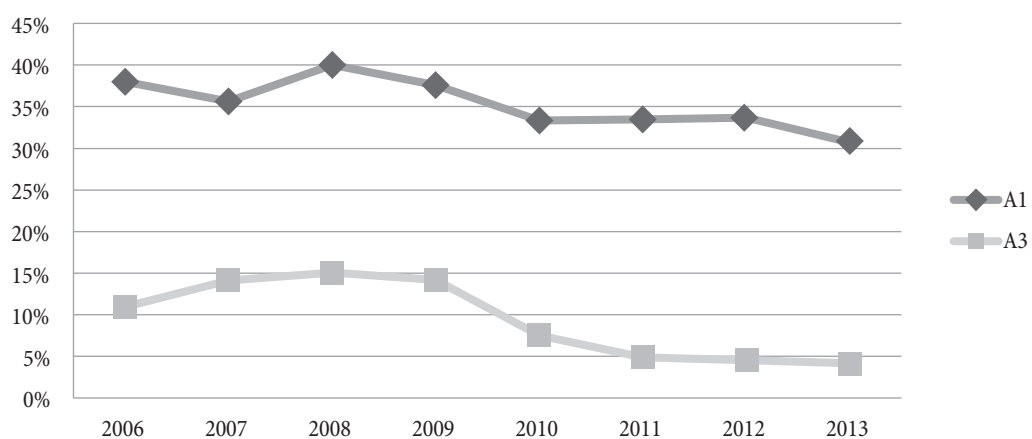
Source: Authors' calculation on the basis of [25], [28]

position among the specified investment directions of insurers have real estate investments (58.6%), contrary to the usual structure of assets of financial institutions, but in line with a low development level of the domestic financial market, which is confirmed by the low share of equities in total assets of the insurers (of 4.2% in the 2013).

There is an obvious improvement of the values of A1 and A3 CARMEL indicators in 2013 compared to 2008, when they reached maximum average values of even 40.0% and 15.1%, respectively (see Figure 2). Although the individual share of the above forms of risky investments in total assets of insurers decreased during the observed period, it should be emphasized that the share of receivables remained at approximately same level (of about 7.9% on average). Since receivables for insurance premiums dominate among total receivables of insurance companies, such a finding witnesses on persistent insurers' propensity to credit their policyholders, in terms of illiquidity of the economy and low payment capabilities of population.

Although it represents the most important instrument of risk management for insurance companies, reinsurance by itself generates certain risks in terms of the inadequately estimated self-retention limit and arranged reinsurance coverage, but also credit risk, i.e. inability and/or unwillingness of reinsurer to meet its obligations to the insurer. Therefore, monitoring of relevant actuarial positions (reflected through the amount of net technical reserves in relation to net claims paid or net premium), as well as the reinsurance policy (in the form of share of retained in the gross earned premium) occur as an inevitable element of the insurer financial stability evaluation.

According to available data for 2013 non-life insurers in Serbia retain approximately 91.6% of the insured risks in their own coverage (see Table 3). Such a value of the retention rate is relatively high, having in mind that the average value of the same indicator at the level of the OECD countries in non-life insurance sector amounts to 80.5% [10, p. 32]. The behaviour of R1 indicator in time suggests no significant changes in the reinsurance policy of observed non-life insurers during the period 2006-2013 (see Figure 3). The relatively high average value of the ratio of net technical reserves and the average of net claims paid (of 192.0% in 2013), indicates sound quantification and estimation of insurance liabilities and, therefore, the absence of pressures on the insurers' capital, thus leaving manoeuvring space to cover possible unexpected and catastrophic losses. However, given indicator provides only a rough measure of the actuarial calculation accuracy. More reliable conclusions on the sufficiency of technical reserves can be obtained on the basis of their run-off

Table 3: Indicators of reinsurance and actuarial issues of non-life insurers in Serbia in 2013

Indicator	Average value	Median	Min. value	Max. value	Relative st. dev.
Net earned premium / Gross earned premium (R1)	91.6%	91.9%	73.3%	98.7%	8.4%
Net technical reserves / Average of net claims paid in last three years (R2)	192.0%	246.0%	150.3%	1305.0%	103.1%

Source: Authors' calculation on the basis of [25], [28]

