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Impact of Macroeconomic Variables on the Performance of State-owned Insurance Companies in Bangladesh

Abstract

The aim of this study is to investigate the impact of some selected macroeconomic variables on the performance of state-owned insurance companies operating in Bangladesh. The state-owned companies are observed from the year of 2013 to 2022. In this study, we have used five performance measures such as Net Profit Margin, Solvency Ratio, Claim/Loss Ratio, Underwriting/Gross Profit Ratio and Dividend pay-out Ratio as dependent variables. The explanatory variables used in this study are categorized as macroeconomic factors such as GDP growth rate, inflation rate, employment rate and interest rate. Firm-specific factors such as the age of the firms, firm size (measured as total asset), net premium are used as control variables. The research employs Pooled Ordinary Least Square (POLS) Regression to investigate the impact of macroeconomic variables on the performance of the state-owned insurance companies. The results of our study suggest that interest rate has significant impact on the performance of state-owned insurance companies. Also, the size of the company has statistically significant impact on the performance of the companies. So, the interest rate along with firm size have been considered as important determinants of the performance of the state-owned insurance companies in Bangladeshi. The findings of the study are expected to be useful for the investors in making decisions while selecting stocks of insurance companies and policymakers can also use the findings to formulate policies aiming at economic development of the country.

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1. Introduction

The human life has risks and these risks are associated with cost. The concept of insurance was introduced to manage these risks effectively and efficiently as individuals cannot manage risks because of lack of knowledge and expertise. Insurance companies act as financial intermediaries by ensuring the flow of funds from surplus spending units of a society to the deficit spending units through issuing insurance policies to the policyholders and by investing the premiums in productive sectors (Gatsi and Gadzo, 2013). Insurance acts as a co-operative device which distributes loss among number of users where loss of any person caused by some specific risks is shared by the rest of the people from the group through payment of premiums. Insurance industry not only cover individuals and families but also provides support to businesses by providing

mechanisms for risk management, pooling resources, providing information and protection and developing economic efficiency and growth (Merton and Bodie 1995).

Financial performance of insurance companies plays significant role in the growth of the industry which contributes to the growth of an economy. Insurance sector of Bangladesh has a very long history and there are many insurance companies in Bangladesh but this industry is not yet matured enough. Its contribution to the labor force is low compared to other emerging economies and contribution to the market capitalization of DSE is only 0.70% (as of 31st January, 2023, source-Dhaka Stock Exchange). Also, insurance companies' performances in Bangladesh from financial perspective is not satisfactory. The financial performance of insurance companies can be investigated at micro and macroeconomic level. This can be determined by both internal factors represented by company specific characteristics, and external factors regarding connected institutions and macroeconomic environment such as GDP growth rate, rate of inflation, interest rate, employment rate, exchange rate, etc (Burca and Batrinca, 2014). The probability of selling insurance products grows if GDP grows and insurers are likely to be benefited in the form of higher profits (Suheyli, 2015). On the other hand, exposure of interest rate and excessive changes in interest rate could pose significant threats to the earnings and capital base of insurance company as well as increase the operating expenses. From the micro perspective, foreign exchange rate affects the firm's performance (Nyamu, 2016). According to Suheyli (2015), due to the expectation of inflation, payments of claim rise as well as reserves which are required for the anticipation of higher claims. Considering these effects, macro-economic variables have been incorporated as these variables affect the performance of the insurance companies.

Till date, most of the precious studies on insurance sector were about examining determinants of profitability of firms' and measuring the financial performances of firms. However, it is evident from the existing literature that a only few study has considered the impact of macroeconomic variables on the performance of insurance companies. Especially the impact of macroeconomic factors on the financial performance of state-owned insurance companies operating in Bangladesh is yet to be analyzed and identified. This research gap inspired us to conduct this research on this ground.

