

An Empirical Study on Underwriting Risk of Insurance Companies in Bangladesh

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ABSTRACT

The objective of this study is to give a clear overview of the insurance companies operated in the Bangladesh. This study aims to find the determinants of the underwriting risk of the insurance companies in Bangladesh. Further it extends the study to determine the decision and risk taking ability of the insurance companies in the Bangladeshi context. The sample used in this study has taken from the Bangladeshi insurance company incorporated under the Bangladeshi insurance act for the time frame between 2013 and 2017. Using SPSS statistical software the multiple linear regression analysis has been done. Empirical result shows that underwriting risk is related to the different factors such as firm size, capital level, GDP, liquid asset and return on asset. The limitation of this study was the lack of availability of the data and sample is limited to Bangladeshi insurance company.

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KEYWORDS: Underwriting Risk, Insurance Company, Multiple Linear Regression, Firm Size

INTRODUCTION

Insurance is a form of managing the risk of losing valuables or form of risk management, used to hedge valuables against the risk of a future expected loss. It involves activities of the shifting of the risk of losing valuables from one entity to another entity. In return it takes risk premium from the insured person before the commencement of insurance policy.

In fact the insurance sector fosters economic balance by using financial dealers to accomplish different transactions with the help of transfer and removal of risks. The role of insurance business in developing countries like Bangladesh is most essential with low ranges of monetary penetration. It works as an economic middleman within the industry. In this globalization era general insurance plays an important role along with the life insurance business. It provides fire, marine, accident, causality and many other forms of insurance.

Insurance business is a conventional business in Bangladesh. It has a long historical background started during the British empires in Indian subcontinent. During 1947 to 1971 most of the insurance companies developed in the East Pakistan. Almost 49 insurance companies were operated business in both life and general insurance. From that twenty seven insurance companies head office were in West Pakistan and rest of the companies head office were in Bangladesh former East Pakistan. The government of Bangladesh officially called People's Republic Government of Bangladesh nationalized the insurance companies by Presidential Order No. 95 after the liberation war in 1972. As a result all insurance companies in Bangladesh started to operate their business under this government order. By the virtue of this order some insurance companies started to operate the business in the public sector of Bangladesh. There are five insurance companies forming to operate business in the public sector during the 1972. The name of these companies was- Jatiya

Bima Corporation, Tista Bima Corporation, Karnafuli Bima Corporation, Rupsa Jiban Bima Corporation, and Surma Jiban Bima Corporation. During 1984 People's Republic Government of Bangladesh permitted insurance companies to operate business in the private sector by the virtue of ordinance (LI of 1984). From then the number of insurance companies was growing rapidly in the private sector. Now a days, there are 62 companies are operating insurance business in Bangladesh under the Insurance Act 2010. From them there are eighteen life insurance companies including one foreign life insurance company and one is state owned company. Rest of the companies is general insurance companies including one state owned company. Now 36 general insurance companies are listed in the Dhaka stock exchange.

Bangladesh is a developing country. Insurance sectors play an important role in the developing country like Bangladesh. But due to some unavoidable circumstances, insurance sector failed to achieve its goal. Overall insurance industry is under the lack of supervision. There are several problems behind the performing of insurance business such as social pressure, economic instability, political pressure, legal procurement etc. The reporting process of the insurance companies is also so poor. The financial statements of the insurance companies are prepared not following any prescribed manner. Low level of reporting hampers the stakeholder's interest. It hardly does risk reporting and publishes other risk related information. Further it is hard to

understand the risk taking ability of the insurance company of Bangladesh by examining the firm size given in the information in the financial statements. Bangladesh has a small economy where the market size is big in relation to the number of insurance companies. Sometimes it goes at an insignificant point. In this situation there is a strong appeal of finding the factors affecting the underwriting risk of the insurance companies in Bangladesh. Based on that, this study contributes to the existing research factors affecting the underwriting risk of the insurance companies in Bangladesh.

