

# Testing Market Efficiency of Oil, Steel & Power Stocks: Post 2000 Era

Hemalatha Ramasubramanian<sup>1\*</sup>, Madhulika P. Sarkar<sup>2</sup> and Parul Bhatia<sup>3</sup>

<sup>1</sup>Dean, FMG Academy, Greater Noida, Uttar Pradesh, India; hemajayarama@gmail.com

<sup>2</sup>Assistant Professor, SOMS, IGNOU, New Delhi, India; madhuliklal@gmail.com

<sup>3</sup>Assistant Professor, Rawal Institute of Management, Faridabad, Haryana; parul.bhatia84@gmail.com

## Abstract

India's economic growth is closely connected to the demand of energy and other related products. The demand for oil, steel and power sector products is expected to grow providing vast opportunities for investment. The Indian oil and gas industry is expected to be worth US\$ 139,814.7 million by 2015. To meet this demand, the Government of India has adopted various policies, such as allowing 100 per cent foreign direct investment (FDI) in many segments of the sector, such as natural gas, petroleum products, pipelines, and refineries. Steel industry contributes to nearly two per cent of the gross domestic product (GDP) and employs over 5,00,000 people. India is the sixth largest in terms of power generation and the per capita power consumption in the country is 733.54 kilowatt-hours per year (kWh/yr).

Oil, Steel and Power together have got ample opportunities and potential for growth and investment. Thus, Indian and foreign investors show their keen interest in the stock market towards this sector. The present paper strives to find out whether this industry is affected by news announcement in the first decade of 21st century. There may be many fundamentals which may affect stock returns of a company but dividend may be regarded as one of the most awaited news by a shareholder.

The impact of dividend in four event windows (31, 61, 121 and 251 days) has been analyzed in the present study. The cumulative abnormal returns computed with the help of CAPM have been statistically tested by Paired Sample t-test, Wilcoxon Signed Rank test. The study observed a significant impact of dividend announcement on abnormal stock returns of 21 stocks commonly listed at BSE and NSE. The effect was present in all event windows. Therefore, this industry may be said to have discounted the news in its historical stock prices and thus may be regarded as semi-strong efficient.

**Keywords:** CARs, Market Efficiency, Beta, Market Rate of Return, CAPM

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## 1. Introduction

Stock market is the mirror of a country's economy. It reflects each and every event which takes place inside a particular industry or any individual company. There may be different type of events which may affect the growth and performance of stocks listed at the popular stock exchanges. The announcement of information like mergers/acquisitions, bonus issue, rights issue, management change, stock split, earnings, dividend etc. can produce a spontaneous reaction in stock prices. The present study with this belief has tried to investigate the effect of dividend announcements on stock returns of commonly listed companies at Bombay Stock Exchange and National Stock Exchange of India in context to oil, steel and power stocks.

Oil, Steel and Power together have got ample opportunities and potential for growth and investment. Thus, Indian and foreign investors show their keen interest in the stock market towards this sector. The present paper strives to find out whether this industry is affected by news announcement in the first decade of 21<sup>st</sup> century. There may be many fundamentals which may affect stock returns of a company but dividend may be regarded as one of the most awaited news by a shareholder.

The impact of dividend in four event windows (31, 61, 121 and 251 days) has been analyzed in the present study. The rest of the paper has been divided into four main sections. Section 2 discusses the review of literature, section 3 explains the research methodology, section 4 elaborates the findings and statistics and section 5 concludes the paper.

## 2. Review of Literature

There have been various literary studies undertaken to find the impact of dividend announcement on abnormal returns of stocks. However, most of the studies have used event study methodology as a base to understand the effect and cumulative abnormal returns have been obtained to locate statistical evidence. Few studies have been discussed in this section of the paper.

Aharony and Swarky<sup>1</sup> have tested impact of quarterly dividend and earnings announcement on stockholders return by using daily stock prices of 149 firms from CRSP. The study concluded that dividend announcements and earnings announcement convey useful information in the market which is well reflected in stock prices indicating that the NYSE market was a semi-strong market during 1963-1976.

