

## DETERMINANTS OF PROFITABILITY: EVIDENCE FROM POWER AND ENERGY SECTOR

**Zeeshan Fareed\***

Zhongnan University of Economics and Law, China

**Zahid Ali**

Zhongnan University of Economics and Law, China

**Farrukh Shahzad**

Chongqing University, China

**Muhammad Imran Nazir**

Zhongnan University of Economics and Law, China

**Assad Ullah**

Huazhong University of Science and Technology, China

**Abstract:** The study examines the impact of key determinants of profitability of power and energy sector in Pakistan such as firm size, firm age, firm growth, productivity, financial leverage and electricity crisis discussed in the broader inter-disciplinary literature. For this purpose panel data of 16 firms of power and energy sector is taken for 2001 to 2012. The study considers profitability determinants at the firm as well as industry affiliation levels in examining hypotheses developed from resource-based approaches. Random effect model is used to detect the combination of variables that best estimated the impact of the explanatory variables on the dependent variable. The empirical results suggest that firm size, firm growth, and electricity crisis positively impact the profitability. However, firm age, financial leverage and productivity negatively influence the firm profitability. This study also propose that during the electricity crisis the profitability of power sector is increased even production of this sector is very low. The findings further indicate that larger and younger firms with high growth and low productivity are more likely to be profitable. This study has found that firm productivity and firm size are the strongest determinants of profitability in power and energy sector of Pakistan.

**JEL classification:** F65, G23

**Keywords:** Profitability, Firm size, Firm growth, Leverage, Firm age, Productivity, Electricity crisis

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\* Corresponding author address, Zhongnan University of Economics and Law, Wuhan, China. School of Finance, Tel:+86-13163200349, Email: zeeshanfareed@hotmail.com

## 1. Introduction

Profit is one of the core objectives of any firm for its long term reputation and survival. Profitability is the profit making ability which is considerable an important factor for perpetual existence of firms. Measuring firm's profitability or taking into effect how well a business is being run is a very difficult task. There are various approaches have been developed. It can be measuring the process of gain sharing financially or in economic terms, depending on the prevailing situation and the current scenario. As we know that there is a strong bonding between the profitability and the growth. Profitability is also cause of maximizes the values of stakeholders as well as investors and also show the performance of any firm in competent environment.

Profitability is usually seen as significant prerequisite for firm survival and long term achievement; In addition, the variable significantly affects the performance of the other financial goals of the company. Some other factors that describe the position of the profitability of the company are its effect on economic development, technological change, employment and innovation. But as a result of increased competition, price forces and improved efficiency, companies are facing more difficulties to the required profitability. If the question what factors determine the profitability elements are one of a high priority for researchers and practitioners, including debt holders, managers, debt holders, policy makers and investors (Yazdanfar, 2013).

The interest to study the determinants of profitability has grown over time in a wide range of scientific disciplines. Internal resources of a company are believed to have significant impact on profitability by strategic management, finance and accountancy scholars (Barney, 2001). Slater & Olson, (2001) recognize the competition within the market in which the company operates in as the determining factor of profitability in Industrial economics.

The issue of firm profitability has been central in strategy research for decades and encompasses most other questions that have been raised in the field, as for instance, why firms differ, how they behave, how they choose strategies and how they are managed (Porter, 1991).

### 1.2 Problem statement of the study

Taking into account the fact that Pakistan economy is going down due to the severe problem of the energy shortage since last six to seven years. There are lot of studies have been conducted on bank profitability but now there is need to check the profitability (Performance) of non-financial firms like Power and Energy Sector of Pakistan with the same internal variables which have been highlighted in the literature available both for developed and developing economy.

In short, there is no generally accepted outcome to the determinants of profitability of any firm or industry level because countries are different in nature to each other by their financial system, political systems, operating environments and economic systems. Hence in this study, we studied some firm specific determinants of profitability of power and energy sector of Pakistan and different variables (firm age, firm size, firm growth, lagged profitability and financial leverage etc.) that are possibly accountable for defining profitability of power sector, have been nominated based on the theoretical literatures and past empirical studies. Even though, lot of previous studies have done to add their own novelty to the profitability theory and specified their particular policy implications in developed economy, and developing countries including Pakistan received slight attention in numerous literature on this concern.

The objectives of the study are:

1. To determine the profitability (performance) of power and energy sector in Pakistan.
2. To investigate the firm different determinants of profitability
3. To investigate the relationship between profitability and productivity of Power and Energy sector of Pakistan.
4. To investigate the relationship between profitability and electricity crises of Power and Energy sector in Pakistan.

### **1.3 Significance of the study**

The power and energy sector is one of the most important industry sectors of Pakistan because all other industry sectors like textile, cement, sugar and agriculture are also based on this sector. The economy of Pakistan is much dependent on this sector but now a day's country is facing a huge shortfall of electricity which badly affected the economy of Pakistan. This study determined the profitability of power and energy sector of Pakistan.

The findings have policy implications both for the firms as well as for economic managers of developing countries like Pakistan. The proprietors, directors, and managers of the firms which are working in developing countries especially like Pakistan reflect both the liquidity level and capital structure to attain higher profitability.

