

2 BOARD CHARACTERISTICS, OWNERSHIP CONCENTRATION AND THE FINANCIAL PERFORMANCE OF EUROPEAN LISTED INSURANCE COMPANIES: NEW EMPIRICAL EVIDENCE

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Abstract

The research aims to appraise the interplay between several features of corporate governance and company financial results, as well as the impact of board characteristics and ownership credentials on the size and performance of European companies operating in insurance, reinsurance, and pension funding. Data was extracted from the Orbis database for a newly compiled sample of 6,096 active firms in 2015-2022 (according to the last available year). The methodological approach was based on robust regression with Huber and biweight iterations and network analysis with Gaussian and Mixed-Markov graphical models. Main results revealed notable positive impacts of the number of directors, managers, and shareholders on firms' financial results. Instead, the ownership concentration, namely the board independence, negatively influenced the performance of the European insurance companies, with a less significant impact on their operating revenue and profitability.

Keywords: corporate governance, ownership concentration, revenues, financial performance, insurance, econometric modelling

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1. Introduction

The landscape of the insurance and reinsurance field of activity has changed significantly over time, getting more and more attention due to its impact on investment decisions as well as on

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macroeconomic stability and growth. Insurance companies give participants in economic life the chance to reduce and mitigate the financial impact of different risks occurring (Cristea *et al.*, 2021). Moreover, the size of this sector has increased in time, making the insurance business one of the most significant in the world (Cristea *et al.*, 2022). The diversification of the range of products the insurance companies offer, with different time spans, leads in time to new opportunities in terms of assets they invest into, with more illiquid asset classes becoming an option. The size of the industry and their change of preferences in terms of assets have raised the importance of the insurance industry in the economic environment (Ward and Zurbruegg, 2000). But all companies are concerned with their performance. Therefore, researchers are tackling more and more the issue of the performance of insurance companies, especially from the financial point of view, trying to identify the factors that affect it (Petroni, 1992; Burca and Batrinca, 2014; Mwangi and Murigu, 2015; Nyongesa, 2017; Kapil and Mishra, 2019; Morara and Sibindi, 2021).

In this complex framework, this paper aims to assess the influence of board characteristics and ownership concentration on the main results (operating revenue and financial performance) and dimension/capacity of European companies operating in insurance, reinsurance, and pension funding (except compulsory social security). We also included the impacts on the size of insurance companies, since there are findings (Derbali, 2014; Jadi, 2015; Öner Kaya, 2015; Cristea *et al.*, 2022) proving that, usually, size positively impacts performance (bigger companies have more opportunities for better financing, better management, better diversification of risks, etc.), with spillover effects. To achieve this aim, we collected data from the Orbis database on a large sample of 6,096 companies in Europe active in this field. The methodological endeavor consisted of two advanced econometric procedures that capture an integrative measurement approach of the interplay between board characteristics, ownership concentration, and the firm's results (turnover, return on assets, and return on equity) and capacity (total assets), through robust regression with Huber and biweight iterations (RREG) and Gaussian and Mixed-Markov graphical models (GGMs, respectively MGMs). Our research showed that there were direct impacts of management, shareholders, and ownership concentration on the performance of European insurance companies. Specifically, these factors affect the size and capacity of the companies, as well as the overall interlinkages among these coordinates.

The novelty of our paper is given by: (i) new insights that can provide the groundings for identifying the essential features of corporate governance that can enhance or restrain the results/performance and capacity of the European insurance companies; (ii) a new in-depth perspective of the existing body of literature with an innovative integrative assessment, not debated previously in literature, of the interlinkages between management characteristics, from the quantitative point of view, the independence level of insurance companies, company financial outcomes/ performance and dimension of these companies; (iii) policy recommendations and measures, related to our findings that are largely discussed within the paper, which need to be designed, adopted, and implemented by companies in this area.

The rest of the paper is organized as follows: after a general overview of this topical subject, a notable critical review of the literature is presented next, followed by a detailed description of the sample and indicators used in the empirical analysis, along with the methodological rationale. The final sections embed a detailed presentation and discussion of the results obtained in this new modeling approach, separately for each econometric procedure employed, with managerial and policy implications of own research concluding the paper.

2. Literature review

Literature regarding main results/financial performance is considered abundant but, for the specific case of the insurance industry, it is scarce, especially before 2000.

As regards performance, it can be interpreted in many ways, and one cannot say that we have a consensus on the set of criteria to be used for establishing the performance (Ostroff and Schmidt, 1993). Often, profitability is considered to be a proxy of financial performance because the majority of stakeholders regard it as an indicator of the capacity of the entity to attract investors, finance its future activities, and generate satisfaction for shareholders, as well as for the clients (Orlitzky *et al.*, 2003). The measures of financial performance can be regarded as quantitative (through market-based indicators, such as the price per share, or accounting-based ones that measure the company's internal efficiency through the return on assets - ROA, return on equity - ROE, or earnings per share - EPS) and qualitative methods (through perceptual tools) (Orlitzky *et al.*, 2003).

Certain analysts tried to observe the results/ financial performance determinants in the insurance business, in different countries, approached at both micro and macroeconomic levels. For example, Burca and Batrinca (2014) consider that the Romanian insurance market is performing at a lower level than it should, and in terms of financial performance, this is due to the financial crisis and the market conditions that are worse than they used to be. According to them, the financial leverage in insurance, the size of the participants on the market, the increase of gross written premiums, the risk retention ratio, and the solvency margin are the factors that influence the performance of the Romanian insurance market. The results/ financial performance is influenced both by internal factors (such as capital structure, governance approach, management quality, etc.) and, also, by external factors and the way the company is connected to the environment. Insurance policies cover a wide range of risks that are significant for insurance companies. These risks include catastrophic events that can cause substantial losses for individuals and the economy (Kang *et al.*, 2022) as well as various risks in both life and non-life fields (Cristea *et al.*, 2021). Therefore, the actuary, namely the person who predicts, mainly, the price for insurance products, based on statistical modeling, gives insurance performance the significance of "actuarial thinking" (Embrechts and Wüthrich, 2022, p. 135), with implications for the enhancement of overall performance.