Figure 3: Trend of indicators of reinsurance and actuarial issues of non-life insurers in Serbia (2006-2013)
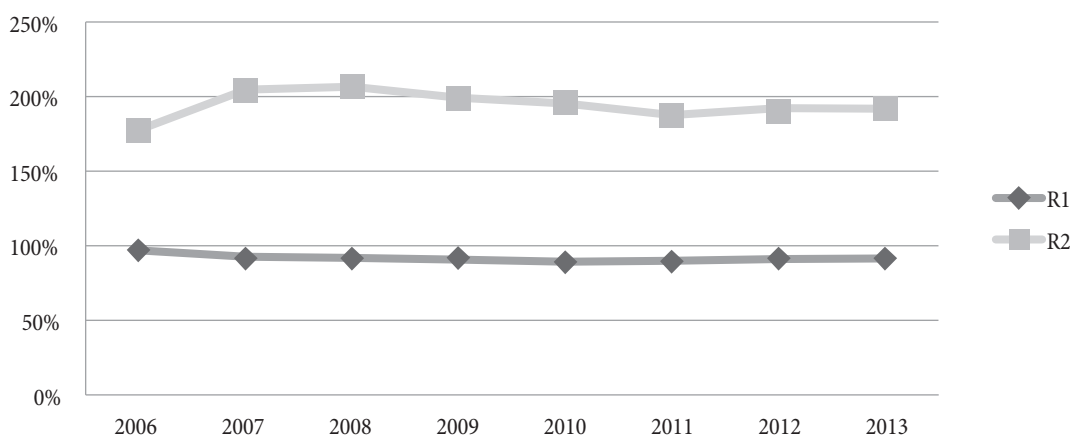
Source: Authors' calculation on the basis of [25], [28]

analysis, which cannot be performed solely on the basis of the financial statements of insurance companies.

Operational risk occupies an important place among the factors that influence on the financial soundness of insurers. Inadequate internal processes, personnel and systems rarely directly cause the insolvency of insurers, but critically contribute to it. Potential weaknesses and failures of management that are relatively the most difficult to identify and quantify are of particular relevance within the broad category of operational risks from the aspect of the solvency of insurers. Despite its indisputable importance, the lack of data is a fundamental problem in measuring operational risk in insurance. Although modelling of operational risk is primarily of qualitative nature, relationship between appropriate indicators of business volume (such as total premium or assets) and number of employees or the salaries expenses can provide initial guidelines in terms of operational efficiency and, indirectly, the quality of the management structure of insurance companies. The average values of the total contracted premium and total assets per employee in the amount of RSD 5,455 thousand and RSD 12,083 thousand, respectively, are calculated for observed non-life insurers on the basis of the available data from 2013 (see Table 4). At the same time, average share of salaries expenses in net premium reached the amount of 7.8%.

More relevant conclusions can be obtained from the analysis of the manifested trend of given indicators' values over time (see Figure 4). Increasing average value of the M2 indicator, on one hand, and the decreasing average value of the M3 indicator, on the other hand, witness of a gradual improvement of the quality of non-life insurers management structure in Serbia. However, it is worth noting that not only the increase in business volume contributed to this outcome, but also reduction in the number employees on the entire sector level since 2008, which may be related to the better organization of companies and the more rational use of resources, but also with a lower quality of services to customers and greater exposure to operational risk. Therefore, the conclusions of the given analysis must be complemented by a more detailed and complete examination of the efficiency and quality of the business model of insurers and their management.

Accounting data on net result, revenues and expenses represent the starting point for the measurement of earnings and profitability of insurance companies. Insurers make profit from taking risks as well as from investing of funds stemming from premiums collected on financial market [18, p. 196]. In the field of non-life insurance, underwriting business performance is measured by the loss ratio (as a percentage share of claims incurred in the earned premium)

Table 4: Management soundness indicators of non-life insurers in Serbia in 2013

Indicator	Average value	Median	Min. value	Max. value	Relative st. dev.
Total contracted premium in RSD thousands / Number of employees (M1)	5,455.2	5,357.1	3,437.0	15,951.3	178.6%
Total assets in RSD thousands / Number of employees (M2)	12,083.3	10,184.8	6,150.8	96,259.6	74.0%
Salaries expenses / Net written premium (M3)	7.8%	6.2%	0.8%	22.4%	128.3%

Source: Authors' calculation on the basis of [25], [28]

