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The Effect of Firm's Size and Leverage on Profitability: a panel data approach

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Abstract:

The purpose of this study is to investigate the effect of firm's size and leverage on the profitability of publicly listed firms adopting IFRS. A Panel data fixed-effects regression model is employed to estimate the relationship between firm size and leverage on profitability, while controlling also for the effects of other variables as asset turnover and liquidity. The study is based on a sample of 94 firms from Malaysia over the period from 2012 to 2016. The study is applied to the industrial sector. The study concluded that firm size is positively and significantly related to profitability. However, leverage is negatively and significantly related to profitability. This study contributes to the literature by using data from a developing country. It provides an important insight on the international debate on the effects of firm size and leverage on decision making.

Keywords: Developing countries; Size; Leverage; Profitability

JEL Classification: M41; M48

Introduction

The main goal of any firm is to maximize its success through its performance that is measured by its profitability. Accordingly, analyzing the determinants of firm profitability has been regarded as an important research theme by researchers in various fields such as economics, strategic management, marketing, accounting and finance [1-3]. In turn, it is the response variable in this study. Previous empirical studies show a plausible but mixed relationship between firm size, leverage, and profitability [4]. Hence, the outcomes are uncertain and entail more empirical research to settle the conflicting findings. In this way, the objectives of this study are twofold. The first objective is to empirically examine the connection between firm size and profitability. The second is to empirically investigate the connection between firm leverage and profitability.

The findings of this study signify that economies of scale have a major role in the industrial zone. This implies that large firms have better ability to face competition, control prices and cope with market changes which may contribute to the positive relationship between size and performance. Additionally, the results indicate that leverage is negatively related to firm profitability. This result also supports the pecking order theory, where firms that create high earnings are anticipated to employ a smaller amount of debt capital than those that create low earnings. This research has potential policy implications. It helps managers to be able to take right decisions regarding their financing choice and strategies considered for improving firm performance.

1. Literature Review and Hypotheses Development

There are numerous theories developed trying to explain why firms exist and the reason for the differences in their organization and performance. Some of which are the trade-off theory, the pecking order theory and the economies of scale. The static trade-off theory derived by Modigliani and Miller [23] suppose that there are most favorable capital structures by performing a trade-off between the costs and benefits of debt and equity. However, other studies have shifted from the trade-off theory to pecking order theory [24]. The trade-off approach involves a fixed technique to financing decisions according to a target capital structure, while pecking order theory permits the operation of the firm to set the best capital structure for a particular firm at whichever specific instance.

According to the pecking order theory, firms select capitals consistent with the subsequent order: internal finance, debt, equity. In turn, the pecking order theory proposes that a firm ought to favor to finance itself primarily internally via retained earnings. If this means of financing is unavailable, the firm ought to then consider financing itself using debt. If this is not feasible, as a last option, the firm should consider financing itself by issuing new equity. This pecking order is essential because it indicates to the public how the firm is operating. If the firm finances itself from within, it means it is strong. If the firm finances itself via debt, it is an indication that management is sure the firm can cover its debt. If the firm finances itself by issuing new stock, this is generally a negative sign. Hence, successful firms are not required to depend heavily on outside funding. Some practical proof supports this argument and is consistent with the pecking order theory [26]. The pecking order theory has been maintained via numerous scholarly literature [28].

Economies of scale describe a competitive advantage that large firms have over smaller ones. It argues that firm size is related to profitability as large firms have greater strategic diversification, a better chance of renegotiating with customers and suppliers, greater capability to face competition, and keeping prices higher than the competitive point. Relevant with this idea, a positive association between firm size and profitability is predicted [32].

2. Firm Size and Profitability

The firm size is a key element in verifying the profitability according to the notion of economies of scale. This concept proposes items or services can be provided with lower costs by bigger firms. Thus, a positive relationship between firm size and profitability is expected. Amato and Wilder [5] conclude that it is possible to maintain a positive association between firm size and profitability, but at a particular size, then this relationship might turn negative. With respect to Glancey [6] when bigger firms consider the economies of scale, a positive association is anticipated between profitability and size of the firm.