Petroni (1992) considers that profit-related accounting indicators can be used to determine just the annual performance, as there are actuarial smoothing activities that can be used for longer time frames. Still, the return on investment (ROI), ROE, and ROA are probably the most extensively used indicators to assess investment performance. Burca and Batrinca (2014) show that, in the case of the equity of insurance companies in Romania (measured through decimal logarithm), their volume is positively connected to the financial performance, because it ensures stability and potential expansion. Also, a bigger market share of the insurance company generates better financial performance.

As regards the interplay between the size of a company and corporate governance performance, large companies have better "substantial legal compliance measures compared to small-scale companies" to apply and report (Zhu *et al.*, 2023, p. 76).

Besides size, which seems to be a generally tested determinant of the performance of insurance companies (Derbali, 2014; Jadi, 2015; Öner Kaya, 2015; Cristea *et al.*, 2022), other factors also appear in the literature, but much less often. For example, Nyongesa (2017) tests the impact of management quality in terms of financial decisions regarding capital structure, budgeting, management of the working capital, as well as corporate governance, upon the companies' performance and finds a positive relation. Mwangi and Murigu (2015) have similar findings with respect to profitability being positively related to the quality of management staff and to the high levels of debt, but they show a negative correlation to size (which is different from other authors). A new issue is that of the majority ownership by foreign shareholders, which also negatively impacts profitability.

Morara and Sibindi (2021) consider a series of factors that are tested as determinants of the financial performance of insurance companies. While the size of the insurer has a positive impact

on performance, the age of the firm negatively impacts performance. Also, they show that higher leveraged insurers perform better in Kenya but, they suggest that the level of indebtedness should be kept under observation to not lead to a failure in servicing their debt obligations.

As mentioned before, among the internal factors that influence corporate financial performance, one can also find factors related to corporate governance (board size and independence, ownership concentration, number of external advisors, and quality of the management team). Results of studies regarding their influence on the performance of companies do not always lead to the same results. Still, in most cases, the quality of corporate governance is directly connected to the financial results that the entity obtains. Researchers start their studies from the idea that inside members of the board, trying to keep their positions, tend to comply with the managers more, while the independent members of the board are more critical, bringing their external experience and relations, influencing the firm performance (Daily and Dalton, 1994).

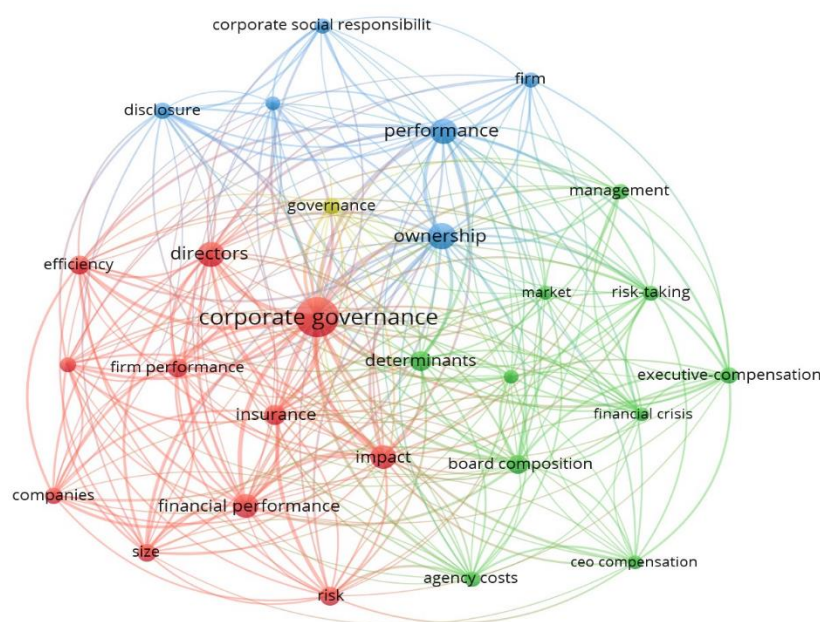
The link between the corporate governance system (structure of ownership, foreign ownership, board size and independence, frequency of board meetings, etc.) and the firm's performance, studied by Kapil and Mishra (2019), proved that such factors are more relevant for market-based performance measures than for accounting-based performance measures (ROA and ROE). According to a study by Abebe Zelalem *et al.* (2022), corporate governance, including board size, had a positive impact on the financial performance of insurance companies in Ethiopia, as measured by ROA and ROE. The independence of the board was more relevant for the accounting-based performance, while the frequency of board meetings was more relevant for the market-based performance measures. Khadash and Washali (2019) deepened the study, referring to the impact of the board characteristics on the performance, of the case of insurance companies and banks, and among other conclusions that were in line with the general results of the literature, they found that gender and educational diversity did not have a significant impact upon ROA or ROE.

Merendino and Melville (2019), by setting a connection between the number of independent directors on the board, the board size, and the performance of the company, consider that independent directors do not necessarily have a positive impact on the performance and nor do the ownership structure and composition. A highly concentrated ownership and therefore greater monitoring is not a guarantee of better performance.

In a study of almost 400 Indian listed companies (Mishra and Kapil, 2018), a significant positive correlation is established between board independence and the company's results. These results are also confirmed by Kao *et al.* (2019), who show that companies with smaller size boards, more independent directors, and a two-tier board system, perform better. Kao *et al.* (2019) also established a positive relationship between the ownership structure and the firm's value, showing that block-holders' ownership or institutional ownership, as well as a high percentage of family-owned or foreign equity, led to an increase in the company's value.

To accompany the literature underpinnings on our topic, we conducted a bibliometric analysis of the papers published in the Web of Science (WoS) Core Collection database, based on the co-occurrence of all keywords approached by these studies. The results entailed 290 articles that approached the topic related to insurance, financial performance, and corporate governance (Figure 1), which reveal the following clusters of similar terms associated with the research: (i) corporate governance, insurance, directors, impact, financial performance, efficiency, risk; (ii) ownership, performance, corporate social responsibility, disclosure; (iii) determinants, board composition, management, risk-taking, CEO compensation; (iv) and governance.

