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DETERMINING THE EFFECT OF FINANCIAL RATIOS ON THE LEVEL OF FINANCIAL DISTRESS OF PUBLICLY-LISTED INDUSTRIAL FIRMS IN THE PHILIPPINES: A PANEL DATA ANALYSIS

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Abstract: Financial ratios have been used for a long time to evaluate a company's performance and financial status. These have also been used as indicators of corporate failure in an increasing number of studies since the turn of the century. However, scholars have not given this relationship among Philippine enterprises much thought. Therefore, the purpose of this study was to ascertain, for the years 2015–2019, how financial ratios affected the degree of financial distress of publicly listed industrial enterprises in the Philippines. The dependent variable in this study was the degree of financial distress as determined by the Altman (2005) Emerging Markets Scoring (EMS) Model, whereas the independent variables were the financial ratios of the enterprises. From 2015 to 2019, information from 51 publicly listed industrial companies was sourced from the Orbis Asia Pacific database and the PSE Edge website. According to the descriptive statistical analysis, 47.5% of the firm-year observations relate to businesses that are in financial hardship. When businesses transition from being financially stable to being in financial distress, their overall state gets worse. The panel data regression analysis revealed that the interest coverage ratio, retained earnings to total assets ratio, debt-to-assets ratio, liquidity ratios, and asset turnover ratio were statistically significant predictors of the subject enterprises' degree of financial distress. In order to preserve or raise their degree of financial stability, the business should focus on certain areas, as this study's actual data supports. This report also highlights how crucial it is to carefully examine the financial standing of companies in order to implement investor protection measures.

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Keywords: Financial Ratios, Financial Distress, Altman Emerging Markets Scoring (EMS) Model, Panel Data Analysis

1. INTRODUCTION

Mismanagement frequently leads to business failures and closures. Nevertheless, these unfavorable occurrences typically take place over a set amount of time rather than happening instantly. Therefore, keeping the business and economic climate stable depends on the early detection of company failure. Because of this, it is critical for managers and those in charge of governance to recognize the early warning indicators of corporate collapse, such as financial difficulty, and to create plans of action that will help the company survive difficult times.

Among the tools available to analysts are financial ratios, which are the most popular financial analysis tools used to determine corporate performance. Numerous research studies used these tools in assessing the level of financial distress of companies (Isayas, 2021; Nguyen et al., 2019; Nurhayati, Mufidah, & Kholidah, 2018; Shi & Li, 2021; Waqas & Md-Rus, 2018). In measuring financial distress, most studies use the Altman Z-score model, developed by Altman (1968, as cited in Altman, 2005). However, the said model is generally applicable only to companies with publicly traded equity securities that are in the manufacturing industry (Altman, 2005). Hence, the model was further enhanced to become the Altman Z-score or the Emerging Markets Scoring (EMS) model to address the needs of emerging markets and non-manufacturers (Altman, 2005).

This study is based on the Theory of Ratio Analysis pioneered by Beaver (1966) and the Early Bankruptcy Theory of Schwartz (2005). The former theory discussed that financial ratios can be used to form predictions of firm failure based on four propositions involving the amount of liquid assets, level of net operating cash inflow, degree of leverage, and amount of operational expenditures. On the other hand, the latter theory discusses that early bankruptcy manifests when the company cannot generate enough cash to sustain its operations and pay off financial obligations.

Capitalizing on the said theories, this study looked into the level of financial distress of industrial firms listed on the Philippine Stock Exchange (PSE) between 2015 and 2019 using the Altman EMS model and several firm-specific financial ratios. Specifically, the researchers sought to answer whether firm-specific financial ratios predict financial distress or provide statistical evidence of financial stability among industrial firms listed in the PSE for 2015–2019. Descriptive statistical analysis was conducted to determine the

financial standing of firms, while the panel data regression analysis was used to test the relationships between the variables.

Despite the availability of numerous studies involving the utilization of financial ratios as predictors of financial distress among various jurisdictions and industries, this topic seemed to be still underdeveloped in the Philippine setting. Likewise, the Altman EMS model was not extensively used in literature involving Philippine firms. In summary, to the best knowledge of the researchers, there is not much literature about the effect of financial ratios on the level of financial distress among firms in the Philippines. Thus, to address the knowledge gap, this paper aimed to answer the question, "*What firm-specific financial ratios affect the level of financial distress of publicly-listed industrial firms in the PSE between 2015 and 2019?*".

