



Article

Impacts of Insurers' Financial Insolvency on Non-Life Insurance Companies' Profitability: Evidence from Bangladesh

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Abstract: A stable and healthy insurance industry plays a vital role in sustaining an economy resistant to economic shocks by providing an efficient risk-transition mechanism. There is a relative scarcity of research inspecting the impact of insurers' financial insolvency on the profitability of insurance firms. Employing 2011–2019 panel data of 16 non-life insurance companies operating in Bangladesh, this research endeavors to examine the impacts of insurers' financial insolvency on the profitability of insurance companies measured by return ratios, return on assets (ROA), and return on equity (ROE). Fixed-effect regression outcome implies that insurers' financial insolvency has a significant adverse influence on non-life insurance companies' profitability. Further findings indicate that financial leverage, technical provision, age, and inflation have a noteworthy adverse influence on profitability. The outcomes of this research are of greater significance for policymakers in tackling insolvency and formulating policies to boost the growth of insurance profitability. In addition, this study aims to serve as a benchmark for other countries' insurance industries to emulate recovery strategies from financial insolvency.

Keywords: financial insolvency; non-life insurance companies; financial leverage; return on equity; return on asset; Bangladesh



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1. Introduction

A stable and thriving insurance industry plays a vital role in sustaining an economy resistant to financial shock by offering a suitable mechanism for the transition of risk. Furthermore, the insurance industry provides a substantial volume of investment funds in an economy by taking advantage of the nature of obligation instead of the nature of demand. [Ul Din et al. \(2017\)](#) stated that insurance firms encourage a sense of security for people, businesses, and governments, promote peace of mind and reduce anxiety and depression. For individuals, the purchase of an insurance policy helps a person to retain the constant consumption of their property in the event of theft or damage. While Bangladesh has become one of the world's most rapidly growing economies, the biggest challenge remains in making this growth inclusive and sustainable. In order to sustain the level of its development, the security of the country's property and business, raising potential financial stability, and promoting trade and commerce, are quite necessary and unavoidable. A financially stable insurance industry is able to provide security to property and businesses by taking all sorts of financial risks, which effectively reduces their anxiety and stress ([Fytros 2021](#)). [Puławska \(2021\)](#) argued that a well-developed and financially healthy insurance industry enhances the stability of financial markets. Nevertheless, insurers' financial insolvency is a common phenomenon in the present world. Financial insolvency occurs once the firm experience financial difficulties, and it is believed

by regulators that the firm can no longer meet its long-term and short-term obligations. Insolvency, which compares the net asset to the net written premium, is considered when the financial health of an insurance company is weak. When a company's total liabilities are larger than its total assets and the total premium collection is less than the total claim payment, the company's financial position becomes fragile. In this case, the company becomes financially unbalanced, and as such, it often fails to claim payment. A financially unstable firm is a baseless benchmark for prospective customers and is unable to attract potential policyholders. Therefore, the insurance company's premium collection gradually decreases from policyholders and increases liabilities and costs, which ultimately reduces the performance of the insurance firm. Therefore, to experience improved profitability, insurance firms need to be financially prosperous so that they can allay the worries of their customers and be able to take on liabilities for their damaged properties.

Companies utilize a variety of profitability ratios to provide helpful insights into the financial health and performance of the company. However, there are various profitability ratios that can be generalized into two categories, as follows: Margin ratios—such as gross profit margin, operating profit margin, net profit margin, cash-flow margin, EBIT, EBITDA, EBITDAR, and NOPAT—demonstrate how well a business turns sales into profits. Return ratios—such as ROA, ROE, and ROI—gauge a company's general capacity to increase shareholder value. This study focuses on the resource efficiency ratio, return on assets, and return on equity as measurements of the profitability of insurance firms. The return on asset (ROA) ratio is crucial for management to determine how well businesses are currently using their resources in comparison to their competitors, the industry average, and performance from the previous year. In other words, it demonstrates how effectively the company generates profits from the use of its available assets. On the other hand, return on equity (ROE) reveals the efficacy of the insurance company's equity utilization and a healthy image of managerial performance.

