Global Journal of Management and Business Research: C Finance
Volume 19 Issue 3 Version 1.0 Year 2019
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4588 & Print ISSN: 0975-5853

# Energy Prices and the Financial Performance of Different Industries in Pakistan

By Qamar Rasheed
*The University of Lahore*

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*GJMBR-C Classification: JEL Code: E44*


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## I. Introduction

The energy prices play its role in the economy level, stock exchange level and corporate level. Sometimes energy prices affect each level with same degree of variation and sometimes differently. The stakeholders should know the impact of the increase and decrease in the energy price to reduce risk against their investment. In each free market buyer wants to pay little price and seller wants to disclose high prices to gain more and more.

Yan (2012) explored that energy and its prices take interest and concentration of each group worldwide. Oil price volatility occurs due to the limited supply of oil by international organizations, instability of oil production in OPEC, economic changes in OPEC countries, change in demand worldwide, variation in oil stock in all countries, political instability, and fluctuation in dollar exchange rate. Bayar and Kilic (2014) revealed that production decreases due to the increase in oil and gas prices because of the cost of manufacturing increases along with the rise in the price of input.

Whether the price of oil is very high or very low depends on the point of reference (Frias, 2000). In the free market, buyers want to pay as little price as possible and sellers want to charge big prices. The World Bank analysis described an increase from a price of US $26 per barrels in January 1985, US $31 per barrel in 2004, US $53 per barrel in January 2007 to US $102 per barrel in January 2014, so this kind of fluctuation is notable over the long-term perspectives. Having fluctuated about US $20 per barrel for much of the 1990s, oil prices have increased rapidly since 1999, peaking in July, 2008, and a very big drop in oil prices found by the end of December, 2008 (Brien and Weymes, 2010).

Latest studies help the belief and ensures that price uncertainty has influence over the macroeconomic variables of advanced economies of the world. The Gross Domestic Product (GDP) is directly linking with oil price volatility, stock return (Sadorsky, 1999; Hondroyiannis and Papapetrou, 2001) and the interest rate ( Hondroyiannis and Papapetrou, 2001; Ferderer, 1996). Sometimes evidence shows that low oil price does not boost economic activity and depress the economy. The asymmetry is one explanation for the impact of price uncertainty, over and above the effect of price level (Mork, 1989; Loungani, 1986). The dynamics of oil prices are very crucial for oil exporting countries and oil producing companies. The Organization of the Petroleum Exporting Countries (OPEC) plays a vital role to set principal motives to exploit and ensure the stability of oil prices in the global market. The OPEC's aim to diversity the detrimental effect of unnecessary fluctuations in the oil prices.

WEO (World Economic Outlook) and International Energy Agency's (IEA's) indicated in World Economic and Financial Survey (April 2016) that there are three key factors which are playing important role to decline in oil prices. The increase in oil supply, weaker global demand and improved energy efficiency. These three factor increased financial and fiscal stress in oil exporting countries. The increase in oil supply cause 50% decline in oil price in 2015 and 2016. The benefit of decline in oil price transfer to advanced economies, which are less dependent on oil exports and their GDP improves gradually along with reduction in oil prices. The global GDP decline due to weaker global demand. The improvement in energy efficiency is the third factor to decline oil prices and it has small positive impact on

*Author: M. Phil. Finance, The University of Lahore, School of Accountancy and Finance, Lahore, Pakistan.*
*e-mail: qamarali1989@yahoo.com*

the Global GDP and more benefits for advanced economies[1].

Responding to persistent low oil prices The Organization for the Petroleum Exporting Countries (OPEC) and Russia met together in January 2017 and decided to wide ranging support for production adjustment and oil prices. They decided to cut production and push up the low crude oil prices. Through this commitment, they tried to make strong economic growth and financial markets. Together two main players have helped to tighten markets[2].

Gas will grow faster than oil and coal over the next five years, helped by low prices, ample supply, and its role in reducing air pollution and other emissions. Industry emerges as the main engine of demand growth, accounting for half of the forecast growth in global gas demand. A growing use of gas in the chemical sector, and strong demand for fertilizers in countries like India and Indonesia, and the replacement of coal by gas in a host of smaller industrial applications in China mean that industrial gas demand grows by almost 3% per year. Many countries are reforming their gas markets to increase the use of gas and to attract new investments. Gas prices in Australia's major eastern market have traditionally been very low but have now risen sharply, in part because new export projects have created a pricing link with international markets. Higher end-user prices have led to concerns about the impact on industrial competiveness. In response, the Australian government has introduced a domestic gas security mechanism that gives it the power to restrict exports if there is a risk of shortfalls on the domestic market [3].

Price competitiveness and market reforms will be critical to sustaining natural gas demand growth in emerging markets. Emerging markets are much more sensitive to price levels than traditional buyers; competitiveness of natural gas, either sourced from domestic production or imported, is therefore a crucial factor in sustaining such demand growth. Emerging Asian markets, where half of the global consumption increase is expected in the medium term, still mainly use oil-indexed mechanisms to define natural gas prices. Importing countries should pursue adequate market reforms to further open their own domestic gas markets if they intend to benefit from the development of more competitive wholesale gas markets, including market-based natural gas pricing mechanism[4].

