Firm Size and Profitability: A Study of Listed Manufacturing Firms in Sri Lanka

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Abstract

The purpose of this study is to explore the effects of firm size on profitability of quoted manufacturing firms in Sri Lanka. In this study, data of 15 companies which were active in Colombo Stock Exchange (CSE) between the years 2008 to 2012 has been used. As indicators of firm profitability, Return on Assets and Net Profit have been used whereas Total Assets and Total Sales have been utilized as indicators of firm size. Correlation and regression methods have been used in the empirical analysis. There is no indicative relationship between firm size and profitability of listed manufacturing firms, the findings reveal. In addition, the results showed that firm size has no profound impact on profitability of the listed manufacturing firms in Sri Lanka.

Keywords: firm size, profitability

1. Introduction

Firm performance can be measured in different ways and by applying various methods. The commonly used method for financial analysis is the use of profitability ratios as key measures of firms' overall efficiency and performance. Various studies examined different variables that may influence firm performance as the survival or business success mostly depends on the profitability of the firm. In this way the present study has been initiated to identify the effects of firm size on profitability of the listed manufacturing firms in Sri Lanka.

The size of a firm is the amount and variety of production capacity and ability a firm possesses or the amount and variety of services a firm can provide concurrently to its customers. The size of a firm is a primary factor in determining the profitability of a firm due to the concept known as economies of scale which can be found in the traditional neo classical view of the firm. It reveals that contradictory to smaller firms, items can be produced on much lower costs by bigger firms. In accordance with this concept, a positive relationship between firm size and profitability is expected. Contrary to this, alternative theories of the firms advise that larger firms come under the control of managers pursuing self-interested goals and therefore managerial utility maximization function may substitute profit maximization of the firms' objective function.

In determining the business success of a firm, profitability performs a dynamic role. Profitability is the amount of money a firm can engender with whatever resources the firm has. The eventual goal for any organization is maximizing its profitability. Consequently, firms can reap out the benefits associated with the increased profitability.

1.1 Objectives of the Study

The main objective of this study is to discover the effects of firm size on profitability of the listed manufacturing firms in Sri Lanka. Sub objectives are:

- To identify the impact of firm size on profitability.
- To identify the profitability of listed manufacturing firms in Sri Lanka.
- To recognize the firms' size.

1.2 Review of Relevant Literature

The majority of the studies measuring the influence of firm size on profitability have found results with positive direction between firm size and profitability. In line with this, a positive relationship between firm size and

profitability was found by Vijayakumar and Tamizhselvan (2010). The authors used different measures of size (sales and total assets) and profitability (profit margin and profit on total assets) while applying model on a sample of 15 companies operating in South India in their study, which was based on a simple semi-logarithmetic specification of the model.

The part that firm size plays in profitability was examined by Lee (2009) who used fixed effect dynamic panel data model and performed analysis on a sample of more than 7000 US publicly-held firms. According to him absolute firm size plays a remarkable role in explaining profitability.

Ozgulbas et al. (2006) have studied the effects of firm size on performance over the firms operating in Istanbul Stock Exchange between the years of 2000 to 2005. As a result of their study, they have found that big scale firms have a higher performance as compared to small scale firms. In a similar fashion, Jonsson (2007) has studied the relation between profitability and size of the firms operating in Iceland. Results of the analysis showed that bigger firms have higher profitability as compared to smaller firms.

Size-profit relationship for the firms functioning in the financial services sector was tested by Amaton and Burson (2007). They tested both linear and cubic form of the relationship. Even though a negative influence of firm size on profitability was revealed with the linear specification in firm size, evidence of a cubic relationship was detected between return on assets and firm size.

Becker et al. (2010) have studied the effects of firm size on profitability in the firms operating in manufacturing sector in USA using the data of years 1987 to 2002. Results of the study showed that negative and statistically significant relations exist between the total assets, total sales and number of employees of the firms and their profitability.

Velnampy (2005) pointed a study on investment appraisal and profitability of toddy bottling project in Sri Lanka which found that the management of the project failed to attain the budgetary results, even though the Net Present Value (NPV), Internal Rate of Return (IRR) and benefit cost ratio showed the project as commendable.

