PREDICTION OF BANKRUPTACY OF NON-LIFE INSURANCE COMPANIES IN INDIA- A STUDY

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Abstract: The previous performance evaluation studies towards non-life insurance companies emphasized on the comparative evaluation among public and private sector companies. Early detection and diagnosis of bankruptcy of insurance companies is much desirable due to their existence in highly competitive and detariff regime. The purpose of this study is to identify the key variables and determine how they contribute to bankruptcy risk prediction, based on which the non-life insurance companies are classified as risky and non-risky. Backward Regression method and Discriminant analysis were applied on secondary data of twenty one non-life insurance companies from 2008-09 to 2013-14 to achieve the desired objectives. From the study, it is found that four public sector and five private sector non-life insurance companies are found to be in risky status.

Key Words: Bankruptacy, Backward Multiple Regression, Discriminant analysis,Non-life insurance companies, Prediction

JEL Classification: G22, G33, C38

INTRODUCTION

The liberalization of general insurance sector paved the path for higher competition which resulted in higher compound annual growth rate of 15 per cent since 2003. However, the general insurance sector still remains relatively low in market penetration rate of 0.8 per cent compared to global figure of 2.8 per cent. Insurance density still remain slow at a mere USD10.50 during the same period compared to the global figure of USD283.00(IRDA Annual Report, 2013-14). In spite of the penetration of private insurance companies with innovative products and wide coverage, the public general insurance companies show dominant position over their counterparts. However, the efficiency of general insurance companies is not consistent due to the competitive environment, especially in the post-de-tariff regime.

Performance indicators such as liquidity, profitability, leverage and solvency were studied mostly in life insurance companies (Sumninder Kaur Bawa and Samiya Chattha, 2013). However, the performance evaluation of general insurance

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companies has limited studies confining to comparison between public and private with selected variables. The studies pertaining to the prediction of performance of general insurance companies were not conducted, especially in Indian context. The present study emphasized on evaluating the performance of public and private general insurance and predicts the bankruptacy risk of general insurance companies as well.

The present study was conducted with the objectives such as to identify the key variables that influence the performance of general insurance companies in India. In addition, the present study also made an attempt to predict the non-life insurance company'sbankruptacypossibility based on the key variables identified that help the regulators and insurance companies to monitor their performance at regular intervals.

REVIEW OF LITERATURE

Analyzing the performance of general insurance companies has been a seminal area of interest in the insurance arena since the last decade. Various research studies were conducted on determining the performance of general insurance companies, notably, Jagendra Kumar (2004), ChiragGosalia (2008), Siva Narayana(2010),Gour. B, Gupta. M.C (2012), RabindraGhimire (2013), Shreedevi D and Manimegalai D (2013) and NiranjanPathi and SudhakarPatra (2014).

Manjit Singh and Rohit Kumar (2000) found that the entry of private sector Insurance Companies had undoubtedly contributed to the strengthening of general insurance business by creating a competitive atmosphere. Supporting to the above view, Sarkar (2006) found that the insurance business has been picking the growth with the entry of private insurance players. Contrarily, the entry of private players is a blessing for public sector companies for them to find the areas where private players shy to enter. Nevertheless, Kumar (2004) asserted that the private companies have shown better performance than public sector companies since the post-liberalization. Further the public sector insurance companies were able to underwrite a premium amount of Rs 14000 crore per year only. Srivastaa and Srivastava (2001) examined the growth of general insurance on the basis of growth of gross and net premium, geographical spread of the business, class wise distribution of the business, underwriting results, reinsurance operations, investment income, free and technical reserves, net worth, overall profitability, overall claim ratio and management expenses. Using data envelopment analysis, Sinha (2007) compared the efficiency of four public sector and eight private insurance companies considering the net premium income as the output and number of agents and operating expenses as inputs. The study found that the public sector insurers proved higher mean technical efficiency than the private sector companies. Gosalia (2008) assessed the financial performance of Indian non-life insurance industry using financial ratios such as claim ratio and combined

