AN IMPLEMENTATION TOWARDS THE EVALUATION OF FINANCIAL PERFORMANCE IN TURKISH INSURANCE SECTOR AT GLOBAL CRISIS SCALE

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Abstract

Enterprises have to develop themselves permanently and to conduct performance analysis to maintain their presence. Although world-wide recognised performance measurement models are being implemented, preference of the best method for the enterprise with regards models in question is significant for reflecting the true financial performance of organisation. The purpose of this study is to examine performance measurement which have a rather significant place for measuring the competitive power of insurance companies in present-day financial sector. In this context, the effects of the last global crisis is taken up with an implementation on the non-life insurance sector which has been widely influenced by the crisis. This study comprises the analysis of 25 non-life insurance companies in Turkish insurance sector within the period of 2003-2008 as the financial performance of the companies during the global crisis are investigated through CRR oriented DEA technique.

Keywords: *Financial Performance Measurement, DEA Analysis, Insurance Sector, Global Crises*

JEL Classification: C44, C67, G22, L25

1. INTRODUCTION

The sustainability and growth of an enterprise depends on its capacity to compete with other companies however, since competition is a relative term, a reliable measurement of the competitive power of an enterprise requires the measurement and analysis of the financial performance of the business in question (Acar, 2003: 21). The performance is a comprehensive term covering many factors like efficiency and productivity, various efficiency and/or productivity measurement methods need to be applied to measure it. In this information age, traditional performance criteria are far from meeting the growth and long-term profitability demands of enterprises (Xiong et al., 2008: 2008: 37). Therefore, financial ratio analysis, parametric and non-parametric methods are the commonly used efficiency measurement techniques as part of performance measurement. Data envelopment analysis is a non-parametric approach with more than one input and a single output putting forward no assumption about the production function. The current techniques are especially critical in the financial services. Turkish financial sector is

quite susceptible to financial crises due to its fragile nature. Insurance firms must efficiently use their resources and implement an efficient performance measurement system during crisis periods to be able to sustain their activities and overcome the crisis with minimum loss.

2. DATA ENVELOPMENT ANALYSIS

As an efficiency measurement based on linear programming, Data Envelopment Analysis (DEA) was first used by Farrell in 1957 in his theoretical study on performance efficiency (Ulucan, 2002: 187; Mansor and Radam, 2000: 97). DEA was later developed by Charnes, Cooper and Rhodes (1978; 1981) in order to measure the "relative" activities of economic decision making units (Kılıçkaplan and Karpat, 2004: 4; Bülbül and Akhisar, 2005: 657; Aktaş, 2001: 170). In DEA model, the number of decision making units should be at least; "the number of inputs + the number of outputs + 1" and "2 x (the number of inputs + the number of outputs)" (Bülbül and Akhisar, 2005: 662).

$E_{k:}$ k the efficiency of decision making unit,expansion coefficient of output   adequately small positive number, idle value of i input dmu k, idle value of r output dmu k , the amount of i i input used by dmu j, the value of intensity of dmu j, the amount of r output produced by dmu j, n as dmu , t as the number of input and m as the number of ouput (Bülbül and Akhisar,2005:660-661)

$$E_k = Maks\beta + (\varepsilon \sum_{i=1}^{m} S_i^-) + (\varepsilon \sum_{r=1}^{t} S_r^+)$$

$$\sum_{j=0}^{n} (x_{ij}\lambda_j) + S_i^- - x_{ik} = 0$$

$$\sum_{j=1}^{n} (y_{rj}\lambda_j) + S_j^+ - (\beta y_{rk}) = 0$$

$$\lambda_j, S_i^-, S_j^+ \geq 0 \qquad i = 1,........,m \quad ; \quad r = 1,........,t$$

The score "1" upon the DEA results, are determined as financially the efficient companies whilst the ones that have the score below"1" are financially the inefficient. While the alignment of j = 1, 2, 3,…,n that exist in the super efficient output based DEA launching from "0", the ranking allows the efficient companies with the score "1" to have greater score than "1". Thus in order to perform better the inefficient companies have to make the necessary changes in their input and/or output variables that are represented by Pİı. In the study the potential improvement value is calculated by the formula below. The negative Pi value indicates the decrease in the I/O variable while the positive Pi value shows the required incease Pİ = [(Expected Value – Valid Value /Valid Value) x 100] (Köse, 2010; 92).