Different research studies suggest different relationships between firm size and profitability ranging from those in favor of a positive association to those not. Conflicting empirical outcomes may be due to different time horizons, indicators, used samples, industry groups, and business environment. Some researchers found that firm size has a positive relationship with firm profitability [7-14]. Babalola [15], employing a sample of registered manufacturing firms in Nigeria, investigates the effect of firm size on the profitability using a panel data set. Profitability was calculated using ROA, whereas both total assets and total sales were utilized as substitutes of firm size. Outcomes reveal that firm size, represented as total assets and total sales, has a positive effect on the profitability. Similarly, Al-Jafari and Al Samman [16] find a positive significant relationship between profitability and firm size on a sample of 17 listed manufacturing firms in Oman using ordinary least square model. The authors conclude that big on the rise firms with resourcefully managed assets increase revenue and eventually boost profitability.

Inyama and Victoria [17] investigate the importance and nature of the relations involving firm size and financial performance in all the firms in the Nigerian brewery industry for the period 2000-2013. The degree that Earnings Per Share (EPS) is influenced by the intensity of fixed assets is assessed. The Engle and Granger 2-step co-integration approach was adopted. Findings show that firm size has short-term and long-term positive effects on EPS. There is no causality running from either EPS to total assets or otherwise at both stages. For a sample of Sri Lankan hotels and travels, Sritharan [13] examines the influence of firm size on profitability using the fixed effect econometric estimation models. The results reveal that firm size is positively related to profitability. In the agricultural sector in Kenya, the Mule, Mukras [18] study assesses the effect of firm size on the financial performance during 2003 to 2013 via a pooled ordinary least square approach. Firm size was considered via the total assets whereas the financial performance was calculated by ROA, return on equity (ROE) and EPS. These outcomes specify that firm size had positive and statistical significance on all the three indicators of the financial performance revealing that big firms were discovered to have a competitive advantage to small firms.

On the other hand, a number of studies provided contradictory evidence on the association among firm size and profitability. Opposing theories exist that propose that big firms come under the control of managers seeking goals of personal interest hence managerial value maximization function may replace profit maximization of the firms' goal function. They concluded that the relationship between firm size and profitability is insignificant or negative [19, 20]. For example, Pervan and Višić [21] find that firm size has a weak influence on firm profitability. While in Pakistan, Kouser, Bano [22] paper analyzes 70 listed nonfinancial firms using panel data techniques. The outcome demonstrates that firm size has a negative impact on the profitability. Similarly, Kartikasari and Merianti [23] examine the effect of firm size on its profitability. One hundred qualified manufacturing firms registered on the Indonesian Stock Exchange in the period of 2009-2014 were analyzed using panel data technique. The result showed that size had a significant negative impact.

Yet other researchers have found an insignificant impact of firm size on firm profitability [24-28]. For example, Mahmoud Abu-Tapanjeh [29] provides evidence that an insignificant relationship existed between firm size and profitability. Nireesh and Thirunavukkarasu [27] explore the effects of firm size on the profitability of 15 active manufacturing firms listed on the Colombo Stock Exchange (CSE) during the period 2008 - 2012 in Sri Lanka. In the study ROA represents the firm profitability, Total Assets represent the Net Profit and Total Sales represent the firm size. Correlation and regression techniques have been employed in the empirical investigation. Findings show there is no analytical association involving the firm size and profitability of publicly registered manufacturing firms in Sri Lanka.

3. Firm Leverage and Profitability

Leverage has been defined in various ways. It is defined as the ratio of long-term debt to total long-term capital [30]. Chandrakumarmangalam and Govindasamy [31] describe leverage as the funds provided to business for which it has to bear the fixed cost. However, many studies suggest that leverage carries risk as well. Hurdle [32] implies that firms with low debt have high market power and lower risk and firms with high debt have low market power and high risk.