Typically, the government is responsible for controlling the financial solvency status of insurance firms. Insurance firms' solvency requires adequate capital available according to what is written on the insurance policies to perform the insured's legal obligations. When an insurance company becomes financially disabled or insolvent, the government must attempt reasonable steps, for instance, revocation of permits, cease-and-desist orders, as well as further efforts which confine the freedom of an insurer to conduct business. Large insurance companies are keener to invest in riskier assets because insurance firms are linked with different financial institutions. In this case, insurance firms are becoming riskier. The principle of assessing the insurance firm's solvency position opens the door for this study's prime focus, as the propensity for survival and bankruptcy of non-life insurance companies is unavoidable. Previously, a number of studies focused on the determinant of non-life insurance companies' profitability (see, e.g., [Zainudin et al. 2018](#); [Killins 2020](#); [Dhiab 2021](#)). [Alarussi and Alhaderi \(2018\)](#) explored firm-specific factors influencing insurance firms' profitability. [Tan \(2012\)](#) stated that financial distress affects the performance of insurance firms. It turns crucial to examine how financial insolvency affects the profitability of insurance companies. On the contrary, insolvency is a financially distressed situation where a financial institution or individual is unable to repay its obligations. To the best of our knowledge, there is no research focused on firm-specific factors, especially financial insolvency, that affect the profitability of insurance firms. Thus, this study fills the research gap by attempting to explore the impacts of financial insolvency on non-life insurance firms' profitability. The contribution of this study is manifold. From a novel perspective, firstly, this study will produce new knowledge regarding how insurers' financial insolvency affects the profitability of insurance companies. Secondly, based on the availability of data, this research aims to investigate and establish the link between financial insolvency and profitability. Ultimately, this research will support decision-makers in making investment decisions, policy-makers, and regulatory authorities to formulate appropriate policies and strategies.

Hypothesis Development

Financial institutions, both bank, and non-bank, play an important role in boosting an economy's growth by providing financial services. Usage of insurance services helps individuals manage their financial risks (Demirgüç-Kunt and Singer 2017). Bangladesh is considered to be one of the fastest developing economies in the world. Among other components of the financial system of Bangladesh, the non-life insurance business plays a critical role by contributing to an appropriate mechanism for the transition of risk. Financially stable insurance firms—which are able to meet policyholders' liabilities—are needed to keep the country's financial sustainability and inclusive growth (Fytros 2021).

An insurer's financial insolvency is supposed to have noteworthy impacts on the profitability of an insurance company. Entering financial insolvency in a year is defined as a position wherein cash flows are insufficient to cover current maturities' long-term commitments. Insurance insolvency is made up of three mechanisms: credit quality that is measured through investment returns, counterparty risk defined via reinsurance activities, and default risk when firms' liabilities are greater than assets (Caporale et al. 2017). According to Burca and Batrinca (2014), profitability increases insurance companies' solvency which is important for dealing with financial risk and meeting long-term financial obligations to potential policyholders. In contrast, insurance firms' solvency affects the bond to assets and equity to assets performance of the insurance market. A company's capacity to achieve profitability, market share, and long-term competitive advantage depends on its survival and progress. However, the unstable financial condition of insurance companies, particularly insolvent firms, makes it abortive to attract potential policyholders and keep their underlying strategies. Therefore, the insurance company's premium collection from policyholders steadily drops while liabilities and costs rise, weakening the company's performance. Therefore, the following hypothesis is being formulated:

H₀: *There is no relationship between an insurer's financial insolvency and the profitability of non-life insurance firms.*

2. Literature Review

2.1. Conceptualization of Insolvency and Profitability

Solvency denotes whether a firm is able to meet its long-term and short-term obligations. This is the capability of an institution to perform its obligations in any situation of termination or insolvency. An insurance firm's solvency affects its ability to obtain advance premiums, investment, and financing capital. An organization could be capable of meeting existing or potential obligations by efficiently liquidating assets. In contrast, if insurance firms' total assets are less than their current liabilities, insurers encounter an insolvency risk and are unable to meet their obligations. Ross et al. (2013) figured out two crucial parts of insolvency questions: stocks and flows. Considering insolvency on a stock basis, the market value of a corporation's assets is a lesser amount than the face value of its debt. Flow-based insolvency is a situation when the operating cash flows of firms are insufficient to satisfy current debts and obligations in the long term. Insolvency is when a business fails to generate adequate cash flows to meet its liabilities promptly. In this study, we consider the flow-based insolvency concept.

Profitability is a key tool for assessing a company's effectiveness in utilizing available resources. It is described as an investment's ability to gain a return on its investment or asset. Insurers' profitability is one of the most critical goals of the insurance firm's financial management since one of the objectives of financial management is to increase the owner's income and productivity. Burca and Batrinca (2014) elucidated that profitability boosts the solvency of insurance firms which is crucial for encountering financial risk and meeting financial obligations toward potential policyholders. As a result, insurance companies are able to meet both long-term and short-term obligations. The following section describes theories related to this study.

2.1.1. Cash Management Theory

Cash management theory assumes that a firm's financial demands, capital disbursement over time, carrying cash, opportunity cost, and transforming security transaction cost are fixed (Beaver 1966). This theory explores a firm as inflows and outflows supply and drains a liquid assets reservoir. The reservoir acts as a buffer when there is a disparity in the inflows. Following the theory, the exhaustion of reservoirs determines the solvency of firms which causes the firm's inability to repay obligations. The primary concern of this theory is the management of the company's cash inflows and outflows. To achieve the objective, this theory outlines how surplus money is invested and how the deficit is financed. A firm can be turned into a technically insolvent one without adequate cash flow, resulting in operations that adversely affect profitability. Financial insolvency can be avoided through effective management of cash flow. The authorities should keep the cash balance in the firm in order to avoid financial insolvency. Thus, this theory is crucial in interpreting why management should handle a cash balance in a corporation that avoids financial insolvency.

