“An evaluation of the financial soundness of insurance firms in the Amman Stock Exchange”

AUTHORS	Hussein Mohammad Salameh
ARTICLE INFO	Hussein Mohammad Salameh (2022). An evaluation of the financial soundness of insurance firms in the Amman Stock Exchange. *Insurance Markets and Companies*, *13*(1), 11-20. doi:10.21511/ins.13(1).2022.02
DOI	http://dx.doi.org/10.21511/ins.13(1).2022.02
RELEASED ON	Tuesday, 05 April 2022
RECEIVED ON	Thursday, 20 January 2022
ACCEPTED ON	Thursday, 31 March 2022
LICENSE	This work is licensed under a Creative Commons Attribution 4.0 International License
JOURNAL	"Insurance Markets and Companies"
ISSN PRINT	2616-3551
ISSN ONLINE	2522-9591
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
29	0	7

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

Hussein Salameh (Jordan)

AN EVALUATION OF THE FINANCIAL SOUNDNESS OF INSURANCE FIRMS IN THE AMMAN STOCK EXCHANGE

Abstract

Financial soundness of insurance firms within a country tends to heavily affect its financial environment. This study will further assess the relationship between both factors with the support of a special model to test the financial soundness of insurance companies. The model could be utilized as an indicator of the stabilization of a country's financial environment; this is done by testing the insurance companies' falls. The methodology used was discriminant regression on the Amman Stock Exchange (ASE) to test 12 indicators that were derived from six CARMEL model parameters. The six tested parameters were: capital adequacy, asset quality, reinsurance and actuarial issues, management efficiency, earnings and profitability, and liquidity. The results have shown that 10 out of 12 indicators are significant factors. Additionally, the study proved that the CARMEL model is an applicable model to test the financial soundness of ASE insurance companies, the possibility of detecting a deviation between the actual and expected performance was barely minimum. The effect of deviation was present in eight firms out of 19, three of which were affected by the type II error (riskier deviation). The study concluded that the CARMEL model is a significant model, and the insurance firms that follow the Jordan Insurance Federation (JIF) requirements are financially sound.

Keywords JIF, discriminant regression, solvency margin, CARMEL

JEL Classification G22, G32, C52

Received on: 20th of January, 2022
Accepted on: 31st of March, 2022
Published on: 5th of April, 2022

Hussein Salameh, Researcher, Associate Professor of Finance, Jordan.

Conflict of interest statement:
Author(s) reported no conflict of interest

INTRODUCTION

Over The Counter (OTC) stock market was initially introduced in the 1930s, where a few public Jordanian firms started trading stocks. The first corporate bonds were issued in the 1960s. In January 1978, Amman Financial Market (AFM) as an organized exchange lunched its operations with 66 listed firms. By the end of 1978, AFM market capitalization was approximately 286 million JDs. On March 11, 1999, the Jordanian Capital Market experienced major developments. AFM got replaced by Jordan Securities Commission (JSC), Amman Stock Exchange (ASE) and Securities Depository Center (SDC). Currently, market capitalization of the subscribed shares is approximately 17.3 billion JDs, and the listed companies increased to 224 by the end of 2016 (ASE website). Later on, the demand of the Kingdom's economy is set to be met by the Association for Insurance Companies. In 1989, a Royal Decree initiated the establishment of the Jordan Insurance Federation (JIF). Jordan Insurance Federation (JIF) comprises 24-member insurance companies licensed to practice in Jordan. There are twenty companies listed on the Amman Stock Exchange, one foreign insurance company, two 'takaful' operators in the market, while the remaining 22 insurers are conventional. The market did not include any specialized reinsurance company. Therefore, Jordanian insurers reinsured their operations after retaining a portion of the risk by ceding the reminder to the Arab and foreign reinsurance compa-

nies. In addition, Insurance companies exchange reinsurance capacity by jointly coinsuring large risks (JIF website). Thus, this study will focus on the financial soundness of insurance industry in ASE because of their large investors, growing links between banks and insurers, financial firms' contagion and their effect on the stability of the country's financial environments.

1. LITERATURE REVIEW AND HYPOTHESES

In the last three decades, Scalars have shown International Monetary Fund that CARMELS model is the best fit model to test the financial soundness in insurance companies. After studying the related literature reviews in Asia, a couple of valuable articles were found to mention and describe. Initially, Surya and Sudha (2020) presented the core set of quantitative financial soundness indicators of life and non-life insurance companies in India. Chakraborty and Sengupta (2014) performed an analysis to assess the financial soundness of two most leading life insurance firms in India. Moreover, Ansari and Fola (2014) found that the public and private sectors' firms were financially sound. On the other hand, private sectors have more adequate reinsurance and capital position than the public sector. There is significant difference between the performances of the two sectors. From an International Monetary Fund point of view, Das et al. (2003) proposed that key indicators should be used to monitor the insurance sector firms' financial soundness. In addition to financial indicators, there is other qualitative information that could be used such as ownership arrangements. Hussain (2015) proved that there is a significant positive impact caused by macroeconomic environment, equity market conditions and inflation on the profitability of insurance companies in Pakistan. The significance and signs of the variables' coefficients vary among insurance companies. Moreover, Darzi (2011) showed that both public and private insurance firms' sectors have satisfactory capital adequacy, asset quality, retention and a lack of significant in earning and profitability soundness. While the satisfactory management soundness and liquidity were only found in public firms. Ahmed and Sarkar (2019) identified a decreasing trend associated with the suitable capital adequacy ratio. They also indicated the companies that rarely participate in reinsurance through the reinsurance and actuarial ratio. They also observed that the expense ratio for selected companies was above 20% (the standard) of the Insurance Development and Regulatory Authority. Majority of companies had a satisfied liquid asset ratio. Moreover, their Z scores depicted they are financially unhealthy in Bangladesh. K. Patel and P. Patel (2020) found that earning and profitability ratio is the crucial performance indicator. Moreover, the CARMEL ratios show a significant gap across the chosen life insurance firms. Yakob et al. (2012) showed that the CARMEL model provides an indication of the Malaysian insurer' financial strength.