3. FINANCIAL PERFORMANCE MEASUREMENT IN INSURANCE INDUSTRY

Studies in the literature on financial performance measurement of insurance firms typically show that; DEA method is the most common one among the non-parametric methods as illustrated in Table 1.

Table 1. DEA Models in Insurance Industry

Author	Input	Output	Scope	Period	Findings
Kılıçkaplan, Atan and Hayırsever (2004)	# of Staff, Fixed Income, Equity, Cash Equivalents, Technical Provisions	Net Premiums Written ,Technical Income, Investment Income	Non- Life Insurance	1998-2002	The research concludes that; the decrease in the technical efficiency index of inefficient firms is caused by changes in scale efficiency rather than technological changes.
Köse (2010)	# of Manufacturing Staff, Total Outcome, Capital Equity	Net Premiums Written Production Total Income	Life /Pension	2004-2008	The results show no disastrous outlook of the general efficiency since the average efficiency rate of the homogenous industry is high.
Çiftçi (2004)	# of Agencies, fixed Income, Capital Equity, # of Staff	Net Premiums Written Production Technical Income	Life /Non-Life Insurance	1998-2002	The differences in the efficiency of insurance firms are caused by major differences in scale efficiency and insurance firms are unable to work efficiently.
Bülbül and Akhisar (2005)	Financial Ratios	Financial Ratios	Life /Non-Life Insurance	1999-2002	It is found that; a great majority of insurance firms are yet to reach the efficiency level.
Sezen, İnce and Aren (2005)	Capital Equity, Total Outcome, Total Debt	Technical provisions, incurred Claims	Non- Life Insurance	1998-2003	The number of branches and agencies in the homogenous industry seems to be inefficient in Turkish market.
Noulas et al (2001)	Direct Cost (sum of payments to the insurer and and indirect cost (salaries and expenses)	Premium income and revenue from investment activities	Non- Life Insurance	1991-1996	The insurance firms are very inefficient and there are big differences among them regarding the efficiency levels.
Cummins, Rubio- Misas, Zi (2004)	Capital Equity, Staff Expenses, Business Services,	Claims Incurred, Net Income	Life /Non-Life Insurance	1989-1997	The results provide only weak evidence for the existence of economies of scope in the U.S. insurance industry.

4. DATA METHODOLOGY AND EMPIRICAL RESULTS

Aiming to determine the efficiency of non-life insurance firms, this study makes use of constant returns to scale (CSR) DEA model on the input and output groups of insurance firms to measure their performance. In our study, we obtained both the reference sets and the inefficient DMUs in their own reference sets that have to become closer to the efficient ones. The inefficient compaines are defined in their own rankings in response to efficiency values. On the other hand the DMUs which are efficient and have the score "1" are ranked on the basis of super efficiency scores. Non-life insurance firms active in Turkish insurance industry during the 2003-2008 period are included in the study. Insurance firms stopping their activities for various reasons are left out of the scope of the study. On the other hand, minus values in technical and financial profits are corrected as plus values due to the DEA analysis program constraint, and the highest negative value according to the absolute value in the related output variables are added to all the elements of decision making units. The number of firms included in the performance analysis study is 25 concerning all the years. The datas are obtained from the annual financial statements of National Treasury Department Insurance Supervisory Authority' reports named "Insurance Activities in Turkish Insurance Industry" concerning the years of 2003-2008 period.