Figure 4: Trend of management soundness indicators of non-life insurers in Serbia (2006-2013)
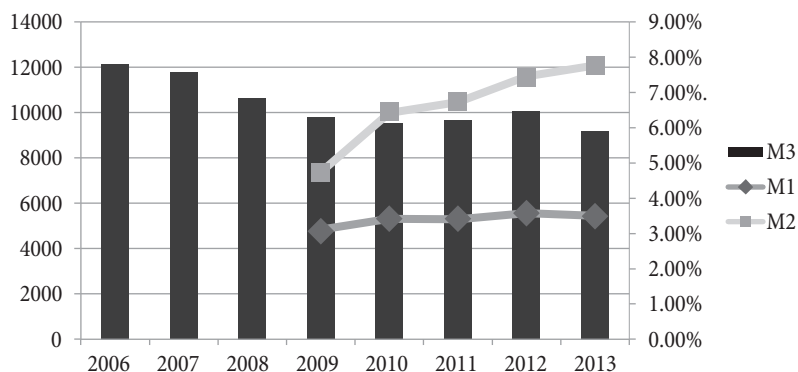
Source: Authors' calculation on the basis of [25], [28]

and the expense ratio (a percentage share of operating expenses in the earned premium), or by the combined ratio, as their sum. When the value of combined ratio is less than 100%, the insurer makes a profit in the insurance business, and vice versa. However, even if its value is greater than 100%, the total insurer's operating can be profitable if loss from insurance activities may be offset by realized investment income. The difference between combined ratio and investment ratio (as a percentage share of investment return in the earned premium), represents an operating ratio, as a measure of the profitability of the overall insurer's business. In addition to these indicators that are specific to insurance activities, by analogy with entities in other business areas, return on assets (ROA) and return on equity (ROE) appear as relevant indicators of profitability of insurance companies. Earning potential of insurance companies is also seen through the comparison of their net results and total revenues or number of employees.

The calculated value of the combined ratio of 101.1% in 2013 demonstrates that non-life insurance activities in Serbia are not profitable, on average, which is primarily to due high amounts of the operating expenses (see Table 5). Nevertheless, realized investment return at the sector level exceeds the loss from insurance operations, causing the whole business to be profitable, as indicated by the value of the operating ratio of 91.1% and positive, although low, rates of return on assets and on equity in the same year (in the amounts of 0.5% and 2.5%, respectively). Although the average values of the selected profitability indicators are relatively stable over time (see Figure 5), there is a slight deterioration in the domain of the insurance activities results, primarily due to faster growth in the operating expenses in relation to the growth of net earned premium. Although variations in the average values of these ratios between the years are not significant, variations between companies exist, which is why it is necessary to further

Table 5: Indicators of earnings and profitability of non-life insurers in Serbia in 2013

Indicator	Average value	Median	Min. value	Max. value	Relative st. dev.
Net incurred claims /Net earned premium (Loss ratio - E1)	55.1%	54.8%	29.5%	79.9%	440.3%
Operating expenses / Net earned premium (Expense ratio - E2)	45.9%	47.4%	21.3%	66.4%	380.4%
Investment return / Net earned premium (Investment ratio - E3)	6.5%	7.6%	0.8%%	32.8%	119.0%
Combined ratio (E4=E1+E2)	101.1%	100.3%	77.6%	141.5%	493.2%
Operating ratio (E5=E1+E2-E3)	91.1%	94.6%	44.7%	137.2%	332.5%
Claim examination, estimation and liquidation expenses / Net claims paid (E6)	8.9%	8.0%	1.3%	16.3%	203.4%
Net result / Average capital (ROE - E8)	2.5%	1.4%	-232.9%	33.0%	34.8%
Net result in RSD thousands / Number of employees (E9)	255.2	32.6	-2,720.9	5,561.8	12.20%
Net result / Total assets (ROA - E10)	0.5%	0.4%	-25.3%	5.8%	35.5%
Net result / Total revenues (E11)	1.0%	0.6%	-35.0%	34.9%	15.9%

Source: Authors' calculation on the basis of [25], [28]