2.1.2. Credit Risk Theory

Merton (1974) established the credit risk theory as a structural theory. Merton (1974) used credit spread and credit portfolio management approaches to the measurement of credit risk. Managers allow a credit portfolio management approach to examine tradeoffs between various categories of assets from a credit perspective. By analyzing the stock price of the underlying asset, credit spreads provide analysts with a significant instrument for extracting and estimating default risk found within a financial contract. Therefore, lenders are exposed to credit risks, especially when the borrower fails to make the required payment on time, which leads to financial insolvency. This theory may help in assessing the level of debt a corporation has on its financial statements and how it impacts profitability.

2.2. Previous Studies

The main concern of this research is to explore and establish a link between financial insolvency and the profitability of insurance companies. Insurer financial insolvency has been a theme of study and area of interest for the last decade. Maulana and Mulyana (2020) stated that insurance profit is one such concept that has been implemented to signify the overall incremental profit of the insurer derived from the writing of the insurance sector. (Zainudin et al. 2018; Dhiab 2021) found various firm-specific factors, including solvency ratio, age of companies, financial leverage, technical provision, premium growth, and claim ratio, that influence insurance companies' financial performance. In addition, Killins (2020) found that macroeconomic factors, such as gross domestic product, interest rate, and inflation, influence the profitability of insurance firms.

Using data from 2008–2012, Burca and Batrinca (2014) observed that solvency margin has a substantial affirmative impact on an insurance company's profitability. A financially sound firm is a fair benchmark for prospective new clients and is uniquely positioned to retain future policyholders and sustain unique subscription strategies. In contrast, Lire and Tegegn (2016) found a negative relationship between the solvency margin, measured by the net asset to net written premium, and the insurance firm's profitability. The authors also explained that the more equity and less underwritten insurance firm premiums, the less profitability there will be. Without increasing the capital of insurance firms, they raise their underwritten premiums in order to increase their underwriting profit. The lower the equity base in comparison to the company's obligations, the lower the company's capability to overcome unpredictable shocks as well as not be able to guarantee payment for the claims.

Analyzing data from 1994–2011, Shiu (2020) found that those insurers who used more reinsurance appeared to have weaker financial health. In contrast, reinsurance and derivatives tended to be used by those insurers with a disposition to the management of risk. By purchasing reinsurance policies, primary insurance firms diversify their underwriting exposure, thereby boosting their financial stability. However, the widespread use of reinsur-

ance by an insurer may imply financial difficulties. In general, a less stable insurer appears to use more reinsurance because it fails to collect the cash flow from the financial market. However, current literature shows that firm-specific and macroeconomic factors influence profitability. In addition, the literature demonstrates that financial distress and reinsurance affect insurance firms' performance. No studies have been found regarding whether and how financial insolvency influences insurance companies' profitability. Therefore, this research attempts to examine whether and how financial insolvency impacts the profitability of insurance firms operating in Bangladesh.

3. Methodology

3.1. Insurance Market in Bangladesh

Immediately after the independence of Bangladesh in 1971, Sadharan Bima Corporation (SBC) and Jiban Bima Corporation (JBC) were founded as state-owned institutions to deal with general and life insurance protection for businesses and individuals' property under the Insurance Corporation Act of 1973. Insurance services were scarce at that time, and the industry made few efforts to develop new products. After that, private insurance companies were permitted for the first time to operate, according to the provisions of the Insurance Corporation Ordinance, 1984. In 2010, the Insurance Development and Regulatory Authority (IDRA) was established to regulate insurance businesses under the Insurance Development and Regulatory Authority Act 2010. At present, there are 78 insurance companies in Bangladesh, including the aforementioned 2 state-owned insurance firms. Of them, 47 insurance corporations are non-life, and 31 insurance firms are life insurance firms. Out of 47, 35 non-life insurance companies and 12 life insurance firms are listed in the capital market of Bangladesh. The robust insurance industry is critical to keeping an economy resistant to financial shocks by providing adequate risk-transfer mechanisms. As a result of this function, non-life insurance firms help to maintain financial stability by allowing economic systems to conduct a variety of transactions with the transfer facility and disperse risks. This implies the significance of non-life insurance firms in Bangladesh's economy. Insurance products are in the adverse category of demand, which implies that consumers are reluctant to purchase a policy unless there are legal requirements or it is absolutely essential. The insurance penetration ratio of Bangladesh is 0.55% as of 2018. Furthermore, under-penetration was exacerbated by a lack of effective corporate governance and policy support. According to [Re \(2020\)](#), non-life insurance has contributed 0.01% to the world market and accounts for 30% of the total insurance business in Bangladesh.