Figure 1. Bibliometric analysis of the co-occurrence of keywords approached in the WoS Core Collection articles related to insurance, financial performance and corporate governance



Source: Created by authors in VOSviewer tool, using Web of Science Core Collection database

The literature showed that some aspects of corporate governance, such as board size and ownership concentration, can have a significant impact on the financial performance of companies, including insurance companies. Therefore, it is important for management at all levels to develop customized strategies.

3. Data and methodology

The data were extracted from the Orbis Database, provided by “Bureau van Dijk” (BvD) (2022), according to the last available year (mainly, 2015-2022), including a number of 6,096 active companies in the field of insurance (NACE Rev. 2, primary code “65 - Insurance, reinsurance and pension funding, except compulsory social security”), located in Europe.

Variables comprise the following *three groups of indicators* (Bureau van Dijk, 2022):

- *companies’ results*: “operating revenue/turnover” (TR), (thousand USD); “Return on equity using profit/ loss before tax” (ROE) (%); “Return on assets using profit/ loss before tax” (ROA) (%);
- *dimension/ size of companies*: total assets (ASSETS) (thousand USD);
- *management and ownership indicators*: “number of directors & managers” (DM); “number of current directors & managers” (C_DM); “number of previous directors & managers” (P_DM); “number of advisors” (ADV); “number of current advisors” (C_ADV); “number of previous advisors” (P_ADV); “the number of shareholders” (SHA); “BvD

Independence indicators” (BI) – (codes from 1-8, for level A, A+, B, B+, C, C+, D, respectively U).

“BvD Independence indicators” (BI) characterize the ownership of the companies, respectively the independence levels, as follows (Horobet *et al.*, 2019, p. 8): “independent companies” with A and A+, respectively “no shareholder has more than 25% direct or total ownership”; “medium-low ownership concentration” with B and B+ that states that “no shareholder recorded with more than 50% direct, indirect or total ownership and one or more shareholders recorded with more than 25% direct or total ownership”; “medium-high ownership concentration” with C and C+, “companies with known recorded shareholders that have a total or calculated ownership above 50%”; “high ownership concentration” with D level, “companies with a recorded shareholder that has a direct ownership above 50%”; “unknown level of independence” with level U.

In Table 1, we summarized the main descriptive statistics of the variables included in our research that disclose the following: there are companies with no reported total assets, ROE and ROA (N value is lower than the total one, of 6,096 companies); medium values for ROE, ROA, numbers of directors (total, current and previous), number of advisors (total, current and previous) and shareholders are closer to minimum values than the maximum ones, which suggests that the majority of the insurance companies tend to account for lower values for these indicators; the medium level of the companies’ ownership is of type D (marked by us with 7), respectively with high ownership concentration.

Table 1. Summary statistics of data used in analysis

Variables	N	Mean	Standard deviation (sd)	Minimum	Maximum
TR	6096	478618.8	3227252	0.0001223	1.10e+08
ASSETS	5805	4634712	3.57e+07	0	1.29e+09
ROE	4929	30.10795	77.16487	0	994.27
ROA	5706	6.211846	11.02792	0	99.023
DM	6096	25.12533	81.18598	0	3713
C_DM	6096	15.05988	54.74313	0	2585
P_DM	6096	12.83301	37.77344	0	1305
ADV	6096	1.955381	2.246787	0	67
C_ADV	6096	1.211286	1.383713	0	17
P_ADV	6096	0.824147	1.6329	0	64
SHA	6096	2.572999	29.11928	0	1518
BI	6036	7.01723	1.356454	1	8
N total	6096				

Source: own contribution in Stata 17

The methodological endeavor relies on two advanced approaches to modeling cross-sectional data, namely robust regression with Huber and biweight iterations (RREG) and network analysis through Gaussian and Mixed-Markov graphical models (GGMs and MGMs).

The robust regression procedure, also known as RREG, is an effective way to handle missing data (no reported values) and outliers when analyzing a cross-sectional sample of different companies. The procedure involves using robust regression imputation for missing data, which combines single imputations with regression data. This helps to ensure that the analysis is accurate and reliable, even when dealing with companies of varying sizes and financial outcomes. Additionally, robust regression algorithm uses iteratively reweighted least squares to estimate

both the regression coefficients and the standard errors, making it a powerful tool for statistical analysis. Overall, RREG is a valuable technique for researchers and analysts who need to analyze complex datasets as the one employed in current research. At the same time, we apply the network analysis performed through Gaussian and Mixed-Markov graphical models as novel exploratory analyses tools that cope with spurious correlations caused by a so-called common cause (a third variable). It therefore reduces the risk of identifying spurious relationships through the use of Bayesian and partial correlation coefficients.

Robust regression is employed to assess the direct impacts of corporate governance credentials on firm revenues/ financial results, respectively companies' size/capacity, and provides robust estimates going beyond the classical regression and dropping the outliers in our sample of over 6,000 active companies in insurance, reinsurance, and pension funding with the main headquarters in Europe. Models of RREG are shown in the set of equations 1, including as dependent variables, alternatively, each of the considered indicators of companies' performance and capacity, namely turnover (TR), return on equity (ROE), return on assets (ROA), and total assets (ASSETS), and numerous credentials of corporate governance as explanatory variables, thus resulting in 10 econometric models per each, as follows:

