

A Comparative Study on Performance of Insurance Companies with Grey Relational Analysis and Analytic Hierarchy Process

(Research Article)

Gri İlişkisel Analiz ve Analitik Hiyerarşi Süreci ile Sigorta Şirketlerinin Performansı Üzerine Karşılaştırmalı Bir Çalışma

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ABSTRACT

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In this study, financial performances of certain selected non-life insurance companies operating in Turkey between 2014-2018 are compared with two multi-criteria decision-making methods. The analytical hierarchy process is integrated into the grey relational analysis. First, the weights of the financial ratios are computed with the analytical hierarchy process, and then the companies are ranked by grey relational analysis using the weights found. The grey relational analysis results in which the financial ratios are taken as equally weighted are compared with the results in which the weights found with the help of the analytical hierarchy process. It is realized that the grey relational analysis results are affected by the weight of the financial ratios calculated with the analytical hierarchy process. In addition, it is observed that the ranking obtained by the combination of grey relational analysis and analytical hierarchy process is more compatible with the data in the financial reports.

1. INTRODUCTION

The insurance sector is a highly competitive sector that includes many insured and many insurance companies to serve these insured. Insurance companies should periodically compare their financial performance with the performance of competitors in the industry so as to incorporate the potential insured and perform better. The assessment of the financial performance is a valuation of whether the optimal asset is carried on by using sources on hand efficiently. In the financial activity assessment of insurance companies, certain financial ratios

such as liquidity, capital adequacy, profitability and operating ratios are utilized. Current ratio, liquidity ratio and ratio of liquid assets to total assets are the liquidity ratios, while solvency ratio, ratio of gross written premiums to equity capital, ratio of net written premiums to equity capital, ratio of equity capital to total assets and ratio of equity capital to net technical reserves are capital adequacy ratios. Furthermore, premium retention and paid loss ratios are the operating ratios and loss ratio, technical profitability ratio, sales profitability ratio, return on assets (ROA) and return on equity (ROE) are the profitability ratios (Kaya, 2016).

In Turkey, as of the end of 2018, there were a total of 62 companies available in the sector, 60 of which were insurance and pension companies and 2 of which were reinsurance companies. 38 of the insurance and pension companies work in non-life, while 5 of them operate in life and 17 of them operate in life and pension branches. The number of companies operating in the non-life branch was considerably higher than in other branches, and, accordingly, non-life insurance companies have a large percentage in overall premium production. Gross premium volume in life branch, which has a share of 12.7 % in total premiums, was 6.9 billion TL, and non-life gross premium production, whose share in total premiums was 87.3%, was 47.7 billion TL. Gross premium volume was realized as 22.711 billion TL, 27.296 billion TL, 35.450 billion TL, 39.735 billion TL and 47.669 billion TL for the years 2014, 2015, 2016, 2017 and 2018, respectively (<https://www.hmb.gov.tr/>, <https://seddk.gov.tr/>).

There were 28 non-life insurance companies operating in Turkey between 2014-2018. Due to the importance of the non-life sector, the financial activity of these non-life insurance companies in Turkey should be examined using some specific methods. There are various techniques to evaluate the performance of companies. Data Envelopment Analysis (DEA) (Hao and Chou, 2005; Harton, 2010; Erdemir and Tatlıdil, 2017; Jafari and Mousavi, 2017; Guirguis, 2021; Kansra and Singh, 2021) is the most commonly used method. Moreover, Principal Component Analysis (PCA) (Shanmugam and Johnson, 2007), Malmquist-Total Factor Productivity (Cingi and Tarım, 2000), Tobit Regression Model (Kılıçkaplan and Karpat, 2004), Stochastic Frontier Analysis (Akan and Çalmaşur, 2011) and technique for order performance by similarity to ideal solution (TOPSIS) (Akyüz and Kaya, 2013) are also utilized for performance comparison. Recently, grey relational analysis (GRA) (Kaya, 2016; Kula et al., 2016; Güleç and Özkan, 2018; Suvvari and Goyyar, 2019) and Analytical Hierarchy Process (AHP) (Pakkar, 2014; Çağlar and Öztaş, 2016), which are the multi-criteria decision-making (MCDM) methods, are often preferred for performance evaluation.

GRA is used to analyse the uncertainty in the MCDM problem and grey colour is used for conditions where information is not fully known. In this method, decision makers hierarchically model the relationship between the main objective, sub-criteria, criteria and alternatives and then make a decision for complex problems. In order to examine the progress or decline in performance on an annual basis, performance evaluation should be carried out between certain periods rather than a single period. GRA is suitable to use in performance comparison studies due to its methodology. Chang (2006) investigated of the financial performances of 15 deposit banks operating in Taiwan between 2000–2002 by using 20 financial ratios by GRA. Ho and Wu (2006) compared the financial performances of three Austrian banks with the help of GRA method. The financial performance of three state-controlled banks and ten private deposit banks in Turkey were analyzed with GRA by Uçkun and Girginer (2011). The financial activity of three leading insurance companies is analyzed with GRA using liquidity, financial leverage and profitability ratios of the companies by Peker and Baki (2011). The financial productivity of

the financial performances of insurance companies by using GRA, which were active during 2010-2011 in Istanbul Stock Exchange is analyzed by Elitaş et al. (2012) using 10 financial ratios, and companies have been sorted by their financial performances within their own group. Kaya (2016) investigated the financial productivity of non-life insurance companies traded in Borsa Istanbul (BIST) between 2010 and 2014 via GRA by using the liquidity, capital adequacy, ratios, operating and profitability ratios. Kula et al. (2016) analyzed financial performances of a pension fund trading on BIST and seven insurance companies via GRA and according to results, the capital structures of half of the companies under investigation were effective. Güleç and Özkan (2018) analysed the financial performances of 16 cement companies that operated in BIST between the years of 2005 and 2016 with GRA. Suvvari and Goyyari (2019) assess the financial performance of 24 Indian life insurance companies for the years from 2013 to 2016 via GRA using a total of 14 indicators. Kayıhan and Kara (2021) have determined the cost performance of banks. The cost performances of eight commercial banks operating in BIST were determined using the criteria importance through inter-criteria correlation (CRITIC)-GRA method for 2018, 2019, and 2020 years. Dinler (2021) has evaluated forty non-life insurance companies by ranking them with GRA method.