Using data from the state-owned insurance companies in Bangladesh and national economy, this study tests the impact of macro-economic factors on the performance of state-owned insurance companies in Bangladesh using Pooled Ordinary Least Square (POLS) Regression. Robustness tests were also conducted to test the stability of the main results. This paper makes a number of contributions to the literature on macro-economic factors and insurance industry performance. First, this paper has investigated the impact of macro-economic factors on performance of state-owned insurance companies in the context of emerging economies country like Bangladesh where most of the current literatures are based on developed countries. In emerging economies, insurance sector is crucial for economic development and employment generation. Bangladesh is one of the largest and important emerging economies where

81 insurance companies are currently operating. The empirical findings of this study will enrich the literature from the context of emerging economies. Second, the findings are particularly helpful in terms of policy implications. The companies can concentrate the policy formulation in accordance with the effects of the macroeconomic factors. Third, the empirical findings of this study will be beneficial for investors in taking rational decisions while selecting insurance companies' stocks at Dhaka stock exchange.

The remaining of the paper is organized as follows. Section 2 provides literature review. Section 3 presents the data and summary statistics. Section 4 describes analysis and interpretation. Section 5 reports the robustness tests and Section 6 presents the conclusion.

2. Literature Review

Insurance sector is a vital component of the economy that supports economic growth and ensures a safety net for individuals and businesses, contributing to the financial stability and risk management of the financial sector of a country (Wani and Ahmad, 2015). In any country, the performance of the insurance industry is well-determined and strongly affected by the firm-specific and macroeconomic indicators of a country. According to several empirical studies, insurance businesses are significantly influenced by the macroeconomic indicators of a country, including the GDP growth rate, inflation, interest rates, and employment level (Wani and Ahmad, 2015; Kripa, 2016; Ismail et al., 2018; Bhattarai, 2018). Rashid and Kameel (2018) suggested that the performance of the insurance industry is influenced by factors such as financial strength, market share, and customer satisfaction. In contrary to this, Hailegebreal (2016) stated that the insurance sector is susceptible to market volatility. Camino-Mogro (2021) also supported the significance of macroeconomic factors, such as market competition and regulatory environment, on the influence of insurance sector's performance.

According to the research conducted by Ullah et al. (2016), GDP growth is a crucial macroeconomic factor that significantly impacts insurance performance. The study emphasizes that as GDP grows, there is an increase in the overall economic activities and income levels of individuals and businesses. This, in turn, leads to a rise in demand for insurance products and services. Hasan et al. (2018) also acknowledge the importance of GDP growth in terms of exerting effects on the performance of the insurance sector. The study found that as the GDP of a country expands, there is a greater capacity for individuals and businesses to invest in insurance coverage, thereby boosting the growth of the insurance sector. However, it is essential to consider conflicting perspectives. Daare (2016) suggested that GDP growth positively affects insurance premium growth, indicating a strong relationship between macroeconomic growth and insurance demand. In a comprehensive study across multiple countries, Benson et al. (2022) found consistent evidence of the strong impact of macroeconomic variables on insurance indicators such as premium growth and profitability. However, Matar et al. (2021) strongly denied the impact of GDP growth on insurance performance. They argued that other factors, such as consumer behavior and regulatory framework, play a more

significant role in shaping the insurance market, overshadowing the influence of GDP growth. Despite differing viewpoints, the majority of research studies suggest a positive relationship between GDP growth and insurance performance. Therefore, understanding the impact of GDP growth on the insurance industry in Bangladesh is one of the objectives of this study.

Hailegebreal (2016) stated that inflation level in an economy is a significant macroeconomic factor affecting the industrial performance in insurance sector. The research suggests that high inflation rates can lead to increased insurance claims and costs, particularly in areas such as healthcare and property insurance. The rising prices of goods and services, driven by inflation, can result in higher replacement costs and claims payouts for insurers. In contradiction to this, Egbunike and Okerekeoti (2018) argued that inflation does not have a substantial impact on insurance performance. The research highlights that other factors, such as competition within the insurance industry and regulatory policies, have a more significant influence on the performance of insurers. As per this research, in terms of inflation rate, the relationship between inflation and insurance performance is complex and can vary across different insurance lines and market conditions. Killins (2020) further supported this and stated that while inflation can pose challenges to insurers in terms of managing costs and claims, insurance companies have strategies in place to adapt to inflationary pressures.

