مجلة جامعة الشارقة للعلوم الإنسانية والاجتماعية

اسم المقال: تقييم أثر استقرار رأس المال في فعالية الاقتصاد: مثال مؤسسات التكافل في منطقة دول الخليج
اسم الكاتب: عاصفة أدينكا داوود، زرينا حامد
رابط ثابت: https://political-encyclopedia.org/index.php/library/8894
تاريخ الاسترداد: 2026/11/01 22:45 +03

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Special Issue on Islamic Finance



Vol. 13, No. Special Issue
Rabe'a Ala'wal 1438 A.H. / Dec. 2016 A.D.

ISSN : 1996 - 2339

Analysis of the Impact of Solvency Capital on Efficiency: Evidence from Takaful Firms in GCC Region

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Received on : 02-06-2015 **Accepted on : 31-07-2016**

Abstract:

The minimum solvency capital regulatory standards introduced by insurance sector's supervisory authorities in the GCC region aimed at protecting and reshaping the takaful takaful industry against adverse effects of global financial crisis as well as other unanticipated socio-economic challenges have attracted different reactions and comments from the sector's stakeholders. While the intent may be commendable, concerns are raised by some stakeholders that compliance with this regulation may stifle operation efficiency of these companies. This paper investigates the impact of solvency capital on efficiency of takaful companies in the GCC region.

The mathematical programming non–parametric data envelopment analysis (DEA) with range adjustment measures (RAM) model is employed for the analysis due to its desirable properties compared to other DEA models. The outcome of DEA analysis is subjected to diagnostic statistical test using Wilcoxon sign ranked statistical test to determine the impact of solvency capital proxy on efficiency score. Solvency condition is model to reflect adjustment to two distinct circumstances, namely management and regulatory positions. Result shows that the adjustment behaviors of takaful companies to solvency conditions affect the efficiency at different period and thus reflects both management and regulatory positions. The negative trajectory of the longitudinal analysis implies that takaful firm with obvious solvency issue is likely to experience decrease in efficiency over the periods under consideration.

Keywords: Data envelopment analysis, Takaful, Efficiency, Solvency, Gulf Cooperative Countries.

1. Introduction:

The GCC region is arguably the leading global takaful market due to the concentration of takaful companies in the region. According to the Ernst & Young World Takaful Report (2012), the region's gross contributions is estimated at US$ 5.68 billion in 2010 represents more than 62% of the global premium. Saudi Arabia remains the largest market in the region contributing US$ 4.3 billion followed by United Arab Emirate (UAE) with a contribution of US$ 818 million representing 28% of the industry contributions.

Several studies have stressed the strong growth potential of takaful industry in the region compared to conventional insurance industry (Alpen Capital, 2013). The high growth rate can be attributed to two major factors: increasing customers' awareness of the value propositions offered by takaful sector as a viable alternative to conventional insurance; and increasing demands for protection among the growing population, especially with the introduction of compulsory health and medical insurance scheme have been introduced (Am-Best & Co, Takaful Reviews, 2013).

Takaful companies have recently begun to come to term with the adverse impacts of the industry's rapid expansion. The influx of substantial amount of capital into the industry has resulted in intense competitions among the operators (Am-Best & Co, Takaful Reviews, 2013). Consequently, this raised the operation cost remarkably compared to conventional insurance. For instance, the operating expense ratio of takaful operators is was`25% in 2009 compared to 19% for conventional insurance firms within the same period (Alpen Capital, 2011). Most takaful operators are struggling to control cost in order to achieve a sustainable underwriting profit. The implication is lower investment returns for the industry relative to the investment yield of conventional insurance industry (Haron & Taylor, 2011).

Moreover, several takaful operators suffered technical losses and investment write-down due to high exposure to real estates and equities investments. This creates uncertainties and pressure on the capital resources and financial obligations to their policyholders. Aligning the stakeholders' expectations (i.e. ROE) and quality growth remains a major challenge of the industry. These and some related factors have heightened the concerns for solvency and financial stability of takaful sector among the industry stakeholders (Smith, 2011).