Literature Review

In recent years there are numerous studies which are conducted related to the different courses. One can easily find the preferable research paper from various sources. Although the research paper is available but in some cases there are not so many studies or researches conducted about some crucial sectors. Insurance sector is one of these. There is no research conducted about the underwriting risk in Bangladesh. But several insurance related studies other than the underwriting risk of insurance company are conducted over recent years in Bangladesh. For measuring the financial performance of the insurance organization, one important measure is monitored and the measure is profitability of the business institution. This measure is crucial objectives of management because the goal of organization is to maximize shareholder's wealth along with the profit margin (ECB, 2009; Ngoyen, 2006).

Koller (2011) explained in his research that insurance companies help to transfer risk through different funds from one section to other section by using financial intermediaries like insurance companies.

Adams & Buckle (2000) determine underwriting risk is an indicating factor of financial performance of the insurance companies. Underwriting risk reflects the availability of underwriting performance. It is measured by the proportion of losses incurred to earn premium. Insurer's financial performance mainly depends on specific underwriting guidelines.

Barrell et al. (2011a), describe the risk taking ability depends on the firm size. It is determined that larger firm size has more risk than lower firm size. This study has conducted using the OECD banks ranging from 1993 to 2008 for determining the relationship between size and risk of insurance companies.

Lu (2011), taking more sample, conducted an improved study on the investment banks and life insurance companies. The subject of this study was the relationship between underwriting risk and the firm size. In this study it is found that there is a positive relationship between size and risk taking of the companies. This study is conducted from 1998 to 2008.

In most literatures, the effect of size on banks profitability is represented by total asset. Flamini et al. (2009) indicated that large firms enjoy more economies of scale than small size firm. It identified that size is represented by the total asset in the financial statements.

Boyd and Runkle (1993), describes that large firms have more cost control ability and less chance of making wrong

decision in comparison to the small firms. Again large firms are less likely to be failure as these have more amount of asset. In this study a theory is used called theory of modern intermediation as the reference of this study. This theory suggests an inverse relationship between the volatility of asset return and firm size measured by total assets. It shows large firm has more opportunity to make an investment in the profitable and big project comparative to the small firm.

Demsetz and Strahan (1997), identifies large firms as the follower of taking riskier strategies. It describes regarding the effect of firm size on risk taking support that large firms have more opportunity to take risk using low level of capital.

Tuan Hock Ng et al. (2013) conducted a study taking data from 2000 to 2010 on the 57 insurance companies of Malaysia. Using univariate Pearson's correlation regression model it suggested a positive relationship between the insurance firm size and underwriting risk. It suggests that taking excessive risk can be hazardous to the overall economic system of a country. According to this, the study is conducted to evaluate how insurance firm size is related to risk taking ability of the insurance firms.

From the aforementioned studies it can be simply hypothesized that the firm size is related to the risk taking of the insurance companies around the world. All these studies give some strong arguments regarding the relationship of the firm size and underwriting risk. Also studies show the weakness of the research using statistical findings. After reviewing these studies it can be understood that a relationship is existed between the firm size and the underwriting risk of the insurance companies.

Methodology Sample

In this study the sample used for empirical testing are included all general insurance firms licensed under Bangladesh Insurance Act 2010, for the time frame between 2013 and 2017. This work is done only for the general insurance firm other than life insurance firms. First of all it is chosen 36 general insurance companies from the list of Dhaka stock exchange. The Audited annual financial statements or reports published by each insurance company were collected from the respective company's web site and also collected from the lanka bangla finance and from the Dhaka stock exchange website. Furthermore those data are not found from these sources are collected from the library of Dhaka stock exchange situated in matijhil.

The sample would be all around 180. But due to lack of availability of the data there is drop of sample during the study. 170 observations are collected from the 180 sample. But there is a lack of availability of the information among these observations. Some information are missing and for this reason model can't be achieved and hence dropping the observations. Again as the study is limited to positive financial data some negative observations are dropped from the main data set. Due to the risk of data distortion again some observations are dropped from the main data set. Finally 125 observations are best suit to the study model. These 125 observations comprised of different general insurance company except life insurance companies for the time frame between 2013 and 2017.

