

The Impact of Firm Size on Profitability – A Study on the Top 10 Cement Companies of Pakistan

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ABSTRACTS

The research is conducted on the “The impact of Firm Size on Profitability – A Study on the Top 10 Cement Companies of Pakistan”. The data was taken from the top 10 cement firms which are listed on the Pakistan stock exchange (PSX). The purpose of this study was to understand how firm size can have an impact on profitability in a developing country like Pakistan and to evaluate what variables play an important role in it. The secondary data was collected by different annual reports published by the companies. The research is based on panel data with multiple regression model run for return on assets (ROA) and return on equity (ROE) which are the dependent variables in this study. The independent being the firm size determined by total assets and total sales. The findings show and conclude that when firm size is determined by total sales value it shows a positive impact with ROA and ROE. Whereas, when determined by total assets value, it shows a negative impact. Overall, the relationship is of a significantly weak impact with that of firm size on the profitability which shows a blend of positive and negative impact as well.

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INTRODUCTION

Profitability is an utmost priority of a business. Every firm’s goal is to earn profit. In order to earn profit, the business to have the ability to do so. Profitability is the ability to earn profit. However, several factors determine and affect the profitability of a firm in the market/industry. Being a fundamental characteristic of the firm, firm size has been an effective means in contributing to the success of the firm by impacting its profitability. Firm’s size traditionally refers broadly to the firm’s ability to hold, its ability to produce at maximum output, the number of services it proposes to offer.

There are various ways of measuring the size of a firm, ranging from amount of capital invested to the total value of sales/goods sold. Profitability could be easily measured by profit margin and profit on the total number of assets or more precisely by the return on assets. Higher the return, the better the result.

Profitability is one of the most important attributes which contributes in the wellness of an organization in a shape of success. To put this in simpler words, profitability is the cash a company earns less the total expenses it incurs. Value added features or number of employees more powerfully predict the size of a firm rather than the sales or assets. The question of whether firm size impacts profitability is still debatable though based on the previously generated mixed results. Despite the fact that some scholars concur with the statement that firm size effectively contributes to the profitability, alternative theorists contradict with their positive correlation with each other. Research shows that somehow large firms withhold managers who are goal oriented in achieving what is best for them and not for the entire organization. When it comes to developing countries, it tends to be found difficult to determine which factors play an important role in effecting the profitability. Since these markets are highly volatile, it leaves a room for debate that which factor is to be taken into account as the most important one. The results found can vary based on the data set, limitations and/or the region in which the research has taken place.

This gap creates a greater interest for researchers to find out how this gap can be filled. There are chances that the findings can be different in other region/countries, mostly in the case of developing countries as they face economic, market and government instability.

In developed countries, the firm size is taken as an important variable while determining the performance of an organization/firm. A thorough research has been done over the years by numerous researchers regarding the stated subject. However, it does leave a room for debate on the acceptability of the factors due to varying results on the topic. It has been stated above in the article already. Now, a greater trend of research has shifted towards developing countries as now countries like India, China, Turkey, Indonesia, Sri Lanka etc. are the emerging economies of the world. Businesses in countries like these go through various challenges which can have a significant improvement regarding this topic.

Pakistan is considered one of the largest countries in the Asian region, with a population nearing 220 million is known as an emerging economy (developing country). The Business market in Pakistan is highly volatile due to several factors like political instability, economic factors debt burden etc. However, the market is gradually rising and has created a wave of awareness among the investors. In this article, I want to create awareness for the investors and future entrepreneurs to have a proper knowledge on what factors affect the profitability and up to what extent. As of now, very few articles are to be found regarding this topic. There is high potential and in order to achieve accurate results, it is important that more research is done on the subject.

Research question

The research question of this study is mentioned below:

What is the effect of firm size on profitability ?

Significance of study

The study will play an import role as not much of the research regarding this topic has been done in Pakistan. Pakistan is a rising economy. In order to have a stable market conditions and investor's confidence, we need to work on factors and the reasons with respect to the global perspective. I believe that this research will help in creating awareness and understanding regarding this topic. This study will not only show that what relationship or

impact exists, but will also look up to how the variables are measured and how relevant these factors can be in the Pakistani market.

LITERATURE REVIEW

Doğan (2013) conducted the research to measure the impact a firm size can have on the ability of profit it can earn. To measure profitability, return on assets is taken while the values for total asset, total sales, and total number of workers in a firm were used. The study shows that total assets have a significantly positive influence on profitability.

