Determinants of Efficiency: Evidences from Financially Distress Firms in Malaysia

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Abstract: In this paper, we analyse a panel data of 190 financially distressed firms to determine which the firm-specific variable is reliably important in explaining the level of efficiency in the financial distress firms in Malaysia. Optimal model selection procedure, together with the panel data analysis technique are used to determine the most optimal model to explain the level of efficiency in the financial distress firm. In addition to that, this paper finds the evidence suggesting the relevance of inventory turnover to current assets, account receivable, and inventory turnover, which implies the importance of these factors in determining the level of efficiency in the financial distress firm. Other variables, such as firm's size, return on assets, working capital, total asset turnover, liquidity, tangible assets, intangible assets, and investment opportunities have no significant impacts on the status of firms in the financial distress. This paper uses random effects (RE) models to analyse the variables used and the result is positive towards the relationship on three variables chosen which are ITCA, ARQ, and ITO.

INTRODUCTION

Efficiency refers to the ability of any firms to avoid wasting materials, energy, efforts, money, and time in doing something or producing a desired result. In a more general sense, it is the ability to do things well, successfully, and without waste. In more mathematical or scientific terms, it is a measure of the extent to which the input is well used for an intended task or function (output). Efficiency refers to the very different inputs and outputs in different fields and industries. In general, efficiency is a measurable concept and quantitatively determined by the ratio of useful output to total input.

One of the ways of measuring efficiency is using the efficiency ratio. The efficiency ratio is typically used to analyse how well a company uses its assets and liabilities internally. An efficiency ratio can calculate the turnover of receivables, the repayment of liabilities, the quantity and usage of equity, and the general use of inventory and machinery. This ratio can also be used to track and analyse the performance of commercial and investment banks.

Efficiency is important in firms as it is necessary to improve the efficiency in managing the outdated and unproductive assets which cause the asset returns to decline [1]. Therefore, by improving the efficiency of the firm, they can reduce the cost of goods sold and improve its competitiveness. However, according to [2], analysing how the company uses its assets and liabilities internally that calculates the turnover of receivables, the repayment of liabilities, the quantity and usage of equity, and the general use of inventory and machinery are ultimately important.

Based on the previous studies, it shows that the firm's decision makers should increase the efficiency in using the tangibles assets to generate the income [3]. According to [4], the firm's efficiency measures on how productive the firm is using its assets to increase the efficiency and they suggested that the firm efficiency can be measured in terms of

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its fixed assets turnover ratio, current assets turnover, and net worth turnover ratio. Then, a firm's financial distress can be measured using the efficiency ratio.

In addition, the study on operating expense ratio (OER) and net worth turnover ratio (NWTR) to measure the operational efficiency as a financial distress factor on the financial performance [5]. Sporta (2017) studied on the operational efficiency that is measured by the return on assets (ROA) and return of equity (ROE) using the generalised least square method on the commercial bank in Kenya between 2005 to 2015. It shows that using the efficiency ratio, it can measure the OER, NWTR, ROA, and ROE.

Studies on the firm's efficiency in the financial distress are mostly conducted on the commercial banks and firms, but very few studies on firms' efficiency on the financial distress that conducted in Malaysia using return on assets (ROA) and return on equity (ROE). It shows that there is a gap research from previous studies on the determinants of firms' efficiency from the financial distress. It has been proved by previous studies that focus more on examining the effect of funding structure on technical efficiency of the banks in Ghana [6], in Italy [7], in Saudi [8], in Brazil [9], and South-Eastern Europe [10].

LITERARTURE REVIEW

Measures related to the dependent variable and the firm's specific determinants of efficiency in the financial distress are taken from reviewing previous studies in order to remain consistent with the previous studies. The following sub-sections explain the variables examined in this paper; dependent and independent.

Dependent variable: Efficiency to financial distress

Financial distress is a condition in which the operating cash flows of a company are not enough to cover the current debt and the company is required to take a corrective action and affects the efficiency of the firms in every industry. Efficiency is a needle of firm accomplishment, and its measurement consents for discovering the hypotheses regarding the sources of efficiency [11]. Efficiency is how the firm uses its assets productively and measured in terms of income to asset ratio; it has great importance in addressing financial distress problem as quoted in [12]. The firm's financial distress negatively affects the firm's performance and leads to the firm inefficiency [1].