This is perhaps first study of its kind of nature that attempts to elucidate variation in profitability determinants of power and energy sector in Pakistani context using a Resource base view. The outcomes of this research also have significant implications for government in formulating suitable policies for the power and energy sector of Pakistan, as the government has dual responsibility of being the manager of the country and main solitary client of the industry.

The study is helpful to the private local and international investors to invest in the Power and energy sector that may cause increase in production and finally will boost the economy of Pakistan. Additionally, other concerned researchers may take this contribution of the study as a base for comprehensive and further studies.

## **2. Literature Review**

### **2.1 Theoretical background of the study**

According the concept of theory, the variables that could clarify profitability of firm can be divided into three categories: market related variables, industry variables and firm specific characteristics. Many efforts have been made to examine the impact of these variables on profitability and also check that how these variables can explain the profitability. There are numerous broad theoretical aspects on profitability: market based view (MBV), organization-environment structure performance (OESP), structure conduct performance" (SCP), strategy-structure-performance (SSP) and Resource based view (RBV) perspective. While SCP and MBV are traditional approaches which explain the

industry characteristics in term of describing firm profitability and RBV explain the firm level determinants of profitability (Wernerfelt, 1984; Barney, 1991; Mahoney & Pandian, 1992; Amit & Schoemaker, 1993; Peteraf, 1993).

For data availability reasons, the current research is based on the RBV and emphases on a few variables categorized as firm specific determinants of. Unlike the other approaches, this approach suggests that firm profitability is mainly determined by internal factors rather than external variables (Barney J., 1991). In other words, the RBV describes firm profitability in various terms, for example, explaining profitability mainly with reference to specific firm-level characteristics, capabilities and resources (Jovanovic, 1982; Wernerfelt, 1984).

## **2.2 Empirical review of the study**

Qian (2002) analyzed that research on curvilinear relationship between variables has been done by while defining the possibility of linking multi-nationality with product diversification and profitability. The three average data (1991-1994) of SME's were taken having on average 260 employees. The results indicated that watching out for the optimal level is the most suitable strategy because profitability is positively by these variables up to a certain extent and after that it starts declining.

Eriksen & Knudren (2003) concluded that the firm level determinants co-determine the level of profitability. Industry affects can affect the profitability of the firms significantly but they are not enough. So, the Danish SME's were taken as a base and the sample size taken were of 9809 firms having the range of 10-499 employees. ROA was used as an ultimate proxy measure for the financial performance.

Spanos, Zaralis & Lioukas (2004) chose Greece as a center of his research on the country's profitability. The specific attention was given to the strategy (pure and hybrid) effects on profitability. Typical variables like market concentration, growth and restraints to entry were selected as the industry variables. The findings support the point that provided as long as the cost of strategy is low and hybrid the profitability level will sustain or increase. Though industry variables not directly but indirectly do contribute to the gain sharing process specially the entry barriers. And ultimately the firm variables can explain the variability in the gain sharing process almost as twice as the industry variables.

Liu & Hung (2006) proposed a unique study about finding of a connection between the services and the profitability of bank industry in Taiwan. The major hypothesis selected was with the increase of the number of branches of banks the profitability increases by taking into account the overhead expenses along with the average salaries taken as a proxy for services. Regression analysis was chosen as a best estimator to calculate the accurate extent. They can up with the final conclusion that a positive relation is found to exist between the long term profitability and the services. Probably that's why the mergers are getting so common now a days. It also seeks to explain that due to the enhanced burden of overheads the firms are encouraging the people for early retirement and thus replacing them with fresh low wage employees.

Hawari & Ward (2006) showed that though customer satisfaction is a mediating variable a positive relation is said to exist between the profitability and the auto mated service quality. Only a few researchers have attempted to work on the

service quality and the profitability. So Australian Banks became the base to conduct a comprehensive study done by the researcher in 2005 for the same. The major hypothesis selected was there is a positive relationship between the service quality of the banking sector and the financial performance while the customer satisfaction proposed to be an intervening variable. Automated service quality is decomposed to ATM, Tele banking, internet banking. Customer satisfaction can include service products, staff, and automated services while the financial performance can include assets utilization, ROE, ROA etc.

The Banks of Korea were taken as a sample from the period 1992-2002 and major determinants of profitability were estimated by taking into account the market structure hypothesis and efficient market hypothesis. The final results clearly indicate that profitability has a major determinant named as the Efficiency and ultimately it is going to support the efficient structure hypothesis which states that due to the high efficiency the banks obtain greater profitability resulting ultimately to a concentration in the market (Park & Weber, 2006).

García-Herrero, Gavilá & Santabárbara (2009) found out the possible causes of the low profitability in the Chinese banks major determinants chosen were capitalization tendency, share of deposits and X-efficiency. The period of study was taken from 1997-2004. Moreover the study revealed that the socialism is detrimental to profitability. Regression analysis also highlighted that market concentration is inversely related to the China's profitability in the banking Sector.