Although there have already been extensive studies involving the relationship between financial ratios and financial distress, this study contributes to the body of literature by describing the said relationship among Philippine publicly listed industrial firms. This study also provides several stakeholders with critical insights that would enable them to maximize their benefits from their business dealings with these firms.

2. REVIEW OF RELATED LITERATURE

2.1. Corporate Failure, Bankruptcy, and Financial Distress

Most studies define corporate failure in terms of a company's financial situation. According to Beaver (1966), a business is failing if, for instance, it finds it impossible to fulfill its maturing debts, which results in bank overdrafts, defaults, or the failure to pay dividends to preferred shareholders. Additionally, Altman (1968) saw bankruptcy as a sign of business failure. Conversely, Cole, Johan, and Schweizer (2021) adopted a multifaceted approach to the definition of corporate failure, characterizing it as the event in which the company is unable to meet the goals set forth by the shareholders, management, and/or other stakeholders. They highlighted the agency problem and contended that bad management choices and judgments cause businesses to fail. Though definitions of corporate failure vary throughout authors, it is clear that corporate failure is caused by a myriad of issues that ultimately bring companies to an end.

Many studies conflate bankruptcy and corporate failure. Veganzones and Severin (2019) have noted that the simple and binary nature of this definition—that is, that companies that have filed for bankruptcy under legal proceedings are considered failed, while those that have not yet filed are considered stable—

has made it more popular among researchers in the twenty-first century. This term is a little controversial, particularly as businesses can also be said to be failing if they start to face financial difficulties. Similar to how different nations define bankruptcy differently, a company's eligibility to file for bankruptcy and subsequent failure in one jurisdiction may not apply to other countries (Yazdanfar & Öhman, 2019).

For this reason, some writers argue that filing for bankruptcy is the last resort before leaving the market and that the first signs of corporate failure appear when businesses encounter operational and financial issues. Platt and Platt (2002) were among the pioneers in discussing the idea that financial strain leads to bankruptcy. That financial difficulty inevitably results in bankruptcy, however, is not true because a company can take remedial action to prevent bankruptcy by identifying the symptoms of financial distress early on (Tinoco & Wilson, 2013). Additionally, Lizares and Bautista (2021) said that financial difficulty is a prelude to bankruptcy, taking into account the fact that companies may experience first liquidity issues as a result of poor financial performance or unfavorable external pressures, which, if ignored, result in company bankruptcy.

Beaver (1966) began the investigation into the relationship between financial ratios and corporate failure using univariate analysis. However, Altman's work in 1968 paved the way for a lot more studies on the relationship between these two variables by introducing a multivariate failure prediction model called the Z-score model. The original model used five ratios, which were selected based on their ability to predict corporate bankruptcy (Altman, 1968). However, to increase the usefulness of the model in addressing the needs of emerging economies and nonmanufacturing firms (Altman, 2005), the EMS model was developed.

$$Z'' = 3.25 + 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4$$

Equation 1. Altman EMS Model

The said model utilizes the working capital to total assets ratio (X1), a liquidity ratio where a higher value indicates a lesser risk of bankruptcy due to the availability of excess current assets that could be used to pay off liabilities; retained earnings to total assets ratio (X2), which implicitly measures the firm age in such a way that younger firms that have lower retained earnings are more likely to fail compared to older firms that have already accumulated their earnings; earnings before interest and taxes over total assets (X3), which indicates the company's current period profitability on which a higher value is ideal; and book value of equity over total debt (X4) on which a higher value indicates that the firm's asset values would need to decline significantly before

the firm experiences solvency problems. Financially stable firms have Z" scores above 5.85, while financially distressed firms have Z" scores below 4.35. Those falling between these values are in the gray area. Thus, it can be argued that firms with stable financial standing should have ideal values for their financial ratios, while those experiencing financial distress exhibit similar characteristics based on their financial ratios.

2.2. Financial Ratios as Predictors of Financial Distress

2.2.1. Liquidity Ratios

Liquidity ratios, particularly the current ratio and the working capital to total assets ratio, were used in this study. As liquidity increases, the chances of failure decrease, since this indicates the existence of enough funds to settle short-term liabilities. Hence, based on the nature of the ratios, a negative relationship is expected. This is consistent with the studies of Nurhayati, Mufidah, and Kholidah (2018), Waqas and Md-Rus (2018), and Shi and Li (2021).

H_{o1}: The current ratios of industrial firms listed in the PSE do not significantly predict their level of financial distress for the period 2015–2019.