3.2. Sample Selection and Data Sources

The main motive of this research is to explore the connection between financial insolvency and the profitability of non-life insurance firms operating in Bangladesh. Based on data availability, we gathered 16 non-life insurance companies' time-series data ranging from 2011 to 2019. Insurance companies' profitability is the dependent variable in this study, measured by return on assets (ROA) and return on equity (ROE). Data on return on assets and return on equity have been collected from their annual reports. We collected data on financial insolvency, financial leverage, technical provision risk, and the age of the company from the annual reports for the period 2011–2019. We also collected data on the inflation rate, which is measured by the percentage of an annual consumer price index, from the World Development Indicator (WDI) of the World Bank. A list of samples of 16 non-life insurance companies is provided in [Table 1](#).

Table 1. List of non-life insurance firms.

Serial No.	Name of Non-Life Insurance Company
01	Asia-pacific General Insurance Company Limited
02	Bangladesh National Insurance Company Limited
03	Continental Insurance Company Limited
04	Express Insurance Company Limited
05	Federal Insurance Company Limited
06	Green Delta Insurance Company Limited
07	Mercantile Insurance Company Limited
08	Prime Insurance Company Limited
09	Republic Insurance Company Limited
10	Rupali Insurance Company Limited
11	Janata Insurance Company Limited
12	Global Insurance Company Limited
13	Peoples Insurance Company Limited
14	Sonar Bangla Insurance Company Limited
15	United Insurance Company Limited
16	Nitol Insurance Company Limited

3.3. Variables' Selection

3.3.1. Dependent Variable

The aim of this study is to inspect the impacts of financial insolvency on insurance firms' profitability. Therefore, based on previous literature and data availability, we considered the commonly used dependent variables, return on assets and return on equity, as proxies of profitability. ROA delineates how proficiently financial institutions generate profit in managing their resources (Husna and Satria 2019). ROE denotes shareholders' return from their invested equity. The ratio reveals the efficacy of the insurance company's equity utilization and a healthy image of managerial performance. A chunk of studies (see Burca and Batrinca 2014; Olalekan 2018; Kerim et al. 2019) used ROA and ROE as proxies for profitability.

3.3.2. Independent Variables

Examining the link between the financial insolvency and profitability of insurance companies is the main concern of this study. Thus, the independent variable is financial insolvency. We measure financial insolvency by the proportion of net assets to the net written premium of insurance companies. This ratio indicates the insurance company's financial health, denoting how efficiently the firm survives in the insurance industry in the long run. A lower value of the ratio is reflected as a weakness in financial health. In contrast, the higher value of the ratio is considered to be indicative of sound financial health. Hailegebreal (2016) found that an expected level of solvency ratio has an affirmative influence on insurance companies' profitability. In contrast, with a lower solvency ratio, the insurance company is financially outperformed by a higher solvency ratio, affecting firm profitability. Therefore, we expect an adverse relationship between financial insolvency and insurance companies' profitability.

To isolate the impacts of financial insolvency on the profitability of insurance firms, we consider some control variables in this research. First of all, financial leverage that discloses the extent of the borrowed funds utilized by the firm. In this study, we incorporate financial leverage, which indicates that the firm's asset ratio is financed with liability. The ratio of financial leverage is considered the portion of liabilities to assets. When a corporation has an exceedingly leveraged fund, the risk of insolvency exists, making it difficult to repay obligations. (Olalekan 2018; Batool and Sahi 2019; Dhiab 2021) observed that financial leverage adversely affects the profitability of insurance companies. Hence, we expect an inverse link between financial leverage and insurance firms' profitability.

Another control variable we considered is a technical provision that specifies the amount required by the insurer to satisfy its insurance liabilities and to settle any potential

liability that arises during the duration of the insurer's insurance contract portfolio for policyholders and other beneficiaries. Technical provision is measured by the share of outstanding claims to total equity as a safety ratio. The larger ratio is considered a better indicator of a firm's financial position. Technical provisions are created by insurance firms to meet liabilities deriving from their business. The provisions serve as a source of financing for the company's policyholder liabilities. As a result, the technical provisions are assessed to be sufficient for the amount that the insurance company can fulfill its obligations deriving from insurers at all times. Thus, we consider a technical provision in the present research and envisage a positive relationship between the issues.

The company's age reflects the number of years since which the insurance corporation has been functioning in the Bangladesh insurance industry. Several studies have considered this variable as it relates to the company's profitability and found mixed results. (Fali et al. 2020; Kaya 2015) found a negative correlation between the insurance companies' age and their profitability. With the increasing companies' age, insurance companies might rapidly change the environmental situation and lose their flexibility. Thus, we incorporate 'age' in this study and expect a negative association between insurance companies' age and profitability.

We have also incorporated another variable, inflation, in this research. Inflation vastly affects the profitability of insurance companies, along with influencing their assets and liabilities. Unexpected inflation is a cause of financial difficulties for insurance companies. An unexpected level of inflation influences higher claim payments and reduces technical provisions, which leads to the decelerating profitability of insurance companies. (Hailegebreal 2016; Batool and Sahi 2019) observed a negative link between unexpected inflation and insurance companies' profitability. Thus, we incorporate inflation into this research and predict a negative sign.