4.1. Input Selection

To estimate the financial perfornance, we defined the firm inputs as; *capital equity, total assets, total expenses, number of agencies, number of staff and marketing employee.*

4.2. Output Selection

For the non-life insurance companies we defined the outputs *as; technical profit, investment profit, premium production and amount of policy.* Since five inputs and four outputs are used in the model, the number of decision making units should be at least: the number of inputs + the number of outputs + 1 = 5 + 4 + 1 = 10 and 2x (the number of inputs + the number of outputs) = 2x(5+4) = 18.

4.3. Empirical Results

We investigated the datas via DEA are analyzed by DEA Solver 3.0 Program and the CRR/DEA obtained the results of CCR based DEA. We didn't give place to the companies which entered into sector in the last period and the companies which quit their operational entity on the purpose of preserving the homogenity of our study. The study also involves the impacts of the 2008 crisis upon the 25 non-life insurance companies. When the empirical results are evaluated year by year, we determine the efficient enterprises in 2003 as 20, 14 in 2004, 19 in 2005, 15 in 2006, 2007 and 2008 identically. Besides, the insurance companies that show permanent efficiency during the analysis period are observed as; Axa, Euro, Fiba, Hur ve Mapfre. The Table 2 presents the average efficiency values for the years 2003 is 0,97; 2004 is 0,93; 2005 is 0,98; 2006 is 0,97; 2007 is 0,94; and finally for 2008 is 0,94 as calculated. The datas are presented under the determination of Score (S) and Rank (R). The results indicate that the enterprises have comparatively higher efficiency scores. If we evaluate the companies individually we can see that Liberty has the lowest efficiency with 0,354 while Birlik has the highest efficiency with 0,989. Euro, Eureko ve Mapfre Genel similiarly appear as the efficient companies compared to Liberty, Aksigorta ve Allianz. Before Liberty purchased Şeker Co. in 2007, the reason of the weakness can be the resolvement of

the equity assets of the company. Hence Liberty financially performed better in 2007 but couldn't sustain it in 2008. The same conditions also are valid for the Ergo İsviçre Ins. Another non- life company Garanti Insurance experienced the decrease in it's number of policy and agency added to its investment loss. However in 2007, the acquisition by Eureko helped Garanti to recover again. Anadolu Ins. and Aviva Ins., between the period 2003- 2005, had the superior efficiency but couldn't seem to sustain it till today. Başak Groupama Ins and Fiba Ins. ,on the other hand, had a lower value in 2006, the improvement in capital equity, technical and investment profit helped to recover the performance nevertheless by the influence of the decrease of investment profit couldn't perform beter in the crisis financially. It is possible to observe also the positive effects of SBN-Ticaret Ins. take over in 2008. If to evaluate overall inefficiency in the sector we can assume that AIG, Ankara, Axa, Güneş, Güven, Hür, Işık ve Zürich the efficiency levels increased in 2008 compared to 2007. Inversely; Anadolu, Aviva, Aksigorta, Birlik, Generali, HDI, Ray ve Yapı Kredi Insurance have performed worse in 2008 compared to previous year.