Efficiency is an indicator of the firm success, and its measurement allows for exploring the hypotheses concerning the sources of efficiency [13]. Efficiency can be measured by (i) an input-oriented process, which focuses on reducing the inputs to produce the same level of outputs and (ii) an output-oriented process which aims to maximise the outputs from a given set of inputs [14]. If the firm has higher efficiency, they have higher ability of debt service coverage [15]. The following formula illustrates the calculation of efficiency:

Efficiency: Earning before tax, depreciation, and amortisation to total assets (EBITDA/TA)

INDEPENDENT VARIABLES

Firm's size: In theory, small firms have a bigger problem in assessing capital because of the asymmetric information between insiders and outsiders as quoted in [16]. It is also assumed that maintaining or improving the efficiency demands a cost in terms of the firm's management, or in other words, a cost of determining how much should be invested in preserving the firm's results [17] Firm size seems to have either a positive or a zero relationship with technical efficiency. The size-efficiency relationship is negative for a large firm and positive for a small firm [18].

Return on Asset: ROA looks closely at how efficiently the business is using the shareholder assets to earn returns. "The linkage between profitability efficiency measured by return on assets (ROA) and operating income-bank size as dependent variable and bank assets-size, asset management (utility), operational efficiency as independent variable" [19]. ROA also looks closely at how efficiently the business is using shareholder assets to earn returns. The following formula illustrates the calculation of return on asset:
ROA = Net Income/Total Assets

Working Capital: Fundamentally, working capital is one of the most dynamic segments in the firm's financing decisions as a vital incentive towards the firm's performance or firm's efficiency [20]. The efficiency can have an effect on the changes in working capital in an exceeding approach as an increaser or reducer from one amount to a different amount [21]. "The importance of managing the working capital efficiently is irrefutable in certifying each components of working capital are at the best level of efficiency to successfully operate and is

highly desirable for firm's growth and sustainability" [22].

Total Asset Turnover: According to [23] concluded from their study on Greek banks, that the larger the total assets, the higher the efficiency is. "Furthermore, a positive relationship between size and efficiency is observed for the European banking industry" [24], [25]. The higher the ability of the banks that can generate profit from the assets, the higher their efficiency is [26]. Previous researchers have used a proxy, such as a value of total asset to represent the total asset [14]. The total assets and age of the firm are included in the model to access the effects of size and experience of MFI on their efficiency level. The results show that the correlation coefficient of value of total assets is positive with all the efficiency measures and that of age are positive with pure technical efficiency (PTE) and scale efficiency (SE) of total assets are positive.

Liquidity: Liquidity refers to the speed in the transfer of assets into cash. Liquidity ratios primarily focus on the cash flows and it is an indicator to measure a company's ability to meet its short-term liabilities. The effective use of assets is achieved through the liquidity management [27]. There are many liquidity ratios used by the organisations to manage their liquidity, such as current ratio, quick ratio, cash ratio, and defensive interval ratio which can greatly affect the financial performance of the companies [27]. There is a negative relationship between liquidity and efficiency because the traditional liquidity ratios, such as current ratio, liquid ratio, and absolute liquid ratio have been known lacking in measuring the efficiency of the firm's liquidity management [28]. "For example is that they incorporate assets that are not readily convertible into cash and ignore the timing of cash conversion" [29].

Inventory Turnover: The inventory turnover ratio is an efficiency ratio that managed by comparing the cost of goods sold with the average inventory for a period that shows how effectively the inventory is. In other words, it measures the frequencies of a company selling its total average inventory dollar amount during the year. Firms with a better inventory performance (faster, more efficient) should acquire the firms with a worse inventory performance (slower, less efficient) and achieve the efficiency gains post-acquisition. However, the occurrence and extent of improvements in operating performance (efficiency gains) are ultimately realised in acquisitions which is unclear [30].

Inventory to Current Asset: Inventory refers to unsold goods that the firm keeps on hand to replenish the stock. Inventory is a current asset in a short term period that usually lasts within a year that the business either sells the inventory to customers or then can liquidate the inventory. Inventory to current asset shows the portion of assets tied up in the inventory. Generally, a lower ratio is considered better. The lower the inventory to current asset shows that the firms are better in maximising, handling, and utilising their inventory to generate the sale. It shows the firm's effectiveness and efficiency in managing the inventory and operation.

