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UNTYING EMPIRICAL KNOTS: DETERIORATION OF PROFITABILITY, ECONOMIC FAILURE, AND FINANCIAL INSOLVENCY IN THE PHILIPPINES BEFORE COVID-19 OUTBREAK

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Abstract

Corporate bankruptcy has enormous economic ramifications, particularly for investors and creditors of publicly listed companies (PLC). Prior to a corporate collapse, a company's financial status is frequently in jeopardy, and its performance either affirms progress or predicts failure. As a result, management is interested in a technique of determining a company's financial distress. Financial accounting analyses were performed to determine the solvency, liquidity, profitability, and gearing capacity of 136 firms, with 680 economic entries, before CoVid-19 Outbreak. To scrutinise financial distress, the Altman Z-scores and financial zone of discriminations were generated through GB bankruptcy, and PLC bankruptcy model. The link between declining profitability, economic failure, and financial insolvency as indicators of financial distress was examined through panel regression with random factors. Prior to the COVID-19 outbreak, there were no signs of declining profitability, economic collapse, or financial insolvency in the Philippines, according to the findings of the study. Individual components of financial distress and the overall z-score have no statistically meaningful association with financial performance and position markers. As a result, the solvency ratio has little predictive value in forecasting financial distress. The fact that a company has a higher solvency ratio does not also imply that it is less likely to go bankrupt. The findings go counter to classic accounting perspectives and pure managerial research that claim the solvency ratio is always a reliable predictor of financial distress. Finally, the paper examined the financial health of firms and untangled the knots of financial distress.

Keywords: financial analysis, financial distress, Altman Z-score of bankruptcy, panel econometrics, publicly-listed companies

Introduction

There have been several instances of business blunders during the last few years. As a result, many enterprises are in financial difficulties or have gone bankrupt. A troubling tendency is emerging as a result of numerous occurrences of similar errors in many sectors around the world. According to Pauli and Wolf (2017) and Sicat (2017), Hanjin Philippines, the largest foreign investor in the Subic Bay Freeport Region, has become financially challenged due to its huge debt (2010). The corporation can no longer continue its operations due to a lagging revenue and debt burden. This is just one of several examples in the Philippines that have been documented.

Financial distress is when a firm is having financial problems, and if these problems are not resolved, the company may go bankrupt. A Financial crisis, according to Brigham and Daves (2007), arises when cash flow projections indicate that the company will soon be unable to satisfy its obligations. Companies might benefit from a better understanding of the causes that contribute to financial difficulties in order to take preventative measures to avoid bankruptcy. Based on a solvency ratio of 67 percent, a study by Brîndescu-Olariu (2016a) encompassing 1176 Romanian enterprises revealed general categorisation accuracy. Although this degree of precision leaves a lot of space for error, it is indeed enough to be employed as a solvency ratio classifier (Chung et al., 2008). Because the tests were conducted on a paired sample of 588 bankrupt enterprises and 588 non-bankrupt enterprises, the optimum cut-off value was not deemed appropriate for the entire population (which has an annual bankruptcy rate of less than 3 percent), therefore no assessment technique was designed.

In this study, financial statements of publicly traded companies on the Philippine Stock Exchange were utilised for meticulous and cross-sectional accounting investigation. The goal of the study was to test if solvency analysis could be used as a predictor of a company's financial problems and untie the knots of relationships between the elements of financial distress (deterioration of profitability, economic failure and financial insolvency) and indicators of financial position and performance (solvency, liquidity, profitability, and growth). The Altman technique, a novel financial tool of interpreting financial bankruptcy, was performed and the Z-scores were generated by manipulating financial statements. The Altman Z-score is a tedious procedure of analysing bankruptcy and is proven to be nearly accurate in evaluating the financial distress of companies (Russ, Peffley, & Greenfield, 2004). It would seem logical to foresee the risk of financial trouble in order to avert future bankruptcy for businesses and stakeholders, particularly investors, lenders, and capital market participants. According to Chouhan, Chandra, and Goswami (2014), severe financial difficulty poses a threat

to long-term viability. Therefore, setting up an early warning mechanism for corporate financial problems can help improve the economic sustainability of businesses.

Review of Related Literature

Financial analyses and financial distress

Solvency refers to a company's ability to meet medium and long-term obligations, particularly with its own funds. This entails a better match between long-term financing needs for tangible and intangible economic assets and continuous financing resources, such as equity and long-term debt (Petrescu, 2008). Solvency evaluation is complicated and can be done from a variety of perspectives. Financial ratios, such as solvency, liquidity, growth, and profitability (If nescu, 1999), (Stancu, 2007), (Balte, 2010), (Bistriceanu, 2001), (Eros-Stark, 2001), (Petrescu, 2009), (Petrescu, 2008) are used in national & international accounting parlance and economic practice. Previous research (Brîndescu-Olariu 2015 & 2014) has shown that the autonomy ratio, debt ratio, equity working capital, and labor productivity of Romanian enterprises can be used to assess bankruptcy risk. In relation to the aforementioned model, the purpose of this study is to determine whether the solvency ratio is valid as a predictor of bankruptcy and whether the Romanian model is admissible in the Philippine context.

According to Brigham and Daves (2007), financial distress begins when cash flow projections show that the company will soon be unable to meet its obligations. Understanding the scenario of the company's financial difficulties is expected to lead towards actions that may anticipate events, which drive bankruptcy. It is very critical to identify the predictors of financial distress, but it's also essential to develop a statistical model that can accurately forecast distress. One of the most well-known models for predicting financial difficulty is the Altman's Z-score (Altman, 1968). Despite the various models for predicting financial distress that are available in the research, the economic literature more typically uses Z-score and O-score models (Adnan Aziz, & Dar, 2006). Over the distinct phases, Altman examined distressed businesses from 1969-1975, 1976-1995 and 1997-1998 using Z-score model. Based on data from one economic reporting period prior to bankruptcy, the proof showed that Z-score precision ranged from 80% to 90% in the repeated cases.