[1] International Monetary Fund | April 2016, Chapter 1, Recent Developments and Prospects
[2] Annual Report OPEC 2017: The World Economy, The Impact of Oil Price on Asia: 2017 Marsh & McLennan Companies, Inc
[3] Analysis and Forecasts to 2O22: Gas 2017, International Energy Agency
[4] Analysis and Forecasts to 2O23 Gas 2018, International Energy Agency

## II. Literature Review

Many researchers and economists have tried to figure out the relationship between oil prices, gas prices and the financial performance of firms. Oil and gas prices have huge impact on the performance of firms in different perspective such as business performance, corporate performance and stock return. A number of studies have carried out at the global level and domestic level on the financial performance along with energy prices. Many of the studies have revealed positive relationship (like, Falzon and Castillo, 2013; Rahmanto et al.,2016; Dadashi et al., 2015; Caporale et al., 2015; Hamma et al., 2014; Baars and Rukavishnikova, 2014; Wattanatorn and Kanchanapoom, 2012; Aliyan, 2013; Liu and Ma, 2017; Gencer and Demiralay, 2013; Jafarian and Safari, 2015; Waheed et al., 2017). Beside that some studies have confirmed negative relationship (such as, Haq, 2017; Janor et al., 2013; Rodríguez, 2007; Arshad and Bashir, 2015). While, some researchers have stated mix relationship (like, Aimer, 2016; Daddikar and Rajgopal, 2016; Zhang and Chen, 2014; Lis et al., 2012; Elder and Serletis, 2009; Gencer and Demiralay, 2014). Whereas, firms level studies have explored that fluctuation in oil price has insignificant impact on the manufacturing industries and top five oil companies of the world (Mahboub and Ahmed, 2016; Hazarika, 2015).

Taking into consideration a firm level relationship between energy prices and performance of firms, Haq (2017) revealed by using quantitative techniques over the four years of high and low oil prices that fluctuation in oil prices have a significant impact on the performance of corporate firms in Oman; he found that average revenue negatively correlated with average oil prices. In addition, oil prices affect average profit by direct proportion and EPS decrease with the reduction in oil prices. Basha (2014) investigated the impact of the increase in the crude oil prices on the financial performance of Jordanian pharmaceutical. The study confirmed that statistically significant relationship stands between oil prices on the financial performance of a pharmaceutical company. Shaari et al. (2013) explored the effects of oil prices on agriculture, manufacturing, transportation and construction sectors and reported that oil prices can affect agriculture, manufacturing, transportation and constructions sectors in long run. Bolaji and Bolaji (2010) probed the effect of the increase in oil prices on manufacturing companies in Nigeria and revealed that raise in the price of oil effect cost, diminish the market demand and decrease profit. Lele (2016) investigated the impact of oil prices on revenue growth, profitability and return on equity of 13 Industrial sector of Saudi Arabian Stock Exchange. The research confirmed that oil price has rigorous and significant impact on overall revenue growth, overall profitability and overall return on equity. Mahboub and Ahmed (2016) probed

the impact of oil price shocks on the manufacturing sector in Saudia Arabia over the period of 2002 to 2014. Vector Auto Regressive (VAR) model used to determine that oil price shocks have the insignificant impact on the manufacturing sector in Saudi Arabia. Aimer (2016) examined the effects of oil price volatility on the four economic sectors of Libya based on 27-year analysis. Granger Causality Test applied to disclose that agriculture and construction sector could be affected by the change in oil price in the same direction. Seth et al. (2016) explored the influence of oil price volatility and its impact on Indian industry by examining 06 manufacturing sector. The ordinary least square (OLS) method applied to report that oil price changes significantly affect the cost of raw material and revenue of automobile industry, dyes industry, chemical industry and oil refinery industry. Daddikar and Rajgopal (2016) applied GARCH model to estimate the volatility trend. The study found that firm value and financial performance partly affected by the change in oil price as per regression analysis and oil prices affect selected firm differently because of equity pattern, economies of scale and other factors.

Besides that, Hazarika (2015) conducted a study to determine the performance of the top five oil and gas companies in the world. Simple linear regression method applied to show that there is no statistically significant relationship exist between oil prices and profitability, liquidity and financial performance of the top five oil and gas companies. Wattanatorn and Kanchanapoom (2012) revealed a study to determine the interaction between crude oil prices and its impact on the profitability performance of listed companies of Thailand Stock Exchange over the period of 2001 to 2010. Panel data regression and generalized least square (GLS) estimation method applied to report that the profitability performance has positive relationship with fluctuation in oil prices. Aliyan (2013) examined the influence of oil prices on industrial production from Iran and applied Vector Auto Regression (VAR) model to shows industrial production increases with the increase in oil price. Elder and Serletis (2009) explored the influence of oil price over industrial output and found that unsure rise in oil price has causes of reduction in industrial production, mining, oil and gas extraction. The outcomes of the rise in oil price are less damage for the industry than the decline in oil price. Liu and Ma (2017) found the interaction between oil prices and world natural gas industry and China separately. According to the study, oil prices positively affect the profit and growth of gas industries and attract the investors. In increasing trend of oil prices become a cause to increase demand for natural gas that's why the growth of gas industries goes up. Similarly, reduction in oil prices creates a problem of cash flow, capital expenditure, and supply of natural gas. In china's perspective, reduction in oil prices affects profit margin and gas consumption. Rodríguez (2007) explored the interaction between oil price shocks and industrial output by analyzing eight-industry group of six OCED (Organization for Economic Development) countries. The study used Vector Auto regression (VAR) methodology for each country. As per result of the study that rise in oil price negatively affects overall manufacturing production in six countries, however, each country response differently. Homogeneity found among USA and UK relationship between oil prices and industrial output but heterogeneity existed among four countries of European Economic and Monetary Union (EMU).

Zhang and Chen (2014) examined the interaction between oil prices and China's bulk commodity market and investigated the impact of oil price shocks towards China's fundamental industries. The study consisted from 8th October 2001 to 30th September 2011 and separately applied on Wenhua China's Commodity Index (CCI) and West Texas Intermediate (WTI). Maximum likelihood estimation (MLE) method applied as parameters for estimation with RATS statistical software. ARMA GARCH model used to explicit the influence of oil price shocks on China's bulk commodities market. The research revealed that oil prices volatility has the significant influence on CCI. Oil price volatility did not affect Grain and metal market like other industries so the study suggested investor should make the investment in these industries for portfolio diversification.