In order to save the nascent industry from collapse, insurance sector' supervisors in the respective member nations introduced different regulatory standards and guidelines. Amongst these are solvency regulatory standards, which introduce a new regulatory capital regime and modifies the risk assessment in the management of assets and liabilities in takaful industry. For example, the UAE insurance authority issued its first ever regulations specific to takaful industry which stipulates the minimum capital requirement of US$ 10 million for each takaful operator. The Central Bank of Bahrain (CCB) stipulates that an insurance company must maintain tier 1 capital adequacy of BD10 million (US$26 million), with other requirements which include having cash deposit of a minimum of BD 150,000 (US$ 400,000) with a commercial bank operating in the country (Am-Best & Co Takaful review, 2013). Similar regulations was were introduced in other countries as well, such as Saudi Arabia, Kuwait, Qatar and Oman with the objective of preventing eroding of shareholders' funds, and of reinforcing the financial stability of the sector.

2. Literature review:

"Solvency" refers to the financial strength and soundness of a financial institution and in this context, it denotes the assessment of financial soundness of takaful companies. It is made up of two aspects , namely, public supervision and fiscal management.

Generally, solvency regulations stem from the perceived need to protect the public against the consequences of insurance insolvencies (Browne & Hoyt, 1995). Bustic (1994) affirms that the main objective of solvency regulation is to ensure that the promised insurance protection is available to an acceptable degree of certainty. Redja (1989) identifies two primary reasons for the regulators' concern with insurance firm's solvency. First, the nature of insurance contract allows the payment of a premium prior to the payment of any losses that may have arisen. Second, through solvency surveillance the economic burden that might have been suffered by the policyholders and their beneficiaries due to failure of insurance companies can be minimized. Therefore, an aspect of insurance regulation encompasses safeguarding the insurance firms both in short term and long term.

Munch & Smallwood (1980) found that capital and surplus requirement are the most effective means of reducing the number of insurance firms' insolvencies. Hence, to minimize the potential for insolvency, supervisors required that financial

institutions maintain a prescribed level of capital to act as a buffer against loss and to certain extent discourage the management from taking excessive risk. Kessler et al, (2008) note that the existence of capital adequacy regulation assists the financial services firm to avoid bankruptcy. Bustic (1994) established a link between solvency and the balance sheet strength of an insurance firm.

In solvency assessment, the relevant risk is that an obligation may exceed assets, both items being balance sheet quantities emphasize the risk inherent in the balance sheet when the future realization of its items can assume one of several values, but the particular outcome is currently unknown (stochastic). To determine the amount of capital needed to provide the minimum security standard, there is a need to define the level of protection.

The usual measure of risk with respect to insurance solvency is "probability of ruin". Bustic (1994) introduces risk-based capital (RBC) method to solvency assessment. Accordingly, he developed a practical approach for setting up RBC by using the expected policyholders' deficit as solvency measure. RBC was further developed by NAIC[1], which is defined as the minimum theoretical amount of capital an insurance firm needed to support its business operations.

Supervisors required an appropriate statistical model for early prediction of insurance firms' insolvency. A.M. Best & Co (2013) advocate an in-depth evaluation of a company's balance sheet strength, operating performance and business profile based on balance approach at both quantitative and qualitative levels. The outcomes can be compared with established industry composite based on the performance of other insurance firms with comparable business-mix and organizational structure. Consequently, this would afford a more discerning and credible opinion on the financial strength of specific insurance firm.

In solvency analysis, the application of suitable statistical model to assess the balance sheet strength and the associated risk component will assist in prescribing the optimum form of regulatory actions. Munch and Smallwood (1980) claim that insurance supervisor's regulatory oversight may be counter-productive, particularly, if they prescribe either high or low capital requirement. Cummins & Sommers (1996) acknowledge that solvency capital requirement affects the operational efficiency of insurance companies.