A prior study (Brîndescu-Olariu, 2016a) looked at the solvency ratio's ability to predict company bankruptcy. Based on a solvency proportion of 67 percent, this study found that a combined sample of 1176 Romanian enterprises had a general precision of categorisation. Despite the fact that this degree of precision allows a lot of room for error, it is thought to be sufficient for creating a

useful solvency ratio classifier (Chung et al., 2008). In 2008, Patrick Enyi's research employed the comparative solvency ratio (RSR) as one of the models for predicting financial trouble (Envi, 2008). Recent studies have also shown that the comparative solvency ratio can be effectively used in the measurement of bank liquidity for efficient bank and financial services administration.

Theoretical Framework

When a business is in financial difficulties, it frequently passes through all of the stages of downturn.

Deterioration of Profitability

Sales declines, changes in operating income, and negative stock returns are all indicators of profitability deterioration. According to Whitaker (1999), operational income drops to 46.32 percent below the sector average in the early stages of financial distress. The company exhibits significant operational inefficiencies, missed operational objectives, and associated profit margins at this phase. Deterioration of profitability refers to a drop in performance as a result of the scheme's degradation processes (Outecheva, 2007)

Although the company is still solvent, management may take steps to improve the fluctuating profitability. The operations, on the other hand, frequently fail. The failure of these actions is frequently caused by inertia and hyperactivity. In the various waves of management responses to economic challenges, inertia and hyperactivity are frequently mentioned. First, the company's response to negative procedures is delayed. As previously said, if a negative consequence can be detected, it usually indicates the need to behave. This inertia is quite costly to the company's efficiency. The leadership then overreacts, often with unnecessary risks, in order to break the downward trend. A synergistic effect promotes the fall in value since various negative procedures communicate in financial distress. As a result of the managerial activities taken, the momentary gain in the firm's worth does not compensate for the negative effects accumulated in working operations and financial distress due to the company's degradation in performance leading to failure.

Economic Failure

According to financial requirements, Altman and Hotchkiss (2005) define failure as a situation in which "the realized rate of return on invested capital, with risk consideration allowance, is significantly and persistently lower than the prevailing rate on comparable investments". Failure depicts the company's descent from a viable to a marginal, "acceptable" state. As a result of the operating reduction, the

money buffer is becoming increasingly thin. A short cash age triggers a transition in the company's economic state from solvent to distress as a result of a continuous drop in cash flow (Outecheva, 2007).

Financial Insolvency

The failure stage of the distress cycle is more severe than the preceding phases due to the interaction of declining profitability and insufficient liquidity. The most serious problem a corporation faces at this point is a lack of cash flows generated by operating activity. Stocks and flows are two important aspects of the bankruptcy problem, according to Ross et al. (2002). When operating cash flows are insufficient to satisfy financial debt, insolvency based on flow occurs. This is a situation in which an organisation is unable to raise sufficient funds to meet its obligations or pay its debts as they become due. (Outecheva, 2007).

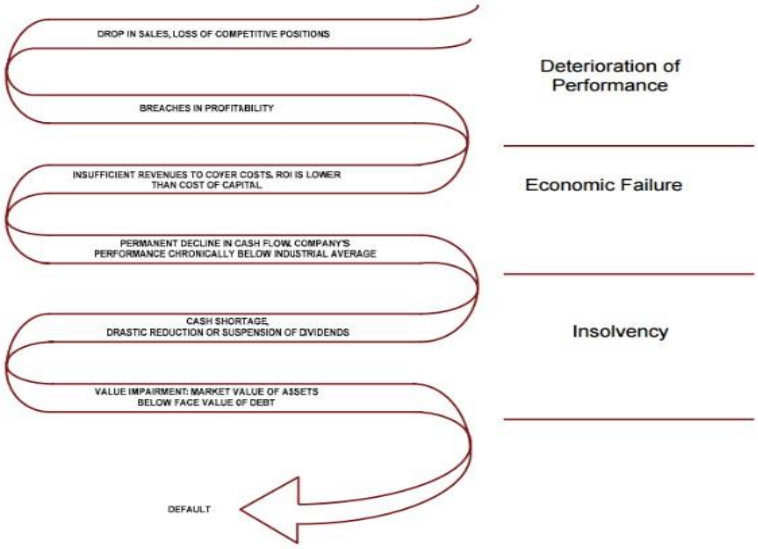

Figure 1: The downward spiral framework of financial distress (Outecheva, 2007)

The illustration herein below gives a general research flow.