Most of the stock level studies have revealed that increase in energy prices have positive impact on stock performance. Falzon and Castillo (2013) collected 461 months data to analyze the relationship between oil prices and equity return in the UK and US. The study reported that higher oil price variation led to higher equity return variation, revealing the higher risk in the market. Rahmanto et al. (2016) applied linear and asymmetric models and divided data into nine sectors to know the impact of crude oil prices. According to their study the stock return increase with the increase in oil prices. Dadashi et al. (2015) explored the relationship between oil prices and value of the listed firm in Tehran Stock Exchange by analyzing data from 62 manufacturing firms during the period of April 2003 to March 2012. Based on Spearman's correlation coefficient that oil prices and stock prices have the positive relationship. Caporale et al. (2015) performed Mean bivariate VAR GARCH model to prove that unsure changes inoil prices have the positive impact of the unexpected shift in the aggregate demand on all sectoral stock returns excluding three sectors. Hamma et al. (2014) conducted a sector level study on oil price volatility and concluded that unidirectional relationship existed between oil market and Tunisian stock market and degree of variation different from sector to sector. Baars and Rukavishnikova (2014) investigated the

relationship between oil price volatility and the stock return of clean energy companies. The study explored data from 85 companies over the period of 2004 to 2014 and applied deductive and inductive research methods. The study found that stock return positively affected by the variation in oil prices and every sector affected by oil prices differently.

Furthermore, Gencer and Demiralay (2013) applied VAR and VEC models to determine the long run and short run relationship between oil prices and stock returns. The study found that oil prices have the positive impact on sector stock return. Jafarian and Safari (2015) examine the association between oil prices and 08 different industrial sectors of Malaysian Stock Market over the period of January 2000 to March 2014. The OLS regression analysis disclosed that oil prices have the significant and positive impact on the Kuala Lumpur Composite Index's (KLCI) return at 10% level of significance. Waheed et al. (2017) reported by individual firm analysis that 27.45% companies have significant positive effect while 25.69% companies have the insignificant effect and 5.28% companies have significant negative effect due to change in oil prices. However, according to full sample, the result of the asymmetric analysis that oil prices shocks have the significant positive impact on stock return.

Lis et al. (2012) investigated the interaction between crude oil prices and stock returns of car manufacturing companies. German and USA car manufacturing companies are more responsive than Japan car manufacturing companies against fluctuation in oil prices. Gencer and Demiralay (2014) conducted research to estimate the sensitivity of changes in oil prices and its impact on five services and industrial sectors by exploring daily data of BIST 100 Index (Borsa Istanbul). The study revealed that oil price has the significant impact on sectoral return and each sector return affects differently in the response to the change in oil price. Additionally, past news also affects the stock return of each sector against the fluctuation of oil prices. Gupta (2016)'s study consisted of monthly data from 70 countries over the period of 1983 to 2014 and deduced that oil-exporting countries face more difficulties than oil importing countries by volatility in oil prices. Gormus (2013) used two different approaches for Istanbul Stock Exchange (ISE-100) and S & P 100. The conclusion made by applying Ordinary Least Square (OLS) method that oil price changes have a significant influence on Turkish stock market and Turkish stock market relatively gets more affected than US stock market.

Some of the stock level studies have confirmed that rise in energy prices have negative impact on stock performance. Janor et al. (2013) deduced that oil price shocks increased uncertainty in KLCI and escalate investment risk. Arshad and Bashir (2015) concluded as per panel regression results of this study that stock returns of chemicals and textile industry negatively affected by the change in oil prices.

## III. Empirical Model, Data, and Methodology

### a) *Data and sample*

The population of selected industrial sector is consisted on 178 firms. Based on the availability and accessibility of the data only 67 companies used in the study to make analysis. The population and the sample of the research consist of the listed companies of Pakistan Stock Exchange (PSX). The sample firms classified by Pakistan Stock Exchange and the study contemplates on annual balanced panel data of each sector over the period of 2007 to 2016. The annual report of selected firms collected by different sources, which include firms official websites, Pakistan Stock Exchange, Business Recorder and Khi Stocks. A total of 67 companies included in our sample size out of which 23 firms selected from textile sector, 13 firms selected from the cement sector, 14 firms selected from the sugar sector, 10 firms from the automobile assembling sector and 07 firms selected from the pharmaceutical sector.

### b) *The study variables*

The study contains 08 variables in which 03 dependent variables (Return on Equity, Return on Asset and Profit Margin Ratio), 04 independent variables (Oil Price, Gas Price, Electricity Fixed Price and Electricity Variable Price), and 01 controlled variable (Exchange Rate), employed to analyze the relationship between them. Figure 3 A, and 3 B, present the oil and gas prices. Figure 3 C, and 3 D display electricity prices and exchange rate mentioned in Figure 3 E.

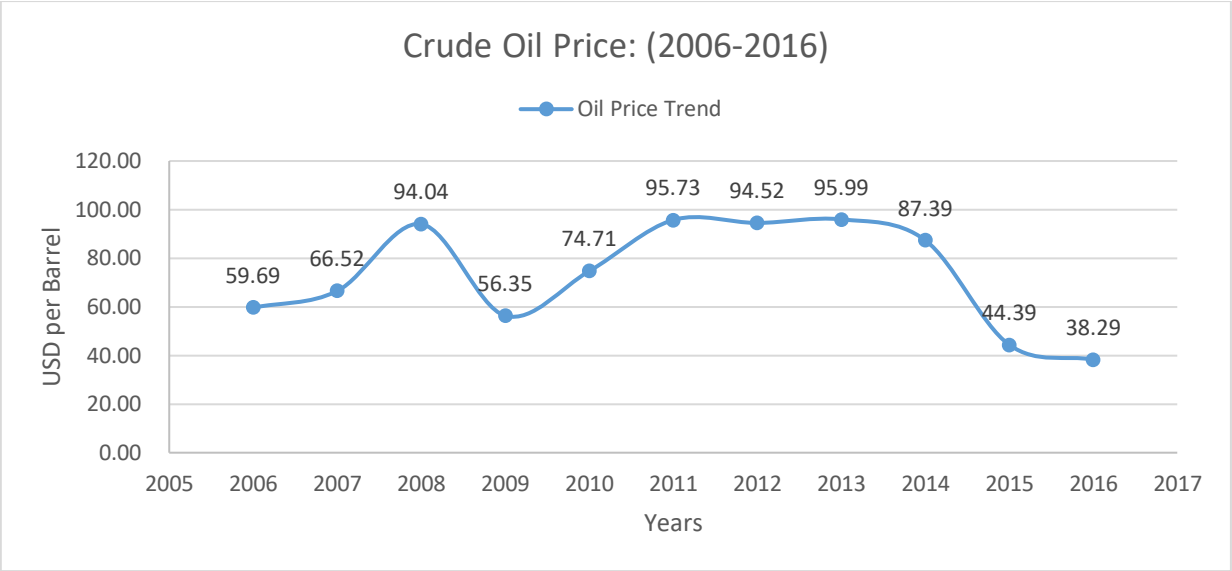


*Figure 3 A:* Average crude oil prices during 2006-2016 as per U.S. Energy Information Administration