1 NAIC National Association of Insurers Commission

Therefore, compelling the management of takaful undertaking to meet certain capital requirement could invariably affect their ability to compete effectively and efficiently. In such a case, there could be "excess underwritten capacity," which may be defined as an excessive ratio of capital (shareholders' funds) to premium underwritten. It indicates inefficient application of shareholders' resources.

Since insurance firms need sufficient capital to fulfill their financial obligation, the majority of insurance firms hold on capital more than required to reduce the probability of default (Haan & Kakes 2010). Therefore, balancing of capital-use against insolvency consideration remains the management and regulator's challenge. The optimum solvency capital margin represents a compromise between safety, market pressure on premium and shareholders' expectations. Moreover, this compromise is inherently subjective and is attained through subjective methods such as mathematical optimization techniques.

This paper focuses on analyzing the impact of solvency capital on the efficiency of takaful companies. The issue is whether solvency regulations as might be imposed by the supervisory authorities interfere significantly with the efficiency,and if so, what the magnitude of the restrictions on efficiency is.

3. Methodology:

3.1 DEA RAM model

Mathematical programming method data envelopment analysis (DEA) with range adjustment measure (RAM) model is chosen for the analysis primarily, because it produces efficiency scores that could be easily amenable to non-parametric statistical methods. The method is best described as 'data oriented' in that it evaluates and produce inferences directly from observed data (Cooper & Tone, 1997). It produces results that cover both pure technical and mix inefficiencies that a method could be identified for any DMU0.

Cooper, Park, and Pastor (1999) refer to this model as DEA-RAM efficiency. It is strongly monotonic and not dependent on the units in which inputs and outputs are measured. This invariance to linear transformation allows us to deal with the possibility of negative values in the analysis without losing contact with results from prior research in DEA that generally assumed an absence of negative values in the observation.

3.2 Data and variable selection for empirical analysis

The study covers 80 takaful companies domicile in GCC countries. These countries include; Saudi Arabia, Kuwait, United Arab Emirate (UAE), Qatar, and Bahrain with the exclusion Oman due to non-availability of data. The data are obtained from DataStream's database and other sources such as published annual report and financial statements from the website of the companies from 2009 to 2012. The breakdown of selected takaful companies with respective to each country are as follows: Saudi Arabia (30), Kuwait (7), United Arab Emirate (26), Qatar (5) and Bahrain (12).

This study followed the viewpoints of financial intermediation approach for insurance industry as adopted by Brocket et al. (2004; 2005) in their variables selection. It follows that insurance firms (similar to other financial services sectors) provide a series of services to the customers of which only a certain aspect will be an end product (i.e. payment losses). Which can be therefore regarded as an intermediate step through which investors get rewarded and customers get compensated for subscribing to a promise of future claim payments. Similarly, the regulators, customers, and employees get assurance of future firm solvency and continuing existence for the provision of insurance services.

Four inputs and three outputs are drawn from the composite financial information in line with (Brockett et al. 2004; 2005; Browne & Hoyte, 1995) these includes: (i) capital and surplus-comprises of capital, surpluses and reserves. (ii) Changes in policyholders' surplus and shareholder's capital - describing the movement in policyholders' surplus and shareholders' fund during the year. It is the difference between the surplus (deficit) at the beginning of the period and gross surplus (deficit) minus distribution to certificate holders during the period at the end of the financial year. The items includes, net income (investment income and underwriting surplus), net realized capital or loss, change in excess statutory reserves over statement reserve. (iii) Underwriting and investment expenses - make up the total cost of takaful day to day operations. (iv) Policy-holders' debt capital – is the probable future sacrifice of economic benefit arising from contractual obligation incurred to render services to other entities in the future. It is present on the liability side of the financial statement and often refers to as technical provision. It includes unearned contributions, outstanding claims, unpaid net losses, unpaid loss adjusted expenses (these two items represent the financial obligation of the undertaking), unearned pooled reserve (represent the liabilities for obligation yet to be provided) and other liabilities.