According to García Padrón, María Cáceres Apolinario [33], large firms can decrease the level of information asymmetries in the market and acquire financial resources without difficulty. In small firms, managers are liable to be the owners. Owners desire to continue to be in control of their firms as they gain an individual advantage over the financial return on their investment. They are required to go without some development prospects if these prospects are hard to recognize and depend further on debt. The development of small firms is more susceptible to internal finance than that of bigger firms [34]. Hussain and Matlay [35] state that small firms go for external alternatives of funding only if the internal alternatives are not available or not enough. Small firms attempt to satisfy their financial needs by a pecking order of personal and retained earnings, debt and issuance of new equity. The pecking order approach is simply implemented in small firms since small firms borrow as their investment requirements more willingly than trying to realize an optimal capital structure [36].

The existing literature gives conflicting evidence on the relationship between leverage and profitability. Some researchers find that leverage has a positive relationship with firm profitability [37-39]. In Indonesia, Kartikasari and Merianti [23] study the impact of firm size and leverage to its profitability. One hundred manufacturing firms registered on the Indonesian Stock Exchange in during 2009-2014 were analyzed using the fixed effect panel data regression model. It was found that leverage had a significant positive impact on profitability whereas size had a significant negative effect. Negasa [40] investigates the effect of the capital structure on firm profitability of Ethiopian big private manufacturing firms using panel data for five consecutive years. Findings reveal that a significant positive association involving firm profitability and total debt ratio exist indicating the firm capital structure.

On the other hand, other studies have contradicted the pecking order theory and supported the targeted (fixed) debt to equity ratio. For example, Opler and Titman [41] notice that during the industry downturns the

higher the leverage, the higher the probability of losing market share leading to very little operating profits. According to Lang, Ofek [42], firms having excellent investment opportunities have leverage positively connected to development, but for firms who are not able to overcome the consequences of their debt overhauling or who don't have good growth opportunities leverage is negatively related to development. Noteworthy is the findings of De Jong, Verbeek [43] study that infers in the static trade-off assumption, a firm raises leverage until it achieves its purposed debt ratio, whereas the pecking order gives way to debt issuance awaiting the debt limit to be achieved. Al-Jafari and Al Samman [16] find a negative association among the financial leverage and profitability in a sample of 17 registered manufacturing firms in Oman using Ordinary Least Squares (OLS) model.

In sum, empirical evidence shows mixed results and based on the influence of firm size and leverage on profitability. In addition, up till now, there is no study carried on publicly listed firms adopting IFRS in developing countries. In this paper, we study the impact of firm size and leverage on profitability in Malaysia. Thus, we form the subsequent hypothesis:

H1: A significant relationship exists between firm size and profitability of publicly listed firms adopting IFRS in Malaysia.

H2: A significant relationship exists between financial leverage and profitability of publicly listed firms adopting IFRS in Malaysia.

4. Data and Methodology

4.1. Data

This study investigates the effects of firm size and leverage on the profitability of publicly listed industrial firms adopting IFRS. Data on all study variables were collected from Thompson Reuters Eikon database. The data set contains a total of 470 observations, with $n=94$ from Malaysia. Malaysia is chosen based on two considerations. The first consideration is its compliance with the IFRS from 2012 to 2016. The second consideration is the rarity of literature that explores the association among firm size and leverage on profitability in Malaysia as a developing country using panel data methodology. Firms were selected on the basis of their audit reports which state their conformity with International Financial Reporting Standards (IFRS) during the period from 2012-2016 and their fiscal year end of December 31st.

The objective of this study is to investigate the relationship between firm size, leverage, and performance. However, from the literature, we consider the possibility of other control variables having implications on profitability, namely: asset turnover and liquidity. As a result, this paper consists of five variables; profitability, firm size, leverage, asset turnover and liquidity. The firm size is further operationalized into total assets and market capitalization, so there are six variables in this study. The response variable, profitability, is considered via ROA. It represents the ability of the firm to earn a profit. It was developed by DuPont in 1919 and is considered the most widely used financial models for measuring firm performance. As mentioned earlier, there are two variables used as proxies for the firm size: namely, log natural of total assets (SIZETA) and market capitalization (SIZECMC).