Though there are some arguments on this matter, as per the research of Mazyiona et al. (2017), interest rates have a significant impact on insurance performance. The research suggests that low-interest-rate environments can pose challenges for insurers, particularly those with long-term liabilities. Insurers heavily rely on investment income, and when interest rates are low, it becomes more challenging to generate sufficient returns to cover policy obligations. Supporting this research, Kaya (2019) stated that in insurance, interest rates play a crucial role in determining the pricing of insurance products, particularly life insurance and annuities. Lower interest rates can result in higher premium costs for policyholders, as insurers need to compensate for the reduced investment income potential. Moreover, interest rates influence consumer behavior regarding insurance purchases.

Employment rates in an economy have a significant impact on the performance of the insurance businesses (Kassie (2017). The research indicates that higher employment levels contribute to increased disposable income, which, in turn, leads to a higher demand for insurance products and services. When individuals have stable employment and higher income, they are more likely to seek insurance coverage to protect their assets and mitigate risks. Deyganto and Alemu (2019) also argued that employment levels also affect the commercial parts of the insurance sector. As businesses expand and hire more employees, they require various insurance policies to safeguard their operations, including property insurance, liability insurance, and workers' compensation insurance. However, Zainudin et al. (2022) argued and stated that employment rates solely may not be the sole determinant of insurance performance. Other factors, such as consumer preferences, market competition, and regulatory environment, should also be considered in understanding the relationship between employment

levels and insurance performance.

Besides, several firm-specific factors are also accountable to affect the performance of the insurance businesses (Kaya, 2015; Vieira et al., 2019). The study suggested a comprehensive analysis incorporating both macro and micro factors is crucial for a holistic understanding of insurance performance. Several studies found that size of the insurance businesses poses a significant impact on the firms' performance (Mehari and Aemiro 2013; Ajao and Ogieriakhi, 2018). Kaya (2015), also emphasized the role of micro-level factors such as age of the insurance business, the number of employees, loss ratio etc. in shaping performance outcomes.

From the perspective of Bangladesh, although there are several studies on micro and macro-level indicators of the privately owned insurance companies' performance (Datta, 2018; Khan et al., 2016; Alam et al., 2019; Nijam et al., 2020), there is a scarcity of studies conducted on the macroeconomic variable's impacts on the state-owned insurance companies' performance in the country. Thus, this study is an attempt to shed light on the macroeconomic variable's impact on the performances of the state-owned insurance companies of Bangladesh.

3. Data and Summary Statistics

3.1 Sample and Variables

To justify the relationship between the macroeconomic variables and the performance of the state-owned insurance companies of Bangladesh, the study considers secondary data. The data are obtained from annual reports of the selected insurance companies, Insurance Development and Regulatory Authority (IDRA), and also the central bank of Bangladesh, Bangladesh Bank's websites. Data including the period of the last ten years (2013-2022) has been considered for the study. The relationship between macroeconomic variables of the economy and insurance sector's performance has been justified by considering the macroeconomic factors including GDP growth rate, Employment Rate, Interest Rate, and Inflation. To evaluate the performance of the state-owned insurance businesses, profitability indicator- Net profit margin has been considered, whereas operating efficiency, solvency and financial stability have been taken into account by including Solvency Ratio, Claim/Loss Ratio, Underwriting/Gross Profit Ratio, Dividend pay-out Ratio, Total Assets (Firm Size), Age of the Firm and Total Premium.

Table 1: Variables, Description, Measurement, and Empirical Studies

Variables	Nature of the variable	Symbols	Calculated as	Empirical Studies
Net profit Margin (NPM)	Dependent	NPM	Net Profit/ Revenues	Lee, 2014; Ahmeti and Iseni, 2022.
Solvency Ratio	Dependent	SR	Net Assets/Net Written Premium	Doumpos et al., 2012; Burca and Batrînca, 2014, Srijanani and Rao, 2019.

