

Impact of Crude Oil Prices on the Profitability and Performance of National Oil Companies in India

ABSTRACT

DISSERTATION

SUBMITTED TO

**BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY
(A CENTRAL UNIVERSITY)
LUCKNOW**



FOR THE AWARD OF DEGREE OF

Master of Philosophy
IN
ECONOMICS

Under the Supervision of
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Enrolment No: -1489/19

Year 2020

Introduction

1.1 Introduction of the study

Crude oil plays a dominant role in the transport and industrial sector of an economy which contributes in the overall development of a nation. Apart from the major oil and gas companies which deal in crude oil and its by-products there are number of other industries like automobiles, FMCGs, aviation, cement, pharmaceuticals etc. which also use oil or its by- products. Any upsurge or down trend in the oil prices have bearings on the working of these industries that directly or indirectly affects the macroeconomic variables like GDP, inflation, exchange rates, BOP as well as the financial performance of these companies.

India is the world's 7th largest economy and is the fastest growing developing economy. As is evident from the nature of the country and its growth, the demand is continuously increasing for oil products. Though India produces some oil domestically also at the various fields and production has somewhat slightly increased also but the quantity produced inside the country is not sufficient to meet up the growing demand. So as to bridge this gap between production and consumption, imports are used. As the population is increasing and country has set itself to develop, to keep the vehicles of growth running, crude oil imports are on hike year by year. According to Petroleum Planning and Analysis Cell (PPAC), India spent USD 111.9 billion on oil imports in 2018-19 as compared to USD 87.8 billion in the previous fiscal year, an increase of 27%. In percentage terms India's imports are 82% and the government has planned to bring it back to 67% by 2022.

Crude oil is a mixture of hydrocarbons and it is formed from the remains of marine plants and animals which got buried deeper and deeper beneath the water millions of years ago. The remains of these plants and animals were then covered by rocks, sand and silt and by the heat and pressure produced from these layers the remains were then converted into rocks which contains crude oil. For getting crude oil, drilling is performed through these layers to reach the rocky formation which contains oil and after drilling the oil is extracted. Later on, it goes to refineries for further processing where different types of oil or what are known as the by-products of crude oil are

produced and separated. There are various types of petroleum products like- gasoline, jet fuels, diesel, lubricants, waxes, kerosene, liquified natural gas etc.

Crude oil mainly comes in the form of different types of **benchmarks** also called as **marker crude** which serves as reference price for the buyers and the sellers, these are based on the geographical locations in which the oil is produced. Benchmarks are used because crude oil comes in different types of varieties(light/heavy). The world crude oil prices depend on **API** i.e. American Petroleum Institute Gravity which measures how light or heavy crude oil is when compared with water. If an API value is more than 10 then oil is light and it floats on water which shows that oil has low sulphur content and is of sweet grade whereas an API value of less than 10 shows that oil is heavy and it gets sink into the water which indicates higher sulphur content and is referred to as sour.

There are three main benchmarks. They are as follows:

1- West Texas Intermediate (WTI), U.S.

It is the most famous benchmark because its API gravity is greater than 10 i.e. it is light weighted and is sweet which means low sulphur content and because of its supreme quality it is usually sold at a premium than other benchmarks.

2- Brent Blend, Europe

Brent crude is used mainly in Europe and is extracted from the North Sea near Norway and the United Kingdom. It basically contains oil from 15 different oil fields. It is a bit heavier and sour than WTI but it is also of premium quality.

3- Dubai Crude, UAE

Dubai crude oil is heavy and sour. It is produced in Dubai and is also known as Fateh.

Other benchmarks include OPEC Reference Basket which is used by OPEC, Tapis Crude used in Singapore, Bonny Light used by Nigeria, Urals oil used in Russia and Isthmus by Mexico.

1.1.1 Indian Crude Oil Basket

In the context of oil prices in India, Indian crude basket is a composite mixture of Dubai and Oman(sour) and Brent Crude(sweet) crude oil prices. For the year 2017-18 the ratio of Dubai: Brent was 74.77:25.23 and for the year **2018-19, the ratio is 75.50:24.50** and is updated by PPAC.