Velnampy (2006) studied the financial position of the companies and the relationship between financial position and profitability with the sample of 25 public quoted companies in Sri Lanka through the use of Altman Original Bankruptcy Forecasting Model. According to his verdicts, out of 25 companies only 4 companies were in the danger of going bankrupt in the near future. Moreover, he also found that in deciding the financial position of the quoted companies, earning/total assets ratio, market value of total equity/book value of debt ratio and sales/total assets in times were the most significant ratios.

Banchuenvijit (2012) studied factors affecting performances of the firms operating in Vietnam. A positive relation has been found between total sales and profitability of the firms but on the contrary, a negative relation has been found between profitability and total assets. Additionally, the author has found statistically non-significant results between number of employees and profitability.

Velnampy and Nimalathasan (2010) studied the relationship between firm size and profitability of all the branches of Bank of Ceylon and Commercial Bank in Sri Lanka over the period of 10 years from 1997 to 2006. They observed that there was a positive relationship between firm size and profitability in Commercial Bank, but there was no relationship between firm size and profitability in Bank of Ceylon.

Velnampy (2013) discovered that there was no correlation between corporate governance and firms' performance measures. The sample of 28 manufacturing companies using the data representing the period of 2007 to 2011 revealed that the determinants of corporate governance were not correlated to the performance measures of the organization.

Based on these literatures it is crystal clear that the studies on the effects of firm size on profitability have generated varied results ranging from those supporting a positive relationship among the variables used in the study to those opposing it. There is no common agreement on how the firm size is related to firm profitability. Hence, the results are inconclusive and require more empirical work. In this way, the current study has been instigated to investigate the effects of firm size on profitability of the listed manufacturing firms in Sri Lanka.

1.3 Hypotheses of the Study

For the study, the following hypotheses were formulated.

H1: There is a significant relationship between firm size and profitability.

H2: There is an impact of firm size on profitability.

2. Research Methods

2.1 Mode of Analysis

The quantitative research approach was applied to investigate the findings of the research study. Multiple regression and correlation methods have been used in the empirical analysis. Additionally, Variance Inflation Factor (VIF) has been used to determine multi collinearity.

2.2 Variables Used in the Study and the Creation of Research Model

The following table gives a snapshot view of the variables and measurements used in the study.

Table 1. Description of variables used in the analysis

Variables	Description
Dependent variables	
Net Profit Ratio (NP)	The ratio of Net Profit before tax to Total Sales
Return on Assets (ROA)	Earnings Before Interest & Tax (EBIT) divided by
	Total Assets & multiplied by 100
Independent variables	
Firm Size 1 (Size_TA)	Logarithm of Total Assets
Firm Size 2 (Size_TS)	Logarithm of Total Sales
Control variable	
Asset Turnover	Sales divided by Total Assets

Main independent variables of the study are firm size indicators. Total assets and total sales have been used as firm size indicators whereas net profit ratio and return on assets have been utilized as the measures of firm profitability. Asset Turnover has been used as the control variable. Size indicators have been tested by developing four models instead of being considered in a single model. This is in order to avoid multi collinearity and auto correlation problems in the study. The following regression models can be developed based on the variables used in the study.

$$NP = \beta0 + \beta1X1 + \beta2X2 + \varepsilon \qquad \text{Model I}$$
$$NP = \beta0 + \beta1X1 + \beta2X3 + \varepsilon \qquad \text{Model II}$$
$$ROA = \beta0 + \beta1X1 + \beta2X2 + \varepsilon \qquad \text{Model III}$$
$$ROA = \beta0 + \beta1X1 + \beta2X3 + \varepsilon \qquad \text{Model IV}$$

Where:

X1= Asset Turnover.

X2= Logarithm of Total Assets.

X3= Logarithm of Total Sales.

NP= Net Profit.

ROA = Return on Assets.

β0= Constant.

ε= Error term.