AHP is a theory of measurement through pairwise comparisons and depends on the experts' judgements to obtain priority scales. It is these scales that measure intangibles in relative terms and Saaty (2008) is a pioneering work in this field. Bayrakdaroğlu and Ege (2008) compared 45 banks operating in Turkey between 2001 and 2006 with AHP. Pakkar (2014) proposed a method to determine the weights by means of AHP and the purpose of this study was to measure the effectiveness of the insurance companies. Çağlar and Öztaş (2016) ranked 8 non-life insurance companies with the help of financial ratios of year of 2014 in Turkey by using the perspective of Pakkar. Two different results based on expert opinions were compared so as to see how the findings were influenced by different expert thoughts in this applied method. Gülsün and Erdoğan (2021) evaluated the financial performance of eight banks which are among the top eight in asset size according to the reports received from the Banks Association of Turkey between 2013 and 2018, using the Fuzzy AHP and Fuzzy TOPSIS methods.

MCDM methods are combined for performance analysis in recent years. Tsai et al. (2008) compared the property-liability insurance companies combining AHP and GRA. Fan et al. (2008) evaluated life insurance companies with AHP and GRA methods. Wu et al. (2010) proposed a model to compare financial performance of wealth management banks in Taiwan by applying AHP and GRA. Tayyar et al. (2014) assessed the financial activity of the listed companies operating in information technology sector in BIST between the years of 2005-2011 with AHP and GRA. Güneysu et al. (2015) used GRA and AHP to assess the financial performance of the commercial banks in Turkey with 16 financial ratios. The activity in the staff evaluation process was investigated by GRA and AHP (Senger and Albayrak, 2016). Arslan et al. listed 14 companies operating in the textile sector according to their financial performances. As a method, gray relational analysis was applied by accepting the criteria as equally weighted and weighted by the AHP method. Noyan et al. (2019) used GRA and AHP combination to give an idea of pension investment decisions of individuals operating in Turkey guiding the company through the most appropriate pension companies. In GRA, the results are affected by how much the ratios used contribute. Exactly at this point, AHP can be used to calculate the weight of financial ratios. Nguyen et al. (2020) ranked the stock of 13 agriculture companies indexed on the Vietnam Stock Exchange Market during the 2016-2019 periods using some methods such as AHP integrated with GRA, multi-objective optimization ratio

analysis (MOORA) and TOPSIS. There are some other combinations of models instead of GRA-AHP. Even in some cases a combination is created using GRA, DEA and AHP for the financial performance assessment of insurance companies (Ormanie et al. 2014). Gharizadeh Beiragh et al. (2020) proposed an integrated model using DEA, GRA and AHP. Raju and Rao (2019) used DEA to obtain ranks of nationalized banks and obtained coefficients by comparing AHM, CAMEL, and GRA. AHP can be included in other methods besides the GRA method. Kandemir and Karataş (2016) evaluated the 10-year financial performance of 12 deposit banks using VIKOR, TOPSIS and GRA methods. Kumar et al. (2018) presented an integrated approach of decision-making integrating AHP with VIKOR and WASPAS.

In this article, instead of using conventional methods such as DEA, financial performances of 28 non-life insurance companies operating in Turkey between 2014-2018 are compared by incorporating AHP into GRA. Moreover, GRA was performed with both equal weights for each financial ratio and the weights found with AHP. It is noticed that the weight of the financial ratios calculated with AHP affected the GRA results. Companies will be able to assess their financial activity and manage the assets and resources over the years using the results obtained with the combination of these two methods.

This paper is organized as follows: Firstly, the methods used, GRA and AHP, are basically explained. Then, an application study involving the combination of these two methods is carried out using the data taken from “Insurance and Private Pension Activities Reports in Turkey” (<https://www.hmb.gov.tr/>, <https://seddk.gov.tr/>) over a five-year period. Finally, concluding remarks are given.

2. METHODOLOGY

In this study, GRA and AHP are combined to analyse the financial activity of non-life companies in Turkey for a five-year period. The methods are explained briefly as follows.

2.1. Grey Relational Analysis

The first research paper titled “Control Problems of Grey Systems” in the area of grey systems is published (Deng, 1982) and then Grey System Theory was first introduced by Deng (1989). Grey theory is a useful theory used to solve problems involving uncertainty. The possible information can contain various ambiguity and noises in the search for new systems with internal and external effects as well as limitations of our understanding. The colours are used to describe the degree of clearness of the information in the theory of uncertainty. Objects with unknown internal information are generally defined as “Black Box” which means no information is available. On the other hand, “White” colour represents the situation where all the information is available. Consequently, black and white refer to “No information” and “Full Information”, respectively. In uncertain theory, there is a “Grey” colour between “Black” and “White” and it symbolize that incomplete information (Suvvari et al., 2019).

Grey System Theory contains the main subjects of research such as grey numbers, grey elements, and grey relations (Liu and Lin, 2006). GRA is getting much attention in financial performance studies in recent years. Grey relational grades are calculated by GRA to evaluate the performance of financial units (Wu and Chen, 1999; Wu, 2002). GRA proceeds gradually and the stages of GRA are given as follows:

Step 1. Construction of the Decision Matrix

Let assume that there are n data sequences characterized by m criteria and where $x_i(j)$ is the value of the i^{th} unit corresponding to the j^{th} variable ($i = 1, \dots, n$), ($j = 1, \dots, m$), the decision matrix is define as follows.

$$X = \begin{bmatrix} x_1(1) & \dots & x_1(m) \\ \dots & \ddots & \dots \\ x_n(1) & \dots & x_n(m) \end{bmatrix}$$

Step 2. Normalization of the Data

The data is normalized to obtain homogeneous units for comparison. There regimes of normalization are given briefly as follows where $\min_{i=1}^n[x_i(j)]$ and $\max_{i=1}^n[x_i(j)]$ show the minimum and the maximum values of the j^{th} variable, respectively. For larger and smaller the better normalizations, the formulas are given below, respectively.

$$x_i^*(j) = \frac{x_i(j) - \min_{i=1}^n[x_i(j)]}{\max_{i=1}^n[x_i(j)] - \min_{i=1}^n[x_i(j)]}$$

$$x_i^*(j) = \frac{\max_{i=1}^n[x_i(j)] - x_i(j)}{\max_{i=1}^n[x_i(j)] - \min_{i=1}^n[x_i(j)]}$$

The formula is defined as follow for nominal the best normalization where $x_{obj}(j)$ displays the target value of the j^{th} variable.

$$x_i^*(j) = 1 - \frac{|x_i(j) - x_{obj}(j)|}{\max\{\max_{i=1}^n[x_i(j)] - x_{obj}(j), x_{obj}(j) - \min_{i=1}^n[x_i(j)]\}}$$

Step 3. Generation of the Normalized Matrix and the Reference Sequence

Initial decision matrix in step 1, is revised as normalized decision matrix.

$$X^* = \begin{bmatrix} x_1^*(1) & \dots & x_1^*(m) \\ \dots & \ddots & \dots \\ x_n^*(1) & \dots & x_n^*(m) \end{bmatrix}$$

The reference sequence is given as follows:

$$x_0^* = x_0^*(1), x_0^*(2), \dots, x_0^*(j), \dots, x_0^*(n)$$

where $x_0^*(j)$ is the reference value of the j^{th} variable ($x_0^*(j) = \max_{i=1}^n[x_i(j)]$).