ratio. However, the difference between premium under written and premium earned by private insurance companies is in declining trend year – on – year and public sector insurance companies are in dominant position. M Singh and R Kumar (2009) evaluated the performance of public and private general insurance companies considering the expenses of management ratio, combined ratio, underwriting ratio and market ratio. The study found that the public insurance companies bettered than private insurance companies in terms of net earnings, and return on net worth ratio. On the other hand, Narayana (2010) emphasize that the public general insurance companies need to improve the net premium revenue and reduce the under writing losses. Malik (2011) determined the relationship between profitability and internal factors of insurance companies in Pakistan. Applying multiple regression analysis with profitability as dependent variable and age, size of company, volume of capital, leverage and loss ratio as independent variables, the study found that there is no relationship between age, but significant positive relationship with size and volume of capital, and significantly negative relationship with loss ratio and leverage.Shreedevi D and Manimegalai D (2013)compared public and private non-life insurance companies and found that the non-life insurance companies are operating under conditions of shrinking premiums, growing customer expectations, tightening regulations, tougher competition, rising operational costs etc. However, the Non-life insurance companies in India were still in a budding stage and among the other non-life insurance companies, only New India Assurance Company was found satisfactory. Ghimire (2013)tried to explore the financial efficiency and health of non-life insurance industry in Nepal using CARAMEL model and found that the financial health and efficiency of companies is not satisfactory. Sumninder Kaur Bawa and Samiya Chattha (2013) evaluated the performance of life insurance industry considering the solvency, liquidity, profitability and leverage ratios. However, the results from multiple regression analysis reveal that the profitability of life insurers is positively influenced by liquidity and size and negatively related with capital. Profitability does not show any relationship with solvency and insurance leverage.Niranjan Pathi and Sudhakar Patra (2014) evaluated the performance of public sector general insurance companies with respect to capital adequacy ratio and gross premium collectionand found that National and Oriental Insurance companies have witnessed increasing trend while for United and New India insurance companies, the capital adequacy ratio witnessed decreasing trend. Ashturkar (2014) compared the performance of Indian life insurance companies with reference to claim management system, specifically, claims received and claims paid aspect. The study found that there is a meager difference between the public sector and private sector insurance companies and most of the private insurance companies have been more transparent in the management of the process of claim settlement and they adhere to the provisions of Protection of Policyholder's Interest Regulations, 2002.

Past research studies on the performance of non-life insurance emphasized evaluating various parameters such as gross and net premium, geographical spread of the business, class wise distribution of the business, underwriting results, reinsurance operations, investment income, free and technical reserves, net worth, overall profitability, overall claim ratio, management expenses, age, size of company, volume of capital, leverage and loss ratio were applied. However, studies pertaining to deriving a linear combination of variables that predict the performance of general insurance companies is the need of the hour to examine the significant difference among the insurance companies.

MATERIALS AND METHODS

Data base and Sampling

Currently, Indian Non-life insurance Industry comprise of 28 insurance companies, of which seven companies are in specialized health insurance, agriculture and Export and Import Credit. General Insurance Corporation of India, which is a single Public Sector Reinsurance Company inIndia, is also not considered for the study. Among 21 General insurance companies, fourare in public sector and seventeen are in private sector. For the purpose study, four public sector insurance companies and seventeen private insurance companies are selected for the study. The study is conducted based on the secondary data collected from IRDA Annual Reports from 2000-01 to 2013-14.

Tools and Techniques

Multiple regression analysis to derive the linear relationship between the variables selected for the study is applied while multiple discriminant analysis is used to define an equation to predict the factors that affect the financial risk for the insurance companies. For the purpose of analysis, the following indicators are assumed with their respective signs and hypothesis, considering the net profit after as dependent variable.

RESULTS AND DISCUSSION

The present section is presented in two parts for each objective. The first objective emphasized on determining the key variables that drive the linear relationship between the net profit after tax as dependent variable and Incurred Claim Ratio, Solvency Ratio, Gross Direct Premium, Net Earned Premium, Claims Incurred, Commission Expenses, Underwriting Profit, Operating Expenses, Operating Profit, FDI Proportion in Equity and Current ratio. The second objective covers the second part which focused on determining the discriminate function to predict the variables that influence the financial risk of non-life insurance business.