Pervan and Višić (2012) in this research evaluates the influence firm size can have on the profitability. They believe that profitability can be found being affected by the firm size in the traditional neoclassical view that is economies of scale. The research was conducted between the years 2002- 2010. The findings of the article says that a positive (although weak) link was established between profitability and size.

Sritharan (2015) conducted the research on the travel and hotel sector of Sri Lankan companies. The period between the data was collected is from 2008 to 2012. The findings suggest that the influence of firm size on profitability may vary business to business in a particular market they are operating in. The article also suggests that the effect is a debatable matter. In order to measure the variables, the author used return on assets as the determinant for profitability which is the dependent variable in the research. Findings of this articles proves that the companies taken into account had a positive impact of their sizes in the profitability. Firms which are greater in size tend to have a greater chance in improving their profitability.

When industry type is taken as a variable, it acts as a moderator variable, and it has an impact on profitability and leverage. The research also sees whether this impact is direct or indirect. The sample data collected is ranging from the period 2005 to 2009. Taiwanese electronic and other companies were selected in the sample.

Niresh and Velnampy (2014) clarifies that their results show a weak form of connection with profitability for the firm size. The data sample consists of 15 manufacturing companies that are trading on the Colombian stock market for the time period ranging 2008 to 2012. The reason behind the weak relationship is believed to be of a qualitative nature as managers instead of focusing on maximizing profits, they are maximizing managerial utility. The two dependent variables used in the study are NPR which stands for net profit ratio and return on assets (ROA). Whereas, the firm size is the independent variable in this study. Results are based on multiple regression and correlation methods. Moreover, to determine co-linearity the variance inflation factor is used.

Kartikasari and Merianti (2016) in this research paper collected the data sample of at least 100 companies from the manufacturing sector that are publicly listed. The data set is from the period ranging 2009 to 2014. The article's objective is purely to see what impact leverage and firm size can have on the profitability. Variables like return on assets and leverage were taken for the study which shows that the debt ratio did have a significantly constructive influence on profitability. For the demonstration of firm size, the relationship shows a negative trend.

Babalola (2013) conducted his research on the companies in Nigeria. The study concludes that firm size has a positive connection with profitability. However, if measure through leverage and total debt, a negative relationship was found. The analysis is of panel data nature which is conducted on 80 commercial companies trading on the Nigerian stock market between 2000-2009.

Devi and Devi (2014) conducted their research in Pakistan which observed the factors that can determine the profitability in companies. The research consists a list of 50 companies

trading on the Karachi Stock market. The authors conclude that the study was able to find a positive impact of firm size on profitability.

Amato and Burson (2007) examines the implications of what a firm size can have on its profitability in the financial sector. The results show that the impact of firm size came out to be of a positive nature. Profitability being the dependent variable is ROA firm size and independent variable.

Azhar and Ahmed (2019) conducted the research to see what impact firm size can have on the profitability in a textile industry. Top 10 textile companies which are listed on the Pakistani stock market were selected for the study. The results showed that in the case of the textile industry, no significant association can be extracted.

METHODOLOGY

Research type

For the research work on “The Effect of Firm Size on Profitability –A study on the Top 10 Cement Companies of Pakistan”, the data that has been selected and collected is of quantitative nature.

Data type and research period

The data set that has been accumulated is done through secondary research. The information has been extracted from the audited, yearly financial reports for the 10 major cement companies of Pakistan. The set of data that has been collected is based on time series data with the period/years ranging from 2013 to 2021, respectively.

Population and planned sample

The sample size selected for this research paper is taken from 10 major cement companies that are listed on the PSX (mention above). The name of these companies are;

1. Attock Cement Pakistan Limited,
2. Bestway Cement Limited,
3. D.G Khan Cement Company Limited,
4. Dewan Cement Limited,
5. Fauji Cement Company Limited,
6. Kohat Cement Limited,
7. Lucky Cement Limited,
8. Maple Leaf Cement Factory Limited,
9. Pioneer Cement Limited,
10. Thatta Cement Company Limited.

Each company’s data is taken for a period of 8 years (2013-2021).

Sources of information

The information has been taken from both, the PSX website and the companies’ respective websites as well. Further information was taken from an external source too. The following is the list of the websites used for the collection of the secondary data.

1. “www.psx.com.pk”
2. “www.scstrade.com”
3. “www.investing.com”

Research hypothesis

H1: Total Sales and Profitability (ROA)

HA: $\beta > 0$: There is a significant and positive relationship between Total Sales and Profitability

H2: Total Assets and Profitability (ROA)

HA: $\beta > 0$: There is a significant and positive relationship between Total Assets and Profitability

H3: Total Sales and Profitability (ROE)

HA: $\beta > 0$: There is a significant and positive relationship between Total Sales and Profitability

H4: Total Assets and Profitability (ROE)

HA: $\beta > 0$: There is a significant and positive relationship between Total Assets and Profitability.