According to US Energy Information Administration, after USA and China, India is the 3rd largest crude oil consumer in the world and is expected to surpass China. India's production of crude oil for December 2019 was 2650.81 TMT which was 10.85% lower than the targeted and 7.39% lower than December-18 and its consumption was 213216 MT in 2018-19 which is higher than 206166 MT in 2017-18 and hence country's import dependency also increased from 77% in 2014-15 to 84.5% in the last quarter of 2018-19. India's imports increased from 1,89,061 MT in 2017-18 to 1,98,750 MT in 2018-19. Within the view of this increase in oil demand the number of retail outlets have also increased to 64624 in 2019 from 18848 in 2002.

India imported crude mainly from Saudi Arabia till 2016-17 which is the major supplier member of crude in OPEC but now from 2017-18 Iraq has overtaken Saudi Arabia. This has happened mainly because Saudi Arabia has reduced production while Iraq maintained increased supply of crude at higher discounts.

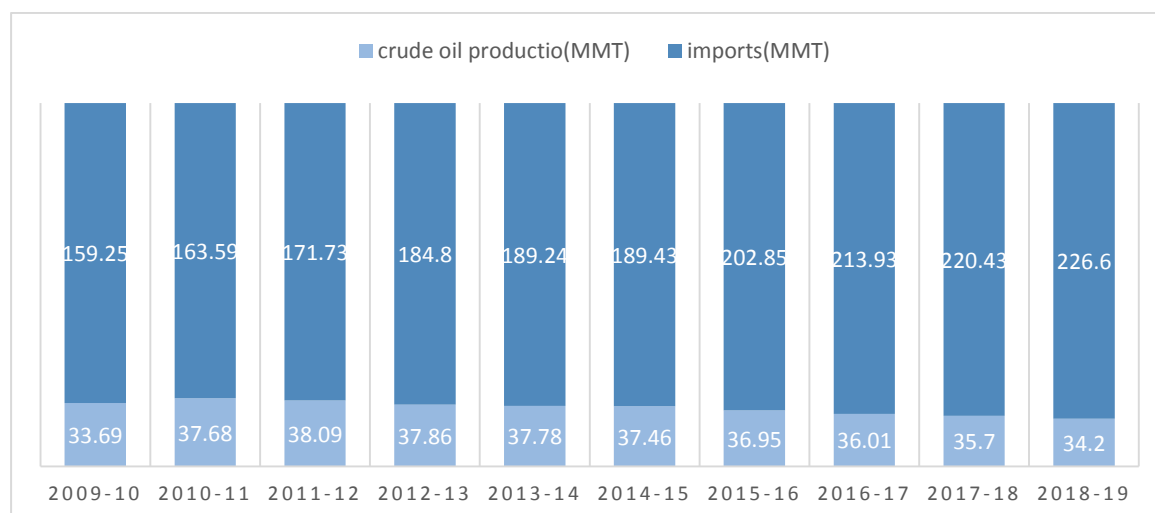
1.1.2 Crude Oil Production, Consumption and Imports of India

Below are the two charts- one depicting the combination of domestic oil production with imports while other chart is showing the consumption pattern of petroleum products in India for 10 years period. From the figure, it can be clearly seen that the production of oil in the country in the initial years has increased, then further it has remained more or less same and in the later years has decreased slightly. Imports are ever increasing throughout the period from 159.35 MMT in 2009-10 to 226.6 MMT in 2018-19.

One of the main reasons for increasing imports is the increasing consumption demand of petroleum products in the country. India's consumption of petroleum products over

