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Article

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Determinants of financial distress: evidence from insurance companies in Ethiopia

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Abstract

The issue of financial distress has received much attention of scholars because it harms firm financial and operational systems which could lead to insolvency. The objective of this study is to examine the determinants of financial distress in Ethiopian insurance companies. A panel dataset was obtained from 11 insurance companies which range from 2010 to 2021. The study used the “Altman’s Z”-score model as a measure for financial distress. The pooled OLS regression results revealed that profitability (ROA), liquidity levels, insurers’ size, earnings growth, diversification have negative and significant effect on financial distress. Moreover, inflation rate, claims ratio, leverage, and asset tangibility have positive significant impact on financial distress. The study will have implications for different stakeholders, such as managers, policy makers, shareholders, etc., in that firm-specific and macro-economic factors are essential for managing the status of financial distress.

Keywords: Financial distress, “Altman’s Z”-score, Insurance companies, Ethiopia, Pooled OLS

JEL Classification: C33, G22, M41, F65

Introduction

Many academicians, scholars, and practitioners are now concerned about the financial health and survival of enterprises, owing to the fact that it has a substantial impact on the overall aims of the firms. The primary goal of any corporate organization is to maximize shareholder wealth (Gitman, 2010). To that aim, every activity conducted by the firm should be directed toward accomplishing this goal. However, many businesses fail to meet their objectives due to incapacity to meet their financial responsibilities or financial difficulty (Gemedo, 2020). After the collapse of various large corporations throughout the world, such as Enron Corp, WorldCom, Xerox, Lehman Brothers, AIG, and Freddie, the issue of financial distress has recently become a hot topic and point of contention in the field of corporate finance (Mahamad, 2015).

In the African context, specifically in sub-Saharan African countries, such as Nigeria, Kenya, Uganda, and Tanzania, banks experienced severe financial distress, and as a result, a number of banks were closed, merged, or taken over by their respective national banks (Brown, 2009). Holland Car and Access Real Estate are two enterprises that have

had financial difficulties in Ethiopia (Andualem, 2011). This all suggests that financial strain is a serious issue for all businesses, whether large or small, and whether they are located in industrialized or developing countries.

Financial distress is a major problem that describes financial difficulties associated with a lack of sufficient liquidity, profitability, efficiency, and solvency (Kiros, 2020). Moreover, financial distress is a problem that may result when the firm is unable to generate sufficient cash flows from its operating, financing, and investing activities (Jantadej, 2006). Furthermore, the problem of financial distress may result from a lack of generating sufficient profitability and financial self-sufficiency. In a broad sense, financial distress could be understood as being used in a negative connotation in order to describe the financial situation of a company confronted with a temporary lack of liquidity and with the difficulties that ensue in fulfilling financial obligations on schedule and to the full extent (Yonas, 2021).

Several studies are conducted on determinants of financial distress in different cases, at different times, and in different parts of the world. The followings are among the studies that were conducted on financial distress: Ceylan (2021), Jaafar et al. (2018); Jahan (2018); Khafid et al. (2019); Kristanti et al. (2021); Masdupi et al. (2018); Wesa and Otinga (2018); Zhang et al. (2015). In Ethiopian context: Andualem (2011), Ephrem (2015), Enyew and Fekadu (2019), Gemedo (2020) and Yonas (2021) have investigated the determinants of financial distress in different sectors. Even though many studies are conducted on this crucial topic, still there is a shortage literature in insurance sector. Many researchers gave emphasis to the manufacturing sector, banking industry, and a little attention is given for insurance industry. In addition to this there is methodological gap while measuring the degree of financial distress, because most of the studies conducted in other industries in Ethiopia have used debt service coverage, a univariate analysis (UA) technique with single financial ratio, for measuring financial distress. In this Study, ZETA analysis or the Altman Z-score, multivariate analysis (MA) technique was used to measure the financial distress.

There is inconsistency of findings between the two studies done in Ethiopia. Enyew and Fekadu (2019) showed that the financial health condition of the insurers under study was not in a safe condition and it shows continuous fluctuations. On the other hand, the research finding of Yonas (2021) revealed that sampled insurance companies are in the safe zone. This is also the gap that this study fulfills by supporting the finding of Enyew and Fekadu (2019). In addition to the inconsistency that discussed above, empirical investigation that had made in Ethiopian insurance industry are far from being sufficient, as a result this study was contributed to the body of knowledge by investigating the effect firm specific, industry specific and macro-economic determinants of financial distress in the case of insurance companies in Ethiopia. Furthermore, this study is different from previous in sample size used, variables used, and nature of data used to investigate the determinants of financial distress in Ethiopian insurance companies.

Literature review and hypothesis development

Definition of financial distress

Various scholars have defined the term financial distress differently. As a result, there is no single universally accepted definition for the term financial distress. This may

due to the complexity and variety of causes that leads to financial distress. Or due to a variety of events may be falling a firms under financial distress. According to Agostini (2018), corporate financial distress can be defined as a negative lasting situation during which a firm experiences bad financial conditions, such as low liquidity, inability to pay debts, restriction on dividend distribution policy, increase in the cost of capital, reduction in access to external funding sources, and weaker credit ratings.

Financial distress predictive model

There are various models that are used to measure the financial distress condition of firms those are, debt service coverage (DSC), Springate S score model, Olson model, standard poor's model, etc. However, this study used Altman Z-score model to measure the financial distress condition of insurance companies in Ethiopia. This is because of the fact that Altman Z-score model is used for measuring firm financial distress by predicting the probability that the firm will become distressed within 2 years Ikpesu and Eboiyehi (2018) and Kristanti et al. (2016). In this study, the new Altman's Z-score model was used to estimate the financial distress condition of insurance companies in Ethiopia.

Hypothesis development

In this study, the following variables based empirical review was conducted to investigate the determinants of financial distress in Ethiopian insurance companies. The empirical reviews were made in the Global context, in African context, and in Ethiopian context, but for the sake of simplicity it was summarized as follows through variables based.