The output variables are specified in ratios for the purpose of maintaining comparability among the variables, these includes: (i) rate of return on assets (ROA) It is the ratio of net investment income and average amount of invested assets. (ii) Ratio of liquid assets to liabilities, liquid assets is cash and short term investment in securities. Liabilities are the likely future obligations arising from present contract to transfer assets or rendering services based on promises contingent upon occurrence of certain future events. The ratio reflects the ability of the takaful undertakings to meet its short term obligations. (iii) Solvency ratio is a proxy for solvency propensity in line with Beard, Pentikainen and Pesonen (1988[1]).

3.3. Conceptual framework

Takaful firms are faced with series of optimization decisions over a specific time period, particularly in the trade-off between risk and return. Holding adequate capital is the fundamental requirement of any insurance firm (Takaful inclusive) to prevent technical insolvency. The relative capital amount is specified by the regulators or through "own capital assessment" as advised by rating agencies and industry analysts. Therefore, following (Brockett, et al., 2004; McCabe & Witt, 1980) solvency capital proxy is a model which functions as a 'constraints' because there is an additional marginal cost associated with holding capital such as agency cost. A "constraints" is imposed by regulatory authorities with allowable risk of violation to certain extent. Thus, the objective of the management is to maximize return (ROA) subject to imposed 'solvency capital constraints'. The model assumes that the solvency constraints imposed will generally interfere with the objectives of profit maximization.

Management of firm can within regulatory guidelines trade-off one output for another, for example, by investing in certain classes of assets categorized as high risk investment, the firm might increase the first output (ROA) while decreasing third output (solvency). Therefore, depending on the firm's structure and lines of business, one output may receive greater emphasis than other; as is the case of general takaful; the second objective (ratio of liquid assets to liabilities) is important because it represents the firm's ability to meet short term financial obligations.

To determine the impact of solvency capital proxy on the output variables, the analysis utilised two procedures with the aid of 'DEA additives' codes runs (with

1 Solvency ratio is defined as the ratio of solvency margin and premium income.

Matlab software R2014a version) for 80 DMUs (takaful firms) in the sample on year to year basis.

The first analysis includes solvency ratio as the output variable while the second analysis omit the solvency ratio. This is just a repetition of the previous sentence. A diagnostic test is subsequently conducted to examine whether changes occurs from efficiency to inefficiency or vice versa. The research question at this point is whether changes occurs occur from efficiency to inefficiency status or vice versa. This is verified by using statistical methods.

A non-parametric statistical measure, Wilcoxon sign ranked statistical test is used to determine the significant difference between the efficiency scores generated from the two different treatments of solvency conditions (i.e. including and omitting solvency ratio) in the DEA analysis. The non-parametric property of the technique makes it perfectly aligned with DEA method in a manner that lends itself to pairing so that the data is matched approximately symmetric as the case in Wilcoxon sign rank test. The scores for each takaful firm are paired and the differences are ranked in order of magnitude.

4. Results and Discussion:

4.1 Descriptive statistics

Table1 in the appendix presents the descriptive statistics of inputs and outputs used in cross sectional DEA analysis in each of the period 2009-2012. The 'policyholders supplied debt capital' gives the largest distribution range; the average value four periods ranges from a minimum of US$0.27 million to a maximum of more than US$1.897 billion dollars. The minimum value for "change in capital and surplus" over the distinctive period (2009-2012) produced a negative value in excess of US$35million, indicating that quite a number of takaful companies experienced negative income (losses) in these periods. Total expenses, which is made up of underwriting and investment expense, are distributed from a minimum value of US$0.45 million to a maximum of US$721.45 million, with mean and standard deviation of US$69.22 million and US$122.40 million, respectively.