Technique and data analysis

Two various types of statistical technique will be used. Pearson's correlation coefficient will be used to identify and direct the correlation between the respective variables and their relationship. Along with that, multiple regression model is to be used to calculate values of the dependent variable due to the changes in the independent variable. This will help in identifying the significance of each of the variables between them. The statistical software to be used for the research is STATA. The two are the following regression models that will be used.

Model 1: $(ROA)_t = a_0 + \beta_1 SizeTSit + \beta_2 SizeTAit + eit$

Model 2: $(ROE)_t = a_0 + \beta_1 SizeTSit + \beta_2 SizeTAit + eit$

Data interpretation

The data that has been gathered will be entered in the given statistical software (STATA). After running and conducting the statistical techniques on the respective models, the findings will be interpreted and will be represented with the supporting graphically and tabular representations to give a final conclusion on the research topic.

Variable description

Table 1: Description of Variables

Variables	Description	Years
Return on Assets (ROA) (Dependent Variable)	“Return on assets (ROA) is an indicator of how profitable a company is relative to its total assets” ROA=Net Profit/Total Assets	2013-2021
Return on Equity (ROE) (Dependent Variable)	“Return on equity (ROE) is an indicator of how profitable a company is relative to its total equity” ROE= Net Profit/ Equity	2013-2021
Firm size: Natural log of Total Assets (TA) (Independent Variable)	“Sum of all current and noncurrent assets held at year end” TA=Non-Current Assets + Current Assets	2013-2021
Firm Size: Natural log of Total Sales (TS) (Independent Variable)	“Income generated from sale of goods and services over a year after necessary deductions and allowances” TS=Gross Sales – Return Deductions – Trade Discounts/Allowances	2013-2021

RESULTS AND ANALYSIS

In this chapter, we have collected and interpreted the results which explains the respective values, relationships and significance of the dependent and independent variable. Panel data was used to run the regression on two models. Model 1 is profitability is determined by ROA which is taken as the dependent variable. While talking about the firm size, it is calculated by taking natural log of total assets (independent variable) and by taking natural log of total sales (independent variable). Model 2 is profitability is determined by ROE (dependent variable), firm size by taking natural log of total assets (independent variable) and firm size by natural log of total sales (independent variable).

Descriptive statistics

The research that has been conducted is of 60 observations for each of the respective variables from which the following summary table has been generated. The data is collected for an 8-year period ranging from 2013-2021. The table consist values related to the variables for standard deviation, mean, minimum and maximum values.

The value for mean is simply known is an average for all the observations that are taken into consideration. The value for mean identifies centre or an average of the data set. So, firstly for the dependent variables, the mean value for ROE is 0.21368 and for ROA it is 0.1312172. Coming towards the two primary independent variables, the centre value for firm size in total sales is 10.19644 and for firm size in total assets is 10.41334.

Coming towards the standard deviation (S.D), it measures the deviation between the values from the mean value. Two types of standard deviations are there. Low standard deviation states that the values are within a close proximity of the mean. Whereas, a high standard deviation would simply state that the values are extremely deviating from the mean value. As for ROE the standard deviation is 0.0848335 which is closer to the mean number so it is a low standard deviation. Same is the case for ROA which has a S.D of 0.0569133. For firm size in total sales, the value is 0.3442415 and for firm size in total assets is 0.04120083. The above stated values implies a high S.D (Standard deviation).

Coming towards the summary table, it shows the minimum and maximum amount for the respective variables in the data set of the observations that has been collected. The minimum value for ROE 0.0447 and maximum value being .4358. The minimum value for ROA is calculated to be 0.0187 and maximum is 0.2438. A point to be noted that these values are originally in percentages. Now for the minimum value of firm size in total sales is 9.33892 and maximum being 10.72332. As for the firm size in total assets the minimum number is 9.341821 and maximum is 11.08596. (*See Appendix 4.1*)

Correlation

When it comes to defining what correlation measures in a statistical data, we look at the range initially. Correlation value rages between -1 and +1. It measures that what effect a change in a single variable can have on the other. Correlation can be positive or negative.