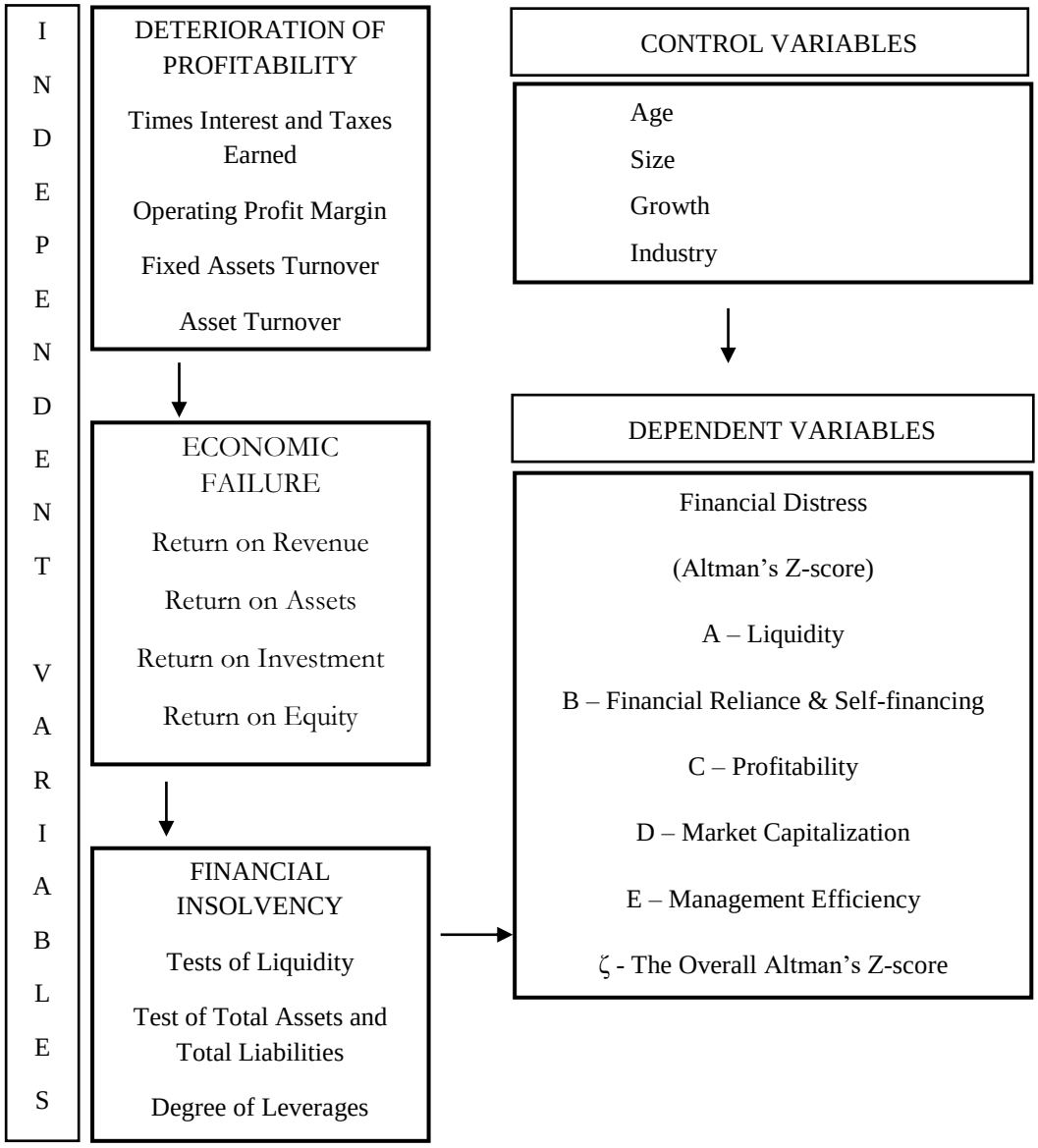

Figure 2: Researcher's theoretical framework

Research Methodology

The research design used in the research is the combination of descriptive-correlation and causal-explanatory.

Data and Variables

The sample is taken from the publicly listed businesses between 2013 and 2017 on the Philippines Stock Exchange. A total of 680 observations were taken for the sample ranging from the companies' solvency, liquidity, and profitability to macroeconomic variables, such as firm age, size, growth, and type of industry as control variables.

The Altman Z-Score of Bankruptcy

The Altman Z-score model was used to forecast the business' financial distress - A model for estimating the likelihood of bankruptcy. This methodology can be used to predict the probability of a financially distressed company declaring bankruptcy within a given time frame (Altman, 1968).

In this study, the Altman Z-score was constructed as follows:

A – Liquidity

ALTMANX1 = Working Capital/Total Assets

After subtracting current liabilities, working capital is the remaining current asset. It is essentially the difference between a publicly traded company's current assets and current liabilities. This is a liquidity indicator that represents the short-term financial health of a company. A firm with positive working capital has the ability to settle its short-term maturing commitments and produce funds for investment from its operating activities. On the other hand, negative working capital indicates that a company's present assets are insufficient, and it may struggle to meet short-term obligations.

B – Financial Reliance & Self-financing

ALTMANX2 = Retained Earnings/Total Assets

A high retained earnings to total assets ratio, means that it has sufficient fund to finance itself. As a result, it has adequate equity financing for capital expenditure. It also reflects company's previous degree of profitability and depicts financial reliance. The company will not depend on borrowings if the ratio of retained earnings to total asset is high. However, if the firm's ratio is low, it asserts that the publicly listed companies is not self-reliant and cannot finance its capital

expenditure by its own fund. Instead, the company will be relying on borrowings. Thus, it heightens the probability of a firm going bankrupt.

C – Profitability

ALTMANX3 = EBIT/Total Assets

Earnings Before Interest and Taxes (EBIT) is a metric for determining a company's profitability. It refers to a company's ability to derive profits from its operations. When using the "going concern" as an underlying accounting assumption, the EBIT/Total Assets ratio demonstrates the firm's potential to earn enough revenue to sustain operations, meet currently maturing obligations, and extend growth.

D – Market Capitalisation

ALTMANX4 = Net Worth/Total Liabilities

Net Worth is a measure of market capitalisation. It can be obtained by multiplying the number of outstanding shares by the current price of shares. The ratio shows the degree to which a company's market value would decline when it declares bankruptcy before the value of liabilities exceeds the value of assets in the statement of financial position. A high ratio indicates high confidence of investors to trust the company's financial strength.

E – Management Efficiency

ALTMANX5 = Sales/Total Assets

The Sales to Total Assets ratio indicates company's efficiency. It shows how efficiently the management utilises assets to generate revenues despite competitive market. A high ratio could be translated that the management requires a small investment to generate sales, which increases the overall profitability of a firm. On the other hand, a low or falling ratio means that the firm will need to use more economic resources to generate enough sales, which will decrease the company's profitability.

ζ - The Overall Altman's Z-score

The ATLMAN Z-Score represents the summation of the five key Altman Ratios. The ALTMAN X1, X2, X3, X4 and X5 reflects liquidity, firm age, profitability, financial structure and capital turnover, respectively. The Altman Z-Score (ζ) is generated as follows:

$\zeta_1 = 1.2AX_1 + 1.4\ AX_2 + 3.3AX_3 + 0.6AX_4 + 1.0X_5$
$\zeta_2 = 0.717AX_1 + 0.847AX_2 + 3.107AX_3 + 0.420AX_4 + 0.998AX_5$

Where:
Zeta (ζ_1) = Altman's Z-score Model 1 *General Model*
Zeta (ζ_2) = Altman's Z-score Model 2 *Manufacturers and Publicly-listed Companies*
X_1 is the Working Capital/Total Assets ratio
X_2 is the Retained Earnings/Total Assets ratio
X_3 is the Earnings before settlement of Interest and Tax/Total Assets ratio
X_4 is the Market Value of Net Worth and Capitalisation/Total Liabilities ratio
X_5 is the Total Sales/Total Assets ratio

The Z-Score described above is a linear combination of five accounting ratios that are weighted by coefficients that are constant across three industry classifications. The coefficients were calculated using a combination of estimation and painstaking manipulation of historical accounting data.