Claim/Loss Ratio	Dependent	CL/LR	Incurred Claims/ Earned Premiums	Öner Kaya, 2015; Berhe and Kaur, 2017; Hussanie and Joo, 2019.
Underwriting Revenue /Gross Profit Ratio	Dependent	UR/GP	Underwriting Revenue/Gross Profit Ratio	Shiu, 2004; Rashid and Kemal, 2018.
Dividend pay-out Ratio	Dependent	DPR	Total Dividends/ Net Profit	Palanisamy and Kathiravan, 2020; Bustani, 2020.
GDP Growth Rate	Independent	GDP	Yearly percentage change in the gross domestic product (GDP) measured by $(GDP_t - GDP_{t-1})/GDP_{t-1}$	Daare, 2016; Ullah et al., 2016; Hasan et al., 2018; Berhe and Kaur, 2017; Matar et al., 2021.
Employment Rate	Independent	Emp	Yearly employment rate of Bangladesh.	Deyganto and Alemu, 2019; Zainudin et al., 2022.
Interest Rate	Independent	IR	Yearly average lending interest rate of Bangladesh Bank	Mazyiona et al., 2017; Kaya, 2019.
Inflation	Independent	Inf	Yearly percentage change in the consumer price index (CPI) measured by $(CPI_t - CPI_{t-1})/CPI_{t-1}$	Hailegebreal, 2016; Berhe and Kaur, 2017; Egbunike and Okerekeoti, 2018; Killins, 2020.
Total Assets (Firm Size)	Control Variable	lnTA	Log of total assets of insurance company.	Mehari and Aemiro 2013; Kaya, 2015; Ajao and Ogieriakhi, 2018.
Age of the firm	Control Variable	lnAge	Log age of the insurance company from the date of establishment.	Mehari and Aemiro 2013; Kaya, 2015; Ajao
Total Premium	Control Variable	lnPrum	Log of yearly total premium of the insurance company	Mehari and Aemiro 2013; Kaya, 2015; Ajao

Source: Author's creation.

3.2 Descriptive Statistics

Table 2 illustrates the descriptive statistics of variables. The descriptive statistics depicts the mean, standard deviation, minimum and maximum values of Net Profit Margin (NPM), Solvency Ratio (SR), Underwriting Revenue to Gross Profit (UR/GP), Claim/Loss Ratio (CL/LR), Dividend Payout Ratio (DPR), GDP Growth Rate (GDP), Inflation rate (Inf), Employment Rate (Emp), Interest Rate (IR) between 2013 to 2022.

Table 2: Descriptive Statistics of the Selected Variables

	Mean	Std. Dev.	Min	Max
GDP	6.516	1.189836	3.45	7.88
Inf	6.199	.8497362	5.51	7.7
IR	11.45	2.5899	9	15.5
Emp	95.384	.3820499	94.59	95.65
lnAge	3.793398	.0664136	3.688879	3.89182
lnPrum	8.68697	.2479102	8.262301	9.079548
lnTA	1.385709	.0115591	1.371253	1.411283
NPM	20.1425	2.974527	14.28	25.22
SR	6.251	1.850658	3.25	8.9
DPR	20.51635	4.969354	12.25	29.08
UR/GP	51.75	3.25622	45.93	58.96
CL/LR	38.503	5.205735	31.12	52.5

Source: Authors' computation

3.3 Empirical Model

The following model has been developed for the study;

$$P_{it} = \alpha_0 + \sum_{1}^{K} \beta_n X_{it} + \beta_2 Z_{it} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots (1)$$

Where: P_{it} is the performance of the state-owned insurance companies, i at time t, X_{it} is the vector of macroeconomic variables affecting the performance of the insurance companies i at time t, Z_{it} are the firm size, age of the firm and total premium included as the control variables in the model. The variables are chosen and derived from theory and related studies. α_0 is a constant or the intercept, are β_n the coefficients or parameter to be estimated of the independent variables of interest (macroeconomic variables) to be estimated with n=1,2, 3, ….., K, β_2 is the parameter of the control variable, and is the error term which is assumed to be normally distributed. The mentioned model is thus expanded based on the dependent and independent variables for the study.