Love, Roper & Du (2009) started to find out the effect of innovation and externally owned manufacturing industries on the profitability. The study was conducted on the manufacturing industry of plants in Ireland taking into effect the indigenous and externally owned plant manufacturing firms. Other studies conducted in this regard propelled the writer to hypothesize a positive relationship between non-indigenous and R&D with profitability. The source of information taken is IIP (Irish Innovation Panel). Questionnaires, sampling technique and postal survey methodologies have applied on the firms having 10 or more employees over 3 years average period from 1994-2002. The conclusion was drawn that there is no direct link with innovation and profitability and externally owned manufacturing firms with profitability.

Sufian & Parman (2009) undertook a study on a developing country Malaysia highlighting the determinants of profitability on the non-banking financial sector. The least square method was chosen as the scale to measure the possible effects on profitability by the major determinants as operational expenses, capitalization level, loan intensity and credit tendency. The conclusion was summarized as the high expenses of operations as well as capitalization tend to boost the level of profitability upwards. But the other two variables as the loan and credit tendency have and inverse with the profitability according to this study.

Asimakopoulous, Samitas & Papadogonas (2009) believed that it's better to exploit the variables determining the profitability of a developing country like that of Greece. He took the panel data of 1995-2003 of non-financial firms listed in Greece Stock Exchange and tested their profitability under consideration of the variables like size, sales growth and investment on one side and leverage and current assets on the other hand. A positive relation was found with the first set of variables and ultimately a negative relationship was drawn with the second set. And finally he also reflected the importance of intervention of EMU in a developing country.

Stierwald (2010) conducted the research which shows the determinants of profitability of 961 large Australian firms using panel data for the period of 1995-2005. The result of descriptive statistics revealed that large profit is heterogeneity in

nature between industries and across firms. Estimation results specify that corporate profitability is primarily determined by the characteristics at the firm level and the industry effects are important, but in a much lesser degree. The analysis also tells that among the effects on business productivity and persistence of productivity improve profitability.

Tan & Floros (2012) conducted research to check the determinants of profitability in Chinese 101 banks. They used bank specific variables to check the impact of inflation on bank profitability while controlling industry specific variables. Bank specific panel data were used for the period of 2003-2009 with 197 observations. The GMM (generalized methods of moments) estimators were applied. The results revealed that there is positive relationship exists between profitability, banking sector development, inflation, cost efficiency and stock market development in China. The authors also explain that low profitability is affected by high taxation and non-traditional activities. They also found competitive atmosphere in chinese banking sectors.

Yazdanfar (2013) conducted the research in Sweden which shows the firm specific determinants of profitability with a large sample size of 12530 micro firms dividing in four industries with 87000 observations for the period of 2006 to 2007. Resource base view approach was used to check the set of variables. Seemingly unrelated regression (SUR) was tested and results revealed that firm growth, firm size, lagged profitability and productivity related positively with profitability while industry affiliation and firm age have negatively influence with profitability.

Based on the resource based view, we found positive relationship between profitability and firm size. If the firms are larger than better chance to access more resources and the more likely to diversity its range of product by taking advantage of economies of scale causing in profitability increased. For example, (Gschwandtner, 2005; Ito & Fukao, 2008; Nunes, Serrasqueiro, & Sequeira, 2009; Stierwald A., 2010) find that there is positive and significant relationship between firm size and profitability while on the other side (Jensen & Murphy, 1990; Pi & Timme, 1993; Dhawan, 2001; Geroski, Machin, & Walters, 1997) find negative relationship between portability and firm size.