H_{o2}: The working capital to total asset ratios of industrial firms listed in the PSE do not significantly predict their level of financial distress for the period 2015–2019.

2.2.2. Asset Turnover Ratio

Nguyen et al. (2019) reported a negative effect of the asset turnover ratio on the bankruptcy risk of real estate firms in Vietnam, consistent with expectations based on the nature of the ratio. Real estate companies generally have illiquid inventories; hence, this ratio is important as it could indicate that the firms generate enough revenues to cover their operational expenses and enable them to minimize the risk of bankruptcy.

H_{o3}: The asset turnover ratios of industrial firms listed in the PSE do not significantly predict their level of financial distress for the period 2015–2019.

2.2.3. Debt-to-assets ratio

Generally, a higher debt-to-assets proportion means that the company is highly likely to experience financial distress (Monti & Garcia, 2010; Nurhayati, Mufidah, & Kholidah, 2018; Shi & Li, 2021; Waqas & Md-Rus, 2021).

H_{o4}: The debt-to-asset ratios of industrial firms listed in the PSE do not significantly predict their level of financial distress for the period 2015–2019.

2.2.4. Profitability Ratios

The profitability ratios used in this study include the retained earnings to total assets ratio, return on assets, return on equity, operating profit margin, and interest coverage ratio. Altman (1968, p. 595) explained that the retained earnings to total assets ratio measures the "cumulative profitability" of the company, of which a higher value demonstrates the firm's ability to recycle its earnings and utilize them to fund its operations. Employing this strategy would limit the company's reliance on debt and, therefore, lower its risk of falling into financial distress. Thus, a negative relationship with financial distress is expected (Waqas & Md-Rus, 2018).

H_{o5}: The retained earnings to total assets ratios of industrial firms listed in the PSE do not significantly predict their level of financial distress for the period 2015–2019.

Both the return on assets and the return on equity measure the firm's profitability, especially its efficiency in using its assets and the amount of income attributable to stockholders. Previous studies showed a negative relationship between these ratios and financial distress (Isayas, 2021; Monti & Garcia, 2010; Nguyen et al., 2019; Nurhayati, Mufidah, & Kholidah, 2018).

H_{o6}: The return on asset ratios of industrial firms listed in the PSE do not significantly predict their level of financial distress for the period 2015–2019.

H_{o7}: The return on equity ratios of industrial firms listed in the PSE do not significantly predict their level of financial distress for the period 2015–2019.

A higher operating profit margin indicates that the firm's operations are profitable. Monti and Garcia (2010) noted a negative relationship between this ratio and financial distress.

H_{o8}: The operating profit margin ratios of industrial firms listed in the PSE do not significantly predict their level of financial distress for the period 2015–2019.

A higher interest coverage ratio is ideal, as this would indicate that the firm is earning enough cash from its operations to fund the interest payments. A negative relationship with financial distress is expected (Lizares & Bautista,

2021; Waqas & Md-Rus, 2018).

H_{o9}: The interest coverage ratios of industrial firms listed in the PSE do not significantly predict their level of financial distress for the period 2015–2019.

2.2.5. Cash flow ratio

The success of a company is anchored on its ability to generate cash flows from operations (Rhyn, 1989, as cited in Kamaluddin, Ishak, & Mohammed, 2019). Hence, the cash flow ratio complements the other financial ratios used in this study to provide a better picture of the relationship between the financial distress level of the company and a higher value of the ratio is ideal since it will indicate the company's ability to convert its net income into cash, which will then be used to fund the operations of the company. A negative relationship with financial distress was observed by Kamaluddin, Ishak, and Mohammed (2019).

H_{o10}: The cash flow from operations to net income ratios of industrial firms listed in the PSE do not significantly predict their level of financial distress for the period 2015–2019.

2.2.6. Control variables

Other researchers found that firm size and age have an effect on the level of financial distress. A higher firm age and a larger firm size would have negative relationships with financial distress. Younger firms are generally unstable since their focus is more on gaining more traction in the market than keeping the business afloat (Isayas, 2021). Moreover, the experience obtained by older firms in weathering economic, social, and political challenges contributes to their financial stability. Similarly, firms with more assets are capable of generating more sales and profits that could contribute to their financial stability (Shi & Li, 2021). In this study, these variables were included as control variables only.