Step 4. Construction of the Difference Matrix

The absolute values of the difference is demonstrated as follows.

$$\Delta_{0i}(j) = |x_0^*(j) - x_i^*(j)|$$

The constructed difference matrix is given as follows.

$$\Delta = \begin{bmatrix} \Delta_{01}(1) & \dots & \Delta_{01}(m) \\ \dots & \ddots & \dots \\ \Delta_{0n}(1) & \dots & \Delta_n(m) \end{bmatrix}$$

Step 5. Computation of the Grey Relational Coefficient

$\gamma_{oi}(j)$ is calculated for the j^{th} variable by the equation as follows:

$$\gamma_{oi}(j) = \frac{\min_{i=1}^n \min_{j=1}^m \Delta_{oi}(j) + \zeta \max_{i=1}^n \max_{j=1}^m \Delta_{oi}(j)}{\Delta_{oi}(j) + \zeta \max_{i=1}^n \max_{j=1}^m \Delta_{oi}(j)}$$

where ζ is the distinguishing coefficient valued between 0 and 1.

Step 6. Computation of the Grey Relational Grades

Γ_{oi} is calculated as follows:

$$\Gamma_{oi} = \sum_{j=1}^m [w(j)x\gamma_{oi}(j)]$$

where $w(j)$ shows the weight of the j^{th} variable and $\sum_{j=1}^m w(j) = 1$. The weights can be determined arbitrary consulting the opinions of experts in the field (Kaya, 2016) or can be taken equally as $w(j) = 1/m$ for each variable (Peker and Baki, 2011). On the other hand, MCDM methods such as AHP can be used to determine the weights (Tsai et al., 2008; Tayyar et al., 2014; Senger and Albayrak, 2016; Noyan et al., 2019). In this study, the weights of financial ratios are determined with AHP, by including AHP between steps 5 and 6 of the GRA.

2.2. Analytic Hierarchy Process

AHP is one of complex MCDM methods that was created by Thomas L. Saaty in the 1970s. This method is a technique that requires the decision-maker's opinion to determine the relative importance of all criteria. The criteria and sub-criteria are compared via completing surveys using Saaty's 1-9 scale by decision-makers. Priority of decision alternatives is obtained by evaluating all criteria (Anderson et al., 2012).

There are many MCDM techniques. Among these techniques, the most important advantages of the AHP are its ease of use and the ability to apply complex problems that include subjective judgments as well as objective judgments. (Timor, 2011)

The following steps are performed in modelling MCDM problems with AHP.

- Decision-making problem is diagnosed, and then the objective is determined.
- The decision criteria required to achieve the objective are listed.
- Potential decision alternatives are identified.
- Hierarchical structure of decision problem is formed.
- Criteria for each level are compared dually, and then the importance of criteria by using eigenvalues/eigenvectors is determined.
- Alternatives are compared based on the criteria and calculation of priorities
- Consistency ratio is calculated.
- Alternatives are listed according to relative priority values, and then the alternative with the highest priority value is selected
- Sensitivity analysis is conducted.

The stages of AHP are given as follows:

1. Construction of the matrix in which pairwise comparisons will be made

In order to compare, we need a scale of numbers that shows how many times more significant one element is over another element in relation to the criterion or property in relation to which they are compared. Table 1 exhibits the scale.

Table 1. The Fundamental Scale of Absolute Numbers

Definition- Intensity of Importance	Explanation
Equal Importance-1	Activities contribute equally to the objective
Weak or slight-2	
Moderate importance-3	Experience and judgement slightly favour one activity over another
Moderate plus-4	
Strong importance-5	Experience and judgement strongly favour one activity over another
Strong plus-6	
Very strong or demonstrated importance-7	An activity is favoured very strongly over another; its dominance demonstrated in practice
Very, very strong-8	
Extreme importance-9	The evidence favouring one activity over another is of the highest possible order of affirmation

2. Standardizing the generated comparison matrix

To obtain standardized matrix, the columns are summed and each value is divided by its column total.

3. Taking the average of the rows to obtain the weights

4. Checking the consistency of the comparison matrix

The consistency of the comparison matrix should be checked to use the calculated weights. λ_{max} satisfying the $Aw = \lambda_{max}w$ equation is the largest eigenvalue of the comparison matrix A , w is the resulting weight matrix.

In addition, two coefficients, the Consistency Index (CI) and the Consistency Ratio (CR), are used to ensure the consistency of subjective perceptions and the accuracy of relative weights. CI which is calculated by

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

where n is the total number of criteria. For a reliable result, the CI value should not be greater than 0.1.

CR which is calculated by

$$CR = \frac{CI}{RI}$$

where RI is randomness index. The RI values for different criteria numbers (n) are shown in Table 2 (Tzeng and Huang, 2011):

Table 2: The Randomness Index (RI)

<i>n</i>	1	2	3	4	5	6	7	8	9	10
<i>RI</i>	0	0	0.52	0.89	1.11	1.25	1.35	1.40	1.45	1.49

3. APPLICATION

3.1. Data

In this article, data in the “Insurance and Private Pension Activities Reports in Turkey” which was published by Ministry of Treasury and Finance (<https://www.hmb.gov.tr/>) and Insurance and Private Pensions Regulation and Supervision Agency (<https://seddk.gov.tr/>) between the years 2014-2018 is used.

According to the data, 28 non-life insurance companies operate actively in the five-years period.

3.2. Financial Ratios

Financial ratios are calculated with some financial items such as total assets, total gross premium, total shareholders’ equity and similar items in the accounting records. Rather than directly comparing a financial value, the use of ratios better measures the effect of changing one value over another on financial performance. Financial ratios used for financial performance analysis of companies are given in Table 3 with their formulas and targets as follows.