The variables used in this study and their measurements are as follows:

- 1) Profit (ROA) (net profit before taxes / total assets)
- 2) Firm size (SIZETA)(log natural of total assets)
- 3) Firm size (SIZECMC)(log natural of market capitalization)
- 4) Leverage (LEV) (total debt / total equity)
- 5) Asset turnover (TURNOVER) ((Sales / total assets)
- 6) Liquidity(LIQ) (current assets / current liabilities)

Table 1 contains the descriptive statistics of these variables. The mean value for ROA is 0.03 for firms,

while size and leverage were having 19.6 and 0.45 respectively. 45% of the firm's capital is financed from debt. It is clear that liquidity has the highest standard deviation of the explanatory variables and therefore has the lowest contribution to the profitability variable.

Table 1. Descriptive statistics

| | ROA | SIZETA | SIZECMC | LEV | TURNOVER | LIQ |
|--------------|-----------|----------|----------|----------|-----------|----------|
| Mean | 0.030654 | 20.13037 | 19.64266 | 0.444659 | 0.734052 | 3.790317 |
| Median | 0.038458 | 19.84344 | 19.37073 | 0.431373 | 0.615707 | 1.733537 |
| Maximum | 0.438547 | 26.14114 | 25.60404 | 2.919502 | 3.813037 | 460.5273 |
| Minimum | -1.423664 | 16.17828 | 16.23810 | 0.003998 | -0.077420 | 0.015087 |
| Std. Dev. | 0.115598 | 1.814290 | 1.812611 | 0.265511 | 0.615422 | 18.24555 |
| Observations | 470 | 470 | 470 | 470 | 470 | 470 |

4.2. Methodology

This study relies on panel data analysis to permit discrepancies in the type of unnoticed distinct country and firm effects. Panel data combines both time series and cross-sectional techniques. It has a number of advantages over both techniques. These include its ability to provide outcomes that could not be projected by either the cross-section data or the time-series data alone. Precisely, due to a large number of observations which increases degrees of freedom and decreases multi-collinearity problems. This results in improving the effectiveness and efficiency of econometric values [44]. Furthermore, its capability to control for heterogeneity in addition to state and time-invariant variables that are not probable with both time series and cross-sectional technique [45]. This study applies panel fixed-effects regression model. The natural logarithm transformation was used in some variables to improve the regression's fit.

To examine the association among response and explanatory variables, this panel data model was projected using log natural of total assets as a proxy for firm size:

$$Y_{it} = a_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon_{it} \dots\dots\dots (1)$$

Where

Y_{it} =ROA, X_1 =SIZETA, X_2 =LEV, X_3 =TURNOVER, X_4 =LIQ; a_0 = Constant;

β = The Coefficient of the variable; i = firm; t = time period and ε = error term.

In addition, another panel data model was estimated using market capitalization as a proxy for firm size:

$$Y_{it} = a_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon_{it} \dots\dots\dots (2)$$

Where

Y_{it} =ROA, a_0 = Constant, β = The Coefficient of the variable, i = firm, t = time period, X_1 =SIZECAC, X_2 =LEV, X_3 =TURNOVER, X_4 =LIQ and ε = error term.

To determine whether to apply fixed-effects or random-effects regression model, Hausman's test is conducted. While the outcome of the Hausman's investigation shows that the discrepancy in the coefficients among fixed effects and random effects is orderly, fixed effects panel regression is used in this study.

5. Empirical Results and Discussion

Table 2 contains the correlation matrix between study variables. The values were computed using Pearson

correlation of two tailed significance. The results indicate that the relationship between ROA and the other variables are statistically significant except for liquidity where the relationship is insignificant. In accordance with the findings, asset turnover and size represented as total assets and market capitalization are positively correlated with ROA at 24.5 percent, 19.7% and 32.9 percent, respectively. On the other hand, leverage is negatively correlated with ROA at 37.9 percent. It is also obvious that the correlation between ROA and size in terms of market capitalization and between ROA and leverage is medium. While the correlation between ROA and size in terms of total assets and between ROA and asset turnover is weak. There is very weak inter-correlation between each pair of the explanatory variables which may constrain any collinearity problem.