Liquidity refers to the firm's ability to pay short-term financial obligations as they become due (Adeyemi, 2011). Liquidity can also be defined as the ease with which current assets can be converted into cash so as to meet the obligation of a firm (Pranow et al., 2010). According to Ceylan (2021), liquidity ratio is the "Ratio used to determine the ability of the company to meet its short-term obligations in a timely manner". When the company is illiquid or have lack of sufficient liquidity it is possible to say that the company is in unhealthy situation. Liquidity ratio also measures a company's ability to pay off its short-term liabilities and debt obligations from short-term assets (Baimwera, 2014). Liquidity ratio can also measure ability of an asset to be converted to cash quickly and cheaply at the lower costs (Richard et al., 2000). The profitability ratio shows how much a firm is effective in generating profits by using company total assets or it indicates the company's ability to generate revenue over expenses or net profits by using the company total assets (Kisman et al., 2019). According to Brealey et al. (2000), profitability ratio is used to measure the firm's return on assets. This profitability ratio is computed by the ratio of net income to total assets (Campbell et al., 2005; Yonas, 2021). Therefore, we predict the hypotheses as follows:

H₁: Profitability has a significant positive effect on Z-score as a proxy of financial distress of insurance companies in Ethiopia.

H₂: Liquidity has a significant positive effect on Z-score as a proxy of financial distress of insurance companies in Ethiopia.

The leverage ratio is a financial ratio that describes the amount of debt used by the company to finance its business operations compared to its own capital or equity (Kisman et al., 2019). Leverage ratios also measures how much financial leverage the firm has taken on from the creditors (Brealey et al., 2000). If a high percentage of a firm's capital structure is in the form of debt, then the firm is said to have a high degree of financial leverage (Ehrhardt and Brigham, 2011). According to these scholars, leverage ratios are a measures of the relative contribution of stockholders and creditors for the total assets of a firms. Thus a higher ratio indicates high financial leverage and the high probability that leads the firms to financial distress risk (Baimwera, 2014). While the lower ratio, shows low financial leverage a low possibility of financial risk. The size of the company is assessed through assets owned by the firms. The size of the company also directly reflect the high and low operating activities of a company (Liahmad et al., 2021). The firm that has large in size would be better in a diversifying its assets and tend to be lower chance of financial distress (Berry-Stölzl et al., 2013). As a number of studies documented that company size is one of the key determinants of financial distress and it is inversely related to financial distress. Kristanti et al. (2021) and Udin et al. (2017) also argued that firm size is negatively related to the probability of a firm going financial distress. Drawing on these empirical findings, we designed the hypotheses:

H₃: Leverage has a significant negative effect on Z-score as a proxy of financial distress of insurance companies in Ethiopia.

H₄: Company size has a significant positive effect on Z-score as a proxy of financial distress of insurance companies in Ethiopia.

Earnings Profit or income is the change in equity of an entity during one particular period resulting from transactions and events or events that are not coming from the owner (Liahmad et al., 2021). The major sources of revenue for insurance business is premium earned and it is the most common sources of revenue than other sources (Yonas, 2021). According to Kristanti et al. (2021) the premium growth ratio is one of the ratios that are included in the earnings growth or income Stability Ratios. This Earnings growth ratio is also used to indicate the stability level of a premium in an insurance company. A significant volatility in the volume of earnings or income indicates a low level of stability in the insurance company's business activities (Dewi et al., 2017; Kristanti et al., 2021). Various empirical literature evidenced that earnings growth and the possibility of financial distress in insurance companies have an inverse relationship. Claims ratio is the ratio of claims incurred to premiums earned by insurance business. According to Kristanti et al. (2021) claims ratio shows the records of claims that occurred and the quality of the insurers claim closing efforts. The higher the ratio implies that a low capacity for expense payments and vice versa (Yonas, 2021). In insurance business this ratio is very vital, since it can affect the profits earned by the company (Dewi et al., 2014; Rameschandra, 2013; Torona & Tiub, 2014). Asset tangibility is the proportion of fixed assets from the total assets of the company. Thus the firm asset tangibility is calculated by dividing the total fixed assets of the company to its total assets. According to Yonas (2021) the high ratio of fixed assets in the total assets of the company indicates an inefficient use of working capital

which reduces the firm's amount of current assets and its profitability (Yonas, 2021). This idea is also supported by other scholars; according to Jia-Liu (2015), the high proportion of fixed assets had a significantly positive correlation with bank distress in the ASEAN, NIC, and G8. Relying on these empirical evidences, we have developed the relationship as below:

H₅: Claims ratio has a significant negative effect on Z-score as a proxy of financial distress of insurance companies in Ethiopia.

H₆: Asset tangibility has a significant effect on Z-score as a proxy of financial distress of insurance companies in Ethiopia.

Company age is the number of period that the company operating in the market. The age of insurance companies tells about the experiences acquired by the institution with operations, resource mobilization as well as market experience. Age of a company does matter, older firms are more experienced, have enjoyed the benefits of learning, are not prone to the liabilities of newness, and can therefore enjoy superior performance (Shiu, 2004). Older firms may benefit from reputation effects, which allow them to earn a higher margin on sales (Yonas, 2021). Inflation refers to a situation in which the economy's overall price level is rising (Mankiw, 2012). Hence, we can predict the hypotheses as follows:

H₇: Company age has a significant positive effect on Z-score as a proxy of financial distress of insurance companies in Ethiopia.

H₈: Earnings growth has a significant positive effect on Z-score as a proxy of financial distress of insurance companies in Ethiopia.