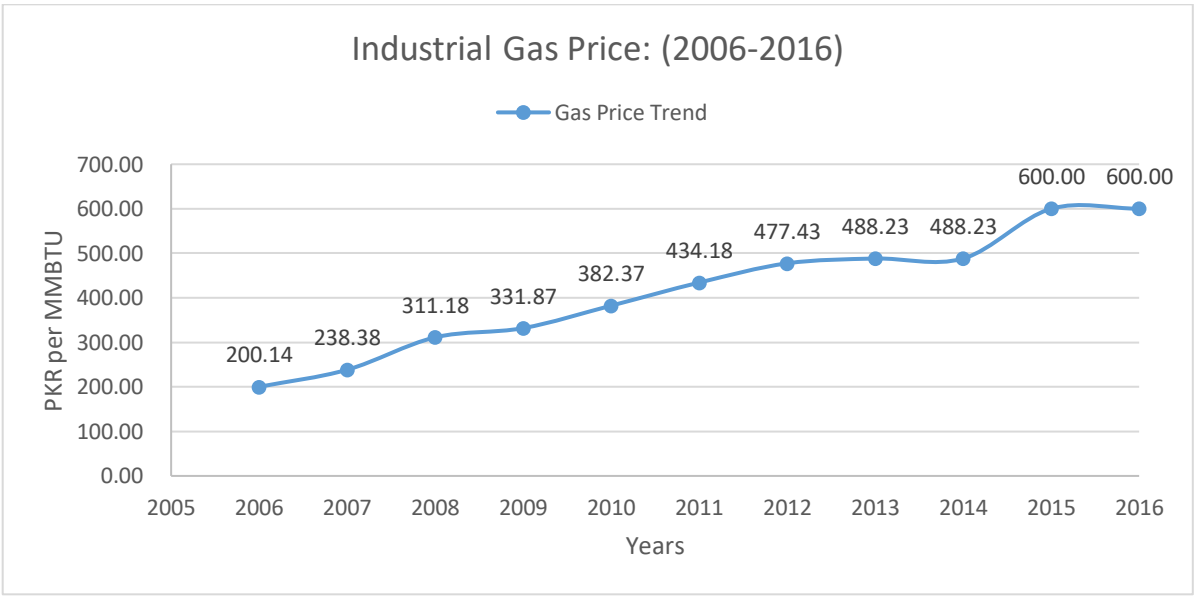


*Figure 3 B:* Average industrial gas prices during 2006-2016 as per The Oil and Gas Regulatory Authority (OGRA)-Pakistan

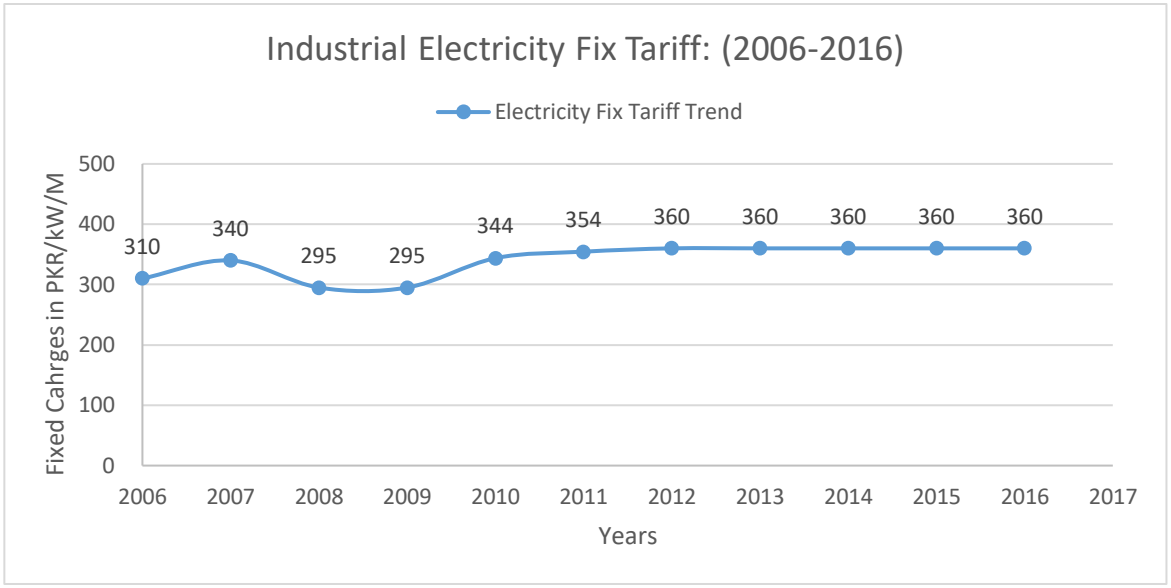


*Figure 3 C:* Average industrial electricity fixed prices during 2006-2016 as per The National Electric Power Regulatory Authority (NEPRA)-Pakistan