Figure 5: Trend of indicators of earnings and profitability of non-life insurers in Serbia (2006-2013)
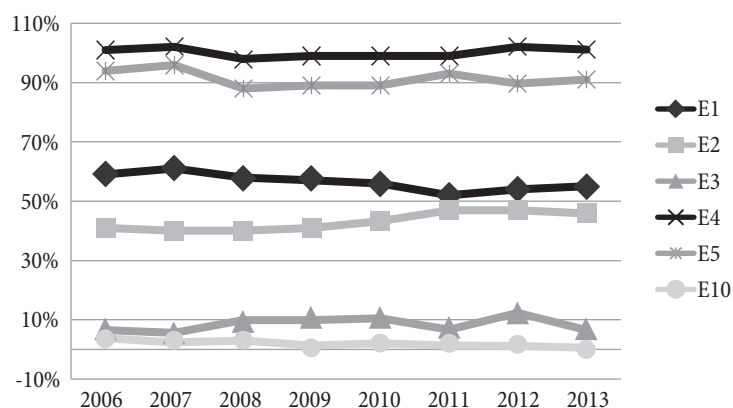
Source: Authors' calculation on the basis of [25], [28]

investigate the influence of internal factors on their profitability.

The liquidity of insurer is evaluated based on the ratio of liquid assets, defined according to different concepts, from cash and cash equivalents, up to securities that are traded on organized market, securities issued by the government, central bank, international financial institutions (or guaranteed by any of these entities), as well as the part of long-term investments maturing within one year and other short-term investments [26, p. 15] and their current liabilities (including unearned premiums and provisions for claims). Tracking the values of liquidity indicators is particularly important for companies dealing with non-life insurance, whose predominantly short-term nature of funding sources and liabilities requires a relatively higher share of more liquid, short-term financial instruments in their investment portfolios, compared with companies that are engaged in life insurance business.

Data from 2013 show that on average 16.0% of non-life insurers` current liabilities are covered by cash and cash equivalents (see Table 6). Defined according to a broader concept, as current assets reduced by inventories, liquid assets of observed companies, on average, covers 98.0% of their short-term liabilities, which undermines the rule of thumb according to which the given value should be greater than 100% [9, p. 77]. The fall in the average value of L2 indicator since 2011 reflects the change in the investment strategy of insurers from short-term to long-term financial

investments due to government borrowing through the issue of long-term bonds whose significant buyers are insurance companies (see Figure 6). On this basis, the investment results of insurers have improved during the period. Nevertheless it would not be good if this tendency of fall continues in the future, because it potentially opens the problem of illiquidity of non-life insurers. In a situation of insufficient liquid assets to settle current liabilities, the insurer is exposed to possible loss because he is forced to borrow or sell assets under unfavourable conditions, which undermines his profitability.

Empirical model specification

Table 7 presents descriptive statistics for each of the predefined research variables, that are calculated on the basis of 96 available observations. It is notable that the return on assets (ROA), as the dependent variable, ranges between -25.3% and 25.4%, with an average value of 1.9%.

In order to test if there is the potential for the multicollinearity of explanatory variables, the matrix of Pearson's correlation coefficients was calculated before the panel model design. Since none of the computed correlation coefficients in Table 8 is greater than 0.7 it can be concluded that a high correlation between selected explanatory variables does not exist.

The choice of the concrete panel model specification is determined with appropriate statistical tests, having as a starting point a model with random effects (RE model),

Table 6: Liquidity indicators of non-life insurers in Serbia in 2013

Indicator	Average value	Median	Min. value	Max. value	Relative st. dev.
Cash and cash equivalents / Current liabilities (L1)	16.0%	16.7%	0.3%	93.1%	87.2%
(Current assets-inventories) / Current liabilities (L2)	98.0%	115.6%	45.1%	774.5%	86.6%

Source: Authors' calculation on the basis of [25], [28]

Figure 6: Trend of liquidity indicators of non-life insurers in Serbia (2006-2013)
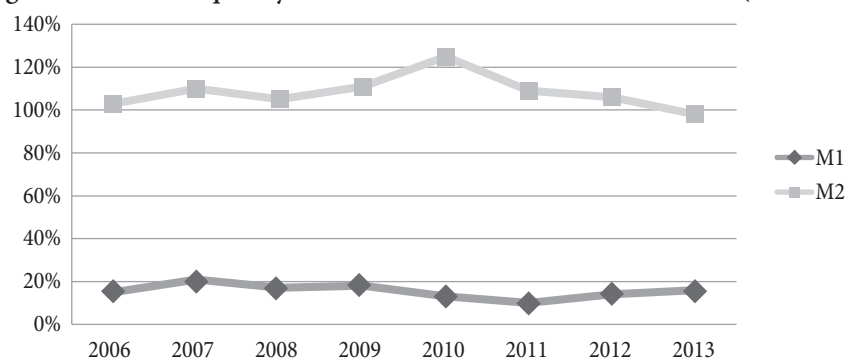
Source: Authors' calculation on the basis of [25], [28]