Table 2. Correlation Matrix

| Probability | ROA | SIZETA | SIZECMC | LEV | TURNOVER | LIQ |
|-------------|-----------|-----------|-----------|-----------|-----------|----------|
| ROA | 1.000000 | | | | | |
| | ----- | | | | | |
| SIZETA | 0.197380 | 1.000000 | | | | |
| | 0.0000 | ----- | | | | |
| SIZECMC | 0.329869 | 0.885871 | 1.000000 | | | |
| | 0.0000 | 0.0000 | ----- | | | |
| LEV | -0.379470 | 0.333523 | 0.185334 | 1.000000 | | |
| | 0.0000 | 0.0000 | 0.0000 | ----- | | |
| TURNOVER | 0.245029 | 0.064134 | 0.099743 | 0.164656 | 1.000000 | |
| | 0.0000 | 0.0844 | 0.0072 | 0.0000 | ----- | |
| LIQ | 0.034786 | -0.089464 | -0.050832 | -0.187556 | -0.086153 | 1.000000 |
| | 0.3496 | 0.0160 | 0.1716 | 0.0000 | 0.0203 | ----- |

Tables 3 and 4 display the outcome of the fixed-effects panel regression. The results of the fixed effect model reported R-squared and adjusted R-squared values of 0.711654 and 0.637565 respectively in model 1. This indicates that 71% of the variability in profitability is measured by the explanatory variables of leverage, firm size and asset turnover. The recorded R-squared and adjusted R-squared values were lower in model 2 than model 1. This means that total asset is preferred as a proxy for firm size.

The results show that size represented as total assets and market capitalization is positively associated to the firm profitability. The variable in model 1 recorded a t-value of 7.029680, a probability value of 0.0000 and a positive coefficient of 0.065921 at 5% level of significance. This result is in line with the results of many developing and developed country studies such as Babalola [15], Mule, Mukras [18]. It supports the argument that larger firms make use of the economies of scale as size brings bargaining power over the suppliers. Big firms have more market which encourage them to require increasing prices and earn increasing profits [21].

Table 3. Model 1 Fixed-effects regression estimation results

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|-----------------------|-------------|------------|-------------|--------|
| C | -1.225660 | 0.190943 | -6.418988 | 0.0000 |
| SIZETA | 0.065921 | 0.009377 | 7.029680 | 0.0000 |
| LEV | -0.323922 | 0.019388 | -16.70763 | 0.0000 |
| TURNOVER | 0.100398 | 0.012118 | 8.285159 | 0.0000 |
| LIQ | -9.35E-05 | 0.000165 | -0.567685 | 0.5705 |
| Effects Specification | | | | |

| Cross-section fixed (dummy variables) | | | |
|---------------------------------------|----------|-----------------------|-----------|
| R-squared | 0.711654 | Mean dependent var | 0.030654 |
| Adjusted R-squared | 0.637565 | S.D. dependent var | 0.115598 |
| S.E. of regression | 0.069593 | Akaike info criterion | -2.311342 |
| Sum squared resid | 2.789656 | Schwarz criterion | -1.368805 |
| Log likelihood | 986.8614 | Hannan-Quinn criter. | -1.947588 |
| F-statistic | 9.605387 | Durbin-Watson stat | 2.061202 |
| Prob(F-statistic) | 0.000000 | | |

Firm size may be positively related to borrowing capacity in such a way that potential bankruptcy costs become a smaller part of the value for larger firms which decreased Bankruptcy costs[13]. However, is in contradiction with the empirical findings of Pervan and Višić [21], Kouser, Bano [22], Kartikasari and Merianti [23] who found a negative relationship between firm size and profitability. Other studies found no relationship between size and profitability[27, 29]. These results indicate that economies of scale may have an essential effect in the industrial zone. Additional explanation adds that large firms have better ability to face competition, control prices and cope with market changes which may contribute to the positive association between size and performance.

