PERFORMANCE RANKING OF TURKISH INSURANCE COMPANIES: THE AHP APPLICATION

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ABSTRACT

Insurance sector performance is important at the stage of economic growth. On the other hand, in practice it is not sufficient to evaluate the options according to the simplest form of decision making only based on a criterion. In such cases, we must consider all the variety of different information to decide to best option. It arise the requirement of multi-criteria decision making methods.

The Analytic Hierarchy Process (AHP) is a multiple criteria decision-making methodology designed to help decision makers in prioritizing decisions that involves both tangible and intangible criteria and has been implemented extensively all over the world. The paper employs the AHP to evaluate the performance of insurance companies in Turkey during the period 2006-2010.

The main starting point for this study is to evaluate the performance of the insurance companies in Turkey. Turkish insurance industry's financial ratios are placed in a hierarchical decision structure to calculate financial performance score for the insurance companies in Turkey. We used AHP as a systematic methodology of acquiring knowledge from experts through group decision-making. The selected companies are prioritized based on financial criteria using AHP. In other words, based on this analysis the decision-makers can also predict the likelihood of a ranking of insurance companies in Turkey.

Sensitivity analysis was performed using Expert Choice. Ranking was sensitive to capital, liquidity and shares-in-sector ratios. In other words, small change in the importance of these criteria caused rank reversal of certain insurance companies.

In this paper, the insurance companies performance score was constructed by using publicly open financial data. This framework can be used to select the insurance companies to invest in Turkish Insurance Sector.

KEYWORDS : *AHP, financial ratios, performance ranking, Turkish insurance sector.*

JEL CLASSIFICATION : *G22, L1, L25*

1. INTRODUCTION

Performance measurement has great deal of attention from researchers in the past decades (Kagioglou et al. , 2001; Bassioni et al., 2004).

Measurement of the performance and the determination of the critical factors for the success of the firms is effected by the globalization and the increase in competition in the business environment. Conventially, different sectors have their own performance measurement, mostly, in financial terms: earnings, sales, etc, and the financial measures of performance shown the only the success of a company financially. However, the measurement of the performance based on financial measures cannot cope with all changes in the industry, in particular increased intensity of the competition (Kaplan and Norton, 1992).

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Performance measurement can also be defined as the process of quantifying the efficiency and effectiveness of an action (Amaratunga and Baldry, 2000). Therefore performance measurement is the process of determining how successful organizations or individuals have been in attaining their objectives and implementing their strategies (Evangelidizs, 1992).

The aim of this study is to present a performance measurement framework for Turkish insurance industry that takes into account company-level factors (objectives, resources) and market-level factors (competition, demand) then define the performance determinants together with their interrelations to determine the effects of these parameters on the performance.
For this purpose, within the context of this study, Analytic Hierarchy Process (AHP) which is a multi-criteria decision-making method is selected as the most appropriate tool to rank Turkish non-life insurance companies.

2. MATERIALS and METHODOGY

2.1. Turkish Insurance Sector
Turkish insurance sector, one of the leading financial sectors, is highly sensitive to the economic development . In general, when GDP grows, insurance premium growth rate exceeds that of GDP but the fall in GDP also leads to a higher shrinkage in insurance market.

In Turkey, non-life insurance premiums written traditionally exceeds the total life insurance premiums, with non-life business accounting for approximately 85% of total business.
Parallel to global insurance market, there are two main insurance groups, life and non-life according to Turkish Insurance Regulation. Since 1998, insurance companies have been obliged to act either in the life or non-life insurance groups.

In the view of premium production by distribution channel, private insurance agencies generates approximately 70% of total premium in non-life branches. Banking agencies and brokers follow private agencies with the share of 14% and 10%, respectively. The share of premium generated directly by insurance companies is approximately 6%.

In Turkish insurance market, 16.029 people have been employed by active insurance, reinsurance and pension companies, as of December 31, 2010. On the other hand, Premium per capita increased to $125 in 2010 in Turkey while it was $113 in 2009. This amount is $627 in the world. Premium volume to GDP is 1.28% in Turkey in 2010. It is 6.9% as globally.

Low penetration rate and the growth potential continue to draw attention of foreign insurance companies to the Turkish insurance market. While there were only 15 foreign shared insurance companies in 2001, with increase foreign capital incoming since 2004, this number increased to 20 in 2005. During the following three years, it nearly doubled and reached to 41 in 2008, 43 in 2009 and 44 in 2010. As of 2010 year-end, 25 of 38 non-life insurance companies and 19 of 24 life and pension companies were foreign owned directly or indirectly. Share of foreign partners is above 50% in 37 of these companies.