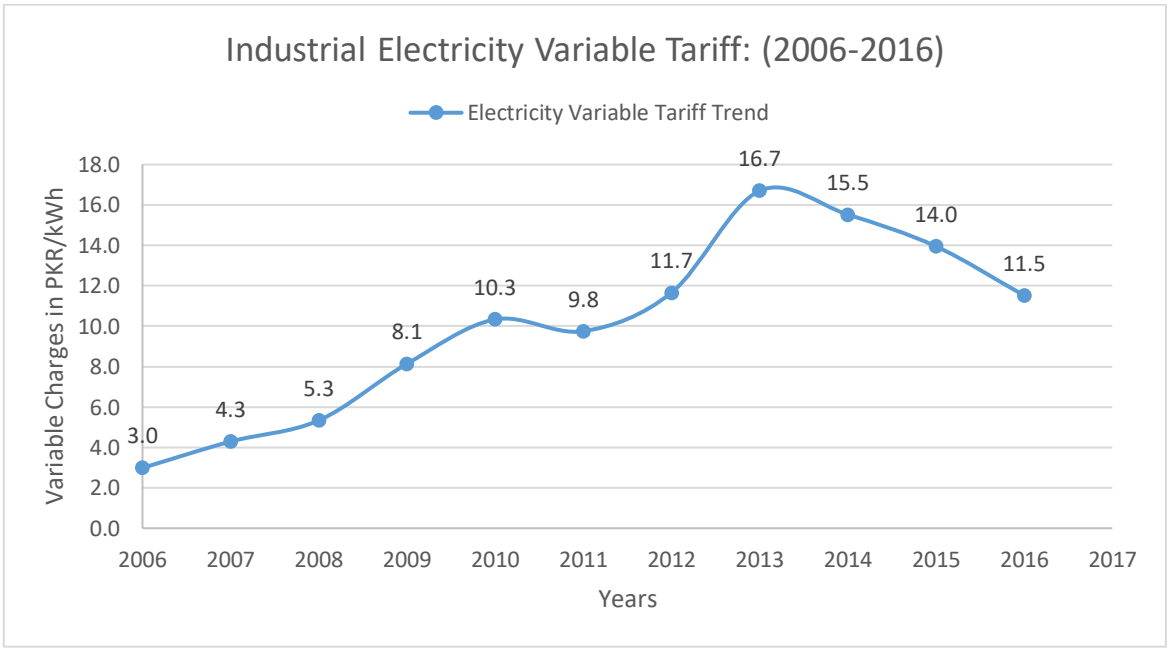


*Figure 3 D:* Average industrial electricity variable prices during 2006-2016 as per The National Electric Power Regulatory Authority (NEPRA)-Pakistan

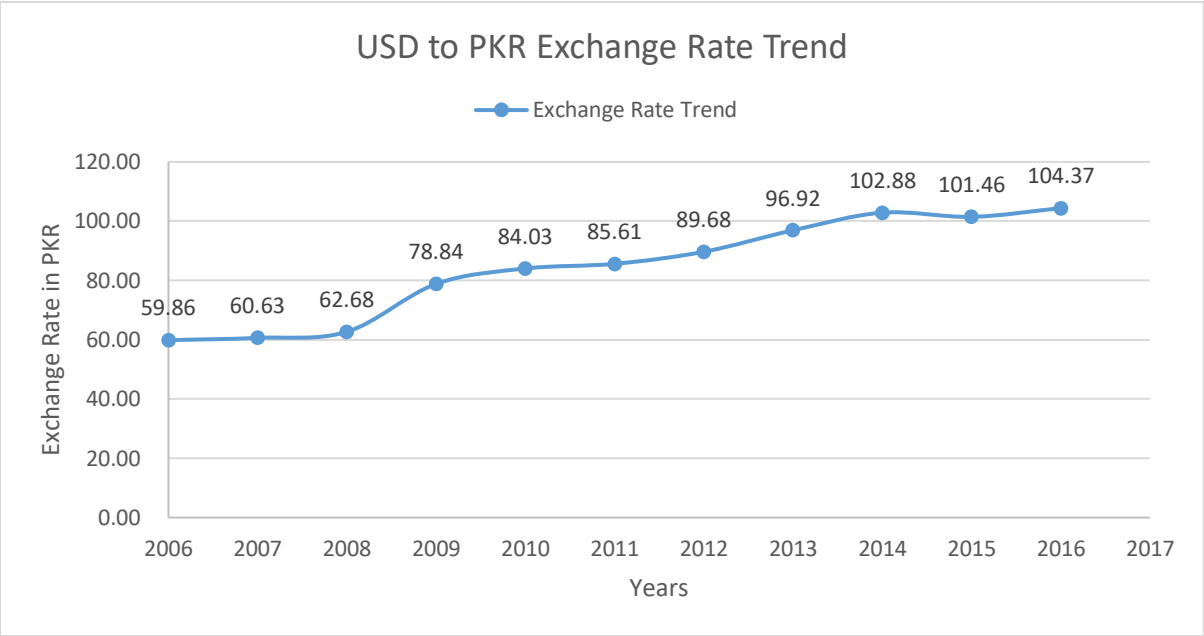


*Figure 3 E:* Average exchange rate (USD to PKR) during 2006-2016 as per State Bank of Pakistan (SBP)

c) *Estimation method*

The key objective of this part of the study is to apply the appropriate research methodology to draw outcomes. The quantitative approach to be used to analyze the data to obtain the study findings. The data converted into a format that can be used to measure and answer the research questions. Panel data is used to analyze the relationship between oil, gas, electricity prices and the financial performance of different manufacturing industries of Pakistan. Panel data have benefits in terms of additional variability, smaller collinearity between the variables, high degree of freedom and high efficiency (Baltagi, 2005, Econometric Analysis of Panel Data). The Panel least square method is applied in the study to estimate the effect of energy prices and the financial performance of the firms. As reported by Wattanatorn and Kanchanapoom (2012), the generalized least square method uses to estimate equations instead of ordinary least square method and to deal with heteroscedasticity and autocorrelation problems. Similarly endogeneity problem may be created because of fixed effects model, therefore there are two method used in this study such as fixed effects and random effects in term to deal such problem. The study considers panel least square with fixed effect models and random effect models to check the relationship between energy price and the financial performance of different industries in Pakistan.