Intangible Assets: Intangible assets are nowadays the important drives of an enterprise and the most respected assets because economies are becoming knowledge and technology based, makes it affect the efficiency of the performance. There are recently the empirical research started to question the link or relationship between the intangible assets and firm's efficiency exist in different sectors, mostly being in the high-tech industries [31]. The resource-based view of the firm suggests that intangible assets have a positive impact on the firm's efficiency [13].

Tangible Assets: Tangible assets are a physical item of value which is used to generate the revenue for the company. Tangible assets can be the fixed asset or current asset. Current assets are including the cash, inventory, and marketable securities. Fixed assets include property, plant, and equipment (PP&E), and including the assets, such as trucks, machinery, office furniture, buildings, etc. These items are typically used and can be sold to raise cash for emergencies. "Tangible assets also tend to reduce the financial distress costs because of the liquidity in case of default" [32]. It shows that if the companies have high tangible assets, the company efficiency performance is positive. [16] pointed out that the higher the percentage of tangible fixed assets over the total assets, the smaller is the incentive for the different stakeholders to push the firm into bankruptcy.

Account Receivable Growth: Account receivable growth shows how well a company uses and manages the credit that extends to the customers and how quickly that short-term debt is collected or paid. The account receivable growth is also called the account receivable turnover ratio. At the micro level, the trade credit is seen by firms as an essential marketing tool that helps their competitiveness and growth [33]. The efficiency of the account receivable growth is where the company is able to manage their account receivable, which they can increase their sales and

can collect the credit sale in a short period. [33] found that the firms invest in AR to reinforce their market position, making them more competitive, increasing their sales, and reducing their inventories.

Investment opportunities: Investment opportunities are situations where the option of buying something that has the opportunity to gain value in the future. The investment opportunity theory shows that the managers are able to maximise the market value of firms by implementing the net worth projects [34]. Accordingly, the firms invest profitably by capital investment opportunities when marginal q > 1 Abel, 1983 and Hayashi, 1982.

METHODOLOGY

Data

The target population for this paper is all firms listed as financially distressed by Bursa Malaysia under the requirement of Practice Notes 4 (PN4), Practice Notes 17 (PN17), and Amended PN17 (APN17) respectively from 15 February 2001 when PN4 was introduced, until 31 December 2011. The list of all affected issuers is obtained by the Media Releases and Companies Announcement from the Bursa Malaysia website from January 2001 to December 2011. The final sample of firms consists of 190 firms that meet the criteria of non-missing data of financial distress costs and other variables, therefore, the sufficient firm-year observations over the period of five years before the financial distress. The five-year period choice is somewhat similar to the study by [35]. The annual reports of the selected firms were obtained from the Annual Companies Handbook (various editions) and the DataStream.

Model and measurement

The main objective of this paper is to examine the determinants of indirect financial distress costs. This paper specifies and estimates the following baseline regression model for all firms:

$$EFF_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 ITO_{it} + \beta_3 TATO_{it} + \beta_4 WC_{it} + \beta_5 ARG_{it} + \beta_6 LEV_{it} + \beta_7 ITCA_{it} + \beta_8 LIQ_{it} + \beta_9 INTANG_{it} + \beta_{10} TANG_{it} + \beta_{11} IO_{it} + \beta_{12} SIZE_{it} + \varepsilon_{it} (2)$$

EFF is efficiency, proxy by financial distress, and calculated as the difference between the growth rate of the sales of the sector and the growth rate of the firm sales. ROA measures a return of company by utilising the asset, ITO measures how efficient they manage their inventory, TATO measures the company making sales by utilising their asset, WC is the capital of a business which is used in its day-to-

day trading operations, ARG is how the company uses and manages the collected debt from the customers in a short period. LEV is a ratio of total debt to total assets; ITCA shows better performances in maximising their inventory to generate the sales when lower in inventory to current asset. LIQ is the availability of liquid assets to a market or company, INTANG is a ratio of total market value to book the value of total assets, TANG is the ratio of net fixed assets to total assets, IO is the opportunity to gain value in the future, and SIZE is the firm's size.