$$\begin{aligned}
 \text{Model 1: } TR/ROE/ROA/ASSETS &= \beta_0 + \beta_1 DM + \theta_i + \varepsilon \\
 \text{Model 2: } TR/ROE/ROA/ASSETS &= \beta_0 + \beta_1 C_DM + \theta_i + \varepsilon \\
 \text{Model 3: } TR/ROE/ROA/ASSETS &= \beta_0 + \beta_1 P_DM + \theta_i + \varepsilon \\
 \text{Model 4: } TR/ROE/ROA/ASSETS &= \beta_0 + \beta_1 ADV + \theta_i + \varepsilon \\
 \text{Model 5: } TR/ROE/ROA/ASSETS &= \beta_0 + \beta_1 C_ADV + \theta_i + \varepsilon \\
 \text{Model 6: } TR/ROE/ROA/ASSETS &= \beta_0 + \beta_1 P_ADV + \theta_i + \varepsilon \\
 \text{Model 7: } TR/ROE/ROA/ASSETS &= \beta_0 + \beta_1 BI + \theta_i + \varepsilon \\
 \text{Model 8: } TR/ROE/ROA/ASSETS &= \beta_0 + \beta_1 SHA + \theta_i + \varepsilon \\
 \text{Model 9: } TR/ROE/ROA/ASSETS &= \beta_0 + \beta_1 DM + \beta_2 ADV + \beta_3 BI + \beta_4 SHA + \theta_i + \varepsilon \\
 \text{Model 10:} \\
 TR/ROE/ROA/ASSETS &= \beta_0 + \beta_1 DM + \beta_2 C_DM + \beta_3 P_DM + \beta_4 ADV + \beta_5 C_ADV + \beta_6 P_ADV + \beta_7 BI \\
 &+ \beta_8 SHA + \theta_i + \varepsilon
 \end{aligned}
 \tag{1}$$

where: θ_i – variable that captures the country/ company effects; ε – error term (residual variable).

To complement the robust regression models and to explore the relationships and connections between all variables included in this study, network analysis is being configured next, through GGMs and MGMs graphical models, as novel exploratory analysis tools. Graphical models depict the set of variables as circles (nodes) and relationships between the variables through a set of lines (edges) in an undirected network of partial correlation coefficients/conditional associations thus avoiding spurious correlations (Epskamp *et al.*, 2018). The intensity of connections between items/variables is captured through the width and saturation of these lines (edges), with no edge implying that there is no linkage between two variables/nodes of the network (partial correlation is zero, variables are independent after conditioning on all other variables in the dataset) (Foygel and Drton, 2010).

Based on our research objective and the methodology applied, the working hypotheses are:

H1. There are direct and favorable impacts of the management, shareholders, and ownership concentration on the performance of European insurance companies;

H2. There are direct and favorable impacts of the management, shareholders, and ownership concentration on the dimension (size/capacity) of the European insurance companies;

H3. There are overall interconnections among management, shareholders, ownership concentration, performance, and the dimension (size/capacity) of European insurance companies.

4. Results and discussions

4.1. Results of robust regression models (RREG)

To assay the first two research hypotheses, respectively, to what extent the dimensions of management, shareholders, and ownership concentration directly and favorably influence the financial performance (H1) and dimension (H2) of the European insurance companies, we applied the RREG models for each of the dependent variables considered, obtaining the following 4 sets of estimations, thus:

- 3 sets of models for revenues/financial performance, measured by turnover (TR) – Appendix, Table A1, ROE – Appendix, Table A2 and ROA – Appendix, Table A3;
- 1 set of models for the dimension of the European insurance companies, measured by total assets – Appendix, Table A4.

Each of these sets of patterns includes 10 models, of which 8 models are simple linear robust regression models, built for each of the considered independent variables (models 1-8), then a model for the total values of the considered explanatory variables (model 9), and one model for the influence of all corporate governance independent variables considered (model 10).

We could observe that the highest associations between variables, highlighted by R2 values, were attained in the case of the multifactorial models, respectively model 9 and model 10, for all dependent variables considered as proxies of revenues/financial performance (Appendix, Tables A1-A4).

Therefore, based on the results from Appendix, Tables A1, the board size, weighed by the number of directors and managers, both total (DM), and for current (C_DM), respectively previous period (P_DM), positively influenced (statistically significant estimated coefficients, with $p < 0.001$) the operating revenue/turnover (TR) (models 1-3), being more pronounced for the previous situation than the current one. The same impacts were induced by the number of advisors (models 4-6) – total (ADV), current (C_ADV) and previous (P_ADV) – on the operating revenue (TR), being uppermost for the current period (model 5). Instead, the ownership of the companies, respectively the independence levels (BI), negatively and statistically significant ($p < 0.001$) influenced the turnover of the European listed insurance companies (model 7), while the number of shareholders (SHA) favorably influenced the operating revenue (model 8). Still, the association between BI, respectively SHA, and TR (models 7-8) is very low (revealed by R2), which means that we must consider these results with caution.

Regarding the influence of the board size (measured by the total number of directors, managers, and advisors), jointly with shareholders and ownership concentration (model 9), only the management dimensions (DM and ADV) induced favorable impacts on the operating revenue of the insurance companies, while the influences of shareholders and ownership concentration were not statistically significant.

When all considered variables were included (model 10), the favorable impacts and statistically significant were determined only by the board size (total, current and previous), and the previous number of advisors, while for the total number of advisors, the influence on TR was unfavorable. The influences of BI and SHA on TR were not statistically significant.

As regards the inference of board size (total, current and previous), the results entail that the financial performance measured in relative terms (by ROE and ROA) was influenced only by the total (DM) and the previous number of directors and managers (P_DM), for ROE (Appendix, Table

A2, models 1-3), while for ROA, the influences were not statistically significant (Appendix, Table A3, models 1-3) for none of these variables. These results are opposite to Mwangi and Murigu (2015) that show a negative correlation between insurance companies' results to board size, but in the same line with findings of Abebe Zelalem *et al.* (2022) that analysed interlinkages between corporate governance, including board size, and financial performance, measured by ROA and ROE, of insurance companies in Ethiopia. In the case of the advisors' involvement in insurance company management, only the previous number of them (P_ADV) induced positive and statistically significant impacts on ROE (Appendix, Table A2, models 4-6). Considering the impacts on ROA (Appendix, Table A3), the favorable influences were highlighted only by the current situation of advisors (C_ADV) (model 5), while the previous situation of advisors (P_ADV) induced an unfavorable impact on ROA (model 6), which reveals an improvement of current number of advisors compared to the previous situation, as shown also by descriptive statistics (Table 1). Therefore, the average number of current advisors increased to 1.211286, compared to 0.824147 for previous period, while the maximum number of advisors of an insurance company decreased from 64 (previous value) to 17 (current value).