Interpretation of Z-Score

The Zone of Discrimination is a numerical clustering of Z-score ranges used to evaluate companies' financial distress, neutrality, and financial stability.

Zone of Discrimination ζ_1

	ZONE OF DISTRESS		GREY ZONE		ZONE OF STABILITY	
0		1.8		3.0		4.0

1. If Z-Score is less than 1.8, it suggests high chances of bankruptcy;
2. If Z-Score is between 1.8 and 3.0, it suggests that the firm is in gray or ambiguous area, and firms have moderate chance of filing for bankruptcy; and
3. If Z-Score is more than 3.0, it implies low chances or no chance of bankruptcy.

Zone of Discrimination ζ_2

	ZONE OF DISTRESS		GREY ZONE		ZONE OF STABILITY	
0		1.20		2.90		4.0

1. If Z-Score is less than 1.20, it suggests high chances of bankruptcy;
2. If Z-Score is between 1.2 and 2.9, it suggests that the firm is in gray or ambiguous area, and firms have moderate chance of filing for bankruptcy; and
3. If Z-Score is more than 2.90, it implies low chances or no chance of bankruptcy

Financial Accounting Analytical tools

To facilitate financial health examination, financial accounting ratios were generated and are analysed.

i. Solvency Ratio

The Total Debt-to-Equity Ratio was used to assess the amount of total incurred by the firm in relation to its equity.

Formula:
S_R = Total Debt to Total Asset = Total Asset/Total Liability

Where:
S_R = Solvency Ratio

ii. Liquidity Ratio

This ratio was used to determine the ability of the company to meet currently maturing obligations.

Formula:
L_R = Current Assets/Current Liabilities

Where:
L_R = Liquidity Ratio

iii. Profitability Ratios

It measures the ability of the company to generate profits solely from its regular course of activities.

Formula:
F_{ATO} = Revenue/Non-Current Assets
A_{TO} = Revenue/Total Assets
T_i = Earnings before Interest and Taxes/Interest and Taxes
O_m = Earnings before Interest and Tax/Revenue
ROR = Net Income/Revenue
ROA = Net Income/Total Assets
ROI = Return On Revenue*Asset Turn Over
ROE = Net Income/Net Worth

Where:
F_{ATO} = Fixed Assets Turn Over
A_{TO} = Asset Turn Over
T_i = Times Interest and Taxes Earned
O_m = Operating Profit Margin
ROR = Return on Revenue
ROA = Return On Assets
ROI = Return On Investment
ROE =Return On Equity

iv. Inter-financial Accounting Ratios

These set of ratios were used to derive the figures utilised for solvency, liquidity, profitability, and gearing capacity.

Formula:
La = Total Liabilities/Total Assets
Le = Total Liabilities/Total Equity
IntT = Earnings before Interest and Tax – Net Income
Tce = Net Income + Interest and Taxes - Revenue
CosEx = Revenue – Interest and Taxes – Net Income
DR = Total Liabilities/Economic Resources
ER = Total Equity/Economic Resources
EM = 1/Equity Ratio
RORA = Return On Assets*Equity Multiplier
FLI = Return On Equity/Return On Assets
FATLL = Noncurrent Assets /Non-Current Liability
FATE = Non-Current Assets/Total Equity
RORCA = Net Income/Current Assets
GR = (Net Income/Revenue)*100
NCA = Total Assets – Current Assets
NCL = Total Liabilities – Current Liabilities

Where:
La = Leverage of Asset
Le = Leverage of Equity
IntT = Interest and Taxes
Tce = Total Cost and Expenses
CosEx = Cost and Expenses
DR = Debt Ratio
ER = Equity Ratio
EM = Equity Multiplier

RORA = Return on Residual Assets
FLI = Financial Leverage Index
FATLL = Fixed Assets to Long Term Liabilities
FATE = Fixed Assets to Total Equity
RORCA = Rate of Return on Current Assets
GR = Growth Ratio
NCA = Non-Current Assets
NCL = Non-Current Liability

Empirical Procedure

The researchers employed the panel regression model and causality analyses to examine solvency as a predictor of financial distress. In a Random-effects model, variation between entities is believed to be random and unrelated to the predictor or independent variables in the model (Greene, 2002). The main distinction between fixed and random is whether the unobserved individual effect has elements that are correlated with the model's regressors, not whether the effects are stochastic or not. The researcher believes that differences in publicly traded company data have an impact on the dependent variable. Because the entity's error term is not linked with the predictors, time-invariant variables can be used as explanatory variables in random effects models. As a result, these models were used to analyse data from a panel. Individual traits that may or may not influence the predictor variables must be specified in random-effect models. Because some variables may not be available, omitted variable bias in the model could become a problem (Torres-Reyna, 2007). Furthermore, the random effect allows inferences to be generalised beyond the sample size utilised in the model. The researcher employed the Hausman test to determine if the effects were fixed or random. The null hypothesis is that the unique errors (u_i) are not linked with the regressors; the alternative hypothesis is that they are (Greene, 2002). The researcher created a fixed and random effects model, recorded the results, and then executed the test. Prob>chi2 is more than 0.05, according to the Hausman test. As a result, the researcher used random effects. This study utilised STATA, R-Studio, and GNU Regression, Econometrics and Time-Series Library Applications (Gretl) to processed and examine the panel data.