As a result of increase of foreign investment in Turkish insurance market, the share of foreign owned companies exceeded 50% in total shareholders' equity and premium in 2008. At the end of 2010, share of foreign investment reached to 59% in total paid-in capital while there was no big change in share for premium volume.

In non-life branches, land vehicles, land vehicles liability, health/sickness and fire and natural disasters, accounted for approximately 75% of total premium and 58% of total policies issued in non-life branches (www.treasury.gov.tr).

2.1. Analytic Hierarchy Process

The analytic hierarchy process (AHP) is an intuitively easy method for formulating and analyzing decisions (Saaty, 1980). Numerous applications of the AHP have been made since its development and it has been applied to many types of decision problems (Zahedi, 1986). It is one of the most widely used multiple criteria decision-making tools. We, therefore, will briefly describe the methodology to facilitate the understanding of the paper. Readers interested in more detail could refer to the most recent book by (Saaty & Penivati, 2008).

After the problem is arranged in a hierarchical fashion, the next step is to evaluate the relative importance of the criteria with respect to the overall objective. The basic approach for deriving weights with AHP is by way of pair-wise relative comparisons. Quantitative or qualitative assessments can be used in the comparisons. In general, a nine-point numerical scale is recommended for the comparisons (Saaty, 1980). A response of 1 indicates that the variables being compared contribute equally to the objective and a response of 9 indicates that the contribution of one activity is significantly more important than the other.

Our study applied the AHP methodology as an effective decision-making tool for weighing each attribute by experts. In the application of AHP, the relative importance or weights of the criteria are determined after the related performance criteria are identified and arranged in a hierarchy. The consensus of the groups was calculated using the geometric mean of individual judgments. *Expert Choice*© software was used in evaluating pairwise-comparison judgments, driving priorities from these judgments and synthesizing the priorities to determine ranking of non-life insurances companies of Turkey.

The consistency of the judgments is tracked to validate the decision process. In cases where inconsistency is above 10% it is recommended that the criteria and judgments be revisited. Our experts were consistent in their judgments.

2.2. Determinating the weight of criteria by AHP

In AHP, decision elements at each component are compared pair-wise with respect to their importance towards their control criterion, and the components themselves are also compared pair-wise with respect to their contribution to the goal. The questionnaire is created in accordance with associated evaluation framework criteria. The geometric mean of all evaluations is also used to obtain the required pair-wise comparison matrix (Lin et al., 2009).

In addition, if there are interdependencies among elements of a component, pair-wise comparisons also need to be created, and an eigenvector can be obtained for each element to show the influence of other elements on it.

The Fundamental Scale used for the judgments is given in Table 1. The relative importance values are determined with a scale of from 1 to 9, where a score of 1 represents equal importance between the two elements and a score of 9 indicates the extreme importance of one element (row component in the matrix) compared to the other one (column component in the matrix) (Meade & Sarkis, 1999; Saaty, 2006).

Judgments are first given verbally as indicated in the scale and then a corresponding number is associated with that judgment.

Table 1: Fundamental Scale

1	equal importance
3	moderate importance of one over another
5	strong or essential importance
7	very strong or demonstrated importance
9	extreme importance
2, 4, 6, 8	intermediate values
Use reciprocals for inverse comparisons	

Source: Adapted from Meade & Sarkis, 1999; Saaty, 2006

A reciprocal value is assigned to the inverse comparison; that is, $a_{ij} = 1/a_{ji}$; where aij (aij) denotes the importance of the ith (j^{th}) element compared to the jth (i^{th}) element. In AHP is made in the framework of a matrix, and a local priority vector can be derived as an estimate of relative importance associated with the elements (or components) being compared by solving the following formulae:

$A.w = \lambda_{max}.w$ where A is the matrix of pair-wise comparison, w is the eigenvector, and λ_{max} is the largest Eigenvalue of A. If A is a consistency matrix, eigenvector X can be calculated by $(A - \lambda_{max} I) X = 0$ (Saaty, 1980) proposed utilizing consistency index (C.I.) and consistency ratio (C.R.) to verify the consistency of the comparison matrix. C.I. and R.I. are defined as follows $C.I. = (\lambda_{max} - n)/(n-1)$, $C.R. = C.I./R.I.$ where R.I. represents the average consistency index over numerous random entries of same order reciprocal matrices. If $C.R. \leq 0.1$, the estimate is accepted; otherwise, a new comparison matrix is solicited until $C.R. \leq 0.1$.