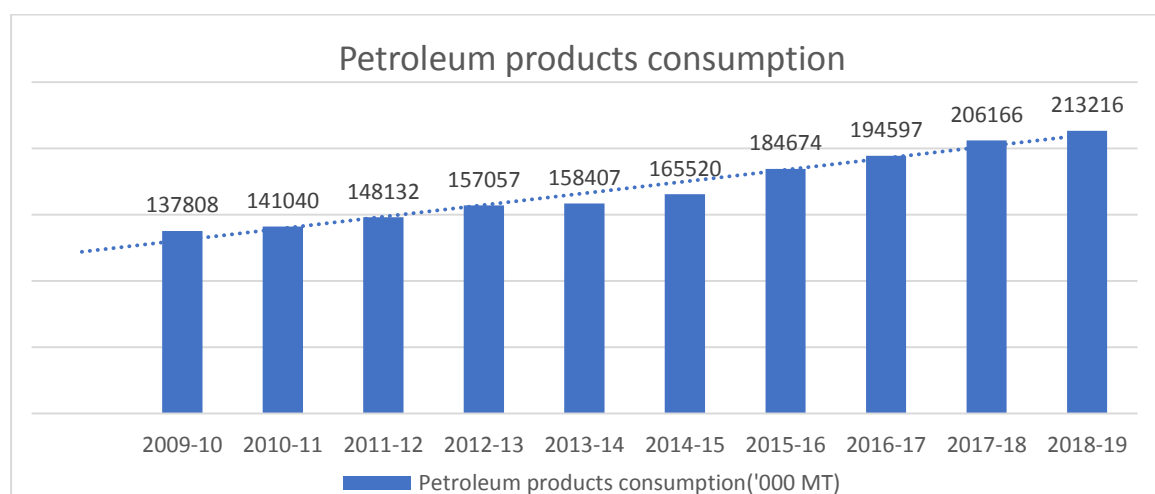
a period of 10 years as is seen from the figure, is continuously increasing and it is expected to rise further in the near future.

Figure 1.1 Production and Import of Crude Oil in India



Source: Indian P&G Statistics

Figure 1.2 Petroleum Products Consumption in India



Source: Indian P&G Statistics

1.1.3 The Oil and Gas Industry

The oil and gas industry are basically divided into 3 categories i.e. upstream oil companies, mid-stream oil companies and downstream oil companies.

Upstream sector- are those which are engaged in oil exploration and extraction or production of oil and gas on ground or underwater which is also referred to as offshore and onshore production.

Mid-stream sector- it serves as connecting link between upstream and downstream sector. They mainly perform the task of marketing and transporting crude oil found at the upstream to downstream sector for further processing.

Downstream sector-this sector involves refining crude oil or natural gas obtained in the upstream sector. It is the downstream sector which sells and markets crude oil to the retail sector to be usable for the general public.

Talking about the **oil industry in India** the first oil deposits were discovered in 1889 near Digboi in Assam.

India has a total of **23 refineries** in which **18 are public sector** oil refineries **3 in private sector** and **2 in joint venture** refineries. In terms of refining capacity India has been ranked as the 2nd largest refiner after China in Asia and 4th largest refiner in the world. Its refining capacity has increased to 249 metric million tonnes per annum (MMTPA) in 2019-20 from 247.566 MMTPA in March 2018 in which 57% share is held by public refineries, 35.3% share by private and 7.7% by joint ventures. The top three refiners in India are Indian Oil Corporation, Bharat Petroleum Corporation and Reliance Industries.

Here is a list of all the 23 refineries in India.

Table 1.1 List of Oil Refineries in India

S.no.	Refinery Location	Company
1	Barauni, Bihar	Indian Oil Corporation Ltd.
2	Bongaigaon, Assam	Indian Oil Corporation Ltd.
3	Guwahati, Assam	Indian Oil Corporation Ltd.
4	Paradip, Odisha	Indian Oil Corporation Ltd.
5	Haldia, W.B.	Indian Oil Corporation Ltd.
6	Kovali, Gujarat	Indian Oil Corporation Ltd.
7	Mathura, U.P.	Indian Oil Corporation Ltd.
8	Panipat, Haryana	Indian Oil Corporation Ltd.
9	Digboi, Assam	Indian Oil Corporation Ltd.
10	Mumbai, Maharashtra	Bharat Petroleum Corporation Ltd.