Model 1

$$NPM_{it} = \alpha_0 + \beta_1 GDP_{it} + \beta_2 Inf_{it} + \beta_3 Emp_{it} + \beta_4 IR_{it} + \beta_5 lnTA_{it} + \beta_6 lnAge + \beta_7 lnPrum + \varepsilon_{it} \dots\dots\dots\dots\dots\dots (2)$$

Model 2

$$SR_{it} = \alpha_0 + \beta_1 GDP_{it} + \beta_2 Inf_{it} + \beta_3 Emp_{it} + \beta_4 IR_{it} + \beta_5 lnTA_{it} + \beta_6 lnAge + \beta_7 Premium + \varepsilon_{it} \dots\dots\dots\dots\dots\dots (3)$$

Model 3

$$\frac{UR}{GP}_{it} = \alpha_0 + \beta_1 GDP_{it} + \beta_2 Inf_{it} + \beta_3 Emp_{it} + \beta_4 IR_{it}$$

$$+\beta_5 lnTA_{it} + \beta_6 lnAge + \beta_7 lnPrum + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Model 4

$$\frac{CL}{LR}_{it} = \alpha_0 + \beta_1 GDP_{it} + \beta_2 Inf_{it} + \beta_3 Emp_{it}$$

$$+\beta_4 IR_{it} + \beta_5 lnTA_{it} + \beta_6 lnAge + \beta_7 lnPrum + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Model 5

$$DPR_{it} = \alpha_0 + \beta_1 GDP_{it} + \beta_2 Inf_{it} + \beta_3 Emp_{it} +$$

$$\beta_4 IR_{it} + \beta_5 lnTA_{it} + \beta_6 lnAge + \beta_7 lnPrum + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

The Model 1, 2, 3, 4, and 5 indicates the regression models to be analyzed in order to find out the predictive relationship between the performance of the state-owned insurance companies and the macroeconomic variables of Bangladesh. In each model, macroeconomic variables are taken into consideration to examine the impact on the dependent variables representing the firm performance by Net Profit Margin (NPM), Underwriting Costs to Gross Profit Ratio (UR/GP), Solvency Ratio (SR), Claim to Loss Ratio (LR) and Dividend Payout Ratio (DPR) in model 1, 2, 3, 4 and 5 respectively.

4. Analysis and Interpretation

4.1 Analysis of POLS Model Results

Table 3 represents the estimation result derived from the Pooled Ordinary Least Square regression (POLS), where dependent variables are the indicators of insurance companies' performance and the independent variables are the macro-economic indicators of Bangladesh. In order to justify the models, POLS, Fixed Effect Model (FEM) and Random Effect Model (REM) have been employed along with the Hausman test to determine the best fit model. According to the Hausman test, except Model 3, the rest of the models are best fit for POLS. Whereas, in model 3, where underwriting revenue to gross profit ratio has been regressed against the macro-economic indicators, this regression model has been analyzed on panel corrected standard errors (PCSE) model. The PCSE model considers all the heteroskedasticity and spherical errors in the model and thus, constitutes better reflection of the analysis than POLS in several cases (Bailey and Katz, 2011).

Table 3: Output of the models.