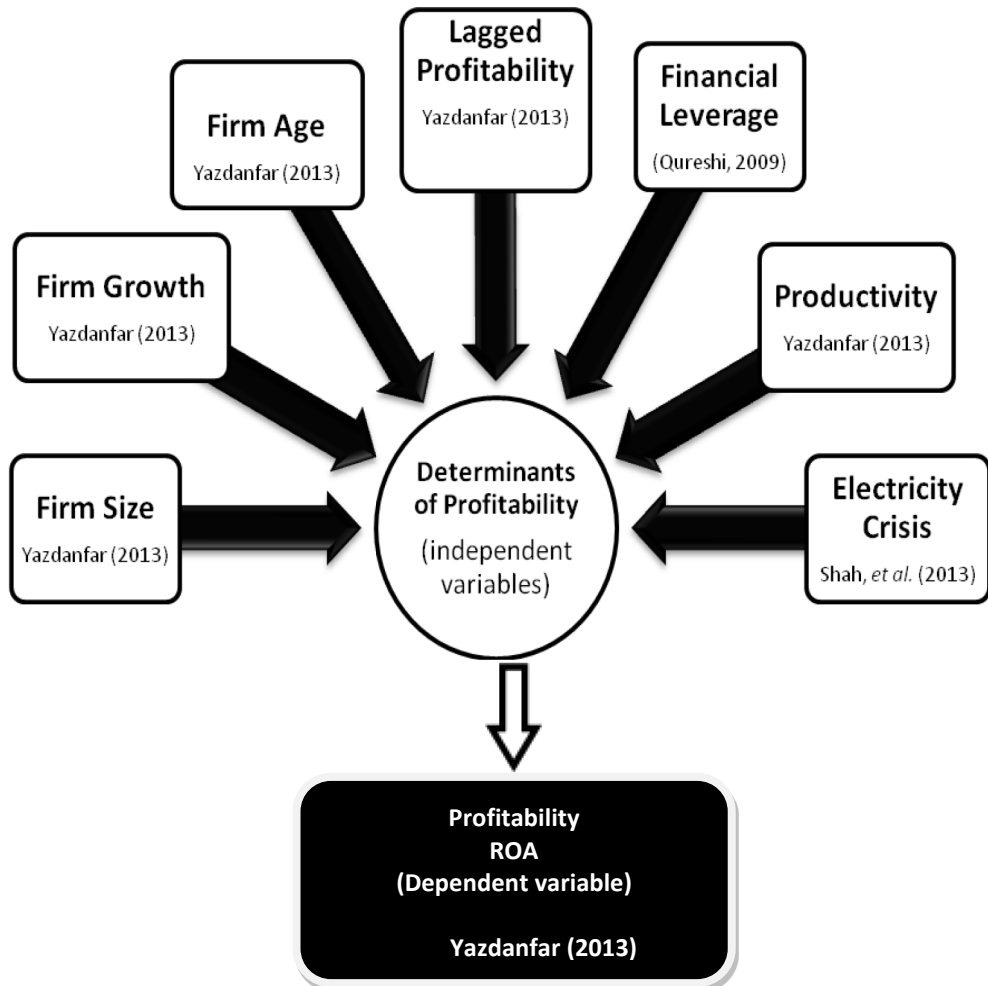
Based on the Resource based view, the more firm old the more it can easily attain resources (Autio, 2005). Because firm age is related with "more information", "better reputation", "greater experience", "financial institutions" and "greater access to business networks", which all these help to overcome on limiting access to resources and firm will operate more efficiently (Curran, Blackburn, & Black, 1993). The studies which determine the relationship between profitability and firm age have made mixed results. Some of these studies explain inverse relationship between profitability and firm age. On other hand such as Claver, Molina, & Tari, (2002) and Ito & Fukao, (2008) found positive and significant relationship between firm age and profitability. On the basis of literature review, in this study firm age is measured as the number of years since commencement of firm by using the proxy variable for age.

This part will address the basic statistical tools used for estimation, the sample size, and the sources from where data has been taken and also a brief description of the research model and variables used.

### 3. Model, Data & Research Methodology

#### 3.1 Theoretical Framework

**Figure 1.** Graphical Representation of Model



#### 3.2 Research Model Developed

Profitability can be measured by Return on Asset (ROA), Return on Equity (ROE), Net Interest Margin (NIM) and Return on Capital Employed (ROCE) variables, but for my research I have focused on Return on Assets (ROA). There are six independent variables Firm Size (FS), Firm Age (FA), Firm Growth (FG), and Lagged Profitability (LROA), Electricity Crisis (EC), Financial Leverage (FL) and Productivity (P).

The following models are constructed for the complete sample and for one industry.

$$ROA_{it} = \beta_0 + \beta_1 FS_{it} + \beta_2 FA_{it} + \beta_3 FG_{it} + \beta_4 LROA_{it-1} + \beta_5 P_{it} + \mu$$

**(Eq. 3.1)**

$$ROA_{it} = \beta_0 + \beta_1 FS_{it} + \beta_2 FA_{it} + \beta_3 FG_{it} + \beta_4 LROA_{it-1} + \beta_5 P_{it} + \beta_6 FL_{it} + \mu$$

**(Eq. 3.2)**

$$ROA_{it} = \beta_0 + \beta_1 FS_{it} + \beta_2 FA_{it} + \beta_3 FG_{it} + \beta_4 LROA_{it-1} + \beta_5 P_{it} + \beta_6 FL_{it} + \beta_7 EC_{it} + \mu$$

**(Eq. 3.3)**

Where Profitability=Return on Asset (ROA) is measured as firm's book value of net profit after tax divided by total assets  $\beta_0$ =constant; firm Size  $i,t$  = size of firm  $i$  at time  $t$ ; firm size (FS) is measured as the firm's book value of sales; Firm Age  $i,t$ =age of firm  $i$  at time  $t$ ; "FA" is measure as the number of years since firm inception as of the year of data collection; Growth  $i,t$ =firm growth is measured as current year's sales – last year's sales/last year's sales; Lagged profitability  $i,t$ =LROA is measured by taking profitability of previous year; Electricity crisis  $i,t$ =EC is measured by using dummy variable 0, 1 while 0 mean no and 1 mean yes; Financial Leverage=FL is measured as ratio of total debt to total assets; Productivity=P is measured by using proxy of total factor productivity (TFP) and  $\mu$ =error term

I have included two more variables in baseline model, "financial leverage" borrowed from (Qureshi, 2009) and "electricity crisis" borrowed from (Shah, et al. 2013) because these two variables suitable for power sector of Pakistan due to current economic condition of the country. I used the above borrowed model for non-financial institutions for the Power and Energy sector of Pakistan.

### 3.3 Sample Size and Source

For the purpose of this study secondary data is used. All the data has been acquired from different publications of State Bank of Pakistan, Karachi Stock Exchange (KSE) and company's website. This study considers the panel data for the period of 2001-2012 for 16 firms of Power and Energy sector which are current listed in Karachi Stock Exchange (KSE). Some of them are private limited while others are public limited. Depending on the availability of company annual reports the observations was made. The assets, liabilities and related accounting data was collect from company annual reports and State Bank of Pakistan library, Web sites.