Furthermore, for Asia, Kumar and Ghimire (2013) emphasized that qualitative factors are essential in determining financial soundness, but not enough to obtain a clear picture of the insurers. They also studied the dimensions of financial performance using the following parameters: Capital adequacy, Assets quality, Reinsurance and Actuarial issues, Management soundness, Earnings and profitability and Liquidity. H. Lee and C. Lee (2011) showed that the insurer retention is negatively affected by underwriting risk, premium growth in insurance companies. On the other hand, it positively affects the liabilities to liquidity assets ratio and business concentration in Taiwan. They also found that the return of investment, inflation rate and interest rate changes impact insurer retention. Dar and Bhat (2015) revealed that capital adequacy, earnings and profitability, and liquidity differ in position for life insurers in India. Chen and Wong (2004) discovered that financial insurers in Asian economies are affected by firm size, investment performance, liquidity ratio, surplus growth, combined ratio, and operating margin. Moreover, the guidelines for insurance industries in Asian economies differ because each one of them is in a different stage of development. Bawa and Verma (2017) proved that liquidity needs improvement and earning and profitability need to be honed in Indian reinsurance companies. Salameh (2021) proven that ASE insurance companies are resistant against distress, 22 variables from 11 parameters of the applied model were significant, signifying the validity of the model. Widati and Anas (2019) concluded that life insurers are financially

http://dx.doi.org/10.21511/ins.13(1).2022.02

satisfied, particularly high result on Risk Based Capital than CARMELS and Financial Strength Rating models in Indonesia. Therefore, to achieve comprehensive results for quantitative and qualitative indicators they used the three models to measure financial soundness

Moving on to Africa, Simpson and Damaoh (2009) found that CARMELS Model was the most comprehensive of all evaluation models and tools in Ghana. Morara and Sibindi (2021) showed that insurer financial performance and size (age) variables have a positive (negative) relationship; their results indicated that a better performance is connected to the percentage of leverage in Kenya insurance companies.

For Europe and US, Kramer (1996) was able to prove that solvency, profitability, investment, and market share are the most significant parameters in Dutch insurers. Sliwinski et al. (2013) showed that the economic and financial nature highly stimulates the life insurance demand in Poland, that is in line with the previous studies. Nevertheless, there were minor contradictions on regard of education level and social benefit variables. Kugler and Ofoghi (2005) show that there is no cyclical effect in UK rather a relationship between insurance market size and economic growth. Smajla (2014) revealed that Croatian firms have high capital adequacy, retention ratio (due to reinsurance services), management, and profitability scores and low liquidity score. Sokic (2019) showed that CARMEL variables are significant indicators to quantify insurance risk management in Serbia; additionally it was revealed that the financial indicators had a negative trend. Puławska (2021) mentioned that the pandemic negatively affected the ROA of insurance companies in Germany and Italy and the solvency ratio of insurance companies in Belgium, France, and Germany. On the other hand, it did not affect the Polish insurance sector, and there was an increase in the value of receivables owed to Belgian insurance companies. Shim (2017) proved the consistence with the concentration fragility view in insurance firms. Moreover, the variables that ensure sound insurance system in US are the firm specific characteristics, including the exposure to natural catastrophes and macroeconomics conditions. Moreno et al. (2021) showed that the Z-score of insurance firms can be calculated by ROA and capitalization with the standard deviation of returns, the Z-score index is an early warning for micro-prudential supervision. Additionally, they supported on convincing a clearer picture of insurance firms' risk factors in Spain.

The purpose of this paper is to assess the financial soundness of insurance firms in an emerging market such as Amman Stock Exchange. Therefore, the hypotheses used are as follows:

H_o: *There is no significant effect of the independent variable on the financial performance score.*

H_1: *There is a significant effect of the independent variable on the financial performance score.*

2. METHOD

The study sample consisted of 95 panel data observations and a time period of 5 years (2014–2018). It included 19/20 annual financial statements for listed companies, one company got excluded due missing data.

This study will follow the suggestion of the literature review; to test the financial soundness of the insurance industry, the study is going to use the CARMELS model; however, the S abbreviation of Sensitivity to Market Risk was excluded due to the lack of variable proxy. Therefore, the used parameters are Capital Adequacy, Asset Quality, Reinsurance and Actuarial Issues, Management Soundness, Earnings & Profitability, and Liquidity.