2.3 Conceptual Framework

Based on the variables used in the study the conceptual framework can be developed in the following manner.
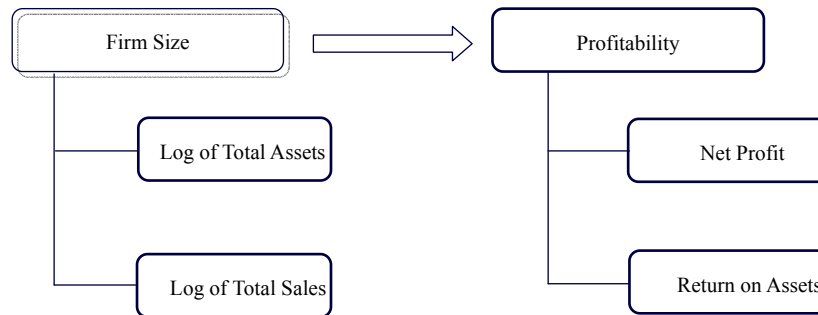
Figure 1. Conceptualization model

2.4 Data Collection and Sampling Design

The data for this study were collected from the listed manufacturing firms' financial statements as published by the Colombo Stock Exchange (CSE). Furthermore, via reference to the review of different articles, papers and relevant prior studies, another source of data were collected. The sample of this study was composed of 15 randomly selected listed manufacturing firms representing the time frame of five years from 2008 to 2012.

3. Results and Analysis

3.1 Measures of Central Tendency

Table 2. Descriptive statistics

Variables	Range	Minimum	Maximum	Mean	Std. Deviation
Net profit	25.18	-2.98	22.20	5.51	6.26
Return on Assets	16.86	2.18	19.04	10.79	4.43
Log of Total Assets	3.81	6.29	10.09	8.97	1.11
Log of Total Sales	3.75	6.48	10.23	9.07	1.05
Asset Turnover	2.19	.64	2.83	1.35	.57

Table 2 indicates the results of descriptive statistics concerning the independent and dependent variables used in the study. As shown in table 2, the profitability ratios measured by Net profit and Return on Assets averaged 5.51% and 10.79% respectively. The size indicators as measured by log of Total Assets and Total Sales were found to be 8.97 and 9.07 respectively. It is obvious from the table that the minimum and maximum values for Net profit and Return on Assets varies substantially among the selected listed manufacturing firms in Sri Lanka.
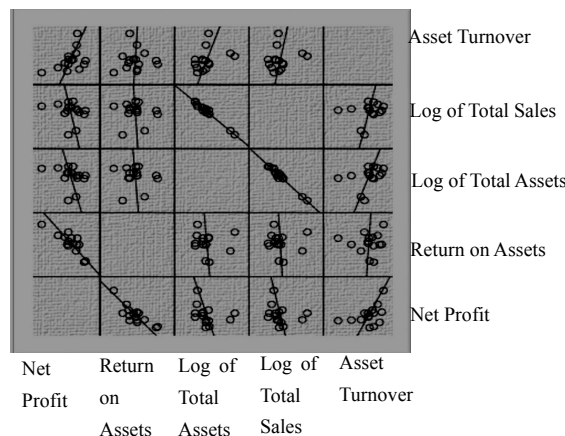
3.2 Test of Linearity

Figure 2. Matrix scatter diagram

Figure 2 reveals that there are outliers spotted away from the diagonal line. Hence, the variables are not linearly related with each other. Pearson product moment correlation coefficient works best if outliers are kept to a minimum or if there are no outliers. Therefore, Spearman's correlation coefficient has been used in order to identify the relationship as it is non-parametric and does not have the above requirements.

3.3 Test of Association among the Variables Used in the Study

Table 3. Correlation matrix

		NP	ROA	LTA	LTS	ATO
Spearman's rho						
NP	Correlation Coefficient	1.000				
	Sig. (2-tailed)	.				
ROA	Correlation Coefficient	0.744**	1.000			
	Sig. (2-tailed)	0.001	.			
LTA	Correlation Coefficient	0.391	0.168	1.000		
	Sig. (2-tailed)	0.149	0.550			
LTS	Correlation Coefficient	0.302	0.214	0.929**	1.000	
	Sig. (2-tailed)	0.274	0.443	0.000	.	
ATO	Correlation Coefficient	-0.390	-0.057	-0.414	-0.146	1.000
	Sig. (2-tailed)	0.151	0.840	0.125	0.603	.