Table 1
Table showing Expected Signs and Hypothesis for the Study

S. No	Independent Variable	Expected Sign	Hypothesis Statements
1	Incurred Claim Ratio	Negative (-)	H1: Incurred Claim ratio has negatively significant influence on Net Profit after Taxes of Non-life Insurance companies.
2	Solvency Ratio	Positive(+)	H2:Solvency Ratio has positively significant influence on Net Profit after Taxes of Non-life Insurance companies.
3	Gross Direct Premium	Positive (+)	H3:Gross Direct Premium has positively significant influence on Net Profit after Taxes of Non-life Insurance companies.
4	Net Earned Premium	Positive (+)	H4: Net Earned Premium has positively significant influence on Net Profit after Taxes of Non-life Insurance companies.
5	Claims Incurred	Negative (-)	H5: Claims incurred have negatively significant influence on Net Profit after Taxes of Non-life Insurance companies.
6	Commission Expenses	Negative (-)	H6: Commission expenses have negatively significant influence on Net Profit after Taxes of Non-life Insurance companies.
7	Underwriting Profit	Positive (+)	H7: Underwriting Profit has positively significant influence on Net Profit after Taxes of Non-life Insurance companies.
8	Operating Expenses	Negative (-)	H8: Operating expenses have negatively significant influence on Net Profit after Taxes of Non-life Insurance companies.
9	Operating Profit	Positive (+)	H9: Operating Profit has positively significant influence on Net Profit after Taxes of Non-life Insurance companies.
10	FDI Proportion in Equity	Positive (+)	H10: FDI Proportion in Equity has positively significant influence on Net Profit after Taxes of Non-life Insurance companies.
11	Current ratio	Positive (+)	H11: Current Ratio has positively significant influence on Net Profit after Taxes of Non-life Insurance companies.

Source: Authors Compilation

Objective-1: To study the influence of selected variables on the net profit after taxes of non-life insurance business

Back ward linear regression method is applied to study the influence of selected variables on the net profit after taxes of non-life insurance business. Back ward linear regression has an advantage over the other regression methods as such it

starts with all of the predictors in the model. The variable that is least significant—that is, the one with the largest P value—is removed and the model is refitted. Each subsequent step removes the least significant variable in the model until all remaining variables have individual P values smaller than some value, such as 0.05 or 0.10. The results of the back ward linear regression method applied on the selected variables are presented in Table 2 ,Table 3 and Table 4.

Table 2
Table showing the Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.860[a]	.739	.686	2.26281	1.864
2	.860[b]	.739	.691	2.24240	
3	.860[c]	.739	.697	2.22234	
4	.859[d]	.738	.701	2.20770	
5	.857[e]	.735	.703	2.20030	
6	.854[f]	.729	.702	2.20428	
7	.847[g]	.717	.694	2.23325	

Model Summary[h]

a. Predictors: (Constant), Current Ratio, Underwriting Profit, Solvency Ratio, Incurred Claim Ratio, FDI, Operating Profit, Operating Expenses, Net Earned Premium, Commission Expenses, Gross Direct Premium, Claims Incurred

b. Predictors: (Constant), Current Ratio, Underwriting Profit, Solvency Ratio, Incurred Claim Ratio, FDI, Operating Profit, Operating Expenses, Commission Expenses, Gross Direct Premium, Claims Incurred

c. Predictors: (Constant), Current Ratio, Underwriting Profit, Solvency Ratio, Incurred Claim Ratio, FDI, Operating Profit, Operating Expenses, Commission Expenses, Gross Direct Premium

d. Predictors: (Constant), Current Ratio, Underwriting Profit, Solvency Ratio, FDI, Operating Profit, Operating Expenses, Commission Expenses, Gross Direct Premium

e. Predictors: (Constant), Underwriting Profit, Solvency Ratio, FDI, Operating Profit, Operating Expenses, Commission Expenses, Gross Direct Premium

f. Predictors: (Constant), Underwriting Profit, Solvency Ratio, FDI, Operating Profit, Operating Expenses, Gross Direct Premium

g. Predictors: (Constant), Underwriting Profit, Solvency Ratio, FDI, Operating Profit, Operating Expenses

h. Dependent Variable: Net Profit Taxes

Source: Authors' Computation

Table 3
Table showing the results of ANOVA

ANOVA[a]