	Model 1 (NPM)	Model 2 (Solvency Ratio)	Model 3 (Underwriting revenue to Gross Profit Ratio)	Model 4 (Claim to Loss Ratio)	Model 5 (Dividend Payout Ratio)
GDP	.0560**	.0386**	-.494	-.702	.042*
	(.226)	(.61)	(.486)	(.590)	(.164)
Inf	.457	-.143	1.229	1.462	-.265
	(.373)	(.263)	(.794)	(.978)	(.270)
IR	1.313***	.861***	-3.133***	.596*	.2409
	(.419)	(294)	(.882)	(1.110)	(.305)
Emp	-.390	-.664	4.414***	-3.043*	.0101
	(.708)	(.505)	(1.529)	(1.838)	(.512)
lnAge	65.13***	10.075	86.046**	92.560*	73.949***
	(17.84)	(12.544)	(35.405)	(50.136)	(13.483)

lnTA	-258.92***	-59.945**	-19.598	234.52**	-8.151
	(32.454)	(26.540)	(49.288)	(111.93)	(29.359)
lnPrum	3.304	-6.744***	1.241	-14.561*	-2.621
	(2.464)	(1.970)	(3.810)	(8.368)	(2.191)
_Cons	156.253**	161.599***	-647.920***	-218.471	-227.746***
	(79.33)	(58.841)	(158.082)	(227.11)	(61.700)
Number of Observation	*20*	*20*	*20*	*20*	*20*
R-Squared	*0.8478*	*0.7543*	*0.6344*	*0.4729*	*0.9595*

This table shows the results of the Pooled Ordinary Least Square (POLS) models. Standard errors in parentheses. Significance levels: ***p<0.01, **p<0.05, *p<0.1

The results from model 1, where Net Profit Margin is the regress and the macroeconomic variables are regressors. The result depicts that although GDP, interest rate and the firm size (measured in terms of the total asset) of the insurance company have significant effect on the profitability of the state-owned insurance firms of Bangladesh, the effect of employment rate and Inflation on the same regress and is not statistically significant(p>.10). One percentage increase in interest rate will cause a rise in the net profit margin of the state-owned insurance companies by 131%, ceteris paribus, which is significant at 1% significance level. The results are similar to Mazyiona et al. (2017) and Kaya (2019) whereby they argued that low interest rate usually reduces the investment income of the insurance firms. Thus, increase in the interest rates will be favorable for the insurance businesses to gain more from the investment in the financial market. Likewise, the firm size poses a significant (p<.01) negative impact on the net profit margin of the state-owned insurance firms in Bangladesh.

Similarly, the findings attest that the effect of inflation and employment rate on the solvency ratio of the public insurance firms is insignificant. Rather, interest rate significantly affects the solvency rate of the insurance firms, where, a one percent increase in the interest rate will cause a capsize in the solvency rate by 0.86 percentage. The results are relevant to those of Mazyiona et al. (2017) and Kaya (2019) as well.

It is evident from the pronouncements of the analysis that although GDP and inflation do not exert any impact on the underwriting revenue to gross profit ratio of the state-run insurance companies in Bangladesh, employment rate positively affects the ratio. One percentage positive change in employment rate will incur a growth by four percentages in the underwriting revenue to gross profit ratio. The findings are in line with the findings by Kassie (2017); Deyganto and Alemu (2019) who also agreed that if more people are employed, the demand for insurance services goes up, thus contributing to more profit of the insurance firms. The result from model 3 also demonstrates that interest rate has an inverse correlation with the profitability indicator marked by UR/GP. A solitary percentage change in interest rate will slow down the progress of the insurance businesses by 3.13 percentage. Although this is contrasting with the studies by of Mazyiona et al. (2017) and Kaya (2019),

there is a potential challenge to earn from the interest sensitive investment schemes, if the liabilities or financial leverage of the insurance business is more than its interest sensitive assets. Besides, the control variable, firm size which has been denoted as the firm-specific factor does not affect the growth of the underwriting profit portion of the state-owned insurance businesses of Bangladesh.

Among the other macro variables, considered in the study, only interest rate has a positive influence on the loss ratio of the state-owned insurance companies in the country. The interest rate's augmentation by 1 percentage would increase the loss ratio by 0.59 percentage. This is also alike with the findings of the studies by Mazyiona et al. (2017) and Kaya (2019).