Sample attributes	Number of observations
Total general insurance company	36
Time frame of annual report of each company	2013-2017
Dropping companies due to unavailability of annual reports	2
Dropping observation due to negative value	17
Dropping due to unavailability of data	28

Figure-1: Sample

Procedure

To conduct this study the multiple linear regression technique is used for determining the relationship between the firm size and the underwriting risk. A regression analysis is a process of statistical analysis for determining the relationship among different variables. There are several techniques available. The multiple linear regression technique is one of them. For making this study meaningful and making it free from error, statistical software is used for calculating the empirical result. As the calculation is quite tough, manual calculation is avoided here rather than sophisticated software is used. In this study SPSS statistics software has taken for calculating the empirical result. SPSS stands for statistical package for the social science. This is packaged software containing different tools and techniques for making statistical analysis easy. So the general model is stated as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

Where

$$(Y = \text{Risk}, X_1 = \text{CAP}, X_2 = \text{Size}, X_3 = \text{GDP}, X_4 = \text{LQA}, X_5 = \text{ROA})$$

Variable Measurement

To conduct the regression analysis it is needed to address one dependent variable along with two or more independent or explanatory variables. It is suggested to take additional concern while selecting the variables for running the regression model in the software. Concerning this issue it has taken one dependant variable along with five independent variables. Among these independent variables, one is the explanatory variable and rests are the control variables. The variables are described below:

Dependent Variable

In this study risk is taken as the dependent variable where risk represents the underwriting risk of the firm. Baranoff and Sager(2002) defined underwriting risk as the ratio of health premium writings of insurance to total health premium writings. But as the study is mainly concerned about the only general insurance companies of Bangladesh, this ratio is not used in this study. So there is needed a proxy of underwriting risk which can be used in both categories of insurance such as life insurance and general insurance. So here risk is measured by the loss ratio of premium earned. By this measurement underwriting risk is examined for a particular company. This measurement is quite relevant as

the underwriting risk because the ability of the insurance company mainly depends on the loss ratio of premium earned. If the loss ratio is higher it means that the company is in higher risk for paying the claims insured under the insurance contract of this organization. Finally dependent variable is calculated by determining the ratio of the net claims to be paid with the net premium earned.

Independent Variables

There is several independent variables can be observed but due to lack of availability of the data in this study takes five variables are determined as the independent variable. In this study firm size is determined as the first independent variable because most of the previous researcher allows this item for making explanatory variable in relation to the dependent variable. Here size represents the total firm size measured by the total assets. But total assets contain very big amount which can't be taken as the variable. For this reason a term natural logarithm is introduced here. In this study log of total asset is determined as the firm size of the company.

Second independent variable is the Cap which stands for capital level of the organization. It is measured by dividing the total share holder's equity with the total assets. Capital level is introduced as the control variable because capital requirement of the organization make a boundary for the risk assets portfolio. This is a firm specific variable of the insurance companies.

The third independent variable taken in this study is GDP. This is a macroeconomic factor that may influence the risk of the company. It is believed that as the different business environments affect the business operation of the organization so the macroeconomic factor-GDP also may affect the risk taking of the company. Particularly GDP represents the gross domestic finished product produced in a particular year within the national boundary. In this study the yearly growth rate of GDP is taken. The data of growth rate is collected from year 2013 to year 2017.

The fourth independent variable is LQA stands for liquid asset which is denoted by the cash & bank balance of the company. Cash & bank balance represent the most liquid assets which determine the risk taking ability of the company. But cash & bank balance contain very big amount which can't be taken as the variable. For this reason a term natural logarithm is introduced here. In this study log of total cash & bank balance is determined as the liquidity of the company.

Fifth independent variable is the ROA. ROA stands for return on assets calculated by dividing the total return by total asset. This is the proportion of total return and total asset. Net profit after tax is the total return of the company. It measures the profitability of the company in terms of total asset. Profitability also describes the risk taking ability of the company.