Inflation is also defined as continuous increases in general prices level of goods and services. A continuous decline in the purchasing power of money is also an indicator of inflation in the economy. It is a persistent tendency for prices and money wages to windup. According to Samuel (2021) if inflation rate is higher than expected, insurance companies will not have sufficient premiums to meet with claims incurred and this can increase insolvency probabilities to insurers. Lowe and Warren (2010) also evidenced the negative impact of inflation on property-liability insurers' claim costs, loss reserves and asset portfolios. The other macro-economic variable that was used in this study is annual exchange rate. Exchange rate is defined as depreciation of local currency relative to base currency or foreign currency. According to Ceylan (2021), exchange rate is defined as the real effective exchange rate of USD to Ethiopian birr. Many argue that exchange rate volatility has contributed a significant impact on the financial crisis occurred in many countries so far. Excessive exchange rate volatility impairs economic and financial stability in a country and was found to have played a significant role in inducing financial crises in many countries. Thus, depreciation of local currency (ETB) relative to foreign currency (USD) can increase the possibility of the firm financial distress. This idea is supported by Zhang et al. (2015), who evidenced that change in exchange rate can lead firms to financial distress. So the researcher hypothesize that: there is a direct relationship between increase in

exchange rate and financial distress condition of insurance companies in Ethiopia. In addition to firm-specific variables macro-economic variables could have effect on financial distress and we developed the following hypothesis to test the relationship:

H₁₀: Inflation rate has a significant negative effect on Z-score as a proxy of financial distress of insurance companies in Ethiopia.

H₁₁: Exchange rate has a significant negative effect on Z-score as a proxy of financial distress of insurance companies in Ethiopia.

Methods

Data and sample size

The research approach employed in the current study was a quantitative research approach with an explanatory research design because the objective of this study is to identify the determinants of financial distress for insurance companies in Ethiopia. The target population of this study is all insurance companies in Ethiopia. Currently, there are 18 insurance companies operating in Ethiopia (NBE, 2019/2020). The study applied the judgmental sampling technique. From the total of 18 insurance companies, only 11 that have a 12-year (2010–2021) annual report were selected. We obtained financial data of the sample insurance companies and macroeconomics data from National Bank of Ethiopia.

Model specification

According to Brooks (2008), unlike correlation, in the case of regression if X has significant effect on Y, thus change in Y is influenced by change in X. This implies that regression is used to show cause and effect relationship between dependent and explanatory variables. Therefore, to see the effect of firm-specific and macro-economic factors on insurance companies' financial distress multiple linear regression model was used. This is because multiple linear regression model is the most reliable model that is widely accepted and used in the literatures. As a result this study was employed multiple linear regression model to achieve the stated objective. The significant factors that affect firm financial distress was used as the representatives for the variations. The regression model is estimated and presented in the following linear format:

$$(FD)Z_{it} = \beta_0 + \beta_1 LIQ_{it} + \beta_2 ROA_{it} + \beta_3 LEV_{it} + \beta_4 FSIZE_{it} + \beta_5 CR_{it} + \beta_6 AT_{it} + \beta_7 FA_{it} + \beta_8 EG_{it} + \beta_9 DIV_{it} + \beta_{10} INFR_{it} + \beta_{11} EXR_{it} + \varepsilon_{it},$$

where Z-score—the dependent variable and calculated from financial ratio manually as follows:

$$Z - score = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4,$$

where X_1 = working capital/total assets, X_2 = retained earning/total assets, X_3 = EBIT/total assets, X_4 = book value of equity/total debt if the Z value is greater than 2.6, the firm is considered to be in a safe zone, if the Z value is between 1.1 and 2.6, the firm is in a grey zone; on the other hand, Z value below 1.1 shows the firm is regarded to be in a distress zone (Altman, 2000). i represents individual insurance company; t represents

time; LIQ stands for liquidity of insurance companies; ROA stands for profitability of insurance companies; LEV stands for leverage of insurance companies; FSIZE stands for firm size or insurers size in Ethiopia; CR stands for claims ratio of insurance companies in Ethiopia; AT stands for asset tangibility of insurance companies in Ethiopia; FA stands for firm or company age of insurance companies in Ethiopia; EG stands for earnings growth; DIV stands for insurers service diversification; INFR stands for inflation rate and EXR stands for exchange rate.

Results and discussion

Descriptive statistics of variables

Table 1 shows that the mean value of the Z-score is 1.987, which indicates that the sampled insurance companies are within the moderate zone according to Altman (2000) classification. This moderate zone is the area that exists between the distress zone and the safe zone. The finding of this study is consistent with Enyew and Fekadu (2019) who evidenced that the financial health condition of the insurance companies in Ethiopia was in a grey zone. The minimum and maximum values of the Z-score were -1.157 and 5.114 with a standard deviation of 1.254 (Tables 1, 2).

The mean value of profitability which is measured by ROA is 8.7% ; this indicates that insurance companies in Ethiopia are profitable on average during the study period. The maximum value of ROA is 73.6% and the minimum value of ROA is -12.2% . This result can also be interpreted as the insurance companies got a return on average of 0.087 birr or 8.7 cents for every one birr investment they made on the total assets. The most profitable insurance companies earned 0.736 birr or 73.6 cents profit for a single birr investment they made on the total assets.

The mean value of liquidity is 0.986 which implies that the sampled insurance companies are possessing a liquidity position below the standard liquidity ratio of $2:1$. This in turn, will lead the insurers to insolvency. The maximum, minimum, and standard deviation of liquidity for the sampled insurance companies is 1.632 , 0.263 , and 0.241 , respectively. The mean value of liquidity can also be interpreted as, the sampled insurance

Table 1 Summary of descriptive statistics

Variables	Obs	Mean	Std. Dev	Min	Max
Z-score	132	1.987	1.254	-1.157	5.114
ROA	132	0.087	.086	-0.122	0.736
Size	132	$1.168e+09$	$2.456e+08$	55,250,220	$1.775e+10$
LEV	132	2.493	2.394	0.008	27.173
Firm Age	132	26.5	27.955	3	118
EG	132	1.147	8.714	-2.23	99.222
LIQ	132	0.986	0.241	0.263	1.632
CR	132	1.540	6.25	0	66
AST	132	0.25	0.257	0.051	0.926
DIV	132	0.64	0.481	0	1
INFR	132	0.15	0.081	0.066	0.32
EXR	132	25.55	8.591	16.9	45

Source: STATA version 14 (2022)