2.1. Applied model

$$\begin{aligned} &Financial\ Performance\ Score = \\ &= \alpha + \beta_1 SURTR + \beta_2 SOLR + \beta_3 SETA + \\ &+ \beta_4 RETENTION + \beta_5 NTRNC + \\ &+ \beta_6 NTRNRP + \beta_7 LNAPE + \beta_8 LOSSR + \\ &+ \beta_9 EXPENSER + \beta_{10} ROA + \beta_{11} ROE + \\ &+ \beta_{12} GRAHAMRAT. \end{aligned} \quad (1)$$

According to the Internationally Active Insurance Groups & Reinsurance Standards Instructions

and Amendments, the dependent indicator in this model is a dummy variable that indicates a financially poor company for the value 0 (annual solvency margin of 150% or less), and 1 otherwise.

- ***Capital Adequacy***: It is a measure of the financial stability risk of the insurer such as high volume and volatile business sustainability (Das et al., 2003).

1. *SURTR*: Surplus/Technical Reserves Ratio (Das et al., 2003).

2. *SOLR*: Solvency Ratio (Net written Premium / Total Equity) (Das et al., 2003).

For simplicity reasons, total equity was used as an equivalent to the capital; however, analysis of capital tiers quality is still required. Moreover, the Ratio of capital / technical reserves (life insurance) and the Ratio of net premium / capital (non-life insurers) could cause irregular outcomes due to underpricing (non-life) and inadequate reserving (life)

- ***Asset Quality***: It is the percentage of exposure stock market risk and the fluctuation in economy. Significant proportion of equities to total assets leads to the need to examine portfolio composition and check the correlation of exposure on assets and liabilities (Das et al., 2003).

3. *SETA*: Shareholder Equities/Total Assets (Das et al., 2003).

- ***Reinsurance and Actuarial Issues***: It is the severe risk scenarios overcome by capital and reinsurance of the insurers (Das et al., 2003).

4. *RETENTION*: Retention Ratio (shows the percentage of risk taken by reinsurers (Das et al., 2003).

5. *NTRNC*: Net Technical Reserves / Net Claims paid at the end of the year (it is the measure of estimated value quality for the reported and outstanding claims also called as survival ratio) (Das et al., 2003).

6. *NTRNRP*: Net Technical Reserves to Net Realized Premiums (it indicates long-term step increase of reserves form business) (Das et al., 2003).

- ***Management Efficiency (Soundness***): Its value is affected by the exchange efficiency between variance distributions channels for selling of its products, also referred to as operational efficiency indicator (Das et al., 2003).

7. *LNAPE*: Asset per employee (total assets/number of employees) (Das et al., 2003).

- ***Earnings and Profitability***: Solvency problems is caused by low profitability

8. *LOSS*: Loss Ratio (Das et al., 2003) (indicator for pricing policy).

9. *EXPENSER*: Expense Ratio (Das et al., 2003) (indicator for operating cost).

10. *ROA: Return on Assets* (Das et al., 2003) (indicator for pricing policy).

11. *ROE: Return on Equity* (Das et al., 2003).

- ***Liquidity***: Is an indicator of unexpired premium returns, and change of insurance company

12. *GRAHAMRAT*: Graham Rating = (2·Equity)/ Total Liabilities) (Graham, 2005).

2.2. Arithmetic technique

Discriminant analysis was the approach used in this study to construct predictive group memberships models. Groups are discriminated according to the linear combinations of the predictor variables; Consequently, discriminant function(s) are composed. To begin with, the known samples of cases are used to create the functions for the group memberships. The functions can be then reused for any upcoming future cases that entail predictor variables with unknown group memberships.

3. RESULTS

The results included 95 valid cases (76 out of 95 is at the good performance level), with no outliers and discriminating variable.

http://dx.doi.org/10.21511/ins.13(1).2022.02

Table 1. Descriptive statistics

Status		Mean	Standard deviation	Status		Mean	Standard deviation
POOR	*SURTR*	0.497	0.096	GOOD	*SURTR*	1.318	1.246
	SOLR	2.098	0.458		*SOLR*	1.158	0.557
	SETA	0.267	0.035		*SETA*	0.417	0.109
	RETENTION	0.839	0.053		*RETENTION*	0.674	0.162
	NTRNC	1.137	0.310		*NTRNC*	1.441	0.738
	NTRNRP	1.040	0.294		*NTRNRP*	1.012	0.315
	LNAPE	12.467	0.288		*LNAPE*	12.713	0.290
	LOSSR	0.826	0.097		*LOSSR*	0.778	0.107
	EXPENSER	1.108	0.264		*EXPENSER*	0.954	0.409
	ROA	0.014	0.041		*ROA*	0.030	0.020
	ROE	0.032	0.153		*ROE*	0.728	0.555
	GRAHAMRAT	0.734	0.132		*GRAHAMRAT*	1.599	0.937

Table 2. Test of means' equality

Indicators	Wilks' Lambda	F	P value	Indicators	Wilks' Lambda	F	P value
SURTR	0.919***	8.172	0.005	*LNAPE*	0.894***	10.992	0.001
SOLR	0.668***	46.266	0.000	*LOSSR*	0.967*	3.198	0.077
SETA	0.726***	35.150	0.000	*EXPENSER*	0.975	2.417	0.123
RETENTION	0.830***	19.053	0.000	*ROA*	0.940**	5.949	0.017
NTRNC	0.968*	3.060	0.084	*ROE*	0.963*	5.579	0.062
NTRNRP	0.999	0.122	0.728	*GRAHAMRAT*	0.853***	15.988	0.000

Note: *** Sig. at 1%. ** Sig. at 5%. * Sig. at 10%.