Note. **, Correlation is significant at the 0.01 level (2-tailed).

NP = Net Profit, ROA = Return on Assets, LTA = Log of Total Assets, LTS = Log of Total Sales & ATO = Asset Turnover.

Table 3 shows the presence of statistically insignificant association between the indicators of firm size and the measures of firm profitability. Hence, H1 is rejected and $H1_0$ is accepted. It is meant that no remarkable relationship is found between firm size and profitability of the listed manufacturing firms in Sri Lanka. Negative and statistically insignificant relations have been observed between Asset Turnover and profitability measures of Net Profit and Return on Assets consisting the r values of -0.390 & -0.057 respectively. It implies that the profitability of the firm will decrease with the growth of asset utilization. This is an indication that assets are not efficiently utilized in generating profit.

3.4 Test of Collinearity

In order to determine the presence of multi collinearity among independent variables used in the study, two major methods (Variance Inflation Factor and Tolerance) were used. The Variance Inflation Factor (VIF) indicates whether a predictor has a strong linear relationship with other predictors. Related to the VIF is the tolerance statistic, which is its reciprocal (1/VIF). If the VIF is greater than 10 there is a cause for concern (Bowerman and O' Connell, 1990; Myers, 1990). Tolerance below 0.1 indicates a serious problem. The results of the analysis are as shown below.

Table 4. Collinearity statistics for the 4 models

Model I - NP		Model II - NP		Model III - ROA		Model IV - ROA	
Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF
0.880	1.137	0.957	1.045	0.880	1.137	0.957	1.045
0.880	1.137	0.957	1.045	0.880	1.137	0.957	1.045

As it can be seen from the table 4, none of the Tolerance level was less than or equal to 0.1 and all VIF values were well below 10. Hence, among the independent variables in the data there were zero multi-collinearity problems.

3.5 Regression Analysis

Table 5. Results of regression analysis

Model	R	R^2	Adjsuted R Square	Std.Error of the Estimate	Durbin-Watson
I	0.453	0.205	0.073	6.023	2.190
II	0.449	0.202	0.069	6.036	2.185
III	0.081	0.007	-0.159	4.766	2.342
IV	0.072	0.005	-0.161	4.769	2.335

As shown in the table 5, the R^2 values suggest that 21%, 20%, 0.7% and 0.5% of the observed variability in the model I, II, III and IV were demonstrated by the variations in the independent variables used in the study. Remaining 79%, 80%, 99.3% and 99.5% of the variations in the models were related to other variables which were not portrayed in the models. These R^2 values show that there may be a number of variables which can have impact on the profitability that need to be studied. Hence, this area is indicated as a scope for future research.

In order to identify the auto correlation in the residuals in the regression, Durbin-Watson value of each model was computed. The result shows the values of 2.190, 2.185, 2.342 and 2.335 for model I, II, III and IV respectively. The values of Durbin-Watson have an upper limit of four and lower limit of zero. The acceptable Durbin-Watson range is between 1.5 and 2.5. The value of 2 indicates the absence of multi collinearity, value of above 2 indicates the existence of negative correlation and value of below 2 indicates the existence of positive correlation. All four models which have pretty good Durbin-Watson values reveal that there is no auto correlation problem in the models.