Table 2 Pearson correlation coefficients

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Z-score	1.000											
(2) ROA	0.200	1.000										
(3) Size	0.123	0.123	1.000									
(4) LEV	− 0.234	0.124	− 0.044	1.000								
(5) Firm age	0.066	0.385	0.431	0.054	1.000							
(6) EG	0.096	0.075	0.006	0.017	− 0.002	1.000						
(7) LiQ	0.883	0.059	0.320	− 0.218	− 0.065	0.032	1.000					
(8) INFR	− 0.102	− 0.009	0.005	− 0.040	0.014	0.081	− 0.035	1.000				
(9) CR	− 0.249	0.022	0.032	− 0.004	0.027	0.045	− 0.151	− 0.016	1.000			
(10) EXR	− 0.090	0.094	0.115	− 0.174	0.280	− 0.086	− 0.069	0.267	0.034	1.000		
(11) DiV	0.207	0.266	0.480	− 0.010	0.482	0.066	− 0.005	0.020	− 0.081	0.032	1.000	
(12) AST	− 0.020	− 0.092	− 0.111	− 0.071	0.018	0.191	0.014	0.076	0.003	0.179	0.161	1.000

Source: STATA 14 (2022)

companies are having 0.986 birr or 98.6 cents current assets to cover 1 birr current liabilities.

The average size of sample insurance companies is 1,168,461,436 with a minimum value of 55,250,220 and maximum values of 17,752,397,000. The maximum value of size indicates that some insurance companies are very large in size as compared to others; therefore, the larger insurance companies may enjoy economies of scale.

With regard to leverage, a higher ratio indicates high financial leverage while a lower ratio shows low financial leverage. The value of leverage which is measured by debt to equity ratio is 2.49, which revealed that the debt financing of insurance companies is 2.49. In other words, the debt financing of insurance companies is 2.5 times greater than equity financing. From this result it is possible to understand that the sampled insurance companies are highly leveraged and this may lead the insurance companies to financial problems.

Earnings growth has an average value of 1.15. The minimum and maximum values of earnings growth during the study period are - 2.23 and 99.2, respectively. The standard deviation of earnings growth for insurance companies under the study period amounts 8.71, which indicates the existence of a high variation of earnings growth among insurance companies in Ethiopia. The average value of firm age is 26.5, which shows that the average age of insurance companies is 26 years and 6 months. The minimum age and maximum age of insurance companies was 3 years and 118 months, respectively.

The claims ratio has a mean value of 1.540, while the minimum and maximum values are 0 and 66, respectively. The standard deviation of the claims ratio is 6.25, which indicated that there is a big variation among the sampled insurance companies regarding the claims ratio. Asset tangibility, fixed assets to total assets of insurance companies shows 0.25 mean which indicated that the total fixed assets of the firm cover around 25% of the total assets. The minimum and maximum values of asset tangibility are 0.051 and 0.926, respectively, with the standard deviation of 0.257 which indicated the existence of moderate variation among the sample insurance companies by distribution of asset tangibility.

The mean value of diversification shows that 64% of sampled insurance companies are underwriting both the general and life insurance services. This value shows that most of the sample insurance companies are diversified their services.

With regard to the macro-economic variables inflation has mean, minimum and maximum value 15%, 6.6% and 32%, respectively. The mean value of inflation indicates that Ethiopian economy had been experiencing an average of 15% inflationary effect for the last 12 years. The standard deviation of inflation rate is 8.1% which indicates the existence of high deviation from the mean and the maximum value of inflation rate is 32% that was recorded in the year 2011.

The mean, minimum and maximum value of exchange rate during the study period are 25.55, 16.9 and 45, respectively. The mean value of exchange rate implies that the value of one dollar in terms of Ethiopia currency is 25 birr and 55 cents on average. The maximum value of exchange rate during the study period is 45 birr which was recorded in the year 2021.

Correlation analysis

According to Gujarati (2004), the objective of correlation analysis is to measure the degree of linear association among two variables. In this study, Pearson correlation analysis was employed to know the degree of correlation among variables (dependent variable and explanatory variables) and the degree of correlation among independent variables as well. The following table is used to show correlation of independent variables with dependent variable.

As shown in Table 2, leverage (LEV), claims ratio (CR) and inflation rate (INFR) had a negative and significant correlation with Z-score at 5% level of significance. It suggests an increase in the variables may result in a decline in a Z-score which in turn increases financial distress. The negative and significant correlation of leverage and claims ratio with Z-score implying that increase in debt to equity ratio and claim incurred to earned premium will positively contribute for the possibility of insurance companies' financial distress. That means the use of higher leverage and the payments of high claim expenses will negatively affect the financial healthiness of Ethiopian insurance companies. While, return on assets (ROA), size, liquidity (LIQ) and service diversification (DIV) had positive and significant correlation with Z-score at 1% level of significance. It indicates that increase in this variables leads to increase in Z-score and decrease the possibility financial distress. The positive and significant correlation between profitability and Z-score indicates that highly profitable insurance companies have able to shoulder financial distress, which means the higher the profitability the good financial healthiness of insurers and the low possibility of financial distress. Again the positive and significant correlation of firm size and liquidity on Z-score implies that large and highly liquid companies have high ability to safe from the risk of financial distress. That means the larger insurance companies the lower possibility of financial distress this is because if the fact that large companies have high opportunity to use the economies of scale. The positive and significant correlation between liquidity and Z-score indicates that liquidity of insurance companies is negatively correlated with the probability of financial distress in Ethiopian insurance companies. This is true because the higher the liquidity of firms the higher ability of the companies to fulfill their short-term obligation and the lower probability that the firms to undergo financial distress. However, asset tangibility (AST), firm age (FA) and exchange rate (EXR) had insignificant correlation with Z-score.

Assumption of classical linear regression model

To ensure whether the data suit the basic assumptions of the classical linear regression model, the following tests have been conducted: heteroskedasticity test, multicollinearity test, autocorrelation test, normality test, model specification or Ramsey test, the Hausman specification test and Breusch–Pagan–Lagrange multiplier. Each of them are discussed below in detail (Table 3).