The results in Table 1 show that the mean (standard deviation) for seven (ten) indicators is higher for good performance level than the mean (standard deviation) in poor performance level, which will be a good support of the results.

As shown in Table 2, the alternative hypothesis is valid for six, one, and three indicators at a significant level of 1%, 5% and 10%, respectively. On the other hand, the two other indicators are insignificant. Therefore, the null hypothesis is valid.

Table 3 shows that 13 out of 66 correlation coefficients between the 12 variables is either above + 0.5 or below – 0.5. This is an indication that there is no correlation between the indicators.

Table 4. Covariance matrices equality

Log Determinate			Test Results	
Status	Rank	Log Determinate	Box's M	470.456***
Good	12	–71.623	F Approx.	4.445
Poor	12	–49.497	Df1	78
Total	12	–48.721	Df2	3500.167
	–		P value	0.000

Note: *** Sig. at 1%. ** Sig. at 5%. * Sig. at 10%.

Table 4 shows that the Log Determinate values for good, poor and total are fairly similar with little

Table 3. Correlation matrix

Variables	*SURTR*	*SOLR*	*SETA*	*RETENTION*	*NTRNC*	*NTRNRP*	*LNAPE*	*LOSSR*	*EXPENSER*	*ROA*	*ROE*	*GRAHAMRAT*
SURTR	1.000	–	–	–	–	–	–	–	–	–	–	–
SOLR	–0.597	1.000	–	–	–	–	–	–	–	–	–	–
SETA	0.864	–0.761	1.000	–	–	–	–	–	–	–	–	–
RETENTION	–0.681	0.665	–0.674	1.000	–	–	–	–	–	–	–	–
NTRNC	–0.242	–0.245	–0.226	0.062	1.000	–	–	–	–	–	–	–
NTRNRP	–0.235	–0.331	–0.263	0.034	0.842	1.000	–	–	–	–	–	–
LNAPE	0.242	–0.492	0.284	–0.506	0.240	0.330	1.000	–	–	–	–	–
LOSSR	0.188	0.144	–0.023	–0.027	–0.322	–0.106	0.127	1.000	–	–	–	–
EXPENSER	0.105	–0.139	–0.080	0.006	0.177	0.336	0.161	0.266	1.000	–	–	–
ROA	0.000	0.086	0.083	0.020	0.006	–0.180	0.003	–0.331	–0.299	1.000	–	–
ROE	–0.132	0.232	–0.102	0.150	0.069	–0.126	–0.121	–0.295	–0.283	0.938	1.000	–
GRAHAMRAT	0.953	–0.676	0.953	–0.659	–0.221	–0.235	0.271	0.065	–0.013	–0.014	–0.036	1.000

Table 5. Canonical discriminant functions

Eigenvalue

Function	Eigenvalue	N of variance	Cumulative, %	Canonical correlation
1	1.105	100.0	100.0	0.725

Wilks' lambda

Test of function	Wilks' Lambda	Chi-square	df	P-value
1	0.475***	64.755	12	0.0000

Standardized canonical discriminant function coefficients

Variable	SURTR	SOLR	SETA	RETENTION	NTRNC	NTRNRP	LNAPE	LOSSR	EXPENSER	ROA	ROE	GRAHAMRAT
Function 1	0.776	1.693	0.311	–0.046	–0.859	1.507	–0.087	–0.365	0.013	0.610	–0.903	–0.244

Structural matrix

Variable	SOLR	SETA	RETENTION	GRAHAMRAT	LNAPE	SURTR	ROA	ROE	LOSSR	NTRNC	EXPENSER	NTRNRP
Function 1	0.671	–0.585	0.431	–0.394	–0.327	–0.282	–0.241	–0.187	0.176	–0.173	0.153	0.034

Unstandardized canonical discriminant function coefficients

Variable	SURTR	SOLR	SETA	RETENTION	NTRNC	NTRNRP	LNAPE	LOSSR	EXPENSER	ROA	ROE	GRAHAMRAT	(Constant)
Function 1	0.694	3.142	3.155	–0.310	–1.270	4.844	–0.300	–3.481	0.034	23.897	–10.773	–0.289	–2.227

Centroid functions

Grade	Poor	Good
Function 1	2.080	–0.520

Note: *** Sig. at 1%. ** Sig. at 5%. * Sig. at 10%.

deviation for good performance levels accordingly, so, the results obtained will not be affected. While the Box's M value is significant at 1%, thus, for the same population, covariance matrices, the null hypothesis can be rejected, which is as a disadvantage for supporting the results.