### 3.4 Chosen Variables

The choice to examine the determinants of profitability identified below from above review of literature and on the base of resource based view (RBV) approach. Return on assets (ROA) is used as proxy variable for the profitability dependent variable in this study. Return on assets is measured by firm book value after tax divided by total assets. Return on assets (ROA) is always been considered as one of the best measures to estimate the financial efficiency of the firm. This may be due to two possible causes,

first the managers and the external analysis considers this ratio as much more convenient and easy to reflect the true position of the company with respect to the assets. And secondly, it reflects the effect of corporate level strategy on the firm's performance as compared to the ROE which measures investors' expectations (Grant, Jammine, & Thomas, 1988). On the subject area eight variables have been selected to be examined and they include:

**Table 1.** Summaries of Explanatory Variables and Expected Relationship

Determinants	Definition/Proxies	Hypotheses	Source
<b>Dependent Variable</b>			
Profitability (ROA)	Firm's book value of net profit after tax divided by total assets	NA	Yazdanfar (2013),
<b>Independent Variables</b>			
Firm Size (FS)	Firm size is measured as the firm's book value of sales	+	Yazdanfar (2013)
Firm Age (FA)	The number of years since firm inception	+	Yazdanfar (2013)
Firm Growth (FG)	Current year's sales minus last year's sales divided by last year's sales	+	Yazdanfar (2013)
Lagged Profitability (LROA)	Previous year profitability	+	Yazdanfar (2013)
Financial Leverage (FL)	Total debt divided by total assets	-	(Qureshi, 2009)
Productivity (P)	Total factor productivity (TFP) Book value output divided by labour cost plus capital cost. Labour cost= Salaries and Wages Capital cost=Capital investment income and Interest	+	Yazdanfar (2013)
Electricity Crisis (EC)	Use dummy variable 0 and 1 2001-2006= 0 2007-2012= 1	-	Shah, et al. (2013)

### 3.5 Estimation Techniques

The determinants of profitability are tested with the help of statistical tools in EViews version 6.0. Descriptive statistics is used to check the central tendency and dispersion of the data, with the help of Correlation analysis the hypothesis is tested, Panel unit root is used to check the stationarity of the data. Hausman test used for model selection which suggests that random effect model is more appropriate for this study.

## 4. Empirical results

### 4.1 Descriptive Statistics Results

**Table 2.** Descriptive Statistics Results

<b>Variables</b>	<b>Mean</b>	<b>Median</b>	<b>Maximum</b>	<b>Minimum</b>	<b>Std. Dev.</b>
<b>Return on asset</b>	0.012889	0.004779	0.271238	-0.36499	0.091915
<b>Firm size</b>	15687.77	2067.177	174712.2	0.000000	29825.44
<b>Firm growth</b>	0.528477	0.077618	19.60843	-0.98208	2.359224
<b>Firm age</b>	17.09375	13.00000	100.0000	0.000000	20.80026
<b>Lagged profitability</b>	0.012404	0.004644	0.271238	-0.36499	0.091783
<b>Electricity crisis</b>	0.500000	0.500000	1.000000	0.000000	0.501307
<b>Financial leverage</b>	0.442338	0.454290	1.265267	0.000000	0.335905
<b>Productivity</b>	30224000	29449000	44153000	19036000	8613111.

The table 2 presents the descriptive statistics of the variables (i.e. Return on assets, firm size, firm growth, firm age, lagged profitability, electricity crisis, financial leverage and productivity based on raw data for the years 2008 to 2012. The table indicates the last twelve year overall financial performance of the companies.

The table also shows the summary of data defining the central tendency and dispersion of the data. The table exhibits the minimum and maximum value of each variable that actually tells about the date range of each variable. Mean and Std. Deviation of each variable also given below.

### 4.3 Panel Unit Root Results

Before going to modeling, it is necessary to check first whether the data is stationary or non-stationary. To analyze the efficiency of the variables in model, unit root test should be applied. If data is non-stationary at level then it is need to check at first difference or second difference because non stationary of data can produce spurious results that cause the insignificants of model. Due to unbalanced panel, in this study, the Augmented Dickey Fuller (ADF) is used to check the stationary or non-stationary of data (Baltagi, 2005) and other literature of econometrics suggest that Augmented Dickey Fuller is suitable for unbalance panel data because it accommodates with any number of lags.

**Table 3. Unit Root Results**

H0: Series contains a unit root			
H1: Series is stationary			
Series	ADF Value	Fisher (p-Value)	Decision
Profitability	1.96021	0.0250**	Stationary at Level
Firm Size	7.56610	0.0000***	Stationary at Level
Firm Growth	1.43963	0.0750*	Stationary at Level
Firm Age	9.31745	0.0000***	Stationary at Level
Lagged Profitability	1.73406	0.0415**	Stationary at Level
Electricity Crisis	7.18736	0.0000***	Stationary at Level
Financial Leverage	6.86959	0.0000***	Stationary at Level
Productivity	8.23387	0.0000***	Stationary at Level

Note: \*, \*\*, \*\*\* indicate the significance at 10%, 5% and 1% level respectively

According to the results of ADF – Fisher Chi-square, all variables are significant at level so there is no need to take first or second difference. So, null hypothesis  $H_0$  is rejected. Hence, the series is stationary at level. Now we can further proceed to analyze the impacts with the help of random effect or fixed effect model in order to find determinants of profitability of power sector.