The result shows that the general model goodness as represented by F statistic is satisfied. The model explains about 86.42% of the variation in the dependent variable (Z-score) is explained by the independent variables, such as profitability, liquidity, earnings growth, firm age, claim ratio, size, leverage, diversification of insurance service, asset tangibility, inflation and exchange rate. The remaining 13.58% explained by other

Table 3 Assumption of classical linear regression model

Assumptions	One	The error have zero mean ($E(\epsilon) = 0$)
	Checked by	Adding a constant term (β_0) to the model
	Result	The assumption is not violated
	Two	Homoscedasticity (variance of the errors term is constant)
	Checked by	Breusch–Pagan / Cook–Weisberg test for heteroskedasticity
	Result	Since the P value of test statistic is highly insignificant,, there is no heteroskedasticity problem
	Three	Multicollinearity
	Checked by	Variance inflation factor (VIF)
	Result	The finding revealed the values of variance inflation factor (VIF) on each variables is less than 10 and values $1 / VIF$ is greater than 0.1 or 10%. As a result multicollinearity is not a serious problem in the model
	Four	Autocorrelation test
	Checked by	Wooldridge test for autocorrelation in panel data
	Result	The P value of test static is highly insignificant. Hence, there is no evidence for the existence of autocorrelation problem in the model
	Five	Normality test (residuals are normally distributed)
	Checked by	Shapiro–Wilk
	Result	P - values of the residual is highly insignificant, the residuals has normal distribution pattern
	Six	Model specification test
	Checked by	Ramsey RESET test
	Result	Prob > F = 0.8723 which is highly greater than 0.05. This shows that the null hypothesis of the model, which says no omitted variable
Reason for test		Parameter estimation technique among fixed and random effect model
Types of test done		Hausman specification test
STATA result		Since the P -values is highly insignificant (> 0.05) the researcher is decided that the random effect model is suitable for this data set

variables that are not included in this model. The value of beta coefficient on the above regression model denotes that the degree of each coefficient of independent variables effect on dependent variable in both directions. On the other hand, the P value of each independent variables indicates the percentage level of each explanatory variables is significant.

Profitability and financial distress

As may be seen in Table 4, the return on assets (ROA) has a significant positive ($\beta = 1.49842$, $t = 2.74$, $P < 0.01$) effect on Z-score, indicating a negative causal relation with the level of financial distress. Regarding when the value of the Z-score increases the financial healthiness of insurance companies will improve and their probability of going into financial distress will decrease. The logic behind the concept is that profitability improves a company's financial health and allows it to earn enough profit to keep up with its growth rate. On the other hand, if the company's financial health improves, the likelihood of financial trouble decreases, and vice versa. This is the reason why the value of the beta coefficient who have a positive effect on the Z-score is interpreted as it has a negative effect on the likelihood of financial distress. This finding is consistent with prior studies, such as Andualem (2011) and Ceylan (2021) who evidenced that increase

Table 4 Summary of hypothesized and actual results

Independent variables	Measurements or proxy	Expected impact on Z-score as proxy of FD	Actual result	Statistical significance level	Hypothesis status or decisions
Profitability	ROA	Positive & significant	Positive & significant	Significant at 1%	Accepted
Liquidity	CR	Positive & significant	Positive & significant	Significant at 1%	Accepted
Firm size	NLTA	Positive & significant	Positive & significant	Significant at 5%	Accepted
Firm age	Age of firms	Positive & significant	Negative & insignificant	Insignificant at 5%	Rejected
Earnings growth	Change in EBIT	Positive & significant	Positive & significant	Significant at 5%	Accepted
Claims ratio	CI/PE	Negative & significant	Negative & significant	Significant at 1%	Accepted
Leverage	TD/TE	Negative & significant	Negative & significant	Significant at 10%	Accepted
Asset tangibility	FA/TA	Positive & significant	Negative & significant	Significant at 10%	Accepted
Diversification	D: 1&0	Positive & significant	Positive & significant	Significant at 1%	Accepted
Inflation	CPI	Negative & significant	Negative & significant	Significant at 5%	Accepted
Exchange rate	Annual EXR	Negative & significant	Negative & insignificant	Insignificant at 5%	Rejected

Source: compiled by researchers, 2022

in profitability leads to reduce the probability of firm financial distress. Again this result is also consistent with the research finding of Enyew and Fekadu (2019) who states that the higher the level of profitability the better financial healthiness of insurance companies in Ethiopia and the decrease the probability of financial distress. Consequently, this study verified the premise that profitability has a negative and significant effect on financial distress.

Liquidity and financial distress

The positive and significant effect of liquidity ($\beta = 4.5391$, $t = 22.94$, $P < 0.01$) on Z-score, indicates a negative causal relation with financial distress. The liquidity coefficient reveals a significant positive indication, implying a positive impact on the Z-score and a negative impact on the likelihood of the firm entering financial trouble. This is because a higher Z-score indicates a lower likelihood of financial trouble and vice versa. Furthermore, the findings imply that increasing the degree of liquidity can improve the financial health of insurance businesses in Ethiopia and reduce the likelihood of financial difficulty. This study's findings are consistent with previous studies, such as Andualem (2011), Enyew and Fekadu (2019), Pranowo et al. (2010), Thim et al. (2011), which demonstrated that increasing the ratio of current assets to current liabilities improves company financial health and reduces the likelihood of financial distress. Moreover, this finding is also compatible with the technical insolvency method. When a company is technically insolvent, it is unable to meet its existing financial obligations, suggesting a lack of liquidity (Altman & Hotchkiss, 2006). Consequently, this study confirmed

the premise that insurance company liquidity had a large negative impact on financial distress.