Miller and Scholes<sup>14</sup> have used capital asset pricing model to find out after tax return effects of 178 firms due to dividend yield. Dividend yield has been calculated using regression co-efficient and t-test was applied on the abnormal stock returns calculated using CAPM. The study found that there was no significant difference between returns in after tax dividend yield or long term capital gains.

Elton et al<sup>9</sup> has studied the impact of dividend yields on security returns using zero beta form of CAPM. The study incorporated monthly data on stock prices, dividend yields and returns from 1927-1976 for NYSE securities. 20 portfolios were taken into consideration and their returns were calculated using cross-sectional regression for 40 yearly periods. All the portfolios had significant excess returns in relation to increasing dividend yield except the portfolio of zero dividend yield stocks.

Kane et al<sup>10</sup> have documented joint effect of dividend announcement and earnings announcement with 352 observations from manufacturing business line having 10 days in 1979 and 1981 listed in both university of Chicago tapes and Standard and Poor's quarterly compustat tapes. Abnormal returns were calculated using capital asset pricing model followed by computing regression co-efficient to show statistical significance for corroboration effect between two types of announcements.

Asquith and Mullins<sup>2</sup> have studied the impact of dividend announcement, stock re-purchase and issue of new stock on the stock returns of 88 sample firms using average cumulative abnormal returns and initial dividend yield in the model. It was concluded that dividend announcements benefitted investors at initial level and in the later time period of announcement. Interestingly, the benefit was lesser at initial level as compared to the later period.

Michaely et al.<sup>13</sup> have compared the reactions on stock returns over 887 omissions and 561 initiations of dividend during 1964-1988 using CRSP data files for securities listed at AMEX and NYSE using event study methodology. The study discovered that omissions have a deeper impact on the stock returns than initiations. Though

the omission effect was found to be negative and the initiation effect was found to be positive when analyzed before and after the respective events, it was discovered that omission being considered as a bad news about the stock by the investors results into negative returns on the stock for a longer period as compared to initiation which is considered as a good news.

Lee and Xiao<sup>11</sup> looked into China's stock market for announcement of cash dividends and rights offering vis a vis shareholders concentration in the respective sample firms. The time period in the study ranged from 1996 to 1999 taking Government Bonds as common stocks at the start of stock market in China. It was found in the study with the help of panel data analysis that dividend may be one of the legal ways to arouse investor's interest in a particular stock.

Pani<sup>15</sup> has studied the impact of dividend policy on the stock behavior of 500 Indian companies listed at BSE during 1996-2006. Using data of six different industries and thereafter applying regression and annova to test the effect across various sectors, it was concluded that the aggregate data did not show any significance of independent variables on dependent variables. Dividend retention ratio was observed to have positive impact on stock returns. Hence, it was concluded that all the independent variables did not have significant impact when taken in aggregate data but sector wise they gave positive and significant effect.

Mahmood et al<sup>12</sup> has examined the impact of 100 corporate dividend announcements for Karcahi Stock Exchange from 2005 to 2009. An event study was performed using daily stock prices and index data for 250 days using market model to calculate cumulative abnormal returns. This refined data was tested with the help of student's t-test and the results were found positively significant.

## 3. Research Methodology

The investigation had been started with 76 stocks randomly taken from oil, steel and power sector of the Indian economy. The sample was re-arranged with following conditions:

- Companies commonly listed at Bombay Stock Exchange (BSE) and National Stock Exchange (NSE).
- Companies which have declared dividend at least seven times in a decade.
- Only final dividend taken into consideration leaving interim dividend aside.

21 stocks had been finalized for the study incorporating the above conditions and their historical prices were obtained from the website of National Stock Exchange. The first and foremost requirement of information for solving the present research problem was that of dividend dates on which companies had announced dividends. This data of announcement dates has been taken from the website of money control and only final dividend

have been taken into consideration with an assumption that final dividend incorporates the information of interim dividend for that particular financial year.

Secondary data has been used for the entire research work in the present study. The time period involved in the study has been taken as a decade from 2001-10. The data has been classified into four phases for calculating abnormal stock returns in order to examine the effect of dividends announced by the concerned companies on their stock returns. The year 2001 had to be skipped due to very few dividend announcements in this financial year.