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	782.323	11	71.120	13.890	.000[b]
	Residual	276.498	54	5.120		
	Total	1058.821	65			
2	Regression	782.260	10	78.226	15.557	.000[c]
	Residual	276.560	55	5.028		
	Total	1058.821	65			
3	Regression	782.248	9	86.916	17.599	.000[d]
	Residual	276.573	56	4.939		
	Total	1058.821	65			
4	Regression	781.006	8	97.626	20.030	.000[e]
	Residual	277.815	57	4.874		
	Total	1058.821	65			
5	Regression	778.025	7	111.146	22.958	.000[f]
	Residual	280.796	58	4.841		
	Total	1058.821	65			
6	Regression	772.148	6	128.691	26.486	.000[g]
	Residual	286.673	59	4.859		
	Total	1058.821	65			
7	Regression	759.577	5	151.915	30.460	.000[h]
	Residual	299.244	60	4.987		
	Total	1058.821	65			

a. Dependent Variable: Net Profit Taxes

b. Predictors: (Constant), Current Ratio, Underwriting Profit, Solvency Ratio, Incurred Claim Ratio, FDI, Operating Profit, Operating Expenses, Net Earned Premium, Commission Expenses, Gross Direct Premium, Claims Incurred

c. Predictors: (Constant), Current Ratio, Underwriting Profit, Solvency Ratio, Incurred Claim Ratio, FDI, Operating Profit, Operating Expenses, Commission Expenses, Gross Direct Premium, Claims Incurred

d. Predictors: (Constant), Current Ratio, Underwriting Profit, Solvency Ratio, Incurred Claim Ratio, FDI, Operating Profit, Operating Expenses, Commission Expenses, Gross Direct Premium

e. Predictors: (Constant), Current Ratio, Underwriting Profit, Solvency Ratio, FDI, Operating Profit, Operating Expenses, Commission Expenses, Gross Direct Premium

f. Predictors: (Constant), Underwriting Profit, Solvency Ratio, FDI, Operating Profit, Operating Expenses, Commission Expenses, Gross Direct Premium

g. Predictors: (Constant), Underwriting Profit, Solvency Ratio, FDI, Operating Profit, Operating Expenses, Gross Direct Premium

h. Predictors: (Constant), Underwriting Profit, Solvency Ratio, FDI, Operating Profit, Operating Expenses

Source: Authors' Computation

The results as depicted from the table 2 shows the back ward linear regression model containing variables that affect the net profit after taxes of non-life insurance businesses. R – value (0.847) from the table 2 depicts that the strength of variables considered for the study is satisfactory, after eliminating the insignificant determinants in back ward linear regression method. Adjusted R- square (0.694) explains that 64.9 per cent of variance of net profit after taxes can be explained by the predictors such as Underwriting Profit, Solvency Ratio, FDI, Operating Profit, Operating Expenses. Thus it can be said that the predicting power of explanatory variables such as Underwriting Profit, Solvency Ratio, FDI, Operating Profit, Operating Expenses has increased due to the elimination of insignificant variables which have low predicting power and insignificant at p value. Furthermore, Durbin-Watson statistic 1.864 reveals that the residuals are uncorrelated, i.e. indicating no serial correlation. From the table-3, F- Values, which is a measure of the overall significance of the estimated regression, from the table -3 depicts that the model is fit at F- value = 30.460 at $p<0.05$.

Table 4
Table showing the Coefficients of Backward Linear Regression

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-13.613	5.659		-2.406	.020
	Incurred Claim Ratio	-.001	.005	-.028	-.291	.772
	Solvency Ratio	.890	.261	.324	3.412	.001
	Gross Direct Premium	1.483	3.498	.257	.424	.673
	Net Earned Premium	.252	2.271	.059	.111	.912
	Claims Incurred	-.516	4.453	-.108	-.116	.908
	Commission Expenses	-2.767	2.629	-.425	-1.053	.297
	Underwriting Profit	-.459	.121	-.357	-3.780	.000
	Operating Expenses	-5.872	2.874	-.884	-2.043	.046
	Operating Profit	.255	.122	.193	2.090	.041
	FDI	-.146	.031	-.461	-4.730	.000
	Current Ratio	.237	.291	.061	.813	.420
2	(Constant)	-13.710	5.541		-2.474	.016
	Incurred Claim Ratio	-.002	.003	-.035	-.492	.625
	Solvency Ratio	.893	.257	.325	3.478	.001
	Gross Direct Premium	1.427	3.429	.247	.416	.679
	Claims Incurred	-.142	2.869	-.030	-.049	.961
	Commission Expenses	-2.754	2.603	-.423	-1.058	.295
	Underwriting Profit	-.459	.120	-.357	-3.816	.000
	Operating Expenses	-5.792	2.756	-.872	-2.101	.040
	Operating Profit	.256	.121	.194	2.115	.039