Table 3. Financial Ratios

Financial Ratios	Formula	Target
Return on Assets (ROA)	Net Profit/Total Assets	Larger the better
Gross Written Premiums (GWP)	Log (Total Gross Premium)	Larger the better
Company Size (CS)	Log (Total Assets)	Larger the better
Insurance Leverage Ratio (ILR)	Net Technical Provisions/Shareholders’ Equity	Smaller the better
Expense-Revenue Ratio (ERR)	Expenses/Net Revenue	Smaller the better
Market Share (MS)	A percentage value taken from reports directly	Larger the better
Current Ratio (CR)	Total Current Assets/Total Short-Term Liabilities	Larger the better
Equity-Asset Ratio (EAR)	Total Shareholders’ Equity/Total Assets	Larger the better
Premium-Asset Ratio (PAR)	Total Premium Production/Total Assets	Larger the better
Return on Equity (ROE)	Net Profit/Total Shareholders’ Equity	Larger the better

Financial ratios are calculated separately for each of companies and the steps of each GRA analysis are carried out separately for each year. Firstly, decision matrices are obtained using the financial ratios for each year and given in Appendix. The ratios are normalized according to the formulas given in stage-2 of GRA based on their targets which are given in Table 1. Then decision matrices are normalized and reference sequences are obtained as in stage-3 of GRA after the normalization. Difference matrices are constructed as the absolute value of the difference between normalized and the reference values according to the stage 4 of GRA. Grey relational coefficients are calculated using the formula given in stage 5 of GRA. Finally, grey relation grades of companies are obtained using both equal weights and the weights which are obtained via AHP. AHP is included between stages 5 and 6 of GRA.

The matrices obtained are not demonstrated separately because the number of companies whose financial performance is examined is high and they are analyzed on a yearly basis. Furthermore, in this study, the ranking based on years is also compared within itself. As an alternative method, as in the study of Kaya (2016), the decision matrix could be taken from the beginning as the 5-year average of financial ratios and analyzes could be made. A single ranking of 5-year performance could be obtained.

3.3. Financial Performance Assessment of Non-Life Insurance Companies

Firstly, grey relational grades are obtained using equal weights and given in Table 4. Then, the companies are ranked as in Table 5 according to GRA grades with equal weights (0.1) given in Table 4.

Table 4. GRA Grades of Companies with Equal Weights

Companies	2014	2015	2016	2017	2018
Aksigorta	0.6941	0.7303	0.6782	0.6973	0.7002
Allianz	0.6691	0.6784	0.7559	0.6526	0.7305
Anadolu	0.6419	0.6706	0.7402	0.6181	0.7114
Ankara	0.6634	0.6914	0.6513	0.6831	0.7400
Atradius	0.5332	0.5084	0.4660	0.5172	0.8660
Axa	0.6688	0.6546	0.6992	0.5492	0.6106
Bnp Paribas Cardif	0.6188	0.6609	0.6265	0.5356	0.4579
Coface	0.7002	0.7064	0.6455	0.5084	0.7995
Doğa	0.5468	0.7777	0.6797	0.7048	0.6962
Dubai Starr	0.6450	0.6655	0.6444	0.8154	0.7734
Ergo	0.6688	0.7421	0.5676	0.7177	0.7057
Euler Hermes	0.6931	0.5013	0.5556	0.5559	0.5160
Eureko	0.6792	0.6031	0.7265	0.5843	0.7120
Generali	0.7819	0.4757	0.6239	0.7522	0.7226
Groupama	0.6947	0.6665	0.6420	0.7341	0.7493
Güneş	0.7102	0.7200	0.6663	0.7357	0.7120
Halk	0.6232	0.7481	0.6281	0.7445	0.7202
Hdi	0.6618	0.6287	0.6777	0.7564	0.7303
Koru	0.4970	0.4733	0.5658	0.5539	0.4915
Mapfre	0.6894	0.7205	0.7107	0.6981	0.6705
Neova	0.6446	0.7272	0.6450	0.6512	0.7151
Orient	0.4982	0.7217	0.5414	0.6333	0.7813
Ray	0.6762	0.7141	0.6706	0.7498	0.7608
Sompo Japan	0.6476	0.7270	0.6905	0.7005	0.6860
Türk Nippon	0.7149	0.6516	0.6409	0.6341	0.7270
Türk P&I	0.5187	0.5512	0.6683	0.5177	0.6588
Ziraat	0.5843	0.6644	0.7497	0.7344	0.7170
Zurich	0.6354	0.7169	0.6360	0.6917	0.5663

Table 5. Ranking of Companies Using GRA with Equal Weights

Rank	2014	2015	2016	2017	2018
1	Generali	Doga	Allianz	Dubai Starr	Atradius
2	Türk Nippon	Halk	Ziraat	Hdi	Coface
3	Gunes	Ergo	Anadolu	Generali	Orient
4	Coface	Aksigorta	Eureko	Ray	Dubai Starr

5	Groupama	Neova	Mapfre	Halk	Ray
6	Aksigorta	Sompo Japan	Axa	Gunes	Groupama
7	Euler Hermes	Orient	Sompo Japan	Ziraat	Ankara
8	Mapfre	Mapfre	Doga	Groupama	Allianz
9	Eureko	Gunes	Aksigorta	Ergo	Hdi
10	Ray	Zurich	Hdi	Doga	Turk Nippon
11	Allianz	Ray	Ray	Sompo Japan	Generali
12	Ergo	Coface	Turk P&I	Mapfre	Halk
13	Axa	Ankara	Gunes	Aksigorta	Ziraat
14	Ankara	Allianz	Ankara	Zurich	Neova
15	Hdi	Anadolu	Coface	Ankara	Gunes
16	Sompo Japan	Groupama	Neova	Allianz	Eureko
17	Dubai Starr	Dubai Starr	Dubai Starr	Neova	Anadolu
18	Neova	Ziraat	Groupama	Turk Nippon	Ergo
19	Anadolu	Bnp Par. Car.	Turk Nippon	Orient	Aksigorta
20	Zurich	Axa	Zurich	Anadolu	Doga
21	Halk	Turk Nippon	Halk	Eureko	Sompo Japan
22	Bnp Par. Car.	Hdi	Bnp Par. Car.	Euler Hermes	Mapfre
23	Ziraat	Eureko	Generali	Koru	Turk P&I
24	Doga	Turk P&I	Ergo	Axa	Axa
25	Atradius	Atradius	Koru	Bnp Par. Car.	Zurich
26	Turk P&I	Euler Hermes	Euler Hermes	Turk P&I	Euler Hermes
27	Orient	Generali	Orient	Atradius	Koru
28	Koru	Koru	Atradius	Coface	Bnp Par. Car.