It is however, important to note that the four input variables are measured in US$ amount whereas the three outputs are in the form of ratios as noticeable in the last three rows of Table 1. As detailed in the table, the average rate of return on assets ranges from a minimum of -3.7% to a maximum of 9% for the 4-year periods,

with mean value of -1% and standard deviation of 9%. The second output is the ratio "liquid assets to liability" given a maximum and minimum ratio of 4.64 and 0.10 respectively, with the mean and standard deviation of 1.09 and 3.29 in that order. Solvency ratio is obviously the third output variable; the four-year average scores range from a maximum and minimum ratio of 8.18 and 0.15 with mean and standard deviation of 1.90 1.98 correspondingly.

As previously noted in the model specification, efficiency scores obtained from the range adjustment measure (RAM) model are invariant to changes in the measurement units of inputs and outputs. Also, it is invariants to choice of origin, by this method the negative value in the data can be eliminated. Thus, the negative value for "changes in capital and surplus" are eliminated by adding a constant to the data in the row such as 36.88; 29.18; 101.27 & 97.91 are added for the periods 2009; 2010; 2011 and 2012 respectively. Subsequently, constant 36.88; 29.18; 101.27 & 97.91 are added for the period 2009; 2010; 2011; and 2012 respectively in the case of rate of return on assets (ROA). It is important to point out that all inputs and outputs values are scaled to convenient units of $'million, as shown in the Table (1) in the Appendix.

Next, in line with (Brockett et al, 2004), it is desirable to use the complimentary value of policyholders supplied debt capital rather than the values itself (since an increase in the 'policyholder supplied debt capital', ceteris paribus is less rather than more desirable. Therefore, it is preferable if the same result can be obtained with less policyholder capital). This is accomplished by initially multiplying all the values by -1 and the adding the result from the same constant (here = 200000) thus reverses the relation that previously maintained, for example between the minimum and maximum value, in the above tables it is shown as policyholder supplied debt capital (complimentary value). These are the data set that were used in conducting the analysis.

4.2 Analysis and Discussion of Relation between Solvency and Efficiency

4.2.1 Non-parametric statistical test

Table 2 shows the result of Wilcoxon sign ranked test conducted using the SPSS software. The Wilcoxon signed ranked test compare the differences in the efficiencies scores ranking. The DEA efficiency scores for each DMU are examined across the two conditions (i.e. with and without solvency scores as output variable). The differences are ranked in order of magnitude. Thus, each DMU ranked score is assigned a positive or negative sign according to which of the condition has the highest score. As a result, all of the positive ranks are summed followed by the entire negative ranks.

The results of Wilcoxon signed rank test reveals strong statistical significance difference in 2009 and 2011 as indicated by their Z-statistics and asymptote significant 2-tailed p-value (2009-Z-statistics -2.687, p-value 0.007<5%; 2011-Z statistics -2.216 p-value 0.027<5%). The p-value is statistically significant at 5% level, thus, the null hypothesis of no difference in the rank of efficiency scores can be rejected for the two periods. Meanwhile, the null hypothesis cannot be rejected for 2010 and 2012 because the test is not statistically significant. Hence, it is inferred that the solvency capital proxy produces no influence in efficiency score ranking in the two periods, but shows strong significant difference in 2009 and 2011. Therefore, inclusion of solvency capital proxy has strong implications on either the efficiency scores outcomes or their component elements. It should be noted that the hypothesis is a two-tail asymptotic test since solvency capital proxy is modelled as constraints to either reinforce or attenuat the efficiency scores.

Table 2: Wilcoxon sign ranked test statistics result based on negative and positive ranks

S/N	Sign Rank (Period)	Rank	Z-Statistics	P-value 2-tailed
1.	W_Solvency2012 < WT_Solvency2012	-26.89	-0.583	0.560
	W_Solvency2012 > WT_Solvency2012	26.04		
2.	W_Solvency2011 < WT_Solvency2011	-28.90	-2.216	0.027**
	W_Solvency2011 > WT_Solvency2011	20.40		
3.	W_Solvency2010 < WT_Solvency2010	-27.87	-0.151	0.880
	W_Solvency2010 > WT_Solvency2010	31.25		
4.	W_Solvency2009 < WT_Solvency2009	-27.54	-2.687	0.007***
	W_Solvency2009 > WT_Solvency2009	25.75		

***1% significant level
**5% significant level
Source: Asafa, A. (2015).

4.2.2 Latent growth curve modeling

Furthermore, this study estimated the growth rate of efficiency over the four periods using latent growth curve modeling, a statistical technique for longitudinal analysis of initial status and the estimated growth rate of a period of time. It provides the group level statistics mean intercept and mean growth rate.