Model		Unstandardized Coefficients		Standardized Coefficients	*t*	*Sig.*
		B	Std. Error	Beta		
	FDI	-.145	.029	-.457	-4.975	.000
	Current Ratio	.235	.288	.061	.815	.419
3	(Constant)	-13.927	3.336		-4.175	.000
	Incurred Claim Ratio	-.002	.003	-.035	-.502	.618
	Solvency Ratio	.899	.227	.327	3.966	.000
	Gross Direct Premium	1.263	.872	.219	1.449	.153
	Commission Expenses	-2.757	2.579	-.424	-1.069	.290
	Underwriting Profit	-.460	.119	-.357	-3.856	.000
	Operating Expenses	-5.801	2.725	-.873	-2.129	.038
	Operating Profit	.256	.120	.194	2.145	.036
	FDI	-.145	.027	-.456	-5.275	.000
	Current Ratio	.235	.285	.061	.823	.414
4	(Constant)	-14.066	3.303		-4.259	.000
	Solvency Ratio	.904	.225	.329	4.020	.000
	Gross Direct Premium	1.231	.864	.213	1.425	.160
	Commission Expenses	-2.664	2.555	-.409	-1.043	.301
	Underwriting Profit	-.458	.118	-.356	-3.871	.000
	Operating Expenses	-5.730	2.704	-.862	-2.119	.038
	Operating Profit	.259	.119	.196	2.184	.033
	FDI	-.145	.027	-.458	-5.332	.000
	Current Ratio	.221	.282	.057	.782	.437
5	(Constant)	-13.147	3.076		-4.274	.000
	Solvency Ratio	.912	.224	.332	4.075	.000
	Gross Direct Premium	1.353	.847	.234	1.597	.116
	Commission Expenses	-2.799	2.541	-.430	-1.102	.275
	Underwriting Profit	-.453	.118	-.352	-3.843	.000
	Operating Expenses	-5.609	2.690	-.844	-2.085	.041
	Operating Profit	.259	.118	.196	2.194	.032
	FDI	-.147	.027	-.464	-5.454	.000
6	(Constant)	-13.463	3.068		-4.388	.000
	Solvency Ratio	.925	.224	.336	4.128	.000
	Gross Direct Premium	1.365	.849	.236	1.609	.113
	Underwriting Profit	-.441	.118	-.343	-3.754	.000
	Operating Expenses	-2.828	.931	-.426	-3.038	.004
	Operating Profit	.251	.118	.190	2.126	.038
	FDI	-.142	.027	-.448	-5.335	.000
7	(Constant)	-13.966	3.092		-4.517	.000
	Solvency Ratio	.775	.206	.282	3.754	.000
	Underwriting Profit	-.432	.119	-.336	-3.632	.001
	Operating Expenses	-3.995	.590	-.601	-6.771	.000
	Operating Profit	.255	.120	.193	2.130	.037
	FDI	-.147	.027	-.463	-5.476	.000

a. Dependent Variable: Net Profit Taxes
Source: Authors' Computation

Table 4 represents the coefficients of variables selected for the study at p<0.05. The regression coefficients of solvency ratio represent that one unit change in the solvency ratio lead to 0.775 units' positive change in the net profit after taxes. However, one unit change in the operating expenses lead to (-) 3.995 units change in net profit after taxes followed by a unit change in operating profit lead to (+)0.255 units change in net profit after taxes and one unit change in FDI in Equity lead to (-)0.147 changes in net profit after taxes.

Therefore, Net Profit After Tax= -13.966 + (.775) Solvency Ratio + (-.432)(Underwriting Profit)+ (-3.995)(Operating Expenses)+(.255)(Operating Profit)+(-.147) (FDI).