Further, the market index (CNX Nifty) was obtained from 2002-11 for computing market rate of return to be taken as a base to fit the financial model. The interest rates on T-bills issued by Reserve Bank of India were assumed as risk free rates. These were obtained from the website of RBI.

The following hypotheses were framed in the study:

- H1: There is no significant impact of dividend news on the abnormal returns of individual stocks over the decade.
- H2: There is no significant change in the effect produced by dividend news in different time periods.

Event study methodology has been used as a base to meet with the above hypotheses. Following four event windows had been developed to specifically develop background for second hypothesis (Table 1).

CAPM has been used in the present study for finding the expected rate of return  $\{E(r)\}$  on all stocks. It consists of three main components; risk-free rate ( $R_f$ ), market rate of return ( $R_m$ ) and beta values ( $\beta$ ). The step wise calculation of these components along with  $\{E(r)\}$  has been explained below:

### 3.1 Daily Historical Stock Returns

The daily historical returns for 21 companies 2002-10 for 251 days have been calculated with the help of following formula:

$$R_{its} = \frac{Pts - (Pts - 1)}{(Pts - 1)}$$

where,  $R_{its}$  = Historical Daily Stock Return

$Pts$  = Current Closing Stock Price

$(Pts-1)$  = Previous Day Closing Stock Price

**Table 1.** Showing event windows before and after the event

Event Window (in days)	Description
31	(-15) – t – (+15)
61	(-30) – t – (+30)
121	(-60) – t – (+60)
251	(-120) – t – (+120)

### 3.2 Daily Historical Market Returns

The daily historical market returns based on closing index values from 2002-11 (to complete decade study as 2001 had been left out due to few dividend announcements) have been calculated with the help of following formula:

$$R_{itm} = \frac{Ptm - (Ptm - 1)}{(Ptm - 1)}$$

where,  $R_{itm}$  = Historical Daily Market Return

$Ptm$  = Current Closing Index Value

$(Ptm-1)$  = Previous Day Closing Index Value

The simple arithmetic mean per year of the above calculated daily market returns to be treated as market rate of return ( $R_m$ ) were computed with the following formula:

$$R_m = \frac{\sum R_{itm}}{n}$$

where,  $R_m$  = Market Rate of Return

$\sum R_{itm}$  = Sum of Daily Market Returns

$n$  = Number of Traded Days in a Year

## 4. Risk-free Rates

Risk-free rates ( $R_f$ ) have been taken from Handbook of Statistics on Indian Economy published by Reserve Bank of India (RBI) from time to time. The weighted average interest rates on t-bills issued by RBI from 2002-10 have been taken as risk free rate for the respective years.

## 5. Beta Values

Beta is used in CAPM to compute the sensitivity of the stock towards market changes. Therefore, beta has been calculated on yearly basis for all the sample stocks using the following formula:

$$\beta = \frac{CoVar(R_m; R_{its})}{Var(R_m)}$$

where,  $\beta$  = Beta Value of the Particular Stock

$CoVar(R_m; R_{its})$  = Covariance between Historical Market Rate of Return and Historical Stock Return

$Var(R_m)$  = Variance of the Market Rate of Return.

## 6. Expected Returns

The expected returns for individual stocks from 2002-10 have been calculated by applying CAPM as follows:

$$E(r) = R_f + \beta(R_m - R_f).$$

where,  $E(r)$  = Expected Return in the Respective Year

$R_f$  = Risk-free rate taken as Interest Rate on Central Government

Securities issued by RBI in the Respective Year

$\beta$  = Beta on the Particular Stock in the Respective Year

$R_m$  = Market Rate of Return in the Respective Year

The above calculated expected returns have been used as a barometer to find out abnormal returns for all stocks.