Table 6. Coefficient for predictors of profitability

Models	**Unstandardized**		**Standardized**	**t-value**	**Sig.**
	Coefficients		**Coefficients**		
	B	**Std.Error**	**Beta**		
I-NP					
Constant	3.931	15.846		0.248	0.808
Log of Total Assets	0.805	1.550	0.143	0.520	0.613
Asset Turnover	-4.199	3.003	-0.384	-1.398	0.187
II-NP					
Constant	4.903	15.582		0.315	0.758
Asset Turnover	-4.463	2.885	-0.408	-1.547	0.148
Log of Total Sales	0.729	1.569	0.122	0.465	0.651
III-ROA					
Constant	8.869	12.539		0.707	0.493
Log of Total Assets	0.253	1.226	0.063	0.207	0.840
Asset Turnover	-0.259	2.376	-0.033	-0.109	0.915
IV-ROA					
Constant	9.488	12.312		0.771	0.456
Asset Turnover	-0.355	2.279	-0.046	-0.156	0.879
Log of Total Sales	0.197	1.240	0.047	0.159	0.877

According to the table 6, the results of regression models can be shown mathematically as below.

$$NP = 3.931 - 4.199X1 + 0.805\ X2 + \varepsilon \qquad \text{Model I}$$

$$NP = 4.903 - 4.463X1 + 0.729\ X3 + \varepsilon \qquad \text{Model II}$$

$$ROA = 8.869 - 0.259X1 + 0.253X2 + \varepsilon \qquad \text{Model III}$$

$$ROA = 9.488 - 0.355X1 + 0.197X3 + \varepsilon \qquad \text{Model IV}$$

It is apparent from the models that the Asset Turnover denoted by X1 exhibits a negative association with Net Profit (NP) and Return on Assets (ROA) whereas Log of Total Assets (X2) and Log of Total Sales (X3) exhibit positive association with Net Profit (NP) and Return on Assets (ROA).

As shown in the table 6, t values are insignificant for all the independent variables in the model I, II, III and IV. It reveals that the size indicators as measured by Log of Total Assets and Log of Total Sales are not contributing to determine the Net profit and Return on Assets of the listed manufacturing firms in Sri Lanka.

3.6 Testing of Hypotheses

Table 7. Hypotheses testing

No.	Hypotheses	Results	Tools
H1	There is a significant relationship between firm size and profitability.	Rejected	Correlation
$H1_0$	There is no significant relationship between firm size and profitability.	Accepted	Correlation
H2	There is an impact of firm size on profitability.	Rejected	Regression
$H2_0$	Firm size is having no impact on profitability.	Accepted	Regression

4. Discussion

4.1 Conclusion

This study examined the effects of firm size on the profitability of the listed manufacturing firms in Sri Lanka. In this study, data of 15 companies which were active in Colombo Stock Exchange (CSE) between the years 2008 to 2012 has been used. Multiple regression and correlation methods have been used in the analysis.

The results of the analysis showed the existence of a weak positive relationship between size indicators and profitability of the listed manufacturing firms in Sri Lanka. The reason why this relationship is weak can be found in separation of ownership from management in modern corporations that shifted managers' focus from profit maximization to maximization of managerial utility. In addition to this, adamant organization structure, used technology and a change in tactical logic of firms might be the reasons for this kind of relationship. Furthermore, the r values were found to be negative for the association between Asset Turnover and performance measures of Net Profit and Return on Assets consisting the r values of -0.390 and -0.057 respectively. It shows the managerial inefficiency as lower Asset Turnover indicates inefficiency of management in utilizing its assets (excess production, poor inventory management, etc.), which in turn will lead to a decline in profitability of the firm.

The R^2 values of 0.205, 0.202, 0.007, 0.005 which are in the models denote that 21%, 20%, 0.7% and 0.5% of the observed variability in the profitability measures of Net Profit and Return on Assets were explained by the variability in the Log of Total Assets, Log of Total Sales and Asset Turnover. Remaining 79%, 80%, 99.3% and 99.5% of the variations in the Net Profit and Return on Assets related to the variables which are not shown in the models. Hence, other factors are probably found to be better predictors of profitability.

4.2 Limitations and Scope of Future Research

The limitations of the study are the usage of the data belonging to the years 2008 to 2012 and only the firms in Colombo Stock Exchange (CSE) operating in the manufacturing sector have been included. In future studies the effects of firm size on profitability may be analyzed by differentiating by sector.

The R^2 values reveal that the size indicators are not the determining factors of profitability of listed manufacturing firms in Sri Lanka. That is other factors are probably found to be better predictors of profitability. Hence, there is an enormous scope for further researches in this area.

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