When the ordering of companies obtained using the equal weighted GRA is compared with the values of the gross premium volume, technical results of profit and loss accounts of the companies published in the reports of the Ministry of Treasury and Finance, some inconsistencies are observed. It is seen that the results obtained with equal weights are not very compatible with the sector averages. Company performances are not significantly compared with the equally weighted GRA. Hence, the ranking of companies will be repeated by including AHP in the GRA.

In GRA, financial ratios' weights are determined with AHP instead of being taken as equal and given in Table 6 as follows. In AHP, $CI=0.098026$, $RI=1.49$ (for $n=10$) and $CR=0.065789 \leq 0.1$. The sum of all weights is 1.

Table 6. Financial Ratios' Weights via AHP

Ratio	Weight
ROA	0.206724
GWP	0.070444
CS	0.100904
ILR	0.018198
ERR	0.037040
MS	0.305473
CR	0.031402
EAR	0.055855
PAR	0.139820
ROE	0.034139

The grey relational grades are re-calculated. The grades and the ranking of companies with the integration of GRA and AHP are given in Table 7 and Table 8, respectively.

Table 7. GRA Grades Of Companies with the Weights Obtained AHP

Companies	2014	2015	2016	2017	2018
Aksigorta	0.7063	0.6946	0.6782	0.6806	0.7002
Allianz	0.7908	0.7786	0.7559	0.7343	0.7305
Anadolu	0.7332	0.7291	0.7402	0.6733	0.7114
Ankara	0.6349	0.6484	0.6513	0.6280	0.7400
Atradius	0.4735	0.4286	0.4660	0.4413	0.8660
Axa	0.7635	0.6674	0.6992	0.5502	0.6106
Bnp Paribas Cardif	0.5908	0.6074	0.6265	0.4532	0.4579
Coface	0.6683	0.6400	0.6455	0.4604	0.7995
Doğa	0.4700	0.7380	0.6797	0.6832	0.6962
Dubai Starr	0.6293	0.6329	0.6444	0.7774	0.7734
Ergo	0.6489	0.6926	0.5676	0.6752	0.7057
Euler Hermes	0.6680	0.4541	0.5556	0.5209	0.5160
Eureko	0.6588	0.5428	0.7265	0.5376	0.7120
Generali	0.7440	0.4282	0.6239	0.6949	0.7226
Groupama	0.6837	0.6226	0.6420	0.6980	0.7493
Güneş	0.7100	0.6891	0.6663	0.6956	0.7120
Halk	0.6123	0.7073	0.6281	0.7098	0.7202
Hdi	0.6419	0.5715	0.6777	0.6992	0.7303
Koru	0.4647	0.4118	0.5658	0.4709	0.4915
Mapfre	0.6916	0.7097	0.7107	0.6815	0.6705
Neova	0.6280	0.6877	0.6450	0.6066	0.7151
Orient	0.4601	0.6827	0.5414	0.6124	0.7813
Ray	0.6567	0.6700	0.6706	0.7012	0.7608
Sompo Japan	0.6344	0.6883	0.6905	0.6690	0.6860
Türk Nippon	0.6793	0.5975	0.6409	0.5892	0.7270
Türk P&I	0.4861	0.5088	0.6683	0.5061	0.6588
Ziraat	0.5981	0.6622	0.7497	0.7203	0.7170
Zurich	0.6212	0.6783	0.6360	0.6298	0.5663

Table 8. Ranking of Companies Using GRA with the Weights Obtained AHP

Rank	2014	2015	2016	2017	2018
1	Allianz	Allianz	Allianz	Dubai Starr	Atradius
2	Axa	Doga	Ziraat	Allianz	Coface
3	Generali	Anadolu	Anadolu	Ziraat	Orient
4	Anadolu	Mapfre	Eureko	Halk	Dubai Starr
5	Gunes	Halk	Mapfre	Ray	Ray
6	Aksigorta	Aksigorta	Axa	Hdi	Groupama

7	Mapfre	Ergo	Sompo Japan	Groupama	Ankara
8	Groupama	Gunes	Doga	Gunes	Allianz
9	Turk Nippon	Sompo Japan	Aksigorta	Generali	Hdi
10	Coface	Neova	Hdi	Doga	Turk Nippon
11	Euler Hermes	Orient	Ray	Mapfre	Generali
12	Eureko	Zurich	Turk P&I	Aksigorta	Halk
13	Ray	Ray	Gunes	Ergo	Ziraat
14	Ergo	Axa	Ankara	Anadolu	Neova
15	Hdi	Ziraat	Coface	Sompo Japan	Gunes
16	Ankara	Ankara	Neova	Zurich	Eureko
17	Sompo Japan	Coface	Dubai Starr	Ankara	Anadolu
18	Dubai Starr	Dubai Starr	Groupama	Orient	Ergo
19	Neova	Groupama	Turk Nippon	Neova	Aksigorta
20	Zurich	Bnp Par. Car.	Zurich	Turk Nippon	Doga
21	Halk	Turk Nippon	Halk	Axa	Sompo Japan
22	Ziraat	Hdi	Bnp Par. Car.	Eureko	Mapfre
23	Bnp Par. Car.	Eureko	Generali	Euler Hermes	Turk P&I
24	Turk P&I	Turk P&I	Ergo	Turk P&I	Axa
25	Atradius	Euler Hermes	Koru	Koru	Zurich
26	Doga	Atradius	Euler Hermes	Coface	Euler Hermes
27	Koru	Generali	Orient	Bnp Par. Car.	Koru
28	Orient	Koru	Atradius	Atradius	Bnp Par. Car.

When the ranking of non-life insurance companies obtained with the integration of GRA and AHP is more consistent with the values of the gross premium volume, the technical results of profit and the loss accounts of the companies published in the reports of the Ministry of Treasury and Finance. According to the result of GRA with AHP weights, it is seen that while companies with bigger market share in insurance sector which are Allianz, Anadolu, Aksigorta are effective, companies with smaller market share which are Koru, Atradius, Turk P&I are not that effective. The results obtained with AHP weights are consistent.