The same unfavorable influences (statistically significant, with $p < 0.001$), as in the case of operating revenue (TR), were exerted by the ownership concentration both on ROE (Appendix, Table A2, model 7) and ROA (Appendix, Table A3, model 7), as Merendino and Melville (2019) and Mwangi and Murigu (2015) also proved. These results require reconsideration the level of independence of European insurance companies, whose average reveals high ownership concentration (code 7 for D level for *BvD Independence indicators* - BI), as shown by descriptive statistics (Table 1). The number of shareholders (SHA) favorably and statistically significant (with $p < 0.001$) influenced ROE (Appendix, Table A2, model 8), while in the case of ROA, the impact was not significant.

When we included more variables, respectively the size of management (total number of directors, managers, and advisors), jointly with shareholders and ownership concentration (Appendix, Table A3, model 9), the management dimension measured by the total number of directors and managers (DM) and the number of shareholders (SHA) has exerted favorable impacts (with $p < 0.05$) on ROE registered by the insurance companies, while the influences of ownership concentration were unfavorable (statistically significant, $p < 0.01$). In the case of ROA (Appendix, Table A3, model 9), the only variable that employed statistically significant impact on it, but unfavorable, was the independence level (BI).

For the inferences of all considered variables on ROE (Appendix, Table A2, model 10), the favorable impacts and statistically significant were deployed by the total number of advisors (ADV) and shareholders (SHA) (statistically significant, $p < 0.01$), while for the current and previous number of advisers (C_ADV, P_ADV), and the ownership concentration (BI) the influences were unfavorable. Associations of all variables in relation to ROA (Appendix, Table A3, model 10) generated favorable and statistically significant impacts only by the current number of advisers (C_ADV), while the total number of advisors (ADV) and the ownership concentration (BI) induced unfavorable impacts on ROA.

Based on these results, the first hypothesis, *H1. There are direct and favorable impacts of the management, shareholders, and ownership concentration on the performance of the European insurance companies*, is partially fulfilled.

As regards *the dimension of the European insurance companies, measured by total assets* (Appendix, Table A4), the same positive and significant impacts, as in the case of operating revenue (TR) (Appendix, Table A1) were induced by the number of directors and managers, both total (DM), current (C_DM), and previous (P_DM) situations (models 1-3), being in line with the previous situation. Also, the total and current number of advisors (ADV, respectively C_ADV) (models 4 and 5), the ownership concentration (BI) (model 7) and the dimension of shareholders (SHA) (model 8) have generated positive impacts on total assets of insurance companies.

Favorable influences on total assets were also exerted by the overall number of directors and managers (DM), shareholders (SHA), and ownership concentration (BI), when the selected variables were included in the RREG model (model 9).

The influences of all considered variables on total assets (model 10), revealed favorable impacts and statistically significant by the current and previous number of advisers (C_ADV, P_ADV), the current situation of advisers (C_ADV), the ownership concentration (BI) and the size of shareholders (SHA). Opposite, unfavorable, and statistically significant impacts on assets were induced by the total number of directors, managers, and advisers (DM and ADV).

Considering these results, the second hypothesis, *H2. There are direct and favorable impacts of the management, shareholders, and ownership concentration on the dimension of the European insurance companies*, is partially fulfilled.

Summarising, specific policies and strategies for the European listed insurance companies are required for the ownership concentration, since this variable has induced a negative impact on the operating revenue/financial performance of these companies, but also for reconsidering the current board size (number of directors, managers, advisors), compared with previous situation.

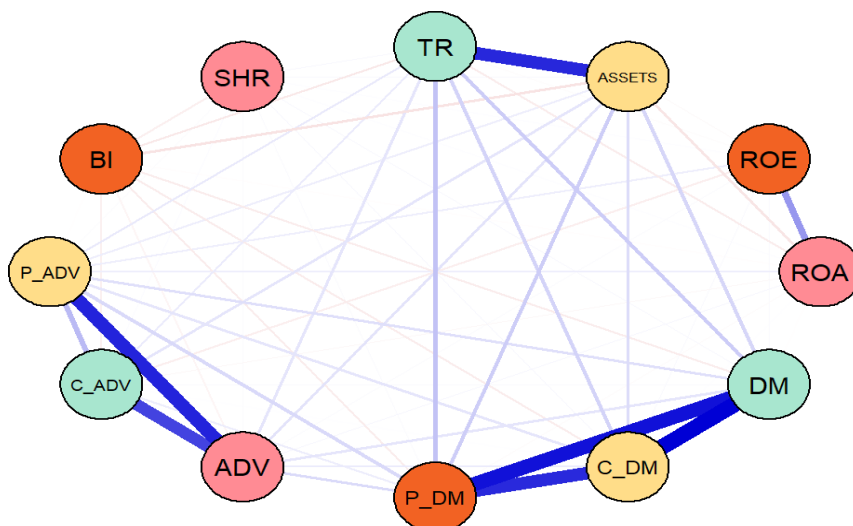
4.2. Results of Gaussian and Mixed-Markov graphical models (GGMs and MGMs)

To assess the overall interlinkages among management characteristics, shareholders, ownership concentration, revenues/financial performance, and capacity of the European insurance companies (*H3*), we built Gaussian (GGMs) (Figure 2) and Mixed-Markov (MGMs) (Figure 3) graphical models, based on partial correlation (PCOR) method.

The results (Figures 2 and 3) revealed positive and significant interlinkages between turnover (TR) and the number of directors and managers (total, current and previous), but also with the number of advisors (but with less intensity). Unfavorable interlinkages (but not very strong) of TR were attained with ownership concentration. ROE was connected with the number of advisors, but at a lower pace, with positive influence related to previous advisors and a negative one with current advisors, while ROA was favorably interlinked only with the previous situation of advisors (also with low intensity). These findings require detailed reconsideration of current situation of advisors, compared with the previous one, as regards the ratio between profit or loss and equity.