Table 7: Descriptive statistics of variables

	ROA	AGE	COMBINED	GROWTH	HHI	INVESTMENT	LEVERAGE	LIQUIDITY	REINSURANCE	SIZE
Mean	1.9%	18.6	90.2%	154.3%	0.4691	12.0%	293.8%	155.2%	91.8%	9.08
Median	1.6%	16.0	94.9%	8.9%	0.4462	8.3%	226.2%	120.7%	94.6%	9.18
Maximum	25.4%	51.0	140.2%	11442%	0.9322	67.7%	1840.1%	774.7%	100.0%	10.22
Minimum	-25.3%	4.0	37.4%	-43.1%	0.1504	-6.0%	9.6%	45.1%	60.5%	5.90
Std. Dev.	6.4%	10.6	21.7%	1175.8%	0.2375	13.8%	277.3%	116.2%	8.7%	0.79
Observations	96	96	96	96	96	96	96	96	96	96

Source: Authors' calculation

Table 8: The matrix of Pearson`s correlation coefficients

	AGE	COMBINED	GROWTH	HHI	INVESTMENT	LEVERAGE	LIQUIDITY	REINSURANCE	ROA	SIZE
AGE	1.000	0.283	-0.110	-0.371	-0.090	-0.168	-0.152	0.016	-0.090	0.456
COMBINED	0.283	1.000	0.062	-0.024	-0.456	0.163	-0.598	0.240	-0.558	0.443
GROWTH	-0.110	0.062	1.000	0.150	-0.150	-0.075	-0.035	0.117	0.022	-0.436
HHI	-0.371	-0.024	0.150	1.000	0.012	-0.038	0.186	0.473	-0.073	-0.592
INVESTMENT	-0.090	-0.456	-0.150	0.012	1.000	0.021	0.614	-0.350	0.323	-0.340
LEVERAGE	-0.1681	0.163	-0.075	-0.038	0.021	1.000	-0.079	-0.243	-0.580	0.169
LIQUIDITY	-0.152	-0.598	-0.035	0.186	0.614	-0.079	1.000	-0.112	0.284	-0.538
REINSURANCE	0.016	0.240	0.117	0.473	-0.350	-0.243	-0.112	1.000	-0.207	-0.184
ROA	-0.090	-0.558	0.022	-0.073	0.323	-0.580	0.284	-0.207	1.000	-0.191
SIZE	0.456	0.443	-0.436	-0.592	-0.340	0.169	-0.538	-0.184	-0.191	1.000

Source: Authors' calculation

which is estimated on the basis of available observations. According to the Hausman test results, which are shown in Table 9, the null hypothesis under which the difference between the estimates of the regression coefficients obtained on the basis of fixed-effects and stochastic-effects specification is not statistically significant is rejected at a significance level of 1%, indicating a selection of model with fixed effects (FE model).

Table 9: The Hausman test results

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	33.061068	9	0.0001

Source: Authors' calculation

The presence of individual and/or time fixed effects in the FE model can be tested using the F test. According to its results presented in Table 10, the null hypothesis under which individual fixed effects are not significant is rejected at a significance level of 1%, which is why the model with individual fixed effects is superior to the pooled regression model.[1]

Table 10: The Redundant Fixed Individual Effects Test

Test Summary	F Statistic	F d.f.	Prob.
Cross-section fixed	3.0339	(11.75)	0.0021

Source: Authors' calculation

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[1] The same test indicates that the time effects, or individual and time effects simultaneously, are not statistically significant.

Table 11 shows the estimated FE model by using covariance method. The calculated value of the coefficient of determination indicates that 60.2% of the total variations of the return on assets as dependent variable is explained by the variations of all explanatory variables in the model. Given regression is statistically significant because F statistic has a value of 12.6 at a significance level of 1%. The impact of each of the explanatory variables, except LIQUIDITY and SIZE, on the movement of the dependent variable ROA is statistically significant at a significance level of 5%.

However, admissibility of obtained coefficient estimations requires prior verification of fulfilment of FE model assumptions. According to the Breusch-Godfrey/ Wooldridge test for serial correlation in panel models, whose results are shown in Table 12, it can be concluded that the null hypothesis of absence of serial correlation in the model cannot be rejected at a significance level of 5%.