3.4. The Model

This study aims to scrutinize the connection between insurers' financial insolvency and the profitability of non-life insurance companies. Following the work of (Hasan et al. 2018), we develop the econometric model as follows:

$$ROA_{it} = \omega_0 + \omega_1 FINS_{it} + \omega_2 FIL_{it} + \omega_3 TP_{it} + \omega_4 AGE_{it} + \omega_5 INF_{it} + \eta_{it} \quad (1)$$

$$ROE_{it} = \omega_0 + \omega_1 FINS_{it} + \omega_2 FIL_{it} + \omega_3 TP_{it} + \omega_4 AGE_{it} + \omega_5 INF_{it} + \eta_{it} \quad (2)$$

In the above Equations (1) and (2), ROA_{it} and ROE_{it} signify as dependent variables that reflect i insurance firms' profitability at the period of t ; $FINS_{it}$ denotes financial insolvency, the main independent variable of interest and ω_{it} is the coefficient of the baseline model. Similarly, FIL_{it} represents financial leverage; TP_{it} denotes technical provision; AGE_{it} signifies companies' age; INF_{it} presents inflation rate; η_t denotes residual error term. A summary of the employed variable is represented in Table 2.

Table 2. List of employed variables, measurements, and their sources.

Variable	Measurement	Legend	Source
Profitability	The portion of net profit before tax to total asset	ROA	Annual report (2011–2019)
	The portion of net profit before tax to total shareholder equity	ROE	Annual report (2011–2019)
Financial insolvency	The share of net asset to net written premium	FINS	Annual report (2011–2019)
Financial leverage	The portion of total liabilities to total assets	FIL	Annual report (2011–2019)
Technical provision	The portion of claim outstanding to total equity	TP	Annual report (2011–2019)
Company age	The Logarithm of the number of years in which the general insurance firm has been functioning in the Bangladesh insurance industry	AGE	Annual report (2011–2019)
Inflation rate	Inflation, consumer price index (annual percentage)	INF	World development indicator

4. Empirical Results and Their Discussions

4.1. Summary Statistics

Table 3 displays the summary statistics of variables and Table 4 provides descriptive for all variables separately for sample non-life insurance firms.

Table 3. Summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	142	0.090	0.079	0.010	0.631
ROE	142	0.129	0.070	0.015	0.722
FINS	142	2.965	1.171	0.321	6.382
FIL	142	0.298	0.371	−2.160	0.933
TP	142	0.248	0.588	−0.013	3.750
AGE	144	1.270	0.130	1.041	1.531
INF	144	6.742	1.778	5.514	11.395

The dependent variable of interest is profitability, measured by return on assets and return on equity, which provides a mean of 0.090 and 0.129 with a minimum of 0.010 and 0.015 and a maximum value of 0.631 and 0.722 standard deviations of 0.079 and 0.070, respectively. We found Republic Insurance Company has the greater mean value of return on asset of 0.265, and Green Delta Insurance company has the lowest mean value of 0.038. In addition, Janata Insurance has a lower mean of return on equity of 0.076, and United Insurance has a higher mean value of 0.250. In the case of independent variable financial insolvency, we examine a mean of 2.965, with a minimum value of 0.321 and a maximum of 6.382, with a minor standard deviation of 1.171. United Insurance has a higher mean value of financial insolvency of 5.201, whereas Republic Insurance has a smaller mean of 1.312. The smaller value indicates larger financial insolvency of firms. Similarly, we examined the mean value of financial leverage as 0.298 with a minor standard deviation of 0.371. Republic Insurance has a lower mean of financial leverage of −0.372, and mercantile has a higher value of 0.473; the lower value of financial leverage signifies a better financial position. For technical provision, we found that United Insurance has a higher mean value of 0.248, whereas Green Delta has a lower mean value of 0.000. We found that the age of the company provides a mean of 1.270 with a smaller standard deviation of

0.130. The highest age of company mean of 1.476 is for Peoples' Insurance, and the lowest mean of 1.169 is for Express, Green Delta, Republic, Global, and Sonar Bangla insurance companies. Furthermore, we observed that the inflation rate provides a mean of 6.742, where a minimum value of 5.514 and a maximum of 11.395, with a lower standard deviation of 1.778. In short, the lower value of standard deviation, maximum, and minimum presents that variable appropriate for additional analysis.

Table 4. Non-life insurance company-wise mean value of all variables.