The consistency ratio provides a numerical assessment of how inconsistent these evaluations might be. If the calculated ratio is less than 0.10, consistency is considered to be satisfactory (Meade, 1996).

3. IMPLEMENTATION AND RESULTS

3.1. Implementation

This study aims to present a AHP model and apply it to insurance companies in Turkey to obtain a performance score per period.

In this study, ten large scale insurance companies which had been operating in non-life insurance branches in Turkish insurance sector between 2006-2010 have been studied and AHP method has been applied to them.

The relative advantages of the companies have been obtained by using the results of the applications that were done separately for each year between 2006-2010.

Criteria's which are going to be used on the AHP model were identified as a result of literature reviewing and interviewing with the industry's leading experts. The designated criteria that were determined to be used in the AHP model were included in the study as three components (Capital Adequacy Ratios, Asset Quality Ratios, Profitability Ratios) and total ten unit under these three groups.

Capital Adequacy
- Premiums Received / Shareholders' Equity
- Shareholders' Equity / Technical Provisions
- Shareholders' Equity / Total Assets

Profitability
- Financial Profit-Loses / Premiums Received
- Loss ratios
- Technical Profit-Loses/ Financial Profit-Loses
- Technical Profit-Loses / Premiums Received
- Total Income / Premiums Received

Asset Quality
- Cash and Cash Equivalents / Total Assets
- Retention Rate

Our study applied the AHP methodology as an effective decision-making tool for weighing each attribute by experts. In the application of AHP, the relative importance or weights of the criteria are determined after the related performance criteria are identified and arranged in a hierarchy.

The consensus of the groups was calculated using the geometric mean of individual judgments. *Expert Choice*© software was used in evaluating pairwise-comparison judgments, driving priorities from these judgments and synthesizing the priorities to determine ranking of non life insurance companies of Turkish Insurance Sector for the period of 2006 - 2010.

Table 1. AHP Weights

Main Criteria	Combine Weights	Sub-Criteria	Combine Weights
Capital Adequacy	0.382759	Premiums Received / Shareholders' Equity	0.43570
		Shareholders' Equity / Technical Provisions	0.25781
		Shareholders' Equity / Total Assets	0.30714
Profitability	0.378796	Financial Profit-Loses / Premiums Received	0.06587
		Loss ratios	0.12118
		Technical Profit-Loses/ Financial Profit-Loses	0.06395
		Technical Profit-Loses / Premiums Received	0.21937
		Total Income / Premiums Received	0.22118
Asset Quality	0.238528	Cash and Cash Equivalents / Total Assets	0.56727
		Retention Rate	0.43278
Inconsistency			10 %

Source: made by the author

The consistency of the judgments is tracked to validate the decision process. In cases where inconsistency is above 10% it is recommended that our experts were consistent in their judgments.

3.2. Results

Performance ranking of non-life insurance companies of Turkish insurance sector for the period of 2006 - 2010 years obtained from Expert Choice software using financial ratios given Table 1.

Table 2. Performance Ranks of Insurance Companies (2006-2010)

No	Company Name	2006	Company Name	2007	Company Name	2008
1	AKSİGORTA	1.000	T. GENEL	1.000	MAPFRE GENEL	1.000
2	ANADOLU	.948	AKSIGORTA	.992	AKSIGORTA	.962
3	YAPI KREDİ	.931	ANADOLU	.917	GUNES	.908
4	T. GENEL	.902	KOÇ ALLIANZ	.830	AXA	.908
5	ERGOİSVİÇRE	.875	TİCARET	.699	ANADOLU	.787
6	KOÇ ALLIANZ	.874	ERGOİSVİÇRE	.695	BIRLIK	.719
7	ANKARA	.866	BİRLİK	.675	GUVEN	.702
8	BAŞAK GROUPAMA	.817	BAŞAK GROUPAMA	.634	ISIK	.663
9	AXA OYAK	.811	EUREKO	.611	ALLIANZ	.651
10	IŞIK	.794	ANKARA	.610	ERGOISVICRE	.617
11	HÜR	.775	YAPI KREDİ	.605	BASAK GROUPAMA	.609
12	AVIVA	.739	GENERALİ	.601	ZURICH	.597
13	DEMİR	.738	GÜNEŞ	.594	EUREKO	.581
14	GENERALİ	.731	AXA OYAK	.587	ANKARA	.572
15	GÜVEN	.716	AVIVA	.587	AIG	.562
16	RAY	.698	HDI	.583	YAPI KREDI	.533
17	HDI	.694	COFACE	.578	EURO	.532
18	GARANTİ	.666	TEB	.574	AVIVA	.519
19	RUMELİ	.653	RAY	.561	CARDIF	.514
20	GÜNEŞ	.650	FİBA	.558	GENERALI	.512
21	TEB	.629	IŞIK	.537	ATRADIUS	.508
22	BİRLİK	.611	AIG	.522	HDI	.504
23	TÜRK NİPPON	.585	ATRADIUS	.510	LIBERTY	.498
24	ŞEKER	.550	LIBERTY	.510	SBN	.479
25	MAGDEBURGER	.547	GÜVEN	.493	FIBA	.460
26	FİNANS	.530	HÜR	.456	HUR	.430
27	MERKEZ	.502	TOPRAK	.423	COFACE	.426
28	TİCARET	.495			RAY	.396
29	AIG	.439			DEMIR	.386
30	BATI	.421				
31	TOPRAK	.411				