Econometric Model

The econometric models were estimated and constructed based on financial accounting theories as follows:

$$\mathbf{y = \beta 0 + \beta 1 x + \sum_{k=1}^{k} \delta_k z_k}$$

where y = Financial distress measured through Altman Z-scores of Bankruptcy, x represents financial position and performance indicators, and z_k captures all other control variables. The matching of dependent and independent variables, and the list of variables involved are shown in Tables 1 and 2 in this section.

Model 1

AX1 = β0 + β1LIQRATIO$_i$t + β2FIRMAGE$_i$t + β3FIRMSIZE$_i$t + β4GROWTHR$_i$t + β5TYINDSTRY$_i$t + α_i + Ɛ$_i$t

Model 2

AX2 = β0 + β1TINTTAXE$_i$t + β2FIRMAGE$_i$t + β3FIRMSIZE$_i$t + β4GROWTHR$_i$t + β5TYINDSTRY$_i$t + α_i + Ɛ$_i$t

Model 3

AX3 = β0 + β1OPM$_i$t + β2LROR$_i$t + β3ROI$_i$t + β4FIRMAGE$_i$t + β5FIRMSIZE$_i$t + β6GROWTHR$_i$t + β7TYINDSTRY$_i$t + α_i + Ɛ$_i$t

Model 4

AX4 = β0 + β1ROE$_i$t + β2FLINDEX$_i$t + β3FIRMAGE$_i$t + β4FIRMSIZE$_i$t + β5GROWTHR$_i$t + β6TYINDSTRY$_i$t + α_i + Ɛ$_i$t

Model 5

AX5 = β0 + β1SFATO$_i$t + β2ROA$_i$t + β3FIRMAGE$_i$t + β4FIRMSIZE$_i$t + β5GROWTHR$_i$t + β6TYINDSTRY$_i$t + α_i + Ɛ$_i$t

Model 6

ALTMANζ = β0 + β1SOLRATIO$_i$t + β2FIRMAGE$_i$t + β3FIRMSIZE $_i$t + β4GROWTHR$_i$t + β5TYINDSTRY$_i$t + α_i + Ɛ$_i$t

where:

$_i$ = firm;
t = year;
α_i = is the intercept for each sample (n entity-specific intercepts);
Y$_i$t = AX1-AX5 & ALTMANζ dependent variable, where i = firm and t = time;
X$_i$t = independent variable where i = firm and t = time;
β1 = is the coefficient for independent variable; and
Ɛ$_i$t = is the error term.

Table 1: Matching of Dependent Variables with Independent Variables

Dependent Variables	VAR	Independent Variables	VAR
Liquidity	AX_1	Liquidity Ratio	LIQRATIO
Financial Reliance & Self financing	AX_2	Times Interest and Taxes Earned	TINTTAXE
Profitability	AX_3	Operating Profit Margin	OPM
		Return on Revenue	ROR
		Return On Investment	ROI
Market Capitalisation	AX_4	Return On Equity	ROE
		Financial Leverage Index	FLINDEX
Management Efficiency	AX_5	Fixed Assets Turn Over	FATO
		Return On Assets	ROA
Bankruptcy Z-Score	ALTMANζ	Solvency Ratio	SOLRATIO

Table 2: Variable Descriptions and Sources

Variables		VAR	Description
Dependent Variables	Liquidity	AX_1	Ratio of Working Capital to Total Assets*
	Financial Reliance & Self-financing	AX_2	Ratio of Retained Earnings to Total Asset*
	Profitability	AX_3	Ratio of Earnings Before Interest and Taxes to Total Assets*
	Market Capitalisation	AX_4	Ratio of Net Worth to Total Liabilities*
	Management Efficiency	AX_5	Ratio of Sales to Total Assets*
	Bankruptcy Z-Score	ALTMANζ	Summation of the products of AX1 to AX5 multiplied by the corresponding Altman constants.
Independent Variables	Solvency Ratio	SOLRATIO	Ratio of Total Debt to Total Asset*
	Liquidity Ratio	LIQRATIO	Ratio of Current Assets to Current Liabilities*
	Fixed Assets Turn Over	FATO	Ratio of Revenue to Total Assets*
	Times Interest and Taxes Earned	TINTTAXE	Ratio of Earnings before Interest and Taxes to the sum of Interest and Taxes*
	Operating Profit Margin	OPM	Ratio of Earnings before Interest and Tax to Revenue*
	Return on Revenue	ROR	Ratio of Net Income to Revenue*
	Return On Assets	ROA	Ratio of Net Income to Total Assets*
	Return On Investment	ROI	Product of Return On Revenue and Asset Turn Over*

	Return On Equity	ROE	Ratio of Net Income to Net Worth*
	Financial Leverage Index	FLINDEX	Ratio of Return On Equity to Return On Assets*
Control Variables	Firm Age	FIRMAGE	The actual age of the firms from the time of incorporation to current year**
	Firm Size	FIRMSIZE	The Capital Stock of each Publicly listed Company**
	Growth	GROWTHR	The ratio of Net Income to Revenue multiplied by 100*
	Type of Industry	TYINDSTRY	The classification of company per economic sector by Securities and Exchange Commission**

Sources:
*PSE EDGE – Processed and Analysed by Researcher ** PSE EDGE & CAR – Given

Results and Discussion

Age of publicly listed companies

In this section, Table 3 presents that most of the publicly listed companies in the Philippines operate businesses at the range of age, 20-29 years, which accounts for nearly 26% of the companies in study. The older companies are limited, which compose only 7% of the companies and have operated at 120-129 years. This result is consistent with Ferrer and Banderlipe II (2012)'s descriptive statistics findings on the impact of corporate board features on business performance.

Table 3: Publicly Listed Company's Age

Age of Publicly Listed Companies		
Range	Frequency	Percentage
0-9	5	3.68
10-19	15	11.03
20-29	35	25.74
30-39	28	20.59
40-49	18	13.24
50-59	10	7.35
60-69	12	8.82
70-79	3	2.21
80-89	4	2.94
90-99	3	2.21
100-109	2	1.47
120-129	1	0.74

Size of publicly listed companies

The capital stock of publicly traded companies was used to determine their size.