Earnings growth and financial distress

As shown in Table 5, earnings growth has significant positive impact ($\beta = 0.01037882$, $t = 2.06$, $P < 0.05$) on the Z-score of insurance companies, which indicating a negative effect on level of financial distress. As a result, as insurance businesses' earnings rise, their financial health improves and their risk of financial trouble declines. The beta coefficient of .010374 indicates that, while all other explanatory variables remain constant, one unit increase in earnings leads to .0103074 units increase in Z-score and decreases the probability of financial distress for insurance companies in Ethiopia. This is due to the fact that financial distress is inversely interpreted to its proxy, i.e., Z-score value, which means that as the value of Z-score increases, the probability of financial distress decreases and vice versa. This study's findings are compatible with prior studies, such as Dewi et al. (2017), Jahan (2018), Khan and Jain (2004), Kristanti et al. (2021) who state that a significant increase in the volume of earnings indicates a high level of financial health in the insurance company's business activities. Nevertheless, the finding of Yonas (2021) revealed a positive relationship between earnings growth of insurance companies in Ethiopia and their probability of financial distress, but his finding is not significant even at 10% significance level.

Firm size and financial distress

As it can be seen in Table 5 the firm size has a significant positive ($\beta = 0.0335573$, $t = 2.18$, $P < 0.05$) effect on Z-score, indicating a negative relation with financial distress. This result implies that as the firm size increase the level of financial distress will decrease in the institutions. The coefficient of size shows a positive impact on z-score that will improve insurance companies' financial healthiness and reduce the probability of financial distress and vice versa. This finding is similar with previous findings, such as Andualem (2011), Enyew and Fekadu (2019), Ephrem (2015), Kristanti et al. (2021), Udin et al., (2017), Yonas (2021) who evidenced that large companies are likely to be more health and leading the companies to be out of the distress zone. However, this finding is not consistent with the "too-big-to-fail" concepts which expects large firm take excessive risk in an anticipation of government support during difficulties. As a result, the researcher accepted the hypothesis, which states that firm size has a significant positive effect on Z-score.

Claims ratio and financial distress

As illustrated in Table 5, claims ratio has significant negative ($\beta = -0.0194452$, $t = -2.76$, $P < 0.01$) effect on Z-score, indicating a positive effect on possibility of financial distress. This finding is interpreted as the higher ratio of claims incurred to earned premium will increase insurers possibility of financial distress. The coefficient of claims ratio shows a negative significant indication, suggesting a negative impact on Z-score and positive effect on probability of financial distress by deteriorating the insurance companies' financial health. This means as the number of claims increased in comparison to the premium earned the financial healthiness of the insurance companies will

Table 5 Regression results of the study

Source	SS	df	MS	Number of obs = 132		
Model residual	178.22135	11	16.2019409	F(11,120) = 69.44		
	27.9998473	120	0.23333206	Prob > F = 0.0000		
Total	206.221198	131	1.57420761	R-squared = 0.8642		
				Adj R-squared = 0.8518		
				Root MSE = 0.48304		
Z-score	Coef.	Std. Err.	T	P> t	[95% conf. Interval]	
ROA	1.49842	.5460139	2.74	0.007	0.4173505	2.57949
Liq	4.539123	.1978605	22.94	0.000	4.147372	4.930873
EG	0.0103782	0.0050417	2.06	0.042	0.000396	0.0203604
Firm age	− 0.023008	0.078482	− 0.29	0.770	− 0.178397	0.1323809
CR	− 0.0194452	0.0070446	− 2.76	0.007	− 0.033393	− 0.0054974
Size	0.0335573	0.0153997	2.18	0.031	0.0030669	0.0640477
LEV	− 0.033134	0.0189507	− 1.75	0.083	− 0.0706551	0.004387
DIV	0.3480898	0.114457	3.04	0.003	0.121473	0.5747067
INFR	− 1.175165	0.5168369	− 2.27	0.034	− 2.257864	− 0.0924662
AST	− 0.3096705	0.1766728	− 1.75	0.082	− 0.6594702	0.0401293
EXR	− 0.0973497	0.1601026	− 0.61	0.544	− 0.4143418	0.2196423
_Cons	− 2.542778	0.5714619	− 4.45	0.000	− 3.674232	− 1.411323

Source: STATA 14 output, data from financial statements of sampled insurance companies

NB: level of significance is decided at 1%, at 5% and 10%

spark and this can facilitate the probability of the firm financial distress. This is because of the fact that claims can increase the amount of expenses in insurance business operation. The findings of this investigation are congruent with the prior scholars, such as Yusuf and Dansu (2014), who evidenced that the higher claims expense as compared to earned premium, the higher the probability of insurance companies to undergo financial distress as cited by Yonas (2021) the following scholars also documented a positive relationship between claims ratio and financial distress of insurance companies: Ennis and Malek (2005), Denis and Mihov (2003), Chemmanur and Fulghieri (1994), and Horrigan (1966), and Palepu (1986), and Rajan and Zingales (1995), cited by Yonas (2021). In view of that, the researcher accepted which states that claims ratio has a significant negative effect on Z-score.

Leverage and financial distress

It could be seen in Table 5 that the leverage ratio has negative ($\beta = -0.033134$, $t = -1.75$, $P < 0.1$) effect on Z-score, indicating a positive effect on the level of financial distress. The coefficient of leverage ratio shows a negative significant indication, suggesting a negative impact on Z-score and positive effect on the level of financial distress. This indicates as leverage ratio increases the financial healthiness of insurance companies will erode and this situation can increase the probability of financial distress. This study's findings are compatible with the tradeoff theory and supported by the empirical findings of the following scholars: Enyew and Fekadu (2019), Jaafar et al. (2018), Khafid et al. (2019), Pranowo et al. (2010), Outecheva (2007), Udin et al. (2017). As a result, the researcher accepted the hypothesis that leverage had a considerable negative impact on Z-score.