#### 4.4 Model Selection

Random Effect model is used when the sample has different characteristics. Because companies are not same in characteristics such as Return on Assets, firm size, firm growth, number of shareholders and business in nature etc. Fixed Effects model is applied for firms to control all characteristics that are stable considered for research for time of fixed period. This model delivers results that statistically more better by eliminating biasness from data and describes within sample differences only (Gujarati, 1988). That's why random effect model is more appropriate to describe deviations between determinants of profitability.

First, when number of cross section  $N$  is greater than number of period  $T$  than random effect model is more appropriate.  $N > T$  (REM) (Gujarati, 1988)

When number of cross section  $N$  is less than number of period  $T$  than fixed effect model is more appropriate.  $N < T$  (FEM) (Gujarati, 1988)

The other way to check which model is more appropriate through Hausman test.

#### 4.5 Hausman Test

Panel data is used in this study, so the data is analyzed whether through random effect or fixed effect. In this purpose, I use the Hausman test criteria to check which model is more appropriate in this study.

$H_0$ : Random Effects model is consistent and efficient.

$H_1$ : Random Effects model is inconsistent.

**Table 4.** Hausman Test Results

Correlated Random Effects - Hausman Test Pool: POOL01 Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	7	1.0000
* Cross-section test variance is invalid. Hausman statistic set to zero. ** WARNING: estimated cross-section random effects variance is zero.			

Table 4 describes that the p value is not significant. So null hypothesis is accepted and alternative hypothesis is rejected. According to the Hausman test, random effect model is appropriate in this study.

#### 4.6 Base Line Model

$$ROA_{it} = \beta_0 + \beta_1 FS_{it} + \beta_2 FA_{it} + \beta_3 FG_{it} + \beta_4 LROA_{it-1} + \beta_5 P_{it} + \mu$$

**Table 5.** Base Line Model Results

Dependent Variable: ROA_?				
Method: Pooled EGLS (Cross-section random effects)				
Sample: 2001 2012				
Included observations: 12				
Cross-sections included: 16				
Total pool (balanced) observations: 192				
Swamy and Arora estimator of component variances				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
<b>C</b>	0.058509	0.021425	2.730871	0.0069
<b>Firm Size</b>	0.656340	2.297607	2.871046	0.0046***
<b>Firm Growth</b>	0.003421	0.002384	1.434744	0.1530
<b>Firm Age</b>	-0.001281	0.000329	-3.890007	0.0001***
<b>Lagged Profitability</b>	0.301780	0.066290	4.552451	0.0000***
<b>Productivity</b>	-1.317309	6.908710	-1.896733	0.0594*
<b>R Square = 0.24</b>		<b>Mean dependent var = 0.012889</b>		
<b>Adjusted R<sup>2</sup> = 0.22</b>		<b>S.D. dependent var = 0.091915</b>		
<b>F-statistic = 12.36</b>		<b>Sum squared resid = 1.211142</b>		
<b>Prob (F-statistic) = 0.000000</b>		<b>Durbin-Watson = 2.05</b>		

Note: \*, \*\*, \*\*\* indicate the significance at 10%, 5% and 1% level respectively

Table 5 shows the result of random effect model. Firm size having the p value .00 which is significant at .00<.01 levels and  $\beta$  value .65 which indicate that firm size have 65% impact on profitability and results are very similar to the results of (Gschwandtner, 2005; Ito & Fukao, 2008; Nunes, Serrasqueiro, & Sequeira, 2009; Stierwald A., 2010). On other hand, results have contradiction with the results of (Jensen & Murphy, 1990; Pi & Timme, 1993; Dhawan, 2001; Geroski, Machin, & Walters, 1997). Firm size is the most significant variable in model. So if the firms in power and energy sector increase the volume of their sales and number of employees then profitability will increase.

The p value of firm growth is .15 which is not significant at any level and  $\beta$  value .003 which describe that firm growth is positive but not significant relationship with profitability and have very minor impact on profitability of power and energy sector. The result is matched with the results of (Weisbord, 1994; Markman & Gartner, 2002; Coad, 2007).

Firm age having p value .00 which is highly significant at .01 levels with  $\beta$  coefficient -.001. It indicates that firm growth is highly significant but negatively related with profitability of power and energy sector. The firm age have no impact on profitability. The result of this variable do not goes to the favor of (Claver, Molina, & Tari, 2002) and (Ito & Fukao, 2008).

The p value of lagged profitability is .00 which is highly significant at .01 levels. The  $\beta$  coefficient is .30 which indicates that lagged profitability is significant and positively related with profitability of power and energy sector. The results are similar to the results of (Bothwell, Cooley, & Hall, 1984) and (Fenny & Rogers, 1999).

The p value of productivity is .07 which is significant at .1 levels. The  $\beta$  -0.91 indicates that the productivity have 91% impact on profitability. So productivity is negative and significantly related with profitability of power and energy sector.