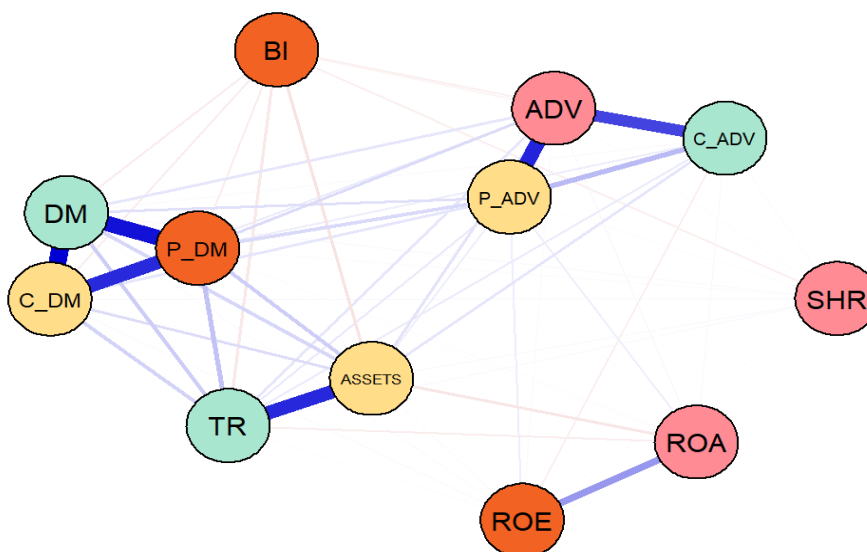
As well as turnover, the total assets of insurance companies were positively associated with the number of directors and managers (total, current and previous), but also with the number of advisors (but with less intensity), on the one hand, and negatively related with ownership concentration - high ownership companies for the European insurance companies, on the other hand, as shown in Table 1.

Figure 2. Gaussian graphical model (GGM) results



Source: own contribution in RStudio 4.2.2.

Figure 3. Mixed-Markov graphical model (MGM) results



Source: own contribution in RStudio 4.2.2.

Therefore, the third working hypothesis, *H3*. There are overall interconnections among management, shareholders, ownership concentration performance, and the dimension of the European insurance companies, is partially fulfilled.

Compared with direct influences of the considered corporate governance variables on revenues/financial performance and size/capacity of insurance companies (*H1* and *H2*), the results of GGMs and MGMs are similar with robust regression estimations, thus enforcing the conclusions drawn.

Conclusions

In this paper, we assessed the influence of board characteristics and ownership concentration on the performance (measured by turnover, ROA and ROE), and the dimension/capacity (measured by total assets) of European companies operating in insurance, reinsurance, and pension funding (except compulsory social security).

To reach this two-fold research objective, we applied two advanced econometric procedures, namely robust regression models (RREG), along with Gaussian and Mixed-Markov graphical models (GGMs, MGMs) to a number of 6,096 active companies in the field of insurance, based on data extracted from Orbis Database, provided by "Bureau van Dijk" (2022).

The main findings revealed that: there are direct and favorable influences of certain board characteristics both on the performance (*H1*), and dimension/capacity (*H2*) of the European insurance companies, but also overall interconnections among these credentials (*H3*). The characteristics that exerted positive influences on revenues/financial performance and dimension/capacity of the European companies operating in insurance were the number of directors&managers, advisors and shareholders. Still, the total situation of directors&managers needs some reconsideration since they negatively impacted the total assets of these companies. The features of the board of directors of companies are important as they are the ones choosing the general manager and executive directors. The way the company's board is configured influences the management team's ability to properly conduct its tasks. The experience of the members of the board with the company also limits the variability of performance as the board can make predictions and adopt certain positions for long-term decisions. Along the same line, the number of advisors that exerted unfavorable impacts both on financial performance and the dimension of insurance companies must be readapted, by employing the highest number of them, based on a low average situation of around 1 advisor for each company. Moreover, there are insurance companies that have not employed any advisor (the minimum value of these variables is 0), while others engaged a maximum number of 67 advisors. Furthermore, including actuary as a valuable and specialized "internal advisor", with implications on companies' results and risk management, insurance managers should bolster this position, considering the remarkable reflection made by Frank Redington, "the actuary who is only an actuary is not an actuary" (Embrechts and Wüthrich, 2022, p. 135).

The unfavorable impacts on the revenues/financial performance and dimension/capacity of the European insurance companies were deployed, in all cases (direct or overall interlinkages), by ownership concentration. Since the medium level of independence of these companies is 7, which provide high ownership concentration, respectively the ownership of shareholder is above 50% (Horobet *et al.*, 2019), this level of independence must be reconsidered toward the lowest one, in line with the findings of Merendino and Melville (2019) which outlined that ownership structure and composition do not necessarily have a positive impact on performance. Hence, a highly concentrated ownership and therefore greater monitoring is not a guarantee of better performance.

The limit of our research relies on the relatively reduced availability of data for longer time series that is needed to capture the complexity of financial, ownership, and corporate governance credentials. Future research directions target a distinctive assessment of the nexus between board independence and performance for separate sub-samples of insurance companies

analyzed, namely life and non-life insurance, in a comparative approach, but also, by including credentials related to management skills and digitalisation.