## 7. Abnormal and Cumulative Abnormal Returns

The stock returns over and above the expected returns are known as abnormal (extra) stock returns. These abnormal returns have been calculated with the help of following formula:

$$AR_{Rits} = R_{its} - E(r)$$

where,  $AR_{Rits}$  = Abnormal Return on the Specific Stock in the Respective Year

$R_{its}$  = Actual Historical Stock Return on the Specific Stock in the Respective Year

$E(r)$  = Expected Return in the Respective Year

The abnormal returns have been further converted into cumulative abnormal returns with the help of following formula:

$$CAR_{Rits} = \sum AR_{Rits} : 1 - 251$$

where,  $CAR_{Rits}$  = Cumulative Abnormal Returns for the Respective Stocks per Year

$\sum AR_{Rits}$  = Sum of Abnormal Returns

The risk and return analysis had been with the help of mean average and standard deviation. The cumulative abnormal returns have been tested with the help of Paired Sample t-test and Wilcoxon Signed Rank test. The next section elucidates the results.

## 8. Empirical Results

This section may be divided into two parts; risk & return analysis and statistical analysis. The risk and return analysis explains the mean average and standard deviation of individual stocks.

### 8.1 Risk & Return

Risk and return are very appropriately said to be the two sides of the same coin. Return is the reward for plugging funds in an investment for a stipulated period of time. An investor expects to earn something when he buys and holds a particular stock. Dividend is a regular return announced from time to time by companies whenever the corporate runs into profits.

The reactions of stocks due to dividend announcement have been calculated in different brackets; before a day, after a day, before and after a day, after two days, before a day and after two days, after a day and after two days, all the three days (positive/negative).

Aban Offshore and Tata Sponge Iron had positive returns before a day. Reliance Infrastructure was the only stock which had positive returns after a day. Indraprastha Gas, Man Industries, ONGC and Tata Steel had positive returns before and after a day. Gujarat Gas and Jyoti Structure had positive returns after two days. GAIL, Gujarat Industries Power, Kalpataru Power, Maharashtra Seamless, Neyveli Lignite and PSL had positive returns before a day and after two days. Jindal Saw was the only stock which had positive returns after a day and after two days. Alstom Projects, Jindal Steel, Surya Roshni, Tata Power and Usha Martin had positive returns for all the three days. None of the stocks from this sector had negative returns for the three days under observation.

Standard Deviation is a measure to find out the possibility of departing from expected returns. In other words, it is used to evaluate the risk of deviating from the standard returns. The risk content of sample stocks can be discussed as below (Table 2 and Table 3).

**Table 2.** Showing Mean Average Results of Sample Stocks

Name of Stock	-1	1	2
Aban Offshore	0.010	-0.013	-0.006
Alstom Projects	0.002	0.004	0.004
GAIL	0.003	-0.004	0.010
Guj Gas	-0.007	-0.006	0.001
Guj Ind Power	0.009	-0.014	0.009
Indraprastha Gas	0.007	0.001	-0.008
Jindal Saw	-0.011	0.001	0.007
Jindal Steel	0.005	0.000	0.002
Jyoti Structure	-0.005	-0.003	0.009
Kalpataru Power	0.009	-0.005	0.002
Mah Seamless	0.001	-0.001	0.006
Man Industries	0.003	0.004	-0.020
Neyveli Lignite	0.010	-0.006	0.009
ONGC	0.006	0.001	-0.001
PSL	0.002	-0.001	0.009
Reliance Infra	-0.015	0.006	-0.024
Surya Roshni	0.003	0.004	0.007
Tata Power	0.000	0.013	0.000
Tata Sponge Iron	0.024	-0.019	-0.008
Tata Steel	0.009	0.010	-0.005
Usha Martin	0.027	0.016	0.015