i. *Model specification*

To investigate the empirical analysis, a multifactor regression model structured to examine the relationship between energy price and firm financial performance. Equations 3.1, 3.2 and 3.3 run on E views to investigate the impact of energy prices on the financial performance of each sector of the firms.

$$ROE_{i.t} = \beta_{0\,i.t} + \beta_1 OIL_{i.t} + \beta_2 GAS_{i.t} + \beta_3 ELFR_{i.t} + \beta_4 ELVR_{i.t} + \beta_5 ER_{i.t} + e_{i.t} \quad \ldots\ldots 3.1$$

$$ROA_{i.t} = \beta_{0\,i.t} + \beta_1 OIL_{i.t} + \beta_2 GAS_{i.t} + \beta_3 ELFR_{i.t} + \beta_4 ELVR_{i.t} + \beta_5 ER_{i.t} + e_{i.t} \quad \ldots\ldots 3.2$$

$$PMR_{i.t} = \beta_{0\,i.t} + \beta_1 OIL_{i.t} + \beta_2 GAS_{i.t} + \beta_3 ELFR_{i.t} + \beta_4 ELVR_{i.t} + \beta_5 ER_{i.t} + e_{i.t} \quad \ldots\ldots 3.3$$

*$\beta_0$: Intercept, $\beta_1$: coefficient of OIL, $\beta_2$: coefficient of GAS, $\beta_3$: coefficient of ELFR, $\beta_4$: coefficient of ELVR, $\beta_5$: coefficient of ER, e: error term*

where ROE $_{i.t}$, signify Return on Equity of i'th firm and performance in year t. ROA $_{i.t}$ and PMR $_{i.t}$ represent Return on Assets and Profit Margin Ratio of i'th firm and performance in year t. Where β is the constant and OIL $_{i.t}$ is the price return of annually oil prices. Annual Gas price return is denoted by GAS $_{i.t.}$ Where ELFR $_{i.t}$ and ELVR $_{i.t}$ represents the annual price return of Electricity Fixed Tariff and Electricity Variable Tariff. ER $_{i.t}$ denotes Pakistan Rupee Exchange Rate return against US Dollar on annual basis. where e $_{i.t}$, is a disturbance term.

## IV. Empirical Results

*a) Descriptive statistics for sectoral analysis*

Table 1, contains the statistical summary of textile, cement, sugar, automobile and pharmaceutical sector over the period of 2007 to 2016. In the statistical summary included mean, maximum value, minimum value and standard deviation of the dependent variables are used in the study. The extreme average value of ROE in the sectoral study is 14.70% and the lowest average value of ROE is -303%. Its mean ROE of automobile sector generates a highest average return from five industrial sectors while the sugar sector faces huge average losses against ROE within the five sectors. The minimum and maximum value from sector analysis in terms of ROE is -21279% and 1050% respectively. It indicates that the sugar sector is one of the sectors, which provides the lowest and highest return over ROE as compared to other sectors.

*Table 1:* Sectoral descriptive statistics over the period of 2007-2016

| Industry | Variables | Mean | Maximum | Minimum | Std. Dev. |
|---|---|---|---|---|---|
| Textile | ROE | -0.06 | 1.29 | -26.46 | 1.84 |
| | ROA | 0.05 | 0.54 | -0.27 | 0.08 |
| | PMR | 0.04 | 7.30 | -10.64 | 0.97 |
| Cement | ROE | 0.09 | 0.48 | -0.95 | 0.21 |
| | ROA | 0.06 | 0.24 | -0.18 | 0.09 |
| | PMR | 0.05 | 0.31 | -2.14 | 0.29 |
| Sugar | ROE | -3.03 | 10.50 | -212.79 | 24.59 |
| | ROA | 0.02 | 0.24 | -0.27 | 0.08 |
| | PMR | 0.00 | 0.43 | -0.49 | 0.11 |
| Automobile | ROE | 0.15 | 0.65 | -1.64 | 0.31 |
| | ROA | 0.09 | 0.42 | -0.27 | 0.11 |
| | PMR | 0.03 | 0.18 | -1.34 | 0.16 |
| Pharma | ROE | 0.09 | 0.52 | -3.81 | 0.52 |
| | ROA | 0.10 | 0.37 | -0.13 | 0.09 |
| | PMR | 0.08 | 0.25 | -0.19 | 0.08 |

*This table describes the descriptive statistics of study's specimen over the period 2007-2016*

Pharmaceutical sector performs better than other sectors in term of average value of ROA meanwhile the maximum value and minimum value of ROA is 53.50% and 23.60% respectively. It denotes that the textile sector show an enormous return over ROA but sugar sector generates less return over ROA. The pharmaceutical sector has great mean value in regards to PMR while the maximum value of PMR is 729.50%. It signifies that the textile sector has great potential to generate profit margin within the entire sample. The standard deviation of the sugar sector is relatively higher than other sectors because its value is 24.59. However, ROA of each sector deviates comparatively low. It indicates that investment in assets of each sector is less risky than other financial indicators such as ROE and PMR.

*b) Descriptive statistics for energy variables*

Table 2, consists on analytical examination of the statistical summary of energy variables and control variable. The mean value of ELVR is more than other energy variables so it is more risky energy variable beside OIL and GAS. In term of maximum and minimum value, ELVR and OIL value is 52.50% and -49.20% respectively. It identifies the span of both variables. The standard deviation shows the dispersion of variables from their means. Looking through the standard deviation, the most dispersed measure is OIL with the standard deviation of 0.28 and the least scattered variable is ELFR with the standard deviation of 0.07. ELFR shows moderate variability as compare to others energy indicators such as OIL, GAS, and ELVR. In the meantime, OIL and ELVR report high disparity within the energy samples.