Service diversification and financial distress

As seen in the preceding Table 5, diversification has a significant positive ($\beta = 0.3480898$, $t = 3.04$, $P < 0.01$) effect on Z-score, indicating a negative relation with probability of financial distress. This indicates that service diversification has a statistically significant positive relationship with the financial health status of insurers and negative relation with the possibility of financial distress. Therefore, the researcher accepted the hypothesis which states that insurance company's service diversification has a significant negative effect on financial distress of insurance companies in Ethiopia. The findings of this investigation are congruent with Martin and Sayrak (2003) who stated that diversification of services can mitigate companies from failures. This study's findings further corroborate the Coordinated Risk Management theory, which claims that risk management is not synonymous with risk reduction. Rather, it is a method of determining the ideal level of risk for a firm's survival.

Inflation rate and financial distress

It could be seen in Table 5 that inflation rate has a significant negative ($\beta = -1.175165$, $t = -2.15$, $P < 0.05$) effect on Z-score indicating a positive causal relationship with the likelihood of financial distress. This implies that inflation rate has a positive and statistically significant impact on the level of financial distress of insurance companies during the study period. The negative beta coefficient of inflation rate can also be interpreted as keeping all other explanatory variables constant, one percent increase in inflation rate can lead to -1.175165 decrease in Z-score and increase in the possibility of financial distress of Ethiopian insurance companies. Therefore, this finding confirmed the alternative hypothesis which states that inflation rate has a significant positive effect on financial distress. The finding of this study is supported by different scholars, such as Lowe and Warren (2010) who states if inflation rate is higher than expected, insurance companies will not have sufficient premiums to meet with claims incurred and this can increase insolvency probabilities to the insurers.

Asset tangibility and financial distress

As shown in above Table 5, asset tangibility has significant negative ($\beta = -0.3096705$, $t = -1.75$, $P < 0.10$) effect on Z-score indicating a positive causal relationship with financial distress. This implies that high proportion of fixed assets from the total assets of the company has negative effect on the financial healthiness of insurers in Ethiopia. The coefficient indicates that one unit increase in asset tangibility leads to -0.3096705 decrease in Z-score and increase in the probability of financial distress. This study's findings are in line with Ceylan (2021), Jia-Liu (2015) and Yonas (2021) who evidenced the high proportion of fixed assets indicates an inefficient use of working capital which reduces the firm's amount of current assets and profitability.

Exchange rate and financial distress

As one can see from above Table 5, exchange rate has a negative but statistically insignificant ($\beta = -0.0973497$, $t = -0.61$, $P > 0.10$) impact on the Z-score of insurance companies indicating a positive causal relationship with financial distress. Based on the beta coefficient it can be concluded that, keeping all other explanatory variables constant,

one unit increase in exchange rate leads to -0.0973497 unit decrease in Z-score and increase in the level of financial distress. The finding of this study is consistent with Zhang et al. (2015) who stated that high volatility of exchange rate can lead to financial distress. But in this study exchange rate has no significant effect on the financial distress of insurance companies in Ethiopia. Therefore, the hypothesis which stated that exchange rate has a significant positive effect on financial distress of insurance companies is rejected.

Firm age and financial distress

The P -value of 0.786 in Table 5 demonstrates that company age has no effect on the level of financial hardship because the P -value is not significant even at the 10% threshold of significance. As a result, the hypothesis that company age has a strong negative effect on financial distress in Ethiopian insurance companies was refuted. Because the degree of significance is so low, and the sign of the beta coefficient is also contrary to the hypothesis. The sign of the beta coefficient indicates that as a firm's age increases, it may experience financial distress. Even though the firm age is insignificant, the negative coefficient of firm age is supported by Coleman's (2007) thesis that as the age of a financial institution increases, the organization expands and reaches more disadvantaged people. However, in this study, firm age is relatively negligible, hence the researcher concludes that firm age is not a factor that indicates financial distress.

Conclusions

Based on descriptive statistics and pooled OLS regression analysis findings, the following conclusions were derived. Based on the mean value of Z-score and Altman classification, the researcher discovered that the current financial health of insurance enterprises in Ethiopia is not in a safe zone. ROA has a positive and statistically significant influence on Z-score as a proxy for financial distress in Ethiopian insurance enterprises, indicating a negative and statistically significant effect on FD, according to the pooled OLS model findings. Profitability has a negative and statistically significant influence on the risk of financial difficulty, demonstrating that when businesses earn enough profit, they are less likely to encounter financial hardship.

The positive liquidity coefficient in relation to Z-score indicates a significant negative link with the FD. If a company has more liquid assets, it will be able to meet its fixed costs more easily, and the chances going bankrupt will be smaller. The size of an insurer has a negative and statistically significant effect on the likelihood of financial distress. This is because size-related diversification may provide them with a better incentive to reduce financial distress, and firms with a large size will be in a good position of financial stability and can minimize their financial distress risk.

Earnings growth, as measured by changes in earnings before interest and tax, has a negative and statistically significant impact on Ethiopian insurance businesses' financial distress. This means that the greater the rate of earnings growth, the better the financial health. The negative coefficient claims ratio relative to Z-score demonstrates the substantial positive link between variable FD likelihood and this ratio. This is because

large claims expenses can undermine insurance firms' financial health and, as a result, increase the danger of financial difficulty.

Asset tangibility has a positive impact on financial distress, implying that a corporation with a significant volume of plant assets in comparison to its present assets is in a worse financial position. Because insurance service diversification has a negative influence on financial distress, diversified insurers have a high capacity to bear the risk of financial distress. The positive and significant influence of inflation rate on insurers' risk of financial distress implies that a continual increase in inflation rate may impair insurers' financial health status, ultimately leading to the danger of financial distress.

In summary, the study concluded that profitability, liquidity, company size, profits growth, diversification, claims ratio, and inflation rate are the primary factors of financial distress in Ethiopian insurance businesses.

Theoretical and practical implications

Depending on the mean value of Z-score on descriptive statistics the study concludes that insurance companies in Ethiopia are in grey zone. It implies the financial health condition of the insurance companies was not in a safe condition. So it is better if management of insurance companies take corrective actions before their companies face serious bankruptcy problem.