There can be a strong and weak correlation between the two variables, which means that if one increases, the other will also increase by the same or nearest number. A positively weak correlation is where the value of one variable increases but by proportionately lower numbers than the value for the other. For a negative correlation, a strong negative correlation means that if a value for one variable decreases, the other will decrease by almost the same amount/percentage. As for a weak negative correlation, the value of the other variable will

decrease by a much lesser amount/percentage. Coming towards the data on the table shown below, as for firm size in total sales and ROE, the value is -0.0272 which is a negatively weak correlation. For ROA and firm size in total sales, the correlation value is 0.1373 which depicts a positively weak correlation. Now doing the same for firm's size in total assets with ROE, the value -0.2134 shows a negatively weak correlation and with ROA, it also depicts a negative, weak correlation with a value of -0.1051. (See Appendix 4.2)

Panel Data Regression

Fixed and random effect

Panel data is a type of analysis which examines data of individual variables over several different point in the given time period. It gives the research a control over the variables being observed that are unable to be measured due to the observations being too high in number or the time period selected being too vastly spread.

A fixed effect comes in handy when the researcher is only looking to find the impression of the respective variables which “vary” over a given period of time. Fixed effect looks at the relationship between the entity (company/country) and the variable (ROA/GDP) that changes over the period. Every institute has its own, unique characteristic which may or may not control the variable. These can be political factors in the case of country and GDP or company decision/practices and the effect on profitability. So, the researcher needs to control that effect in order to eliminate error and understand the net impact. This model might be unable to work if the values of the variable changes a particularly slow pace over the period of time. To see whether the model is significant or not, the “Prob>F” number should be less than 0.05.

While coming towards the random effect now, it is assumed that the relationship between the variables are random or un-correlated. While using random-effects, the researcher will need to briefly specify the individual characters that can impact the performance of the variables. However, a problem arises which is the availability of some variables may or may not be available. This can lead to omitted variable bias in the model which can jeopardize the results. In order to check whether the model is the significant or not, the ‘Prob> chi2’ value has to be below 0.05.

Hausman test

After conducting the random and the fixed effect, it is to be decided which is to be selected. For that the researcher runs a Hausman Test. We assume the following while conducting the test.

$H_0 = \text{Random effect is appropriate}$ $H_1 = \text{Fixed effect is appropriate}$

To decide whether to accept the null or alternate hypothesis, researcher will look at the “Prob> chi2” value. If the tested values is below 0.05, we will accept the H_1 , which is the fixed effect. For the value being higher than 0.05, we will accept H_0 , which is the random effect.

Now looking at the following tables for the hausman test, we will have separate tests for the two models.

Model 1: $(ROA)_{it} = \alpha_0 + \beta_1 \text{SizeTS}_{it} + \beta_2 \text{SizeTA}_{it} + e_{it}$.

The “Prob>chi2” value is 0.4011, which is greater than 0.05. We will accept random effect. (See Appendix 4.3.2(a))

Model 2: $(ROE)_{it} = \alpha_0 + \beta_1 SizeTS_{it} + \beta_2 SizeTA_{it} + e_{it}$.

The “Prob>chi2” value is 0.3384, which is greater than 0.05. We will accept random effect. So, for both of our models, the value was greater than 0.05. This means that the random effect will be accepted in both cases. (See Appendix 4.3.2(b))

Model summery

The research paper focuses on to determine the magnitude of change in profitability which is dependent on the change in the size of the firm. Value of total sales and total assets are used as the independent variables. Return on assets and return on equity are used for determining profitability. They are the independent variables. Two models are developed. The first one is for ROA and the second is for ROE. After conducting the hausman test as it can be seen in the hausman test for both the models, the random effect is accepted as the value for “Prob>Chi2” is greater than 0.05.

The significance of R-square is seen through its value and how low or how high it is. While interpreting the value for R-square, it depicts the connection between dependent and independent variable. The value shows the degree of dependency of the dependent variable on the independent.

Model 1: ROA

If the value of R-square is high, this explains that there is a significant influence of the independent variables on the dependent variable and vice versa. For this particular model, our value of R- square is 42.38%. This means the value is high and around 42.38% of variation in ROA is explained by the independent variables in the regression model. (See appendix 4.3.3(a))

Adjusted R-square explains the significance when there are multiple variables under observation. This helps in eliminating or penalizing the correlations of variables that are not significant with the dependent variable. For this, the adjusted R-square value is 56.03%. (See appendix 4.3.3(a))

In order to see whether the regression model is significant or not, the researchers look at P>chi2 of the model. The value should be below 0.05 for it to be a significant model. This model has P>chi2 value of 0.000 which means the random effect regression model is significant. (See Appendix 4.3.3(a))

Model 2: ROE

In ROE model, again random effect regression model was selected depending on the respective values of the hausman test. The R-square for the model is 12.33%. The value is low and a 12.33% variation is explained in ROE by the independent variable in this model. The Adjusted R-square value is 34.87%. Again, for this model the significance will be checked. The P>chi2 is 0.0023 which is below 0.05. Hence, this model is also significant. (See Appendix 4.3.3(b))