The hypotheses can be tested by assessing the statistical and practical significance of the model parameters such as intercept, slope factors, variances and covariance. The model-fit can be assessed and the good-fit is usually the pre-requisite for interpreting parameter estimates. Chi square ($\chi 2$) statistics forms the basis from an array of fit indices that can be used to measure the match between the model prediction and observed data.

Thus, the null hypothesis is the researcher's latent growth curve model; the power is the probability that one's model will be rejected if it is not true representative

of the population. The variables to be estimated in this model comprise observed endogenous variable (repeated measures of dependent variables for 2009, 2010, 2011 & 2012); unobserved endogenous variables includes intercept (initial status) and slope (trajectory); and unobserved exogenous variables (includes E1, E2, E3, E4, E5, E6).

Figure 1 and 2 present the path diagrams of unconstraint latent growth curve model for the four periods repeated measurement of efficiency scores generated from the two solvency conditions (i.e. including and omitting solvency ratio) as output variable. The assessment of the two models show the good-fit as indicated by the $\chi 2 = 13.614$, df (8) & 6.563, df (8) with p-value = 0.092 & 0.584 >5%.

Table 3 shows the result of the parameters estimate of the latent growth curve model, the initial status or baseline (intercept) mean efficiency score is 0.971 and 0.987 with average growth rate of 0.081 and -0.008 respectively for with and omitting solvency ratio. The negative value of the slope is an indication of decrease in average efficiency score over the periods. Furthermore, the variance of intercept for both solvency conditions is zero while the covariance between the initial status and the rate of change are -0.002 and -0.001 respectively for with and without solvency propensity. The negative value of indicate the ceiling in the growth trajectory.

Table 3: Result of Latent Growth Curve model with no covariate

Effect	Model (With solvency)	Model (Without solvency)
Intercept(mean)	0.971 ***	0.987***
Slope (mean)	0.081	-0.008
Variance (intercept)	0 .000	0.000
Variance (slope)	0.004	0.004
Covariance (intercept & slope)	-0.002	-0.001

***1% significant level

Source: Asafa, A. (2015).

Figure 1

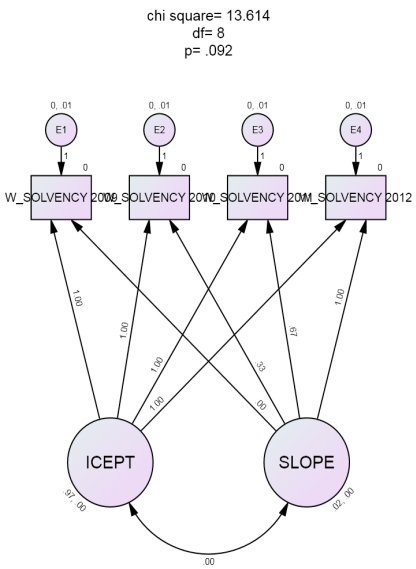
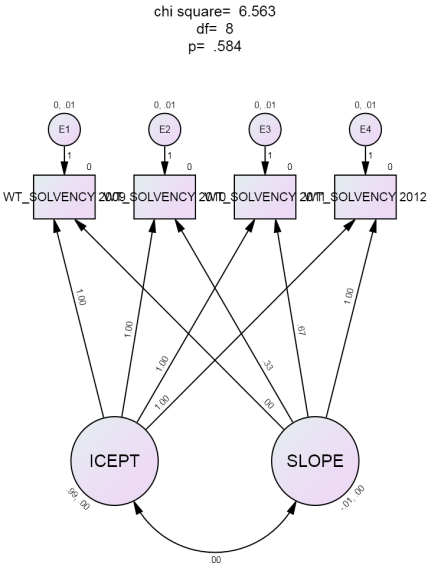


Figure 2



Source: Asafa, A. (2015).