Table 4: Publicly Listed Company's Size

Size of Publicly Listed Companies		
Range	Frequency	Percentage
1 – 9,999,999,999	129	94.16
10,000,000,000 -10,999,999,999	2	1.46
20,000,000,000 -20, 999,999,999	2	1.46
30,000,000,000 -30, 999,999,999	1	0.73
40,000,000,000 – 50, 999,999,999	1	0.73
110,000,000,000 – 120, 999,999,999	1	0.73

Table 4 reveals that 129 firms, or 94.16 percent of all firms, have capital stock in the range of 1 - 9,999,999,999, while just three firms have capital stock in the range of 30,000,000,000 to P120,999,999,999. This result is comparable to McReynald's (2013) study, which looked at the effects of board qualities on the share prices of publicly traded holding companies.

Growth of publicly listed companies

To evaluate growth, each company's net profit margin was measured. A higher margin means that a company is more efficient in converting sales into actual profit. In range of negatives, it is presented that 3 companies are belonging to -31 to -40, while the other ranges have one company each. This indicates that these companies do not have efficient cost control. On the other hand, there were 35 companies having the lowest positive growth bracket of 0-9 percent and there were 17 companies which reached the highest growth bracket of 100 percent and above. The gearing capacity of companies is determined to be favourable in 680 observations in the study. This argument is supported by ADBI's (2019) research, which evaluated 73 publicly traded firms in the Philippines.

Table 5: Publicly Listed Company's Growth

Growth of Publicly Listed Companies		
Range	Frequency	Percentage
-41% and above	1	0.74
-40 to -31	3	2.21
-30 to -21	2	1.47
-20 to -11	1	0.74
-10 to -1	1	0.74
0-9	35	25.74
10-19	33	24.26
20-29	23	16.91
30-39	10	7.35
40-49	5	3.68
50-59	1	0.74
60-69	4	2.94
70-79	2	1.47
80-89	1	0.74
90-100	2	1.47
110-119	17	13.24

Economic sectors of publicly listed companies

Table 6: Types of Company's Industry

Type of Industry		
Profile	Frequency	Percentage
Services	27	19.85
Property	21	15.44
Holding firms	22	16.18
Mining	3	2.21
Mining and oil	6	4.41
Financials	13	9.55
Industrial	43	31.62
Small medium and emerging board	1	0.74

There are a total of 136 companies that were divided into eight (8) industries or economic sectors. The following public listed companies are classified as follows: (1) Industrial (2) Services (3) Holding Firms (4) Property (5) Financials (6) Mining and Oil (7) Mining (8) Small Medium and Emerging Board (SMEB). According to

the data gathered, Industrial is the most common industry among the subject companies (31.62 percent) and the least is the SMEB. This result can be validated in the Philippine Stock Exchange open data repository (2013-2017).

Examination of Solvency

Solvency assessment helps business owners determine the chances of the firm's long-term survival.

Table 7: Degree of Company's Solvency

	Degree of Solvency		
Industry	Solvent	Insolvent	Total
A. Industrial	40	3	43
B. Services	26	1	27
C. Holding Firms	21	0	21
D. Property	21	0	21
E. Financials	12	1	13
F. Mining and Oil	6	0	6
G. Mining	4	0	4
H. Small medium and emerging board	1	0	1

Legend: (Above 20% - solvent, Below 20% - Insolvent)

Table 7 presents the solvency assessment of the publicly listed companies. Most publicly-listed companies in the Philippines are solvent before CoVid-19 outbreak. The outcomes of the solvency evaluation are consistent with the findings of Lizares and Bautista (2021) in evaluating financial distress of publicly traded corporations in emerging markets. Based on the descriptive statistics of Altman Z-scores, majority of publicly listed companies in the Philippines have liquidity level, and financial reliance & self-financing indicators that are ideal. They also have profitability ratios and market capitalisation variables that are above the threshold of favourable outcomes per financial analyses. Regarding management efficiency metric, the results indicate efficiency of most companies. Thus, the Altman Z-score indicates few companies that are suffering from financial distress. The thresholds and measures were based on Aduana (2015), Helfert (2015) and Wang and Zhou (2016).

Evaluation of Financial Distress through Altman Z-scores

Table 8: Altman Z-score of Publicly Listed Companies

Industry	Altman Z-Score Zone of Distress	Grey Zone	Zone of Stability	Total
Financials	7	8	11	26
Holding firms	13	7	1	21
Industrial	3	8	11	22
Mining	3	1	-	4
Mining and oil	-	2	4	6
Property	9	1	0	10
Services	12	12	14	38
Small medium and emerging board	1	-	-	1
Totals	48	39	41	128

Legend: (Less than 1.20 High chances of bankruptcy, Between 1.20 and 2.90 – Gray or ambiguous, More than 2.90 – Low or no chances of bankruptcy)

Most of the companies which are at a high risk of bankruptcy were under the Property sector. The Industrial sector had the most companies under gray or ambiguous risk level with 12 companies, and it also had the most companies with low or no chance of bankruptcy at 14 companies. The findings are consistent with Mahama's (2015) analysis, which found six companies in Ghana to be financially sound and not in danger of financial hardship. The review also agrees with Lim (1998), who stated in his article that corporate distress existed in the Philippines in 1998, and that intervention and appropriate corporate management should be carried out profitably.