Data analysis steps

The model of efficiency of firms in the financial distress, as presented in equation (2), is estimated using the panel data analysis steps as illustrated in Figure 1. The first step is to determine the most optimal combination of predictors. In this study, Stata command vselect, developed by [36] was used to determine whether a certain variable should be included in the model. Following [36], the optimal model defined as the one that optimises one or more information criteria. Those criteria are Mallow's Cp (C), Adjusted R2 (R2ADJ), Akaike's information criterion (AIC), Akaike's corrected information criterion (AICC), and Bayesian information criterion (BIC). This research uses the definitions of these criteria given in [37]. Generally, a higher variance explained by the model R2ADJ and lower C, AIC, AICC, and BIC values indicate the best fitting model [36]. Similar Stata command vselect was also used by the previous researchers from various fields of studies, such as by [38], [39] and [40]. The second step is to choose the most appropriate panel data estimator. The two available alternatives for analysing the micro panel data are static and dynamic techniques. The main criterion for choosing between the two alternatives is by looking at the coefficient of the lagged dependent variable. The significance of the lagged dependent variable (p-value < 0.05) indicates the need to go for a dynamic model, as it (dynamic model) is more appropriate and useful when the dependent variable depends on its own past realisations [41], otherwise static model is to be preferred (p-value > 0.05). The third step is to choose the most appropriate static or dynamic panel data analysis technique. The choice of the most appropriate static technique depends on the three types of tests as suggested and outlined by [42]. The tests are F-test, Breusch-Pagan lagrange multiplier (LM) test, and Hausman test. For the dynamic model, system generalised method of moment (SGMM) is preferred against difference generalised method of moment (DGMM). This is consistent with the previous literature that SGMM is better [43] and

more efficient [44] than DGMM. The fourth and final step is to perform the diagnostic tests (multicollinearity, heteroscedasticity, and serial correlation) and finding the correct strategy to rectify

the problem(s) identified (if any). The strategy to rectify the problem(s) is based on the suggestion by [45].
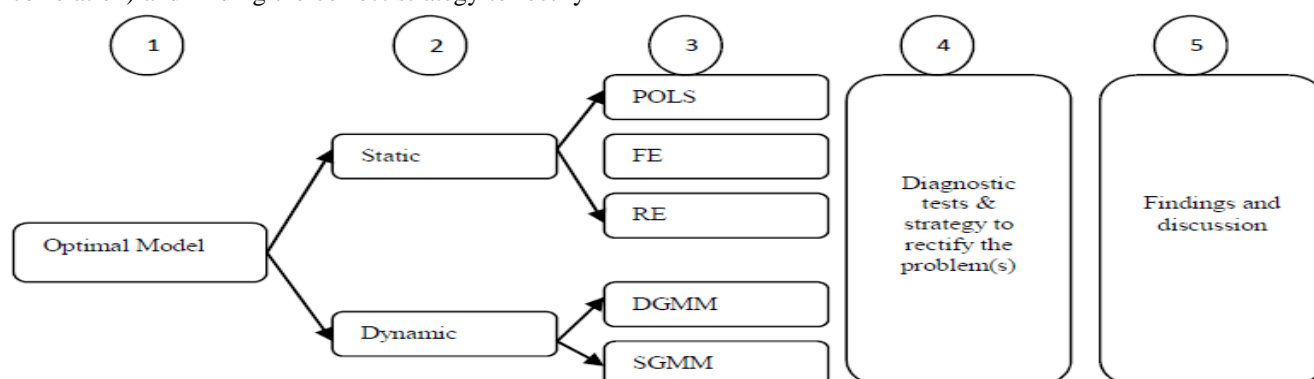

Figure 1: Data analysis steps

Findings and Discussion

Using the proxy for asset turnover, inventory growth, account receivable growth, and inventory to current asset as the proxy for efficiency. This section investigates the size and determinants of firms' efficiency for all firms classified as the sector/sample, for example, the financially distressed under the requirement of PN4, PN17, and APN17 of Bursa Malaysia.

The overall sample consists of 995 observations. The summary statistics of the variables over the sample period is presented in Table 1. The dependent variable which is efficiency that indicates the average efficiency for the period of study is -10% and the range from a minimum value of -278% to a maximum value of 67.62%.

Table 1: Descriptive Statistics

Variables	N	Mean	SD	Min	Max
EFF	995	-10.00739	29.00919	-278.07	67.62
ROA	995	-17.19196	73.25753	-362.7459	771.4512
ITO	995	71.2644	622.0551	-98.1697	7527.5
TATO	995	.5464205	.610894	0	3.7326
WC	995	16.83027	54.22624	-450.7	113.52
ARG	995	66.81963	591.6455	-96.5857	9997.317
LEV	995	88.72801	162.3216	-458.72	980.3
ITCA	995	30.52677	19.7051	0	83.7403
IO	995	.5212362	1.666278	-40.36	.97
INTANG	995	-6.703528	139.8533	-905.95	172.86
TANG	995	44.05733	25.9201	.04	307.95
LIQ	995	-2.90795	36.73156	-595.81	279.81
SIZE	995	4.310915	1.388415	-3.24	8.76

The first step in the optimal models is to determine the most optimal model that able to show the greater influence to the firms' efficiency. As shown in Table 2, the predictor sizes for most optimal models are six for R2ADJ, four for AIC and AICC, and one for BIC.