The positive relationship between liquidity and z-score as proxy of financial distress indicates that increase in liquidity level leads to decrease the level of financial distress. Therefore, management of insurance companies should have to maintain sufficient current assets to cover their short-term financial obligations and reduce probability of financial distress and bankruptcy as well. Again the negative relationship between diversification and financial distress implies that adaption of modern insurance service has positive effect on the financial healthiness of insurance companies. Therefore, it is better if the managers of non-diversified insurance companies have to adopt modern insurance service (life insurance). Again the adoption of this modern insurance service are very important for insurance companies since it gives them competitive advantage to attract customers. It is also recommendable if the customers of insurance companies use this modern insurance service (life insurance) to join globalized services. This is because of the fact that the level life insurance service is very low in Ethiopia.

The negative and significant relationship between profitability, earnings growth and financial distress indicates that profitable insurance companies have high ability to shoulder the risk of financial distress. As a result, managers of insurance companies shall try to improve their profitability and earnings growth to reduce the likelihood of financial distress. The positive relationship between leverage and financial distress implies that increase in leverage ratio leads to financial distress. So insurance companies need to reduce debt ratio and maintain optimum capital structure as much as possible. Again the positive relationship between claims ratio and financial distress indicates that high claim expense as compared to premium earned increase the possibility of financial distress. Therefore, it is better if management of insurance companies are collected enough premium to pay high claim expenses and reduce the probability of financial distress. Overall, in order to ensure their financial healthiness the management of insurance

companies should give attention to the key determinants of financial distress of insurance companies.

Additionally, based on the findings of this study, inflation rate has significant effect on the insurer's financial health, so the study recommend managers and practitioners to take into account the effect of macro-economic factors while making strategies and managing risks.

Again this study recommend supervisors that, the financial health condition of insurers under study was not in a condition. Moreover, the minimum value z-score implies the existence of insurance companies in a distress zone, as a result there should be a close supervision to identify insurance companies that has higher level of financial distress and take remedial actions before they leads to bankruptcy and failure.

Since macro-economic factors are among the determinants that negatively affect the financial healthiness of insurance companies, it is better if government take corrective action to reduce the effect of these factors on the financial healthiness of insurance companies. Last but not least, since the failure of insurance companies can easily spread to other sectors of economy, it is better if corrective action is taken on time and the government to pay attention to this important sector by creating a conducive environment and infrastructural facilities to reduce their possibility of financial distress.

Limitation of the study and suggestion for future research

This study, like any other study, also has its own limitations. Consequently, the study only explains 86.42% of the variation in the dependent variable, implying that there are still other factors explaining determinants of financial distress. Consequently, future research should be conducted by including other firm-specific and macro-economic factors, such as corporate governance, ownership structure, regulation, rule of law, control of corruption, and the like that will affect the financial health of insurance companies. Inclusion of such factors may result in robust future studies and help to arrive at a more general conclusion. Future researchers would be better qualified to conduct research between countries, as this one only addresses one country's context. Since this study only considers insurance companies, additional research will be conducted to examine the determinants of financial distress in other financial institutions, like commercial banks and microfinance institutions.

Appendix

Breusch–Pagan/Cook–Weisberg test for heteroskedasticity.

Ho: Constant variance.

Variables: fitted values of z-score.

$\chi^2(1) = 0.13$.

$\text{Prob} > \chi^2 = 0.7199$.

Variance inflation factor (VIF)

	VIF	1/VIF
Firm age	1.719	0.582
Size	1.655	0.604
DIV	1.639	0.61
EXR	1.333	0.75
Liq	1.26	0.794
ROA	1.257	0.796
LEV	1.155	0.866
AST	1.154	0.867
INFR	1.1	0.909
EG	1.083	0.923
CR	1.021	0.979
Mean VIF	1.321	

Source: STATA 14 output, 2022Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

$F(1, 10) = 2.548$

$\text{Prob} > F = 0.1445$

Shapiro–Wilk W test for normal data

Variable	Obs	W	V	Z	Prob > z
Residual	132	0.988	1.302	0.594	0.276

Ramsey RESET test using powers of the fitted values of Z-score

H0: model has no omitted variables

$F(3, 117) = 0.23$

$\text{Prob} > F = 0.8723$

Hausman specification test

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fe	(B) re		
ROA	1.563053	1.399822	.1632303	.0951673
Size	.1824981	.0331739	.1493242	.1041023
LEV	-.0278225	-.0282315	.000409	.0021636
FirmAge	.6334657	.0986487	.534817	.257679
EG	.0083777	.0093257	-.000948	.
Liq	4.145218	4.289752	-.1445334	.0853705
INFR	-.5606025	-1.083032	.5224291	.1825106
CR	-.0165432	-.0167053	.0001621	.
EXR	-.7478575	-.1699836	-.577874	.2300134
DIV	.0026317	.2665945	-.2639628	.4347493
AST	-.449382	-.4130009	-.036381	.1386958

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 14.87
Prob>chi2 = 0.1886

Abbreviations

AT	Asset tangibility
CR	Claims ratio
DIV	Diversification
DSC	Debt service coverage
EBIT	Earnings before interest and tax
EG	Earnings growth
FA	Firm age
EXR	Exchange rate
FD	Financial distress
FSIZE	Firm size
GDP	Gross domestic product
INFR	Inflation rate
LEV	Firm leverage
LIQ	Liquidity
NG	Natural logarithm
MDA	Multiple discriminant analysis
MA	Multivariate analysis
NBE	National bank of Ethiopia
OLS	Ordinary least square
ROA	Return on asset
UA	Univariate analysis

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Author contributions

GD wrote the main manuscript text and TN and OT drafted the work, commented and substantively revised it from proposal write stage to the final stage of completion of the paper. TN and OT reviewed the manuscript.

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Data availability

All data generated or analyzed during this study are included in this published article.

Declarations

Ethics approval and consent to participate

The datasets generated and/or analyzed during the current study are obtained from each insurance companies and on the other hand, data on macro-economic factors, such as inflation and exchange rate, were collected from National bank reports and the Central Statistics Agency (CSA).

Consent for publication

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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