*Table 2:* Descriptive statistics for energy prices over the period of 2007-2016

| Variables | Mean | Maximum | Minimum | Std. Dev. |
|---|---|---|---|---|
| OIL | 0.00 | 0.41 | -0.49 | 0.28 |
| GAS | 0.12 | 0.31 | 0.00 | 0.10 |
| ELFR | 0.02 | 0.17 | -0.13 | 0.07 |
| ELVR | 0.17 | 0.53 | -0.17 | 0.24 |
| ER | 0.06 | 0.26 | -0.01 | 0.07 |

*c) Sector-wise regression results*

The study examined sector wise panel data to analyze the influence of energy prices on the financial performance of different industries in Pakistan such as textile industry, cement industry, sugar industry, automobile assembling industry and pharmaceutical industry. Run the regression model by applying the fixed effect model to interpret the association of financial performance of firms with energy prices. Later on, draw a conclusion which method would be effective and suitable for the study. Table 3, reports the coefficient values and probability values of return on equity, return on assets and profit margin ratio (return on sales) of the fixed effect model and random effect model for each sector. All energy prices excluding electricity variable prices significantly affect the financial performance of the cement sector based on its probability value at 5% level of significance. Electricity variable price is one of them, which affects insignificantly the return on sales of cement sector because its probability value is more than the 5% level of significance. In the meantime, it also behaves positively with return on sales of cement sector. From other energy variables, only electricity variable prices affect the profitability of the sugar sector with respect to return on assets. Return on assets has a negative association with electricity variable prices from the perspective of the sugar sector in accordance with its coefficient value. The other industrial sectors behave insignificantly against changes in energy prices such as textile, automobile and pharmaceutical sector. However, these sectors have a negative or positive relationship with energy prices as per their coefficient values.

*Table 3:* Sectoral regression analysis over the period of 2007-2016

| Industry | Independent Variable | (β)-Values | | | (P)-Values | | |
|---|---|---|---|---|---|---|---|
| | | ROE | ROA | PMR | ROE | ROA | PMR |
| Textile | OIL | 0.47 | 0.03 | -0.22 | 0.35 | 0.13 | 0.42 |
| | GAS | -0.33 | -0.12 | 1.24 | 0.84 | 0.08 | 0.16 |
| | ELFR | -0.32 | 0.14 | 0.90 | 0.86 | 0.07 | 0.37 |
| | ELVR | -1.16 | -0.03 | -0.77 | 0.14 | 0.31 | 0.08 |
| | ER | 2.33 | -0.09 | 0.91 | 0.42 | 0.42 | 0.56 |
| Cement | OIL | -0.37 | -0.14 | -0.38 | 0.00 | 0.00 | 0.00 |
| | GAS | -1.07 | -0.45 | -1.02 | 0.00 | 0.00 | 0.00 |
| | ELFR | -1.00 | -0.32 | -0.70 | 0.00 | 0.00 | 0.02 |
| | ELVR | 0.34 | 0.09 | 0.20 | 0.00 | 0.00 | 0.11 |
| | ER | -1.80 | -0.68 | -1.59 | 0.00 | 0.00 | 0.00 |
| | OIL | -3.67 | 0.01 | -0.02 | 0.67 | 0.48 | 0.52 |
| | GAS | -35.64 | 0.03 | 0.05 | 0.19 | 0.70 | 0.64 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sugar | ELFR | 36.68 | -0.01 | -0.14 | 0.24 | 0.92 | 0.25 |
| | ELVR | 3.92 | -0.07 | -0.04 | 0.77 | 0.02 | 0.45 |
| | ER | -74.82 | 0.37 | 0.34 | 0.12 | 0.00 | 0.08 |
| | OIL | -0.07 | -0.05 | -0.02 | 0.55 | 0.06 | 0.74 |
| | GAS | -0.11 | 0.00 | 0.15 | 0.76 | 0.96 | 0.43 |
| Automobile | ELFR | 0.02 | -0.05 | 0.02 | 0.96 | 0.61 | 0.92 |
| | ELVR | -0.02 | -0.06 | 0.02 | 0.93 | 0.18 | 0.85 |
| | ER | -1.72 | -0.31 | -0.21 | 0.01 | 0.05 | 0.53 |
| | OIL | 0.10 | -0.01 | 0.00 | 0.67 | 0.88 | 0.91 |
| | GAS | 0.49 | -0.06 | -0.01 | 0.53 | 0.52 | 0.89 |
| Pharma | ELFR | 0.29 | 0.04 | 0.02 | 0.74 | 0.72 | 0.81 |
| | ELVR | 0.33 | 0.03 | 0.05 | 0.38 | 0.57 | 0.14 |
| | ER | -0.06 | -0.30 | -0.25 | 0.97 | 0.09 | 0.06 |

i. *Fixed effect model sector-wise results*

Table 4, displays the results of the fixed and random effect model. The constant (β0) behave similarly with respect to the fixed and random effect model because there is no change found in the value of constant (β0). However, R-Squared, adjusted R-Squared and probability values of F-Statistics are different. In terms of constant (β0), the aggregative effect of energy prices is positive with the financial performance of different sector meanwhile, profit margin ratio partially negative with respect to energy prices. There is a cumulatively negative relationship exist between the textile and sugar sector with energy prices from the perspective of profit margin ratio. As per fixed effect model, the energy prices and control variable dominate over the financial performance of cement and pharmaceutical sector in accordance with R-Squared analysis. Similarly, if more independent variables included in the fixed effect model then cement and pharmaceutical sector would be affected relatively more comparatively other industrial sectors according to adjusted R-Squared values. The probability values of F-Statistics show that energy prices and exchange rate mutually and significantly affect the financial indicator of each sector except return on equity of textile, sugar, pharmaceutical, and profit margin ratio of textile sector.