Name of Firm	ROA	ROE	FINS	FIL	TP	AGE	INF
Asia-pacific	0.086	0.130	3.734	0.340	0.084	1.198	6.742
BD National	0.082	0.115	2.300	0.285	0.182	1.275	6.742
Continental	0.084	0.116	2.390	0.272	0.104	1.198	6.742
Express	0.087	0.121	2.784	0.335	0.127	1.169	6.742
Federal	0.058	0.110	2.425	0.465	0.049	1.445	6.742
Green Delta	0.038	0.130	3.349	0.409	0.156	1.169	6.742
Mercantile	0.061	0.114	4.126	0.473	0.000	1.283	6.742
Prime	0.094	0.170	2.835	0.449	0.026	1.283	6.742
Republic	0.265	0.199	1.312	−0.372	0.154	1.169	6.742
Rupali	0.079	0.111	3.094	0.285	0.125	1.429	6.742
Janata	0.049	0.076	3.611	0.356	0.096	1.461	6.742
Global	0.067	0.085	3.693	0.206	0.031	1.169	6.742
Peoples	0.076	0.125	3.310	0.380	0.066	1.476	6.742
Sonar Bangla	0.109	0.165	1.799	0.333	0.185	1.169	6.742
United	0.130	0.107	5.201	0.174	2.328	1.198	6.742
Nitol	0.092	0.156	1.525	0.398	0.227	1.225	6.742
Total	0.090	0.129	2.968	0.299	0.246	1.270	6.742

4.2. Multicollinearity Test

In the present research, we employed panel data of 16 non-life insurance firms from 2011 to 2019, and thus there is a need to check for multicollinearity. To check multicollinearity among variables, we first conducted a correlation analysis. [Wooldridge \(2015\)](#) suggested that a correlation coefficient of not greater than 0.7 be accepted, which implies a lower level of multicollinearity. Secondly, we analyze the variance inflation factors test to check for correlation among variables. [Ott and Longnecker \(2015\)](#) argued that variance inflation factor values of more than 10 designate high multicollinearity. Table 5 exhibits the outcomes of correlation analysis and variance inflation factors, respectively. Findings show that the Variance Inflation Factor, VIF, values are not more than 10, and the correlation coefficient is less than 0.7, which implies a lower level of multicollinearity among variables. Therefore, the low multicollinearity among variables is not a big issue for conducting further analysis.

Table 5. Results of correlation matrix and VIF test.

	ROA	ROE	FINS	FIL	TP	AGE	INF	VIF
ROA	1.000							
ROE	0.317	1.000						
FINS	−0.242	−0.414	1.000					1.190
FIL	−0.902	0.027	0.054	1.000				1.040
TP	0.047	0.085	0.365	−0.070	1.000			1.200
AGE	−0.213	−0.279	0.093	0.120	−0.140	1.000		1.210
INF	−0.030	0.090	−0.064	0.082	−0.001	−0.351	1.000	1.160
Mean VIF								1.160

4.3. Cross-Sectional Dependency Test

It is essential to analyze the Cross-sectional Dependency (CD) test to deal with panel data. Because ignorance of cross-sectional dependence resolution might be the reason for generating bias and contradictory results. Therefore, we performed the Pesaran (2004) CD tests in Equation (3) to examine the appearance of cross-sectional dependence.

$$CD = \sqrt{\frac{2T}{(N-1)N}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij} \right) \tag{3}$$

In the aforementioned Equation (3), panel index is denoted by N ; T signifies period, and indicates a connection between the i th and j th error terms. Additionally, it has zero average value for the fixed value of N and T . Here,

$$\hat{\rho}_{ij} = \sum_{t=1}^T \frac{x_{it}x_{jt}}{(\sum_{t=1}^T x_{it}^2)^{1/2} (\sum_{t=1}^T x_{jt}^2)^{1/2}} \tag{4}$$

The OLS residual error terms on the basis of T observation for every $i = 1, \dots, N$ are clarified by x_{it} . The Pesaran (2004) CD test result strongly accepted the alternative hypothesis at a 1 percent significance level, which denotes the absence of cross-sectional dependency. The outcomes are displayed in Table 6.

Table 6. Outcomes of CD test.

	Test	Statistics	Prob.
Model-1	Pesaran CD	7.406	0.000 ***
Model-2	Pesaran CD	5.783	0.000 ***

Note: *** signifies 1% significant level.

4.4. Unit Root Test

Levin et al. (2002), known as LLC, panel unit root test is the usually used unit root test (Hasan et al. 2018; Zhao et al. 2018; Alam et al. 2021). The LLC test is based on orthogonalized residuals, and the long-run to short-run variance ratio of a particular variable is corrected. This test allows for serially correlated heterogeneous error based on Augmented Dickey-Fuller (ADF) regression as the subsequent type:

$$\Delta k_{it} = \alpha_i + \theta_t + \omega_i t + \rho_i k_{i,t-1} + \sum_{j=0}^p \alpha_j \Delta k_{i,t-j} + \eta_{it} \quad (i = 1, \dots, N; t = 1, \dots, T) \tag{5}$$

In above-mention Equation (5), Δk_{it} signify exogenous variables; $\alpha_i, \theta_t, \omega_i t$ are nuisance parameters; Δk_{it} is regressed on Δk_{t-j} ; p implies a number of lag and η_{it} is a residual error term, whereas $i = 1, \dots, N$ presents panel index; $t = 1, \dots, T$ signifies time index. Hence, the alternative hypothesis $H_a: \rho_i < 1$ and the null hypothesis $H_0: \rho_i = 0$ for all series is applied in the LLC panel unit root test. In line with LLC unit root testing, the null hypothesis (H_0) might be rejected for a portion or one or all i .