Table 12: Breusch-Godfrey/Wooldridge test for serial correlation in panel models

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section fixed	1.8867	2	0.3893

Source: Authors' calculation

On the other hand, the Breusch-Pagan test indicates the presence of heteroscedasticity in the considered FE model.

Table 11: Fixed effect model

Variable	Coefficient	Std. Error	t-value	Prob.
AGE	-0.007463	0.002148	-3.4743	0.0008**
COMBINED	-0.135056	0.039481	-3.4208	0.0010**
GROWTH	0.001543	0.000679	2.2710	0.0260*
HHI	-0.240591	0.085619	-2.8100	0.0063**
INVESTMENT	0.104551	0.042383	2.4668	0.0159*
LEVERAGE	-0.012482	0.002254	-5.5363	0.0000**
LIQUIDITY	-0.003335	0.005018	-0.6647	0.5082
REINSURANCE	-0.240073	0.089708	-2.6761	0.0091**
SIZE	0.070533	0.041635	1.6940	0.0944

Significance codes: 0.01 '**', 0.05 '*'

R-squared=0.60187, Adj. R-squared=0.47021

F-statistic=12.5979, Prob(F-statistic)=0.0000

Source: Authors' calculation

Based on the results of this test that are shown in Table 13, the null hypothesis of random error homoscedasticity is rejected at a significance level of 5%.

Table 13: Breusch-Pagan test

Test Summary	BP	BP d.f.	Prob.
Cross-section fixed	119.6202	9	0.0000

Source: Authors' calculation

Heteroskedasticity can be controlled through robust covariance matrix estimation, i.e. sandwich estimation [17, pp. 1387-1396]. For the panel model with fixed effects, robust estimators of the covariance matrix of coefficients can be provided in accordance with *Arrelano* [2] allowing for both heteroskedasticity and serial correlation [8, p. 31]. Table 14 displays the results of t-test for heteroskedasticity consistent coefficients. Explanatory variables COMBINED, GROWTH, INVESTMENT, LEVERAGE, REINSURANCE and SIZE have a significant impact on the dependent variable ROA at a significance level of 5%.

Discussion of results

Estimated values of coefficients in suggested fixed-effects model show that the combined ratio, leverage and retention rate negatively affect the profitability of non-life insurers in Serbia, while the influence of the written premium rate of growth, investment ratio and company size is positive. Taking into account the absolute t-values of coefficients, the leverage and combined ratio have relatively greatest impact on the return on assets. On the other hand, the influence of companies' age, liquidity and product diversification on their profitability was not found to be statistically significant.

Combined ratio is a measure of efficiency of insurance operations. The more the value of this ratio, a key segment of activities of the insurance company, and thus of its entire business, may be regarded the less successful. The results show that an increase in the combined ratio by one percentage point on average leads to a reduction in the rate of return on assets of non-life insurer by 0.13 percentage points, with other conditions unchanged. However, losses in the insurance activities may be offset by realized investment yield. For every additional percentage point in the investment ratio, we can expect the return on assets to increase by an average of 0.10 percentage points, *ceteris paribus*. These results coincide with the findings of *Lee* [19].

On the other hand, increase in the annual written premium rate of growth by one percentage point leads to an increase in the return on assets for 0.001 percentage point on average, *ceteris paribus*. Obtained result is in line with certain previously conducted studies that suggest a negative impact of premium growth on non-life insurer profitability (i.e. *Burca* & *Batrînca* [7]). In the case of non-life insurance Serbian market, such a result can be explained by the fact that premium has stagnated after the onset of the economic crisis in 2009, because of which there is an objective need for its faster growth in the coming period. One should bear in mind that the increase in insurer's business volume is followed by the increase in liabilities towards policyholders and it is necessary to set aside relatively larger technical reserves. If premium growth is too aggressive, insurance company is exposed to actuarial risks to the extent that exceeds its available

technical and financial capacity, which can be one of the key causes of its insolvency.

Financial leverage reflects the potential impact of technical reserve deficit on insurer`s equity in the case of larger-than-expected losses due to insured risks realization. The increase in financial leverage by one percentage point corresponds to a decline on the return on assets by 0.01 percentage point on average, with other circumstances unchanged. The negative correlation between financial leverage and ROE supports the findings of *Bilal et al.* [5] and *Lee* [19].