Figure-2 shows the variables list of both dependent and independent variable mentioning the full form of the variables with explanation. It also shows the formula used for determining the quantitative value of the variables.

Short form	Full form	Explanation	Formula
Dependent Variable			
Risk	Underwriting Risk	Total ratio of losses incurred to premium earned	Net claims/ Net premium

Independent Variables			
Size	Firm Size	Natural logarithm of total asset	Log of total asset with base 10
CAP	Capital level	Proportion of equity to total assets	Total Equity/ Total Assets
GDP	Gross Domestic Product	GDP growth rate over the year from 2013 to 2017	Rate collected from internet source
LQA	Liquid Asset	Cash & Bank Balance	Log of Cash & Bank Balance with base 10
ROA	Return on Asset	Proportion of total return to total asset	Net profit after tax/ Total assets.

Figure-2: Variables

Empirical Result

Descriptive Statistics

From the following figure-3, it shows the summary of the data of the insurance company for the year 2013 to 2017. The mean value of the underwriting risk is .2260 while the standard deviation is the 14.80 percent taking sample size 125. The mean value of the firm size is 9.0620 while the standard deviation is the 24.40 percent taking sample size 125. The mean value of the capital level is .6553 while the standard deviation is the 26.02 percent taking sample size 125. The mean value of the GDP is .0645 while the standard deviation is the 1.39 percent taking sample size 125. The mean value of the liquid asset is 8.6314 while the standard deviation is the 34.15 percent taking sample size 125. The mean value of the return on asset is .0859 while the standard deviation is the 10.04 percent taking sample size 125.

Descriptive Statistics			
	Mean	Std. Deviation	N
RISK	.2260	.14803	125
SIZE	9.0620	.24405	125
CAP	.6553	.26016	125
GDP	.0645	.00394	125
LQA	8.6314	.34153	125
ROA	.0859	.10042	125

Figure-3: Descriptive Statistics

Pearson's Correlations

In this study to find the correlation between the variable the Pearson's correlation analyses is conducted. This correlation analysis helps to find the relationship among the variables. Figure-4 shows the correlation result among the variables. It is seen that a negative correlation between the firm size and the underwriting risk. Capital level and the Underwriting Risk are strongly correlated. Again there is a negative correlation between GDP and the Underwriting Risk. The Liquid Asset and Underwriting Risk are positively correlated while there is a negative correlation between Return on Asset and the Underwriting Risk. Apart from the relationship between the dependent variable and independent variables, it shows the relationship among the independent variables. Table shows that there is no serious level of multi-co-linearity exists as the highest correlated value is .599 between the Liquid asset and the Firm size. Other correlations are insignificant among the independent variables.

	RISK	SIZE	CAP	GDP	LQA	ROA
RISK	1.00					
SIZE	-.058	1.00				
CAP	.066	.224	1.00			
GDP	-.060	.061	.182	1.00		
LQA	.160	.599	.222	.028	1.00	
ROA	-.163	-.181	-.068	.018	-.113	1.00

Figure-4: Pearson's Correlation

Goodness of fit

This is a statistical model denoted by R^2 explained the goodness of fit of the model. It describes the level of variation of dependent variable explained by the independent variable. In this study it measures the level of variation of the underwriting risk explained by the independent variables (Capital level, Firm size, GDP, Liquid Asset and ROA). Figure-5 shows that the value of R square is .099. That means almost 10% of the total variation in the dependent variable (Underwriting risk) is explained by the independent variables (Capital level, Firm size, GDP, Liquid Asset and Return on Asset). And remaining 90% of the total variation in the dependent variable (Underwriting risk) is not explained by the independent variables (Capital level, Firm size, GDP, Liquid Asset and Return on Asset). That means 90% variation of underwriting risk is explained by the other factors included in the random error term. As the value of R square is much lower that is 9.9 percent closes to 10 percent, it expresses the model as the relatively poor model. But the value of R square in this study is closes to the R square estimation of Tuan Hock Ng et al. (2013) and Lu (2011). In these studies, the value of R square was 9 percent and 13.50% respectively. But the limitation of this study is that the variables used are somewhat different from the aforementioned study due to lack of availability of the data. Future research is suggested based on this initial research. There is a future research prospect about this area.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.315 ^a	.099	.061	.14343