The adjusted  $R^2$  shows the goodness of fit of model. Adjusted  $R^2$  is .22 which means that there is 22% variation in dependent variable with due to predictors (independent variables). So, this model is weak but in panel data adjusted  $R^2$  is mostly low as compared to series and cross-sectional data (Victoria, 2013). The value of Durbin Watson is 2.05 which mean there is no auto correlation in sample.

#### 4.7 Model with Financial Leverage

$$ROA_{it} = \beta_0 + \beta_1 FS_{it} + \beta_2 FA_{it} + \beta_3 FG_{it} + \beta_4 LROA_{it-1} + \beta_5 P_{it} + \beta_6 FL_{it} + \mu$$

**Table 6.** Model with Financial Leverage Results

Dependent Variable: Return on Assets (ROA)				
Method: Pooled EGLS (Cross-section random effects)				
Sample: 2001 2012				
Included observations: 12				
Cross-sections included: 16				
Total pool (balanced) observations: 192				
Swamy and Arora estimator of component variances				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
<b>C</b>	0.060339	0.021579	2.796151	0.0057
<b>Firm Size</b>	6.478707	2.294307	2.820422	0.0053***
<b>Firm Growth</b>	0.003543	0.002395	1.479566	0.1407
<b>Firm Age</b>	-0.001207	0.000340	-3.546316	0.0005***
<b>Lagged Profitability</b>	0.299240	0.066525	4.498170	0.0000***
<b>Financial Leverage</b>	-3.785093	2.017991	-1.875674	0.0742*
<b>Productivity</b>	-1.173209	7.090810	-1.655502	0.0995*
<b>R Square = 0.38</b>		<b>Mean dependent var = 0.012889</b>		
<b>Adjusted R<sup>2</sup> = 0.35</b>		<b>S.D. dependent var = 0.091915</b>		
<b>F-statistic = 10.40</b>		<b>Sum squared resid = 1.206407</b>		
<b>Prob (F-statistic) = 0.000000</b>		<b>Durbin-Watson = 2.04</b>		

Note:\*, \*\*, \*\*\* indicate the significance at 10%, 5% and 1% level respectively

According to table 6, financial leverage is added to previous model to identify its impact on profitability of power and energy sector in Pakistan. Financial leverage having p value .07 which is significant at .1 level but  $\beta$  -.016 indicates minor impact on profitability. So the results show that financial leverage is significant but negatively related with profitability of power sector. This result is similar to the results of (Qureshi, 2009; Sheikh & Wang, 2011).

Adjusted  $R^2$  increases to .35 from .22 and Durbin-Watson is 2.04 which mean that autocorrelation does not exist. So it expresses that by introduction variable of financial leverage this model is improved than base line model. Firm size, firm age and lagged profitability are significant at .01 levels while firm growth is positively but not significantly related with profitability. The firm productivity is also significant at .1 levels and positively related with profitability. The overall performance of model is increase but firm growth still not has significant relationship with profitability of power and energy sector.

#### 4.8 Final Model

$$ROA_{it} = \beta_0 + \beta_1 FS_{it} + \beta_2 FA_{it} + \beta_3 FG_{it} + \beta_4 LROA_{it-1} + \beta_5 P_{it} + \beta_6 LFL_{it} + \beta_7 EC_{it} + \mu$$

**Table 7.** Final Model Results

Dependent Variable: ROA_?				
Method: Pooled EGLS (Cross-section random effects)				
Date: 05/22/14 Time: 01:17				
Sample (adjusted): 2002 2012				
Included observations: 12				
Cross-sections included: 16				
Total pool (balanced) observations: 192				
Swamy and Arora estimator of component variances				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
<b>C</b>	0.103426	0.038225	2.705669	0.0076
<b>Firm Size</b>	5.680407	2.329407	2.449095	0.0154**
<b>Firm Growth</b>	0.003996	0.002372	1.684659	0.0940*
<b>Lagged Firm Age</b>	-0.000921	0.000357	-2.581585	0.0107**
<b>Lagged Profitability</b>	0.340227	0.070072	4.855352	0.0000***
<b>Electricity Crisis</b>	0.044996	0.028819	1.561318	0.0905*
<b>Financial Leverage</b>	-0.017203	0.009657	-1.781537	0.0702*
<b>Productivity</b>	-3.593809	1.688209	-2.134271	0.0344**
<b>R Square = 0.41</b>		<b>Mean dependent var = 0.011343</b>		
<b>Adjusted R<sup>2</sup> = 0.38</b>		<b>S.D. dependent var = 0.091430</b>		
<b>F-statistic = 8.665821</b>		<b>Sum squared resid = 0.988878</b>		
<b>Prob (F-statistic) = 0.000000</b>		<b>Durbin-Watson = 2.16</b>		

Note: \*, \*\*, \*\*\* indicate the significance at 10%, 5% and 1% level respectively

At this step the inclusion of another variable electricity crisis in the model, coefficients and significance values are again changed. The p value of electricity crisis is .09 which is significant at .1 level and  $\beta$  coefficient is .04 which indicate that electricity crisis have 4% impact on profitability. The electricity crisis has positive and significant relationship with profitability of power and energy sector in Pakistan. So during the crisis period the profitability of power sector is increased while on other hand electricity crisis negatively related with profitability in Textile industry, cement industry (Shah, Essrani, Shah, & Rahat, 2013) and electricity crisis is positively related with profitability of food producers in Pakistan (Hussain & Javed, 2012).