The study also finds a positive and significant impact of GDP growth rate on the dividend payout ratio of the state-run insurance firms in Bangladesh. The upshot is analogous to the findings by Daare(2016),Ullah et al. (2016), Hasan et al. (2018) and Matar et al. (2021). However, increase in the level of inflation by the same range in the economy (1 percentage) will decrease the rate of dividend payout rate .26 percentage. The effect of inflation on the dividend payout ratio is also logical, because the rise in the general price level shrinks the capability of the firms to generate more earnings. In turn, the payout of the dividends to its shareholders also drops. Additionally, the DPR will tend to positively altered by the increase in the interest rate in the economy. Whereas, the employment rate and the total asset have insignificant influence on the dividend payout ratio of the insurance firms considered in the study.

4.2 Diagnostic Tests:

Table 4 presents the correlation matrix is measuring the linear correlation among the variables. The results show that there is no perfect linear correlation affecting the variables' validity to be included in the models. Moreover, VIF Test for Multicollinearity (Table-5) and Wooldridge Test for finding out the autocorrelation in the panel data (see Appendix-1) have been conducted.

Table 4: Pearson Correlation Matrix of the Variables

	GDP	Inf	Int	Emp	lnAge	lnPrm	lnTA	NPM	SOL	DPR	UR/GP	CL/LR
GDP	1.000											
Inf	-.092	1.000										
IR	-.132	0.431	1.000									
Emp	0.114	0.147	0.595	1.000								
lnAge	0.076	0.205	0.734	0.684	1.000							
lnPrum	-.004	0.202	0.814	0.597	0.851	1.000						
lnTA	-.047	0.115	0.469	0.343	0.461	0.561	1.000					
NPM	0.068	-.111	0.023	0.076	0.131	0.015	-.708	1.000				
SR	0.127	0.259	0.489	0.179	0.457	0.080	-.215	0.240	1.000			
DPR	0.054	0.184	0.715	0.660	0.976	0.794	0.418	0.110	0.540	1.000		
UR/GP	0.317	-.290	-.337	0.293	-.118	-.103	-.152	0.248	-.280	-.215	1.000	
CL/LR	-.100	0.254	0.477	0.189	0.436	0.278	0.495	-.273	0.361	0.512	-.356	1.000

Source: Authors' computation using STATA

Table 5 depicts the outputs of the Variance Inflation Factor (VIF) Test which can demonstrate whether there is any multicollinearity predicament (Wooldridge, 2013) among the independent or explanatory variables.

Table 5: Outcomes of VIF Test (Multicollinearity Test) of the Explanatory Variables

Variable	VIF	1/VIF
lnAge	4.13	0.242130
IR	3.91	0.255575
lnPrum	3.57	0.280112
Inf	2.72	0.367867
Emp	2.04	0.489943
GDP	2.00	0.499328
lnTA	1.50	0.668538
Mean VIF	2.795	

Source: Authors' computation

Table 5 presents the multi-collinearity test result of the independent variables. There will be multi-collinearity among the explanatory variables when the variance inflation factor (VIF)'s value is either above 10 or the lower value (1/VIF) (Robert, 2007). The above test result clearly states that there is no VIF value greater than 10, dictating none of the independent variables included in this study is explained by another variable. Hence all variables can be suitable to be considered in the study.

In order to determine the serial autocorrelation among the variables considered in the study the Wooldridge Panel Data Autocorrelation Test has also been conducted. Whereby, the null hypothesis indicating that 'there is no serial autocorrelation among the variables'- cannot be rejected ($p>0.05$). Thus, the results (Appendix-1) support that there is no first-order serial autocorrelation in the panel data.

5. Robustness Tests

5.1 Alternative Measure of the Dependent Variable

In this section we have conducted some robustness tests to validate our main results. First, we have considered alternative measures of one of our dependent variables. We have considered "Return on Asset (ROA)" as alternative measure of net profit margin (NPM) as profitability measure. We re-run our regression models with this alternative measure of the dependent variable. The regression results for the impact of marco-economic factors on profitability for the companies did not change significantly when this was done indicating robustness of our previous result.