Table 5 shows that the eigenvalue is 1.105, which means that the function was only able to explain 1.105 of a company's performance score variance. The value of 1.105 indicates that the model is best fit. The canonical correlation turns out to be of a decent value (the effect size is $0.725^2 = 0.526$). Moreover, the results (Wilks' Lambda) show that the prediction model is significantly fit at 1%. While the values in standardized canonical discriminant function coefficients are an indicator of the predictors' importance ranking (the higher the value, the higher the importance ranking). Nevertheless, the structural matrix part shows a different ranking of importance for the indicators' ranking. Furthermore, the structural matrix shows that 10 indicators don't support the results since their values are less than 0.3. Contrary, only two indicators support the results. The unstandardized canonical discriminant function coefficients:

$$\begin{aligned} &Financial\ Performance\ Score\ = \\ &= -2.227 + 3.142^{***} \cdot SOLR\ + \\ &+0.694^{***} \cdot SURTR + 23.897^{**} \cdot ROA\ + \\ &+3.155^{***} \cdot SETA\ - \\ &-0.310^{***} \cdot RETENTION\ - \\ &-0.300^{***} \cdot LNAPE\ - \\ &-0.289^{***} \cdot GRAHAMRAT\ - \\ &-3.841^{*} \cdot LOSSR\ -1.270^{*} \cdot NTRNC\ - \\ &-10.773^{*} \cdot ROE. \end{aligned} \quad (2)$$

(The indicators in the equation are sorted out by their importance of predicting the financial performance score).

According to the financial performance scores, the alternative hypothesis can be accepted for the 10 significant indicators, which are: earnings and profitability (loss ratio, ROA and ROE), reinsurance and actuarial issues (Retention Ratio, Net Technical Reserves/Net Claims paid at the end of the year), capital adequacy (surplus/technical reserves ratio and solvency ratio (net written premium/total equity), liquidity (Graham rating), asset quality (shareholder equities / total assets),

http://dx.doi.org/10.21511/ins.13(1).2022.02

Table 6. Classification statistics results

Cases	Count or percentage	Grade	Predicated group membership		Total
			Poor	Good	
Original	Count	Poor	13	6	19
		Good	5	71	76
	%	Poor	68.4	31.6	100.0
		Good	6.6	93.4	100.0
Cross validated	Count	Poor	12	7	19
		Good	8	68	76
	%	Poor	63.2	36.8	100.0
		Good	10.5	89.5	100.0

and management soundness (asset per employee). Finally, Table 5 also shows that the average for good (poor) performance score is –0.520 (2.080).

Table 6 shows that the original (cross validated) cells sensitivity is 93.4% (89.5%) of the predicting good performance, companies are really good, and 6.6% (10.5%) are really poor. While the specificity is 68.4% (63.2%) of predicting poor performance, companies are really poor, and 31.6% (36.8%) are really good. The vast sensitivity and specificity of the model is justified and classified by 88.4% (84.2%) of the original (cross validated) group cases.

Table 7 shows that type I and II errors occurred in 11 out of the 95 observations (deviation between actual and expected performance). Particularly, five out of the 11 observations had the type I error (actual performance was good, but expected performance was poor): Al-Nisr Al-Arabi (2018); Jordan French (2015); Al-Manara (2016); The Arab Assurers (2018); The Mediterranean & Gulf (2014)) and the probability of determination for poor in the five observations is 50%, 82%, 68%, 57%, and 91%, respectively. While six out of the 11 observations had a type II error (actual performance was poor, but expected performance was good): Arab Union International (2014); The Arab Assurers (2016); & Arab Jordanian