4. CONCLUSION

For years, the financial performances of companies have been evaluated with some methods. The evaluation process is usually a ranking of companies according to specific standards. For these analyses, not a single year, but a certain period is selected and the change in the performance of the companies is investigated. With the evaluation, companies can not only observe the change in their financial performance over time, but also find the opportunity to compare their performance to other companies in competitive markets. Companies that are adequate in terms of financial performance use managerial policies that protect their status. On the other hand, companies that perform relatively lower than other companies take up risk management policies that will improve their performance.

The non-life insurance sector has a large market share in Turkey for years. Due to the high market share of the non-life insurance sector in Turkey, the financial performance of companies operating in this branch is important. In non-life insurance branch, the number of optional insurance types outnumbers liability or compulsory insurance types. Therefore, companies should show successful financial performance, not to lose their current insured and to be able to include new insured in their insurance pool. Hence, non-life insurance companies should

carefully examine the change in their performance using mathematical, statistical, financial, economic or econometric methods. In addition to well-known methods such as DEA, GRA has been used frequently in financial performance measurement in recent years. In fact, instead of using only GRA, studies are enriched by including other methods such as AHP.

In this study, real data from the “Insurance and Private Pension Activities Reports in Turkey” during the years 2014-2018 with 10 financial ratios are used. GRA and AHP are combined to analyze whether insurance companies operate effectively. If the performance analysis is made for certain periods instead of a single period, the change in performance can be observed much more effectively on an annual basis. The AHP is included in the GRA and the performance analysis of the selected insurance companies is conducted over a 5-year period.

It has been observed that the weight of the financial ratios found by the AHP affects the results of the GRA. According to the results of performance comparison obtained with the combination of these two MCDM methods, insurance companies will have the chance to compare their performances over the years and with their competitors. According to the results of the comparison, they will have the chance to find out the changes they will make in their management policies and make improvements. This study could guide insurance companies to use their resources and assets more efficiently. The result of the study is beneficial not only for insurance companies, but also for other stakeholders of sector such as policyholders, agents, supervisory and regulatory authorities.

This study can be developed using a survey to determine AHP rates. The combination can be developed by using Fuzzy AHP, instead of AHP. Also, some other methods such as DEA can be included the combination of GRA-AHP, and the results of the combinations of methods can be compared. Furthermore, the analyses can be repeated with the use of other methods such as TOPSIS, MOORA, COPRAS, KEMIRA or EDAS for the same period and results can be compared.

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APPENDIX

Decision matrices between 2014-2018

2014										
Companies	ROA	GWP	CS	ILR	ERR	MS	CR	EAR	PAR	ROE
Aksigorta	0.02	14.35	14.32	1.77	-0.97	6.59	1.44	0.31	1.03	0.06
Allianz	0.07	14.98	15.28	1.79	-0.87	12.37	1.40	0.31	0.74	0.21
Anadolu	0.02	14.92	15.14	2.17	-0.95	11.56	1.22	0.27	0.80	0.07
Ankara	0.02	12.31	12.54	3.51	-0.95	0.85	1.26	0.19	0.79	0.09
Atradius	-0.17	9.72	9.96	0.63	-1.91	0.06	2.64	0.26	0.79	-0.65
Axa	0.06	14.94	15.36	2.30	-0.88	11.84	1.38	0.28	0.66	0.20
Bnp Paribas	0.05	10.22	11.02	1.50	-0.84	0.11	1.63	0.38	0.45	0.14
Cardif										
Coface	-0.07	10.99	11.18	2.52	-1.08	0.23	1.29	0.18	0.82	-0.41
Doğa	-0.21	10.18	10.29	7.05	2.72	0.10	1.06	0.06	0.90	-3.70
Dubai Starr	0.02	11.73	11.78	1.54	-0.98	0.48	1.22	0.23	0.96	0.09
Ergo	0.02	13.42	13.86	2.63	-0.94	2.59	1.31	0.25	0.64	0.09
Euler Hermes	-0.04	10.84	10.73	1.52	-1.14	0.20	1.37	0.31	1.12	-0.13
Eureko	0.03	13.59	13.89	1.04	-0.89	3.08	1.62	0.39	0.74	0.07
Generali	-0.17	11.97	12.08	2.39	-1.54	0.61	1.18	0.19	0.90	-0.92
Groupama	0.02	13.87	14.30	1.50	-0.97	4.07	1.22	0.36	0.65	0.06
Güneş	0.01	14.01	14.12	1.79	-0.95	4.67	0.89	0.28	0.89	0.03
Halk	0.07	13.20	13.34	2.00	-0.97	2.07	1.41	0.29	0.86	0.26
Hdi	0.04	13.28	13.53	1.51	-0.86	2.25	1.53	0.34	0.78	0.11
Koru	-0.99	10.30	9.72	-1.96	-2.02	0.11	0.55	-0.70	1.80	1.41
Mapfre	0.03	14.21	14.38	1.48	-0.94	5.74	1.48	0.33	0.85	0.08
Neova	0.05	12.85	12.81	2.92	-0.90	1.46	1.30	0.24	1.03	0.22
Orient	-0.17	9.00	10.11	0.22	-8.75	0.03	2.01	0.55	0.33	-0.30
Ray	0.01	12.85	12.90	1.71	-0.96	1.46	1.30	0.27	0.95	0.02
Sompo Japan	0.05	13.44	13.65	1.78	-0.92	2.64	1.43	0.30	0.81	0.16
Türk Nippon	-0.09	11.19	11.16	1.43	-1.18	0.28	1.47	0.32	1.03	-0.28
Türk P&I	-0.19	8.88	9.02	0.07	-7.05	0.03	1.82	0.52	0.87	-0.37
Ziraat	0.14	13.46	13.06	1.54	-0.73	2.71	1.48	0.32	1.50	0.43
Zurich	0.05	12.99	13.39	1.68	-0.76	1.69	1.26	0.22	0.67	0.21
2015										
	ROA	GWP	CS	ILR	ERR	MS	CR	EAR	PAR	ROE
Aksigorta	-0.07	14.30	14.46	3.08	-1.12	5.22	1.20	0.18	0.85	-0.39
Allianz	0.04	15.21	15.53	2.34	-0.92	13.04	1.19	0.25	0.73	0.17
Anadolu	0.01	15.10	15.40	2.37	-0.96	11.63	1.18	0.25	0.74	0.05
Ankara	0.04	12.17	12.70	3.23	-0.91	0.62	1.26	0.20	0.59	0.18
Atradius	-0.33	10.36	10.65	4.71	-4.18	0.10	1.50	0.09	0.75	-3.74
Axa	-0.06	14.94	15.40	3.91	-1.11	9.87	1.20	0.19	0.63	-0.30
Bnp Paribas	0.00	11.03	11.49	2.90	-1.11	0.20	1.31	0.24	0.63	-0.01
Cardif										
Coface	-0.12	11.17	11.33	2.47	-1.34	0.23	1.31	0.18	0.85	-0.65
Doğa	-0.04	12.58	12.54	2.75	-1.44	0.94	1.15	0.13	1.04	-0.33
Dubai Starr	0.03	12.00	11.97	1.49	-0.90	0.52	1.26	0.25	1.03	0.12
Ergo	-0.04	13.71	13.97	4.47	-1.10	2.91	1.17	0.16	0.77	-0.25
Euler Hermes	-0.18	11.08	10.89	8.42	-4.44	0.21	0.99	0.08	1.21	-2.27
Eureko	0.04	13.82	14.10	1.19	-0.88	3.23	1.52	0.35	0.75	0.11
Generali	-0.37	12.21	12.34	-12.81	-1.94	0.64	0.83	-0.06	0.87	5.93
Groupama	-0.12	13.92	14.28	2.63	-1.24	3.59	1.05	0.25	0.70	-0.48
Güneş	-0.11	14.07	14.25	3.00	-1.19	4.15	0.84	0.20	0.84	-0.53
Halk	0.01	13.54	13.63	3.93	-1.03	2.44	1.22	0.18	0.91	0.06
Hdi	0.02	13.46	13.76	1.81	-0.93	2.26	1.44	0.31	0.74	0.06
Koru	-0.60	11.46	11.34	-2.10	8.06	0.31	0.67	-0.48	1.13	1.26
Mapfre	0.01	14.56	14.66	2.27	-0.96	6.80	1.24	0.25	0.90	0.06
Neova	0.02	13.15	13.19	3.89	-0.96	1.66	1.23	0.19	0.96	0.12