Therefore, from the above equation, it is observed that solvency ratio and operating ratio have positively significant effect on Net Profit after taxes of Non – life insurance companies. Therefore, Hypothesis 2 and Hypothesis 9 are accepted at p<0.05. However, it is expected that the operating expenses is negatively effect on Net profit after taxes significantly, and as such the result also prove that the operating expenses significantly affect the net profit after taxes but with negative sign. Hence the hypothesis statement H8 is also accepted. Contrary to the expected sign for underwriting profit and Foreign Direct Investment proportion in equity, the results show that negative signs but significant at p<0.05. Conversely, variables such as Gross Direct Premium, Net Earned Premium, Claims Incurred, Commission Expenses, Incurred claim ratio and current ratio are removed during backward regression process due to their higher significant level. Hence, Hypotheses H3, H4, H5, H6, H1 and H11 are not accepted.

Objective -2: To determine the discriminate function to predict the financial risk of Non-life insurance companies

This section presents the discriminant analysis results of the companies based on the selected variables considered for the study. Initially, univariate ANOVA statistics performed for each independent variable were examined from the table -5 which depict that incurred claim ratio, solvency ratio, underwriting profit, operating profit and current ratio could not provide sufficient discrimination at significant level p<0.05. However, variables such as Gross direct premium, net earned premium, claims incurred, commission expenses, operating expenses and FDI are able toexplain the discrimination of the group of companies which have negative Net profit after taxes and profit Net profit after taxes.

Table 6 present the summary of the canonical discriminant function. A higher eigenvalue for our discriminant function translates into a larger proportion of variance that is explained and, thus, into a stronger function of separating the companies into the two groups chosen. This is evident from the canonical correlation which takes the value of 69.5 percent. The proportion of explained

Table 5
Table showing the Table for Equality of Means.

	Wilks' Lambda	*F*	*df1*	*df2*	*Sig.*
Incurred Claim Ratio	.980	2.543	1	124	.113
Solvency Ratio	.995	.619	1	124	.433
Gross Direct Premium	.765	38.040	1	124	.000
Net Earned Premium	.809	29.287	1	124	.000
Claims Incurred	.802	30.698	1	124	.000
Commission Expenses	.819	27.317	1	124	.000
Underwriting Profit	.980	2.529	1	124	.114
Operating Expenses	.822	26.764	1	124	.000
Operating Profit	.988	1.452	1	124	.231
FDI	.876	17.525	1	124	.000
Current Ratio	**.993**	**.855**	**1**	**124**	**.357**

Source: Authors' Computation

variance in the stated variables amounts to $(69.5\%)^2$ or 48.30 per cent. The proportion of the total variance not explained is expressed by the Wilks' Lambda coefficient. The Wilks' Lambda coefficient is significant value at 5% in our case, indicating that the two groups, profitable or non-profitable, seem to differentiate quite well.

Using the functions coefficients we determine the threshold value which will be used to classify the companies, whether the company is in the zone of financial risk or not. To determine the threshold value, the average values of each indicator across companies are calculated and substituted in the derived equation below.

Table 6
Canonical Discriminant Function Coefficients

	Function
	1
Incurred Claim Ratio	-.001
Solvency Ratio	-.056
Gross Direct Premium	-3.468
Net Earned Premium	.024
Claims Incurred	2.377
Commission Expenses	-1.364
Underwriting Profit	-.106
Operating Expenses	.699
Operating Profit	.265
FDI	.054
Current Ratio	.016
(Constant)	1.120

Unstandardized coefficients
Source: Authors' Computation

Table 7
Table showing Eigenvalues

Function Canonical Correlation	Eigenvalue	% of Variance	Cumulative %
1 .695	.934[a]	100.0	100.0

a. First 1 canonical discriminant functions were used in the analysis.
Source: Authors' Computation

Table 8
Wilks' Lambda

Test of Function(s) Sig.	Wilks' Lambda	Chi-square	df
1 .000	.517	78.159	11

Source: Authors' Computation

Z = 1.120 + (-0.001) Incurred claim ratio + (-0.056) Solvency Ratio + (-3.648) Gross Direct Premium + (0.024) Net Earned Premium + (2.377) Claims Incurred +(-1.364) Commission Expenses + (-0.106) Underwriting profit + (0.699)Operating expenses +(0.265)(Operating Profit) + (0.054)(FDI in Equity) +(0.016)Current ratio.