Table 2. CCR- Oriented Model DEA Results

Insurance Companies	2003		2004		2005		2006		2007		2008	
	S	R	S	R	S	R	S	R	S	R	S	R
AIG	1	4	1	2	0,88	24	0,89	24	1	9	1	6
AKSIGORTA	1	20	0,71	24	0,91	23	0,83	23	0,95	19	0,66	24
ALLIANZ	1	10	1	11	1	13	0,91	13	0,84	22	0,83	23
ANADOLU	1	6	1	7	1	19	0,95	19	0,95	18	0,93	20
ANKARA	1	17	0,87	20	0,95	20	1	20	0,77	23	1	15
AVIVA	1	7	1	10	1	17	1	17	0,97	17	0,9	21
AXA	1	9	1	4	1	7	1	7	1	6	1	5
BAŞAK GROUPAMA	0,82	24	0,94	17	1	18	0,95	18	1	7	0,97	18
BIRLIK	0,98	21	0,96	16	1	11	0,96	11	1	12	0,99	16
ERGO ISVIÇRE	1	8	1	9	1	12	0,98	12	1	1	1	12
EUREKO	1	1	1	1	1	1	1	1	0,74	24	1	2
EURO	1	5	1	3	1	2	1	2	1	3	1	1
FIBA	1	15	1	12	1	14	1	14	1	4	1	13
GENERALI	1	13	0,73	23	0,92	22	1	22	1	13	0,88	22
GÜNEŞ	1	18	0,89	18	1	8	1	8	1	11	1	9
GÜVEN	1	16	1	13	1	15	0,94	15	0,85	21	1	8
HDI	0,96	22	1	14	1	5	1	5	1	10	1	14
HUR	1	3	1	6	1	6	1	6	1	8	1	7
IŞIK	1	14	0,99	15	0,93	21	0,87	21	0,91	20	1	11
LIBERTY	0,64	25	0,68	25	0,82	25	0,89	25	1	2	0,35	25
MAPFRE GENEL	1	11	1	8	1	4	1	4	1	5	1	3
RAY	0,94	23	0,85	21	1	9	1	9	1	14	0,93	19
SBN	1	2	1	5	1	3	1	3	0,62	25	1	4
YAPI KREDİ	1	12	0,88	19	1	10	1	10	0,99	16	0,98	17
ZURICH	1	19	0,76	22	1	16	1	16	1	15	1	10

Table 3 presents the reference sets and the potential improvement values(the required input and output values) of inefficient non-life insurance companies and conducted for the year 2008 which the significant affects of crisis and the sectoral mergers-/take over and acquisition occurred.

Table 3. CRR Improvement Values for Inefficient Non- Life Enterprises

References	Companies	Output	Valid Value	Expected Value	Difference	Pİ (%)
		I1	1795007,9	620107,9	-1174900	-65,5
AXA		I2	2384803,5	1437969,3	-946834,2	-39,7
		I4	1445	1018,3	-426,7	-29,5
		O1	487553,3	743780,7	256227,4	52,6
EUREKO		O2	42841,7	154327,4	111485,7	260,2
		O3	56204,3	85649,9	29445,6	52,4
MAPFRE GENEL	**AKSIGORTA**	O4	3010768	4588120	1577352	52,4
		I1	328053,6	323695,1	-4358,5	-1,3
		I5	682	662,31628	-19,68372	-0,0289
AXA		O1	551010,2	666598,9	115588,7	21
		O2	96407,7	346617,1	250209,4	259,5
SBN		O3	22526,6	67942,7	45416	201,6
ERGO İSVİÇRE	**ALLIANZ**	O4	2071331	4073078,7	2001747,7	1
		I1	607990,7	542376,7	-65614	-10,8
		I5	778	544	-234	-30,1
AXA		O1	872199,1	942499,4	70300,2	8,1
GÜNEŞ		O2	136197,5	147754,2	11556,7	8,5
		O3	48779,2	66434,8	17655,6	36,2
MAPFRE GENEL	**ANADOLU**	O4	3581686	4591103,3	1009417,3	28,2
		I1	114640,5	105519,4	-9121,1	-8
AXA		I3	91157,9	80203,8	-10954,1	-12
		I4	662	492,2	-169,8	-25,7
ERGO İSVİÇRE		O1	209976,3	232543,4	22567,1	10,8
		O2	61985,6	68647,4	6661,9	10,8
FİBA		O3	7920,6	14068,9	6148,3	77,6
SBN	**AVIVA**	O4	1172120	1298093,3	125973,2	10,8