Orient	-0.10	11.01	10.88	2.23	-1.56	0.19	1.11	0.16	1.15	-0.65
Ray	-0.03	13.01	13.02	2.52	-1.06	1.43	1.21	0.21	0.99	-0.16
Sompo Japan	0.02	13.88	14.02	2.68	-0.94	3.42	1.30	0.23	0.87	0.10
Türk Nippon	-0.07	11.62	11.50	1.87	-1.14	0.36	1.34	0.26	1.12	-0.27
Türk P&I	-0.06	9.54	9.28	0.51	-1.43	0.04	1.37	0.34	1.30	-0.17
Ziraat	0.15	13.75	13.30	1.48	-0.71	3.00	1.50	0.33	1.57	0.44
Zurich	0.03	13.14	13.53	2.12	-0.87	1.63	1.25	0.22	0.67	0.12
2016										
Companies	ROA	GWP	CS	ILR	ERR	MS	CR	EAR	PAR	ROE
Aksigorta	0.02	14.46	14.55	3.04	-0.90	4.68	1.23	0.19	0.91	0.12
Allianz	0.05	15.57	15.81	2.88	-0.91	14.26	1.18	0.22	0.78	0.23
Anadolu	0.01	15.32	15.60	3.10	-0.96	11.07	1.16	0.20	0.75	0.07
Ankara	0.09	12.66	13.00	2.44	-0.79	0.78	1.31	0.24	0.71	0.36
Atradius	-0.30	10.51	11.23	2.34	-2.78	0.09	2.51	0.12	0.49	-2.51
Axa	0.02	15.09	15.54	4.38	-0.94	8.80	1.18	0.17	0.64	0.11
Bnp Paribas	0.04	11.15	11.70	0.47	-0.97	0.17	5.88	0.23	0.57	0.18
Cardif										
Coface	0.01	11.08	11.27	1.12	-1.14	0.16	1.83	0.33	0.83	0.03
Doğa	0.04	13.59	13.27	3.12	-0.84	1.98	1.19	0.17	1.39	0.24
Dubai Starr	0.02	12.11	12.22	1.36	-0.90	0.45	1.27	0.23	0.90	0.10
Ergo	-0.11	13.62	14.06	4.21	-1.16	2.03	1.18	0.17	0.65	-0.67
Euler Hermes	-0.01	10.96	10.88	1.35	-2.72	0.14	1.39	0.37	1.08	-0.04
Eureko	0.05	14.03	14.26	1.26	-0.86	3.05	1.48	0.35	0.79	0.14
Generali	-0.04	12.19	12.73	1.75	-1.01	0.48	1.33	0.29	0.58	-0.13
Groupama	0.00	13.96	14.17	3.12	-1.00	2.84	1.26	0.22	0.81	0.01
Güneş	-0.03	14.13	14.38	2.32	-0.98	3.39	0.91	0.25	0.78	-0.12
Halk	0.02	13.85	13.98	4.03	-1.02	2.56	1.22	0.18	0.88	0.11
Hdi	0.04	13.68	13.95	2.05	-0.87	2.15	1.42	0.29	0.76	0.12
Koru	0.04	11.56	11.41	-79.41	-0.96	0.26	0.87	-0.01	1.16	-3.53
Mapfre	0.03	14.84	14.96	2.79	-0.93	6.90	1.21	0.22	0.89	0.15
Neova	0.08	13.82	13.87	3.99	-0.83	2.48	1.22	0.18	0.95	0.46
Orient	-0.04	11.42	11.13	6.46	-1.12	0.23	0.99	0.08	1.33	-0.56
Ray	0.06	13.25	13.28	2.17	-0.82	1.40	1.26	0.22	0.97	0.26
Sompo Japan	0.06	14.62	14.70	4.06	-0.88	5.52	1.21	0.17	0.92	0.34
Türk Nippon	0.07	12.53	12.45	3.20	-0.88	0.68	1.21	0.20	1.08	0.37
Türk P&I	0.05	10.11	9.78	1.31	-0.93	0.06	1.29	0.26	1.39	0.19
Ziraat	0.15	14.11	13.64	1.57	-0.69	3.30	1.48	0.32	1.60	0.49
Zurich	0.01	13.08	13.70	2.30	-0.89	1.19	1.25	0.20	0.54	0.07
2017										
Companies	ROA	GWP	CS	ILR	ERR	MS	CR	EAR	PAR	ROE
Aksigorta	0.05	14.78	14.84	2.36	-0.85	5.66	1.30	0.23	0.95	0.20
Allianz	0.08	15.45	15.85	2.05	-0.88	11.03	1.30	0.30	0.67	0.25
Anadolu	0.03	15.36	15.77	2.63	-0.93	10.03	1.18	0.23	0.66	0.11
Ankara	0.07	13.01	13.16	1.95	-0.86	0.96	1.42	0.29	0.86	0.25
Atradius	0.07	10.68	11.43	0.59	-0.62	0.09	3.57	0.26	0.47	0.27
Axa	-0.06	14.88	15.61	4.51	-1.11	6.25	1.19	0.17	0.48	-0.33
Bnp Paribas	0.07	11.59	12.16	0.48	-0.92	0.23	5.14	0.30	0.57	0.22
Cardif										
Coface	0.01	11.05	11.21	0.81	-1.10	0.14	2.12	0.36	0.85	0.04
Doğa	0.04	14.22	13.94	3.33	-0.91	3.22	1.18	0.16	1.32	0.28
Dubai Starr	-0.05	12.31	12.32	2.25	-1.04	0.48	1.21	0.16	0.99	-0.30
Ergo	-0.06	13.55	14.01	3.83	-1.07	1.65	1.21	0.18	0.64	-0.34
Euler Hermes	0.00	10.98	11.23	1.00	-1.51	0.13	1.46	0.33	0.77	0.01
Eureko	0.03	14.14	14.34	1.21	-0.93	2.96	1.51	0.36	0.82	0.08
Generali	-0.07	12.31	12.77	2.03	-1.08	0.48	1.29	0.25	0.63	-0.28
Groupama	-0.02	14.02	14.23	3.65	-1.03	2.63	1.20	0.19	0.81	-0.12
Güneş	0.01	14.32	14.59	1.63	-0.97	3.57	0.99	0.31	0.77	0.04
Halk	0.02	14.21	14.33	4.88	-1.01	3.18	1.18	0.15	0.89	0.15