Firm size, Lagged firm age, and productivity are significant at .05 levels while firm growth and financial leverage are significant at .1 levels. Adjusted  $R^2$  increases to .38 from .35 and Durbin-Watson is 2.16 which means that autocorrelation does not exist. So it expresses that by introduction variable of electricity crisis this model is improved than previous model used in this study. This model shows the best possible combination of variables with improved adjusted R square .38.

## 5.1 Conclusion

This study has examined how firm specific characteristics had affected the profitability of power and energy sector in Pakistan over the period 2001-2012 that includes both pre and post electricity crisis. The present study also addresses an issue of profitability that is relevant to various stakeholders, including debt holders, investors and managers and may facilitate further research in similar areas of small business studies. The empirical results from investigating a large sample of 16 firms of power and energy sector of Pakistan suggest that firm size has positive and significant relationship with profitability (Gschwandtner, 2005; Nunes, Serrasqueiro, & Sequeira, 2009; Ito & Fukao, 2008; Stierwald A., 2010). Firms in power and energy sector with high volume of sales and greater number of employees increases the profitability of this sector. Firm growth has positive and significant relationship with profitability (Geroski, Machin, & Walters, 1997; Samiloglu & Demirgunes, 2008; Fitzsimmons, Steffens, & Douglas, 2005; Claver, Molina, & Tari, 2002; Asimakopoulos, Samitas, & Papadogonas, 2009). Firm productivity have negative and significant relationship with profitability which indicate that larger and younger firms of power sector with low productivity and high growth are more likely to be profitable. The findings further suggest that lagged firm age and lagged profitability both have significant relationship with current year profitability of power and energy sector. Firm size and productivity are found to be the strongest determinants of profitability.

Additionally, and providing evidence from variables that were not taken into consideration in previous studies namely the effects from financial leverage and electricity crisis, I found power and energy sector firms were not ready to be exposed to the competition that resulted from these two variables. This study found significant relationship of financial leverage and electricity crisis with profitability of power and energy sector of Pakistan. So during the period of electricity crisis the profitability of power sector is increased while on other hand electricity crisis negatively related with profitability in Textile industry and cement industry (Shah, Essrani, Shah, & Rahat, 2013) whereas electricity crisis is positively related with profitability of food producers in Pakistan (Hussain & Javed, 2012).

As our results suggest that Profitability in terms of ROA in Power sector is very important and it is affected by the above predictors which claim that Resource Based theory is partially accepted in power and energy sector of Pakistan. This study also tells that during the electricity crisis the profitability of power and energy sector has not declining trend even production of this sector is very less due to which Pakistan is suffering with high shortfall of electricity.

## **5.2 Practical Implications**

The study highlights the (Profitability) performance of Power and Energy sector of Pakistan. The findings of this research will probably help the top management of power sector in making important decisions and in contingency planning for unexpected factors. Moreover, it will provide an insight into activities which require consideration for improving the profitability of the power and energy sector. The study will also attract the private local and international investors to invest in the Power and energy sector which will cause the increase in production of this sector and finally will boost the economy of Pakistan.

## **5.3 Limitations of the Study**

We were unable to collect more deep and sufficient data to analyze the subsequent performance of power and energy sector in the light of state owned policies and regulations which have an outer impact on power and energy sector of Pakistan. Due to insufficient data it would not be possible for me to generate highly reliable results but I can try to explore the relationship and the effects of different variables with respect to profitability of the power and energy sector of Pakistan. This research is limited to firms of power and energy sector with Karachi stock exchange of Pakistan and identifies the real performance of the power and energy sector in terms of profitability. It does not include those firms of power and energy sector which do not generate electricity in Pakistan.

## **5.4 Future Research Directions**

The current study should be according to both policymakers and researchers in the arena of economic development. Certainly, the findings of this study are Pakistan-specific, and further work is needed to found whether it may be comprehensive results for the global economy. Future research should also include external variables as Inflation, GDP and circular debt that affect the profitability in the Power and Energy Sector.

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### Appendix 1 Summary of Sample Used In the Study

Power and Energy Sector	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Obs.
Altern Energy Ltd.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Ideal Energy Ltd	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Gapan Power Generation Ltd.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Karachi Electric Supply Company Limited	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Kohinoor Energy Limited	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Kohinoor Power Company Limited	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Kot Addu Power Company Limited	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Nishat Chunian Power Limited						✓	✓	✓	✓	✓	✓	✓	07
Nishat Power Limited						✓	✓	✓	✓	✓	✓	✓	07
Pakgen Power Limited	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Sitara Energy Limited	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
S. G. Power Ltd.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Southern Electric Power Co. Ltd.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
The Hub Power Company Limited	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Tri - Star Power Company Limited	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Genertech Pakistan Limited	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Observations	14	14	14	14	14	16	16	16	16	16	16	16	182