11	Kochi, Kerala	Bharat Petroleum Corporation Ltd.
12	Mumbai, Maharashtra	Hindustan Petroleum Corporation Ltd.
13	Visakhapatnam, A.P.	Hindustan Petroleum Corporation Ltd.
14	Numaligarh, Assam	Numaligarh Refinery Ltd.
15	Tatipaka, A.P.	ONGC
16	Mangalore, Karnataka	MRPL
17	Manali, Tamil Nadu	Chennai Petroleum Corporation Ltd.
18	Nagapattinam	Chennai Petroleum Corporation Ltd.
19	Vadinagar, Gujarat (Private)	Essar Oil Ltd.
20	DTA- Jamnagar (Private)	Reliance Industries Ltd.
21	SEZ, Jamnagar, Gujarat (Private)	Reliance Industries Ltd.
22	Bathinda, Punjab (JV)	HPCL Mittal Energy Ltd.
23	Bina, M.P. (JV)	Bharat Oman Refinery Ltd.

India produces crude oil both **onshore** and **offshore**. The onshore oil fields are located at Assam, Andhra Pradesh, Rajasthan, Gujarat, Tripura, and Tamil Nadu and are operated by Oil and Natural Gas Corporation (ONGC). The onshore fields of Assam, Arunachal Pradesh and Rajasthan are operated by Oil India Limited (OIL). Offshore oil field was discovered in 1974 and is in Bombay High now Mumbai High in the Arabian sea which 160 km west to Mumbai. The offshore oil field has two blocks namely Mumbai High North and Mumbai High South. It is operated by the Oil and Natural Gas Corporation (ONGC). One foreign venture of ONGC named as ONGC Videsh is also operating across 17 countries for exploration, development and production of oil and gas outside India.

At the end of March 2019, India's

- Estimated crude oil reserves were- 618.95 million tonnes.
- Estimated natural gas reserves were- 1380.63 billion cubic metres.
- Estimated coal reserves were- 326.40 billion tonnes.

1.1.4 Relationship between Oil Prices and Economy

It is generally believed that oil prices affect the economic activity of a country because oil as an input is used in industries for producing various goods and services. So, any changes in the prices of oil can have an impact on the production process of an economy. Increasing oil prices hampers the production process and supply of goods that are produced from petroleum products by increasing their prices which ultimately reduces the purchasing power of the consumers and all these things affects the working of a country specially, when it happens to be an importing country because a large portion of foreign exchange reserves are spend for importing oil. In the context of India, the interaction between crude oil prices, economy and oil and gas industry will be shown in the forthcoming chapters.

1.3 Research Problem

Crude oil prices constitute a major part among the many other commodities which can impact the health of the economy. India being an oil deficient country the demand for crude is continuously rising, making us the world's 3rd largest consumer of oil with almost 80% dependence on imported oil. Increased imports along with rising oil prices have posed several problems for the economy in the form of increased inflation, current account deficit, hampering efficient working of industries etc. Moreover, if a proper study is performed it will provide us with better evidences about the working & earning capacity of the firms in oil and gas industry. There is thus an urgent need to understand the relationship of crude oil prices with various macroeconomic variables and the working efficiency of our oil and gas industry so as to take corrective actions in time in order to combat the negative effects posed by the former.

1.4 Objectives

- To study the impact of changes in oil prices on India's economy (GDP and inflation rate). and
- To assess the profitability performance of selected oil and gas PSUs of India during 2006-07 to 2018-19.
- To analyse how oil and gas PSUs are getting affected in terms of their profitability by the changes in the crude oil prices.

1.5 Hypotheses

- **H₀₁:** There is no significant effect of crude oil prices on India's GDP
- **H₀₂:** There is no significant effect of crude oil prices on India's inflation rate.
- **H₀₃:** There is no significant effect of crude oil prices on the profitability performance of selected oil and gas PSUs.
- **H₀₄:** There is no negative impact of crisis on the profitability performance of selected oil and gas PSUs.
- **H₀₅:** There is no negative impact of slump on the profitability performance of selected oil and gas PSUs.

1.6 Research Gap

As oil is an important source which affects the economy and its growth. Specially in an oil deficient country like India a change in oil price will definitely affect the future prospects of the country because when oil price increases it not only leads to higher trade deficits due to increase in import prices rather its effects are multidimensional which affects inflation rate, reduced purchasing power of people more expenditure and low savings etc. Hence it is necessary to know the effects of oil prices on the economy and how India's growth will be affected and what should be done to keep the economy in balance. Another aspect of the study are the firms that are dealing in oil products how they are affected what problems they are facing by this change in oil prices in terms of their profitability. The present study focuses on the impact of crude oil prices in the context of Indian economy and on the profitability performance of oil and gas PSUs of India. Sufficient literature has been found regarding the impact of oil prices on Indian economy. But not much work has been devoted to the relationship between oil and gas companies in India and on their profitability with crude oil prices. The studies are either on international oil companies of exporting and importing nations or any study found in context of India's oil and gas companies' performance has not covered the effects of oil prices on the profitability of these companies. Hence, the present study tends to bridge this gap in the existing studies and the present study.