2.2.7. Local studies in the Philippines

There are quite a few studies involving financial distress in the Philippines. Among the recent ones are those of Lizares and Bautista (2021) and Onsay (2021). Using a mixed logit model among financial ratios of publicly-listed firms and macroeconomic variables from 1995 to 2018, Lizares and Bautista (2021) found that firm size (denoted by the natural logarithm of revenues), ratio of market value of equity over total debt, and interest coverage ratio were negatively associated with financial distress. Onsay (2021) used panel

regression analysis to determine the validity of the solvency ratio as a predictor of bankruptcy among 136 PSE-listed firms between 2013 and 2017 and noted that there are no significant relationships between the various profitability, activity, and solvency ratios of the firms and their level of financial distress.

3. METHODOLOGY

The researchers selected the Philippine market as the subject of the study due to the limited literature regarding the relationships among the variables that were tested and investigated in this study. The population of the study consisted of industrial firms listed in the PSE between 2015 and 2019 with publicly available financial statements from December 31, 2015, to December 31, 2019. To narrow down the scope of the study, only the industrial firms were considered due to numerous instances of financial distress during the sample period, totaling 64 observations (25.1%) over 255 observations. Also, the sample period of 2015–2019 was selected to exclude the effects of the pandemic that occurred in 2020. Out of 73 firms as of October 31, 2023, only 51 were selected as the subjects of this study due to certain limitations, which include those that conducted their initial public offering during the sample period, those using a fiscal year accounting period, and those with limited available financial information. Respective financial data were obtained from the Orbis Asia Pacific database, from which the financial ratios and Z scores were manually computed. During data collection, several outliers and invalid data points were removed. The statistical analysis was performed using Microsoft Excel and Stata (Basic Edition), version 18.

Descriptive statistical analysis was performed, specifically on determining the individual firm's level of financial distress and their respective financial standing, as well as that of the industry. Then, the researchers employed two steps for the econometric analysis. First, the appropriate model was selected to test the relationship of each independent variable to the dependent variable, and then the regression analysis was performed. Second, similar procedures were performed to test the relationship between all independent variables and the dependent variable. However, prior to running the regression model for the second step, multicollinear independent variables were removed from the analysis and, consequently, from the latter econometric models. Lastly, the differences noted in the statistical significance and coefficients of the independent variables between the first and second steps were noted and then discussed.

In selecting the best-suited model for the data, the researchers run the three models used in panel data regression analysis, i.e., the pooled OLS model,

the fixed effects model (FEM), and the random effects model (REM). The pooled OLS model considers the data as simple cross-sectional data, ignoring the time component of the dataset, and runs it as a simple linear regression. On the other hand, the FEM has three variants: the least squares dummy variable (LSDV) 1 or the space-varying FEM, the LSDV2 or the time-varying FEM, and the LSDV3 or the space- and time-varying FEM. The three LSDV models are ranked based on their F-values, and the LSDV model with the highest F-value and lowest p-value was selected to represent the FEM. Then, the model selection procedures are composed of three parts: Wald's test of linear restrictions to select between the FEM and pooled OLS, the Hausman specification test to select between the REM and FEM, and the Breusch-Pagan Lagrangian Multiplier test to select between the REM and the pooled OLS.

Final tests included the Wooldridge test and the Breusch-Pagan/Cook-Weisberg test to check the presence of autocorrelation and heteroscedasticity, respectively. If so, the generalized least squares version of the model was used.

4. RESULTS

4.1. Descriptive Statistics

Descriptive statistical analysis was initially performed on the entire dataset to know the financial standing of the firms in the industry (see Table 1).

Table 1: Descriptive Statistical Analysis for the Entire Dataset

Variable	*N*	*Mean*	*Std. Dev.*	*Min*	*Max*
Z	250	6.23	12.54	-54.09	64.19
CR	247	2.61	5.24	.03	53.03
WCTA	253	.07	.62	-8.08	1.00
ATO	232	.74	.56	.0004	3.37
DAR	255	.54	.62	.0006	9.08
RETA	253	-.41	2.36	-17.37	.76
ROA	255	.03	.19	-1.84	.98
ROE	255	.02	.77	-9.69	1.57
OPM	228	.19	.59	-2.32	7.63
ICR	188	45.30	117.69	.20	938.67
CFONI	253	.63	6.73	-47.95	53.69
lnTA	255	12.00	2.41	.15	15.91
Age	255	39.41	22.40	2.00	100.00

Source: Authors' calculations

To better understand the firms' financial standing based on their level of financial distress, the researchers then ran the summary statistics on the firms classified as within the safe zone, gray area, or distressed zone depending on their Z" scores (see Table 2).