Table 4. Model 2 Fixed-effects regression estimation results

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---------------------------------------|-----------------------|-----------------------|-------------|--------|
| C | -0.358652 | 0.108315 | -3.311205 | 0.0010 |
| SIZECMC | 0.023644 | 0.005383 | 4.392371 | 0.0000 |
| LEV | -0.313314 | 0.020051 | -15.62597 | 0.0000 |
| TURNOVER | 0.088373 | 0.012239 | 7.220645 | 0.0000 |
| LIQ | -0.000177 | 0.000169 | -1.050967 | 0.2937 |
| | Effects Specification | | | |
| Cross-section fixed (dummy variables) | | | | |
| R-squared | 0.697062 | Mean dependent var | 0.030654 | |
| Adjusted R-squared | 0.619224 | S.D. dependent var | 0.115598 | |
| S.E. of regression | 0.071332 | Akaike info criterion | -2.261978 | |
| Sum squared resid | 2.930820 | Schwarz criterion | -1.319440 | |
| Log likelihood | 968.9670 | Hannan-Quinn criter. | -1.898224 | |
| F-statistic | 8.955284 | Durbin-Watson stat | 2.168256 | |
| Prob(F-statistic) | 0.000000 | | | |

The results indicate that leverage is negatively associated with firm profitability. The variable in model 1 recorded a t-value of -16.70763, a probability value of 0.0000 and a negative coefficient of 0.323922 at 5% level of significance. This result supports the pecking order hypothesis, where firms that generate high earnings are expected to use less debt capital than those that generate low earnings. In addition, it is in line with the results of many studies such as Al-Jafari and Al Samman [16]. They suggest that profitable firms depend more on equity as their main financing option as the increasing level of debt increase the interest payment and accordingly increase firm risk. Additional perspective on the negative relationship between leverage and profitability may be because of the developing nature of the financial markets of these firms where firms with higher levels of debt are less able to finance projects that may improve profitability due to the cost of pay off the debt periodically. In addition, it is possible that profitable firms prefer to finance their operations rather than reaching out to the external financial markets [46].

At the same time, this study result is inconsistent with the findings of the study of Abor [47] where a significantly positive association between leverage and profitability is found and this suggests that profitable firms depend more on debt as their main financing option. Chandrakumarmangalam and Govindasamy [31] discover a significant positive relation among leverage and Earnings Per Share when the earnings of the firm are more than the fixed financial obligation to be paid for the lenders. Other empirical studies find weak or no relationship between leverage and firm profitability [30, 48]. According to the control variables; a positive association through the asset turnover and profitability is found which suggest that the firm profit will increase in parallel with the increase in the effectiveness of management due to increase in asset utilization. Finally, liquidity turned out to be statistically insignificant.

Conclusion

This paper adds to the current literature in two avenues. First, instead of focusing on only one year, in this paper we study a broad sample of firms that signifies an adequately wide array of firm sizes during the phase between 2012 and 2016. Second, the focus is on the firms complying with IFRS in Malaysia.

The firm's financial performance influences the strength of the countries' capitalist economy. Hence, the determinants of firm profitability deserve more investigation. Lack of studies on firms adopting IFRS in developing countries has motivated this research study. This paper investigates the impact of firm size and firm leverage on the profitability of firms operating in Malaysia and complying with IFRS using fixed effects panel regression. Profitability is measured by ROA, while leverage is calculated using the ratio of total debt to total equity. Liquidity and asset turnover are considered as the control variables. Summarizing the outcomes, it is found that firm size represented as total assets and market capitalization are positively associated with firm profitability. Further, this paper reveals a negative association among leverage and profitability. As for the control variables; a positive association among the asset turnover and profitability is found which suggest that the firm profit will increase in parallel with the increase in the effectiveness of management due to increase in asset utilization. Finally, liquidity turned out to be statistically insignificant. Several empirical agreements such as Gleason, Mathur [8], Shubita and Alsawalhah [12], and disagreements such as Lang, Ofek & Stulz (1995), Stulz [49] were observed in the literature review regarding this study.

By using the results concluded from this research, managers will be able to take the right decisions regarding their financing decisions and strategies to improve firm performance. There are certain limitations to this study that may serve as future research directions. Firstly, the study is applied to the industrial firms adopting IFRS. Hence this may serve as a barrier to generalizing the findings of this study to other sectors. Secondly, data for firms adopting IFRS were analyzed. More studies could be adapted to compare firms before and after adopting IFRS. Finally, only the impacts of two independent variables on profitability were studied. However, there are also other variables like cash conversion cycle, industry factor, corporate social performance, operating efficiency and others which also affect the firm profitability could be studied to cast more light on the determinants of profitability. All these limitations discussed above influence the generalization of the results.

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