5. Conclusion:

The cross-sectional statistical test for each of the four periods shows a strong statistically significant difference in 2009 and 2011 consequently, we reject the null hypothesis for those periods. However, the null hypothesis could not be rejected in 2010 and 2012. The longitudinal analysis shows negative trajectory, the implication of this is that a takaful firm with obvious solvency issue is likely to experience decrease in the performance over the four periods under consideration.

The difference in the solvency propensity and adjustment behavior of takaful firms at different period is an interesting finding and suggests some issues that are consistent with the findings in the previous literature (i.e. Brockett et al, etc.) and industry situation report. Meanwhile, the treatment of solvency capital proxy as the output variable of managerial interest rather than an externally imposed

regulatory condition is justified with the statistical significance status of takaful firms in 2009. This implies that solvency condition is a very important issue in that year. It could be recalled that 2009 marked the onset of the global financial crisis, some takaful firms in the region experience serious financial difficulty as a result of asset impairment and investment write down due to near collapse of the capital market in the respective countries. This condition is exacerbated by the over concentration of takaful investment portfolio in stocks and real estate.

However, the non- statistical significance in 2010 suggests a rapid adjustment to the minimum solvency capital requirement regulation imposed by the insurance supervisors to turn the tide of the sector from collapse.

Furthermore, the statistical significance of solvency status again in 2011 may be purely due to the managerial decision in the insurance business process. It was stated in the foregoing sections that solvency position of a typical insurance firm (takaful inclusive) is affected by virtually all the fiscal management of insurance business which includes rating, reserve evaluation, risk selection, reinsurance, investment and marketing effort; also by the macroeconomic variables such as GDP, inflation, underwriting cycle etc. (Pottier & Sommer, 2002; Cummins & Sommer, 1996).

Yet again, the non-statistical significance of solvency status in 2012 further confirms the solvency adjustment behavior of the takaful firms. This may be partly prompted by takaful firm's "own capital assessment" to review their solvency status in line with their overall risk exposure and partly due to the understanding by the management of takaful firms that a shortfall in the solvency capital position below certain regulatory limit will attract remedial action from the supervisors'.

The soundness of takaful firms is a major concern to all the stakeholders (i.e. manager, policyholders and beneficiaries, regulators etc.). Therefore all parties to the insurance firms are likely to react favorably to the improvement in the solvency condition as well as other two variables in the trio objectives, even though, the management of insurance firm at one time of the other in an effort to maximize profit will trade-off one objective with the other.

One finding of importance is that the actual solvency status does not carry over to the next period, suggesting that management decisions at a particular period reflect the firm's solvency condition. It is suggestive that for takaful firms operating in a congested market typical of GCC insurance market, the quest for meeting the

targeted market share can make the management adjust the underwriting premium rate downward in order to attract more customers.

This may not be difficult for the takaful operators since literature has identified setting underwriting premium rate as a major management decisions in the insurance business processes with larger implications in the solvency status of the company. Takaful managements are required to set a premium at a level that allows the payment of loss claims and also provide competitive return to the shareholders for their role as residual risk bearers.

In addition, the foregoing suggests that regulatory oversight with respect to solvency capital requirement is germane to reducing excessive risk taking and the promotion of market discipline among the takaful operators which must be thoroughly enforced.

Recent experience of the financial crisis has pushed the insurance supervisors to move toward adopting the risk-based capital approach as a methodology for administering capital requirement. Such adoption will allow for quantification of risk exposure as a requirement for establishing the minimum capital requirement. As expressed by (Bustic, 1994), the degree of correlation of risk elements is a critical factor in setting the capital requirement. Das et al (2003) argue that risk-based capital model is a superior technique from a theoretical point of view and thus reflect more precisely the overall firm's risk exposure.