Table 9: Altman Z-score of Publicly Listed Companies in Relation to the Total Observations

Industry	Altman Z-Score through the General Altman Model ζ Zone of Stability	Grey Zone	Zone of Distress	Total
Financials	17	2	46	65
Holding firms	43	26	41	110
Industrial	82	44	84	210
Mining	2	1	17	20
Mining and oil	19	7	4	30
Property	19	19	67	105
Services	59	23	53	135
Small medium and emerging board	0	1	4	5

Totals	241	123	316	680

Legend: (Less than 1.80 High chances of bankruptcy, Between 1.80 and 3.00 – Gray or ambiguous, More than 3.00 – Low or no chances of bankruptcy)

Altman Z-Score through the Altman Model for Manufacturers and Publicly Listed Companies ζ

Industry	Zone of Stability	Grey Zone	Zone of Distress	Total
Financials	15	4	46	65
Holding firms	37	37	36	110
Industrial	65	79	66	210
Mining	1	2	17	20
Mining and oil	17	11	2	30
Property	15	27	63	105
Services	48	43	44	135
Small medium and emerging board	0	1	4	5
Totals	198	204	278	680

Legend: (Less than 1.20 High chances of bankruptcy, Between 1.20 and 2.90 – Gray or ambiguous, More than 2.90 – Low or no chances of bankruptcy)

Table 9 shows the evaluation of financial distress on 680 observations or year entries. Based on the general Altman Z-score Model, the Mining sector, followed by Small medium and emerging board and financial sector has the greatest number of distressed companies by annual performance from 2013 to 2017. The mining and oil sector, followed by Services has the highest degree of stability. While most firms in Holding Companies sector are in grey zone. The Altman model for Manufacturers and Publicly Listed Companies generates the same results for stability and distress. The only difference lies with the zone of ambiguity wherein most firms in Industrial sector are found to be in the grey zone per Altman Z-score model for publicly listed companies. The findings of the study through Altman Z-score evaluation corroborate Klapper, Claessens, and Djankov (1999), Claessens, Djankov, and Klapper (2003), Tuvadaratragool (2013), and Gao, Parsons, and Shen's studies (2018).

Untying the Empirical Knots of Deterioration of Profitability, Economic Failure and Financial Insolvency

The results of panel regression reveal no significant associations between variables involved. Return On Revenue for Profitability and Return On Assets for Management Efficiency are the only variables with p-values lower than the alpha-

level of 0.05, with positive coefficients of 2.92 percent and 56.92 percent, respectively. Because the results of solvency evaluation and financial distress analysis show that the majority of publicly traded firms in the Philippines are in the Zone of Stability and Ambiguity, no significant ties have been found with the majority of variables involved. As a result, the majority of accounting indicators expressed in financial position and performance ratios are favourable and viable, and do not indicate a significant decline in profitability, economic failure, or financial insolvency. Deterioration of profitability as measured by times interest and taxes earned, operational profit margin, fixed asset turnover, and asset turnover. Based on econometric and accounting analysis, 77.94 percent of the 680 observations are profitable, 6.62 percent are highly profitable, and only 15.44 percent have deteriorating profitability.

Based on Operating Profit Margin, 84.71 percent of 680 observations are profitable, 4.12 percent are highly profitable, and just 11.18 percent have deteriorating profitability. Fixed Assets Turnover is profitable to extremely profitable in 34.85% of cases, whereas fixed asset utilisation is inefficient in 65.15 percent of cases. In terms of asset turnover, 94.71 percent are effectively using their assets, 3.97 percent are highly profitable, and 1.32 percent are experiencing declining profitability. As a result, no significant deterioration in profitability has been noticed. The findings show that there are no significant connections or ties between the Altman Z-scores of financial reliance and self-financing capacity, profitability, and management efficiency since profitability is not deteriorating.

Table 10: Results of Panel Regression on Financial Distress – Individual Components

Dependent Variable	**Financial Distress and Bankruptcy**			
Independent Variables				
Liquidity Ratio	*Coef.*	*Std. Err.*	*T-Stat*	*P Value*
ALTMANX1	0.0087	0.0229	0.3800	0.7050
Age	0.2754	0.1199	2.3000	0.0220
Size	-4.05E-11	1.63E-10	-0.2500	0.8040
Growth	-0.0000	0.0002	-0.1100	0.9120
Economic Sector	-0.1033	0.9066	-0.1100	0.9090
_cons	-0.6454	7.9179	-0.0800	0.9350
Financial Reliance & Self-financing	*Coef.*	*Std. Err.*	*T-Stat*	*P Value*
ALTMANX2	-0.0004	0.0044	-0.0900	0.9250
Age	-0.1517	0.1413	-1.0700	0.2830
Size	-2.00E-11	2.28E-10	-0.0900	0.9300
Growth	-0.0000	0.0002	-0.1500	0.8780

Economic Sector	-1.3787	1.0670	-1.2900	0.1960
_cons	19.0419	9.3663	2.0300	0.0420
Profitability	*Coef.*	*Std. Err.*	*T-Stat*	*P Value*
Return On Revenue	0.02925	0.0036	8.1100	0.0000
Operating Profit Margin	-0.0309	0.01513	-2.0400	0.0410
ALTMANX3	0.0006	0.0007	0.8600	0.3920
Age	0.0019	0.0360	0.0500	0.9570
Size	1.51E-11	4.71E-11	0.3200	0.7480
Economic Sector	0.1235	0.2725	0.4500	0.6500
_cons	0.2835	2.3708	0.1200	0.9050
Market Capitalisation	*Coef.*	*Std. Err.*	*T-Stat*	*P Value*
Financial Leverage Index	0.4595	0.5623	0.8200	0.4140
ALTMANX4	-0.0312	0.0252	-1.2300	0.2170
Age	-0.0256	0.0932	-0.2800	0.7830
Size	7.59E-12	1.24E-10	0.0600	0.9510
Growth	0.0008	0.0001	7.6900	0.0000
Economic Sector	0.2523	0.7094	0.3600	0.7220
_cons	2.2292	6.3794	0.3500	0.7270
Management Efficiency	*Coef.*	*Std. Err.*	*T-Stat*	*P Value*
Return On Assets	0.5692	0.0636	8.9500	0.0000
ALTMANX5	-0.0002	0.0006	-0.300	0.7640
Age	-0.1229	0.0705	-1.7400	0.0810
Size	9.58E-12	8.89E-11	0.1100	0.9140
Growth	-0.0002	0.0000	-2.6500	0.0080
Economic Sector	0.2613	0.54014	0.4800	0.6290
_cons	6.8253	4.7148	1.4500	0.1480