The LLC unit root test results are shown in Table 7. In column 2, including intercept only, the outcomes show that all variables strongly rejected the null hypothesis at 1 percent significant level, except inflation rate. Similarly, in column 4, including time trend and intercept, we find variables that reject the null hypothesis at a 1% significance level, demonstrating that applied variables are stationary at the level. On the other hand, columns 6 and 8 present the outcome of the unit root test at first deference, including both intercept and trend. We find those entire variables consistently rejected the null hypothesis at a 1% significant level. The overall result implies that all series are stationary in a different order.

Table 7. The results of LLC Unit Root Test.

Variables	Level				First Deference			
	Intercept		Intercept & Trend		Intercept		Intercept & Trend	
	Statistics	Prob.	Statistics	Prob.	Statistics	Prob.	Statistics	Prob.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ROA	-3.746	0.000 *	-13.918	0.000 *	-14.674	0.000 *	-15.097	0.000 *
ROE	-2.577	0.005 *	-42.129	0.000 *	-29.825	0.000 *	-13.028	0.000 *
FINS	-5.810	0.000 *	-11.173	0.000 *	-18.230	0.000 *	-18.324	0.000 *
FIL	-7.433	0.000 *	-5.330	0.000 *	-11.214	0.000 *	-13.771	0.000 *
TP	-2.990	0.001 *	-4.002	0.000 *	-8.652	0.000 *	-12.099	0.000 *
AGE	-14.601	0.000 *	-12.583	0.000 *	-13.681	0.000 *	-9.394	0.000 *
INF	6.681	1.000	-47.578	0.000 *	-67.105	0.000 *	-59.309	0.000 *

Note: Automatic lag selection criteria: AIC. maximum lag order to be 0 to 2. * denotes a significant 1% level of significance.

4.5. Regression Results and Their Discussions

To decide the selection of fixed-effect or random-effect regression analysis, we conducted the Hausman (1978) specification analysis. Based on the specification test outcome, we ran a fixed-effect regression analysis in this study, and the results are exhibited in Table 8.

The empirical finding indicates that the insurance company’s financial insolvency, FINS, has a statistically significant negative influence on both ROA and ROE. As the more stable insurance firms attract better risks and obtain higher premium revenue, it is notable that the profitability of insurance firms can be improved via a higher solvency margin. In addition, an insurance firm’s stable financial situation can encounter financial difficulties effectively and meet its liabilities; thus, the insurance firm can attract prospective new customers and potential policyholders and keep its underlying strategies that lead to accelerating expected returns (Burca and Batrinca 2014). Financially unstable insurers are unable to attract prospective policyholders and fail to uphold underlying strategies that dwindle the premium revenues of firms, resulting in firms’ being unable to meet their obligations. In short, insurers’ financial insolvency adversely impacts the profitability of insurance companies.

Table 8. Outcomes of fixed-effect regression analysis.

Variables	MODEL-1				MODEL-2			
	Dependent Variable: ROA				Dependent Variable: ROE			
	Coeff.	Std. Err.	t	Prob.	Coeff.	Std. Err.	t	Prob.
FINS	−0.014	0.003	−4.470	0.000 ***	−0.041	0.008	−5.360	0.000 ***
FIL	−0.185	0.006	−29.830	0.000 ***	0.017	0.015	1.130	0.262
TP	−0.005	0.009	−0.540	0.589	0.038	0.022	1.720	0.087 *
AGE	−0.236	0.044	−5.310	0.000 ***	−0.489	0.108	−4.540	0.000 ***
INF	−0.005	0.002	−3.060	0.003 ***	−0.011	0.004	−2.870	0.005 ***
_cons	0.522	0.066	7.920	0.000 ***	0.934	0.160	5.840	0.000 ***
R-square	0.883				0.327			
F	183.29 (<i>p</i> -value = 0.000)				11.00 (<i>p</i> -value = 0.000)			
Hausman	12.69 (<i>p</i> -value = 0.026)				18.06 (<i>p</i> -value = 0.003)			

Note: *** and * signify variable significant at 1% and 10% respectively.

Among control variables, we found that the financial leverage ratio has a significant negative association with ROA, whereas there is no significant relationship with ROE. The higher amount of levered funds raises the risk of insolvency and makes it challenging to meet its obligations. Insurance companies' profitability is negatively affected by an unexpected financial leverage ratio. This outcome is in line with (Batool and Sahi 2019; Olalekan 2018).