Finally, this research provides a framework for linking the solvency with efficiency through year to year cross-sectional analysis that produced the efficiency scores which subsequently used for diagnostic statistical analysis to find empirical evidence on the impact of solvency on the efficiency. Perhaps, a subsequent study may consider investigating the impact of macroeconomic and institutional variables on the performance since these indicators too have an overall effect on the solvency of the takaful sector. Consequently, it will help to increase our understanding of factors influencing the solvency and stability of the takaful sector.

Appendix:

Table 1: Descriptive statistics of inputs and output variables used in DEA for periods (2009-2012)

Inputs (million$) & Outputs (ratio) variables.	Maxi-mum	Mini-mum	Mean	Std dev
Policyholders supplied debt capital	1897.07	0.27	147.64	287.79
Policyholders supplied debt capital (complimentary value)	1999.73	102.93	1852.36	287.79
Underwriting & Investment Expenses	721.54	0.45	69.22	122.40
Capital & Surplus	784.09	11.41	123.00	7.35
Change in Capital & Surplus	218.37	-35.88	7.35	32.45
Change in Capital & Surplus (treated)	255.25	1.0	44.22	32.45
Rate of return on assets	0.09	-0.04	-0.01	0.09
ROA (treated)	0.47	0.01	0.37	0.09
Liquid assets / liabilities	4.0	0.02	1.09	3.29
Solvency scores	8.18	0.15	1.90	1.9

Source: Asafa, A. (2015).

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تقييم أثر استقرار رأس المال في فعالية الاقتصاد: مثال مؤسسات التكافل في منطقة دول الخليج

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ملخص البحث:

الحد الأدنى التنظيمي لملاءمة رأس المال الذى وضعته السلطة الرقابية لقطاع التأمين فى منطقة (GCC) يهدف إلى صيانة وإعادة تشكيل عملية حماية التكافل ضد التأثيرات السلبية اللازمة للمؤسسات المالية العالمية، وسائر التحديات الاجتماعية والاقتصادية غير المتوقعة. فقد جذب الأمر تعليقات وردود فعل مختلفة من أصحاب المصلحة فى قطاع التأمين فى المنطقة.

ولكن على الرغم من أن القصد قد يكون جديرا بالثناء، قد أثار بعض أصحاب المصلحة فى القطاع قلاقلا فى أن المطاوعة لهذا المرسوم قد تخنق كفاءة العمليات لهذه المؤسسات. فهذه المقالة تبحث عن تأثير ملاءمة رأس المال وكفاءة شركات التكافل فى المنطقة.

استخدم (الباحث) البرامج الرياضية لتدوين البيانات غير الحدودية والبيانات الاختتامية (DEA) مع نموذج نطاق وسائل التعديلات (RAM) لعملية التحليل لأجل خصائصه المرغوب فيها عند مقارنته بالنماذج الأخرى. فالنتائج المحصول عليها فى تحليل هذا النموذج متعرضة للاختبار الإحصائي التشخيصي مع استعمال رمز اختبار (Wilcoxon) الإحصائي التشخيصي لتحديد تأثير (ملاءمة رأس المال) ودرجة الكفاءة

صُمِّم شرطُ الملاءمة لينعكس التعديل فى ظرفين متميزين، أولاً حالة التنظيم وثانياً حالة المناصب التنظيمية. أظهرت النتيجة أن تصرفات تعديل شركات التكافل لشروط الملاءمة تؤثر في الكفاءة أحيانا مختلفة، وبالتالى هي تنعكس فى كِلَي عملية التنظيم وشؤون المناصب التنظيمية.

فالمسار السلبي للتحليل الطولي فى هذا البحث اقتضى أن مؤسّسة التكافل التى لها قضية الملاءمة قد يواجه التخفيض خلال مدة قيد النظر.

الكلمات الدالة: التحليل التطويقي للبيانات، تكافل، فعالية، ملادة مالية، دول مجلس التعاون الخليجي.