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References

- Abebe Zelalem, B., Ali Abebe, A. and Wodajo Bezabih, S., 2022. Corporate Governance and Financial Performance in the Emerging Economy: The Case of Ethiopian Insurance Companies. *Cogent Economics & Finance*, 10(1), p.2117117. <https://doi.org/10.1080/23322039.2022.2117117>
- Burca, A.M. and Batrinca, G., 2014. The Determinants of Financial Performance in the Romanian Insurance Market. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 4(1), pp.299–308. <http://dx.doi.org/10.6007/IJARAFMS/v4-i1/637>
- Bureau van Dijk, 2022. ORBIS Database. <https://www.bvdinfo.com/en-gb/our-products/data/international/orbis>
- Cristea, M., Noja, G.G., Drăgoi, D. and Andrițoiu, L.C., 2021. Insurance Development and Life Quality in the European Union Countries. An Empirical Assessment. *Facta Universitatis, Series: Economics and Organization*, 18(4) Special Issue, pp.313–324. <https://doi.org/10.22190/FUEO210616022C>
- Cristea, M., Noja, G.G., Thalassinou, E., Cîrciumaru, D., Ponea, C.Ș. and Durău, C.C., 2022. Environmental, Social and Governance Credentials of Agricultural Companies—The Interplay with Company Size. *Resources*, 11(3), p.30. <https://doi.org/10.3390/resources11030030>
- Daily, C.M. and Dalton, D.R., 1994. Bankruptcy and Corporate Governance: The impact of Board Composition and Structure. *Academy of Management Journal*, 37(6), pp.1603–1617. <https://doi.org/10.5465/256801>
- Derbali, A.M.S., 2014. Determinants of Performance of Insurance Companies in Tunisia: The Case of Life Insurance. *International Journal of Innovation and Applied Studies*, 6(1), pp.90–96.
- Embrechts, P. and Wüthrich, M.V., 2022. Recent Challenges in Actuarial Science. *Annual Review of Statistics and Its Application*, 9, pp.119-140. <https://doi.org/10.1146/annurev-statistics-040120-030244>
- Epskamp, E., Waldorp, L., Möttus, R. and Borsboom D., 2018. The Gaussian Graphical Model in Cross-Sectional and Time-Series Data. *Multivariate Behavioral Research*, 53(4), pp.453–480, <https://doi.org/10.1080/00273171.2018.1454823>
- Foygel, R. and Drton, M., 2020. Extended Bayesian Information Criteria for Gaussian Graphical Models. NIPS.

- Horobet, A., Belascu, L., Curea, Ş.C. and Pentescu, A., 2019. Ownership Concentration and Performance Recovery Patterns in the European Union. *Sustainability*, 11(4), 953, pp.1–31 <https://doi.org/10.3390/su11040953>
- Jadi, D.M., 2015. *An empirical analysis of determinants of financial performance of insurance companies in the United Kingdom*. Doctoral dissertation, University of Bradford, West Yorkshire, UK.
- Kang, H.B., Chang, H. and Chang, T., 2022. Catastrophe Reinsurance Pricing-Modification of Dynamic Asset-Liability Management. *Romanian Journal of Economic Forecasting*, 25(4), pp.5–20.
- Kao, M.F., Hodgkinson, L. and Jaafar, A., 2019. Ownership Structure, Board of Directors and Firm Performance: Evidence from Taiwan. *Corporate Governance: The international journal of business in society*, 19(1), pp.189–216. <https://doi.org/10.1108/CG-04-2018-0144>
- Khadash, K. and Washali, A., 2019. Board Diversity and Its Impact on Corporate Performance of Public Companies Listed in Amman Stock Exchange: The Case of Banks and Insurance Companies. *Jordan Journal of Business Administration*, 15(4), pp.467–487.
- Kapil, S. and Mishra, R., 2019. Corporate Governance and Corporate Performance in Emerging Markets: Evidence from India. *Theoretical Economics Letters*, 9(6), pp.2033–2069. <https://doi.org/10.4236/tel.2019.96129>
- Merendino, A. and Melville, R., 2019. The Board of Directors and Firm Performance: Empirical Evidence from Listed Companies. *Corporate Governance*, 19(3), pp.508–551. <https://doi.org/10.1108/CG-06-2018-0211>
- Mishra, R.K. and Kapil, S., 2018. Effect of Board Characteristics on Firm Value: Evidence from India. *South Asian Journal of Business Studies*, 7(1), pp.41–72. <https://doi.org/10.1108/SAJBS-08-2016-0073>
- Morara, K. and Sibindi, A.B., 2021. Determinants of Financial Performance of Insurance Companies: Empirical Evidence Using Kenyan Data. *Journal of Risk and Financial Management*, 14(12), p.566. <https://doi.org/10.3390/jrfm14120566>
- Mwangi, M. and Murigu, J.W. 2015. The Determinants of Financial Performance in General Insurance Companies in Kenya. *European Scientific Journal (ESJ)*, 11(1), pp.288–297. <https://doi.org/10.19044/esj.2015.v11n1p%p>
- Nyongesa, M.N., 2017. *Effect of Financial Management Practices on Financial Performance of Insurance Companies in Kenya*. Doctoral dissertation, Juja: Jomo Kenyatta University of Agriculture and Technology (COHRED-JKUAT).
- Öner Kaya, E., 2015. The Effects of Firm-Specific Factors on the Profitability of Non-Life Insurance Companies in Turkey. *International Journal of Financial Studies*, 3(4), pp.510–529. <https://doi.org/10.3390/ijfs3040510>
- Orlitzky, M., Schmidt, F.L. and Rynes, S.L., 2003. Corporate Social and Financial Performance: A Meta-Analysis. *Organization studies*, 24(3), pp.403–441.
- Ostroff, C. and Schmitt, N., 1993. Configurations of Organizational Effectiveness and Efficiency. *Academy of Management Journal*, 36(6), pp.1345–1361.
- Petroni, K.R., 1992. Optimistic Reporting in the Property-Casualty Insurance Industry. *Journal of Accounting and Economics*, 15(4), pp.485–508.
- Ward, D. and Zurburegg, R., 2000. Does Insurance Promote Economic Growth? Evidence from OECD Countries. *Journal of Risk and Insurance*, 67(4), pp.489–506.
- Zhu, N, Zhang, S. and Zhou, Y., 2023. Impacts of Environmental Regulation on Corporate ESG Performance – Evidence from China. *Romanian Journal of Economic Forecasting*, 26(3), pp.62–82.