Table 2: Descriptive Statistical Analysis for the Firms Classified based on their Z" scores

Variable	*Classification*	*N*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Z	Safe	131	12.03	10.52	5.94	64.19
	Gray area	57	5.18	.44	4.36	5.85
	Distressed	62	-5.07	14.26	-54.09	4.34
CR	Safe	131	4.01	6.89	.25	53.03
	Gray area	57	1.32	.58	.23	3.90
	Distressed	59	.75	.49	.03	2.28
WCTA	Safe	134	.26	.21	-.09	1.00
	Gray area	57	.06	.09	-.12	.35
	Distressed	62	-.36	1.10	-8.08	.56
ATO	Safe	118	.78	.52	.0004	2.14
	Gray area	57	.77	.64	.005	3.37
	Distressed	57	.62	.54	.02	2.16
DAR	Safe	134	.33	.18	.0006	.79
	Gray area	57	.62	.11	.31	.78
	Distressed	64	.92	1.10	.21	9.08
RETA	Safe	134	.23	.24	-.78	.76
	Gray area	57	.12	.20	-1.04	.39
	Distressed	62	-2.30	4.25	-17.37	.30
ROA	Safe	134	.07	.11	-.29	.97
	Gray area	57	.04	.05	-.07	.32
	Distressed	64	-.04	.32	-1.84	.40
ROE	Safe	134	.11	.13	-.32	1.08
	Gray area	57	.11	.17	-.15	1.19
	Distressed	64	-.24	1.50	-9.69	1.57
OPM	Safe	115	.28	.72	.005	7.63
	Gray area	56	.09	.46	-2.32	.95
	Distressed	57	.11	.30	-1.07	.96
ICR	Safe	103	64.07	116.28	.52	620.91
	Gray area	51	5.25	5.19	.34	20.33
	Distressed	34	48.54	181.82	.20	938.67
CFONI	Safe	134	.59	2.66	-26.63	5.37
	Gray area	57	2.57	8.29	-16.99	53.69
	Distressed	62	-1.05	10.11	-47.95	18.84

Variable	*Classification*	*N*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
lnTA	Safe	134	12.27	1.86	8.15	15.82
	Gray area	57	13.39	1.80	7.37	15.91
	Distressed	64	10.21	2.85	.15	15.67
Age	Safe	134	40.70	21.55	2.00	89.00
	Gray area	57	39.16	28.29	6.00	100.00
	Distressed	64	36.94	17.92	12.00	85.00

Source: Authors' calculations

4.2. Panel Regression Results

The first step in the regression analysis was the testing of the individual effects of the independent variables on the dependent variable. The REM was determined to be the appropriate model for all independent variables, except for the working capital to total assets ratio, where the FEM was deemed best suited. However, the Wooldridge test results revealed the presence of autocorrelation; hence, the GLS version of the models were analyzed (see Table 3).

Table 3: Regression Results for the Individual Panel Data Regression

	Coefficient	*Std. Error*	*p-value*	*Result*
CR	1.447	.122	.000***	Significant
WCTA	19.896	2.046	.000***	Significant
ATO	2.598	1.201	.031*	Significant
DAR	-24.845	2.093	.000***	Significant
RETA	3.774	.233	.000***	Significant
ROA	14.133	8.594	.100	Insignificant
ROE	1.199	1.217	.325	Insignificant
OPM	1.257	1.159	.278	Insignificant
ICR	.008	.003	.002**	Significant
CFONI	-.032	.118	.788	Insignificant
lnTA	.577	.357	.106	Insignificant
Age	.087	.035	.012*	Significant

Source: Authors' calculations

* $p < .05$; ** $p < .01$; *** $p < .001$

The second step in the regression analysis was the testing of the collective effects of the independent variables on the dependent variable. The VIF values of the independent variables ranged between 1.12 and 5.99, indicating low to moderate multicollinearity. Hence, all independent variables were retained in the model. Similar to the individual tests performed and discussed above, the REM was determined to be the appropriate regression model. However, the

GLS version of the model was used due to the presence of autocorrelation in the data (see Table 4).