5.2 Re-estimating Models with new Variable "Asset Specificity"

Next, as part of our robustness tests, we have added one more additional variable "Asset specificity" (total assets / total employees) as additional control variable.

This variable is crucial indicator of a firm's financial health. After re-estimating our original models with this additional variable, we found that, the regression results did not change significantly; the results are almost the same for the variables of interest.

Table 6 Re-estimating Models with New Variable "Asset Specificity"

	Model 1 (NPM)	Model 2 (Solvency Ratio)	Model 3 (Underwriting Revenue/Gross Profit)	Model 4 (Loss Ratio)	Model 5 (Dividend Payout Ratio)
GDP	.351**	.186*	-.230	-.167	0.639*
	(.132)	(.247)	(.184)	(.375)	(0.181)
Inf	.642	-.101	.260	.459	-.387
	(.427)	(.451)	(.840)	(.818)	(.630)
Emp	.126	-.761	2.412***	-1.171**	.461
	(.727)	(.483)	(1.762)	(.873)	(.933)
IR	.635***	.589***	-.138**	.519*	.639
	(.124)	(.273)	(.288)	(.329)	(.281)
Controls	YES	YES	YES	YES	YES
Number of Observation	*20*	*20*	*20*	*20*	*20*

This table shows the results of the Pooled Ordinary Least Square (POLS) models with one new variable "Asset Specificity". Standard errors in parentheses. Significance levels: ***p<0.01, **p<0.05, *p<0.1

6. Conclusion

The study examines the impact macroeconomic factors on firm performances of the state-owned insurance companies operating in Bangladesh using data gathered for a time lapse of the last ten years. The empirical analysis shows that the macroeconomic variables affect either of the performance indicators of the state-owned insurance companies of Bangladesh. The interest rate is the key motivator for the growth in profitability of the state-run insurance firms and whereas, GDP growth rate, inflation and employment rate also pose impacts on the performance indicators of the insurance firms including dividend payout ratio, underwriting revenue and solvency ratio of the firms.

The findings of the study assemble the idea that GDP growth rate positively affects the performance of the state-owned insurance companies, whereas inflation wields a negative influence. In addition, employment rate and interest rate help increase the profitability and other solvency indicators of the insurance businesses. Hence, given the observation discussed, the study suggests several policy implications for the state-owned life and non-life insurance companies of Bangladesh. As this paper has investigated the effect of macroeconomic factors on the performance of state-owned insurance companies from the perspective of emerging economies country, the empirical findings will enrich the literature in terms of economic development and employment generation. This study also suggests that insurance

company can concentrate based on the effects of macroeconomic factors such as GDP and inflation which do not exercise any effect on the underwriting revenue to gross profit ratio of the state-run insurance companies in Bangladesh, whereas, employment rate positively affects the ratio indicating if more people are employed, the demand for insurance services rises, thus leading to more profit for the insurance companies. The study presents a negative association between interest rate and net profit margin ratio representing the decrease of net profit margin ratio. Therefore, in case of interest rate, to smoothening the volatility of interest rate, the non-life state-owned insurance company can enter into any hedge contract. Moreover, the study provides valuable information to different stakeholders of insurance firms namely, investors, experts, regulators and particularly management of the insurance companies who can be benefited based on the results of the study. Management can optimize the financial performance of the firms by downsizing the underwriting, operating and insolvency risk as a whole and can ensure the implementation of the industry and regulatory benchmarks.

However, the study focused on five indicators as the performance indicators of the state-owned insurance companies of Bangladesh. Thus, there are more avenues open for the researchers to conduct analysis on the other performance indicators and also inculcating the greater volume of data set to forecast the efficiency and performance of the other insurance firms as well.

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Appendix 1

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Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F(  1,       1) =     23.357
           Prob > F =      0.1299
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