a. Predictors: (Constant), ROA, GDP, LQA, CAP, SIZE

Figure-5: Goodness of Fit

Multi-co-linearity

VIF stands for Variance inflation factors which measure the inflation in the variance due to the co-linearity among the independent variables. If the value of VIF is more than 4, it suggests further investigation among the variables. And if the value of VIF exceeds 10, it suggests the existence of serious multi-co-linearity among the variables. Figure-6 shows the value of VIF of the independent variables used in this study is less than 2. The highest values (1.615 and 1.581) are seen in the Firm Size and The liquid Asset. Hence there is little multi-co-linearity.

Multi-co-linearity		
Model	Tolerance	VIF
SIZE	.619	1.615
CAP	.908	1.101
GDP	.964	1.037
LQA	.632	1.581
ROA	.965	1.036

Figure-6: Multi-co-linearity

Beta coefficient

$\beta_1 = -.167$, which means there is a negative relationship between the Firm Size and the Underwriting Risk. If the Firm Size increases (decreases) by 1, then the Underwriting Risk will increase (decrease) by $-.167$ while the other variables remain constant.

$\beta_2 = .035$, which means there is a positive relationship between the Capital Level and the Underwriting Risk. If the Capital Level increases (decreases) by 1, then the Underwriting Risk will increase (decrease) by $.035$ while the other variables remain constant.

$\beta_3 = -2.220$, which means there is a negative relationship between the GDP and the Underwriting Risk. If the GDP increases (decreases) by 1, then the Underwriting Risk will increase (decrease) by -2.220 while the other variables remain constant.

$\beta_4 = .127$, which means there is a positive relationship between the Liquid Asset and the Underwriting Risk. If the Liquid Asset increases (decreases) by 1, then the Underwriting Risk will increase (decrease) by $.127$ while the other variables remain constant.

$\beta_5 = -.257$, which means there is a negative relationship between the Return on Asset and the Underwriting Risk. If the Return on Asset increases (decreases) by 1, then the Underwriting Risk will increase (decrease) by $-.257$ while the other variables remain constant.

Model	Unstandardized Coefficients		Standardized Coefficients
	B	Std. Error	Beta
(Constant)	.786	.535	
SIZE	-.167	.067	-.276
CAP	.035	.052	.062
GDP	-2.220	3.329	-.059
LQA	.127	.047	.294
ROA	-.257	.131	-.174

a. Dependent Variable: RISK
Figure-7: Beta Coefficient

Hypothesis

To conduct this study there are two hypotheses. One is null hypothesis and another one is alternative hypothesis. Null hypothesis is denoted by H_0 while alternative hypothesis is denoted by H_1 . Null hypothesis assumes beta i equals to zero where $i = (\beta_1, \beta_2, \beta_3, \beta_4, \beta_5)$. According to the significant level and degrees of freedom the value of t statistics is examined whether it falls inside the critical value or falls outside the critical values.

If the value of t statistics falls outside the critical values it means that the particular beta is statistically significant and there is a relationship between the particular independent variable and the dependent variable. Hence we reject null hypothesis and accept the alternative hypothesis.

If the value of t statistics falls inside the critical values it means that the particular beta is statistically insignificant and there is not any relationship between the particular independent variable and the dependent variable. Hence we accept null hypothesis and reject the alternative hypothesis. So the hypotheses are

Null Hypothesis $H_0: \beta_i = 0$

Alternative Hypothesis $H_1: \beta_i \neq 0$

Where $i = (\beta_1, \beta_2, \beta_3, \beta_4, \beta_5)$

Test Statistics and Confidence Interval

Under the null hypothesis, the result of the test statistics and the confidence interval for all independent variables has given below.