Hence, the empirical knots of deterioration of profitability to financial distress have been untied. When the knots of return on revenue, assets, investment, and equity were evaluated in relation to financial distress, the results proved that no economic failure exists. According to the net profit margin, 63.82 percent earn profits ranging from 5 to 200 percent of total revenues, with 7.65 percent generating returns surpassing 200 percent of annual sales. Only 28.53 percent are losing money, indicating that the economy is failing. In terms of return on assets, 4.41 percent of firms earn profits of more than 100 percent, while 34.85 percent generate profits ranging from 5 to 100 percent of total assets used by companies. There is less evidence of economic failure per return on asset analysis. Moreover, based on return on investment and equity analyses, it is apparent that 34.85 percent and 56.03 percent are generating returns of 5 percent to 100 percent of investment and equity, and 3.82 percent and 6.32 percent are deriving profits from investments and equity, that are more than the value of investments and equity. As a result, no economic failure was found in the study's 680 observations.

With the foregoing, it is reasonable to conclude that profitability has not deteriorated. As a result, there is no economic failure in the case of publicly listed firms in the Philippines.

The knots of insolvency and financial distress have been untangled. According to the liquidity test, 64.71 percent of the 680 observations are liquid, and 14.26 percent are very liquid, with current assets equal to or greater than the amount of currently maturing obligations. Insolvent observations account for only 21.03 percent of all observations. In terms of financial leverage, 58.82 percent have an optimal financial leverage index, 33.82 percent have practical leverage, and only 7.35 percent have insolvency owing to excessive debt financing. In reference to Table 5, the findings of the solvency evaluation, which demonstrated that 96 percent of the 680 observations are solvent. Thus, financial insolvency is not present in the Philippine context from 2013 to 2017. Hence, there is no significant ties between the liquidity, market capitalisation, and the Altman Z-score to financial insolvency indicators because financial distress is not prevalent.

With a p-value of 0.896, which is higher than the 0.05 significance level, Table 9 shows that solvency has no meaningful association to financial distress. The p-Value (0.896 and 0.851) of the variable indicates a weak degree of significance. As a result, it is apparent that the solvency ratio cannot evaluate the likelihood of bankruptcy in the Philippine context.

Table 11: Results of Panel Regression on Financial Distress – General Business, and Manufacturing and PLCs

Dependent Variable	**Financial Distress – General Business, and Manufacturing and PLCs**			
Independent Variables				
Solvency	Coef.	Std. Err.	T-Stat	P Value
ALTMANGEN	0.0002	0.0009	0.1900	0.8510
Age	0.0162	0.1500	0.1100	0.9140
Size	-1.45E-10	1.99E-10	-0.7300	0.4670
Growth	0.0000	0.0001	0.2700	0.7850
Economic Sector	0.0171	1.1345	0.0200	0.9880
_cons	13.1978	9.8852	1.3400	0.1820
ALTMANPLCS	0.0001	0.0010	0.1300	0.8960
Age	0.0161	0.15005	0.1100	0.9150
Size	-1.45E-10	1.99E-10	-0.7300	0.4670
Growth	0.0000	0.0002	0.2700	0.7850
Economic Sector	0.0158	1.1345	0.0100	0.9890
_cons	13.2157	9.8850	1.3400	0.1810

Financial distress as evaluated by the two models of Altman Z-scores has no significant relationship with the solvency ratio as evaluated by accounting indicators of liabilities and assets. The majority of publicly-traded companies in the Philippines did not have material evidence of declining profitability, economic collapse, or financial insolvency between 2013 and 2017. The study's overall findings support Altman's (1968), Ohlson's (1980), and Brîndescu-Olariu's (2015) assertions and claims. The Altman Z-score is a reliable indicator of a firm's stability and likelihood of bankruptcy. The study's conclusions, however, differ from the context of Brîndescu-Olariu (2016a).

Conclusions and Recommendations

Because most businesses are solvent, the findings suggest that solvency is not strongly linked to financial difficulty. In terms of its effects, it was concluded that solvency has little bearing on anticipating financial distress in the Philippines. Companies with a high solvency ratio demonstrate greater assurances in the event of forced liquidation, which can lower lenders' perceived risks and the pressure to file for bankruptcy. However, in the Philippines, a number of factors, including external and internal management issues, may influence bankruptcy. As a result, the solvency ratio for publicly traded companies in the Philippines is not an useful predictor of bankruptcy. Other control variables utilised in the study, have less relation to financial distress. Their coefficients had no bearing on the likelihood of a company's financial distress. It has also been determined that the majority of publicly traded companies in the Philippines are in a zone of stability and uncertainty, and hence the country's financial distress from 2013 to 2017 is less visible. Business profitability is not declining with the foregoing, economic failure is less evident, and financial insolvency is not pervasive. As a result, there is no evidence of financial distress among publicly traded companies in general. The aforementioned knots were loosened, demonstrating that the knots are flimsy as at the evaluation phase.

Financial and operations managers in wealth-maximising firms should not rely solely on the solvency ratio to diagnose their financial distress. Companies will be able to examine financial distress by taking into account a variety of elements. Management accountants could make Cross-sectional financial analysis of accounting data and econometrics models should be devised to validate the results of accounting information. The outcomes of analyses are meant to provide direction for accountants, professionals, and freelancers by advising investors and clients on how to invest their assets or cash. It will undoubtedly aid them in deciding which companies are likely to offer favourable

returns, appropriate yields, and optimal investment opportunities and interests. Based on the Altman Z-score study, the results may assist investors in identifying companies that may have financial difficulties in the future. By favouring companies that are within the zone of stability, investors can reduce the risks associated with their investments. This research would prove to creditors that the company they are about to lend or extend a loan to will repay the debt or has a sound financial position, as evidenced by the growth and profitability analysis. The results of this study can be valuable to academic and business research undertakings. When accounting data on financial performance and position are made available by the Philippine Stock Exchange, the researcher will be conducting a similar study for 2018 to 2022, amidst CoVid-19 outbreak.

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