Table 4: Regression Results for the Collective Panel Data Regression

	Coefficient	*Std. Error*	*p-value*	*Result*
_cons	6.366	.451	.000***	Significant
CR	.749	.046	.000***	Significant
WCTA	3.632	.306	.000***	Significant
ATO	-.073	.117	.531	Insignificant
DAR	-4.540	.434	.000***	Significant
RETA	3.079	.141	.000***	Significant
ROA	15.710	1.925	.000***	Significant
ROE	-3.303	.864	.000***	Significant
OPM	-.638	.316	.043*	Significant
ICR	.001	.001	.063	Insignificant
CFONI	-.002	.006	.786	Insignificant
lnTA	-.008	.037	.838	Insignificant
Age	.002	.002	.352	Insignificant

Source: Authors' calculations
* p < .05; ** p < .01; *** p < .001

5. DISCUSSION

5.1. Descriptive Statistical Analysis

As shown on Table 1, the mean Z" score of the sample firms is within the safe zone (i.e., above 5.85), indicating that industrial firms in the Philippines exhibit low levels of financial distress. However, the high value of the standard deviation indicates that the Z" values are widely spread out from the mean. The relatively high range for Z" supports this finding.

The results further show that the firms are generally capable of meeting their short-term obligations. The positive means of both the current ratio and the working capital to total assets ratio indicate the existence of a large enough level of current assets to cover all of their current liabilities. On the other hand, the firms' high debt-to-assets ratios indicate that a high proportion of debt is used to finance the acquisition of assets. Notably, the ratio's highest value among the sample firms is 9.08, indicating that a particular company has negative equity, which can be interpreted as having a purely debt-financed asset base.

The firms' mean asset turnover ratios explain that, generally, the sample firms have been unable to generate enough sales from the use of their assets (P0.74 sales per P1 of assets). The data also revealed that the sample firms had

low profitability levels over the five-year period based on the mean return on assets, mean return on equity, and mean operating profit margin. This low level of profitability is corroborated by the negative mean value of the retained earnings to total assets ratio, which measures the cumulative profitability of the firms. Thus, it seems that publicly-listed industrial firms in the Philippines may have a difficult time generating net income from their operations. However, the sample firms have the capability of earning more than enough to cover their interest payments. Furthermore, the positive mean value of the cash flow ratio demonstrates the firms' ability to convert their net income into cash flows. However, it should be noted that some firms have low interest payments; hence, the interest coverage ratio values are quite large and highly vary from the mean. Finally, based on the results of the statistical analysis for age and total assets, the sample firms range from relatively small to large corporations and young to old firms.

When the firms' financial ratios were analyzed after they were classified based on their Z" scores (see Table 2), it was evident that as the firms go through a downward spiral towards financial distress, their financial ratio indicators also deteriorate. However, mixed results were found in the operating profit margin, interest coverage, and cash flow ratios.

5.2. Regression Analysis

Liquidity ratios significantly predict the level of financial distress of publicly listed industrial firms in the Philippines. These also provide evidence that liquidity is critical in order for companies to maintain their financial stability, as shown by the positive and statistically significant relationship between the said ratios and the Z" score. These results are consistent with the findings of Nurhayati, Mufidah, and Kholidah (2018), Waqas and Md-Rus (2018), and Shi and Li (2021). The findings reinforce the idea that a good liquidity position for companies would enable them to settle their maturing obligations, fund their current operations, and not rely on external financing such as incurring short-term loans and raising debt or equity capital.

The regression results for the asset turnover ratio support the nature of the said ratio and also confirm the findings of Nguyen et al. (2019). This means that as firms become more active in using their assets to generate sales, their level of financial distress lowers as they are assured to have potentially higher net income and cash flows arising from their operations.

Among all financial ratios, the debt-to-assets ratio has the highest coefficient when ranked based on the absolute values of all coefficients. This shows that

the said ratio is the most important among the independent variables used in this study in predicting financial distress. The negative coefficient proves that as firms become more leveraged, their Z scores tend to become lower, which results in a higher level of financial distress. Moreover, the statistically significant negative relationship between this ratio and the Z" score is also in agreement with previous studies by Monti and Garcia (2010), Nurhayati, Mufidah, and Kholidah (2018), Waqas and Md-Rus (2018), and Shi and Li (2021). Generally, raising debt capital has the lowest cost of capital due to the tax deductibility of interest expense. However, raising more than enough debt capital could also result in higher financial risk. This means that a company is at risk of not meeting its contractual obligations to its creditors when they fall due, which then exposes a company to a higher bankruptcy risk. Therefore, it is crucial for firms to maintain a safe level of debt-to-equity capital ratio to manage financial risk and prevent the occurrence of financial distress.