**Table 3.** Showing Standard Deviation of Sample Stocks

Stock↓/Year→	2002	2003	2004	2005	2006	2007	2008	2009	2010
Aban Offshore	0.034	0.032	0.024	0.058	0.038	0.029	0.051	0.052	0.028
Alstom Projects	0.036	0.040	0.032	0.026	0.039	0.030	0.042	0.035	0.018
GAIL	0.016	0.031	0.036	0.017	0.024	0.031	0.039	0.024	NA
Guj Gas	NA	0.017	0.021	0.019	0.018	0.053	0.026	0.026	0.037
Guj Ind Power	0.042	NA	0.034	0.020	0.024	0.036	0.037	0.039	0.015
IndraprasthaGas	NA	NA	0.031	0.019	0.025	0.028	0.028	0.022	0.020
Jindal Saw	0.033	0.040	0.030	0.028	0.025	NA	0.040	0.039	0.019
Jindal Steel	0.030	0.031	0.030	0.021	0.031	0.072	0.047	0.062	0.017
Jyoti Structure	0.041	NA	NA	0.035	0.061	0.029	0.045	0.039	0.022
Kalpataru Power	NA	0.039	0.037	0.031	0.051	0.024	0.030	0.032	0.054
Mah Seamless	0.026	0.023	0.026	0.022	0.042	0.033	0.033	0.030	0.014
Man Industries	NA	NA	NA	NA	0.037	0.044	0.039	0.038	0.027
Neyveli Lignite	0.040	0.036	0.033	0.019	NA	0.051	0.044	0.031	0.020
ONGC	0.026	0.027	0.022	0.017	0.030	0.027	0.031	0.025	0.051
PSL	0.031	0.038	0.034	0.043	0.022	0.031	0.036	0.041	0.021
Reliance Infra	0.016	0.023	0.032	0.019	0.024	0.034	0.058	0.043	NA
Surya Roshni	0.030	0.041	0.034	0.037	0.035	0.037	0.042	0.040	0.022
Tata Power	0.018	0.021	0.032	0.020	0.021	0.032	0.038	0.026	0.013
Tata SpongeIron	NA	NA	0.037	0.023	0.035	0.032	0.039	0.031	0.022
Tata Steel	0.023	0.022	0.037	0.018	0.030	0.029	0.047	0.043	0.022
Usha Martin	0.034	0.038	0.031	0.037	0.032	0.061	0.051	0.042	0.019

Gujarat Gas had minimum standard deviation for 4 years, GAIL had for 2 years in the complete decade, other low risk profile stocks were Kalpataru Power, Indraprastha Gas and Tata Power. On the other hand, Kalpataru Power had maximum standard deviation in 2004 and 2010. Jindal Steel had maximum standard deviation for 2 years in the decade and other stocks having higher risk profiles were Gujarat Industries Power, Surya Roshni, Aban Offshore, Jyoti Structure and Reliance Infrastructure.

## 8.2 Statistical Analysis

The hypotheses have been empirically tested with the help of paired sample t-test and wilcoxon signed rank test at 5% level of significance by running the data in SPSS. The results have been elucidated in this segment (Table 4).

H1: There is no significant impact of dividend news on the abnormal returns of individual stocks over the decade.

The alternative hypothesis has been accepted at 5% level of significance. The Indian Oil, Steel and Power industry has been one of the leading sectors of the Indian economy in terms of revenue generation. According to a recent ET 500 list, the top 17 companies of oil and gas, top 32 companies of steel and 12 top companies of power sector had contributed a large portion

in national income of the country (source: <http://business.mapsofindia.com/india-company/top-10-companies.html>). Though, the power sector had been surrounded by scams and issues related to hike in prices in the recent past still the behavior of investors at the stock markets had been found strongly efficient for this sector. It may be because Indian investors do not go for fundamental reasons each and every investment. It was found for this sector that 20 stocks out of 21 in total had significant impact on their abnormal returns before and after dividends were announced at 5% level of significance in either whole decade or at least in 9, 8 or 7 years. Thus, for this industry it can be said that markets are efficient in discounting the dividend information floated in the market from time to time depending upon the dividend policy of the respective companies. Looking at the trading volume of this industry's stocks it may be said that the stocks are volatile and play with the market news especially dividend announcements.

H2: There is no significant change in the effect produced by dividend news in different time periods.