Z = 1.120 + (-0.001)(76.698) + (-0.056)(2.060) + (-3.648)(2.721) +(0.024)(4.177) + (2.377)(4.224)+(-1.364)(3.992)+(-0.106)(0.9841)+(0.699)(3.953)+(0.265)(0.9841)+(0.054)(16.06) +(0.016)(0.688) = 0.015

The threshold value 0.015 represent that the insurance companies with higher than the threshold value are in the safe zone i.e. with low financial risk and the insurance companies with the less than the threshold value less than will be facing the financial risk.

Therefore, based on the threshold values the financial riskiness of non-life insurance companies were calculated and tabulated in Table 9.

From the table 9, four public sector general insurance companies and five private sector general insurance companies are found to be in risky status based on the comparison with the threshold value (0.015). However, the variables such as Gross direct premium, Net earned premium, Claims incurred, commission expenses, operating expenses and FDI proportion in equity have the discriminating power. The companies which are in the risky status cannot overlook the rest of variables as well, while improving their position in terms of solvency ratio, underwriting profit and operating profit.

Table 9
Possibility of Bankruptcyof Non-life insurance companies

S. No	Name of Non-Life Insurance Company	Z- Value	Possibility of Bankruptcy
1	National Insurance Co. Ltd.	**-2.50647**	**Possible**
2	The New India Assurance Co. Ltd.	**-0.48368**	**Possible**
3	The Oriental Insurance Co. Ltd.	**-2.1722**	**Possible**
4	United India Insurance Co. Ltd.	**-2.33759**	**Possible**
5	Bajaj Allianz General Insurance Co. Ltd.	**-1.1866**	**Possible**
6	Bharti AXA General Insurance Company Limited	0.639672	Not Possible
7	Cholamandalam MS General Insurance Co. Ltd.	0.190915	Not Possible
8	Future Generali India Insurance Company Limited	0.844332	Not Possible
9	HDFC ERGO General Insurance Co. Ltd.	0.255268	Not Possible
10	ICICI Lombard General Insurance Co. Ltd.	**-0.32451**	**Possible**
11	IFFCO Tokio General Insurance Co. Ltd.	**-0.03317**	**Possible**
12	L&T General Insurance Company Limited	0.490652	Not Possible
13	Liberty Videocon General Insurance Company Ltd	1.485987	Not Possible
14	Magma HDI General Insurance Company Limited	1.292057	Not Possible
15	Raheja QBE General Insurance Company Limited	2.605195	Not Possible
16	Reliance General Insurance Co. Ltd.	**-0.51569**	**Possible**
17	Royal Sundaram Alliance Insurance Co. Ltd	0.343601	Not Possible
18	SBI General Insurance Company Limited	1.069335	Not Possible
19	Shriram General Insurance Company Limited	**-0.43435**	**Possible**
20	Tata AIG General Insurance Co. Ltd.	0.037055	Not Possible
21	Universal Sompo General Insurance Co. Ltd.	1.057327	Not Possible

Source: Authors Compilation

Furthermore, the non-life insurance companies are operating a regulated environment, but de-tariff environment embedded with high competitiveness should also consider other financial and operational variables to understand their status. However, the Z- values shown in the table – 9 are only the early signals for the companies to identify their default risk and chances of investment opportunities. These score/values need to consider judiciously while evaluating the company's performance.

CONCLUSION

The previous studies conducted mostly on comparative evaluation of public and private general insurance companies. However, studies pertaining to the prediction of bankruptacy in various sectors across the world have been studied, yet the

bankruptcy of non-life insurance companies in India has not conducted. Therefore, using discriminant analysis applying on the selected predictors on the net profit after taxes of non-life insurance companies, we found that four public sector and five private sector companies are found to be in the risky zone. However, further studies could be extended using some more predictors such as leverage, size, volume of capital and loss ratio. Among the predictors, FDI proportion in equity, is a matter of concern for future researches as the proposal with Government of India to increase the FDI up to 51% may also influence the operational and financial efficiency of non-life insurance business.

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