*Table 4:* Sectoral fixed and random effect model over the period of 2007-2016

| Model | Industry | Constant $\beta_0$ | | | R-Squared | | | Adjusted R-Squared | | | Prob. F-Statistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ROE | ROA | PMR | ROE | ROA | PMR | ROE | ROA | PMR | ROE | ROA | PMR |
| Fixed Effect | Textile | 0.04 | 0.07 | -0.05 | 0.11 | 0.20 | 0.03 | -0.01 | 0.09 | -0.10 | 0.93 | 0.01 | 1.00 |
| | Cement | 0.29 | 0.15 | 0.25 | 0.62 | 0.78 | 0.51 | 0.56 | 0.74 | 0.44 | 0.00 | 0.00 | 0.00 |
| | Sugar | 4.39 | 0.01 | -0.02 | 0.15 | 0.55 | 0.34 | 0.02 | 0.48 | 0.24 | 0.31 | 0.00 | 0.00 |
| | Automobile | 0.26 | 0.11 | 0.02 | 0.39 | 0.68 | 0.30 | 0.29 | 0.63 | 0.18 | 0.00 | 0.00 | 0.00 |
| | Pharma | -0.03 | 0.12 | 0.08 | 0.26 | 0.58 | 0.73 | 0.12 | 0.50 | 0.67 | 0.07 | 0.00 | 0.00 |
| Random Effect | Textile | 0.04 | 0.07 | -0.05 | 0.02 | 0.07 | 0.03 | -0.01 | 0.05 | 0.01 | 0.63 | 0.01 | 0.21 |
| | Cement | 0.29 | 0.15 | 0.25 | 0.50 | 0.64 | 0.30 | 0.48 | 0.63 | 0.27 | 0.00 | 0.00 | 0.00 |
| | Sugar | 4.39 | 0.01 | -0.02 | 0.05 | 0.10 | 0.07 | 0.02 | 0.06 | 0.03 | 0.19 | 0.02 | 0.09 |
| | Automobile | 0.26 | 0.11 | 0.02 | 0.18 | 0.22 | 0.02 | 0.13 | 0.18 | -0.03 | 0.00 | 0.00 | 0.81 |
| | Pharma | -0.03 | 0.12 | 0.08 | 0.06 | 0.08 | 0.10 | -0.02 | 0.00 | 0.03 | 0.59 | 0.40 | 0.21 |

*This table describes the fixed effect and random effect analysis of study's specimen over the period 2007-2016.*

ii. *Random effect model sector-wise results*

In sector wise panel estimation, the random effect model applied to estimate the impact of energy price on the financial performance of the different sector. Later on, draw a conclusion which method would be effective and suitable for the study. Table 4 reports the outcomes of the random effect model. The constant (β0) behave similarly in both models like fixed and random effect model because of no change found in the value of constant (β0). The R-Squared values signify that energy prices have a big influence on the financial performance of the cement sector. Furthermore, if more independent variables included in the random effect model then only cement sector would be affected as compared to other

industrial sectors from the perspective of adjusted R-Squared. The probability values of F-Statistics of each sector show that energy prices and the exchange rate has a partially significant impact on the financial performance of the different industry. Meanwhile, energy prices insignificantly affect the financial indicator of the pharmaceutical sector.

*d) Hausman test*

After applying the random effect and fixed effect method separately of regression analysis, it is necessary to make a better choice. The Hausman test conducted to eradicate ambiguity regarding the behavior of intercept whether intercept behaves randomly or fixed. Table 5, identifies the results of return on equity, return on asset, profit margin ratio (return on sales) by using the Hausman test for each industrial sector. Results justify that intercept of ROE, ROA and PMR for each sector behave randomly because its probability value is greater than the 5% at 5% level of significance. Therefore, the random effect model is the right choice to take better results for each industrial sector of the study.

*Table 5:* Hausman Test over the period of 2007-2016

Hausman Test

| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|---|---|---|---|
| Cross-section random | 0.000000 | 5 | 1.0000 |

*This table describes the Hausman Test of study's specimen over the period 2007-2016.*

## V. Conclusions

This research proves previous finding that oil prices have positive impact on the financial performance of different industries in Thailand, Wattanatorn and Kanchanapoom, 2012). The study also compliments the previous research that oil prices have the significant and positive impact on the financial performance of pharmaceutical companies in Jordan, (Basha, 2014). This study supports the previous research that oil price affects the firm's financial performance positively, (Daddikar and Rajgopal, 2016), and (Lele, 2016). Sample firms included in Large Scale Manufacturing industries of Pakistan as per division of Pakistan Bureau of Statistics. Fixed effect estimator and random effect estimator are applied to each sector for regression analysis while the Hausman Test is performed to know the appropriate method of regression analysis. Random effect model considered appropriate method based on the Hausman test.

First of all the return on asset more significantly affected by variation in the energy prices than other financial indicators such as return on equity and profit margin ratio based on the entire sample of the study. Secondly, the return on equity significantly affected by changes in energy prices as a whole Large Scale Manufacturing sample firms. The profit margin ratio or return on sales is least and significantly affected by changes in energy prices which are considered as aggregate sample.

The energy prices have the huge and significant impact on the financial performance of the cement industry of Pakistan like return on equity, return on asset and return on sales. The electricity variable prices under energy prices have enormous and significant impact on financial performance of sugar sector of Pakistan in terms of return on assets. The exchange rate is considered as control variable playing a vital role in the whole model to control financial indicators such as return on equity, return on asset and return on sales. The exchange rate has a significant relationship with every financial indicator of the study never with every firm.

To summarize the effect of energy prices on the financial performance of different industries in Pakistan that energy prices significantly and immensely effect the financial performance indicators such as return on equity, return on asset and return on the sale of cement sector of Pakistan. However, there is no effect of energy prices on automobile assembling and manufacturing sector, textile sector, and pharmaceutical sector even any single indicator of the energy computation. The second most affected sector of large-scale manufacturing industries of Pakistan is the sugar sector. In the sugar sector, the return on assets significantly affected by the changes in electricity variable prices while return on equity and return on equity is not affected by the changes in energy prices. The exchange rate is playing significant role in the entire model, it affects every financial indicator like return on equity, return on assets and return on sales. The exchange rate controlled the financial performance of cement sector, sugar sector and automobile assembling sector of Pakistan, however there is no serious effect of exchange rate on the financial performance of textile sector and pharmaceutical sector of Pakistan.

Further in conclusive remarks, based on the intercept values in large-scale manufacturing industry that the aggregate coefficient of energy prices have the positive impact on the financial performance of different industries in Pakistan.

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