We also found a negative, though the insignificant connection between technical provision and ROA has significant affirmative impacts on ROE, confirming the predicted outcomes. These outcomes indicate that as insurance companies keep sufficient technical provisions, and profitability is increased simultaneously. The provisions are used to cover the company's policyholder liabilities. As a result, the technical provisions are intended to ensure that the insurance business can satisfy its contractual responsibilities at all times. Insurance companies' sufficient technical provision presents a better financial position for them, which leads to boosted earnings for firms. These outcomes are similar to Akpan et al. (2017).

We also found that the company's age has a statistically significant negative link with ROA and ROE. An insurance company may change the environmental conditions and drop financial flexibility due to the company's increasing age. As a result, the inflexible financial condition is hindered by the growing profit of the insurance firm. The findings are consistent with those of Fali et al. (2020).

The empirical outcome also indicates that inflation has statistically significant adverse impacts on ROA and ROE. Unexpected inflation rates affect expenses, assets, liabilities, technical provisions, and claim payments in the future, which decelerates a firm's growth. In short, unpredictable inflation rates adversely affect the profitability of insurance companies. This outcome is similar to Batool and Sahi (2019) and Hailegebreal (2016). Overall, we conclude that insurers' financial insolvency has adverse impacts on non-life insurance firms' profitability.

4.6. Robustness Check

To check the robustness of the outcomes of fixed effect regression, we conducted two popular models: Generalized Methods of Moments (GMM) and Ordinary Least Square (OLS). Using GMM and OLS, we find that all variables, except inflation, have significant impacts on the profitability of insurance companies, which are similar to the results of fixed effects regression analysis. These outcomes imply that the aforementioned technique and results are more comprehensive and robust. Table 9 exhibits the outcomes of OLS and GMM techniques.

Table 9. Robustness check using GMM and OLS techniques.

Variables	MODEL-1				MODEL-2			
	Dependent Variable: ROA				Dependent Variable: ROE			
	GMM		OLS		GMM		OLS	
	Coef.	P > z	Coef.	P > t	Coef.	P > z	Coef.	P > t
FINS	−0.023	0.000 ***	−0.014	0.000 ***	−0.063	0.000 ***	−0.029	0.000 ***
FIL	−0.191	0.000 ***	−0.188	0.000 ***	0.014	0.421	0.019	0.183
TP	−0.014	0.074 *	0.007	0.167	0.047	0.029 **	0.028	0.003 ***
AGE	−0.111	0.004 ***	−0.050	0.022 **	−0.221	0.047 **	−0.119	0.006 ***
INF	0.012	0.000 ***	0.000	0.999	0.022	0.015 **	−0.001	0.733
_cons	0.288	0.000 ***	0.249	0.000 ***	0.457	0.018 **	0.360	0.000 ***
F			168.270	0.000 ***			10.800	0.000 ***
R-square			0.860				0.284	
Wald ch2	2494.99 (p-value = 0.000)				128.63 (p-value = 0.000)			
No. of instrument	41				41			

Note: ***, **, and * signify variable significant at 1%, 5%, and 10% respectively.

5. Conclusions

Employing panel data from 2011 to 2019, this research empirically examined the impact of insurers' financial insolvency on the profitability of non-life insurance firms. The outcomes indicate that insurers' financial insolvency has a notable adverse influence on the profitability of insurance companies. An insurance company's uncertain financial situation faces financial distress and is unable to cover its liabilities. Thus, the insurance firm cannot attract prospective new clients and future policyholders and finds it hard to maintain its underlying strategies that decelerate anticipated returns. We also found that financial leverage and profitability are adversely associated. We examined an affirmative link between technical provision and the profitability of insurance firms. Technical provisions are created by insurance firms to meet responsibilities deriving from their business. As a result, the technical provisions are envisioned to ensure that the insurance business can satisfy its contractual responsibilities. We found an adverse connection between the age of insurance firms and profitability. An insurer can change the environmental situation and reduce financial flexibility with the company's increasing age, which reduces expected returns. We observed that the inflation rate has a noteworthy negative link with the profitability of insurance firms. Unexpected inflation rates impact potential expenses, assets, liabilities, technical provisions, and payment claims, which slows down firm development. In the present research, these results are robust for applying two different techniques.

Policy Recommendation, Limitations, and Further Research

The primary motive of this investigation is to generate inspirational attention among policy-makers and decision-makers of non-life insurance firms to take policies and plans that will lead to accelerating the firm's profitability. Although this research focused on the connection between insurers' financial insolvency and non-life insurance companies' profitability, data inadequacy was the prime issue. Once data becomes available, future researchers could add more indicators for analysis and compare them with the whole insurance industry, making outcomes more comparable.

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original draft, Writing—review & editing. S.K. was responsible for Supervision, Validation, writing—original draft, review, and editing. S.J. was responsible for Supervision, Validation, writing—review and editing, Visualization. S.R. was responsible for Supervision, Validation, writing—review. All authors have read and agreed to the published version of the manuscript.

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