Regarding profitability ratios, it is notable that the retained earnings to total assets ratio and the interest coverage ratio are statistically significant predictors of financial distress. These support the findings of Waqas and Md-Rus (2018) and Lizares and Bautista (2021). As the firm accumulates its retained earnings amount, the level of financial distress lowers. Generally, increases in retained earnings are caused by the earnings of the firm. Hence, while the firm remains profitable, there is less risk that the company will fall into financial distress. Similarly, firms with high retained earnings have more than enough savings or reserves that can be used as a buffer and another source of funds when unpredicted events lead to adverse effects on the company. On the other hand, a higher interest coverage ratio indicates the firm's ability to generate a certain level of net income to allow them to service their interest payments to their creditors. However, based on their coefficients, the retained earnings value has a higher effect on the level of financial distress than the interest coverage ratio.

In addition, the return on assets, return on equity, and operating profit margin are statistically insignificant predictors of the financial distress of publicly listed industrial firms in the Philippines. This finding does not conform to the expectations based on previous studies (Monti & Garcia, 2010; Nurhayati, Mufidah, & Kholidah, 2018; Nguyen et al., 2019; Isayas, 2021). Generally speaking, higher profitability ratios are associated with lower financial distress due to the firm's ability to generate net income that would enable it to support its operations with internally generated funds. However, the observed relationship between these ratios and the Z score can be explained by the mixed results for each class of firm, as shown in Table 2. It is shown that

the highest value of return on equity is found among distressed firms. Ideally, this should have been found among firms classified in the safe zone. Similarly, firms within the gray area have lower mean operating profit margins compared to those in the distressed zone.

Finally, the firms' ability to convert their net income figures to actual cash flows does not significantly predict their level of financial distress. Moreover, the coefficient of the said variable is negative, indicating that as firms become less able to convert their net income to cash flows, they are more likely to become financially stable. This relationship is contrary to the findings of Kamaluddin, Ishak, and Mohammed (2019).

Regarding the control variables, firm size alone cannot predict the level of financial distress of publicly listed industrial firms in the Philippines. However, the firm age can significantly predict the level of financial distress. This finding is supported by the statistically significant relationship between the retained earnings to total assets ratio and the Z score since, as Altman (1968) pointed out, firm age is implicitly considered in the retained earnings ratio. Hence, as firms age, they gain more experience in doing business and are more likely to become financially stable.

5.3. Comparison of Results between Individual and Collective Regression Analysis

Based on the results presented in Table 4, the resulting empirical framework is as follows:

$$Z'' = 6.366 + .749(CR) + 3.632(WCTA) - 4.540(DAR) + 3.079(RETA) + 15.710(ROA) - 3.303(ROE) + .638(OPM)$$

Following this framework, companies will be able to understand that in order for them to improve or maintain their level of financial stability, they need to focus on their liquidity position, manage their level of financial leverage, and operate profitably by managing both their sales level and monitoring their expenses.

The collective regression results offered a more comprehensive understanding of the business operations' impact on their degree of financial hardship when all independent variables are considered. The solvency ratio remained statistically significant and negative, while the liquidity ratios continued to be positive indicators of financial crises. Furthermore, the cash flow ratio's negligible negative impact and the retained earnings to total assets ratio's considerable positive effect persisted.

The return on assets, return on equity, and operating profit margin became statistically significant, indicating that while the sales level measured using the asset turnover is not significant, it is important for the firm to consider managing their operating income and net income in order to better manage their level of financial distress. Moreover, an efficient use of the company's asset base enables the company to minimize its level of financial distress. However, emphasis must be placed on the negative coefficients of the return on equity and operating profit margin. Ideally, higher values for these ratios are good, but concerning the observed relationship for the return on equity ratio, it may be inferred that a lower equity value increases the value of the said ratio. Hence, a company with a high return on equity ratio may also imply a heavy reliance on debt to finance its operations. This could increase the company's financial risk.

Similarly, the relationship between operating profit margin and the Z score may be explained by how companies manage their working capital. Notably, the profitability ratios of the subject firms in this study showed a moderately high correlation with the working capital to total assets ratio, indicating that as firms become more liquid, the chances of earning lower profits are imminent. This is because when firms invest more in current assets, they experience lower risks and could earn lower returns. Hence, it is also essential for firms to carefully manage their current asset levels so as to maintain a balance between financial stability and firm profitability.

The collective regression results revealed a statistically insignificant relationship between the Z score and asset turnover, interest coverage, and cash flow ratios. One possible explanation for this is the existence of mixed values for each ratio for each class of firm, as shown in Table 2. Finally, control variables do not impute any significance to the relationships studied.