Table 7. Performance vs. predicted performance

				Error type						Error type						Error type	
Firm	Y	P	PP	I	II	Firm	Y	P	PP	I	II	Firm	Y	P	PP	I	II
AICJ	2014	G	G	1%	99%	JOFR	2014	P	P	97%	3%	AMMI	2014	G	G	3%	97%
AICJ	2015	G	G	1%	99%	JOFR	2015	G	P	82%	18%	AMMI	2015	G	G	10%	90%
AICJ	2016	G	G	2%	98%	JOFR	2016	G	G	40%	60%	AMMI	2016	G	G	3%	97%
AICJ	2017	G	G	2%	98%	JOFR	2017	G	G	19%	81%	AMMI	2017	G	G	5%	95%
AICJ	2018	G	G	4%	96%	JOFR	2018	G	G	8%	92%	AMMI	2018	G	G	17%	83%
AAIN	2014	G	G	0%	100%	ARSI	2014	P	P	94%	6%	TIIC	2014	G	G	0%	100%
AAIN	2015	G	G	0%	100%	ARSI	2015	P	P	97%	3%	TIIC	2015	G	G	0%	100%
AAIN	2016	G	G	4%	96%	ARSI	2016	G	P	68%	32%	TIIC	2016	G	G	0%	100%
AAIN	2017	G	G	5%	95%	ARSI	2017	P	P	100%	0%	TIIC	2017	G	G	0%	100%
AAIN	2018	G	P	50%	50%	ARSI	2018	P	P	100%	0%	TIIC	2018	G	G	0%	100%
MEIN	2014	G	G	0%	100%	PHIN	2014	G	G	14%	86%	ARAS	2014	P	P	99%	1%
MEIN	2015	G	G	0%	100%	PHIN	2015	G	G	5%	95%	ARAS	2015	P	P	73%	27%
MEIN	2016	G	G	0%	100%	PHIN	2016	G	G	1%	99%	ARAS	2016	P	G	25%	75%
MEIN	2017	G	G	0%	100%	PHIN	2017	G	G	2%	98%	ARAS	2017	G	G	2%	98%
MEIN	2018	G	G	1%	99%	PHIN	2018	G	G	3%	97%	ARAS	2018	G	P	57%	43%
JOIN	2014	G	G	5%	95%	AIUI	2014	P	G	22%	78%	ARGR	2014	P	G	24%	76%
JOIN	2015	G	G	0%	100%	AIUI	2015	P	P	99%	1%	ARGR	2015	P	G	38%	62%
JOIN	2016	G	G	0%	100%	AIUI	2016	P	P	98%	2%	ARGR	2016	P	G	26%	74%
JOIN	2017	G	G	0%	100%	AIUI	2017	G	G	2%	98%	ARGR	2017	P	G	12%	88%
JOIN	2018	G	G	0%	100%	AIUI	2018	G	G	1%	99%	ARGR	2018	G	G	18%	82%
DICL	2014	G	G	0%	100%	NAAI	2014	G	G	1%	99%	MDGF	2014	G	P	91%	9%
DICL	2015	G	G	0%	100%	NAAI	2015	G	G	0%	100%	MDGF	2015	P	P	61%	39%
DICL	2016	G	G	0%	100%	NAAI	2016	G	G	0%	100%	MDGF	2016	P	P	70%	30%
DICL	2017	G	G	1%	99%	NAAI	2017	G	G	0%	100%	MDGF	2017	P	P	91%	9%

Table 7 (cont.). Performance vs. predicted performance

				Error type						Error type						Error type	
Firm	**Y**	**P**	**PP**	**I**	**II**	**Firm**	**Y**	**P**	**PP**	**I**	**II**	**Firm**	**Y**	**P**	**PP**	**I**	**II**
DICL	2018	G	G	2%	98%	NAAI	2018	G	G	8%	92%	MDGF	2018	P	P	99%	1%
JERY	2014	G	G	0%	100%	JIJC	2014	G	G	5%	95%	FINS	2014	G	G	0%	100%
JERY	2015	G	G	0%	100%	JIJC	2015	G	G	8%	92%	FINS	2015	G	G	0%	100%
JERY	2016	G	G	0%	100%	JIJC	2016	G	G	0%	100%	FINS	2016	G	G	0%	100%
JERY	2017	G	G	1%	99%	JIJC	2017	G	G	0%	100%	FINS	2017	G	G	0%	100%
JERY	2018	G	G	1%	99%	JIJC	2018	G	G	0%	100%	FINS	2018	G	G	0%	100%
UNIN	2014	G	G	0%	100%												
UNIN	2015	G	G	0%	100%												
UNIN	2016	G	G	0%	100%						–						
UNIN	2017	G	G	1%	99%												
UNIN	2018	G	G	1%	99%												

Note: P – Performance, *PP* – Predicted Performance, *G* – Good, *P* – Poor, *Y* – Year, *AICJ* – Arabia, *AAIN* – Al-Nisr Al-Arabi, *MEIN* – Middle East, *JOIN* – Jordan, *DICL* – Delta, *JERY* – Jerusalem, *UNIN* – The United, *JOFR* – Jordan French, *ARSI* – Al-Manara, *PHIN* – Philadelphia, *AIUI* – Arab Union International, *NAAI* – National, *JIJC* – Jordan International, *AMMI* – Euro Arab Group, *TIIC* – The Islamic, *ARAS* – The Arab Assurers, *ARGR* – Arab Jordanian Group, *MDGF* – The Mediterranean & Gulf, *FINS* – First.

Group (2014, 2015, 2016 & 2017) and the probability of determination for good in the 6 observations is 78%, 75%, and 76%, 62%, 74% and 88%, respectively. Moreover, the 84 error free predications were consistent (no deviations).

4. DISCUSSION

The research results were consistent and contradicting with the previous studies by Surya and Sudha (2020), Chakraborty and Sengupta (2014), Ansari and Fola (2014), Das et al. (2003), Darzi (2011), Kumar and Ghimire (2013), H. Lee and C. Lee (2011), Dar and Bhat (2015), Chen and Wong (2004), Bawa and Verma (2017), Simpson and Damaoh (2009), Kramer (1996), Sliwinski et al. (2013), Kugler and Ofoghi (2005), and Smajla (2014). They were in line with the argument that the CARMELS model is a good fit to test the financial health; they also showed similarities regarding the significant indicators that affect the financial health. However, there were some contradictions regarding the significant coefficient values and their signs. Unlike other articles like Hussain (2015), Das et al. (2003), Kumar and Ghimire (2013), H. Lee and C. Lee (2011), and Sliwinski et al. (2013), the weakness point of this study was the limitation of using only Carmel Model micro approach parameters. Nevertheless, Salameh (2021) avoids the usage of only CARMEL model variables and parameters, which was indicated as a limiting factor in the other articles.