In general, the effect of reinsurance on the profitability of insurer is not uniquely determined. By itself, reinsurance implies corresponding costs for insurers, as well as the risk of reinsurance protection insufficiency due to reinsurer default, inadequately estimated self-retention limit and arranged reinsurance coverage. On the other hand, greater retention rate means lower dependence on reinsurance. On that basis, the insurer achieves adequate savings, but at the same time he is exposed to the actuarial risks in a relatively greater extent. The estimated negative impact of retention rate on business results of non-life insurers in Serbia can be explained by the fact that they, on average, retain a relatively large volume of risks in their own coverage, as evidenced in the context of the analysis of their performance. The available data for domestic non-life insurance market show that an increase of retention rate of non-life insurer by one percentage point leads to a reduction in the return on assets by as much as 0.24 percentage point on average, *ceteris paribus*, which is in accordance with *Shiu* [29].

Finally the results of conducted research indicate that the increase by one percentage point in the size of the insurer as measured by the volume of written premiums, causes an increase in the return on assets by 0.07 percentage points on average, with other conditions unchanged. This finding is consistent with the studies of *Browne et al.* [6], *Bawa* & *Chattha* [4], and *Mehari* & *Aemiro* [23]. Larger companies realize the effects the economies of scale and better cost efficiency based on the control of distribution channels, as well as the application of modern information technology to automate business operations. Thanks to available capacities, they are more able to cope with the

adverse market conditions in comparison with smaller insurers [29, p. 1082], but also to achieve the effects of risk diversification [23, p. 252], which justifies the result obtained.

Conclusion

Modern insurance market on the global scale is characterized by processes of internationalization, liberalization and financial integration, spurred primarily by opening of the developing countries for foreign capital, in an attempt to encourage the development of their own insurance markets. Faced with intense market competition, insurers strive to maintain and improve their profitability, as the main source of capital growth and value creation for shareholders. Identification of the profitability determinants of insurance companies and measurement of their impact is even more important in the adverse macroeconomic conditions under which insurance companies in Serbia operate. Improvement of insurers' performance is a necessary precondition for the growth of the insurance sector and its contribution to the development of the national economy.

A comprehensive assessment of business performance of non-life insurance companies operating in Serbia is presented in this paper. Macroeconomic factors that determine the performance of the overall non-life insurance sector were identified on the basis of the achieved average values of selected CARMEL indicators of financial strength of insurers as well as their manifested trend over time. The direction and intensity of the impact of key internal factors on the profitability of individual companies is described through concrete empirical model. Estimated values of the regression model coefficients show that the combined ratio, leverage and rate of retention negatively affect the profitability of non-life insurers in Serbia, while the influence of the written premium growth, investment return, and the company size is positive.

Important implications for the management of insurance companies operating in Serbia arise from the presented empirical results. In general, room for profitability improvement of non-life insurers should be sought in the transfer of risks to reinsurance to a greater degree. Thus not only the retention rate, but indirectly financial

leverage and the combined ratio can be decreased, due to which it is possible to expect multiple contribution to increase in the return on assets of insurers. Hereby it is important to properly assess the financial strength reinsurer and to provide a dispersion of ceded risks among a large number of reinsurers simultaneously. Operating expenses represent a critical area for the profitability of non-life insurers in Serbia. Their rationalization requires tightening of management discipline, proper management of distribution channels and automation of business operation implementation using modern information technology. Profitability of non-life insurers can be increased through investment activities, with respect to the relevant regulatory restrictions, and taking into account the compliance of the maturity structure between assets and liabilities, in order to safeguard liquidity of insurers.

The main limitation of the conducted research stems from its grounding on the financial statements of insurers. The applied indicators are reliable to the extent to which the values in those statements are realistically estimated and reported. Even though assuming their absolute credibility, we should not forget the fact that they only reflect events from the past. Because of their static nature, the values of these indicators are not sufficient to predict the future, even if they are calculated for longer time intervals. Appropriate prospective approach implies relevant stress tests as a supplement to trend projections as one of possible further research directions, so that future challenges and potential threats to the financial health of insurers could be considered.

Long-term earning capability is certainly an indicator of long-term financial security of a business entity. However, we should not neglect the fact that, in the short run, excessive requirements for profitability may threaten the safety of operations and jeopardize the survival of that entity. Therefore it is very important to establish a delicate balance between these two business principles. Such a requirement is particularly evident in the insurance companies, whose primary role is not an increase of capital, but provision of adequate security and protection against risks.

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