The Table 5 shows the results of Paired Sample t-test in four different event windows for Oil, Steel and Power stocks

The Table 6 shows the results of Wilcoxon Signed Rank test in four different event windows for Oil, Steel and Power stocks

**Table 4.** Showing results of Paired Sample t-test and Wilcoxon Signed Rank test

Stocks	Significant	t-value (Sig.)	Wilcoxon Coefficient (Sig.)
Aban Offshore	2002,2003,2004,2005,2006,2007,2008,2009,2010	15.334 (0.000)	-2.666b (0.008)
Alstom Projects	2002,2003,2004,2005,2006,2007,2008,2009,2010	13.302 (0.000)	-2.666b (0.008)
GAIL	2002,2003,2004,2005,2006,2007,2008,2009	10.355 (0.000)	-2.521b (0.012)
Guj Gas	2003,2004,2005,2006,2007,2008,2009,2010	20.506 (0.000)	-2.521b (0.012)
Guj Ind Power	2002, 2004,2005,2006,2007,2008,2009,2010	14.152 (0.000)	-2.521b (0.012)
IndraprasthaGas	2004,2005,2006,2007,2008,2009,2010	17.975 (0.000)	-2.366b (0.018)
Jindal Saw	2002,2003,2004,2005,2006, 2008,2009,2010	13.480 (0.000)	-2.521b (0.012)
Jindal Steel	2002,2003,2004,2005,2006,2007,2008,2009,2010	18.101 (0.000)	-2.666b (0.008)
Jyoti Structure	2002, 2005,2006,2007,2008,2009,2010	22.487 (0.000)	-2.366b (0.018)
KalpataruPower	2003,2004,2005,2006,2007,2008,2009,2010	13.172 (0.000)	-2.366b (0.018)
Mah Seamless	2002,2003,2004,2005,2006,2007,2008,2009,2010	13.532 (0.000)	-2.666b (0.008)
Man Industries	2006,2007,2008,2009,2010	23.720 (0.000)	-2.023b (0.043)
Neyveli Lignite	2002,2003,2004,2005, 2007,2008,2009,2010	14.494 (0.000)	-2.521b (0.012)
ONGC	2002,2003,2004,2005,2006,2007,2008,2009,2010	8.765 (0.000)	-2.666b (0.008)
PSL	2002,2003,2004,2005,2006,2007,2008,2009,2010	15.059 (0.000)	-2.666b (0.008)
Reliance Infra	2002,2003,2004,2005,2006,2007,2008,2009	15.988 (0.000)	-2.521b (0.012)
Surya Roshni	2002,2003,2004,2005,2006,2007,2008,2009,2010	10.233 (0.000)	-2.666b (0.008)
Tata Power	2002,2003,2004,2005,2006,2007,2008,2009,2010	27.533 (0.000)	-2.666b (0.008)
Tata SpongeIro	2004,2005,2006,2007,2008,2009,2010	21.089 (0.000)	-2.366b (0.018)
Tata Steel	2002,2003,2004,2005,2006,2007,2008,2009,2010	24.986 (0.000)	-2.666b (0.008)
Usha Martin	2002,2003,2004,2005,2006,2007,2008,2009,2010	11.424 (0.000)	-2.666b (0.008)