50

		I3	166176	142129,3	-24046,8	-14,5
AIG		O1	415967,7	429346	13378,4	3,2
AXA		O2	54659,3	70354,4	15695,1	28,7
ERGO İSVİÇRE		O3	14201,1	14657,8	456,7	3,2
FİBA	**BAŞAK**					
GÜVEN	**GROUPAMA**	O4	2042358	2108044,3	65686,3	3,2
		I2	119092,2	118436	-656,2	-0,6
AIG		I4	329	302,4	-26,6	-8,1
		O1	67905,4	68679,7	774,3	1,1
AXA		O2	51201,3	51785,1	583,8	1,1
EUREKO		O3	0,3	9145	9144,7	999,9
EURO						
IŞIK	**BIRLIK**	O4	764740	773460,1	8720,1	1,1
		I2	97906,4	84728,1	-13178,3	-13,5
		I5	106	97,8	-8,2	-7,7
ERGO İSVİÇRE		O1	43368,4	49453,6	6085,2	0,1
EURO		O2	33373,2	47599,5	14226,3	0,4
HDI		O3	7296,7	8320,5	1023,8	0,1
HUR						
IŞIK	**GENERALI**	O4	419630	478509,7	58879,7	0,1
		I1	119629	69911,2	-49717,7	-41,6
		I5	173	147,5	-25,5	-14,7
AXA		O1	50678,5	143128,4	92449,9	1,8
ERGO İSVİÇRE		O2	1393,6	79254,7	77861,1	10
EURO		O3	5228,8	14767,4	9538,6	1,8
FİBA						
GÜNEŞ	**LIBERTY**	O4	300123	847620,7	547497,7	1,8
AIG	**RAY**	I2	270942,6	239354,6	-31587,9	-11,7
		I5	259	231,9	-27,1	-10,5
ERGOİSVİÇRE		O1	144934,2	155676,5	10742,2	0,1

		O2	43019,4	48692,7	5673,3	0,1
HDI		O3	1879,2	9737,1	7857,9	4,2
IŞIK		O4	1143043	1227763,1	84720,1	0,1
AXA		I1	307271,4	242800,5	-64470,9	-21
		I5	888	267,2	-620,8	-69,9
		O1	467249,6	479152,3	11902,7	0
EURO		O2	87423,7	89650,7	2227	0
MAPFRE GENEL		O3	23692,3	30681,3	6989	0,3
SBN	**YAPIKREDI**	O4	1177535	2338169,6	1160634,6	1

[I1; Capital Equity, I2; Total Assets, I3; Total Expenses, I4; Number of Agencies, I5; Number of Staff and Marketing Employee, O1; Premium Production, O2; Technical Profit, O3; Investment Profit, O4; Number of Policies]

When the reference sets and the improvements are took into consideration we can observe that the values of inefficient DMUs are almost negative. As an example, for Ray Ins. to be efficient as the other companies in its own reference sets it has to decrease its total assets with a percentage of %11.6 and decrease its staff and marketing employee %10.45. Besides the premium production has to be increase %0.07, technical profit %0.13, investment profit %4.18, and number of policy %0.07.

5. CONCLUDING REMARKS

Analyzing the performance of insurance firms has become an appealing research area due to the global crisis also in the Turkish insurance industry. This study comprises the analysis of 25 non-life insurance companies in Turkish insurance sector within the period of 2003-2008 as the financial performance of the companies during the global crisis are investigated through CRR oriented DEA technique. The study indicates that the enterprises have comparatively higher efficiency scores. With the mergers and take overs in insurance sector in the last two years, the impact of crisis are significantly observable in the efficiency levels of the non-life branches. Especially, for the reason of the decrase in the financial performance of institutions, we can assert that the crisis caused the dissolvement in the capital equity, weakness in total assets and eventually the decrease in the profits. Another reason may be the diversities in the production. The empirical results of the study only indicates the partial influence of the last global crisis on the sector as the data constraint exist. The overall effects may be observed vias investigating the 2009-2010 period.

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