In this research, following the suggestion by [46], the four-predictor model is chosen. The chosen variables are asset turnover, inventory to current asset, account receivable growth, and inventory growth.

Table 2: Variable Selection

| Models | Variable Selection | | | | | Optimal Model | |
	R2ADJ	C	AIC	AICC	BIC	#	Ivs
Model 1	6		4	4	1	4	Asset turnover, Inventory to current asset, Account receivable growth, Inventory growth

The next step is to choose the most appropriate panel data estimator. The three available alternatives are pooled ordinary least squares (POLS), fixed effects (FE), and random effects (RE) models. As presented in Table 3, the results of the F-test (p-value < 0.05), BP-LM test (p-value < 0.05), and Hausman test (p-value > 0.05) suggest that RE is the most appropriate model estimator.

Table 3: Panel Specification Tests

| Models | p-values of the tests | | | |
	F-test	BP-LM	Hausman	Technique
Model 1	0.0000	0.0000	0.2517	RE

Once the appropriate model was determined (RE model),various diagnostic tests were then performed to check for the presence of multicollinearity, heteroscedasticity, and serial correlation problems. As presented in Table 3, the diagnostic test results indicate the presence of serial correlation (p-value < 0.05) problems. To rectify the problems, following the suggestion by [45], the remedial procedure has been carried out using random effect GLS regression with cluster option.

Table 4: Diagnostic Tests for Static Models

| Models | p-values of the tests | | | |
	VIF	H	SC	Strategy
Model 1	1.00	0.0000	0.0000	Random-effects GLS regression with cluster option

Considering the various diagnostic tests that have been conducted and the remedial procedure undertaken, this paper has enough evidence to conclude that the examined statistical test satisfies the key assumptions of linear regression. As shown in Table 5, the regression result suggests that the model fits the data well at the 0.05 significance level. The Adjusted R2 of 0.0978 suggests that the 3 independent variables explain 9.78% of the variance in the efficiency. According to [47], R2 can be of 0.01 to 0.10 and it might be imperfect representations of theories in using the proxies or the existence of other factors affecting the efficiency of the firm. The remaining 90.22% is explained by other variables that were not included in this model. The results of the regression also suggest that inventory turnover, account receivable growth, and inventory to current asset have a statistically significant relationship with the financial distress. The results also suggest that account receivable growth and inventory to current asset are positively significant related to the financial distress, whereas inventory turnover is positively

related to the efficiency. In addition to that, account receivable growth seems to have the greatest influence on the level of indirect financial distress

costs, which is explained by the highest t-value of 12.05

Table 5: Regression Result

ITCA	0.0068***(5.31)
ARG	0.0003***(12.05)
ITO	0.0000(0.74)
Constant	0.3214***(7.46)
N	995.0000
r2_w	0.1600
r2_b	0.0577
r2_o	0.0978
p	0.0000
chi2	159.0497

Notes:

(1) t statistic parentheses

(2) $^{*}p< 0.1$, $^{**}p< 0.05$, $^{***}p< 0.01$

CONCLUSION

This paper has examined the determinants of efficiency on the financial distress firms in Malaysia. The results on the average suggest that three explanatory variables which are inventory turnover to current assets, account receivable, and inventory turnover are statistically significant. This paper provides the empirical evidence; a number of areas that need to be refined with the future empirical research. However, there is a main limitation on this paper especially the limitation on time to cover this research. Then, the adjusted R2 should be more than

50% for the next researcher. Next, limitation on this paper is it does not provide any sectorial analysis on the size of efficiency on the financial distress. Future research should explore whether the industry or sectorial classification would have any effect on the size of efficiency on the financial distress and its relationship with the selected determinants. Lastly, this paper utilises STATA command Vselect in determining the most optimal model. Future researchers might want to use a different technique and method of analysis in determining the size and types of variables to be included in the model.

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