The reason for the deviations between the predicated and real performance is that solvency margins for those cases were close to the limit value (150%), which distinguishes between good and poor performance. Coming back to the study data, the solvency margin values for type I error firms were 255%, 150%, 151%, 126%, and 182%, while for type II error firms were 117%, 144%, 99%, 106%, 126%, and 146%. Additionally, the CARMEL model is applicable on the ASE exchange, and 10 out of 12 indicators from the six CARMEL model parameters were significant, since the ASE insurance firms follow the knowledge, instructions and requirements for insurance firms of developed countries. This comes as the common acknowledgement across authors; one of the causes of the contagion problem. In the near future, predications tend to increase the solvency margin for insurance firms to eliminate the deviations found in this study.

CONCLUSION

The novelty on this paper lies in applying the CARMEL model in the ASE to assess financial soundness of insurance firms. The model used had a total of 12 indicators selected from six CARMEL model pa-

http://dx.doi.org/10.21511/ins.13(1).2022.02

rameters, which were derived from the CARMEL models pointed out in the literature review, regardless of the country.

The results indicated that the CARMEL model is applicable to test the financial soundness ASE firms; 10 out of 12 indicators were found to be significant with minimum deviation between the actual and predicted performance. Most of the outcomes are good support for the results, while a few of them came as a disadvantage.

Finally, to summarize the main outcomes of this paper: First of all, it develops a financial soundness model for ASE insurance firms. Furthermore, applying this model gives an early warning to insurance firms that are facing deviation between real and predicated performance, especially type II error. In addition, following the requirements and instructions in the insurance industries of developed countries, exchanges support insurance firms by following the herd, however it increases the contagion risks of a worldwide crisis. Finally, insurance firms should focus on the aspects that improve the solvency margin to a higher level than the requirement of regulatory agencies for the insurance sector. Future research may use macro variables and artificial intelligence techniques to enhance and upgrade the scope of this paper.

AUTHOR CONTRIBUTIONS

Conceptualization: Hussein Salameh.
Data curation: Hussein Salameh.
Formal analysis: Hussein Salameh.
Investigation: Hussein Salameh.
Methodology: Hussein Salameh.
Project administration: Hussein Salameh.
Resources: Hussein Salameh.
Software: Hussein Salameh.
Supervision: Hussein Salameh.
Validation: Hussein Salameh.
Visualization: Hussein Salameh.
Writing – original draft: Hussein Salameh.

REFERENCES

1. Ahmed, R., & Sarkar, S. (2019). Measurement of Financial Soundness of Life Insurance Companies in Bangladesh: An Empirical Study. *Business Review – A Journal of Business Administration Discipline, 14*(1), 29-43. https://dx.doi.org/10.35649/kubr.2019.14.1.3
2. Ansari, V., & Fola, W. (2014). Financial Soundness and Performance of Life Insurance Companies in India. *International Journal of Research, 1*(8), 224-253. Retrieved from https://www.semanticscholar.org/paper/Financial-Soundness-and-Performance-of-Life-in-Ansari-Fola/67012741c0054516eccb10d55ed152aa36fc9b65
3. Bawa, S., & Verma, N. (2017). Conducting Financial Analysis of the Indian Reinsurer-GIC Re. *Pacific Business Review International, 10*(3), 113-120.
4. Chakraborty, J. & Sengupta, P. (2014). Financial soundness in Indian insurance sector: A comparison between two leading life insurers. *2014 2nd International Conference on Business and Information Management (ICBIM).* https://doi.org/10.1109/ICBIM.2014.6970961
5. Chen, R., & Wong, K. (2004) The Determinants of Financial Health of Asian Insurance Companies. *The Journal of Risk and Insurance, 71*(3), 469-499. https://doi.org/10.1111/j.0022-4367.2004.00099.x
6. Dar, S., & Bhat, J. (2015). A Comparative Evaluation of Financial Performance and Soundness of Selected Public and Private Life Insurers in India. *Pacific Business Review International, 7*(10), 55-64. Retrieved from http://www.pbr.co.in/2015/2015_month/April/8.pdf
7. Darzi, T. A. (2012). *Financial performance of insurance industry in post liberalization era in India* (Ph.D. Thesis). Retrieved from http://hdl.handle.net/10603/3332
8. Das, U., Davis, N., & Podpiera, R. (2003). *Insurance and Issues*

in Financial Soundness (IMF Working Papers No. WP/03/138). International Monetary Fund. Retrieved from https://www.imf.org/en/Publications/WP/Issues/2016/12/30/Insurance-and-Issues-in-Financial-Soundness-16524

9. Graham Value. (2003). *Public-Utilities and Financial Enterprises*. Retrieved from https://www.grahamvalue.com/blog/benjamin-graham-public-utilities-and-financial-enterprises

10. Hussain, I. (2015). Macro Economy and Profitability of Insurance Companies: A Post Crisis Scenario on Pakistan. *Pakistan Business Review*. Retrieved from https://www.semanticscholar.org/paper/MACRO-ECONOMY-AND-PROFITABILITY-OF-INSURANCE-A-POST-Hussain/14d6791d482d806815f25cbd173b8f84227e7606