Equation

$$\text{Model 1: } ROA = -0.5752517 - 0.298821\text{sizeTA} + 0.3744636\text{sizeTS}$$

For the first model, the above equation has been drawn. ROA has been taken as the determinate for profitability. The following is how the equation is interpreted. So, for a 1 unit increase in total assets, ROA will decrease by a -0.0298821 units, with all other variables kept constant. With a 1 unit increase in total sales, ROA will increase by 0.3744636 units, keeping all other variables constant. With the overall effect showing a positive impact on ROA as the value for total sales is positive and greater than the value of total assets.

$$\text{Model 2: } ROE = 0.0286999 - 0.2543834\text{sizeTA} + 0.2779364\text{sizeTS}$$

The following interpretation is for the second model which involves ROE as the determinant of profitability. A one unit increase in total assets will decrease ROE by - 0.2543834, all other variables kept constant. With a 1 unit increase in total sales, ROE will increase by 0.3744636 units, keeping all other things constant. Yet again, the overall impact on ROE is positive as the value for total sales is greater and positive as compared to total assets.

Hypothesis

H1: There is a positive and significant impact of total sale on profitability (ROA)

According to the model 1, where total sales is the indicator of firm size and ROA for profitability, the $p > |z|$ is 0.000 and coefficient of total sales is 0.3744636 which is positive. A one unit change in total sales will increase ROA by 0.3744636 units. Thus, we will accept **H1**.

H2: There is a positive and significant impact of total assets on profitability (ROA)

The $p > |z|$ for this is 0.000 and coefficient of total assets is -0.298821. As the model is significant but the relationship is negative. So, for a 1 unit increase in total assets, ROA will decrease by a -0.0298821 units. We will reject **H2**. If the denominator value (numerator) of a company's total assets increases by a much larger value than that of the ROA, the profitability will decrease. For various reasons the relationship can be negative. In the case of Pakistan's cement industry, political instability plays an important role.

H3: There is a positive and significant impact of total sales on profitability (ROE)

According to model 2, where total sales in the indicator of firm size and ROE for profitability, the $p > |z|$ is 0.006 and coefficient of total sales is 0.2779364 which is positive. A one unit change in total sales will increase ROE by 0.2779364 units. Thus, we will accept **H3**.

H4: There is a positive and significant impact of total assets on profitability (ROE)

The $p > |z|$ for this is 0.001 and coefficient of total assets is -0.2543834. As the model is significant but the relationship is negative. So, for a 1 unit increase in total assets, ROE will decrease by a -0.2543834 units. The study can be explained by a limited use of data for the research purpose. We will reject H4

DISCUSSION

The purpose of this research was to see what effect the firm size can have on profitability in the cement industry of Pakistan. Pakistan being a developing country, external factors like political, environmental and economic instability over the years can have major

impact on the findings of the research paper. With the limited scope of study and unforeseen factors as mentioned before can change the effect of the variables that may prove to be insignificant or show a weak impact. Research has shown that there is a positive influence on profitability due to firm size (ROA/ROE with total sales) and a negative influence when firm size is determined through the value of total assets. In both models, however, the impact on profitability is of a negative nature. Overall, it can be said that with the given data for the top 10 cement companies of Pakistan, the firm size has a weak relationship/impact with/on profitability in the industry. However, at certain points it is positive. Dogan (2013) has found a positive impact between return on assets and total sales.

The above hypothesis H₁ is accepted as the study finds similar results. Another article backs up this notion as Niresh and Velnampy (2014) finds a positive relationship between total sales and ROA. Although, the overall all result is that firm size has no significant effect on profitability while considering other variables in the calculations.

The H₂ considers the relationship between total assets and return on assets. The results suggest that the hypothesis is rejected as a negative relationship is found. As the value for total assets rise, the return on assets (profitability) while decline. The notion is backed by Azhar and Ahmeed (2019) and Kartikasari and Merianti (2016) who show that total assets has a negative impact on returns on assets.

Sharaf and Haddad (2015) found a positive relationship between sales and return on equity. This proves the notion and due to which H₃ is accepted. It is clear that as the number of sales increases, the profit (net income) will increase as well which is in the numerator while calculating return on equity.

Coming towards the final hypothesis, the findings suggest that the total assets and return on equity depict a negative bond. This is the reason why H₄ was rejected. Pervan and Višić (2012) found a negative relationship based on their study which supports the rejection of the hypothesis.

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