**Table 5.** Showing results of Paired Sample t-test for Sample Stocks

Stock/Window	31	61	121	251
Aban Offshore	15.443 (0.000)	15.432 (0.000)	15.424 (0.000)	15.334 (0.000)
Alstom Projects	13.101 (0.000)	13.117 (0.000)	13.120 (0.000)	13.302 (0.000)
GAIL	11.084 (0.000)	11.088 (0.000)	11.092 (0.000)	10.355 (0.000)
Guj Gas	20.064 (0.000)	20.077 (0.000)	20.067 (0.000)	20.506 (0.000)
Guj Ind Power	14.236 (0.000)	14.237 (0.000)	14.232 (0.000)	14.152 (0.000)
Indraprastha Gas	18.399 (0.000)	18.392 (0.000)	18.394 (0.000)	17.975 (0.000)
Jindal Saw	13.578 (0.000)	13.577 (0.000)	13.573 (0.000)	13.480 (0.000)
Jindal Steel	18.026 (0.000)	18.012 (0.000)	18.005 (0.000)	18.101 (0.000)
Jyoti Structure	22.258 (0.000)	22.292 (0.000)	22.269 (0.000)	22.487 (0.000)
Kalpataru Power	13.086 (0.000)	13.082 (0.000)	13.071 (0.000)	13.172 (0.000)
Mah Seamless	13.734 (0.000)	13.723 (0.000)	13.724 (0.000)	13.532 (0.000)
Man Industries	22.585 (0.000)	22.703 (0.000)	22.746 (0.000)	23.720 (0.000)
Neyveli Lignite	14.407 (0.000)	14.422 (0.000)	14.428 (0.000)	14.494 (0.000)
ONGC	8.739 (0.000)	8.738 (0.000)	8.740 (0.000)	8.765 (0.000)
PSL	15.271 (0.000)	15.242 (0.000)	15.216 (0.000)	15.059 (0.000)
Reliance Infra	15.217 (0.000)	15.234 (0.000)	15.249 (0.000)	15.988 (0.000)
Surya Roshni	10.310 (0.000)	10.292 (0.000)	10.283 (0.000)	10.233 (0.000)
Tata Power	26.883 (0.000)	26.837 (0.000)	26.796 (0.000)	27.533 (0.000)
Tata Sponge Iron	20.910 (0.000)	20.871 (0.000)	20.883 (0.000)	21.089 (0.000)
Tata Steel	24.490 (0.000)	24.511 (0.000)	24.540 (0.000)	24.986 (0.000)
Usha Martin	11.522 (0.000)	11.520 (0.000)	11.523 (0.000)	11.424 (0.000)

**Table 6.** Showing results of Wilcoxon Signed Rank test for Sample Stocks

Stock/Window	31	61	121	251
Aban Offshore	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)
Alstom Projects	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)
GAIL	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)
Guj Gas	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)
Guj Ind Power	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)
IndraprasthaGas	-2.366 <sup>b</sup> (0.018)	-2.366 <sup>b</sup> (0.018)	-2.366 <sup>b</sup> (0.018)	-2.366 <sup>b</sup> (0.018)
Jindal Saw	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)
Jindal Steel	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)
Jyoti Structure	-2.366 <sup>b</sup> (0.018)	-2.366 <sup>b</sup> (0.018)	-2.366 <sup>b</sup> (0.018)	-2.366 <sup>b</sup> (0.018)
KalpataruPower	-2.366 <sup>b</sup> (0.018)	-2.366 <sup>b</sup> (0.018)	-2.366 <sup>b</sup> (0.018)	-2.366 <sup>b</sup> (0.018)
Mah Seamless	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)
Man Industries	-2.023 <sup>b</sup> (0.043)	-2.023 <sup>b</sup> (0.043)	-2.023 <sup>b</sup> (0.043)	-2.023 <sup>b</sup> (0.043)
Neyveli Lignite	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)
ONGC	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)
PSL	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)
Reliance Infra	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)	-2.521 <sup>b</sup> (0.012)
Surya Roshni	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)
Tata Power	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)
Tata Sponge Iro	-2.366 <sup>b</sup> (0.018)	-2.366 <sup>b</sup> (0.018)	-2.366 <sup>b</sup> (0.018)	-2.366 <sup>b</sup> (0.018)
Tata Steel	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)
Usha Martin	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)	-2.666 <sup>b</sup> (0.008)

Table 5 and 6 above depict the statistics obtained for stocks with the help of Paired Sample t-test and Wilcoxon Signed Rank test. The results confirm a significant effect of dividend announcement on abnormal returns of stocks taken in this sector for study. Thus, it may be said that alternative hypothesis stands accepted in this case as well. The stocks may be said to have varied reactions in different time periods under consideration.

## 9. Conclusion

Oil, steel and power industry of the Indian economy may be said to have a strong impact due to dividend information. The stock returns have been found to be influenced by this fundamental event in different span of time both before and after the news was made public. The empirical results support alternative hypotheses for announcement effect annually for all sample stocks. Moreover, the effect has been found to produce multiple reactions in four different time periods. Therefore, it may be concluded for this sector that dividend information significantly affects its stock returns. Hence, in the post 2000 era markets for this sector have been found to be semi-strong efficient.

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