11. Jordan Insurance Federation (JIF). (n.d.) Website. Retrieved from http://www.joif.org/Default.aspx

12. Kramer, B. (1996). An ordered logit model for the evaluation of Dutch non-life insurance companies. *De Economist, 144,* 79-91. https://doi.org/10.1007/BF01680262

13. Kugler, M., & Ofoghi, R. (2005). *Does Insurance Promote Economic Growth? Evidence from the UK* (Working Paper). Retrieved from http://repec.org/mmfc05/paper8.pdf

14. Kumar, P., & Ghimire, R. (2013). Testing of Financial Performance of Nepalese Life Insurance Companies by CARMELS Parameters. *Journal of Business and Management,* 2-15. Retrieved from https://www.academia.edu/7362891/Testing_of_Financial_Performance_of_Nepalese_Life_Insurance_Companies_by_CARAMELS_Parameters

15. Lee, H., & Lee, C. (2011). Determinants of property-liability insurer retention: Evidence from Taiwan insurance industry. *African Journal of Business Management, 5*(32), 12543-12550. https://doi.org/10.5897/AJBM11.1570

16. Morara, K. & Sibindi, A. (2021). Determinants of Financial Performance of Insurance Companies: Empirical Evidence Using Kenyan Data. *Journal of Risk Financial Management, 14*(12), 566. https://doi.org/10.3390/jrfm14120566

17. Moreno, I., Parrado-Martinez, P., & Trujillo-Ponce, A. (2021). Using the Z-score to analyze the financial soundness of insurance firms. *European Journal of Management and Business Economics, 31*(1), 22-39. https://doi.org/10.1108/EJMBE-09-2020-0261

18. Patel, K. & Patel, P. (2020). Performance of Selected Life Insurance Companies – Comparative Analysis. *International Journal of Finance and Banking Research, 7*(2), 51-57. https://doi.org/10.11648/j.ijfbr.20210702.13

19. Puławska, K. (2021). Financial Stability of European Insurance Companies during the COVID-19 Pandemic. *Journal of Risk Financial Management, 14*(6), 266. https://doi.org/10.3390/jrfm14060266

20. Qatar Central Bank. (2017). *Qatar General Insurance & Reinsurance Company Q.P.S.C* (Corporate Governance Report for 2017). Retrieved from https://www.qgirco.com/wp-content/uploads/2019/03/qgi-en-corporate-governance-2017-v2-web.pdf

21. Salameh, H. (2021). Failure threats of insurance companies: A case study of financial environments of Jordan. *Investment Management and Financial Innovations, 18*(3), 113-126. http://dx.doi.org/10.21511/imfi.18(3).2021.11

22. Shim, J. (2017). An Investigation of Market Conentration and Financial Stability in Property – Liability Insurance Industry. *The Journal of Risk and Insurance, 82*(2), 567-597. Retrieved from https://www.jstor.org/stable/26482924

23. Simpson, S., & Damoah, O. (2009). *An Evaluation of Financial Health of Non-Life Insurance Companies from Developing Countries: The Case of Ghana*. Retrieved from https://www.readcube.com/articles/10.2139%2Fssrn.1138338

24. Sliwinski, A., Michalski, T., & Roszkiewicz, M. (2013). Demand for Life Insurance – An Empirical Analysis in the Case of Poland. *The Geneva Papers on Risk and Insurance – Issues and Practice, 38,* 62-87. https://doi.org/10.1057/gpp.2012.21

25. Smajla, N. (2014). Measuring Financial Soundness of Insurance Companies by Using CARMELS Model – Case of Croatia. *Interdisciplinary Management Research, 10,* 600-609. Retrieved from http://www.efos.unios.hr/repec/osi/journl/PDF/InterdisciplinaryManagementResearchX/IMR10a44

26. Sokic, M. (2019). *Analysis of Insurance Industry CARMEL Indicators in REPUBLIC OF SERBIA*. Retrieved from http://tokoviosiguranja.edu.rs/wp-content/uploads/2019/07/19-02_1e.pdf

27. Surya, M., & Sudha, B. (2020). Insurance Financial Soundness Indicator – Carmel Model. *International Journal of Advanced Science & Technology, 29*(1), 1234-1242. Retrieved from http://sersc.org/journals/index.php/IJAST/article/view/3614

28. Widati, T., & Anas, E. (2019). Comparing Three Models to Evaluate Financial Soundness of Life Insurance Companies in Indonesia. *Proceedings of the 2nd International Conference on Inclusive Business in the Changing World (ICIB)* (pp. 568-576). Jakarta, Indonesia. https://doi.org/10.5220/0008433805680576

29. Yakob, R., Yusop, Z., Radam, A., & Ismail, N. (2021). Camel Rating Approach to Assess the Insurance Operators Financial Strength. *Jurnal Ekonomi Malaysia, 46*(2), 3-15. Retrieved from http://journalarticle.ukm.my/6340/1/jeko_47-1.pdf

http://dx.doi.org/10.21511/ins.13(1).2022.02