Hdi	0.03	13.91	14.13	1.87	-0.90	2.35	1.44	0.30	0.80	0.10
Koru	0.03	12.21	11.94	13.71	-0.91	0.43	0.98	0.06	1.31	0.44
Mapfre	0.05	14.80	15.04	2.14	-0.90	5.76	1.29	0.26	0.79	0.21
Neova	0.07	13.89	14.14	2.98	-0.88	2.32	1.29	0.23	0.78	0.31
Orient	-0.08	12.06	11.83	8.32	-1.18	0.37	1.05	0.09	1.26	-0.95
Ray	0.03	13.47	13.51	1.74	-0.92	1.52	1.29	0.25	0.96	0.12
Sompo Japan	0.09	14.63	15.00	2.33	-0.84	4.86	1.35	0.26	0.69	0.33
Türk Nippon	0.05	12.98	12.94	4.07	-0.91	0.93	1.20	0.17	1.03	0.28
Türk P&I	0.07	10.53	10.11	1.82	-0.89	0.08	1.32	0.26	1.53	0.28
Ziraat	0.19	14.37	13.96	1.18	-0.61	3.73	1.63	0.38	1.51	0.51
Zurich	0.05	13.20	13.87	1.87	-0.80	1.16	1.31	0.23	0.51	0.20
2018										
	ROA	GWP	CS	ILR	ERR	MS	CR	EAR	PAR	ROE
Aksigorta	0.06	15.04	15.08	2.69	-0.83	6.26	1.26	0.20	0.97	0.32
Allianz	0.06	15.58	15.98	2.14	-0.90	10.64	1.30	0.29	0.67	0.23
Anadolu	0.04	15.56	15.88	3.04	-0.89	10.44	1.18	0.21	0.72	0.19
Ankara	0.05	13.20	13.43	2.22	-0.94	0.99	1.38	0.28	0.80	0.17
Atradius	-0.12	10.87	11.35	2.34	-1.57	0.10	1.65	0.17	0.62	-0.67
Axa	0.06	15.03	15.71	4.61	-0.85	6.18	1.20	0.16	0.51	0.34
Bnp Paribas Cardif	0.03	11.60	12.54	0.32	-0.89	0.20	4.28	0.42	0.39	0.08
Coface	0.01	11.47	11.58	1.27	-1.11	0.17	1.78	0.26	0.89	0.04
Doğa	0.05	14.33	14.13	3.40	-1.01	3.06	1.21	0.18	1.22	0.26
Dubai Starr	0.03	12.49	12.50	1.84	-1.01	0.49	1.30	0.20	0.99	0.13
Ergo	0.02	13.55	14.04	4.20	-0.93	1.40	1.19	0.16	0.61	0.09
Euler Hermes	0.15	11.34	11.45	0.66	-1.62	0.15	1.89	0.42	0.89	0.37
Eureko	0.02	14.24	14.47	1.28	-0.92	2.79	1.47	0.34	0.79	0.07
Generali	-0.04	12.47	12.90	2.09	-1.02	0.48	1.31	0.26	0.65	-0.15
Groupama	0.03	14.11	14.42	2.19	-0.94	2.47	1.35	0.29	0.73	0.11
Güneş	0.00	14.46	14.78	1.66	-0.98	3.49	1.01	0.31	0.73	0.01
Halk	0.03	14.38	14.66	4.37	-1.02	3.22	1.20	0.16	0.76	0.19
Hdi	0.03	14.28	14.56	2.46	-0.95	2.92	1.33	0.23	0.76	0.12
Koru	0.05	12.70	12.56	10.65	-0.89	0.60	1.06	0.08	1.15	0.67
Mapfre	0.01	14.79	15.09	3.17	-1.02	4.85	1.18	0.19	0.74	0.03
Neova	0.06	14.08	14.41	3.09	-0.87	2.39	1.28	0.22	0.72	0.26
Orient	-0.06	12.00	12.16	4.42	-1.12	0.30	1.10	0.15	0.85	-0.40
Ray	0.03	13.72	13.74	2.12	-0.94	1.66	1.26	0.23	0.98	0.13
Sompo Japan	0.07	14.74	15.18	2.00	-0.85	4.60	1.40	0.29	0.64	0.25
Türk Nippon	0.05	13.31	13.32	4.28	-0.91	1.11	1.19	0.17	0.99	0.29
Türk P&I	0.14	10.88	10.64	1.34	-0.90	0.10	1.51	0.34	1.27	0.40
Ziraat	0.19	14.60	14.28	1.00	-0.62	4.02	1.70	0.41	1.38	0.46
Zurich	0.07	13.45	14.01	1.87	-0.75	1.27	1.38	0.25	0.57	0.26