6. CONCLUSION, IMPLICATIONS, AND LIMITATIONS

6.1. Conclusion

This study aimed to describe the level of financial distress, financial standing, and performance using selected financial ratios and the relationship between financial distress and the financial ratios of publicly listed industrial firms in the Philippines for the period 2015–2019. The independent variables were the firm-specific financial ratios of the subject companies, while the dependent variable was their level of financial distress, measured using the EMS model. To achieve the objectives of the study, descriptive statistical analysis and panel data regression analysis were performed.

Less than half (47.5%) of the firm-year observations demonstrated a moderate to high risk of financial trouble, according to the results. Firms' overall values for the chosen financial ratios are favorable. However, a more thorough examination of the performance and financial situation of businesses categorized using the EMS model showed that businesses' activity, liquidity, and certain profitability ratios all decline as their Z" scores rise. Nonetheless, the solvency ratio rises. These demonstrate that all areas of the firm exhibit warning signs and symptoms when organizations encounter financial difficulties, which should alert management to review and resolve them right away.

Additionally, the panel data regression analysis's results showed a statistically significant relationship between the degree of financial distress and the liquidity ratios, solvency ratio, and certain profitability ratios (such as the retained earnings to total assets ratio and interest coverage ratio). These results aligned with the characteristics of the ratios mentioned and the presumptions. Companies that are profitable, less leveraged, and more liquid are less likely to face financial difficulties. To attain financial stability, businesses should therefore work to increase their profitability, liquidity, and solvency position. Critical information could be gleaned from these, including how to prioritize and identify important business sectors in order to reduce the likelihood of trouble.

Future studies could capitalize on the methods and findings of this research to expand the body of knowledge regarding this topic. For this, future researchers can utilize other financial metrics not extensively used in the literature, such as cash collection periods, price earnings, and other market-based ratios. The scope can also be extended with respect to the time period and the industry covered. Other statistical methods may also be employed, such as the simultaneous equation model, to identify factors that affect both financial ratios and financial distress. Finally, future research could also look at whether other measures of financial distress are better predictors of corporate failure among Philippine firms or whether a mediating variable, such as ESG scores, could better explain the relationship between financial ratios and financial distress.

6.2. Theoretical and Practical Implications

This work adds to the body of research on the usefulness of financial ratios as powerful instruments for financial analysis, particularly with regard to identifying and predicting company failure. Additionally, this study assisted in closing the gap between Philippine enterprises' predictions of corporate failure.

Additionally, the study's methodology validates the hypotheses of Beaver (1966) and Schwartz (2005) and shows how applicable the Altman (2005) EMS Model is in the Philippines. Financial analysts and other interested parties may find it useful to confirm the Altman EMS Model's applicability for financial distress analysis, especially if information is available regarding the correlations between particular financial statistics and the degree of financial hardship.

Stakeholders may find the practical implications of this study helpful in safeguarding investments and maximizing the benefits of financial ratio analysis. As a result of this study, the PSE may host seminars on maximizing profitability and maintaining liquidity and solvency for firms, and the SEC may decide to mandate that publicly traded companies maintain a particular level of liquidity and solvency. This will improve investor protection legislation and enable government regulatory organizations to maintain the integrity of the capital market. Second, financial institutions and corporate decision-makers may look at the particular liquidity, solvency, and profitability metrics of those companies in order to assist those businesses in managing their financial situation.

In particular, operational recalibrations and working capital management strategies, such as creating an ideal capital structure, can be used to cut costs. Businesses may be guaranteed that meticulous oversight of their activities will lead to financial stability in this way. Third, private investors have the option to examine the techniques employed in this research to determine if companies are investment-worthy. Similarly, investors can reduce risk and optimize returns by using appropriate asset allocation and diversification strategies with knowledge of the companies' financial standing. Fundamental analysis must be done as part of an individual's investment-seeking process in order to prevent the waste of investable funds and maximize shareholder welfare.

6.3. Limitations

This study analyzed data from Philippine industrial companies that were publicly listed and had available financial information between 2015 and 2019. As such, the findings are not universally applicable to all Philippine businesses. Likewise, the coverage period was set to include the pre-COVID-19 pandemic period to rule out the possibility that a black swan event would have an impact on the links found. Lastly, companies may have employed particular accounting procedures and techniques that have altered the data shown in their financial accounts. The researchers relied on the external financial auditors' attestations on the fairness of their financial accounts in lieu of taking these factors into consideration for this study.

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Conflict of Interest

There is no conflict of interest involved in the publication of this article.

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