Table A1

RREG results for insurance companies, dependent variable turnover (TR)

Indicators	(1) TR	(2) TR	(3) TR	(4) TR	(5) TR	(6) TR	(7) TR	(8) TR	(9) TR	(10) TR
DM	0.0394*** (0.000629)								0.0383*** (0.000555)	0.0992*** (0.00579)
C_DM		0.0436*** (0.000960)								0.120*** (0.00603)
P_DM			0.0814*** (0.00120)							0.147*** (0.00482)
ADV				0.146*** (0.0180)					0.0408* (0.0166)	-0.245* (0.105)
C_ADV					0.254*** (0.0292)					0.199 (0.101)
P_ADV						0.152*** (0.0286)				0.203* (0.0997)
BI							-0.120*** (0.0301)		-0.0460 (0.0277)	-0.0445 (0.0265)
SHA								0.00459** (0.00140)	0.00202 (0.00126)	0.00223 (0.00121)
_cons	8.338*** (0.0395)	8.598*** (0.0403)	8.280*** (0.0387)	8.855*** (0.0537)	8.838*** (0.0537)	9.011*** (0.0468)	9.980*** (0.215)	9.125*** (0.0408)	8.585*** (0.207)	8.530*** (0.199)
N	6094	6094	6094	6096	6096	6095	6036	6096	6035	6033
R ²	0.392	0.253	0.429	0.011	0.012	0.005	0.003	0.002	0.449	0.488

Note: *Standard errors in parentheses, ^{*}p<0.05, ^{**}p<0.01, ^{***}p<0.001
Source: own contribution in Stata 17

Table A2

RREG results for insurance companies, dependent variable ROE

Indicators	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	ROE	ROE	ROE	ROE	ROE	ROE	ROE	ROE	ROE	ROE
DM	0.00462* (0.00179)								0.00389* (0.00175)	0.0232 (0.0186)
C_DM		0.00449 (0.00266)								-0.0306 (0.0196)
P_DM			0.0125** (0.00386)							0.00142 (0.0153)
ADV				0.125 (0.0675)					0.0188 (0.0669)	1.217* (0.429)
C_ADV					-0.150 (0.111)					-1.510*** (0.416)
P_ADV						0.279** (0.0915)				-0.877* (0.408)
BI							-1.184*** (0.110)		-1.113*** (0.112)	-1.099*** (0.112)
SHA								0.0223*** (0.00493)	0.0152** (0.00487)	0.0158* (0.00486)
_cons	10.41*** (0.168)	10.47*** (0.167)	10.36*** (0.170)	10.26*** (0.218)	10.76*** (0.221)	10.30*** (0.180)	18.68*** (0.779)	10.47*** (0.160)	17.96*** (0.832)	18.08*** (0.840)
N	4929	4929	4929	4929	4929	4929	4887	4929	4887	4887
R ²	0.001	0.001	0.002	0.001	0.000	0.002	0.023	0.004	0.026	0.032

Note: *Standard errors in parentheses, *p<0.05, **p<0.01, ***p<0.001”
Source: own contribution in Stata 17

Table A3

RREG results for insurance companies, dependent variable ROA

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	ROA	ROA	ROA	ROA	ROA	ROA	ROA	ROA	ROA	ROA
DM	-0.000575 (0.000466)								-0.000641 (0.000467)	0.00110 (0.00498)
C_DM		-0.000853 (0.000692)								-0.00135 (0.00526)
P_DM			-0.00111 (0.00099)							-0.00171 (0.00410)
ADV				0.00780 (0.0172)					0.00288 (0.0174)	-0.356** (0.114)
C_ADV					0.0871** (0.0279)					0.442*** (0.111)
P_ADV						-0.0620** (0.0233)				0.210 (0.109)
BI							-0.103*** (0.0285)		-0.1000*** (0.0292)	-0.110*** (0.0294)
SHA								0.00202 (0.00129)	0.00145 (0.00130)	0.00127 (0.00130)
_cons	2.484*** (0.0407)	2.486*** (0.0404)	2.482*** (0.0410)	2.459*** (0.0524)	2.367*** (0.0524)	2.523*** (0.0437)	3.192*** (0.203)	2.468*** (0.0391)	3.171*** (0.218)	3.246*** (0.220)
N	5706	5706	5706	5706	5706	5706	5660	5706	5660	5660
R ²	0.000	0.000	0.000	0.000	0.002	0.001	0.002	0.000	0.003	0.011

Note: "Standard errors in parentheses, *p<0.05, **p<0.01, ***p<0.001"
Source: own contribution in Stata 17

Table A4

RREG results for insurance companies, dependent variable ASSETS

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	ASSETS	ASSETS	ASSETS	ASSETS	ASSETS	ASSETS	ASSETS	ASSETS	ASSETS	ASSETS
DM	0.0373 ^{***} (0.000573)								0.0377 ^{***} (0.000575)	-0.0900 ^{***} (0.00520)
C_DM		0.0404 ^{***} (0.000871)								0.108 ^{***} (0.00542)
P_DM			0.0798 ^{***} (0.00110)							0.141 ^{***} (0.00432)
ADV				0.0762 ^{***} (0.0166)					0.00783 (0.0153)	-0.379 ^{***} (0.0940)
C_ADV					0.273 ^{***} (0.0269)					0.462 ^{***} (0.0911)
P_ADV						-0.0214 (0.0227)				0.131 (0.0895)
BI							0.0589 [*] (0.0275)		0.101 ^{***} (0.0255)	0.0949 ^{***} (0.0241)
SHA								0.00375 ^{**} (0.00126)	0.00227 [*] (0.00115)	0.00233 [*] (0.00108)
_cons	10.12 ^{***} (0.0368)	10.40 ^{***} (0.0374)	10.02 ^{***} (0.0361)	10.80 ^{***} (0.0506)	10.59 ^{***} (0.0505)	10.97 ^{***} (0.0424)	10.52 ^{***} (0.196)	10.94 ^{***} (0.0378)	9.371 ^{***} (0.190)	9.268 ^{***} (0.181)
N	5801	5801	5801	5803	5803	5803	5756	5803	5754	5753
R ²	0.423	0.271	0.476	0.004	0.017	0.000	0.001	0.002	0.432	0.544

Note: "Standard errors in parentheses, *p<0.05, **p<0.01, ***p<0.001"

Source: own contribution in Stata 17