Firm Size (β_1):

At 5% significant level with 120 degrees of freedom, the critical value of test statistics are $-.035$ and $-.300$ [from figure-8]. As the calculated t value (-2.495) [from figure-8] falls outside the critical values, the null hypothesis is rejected. So Firm Size (β_1) is statistically significant hence there is a relationship between the Firm Size and the Underwriting Risk.

Capital level (β_2):

At 5% significant level with 120 degrees of freedom, the critical value of test statistics are $.138$ and $-.068$ [from figure-8]. As the calculated t value ($.679$) [from figure-8] falls outside the critical values, the null hypothesis is rejected. So Capital level (β_2) is statistically significant hence there is a relationship between the Capital Level and the Underwriting Risk.

GDP (β_3):

At 5% significant level with 120 degrees of freedom, the critical value of test statistics are 4.371 and -8.810 [from figure-8]. As the calculated t value ($-.667$) [from figure-8] falls between the critical values, the null hypothesis is accepted. So GDP (β_3) is not statistically significant hence there is less relationship between the Capital Level and the Underwriting Risk.

Liquid Asset (β_4):

At 5% significant level with 120 degrees of freedom, the critical value of test statistics are $.221$ and $.033$ [from figure-8]. As the calculated t value (2.684) [from figure-8] falls outside the critical values, the null hypothesis is rejected. So Liquid Asset (β_4) is statistically significant hence there is a relationship between the Liquid Asset and the Underwriting Risk.

Return on Asset (β_5):

At 5% significant level with 120 degrees of freedom, the critical value of test statistics are $.002$ and $-.515$ [from figure-8]. As the calculated t value (-1.965) [from figure-8] falls outside the critical values, the null hypothesis is rejected. So Return on Asset (β_5) is statistically significant hence there is a relationship between the Return on Asset and the Underwriting Risk.

Model	t	95% Confidence Interval for B	
		Lower Bound	Upper Bound
(Constant)	1.468	-.274	1.845
SIZE	-2.495	-.300	-.035
CAP	.679	-.068	.138
GDP	-.667	-8.810	4.371
LQA	2.684	.033	.221
ROA	-1.965	-.515	.002

Figure-8: Confidence Level

Conclusion

In this study many factors are described affecting the underwriting risk of insurance companies in Bangladesh. Basically there are five independent variables are explained about their relationship with the dependent variable which is underwriting risk. According to the Pearson's correlation

all five variables are correlated with the dependent variable. That means there is a relationship between the independent variables and the dependent variable. Among them the Size, GDP and ROA are the negatively correlated with the Risk while CAP and LQA are the positively correlated with the Risk. But in terms of hypothesis and test statistics the GDP experiences no relation with the Risk as the calculated value of test statistics falls inside the critical region. This is contradictory with the Pearson's correlation. As GDP is the strong economic measure which can affect the performance of the organization, it can be assumed that GDP has somewhat less relationship with the Risk comparative to other variables. Other study also shows that GDP has insignificant effect using fixed effect model by Tuan Hock Ng et al. (2013). Hence if the variable GDP is omitted from the model it has little effect in the model hence still model would perform appropriately.

This study is consistent with Altubas et al (2007), found the negative relationship between the Size and the Risk of insurance companies. But as the value of R square is much lower that is 9.9 percent closes to 10 percent, it expresses the model as the relatively poor model. But the value of R square in this study is closes to the R square estimation Tuan Hock Ng et al. (2013) and Lu (2011). In these studies, the value of R square was 9 percent and 13.50% respectively.

The limitation of this study is that the variables used in this study are somewhat different from the aforementioned study due to lack of availability of the data. Future research is suggested based on this initial research. There is a future research prospect about this area. It is suggested to improve the reporting guideline of the Insurance companies in Bangladesh. The rules and regulation about the annual report of the insurance companies in Bangladesh must be followed accordingly.

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