Table 2. Cont.

No	Company Name	2009	Company Name	2010
1	MAPFRE GENEL	1.000	ANADOLU	1.000
2	AKSIGORTA	.962	AKSIGORTA	.999
3	GROUPAMA	.908	YAPI KREDI	.979
4	AXA	.883	MAPFRE GENEL	.976
5	ANADOLU	.787	ALLIANZ	.909
6	BIRLIK	.719	GENERALI	.798
7	ZURICH	.702	ZIRAAT	.797
8	ISIK	.663	AXA	.784

No	Company Name	2009	Company Name	2010
9	FIBA	.651	HALK	.764
10	ERGO	.617	ERGO	.757
11	YAPI KREDI	.609	SOMPO JAPAN	.756
12	CHARTIS	.597	GROUPAMA	.733
13	EUREKO	.581	ISIK	.682
14	ANKARA	.572	CARDIF	.664
15	HDI	.562	EUREKO	.659
16	AVIVA	.533	AVIVA	.652
17	TURK NIPPON	.532	ANKARA	.648
18	CARDIF	.519	EURO	.647
19	EURO	.514	RAY	.642
20	GENERALI	.512	GUNES	.627
21	NEOVA	.508	LIBERTY	.609
22	GUNES	.504	HDI	.587
23	ALLIANZ	.498	CHARTIS	.586
24	SBN	.479	TURK NIPPON	.578
25	LIBERTY	.468	ZURICH	.587
26	ATRADIUS	.460	COFACE	.489
27	ACE	.458	SBN	.447
28	COFACE	.448	DEMIR	.435
29	HUR	.430	NEOVA	.429
30	DUBAI GROUP	.426	DUBAI GROUP	.427
31	RAY	.386	ACE	.396
32	DEMIR	.343	ATRADIUS	.389
33			EULER HERMES	.379
34			HUR	.333

Investigation of performance ranking of non-life insurance companies that company performance rank and capital adequacy with respect to premium received, shareholders' equity and total assets. Moreover, profitability in relationship technical profit and premium received and also cash and cash equivalents have an important role sorting row data of insurance companies.

4. CONCLUSIONS

Measuring performance in industries and determining the key drivers of performance have been an important research topic in recent years.

The AHP technique is a very handy tool for the situations where several attributes exist and the decision needs to be taken while counting for all these elements. AHP was selected as the most appropriate technique for a multi-criteria decision model

In this study, the model aims to determine the effects of the parameters associated with the company performance. The AHP approach allows us to use quantitative and qualitative information making this methodology flexible.

Moreover, regarding of the non-financial factor can accede to in the treat discussion item, for example: service quality insurance companies, customer's satisfaction etc. Second, follow-up research can be the same method but adopt during different study, to judge the stability of the study results; and the present approach can be applied to life-Insurance

Another interesting direction of research would be comparing the results obtained with AHP with the results found via statistical methods such as discriminant analysis.

A series of sensitivity analyses can be performed to explore the solution's robustness to potential shifts in the priority of criteria (ratios).

On the other hand, one of the major weaknesses of existing methods is not being able to incorporate qualitative factors. AHP assumes independence among the criteria and the alternatives. If there is dependence among the criteria, the Analytic Network Process (Saaty, 2005) is more appropriate far more comparisons which may be formidable in a practical decision environment.

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