1.7 Methodology

The present study is quantitative in nature and is based entirely on the secondary data. The study focuses on analysing the relationship between crude oil prices, India's economy and profitability performance of national oil and gas companies.

Time period taken for the study

For analysing the effects of oil prices on India's GDP and inflation rate (CPI) a time series study has been performed covering 10 years period from 2009-10 to 2018-19. Later, the relationship between oil prices and the performance of national oil and gas companies has been seen. Now there arises a question on what basis we have selected 10 PSUs and which sampling technique has been used? Actually, there are total ten PSUs in India and we have selected them all to check the overall performance of all the oil and gas PSUs in the country. As there are only ten PSUs for which we did not feel to use any sampling technique because our sample population is not much bigger. That is the reason we have not used any particular sampling technique to make inferences. This panel data will cover a period of 13 years from 2006-07 to 2018-19. A panel data is a combination of both cross-section data and time series data. In this firstly we will assess how oil and gas PSUs have performed in terms of their profitability by calculating the average annual growth rate of profitability ratios. Then we will analyse how the prices of crude oil will affect the profitability performance of oil and gas companies in India

Variables used

Time series quarterly data has been taken for all the three variables: GDP (at constant prices base year 2011-12), inflation rate and oil prices for forty quarters starting from 2009q1 to 2018q4 . The following financial ratios: Net Profit Margin, Return on Equity (ROE) and Return on Assets (ROA) are used for analysing the profitability of the companies and are calculated in percentages annually. Further, two dummy variables namely CRISIS and SLUMP have been used to show the effects of CRISIS during 2008 and effects of SLUMP- drastic fall in the crude prices during 2015.

Dependent variables- GDP, inflation rate, net profit margin, ROE, ROA.

Independent variables- crude oil prices, dummy CRISIS and dummy SLUMP.

Data analysis and tools used in the study

Data analysis is done using STATA and Excel. Tools used in the study are average annual growth rate, descriptive statistics, correlation and regression model.

secondary data sources

The study is entirely based on secondary data sources that includes data from- government reports, press information bureau (PIB), financial annual accounts published by oil companies, RBI data, data from PPAC, Indian P&G Statistics, Labour Bureau and MOSPI etc.

1.8 Plan of Work

Chapter 1- Introduction and literature review.

This chapter includes a brief description of India's economy its crude oil production, consumption, trade and previously done work related to the study.

Chapter 2-Conceptual and Theoretical Framework

This chapter deals with concepts, theories, definitions and terminology related with the study to gain better and more familiarity or understanding with the background of the study and related concepts.

Chapter 3- Impact of Crude Oil Prices on India's GDP and Inflation

Third chapter deals with the impact of crude oil prices on India's GDP and inflation rate for the last ten years over forty quarters starting from 2009q1 to 2018q4.

Chapter4- Impact of Crude Oil Prices on the Profitability Performance of Selected Oil and Gas PSUs of India

In the fourth chapter firstly, the performance of oil and gas PSUs of India has been analysed by calculating the growth rate and in the next part of the chapter effects of

crude oil prices on the profitability performance by using profitability ratios has been performed.

Chapter 5- Conclusions, Findings and Recommendations

In the last chapter major findings of the study along with its implications, limitations and suggestions has been provided.

1.9 Findings of the study-

Apart from chapter 1 and 2 which included introduction, literature review, conceptual and theoretical framework the analysis part has been performed in 3rd and the 4th chapters.

In third chapter, our research problem was related with how crude oil prices are affecting India's economy. For this, three variables namely crude oil prices, GDP at constant prices (2011-12) and inflation rate (CPI) have been taken and all the data has been collected quarterly for 10 years i.e. from 2009-10 to 2018-19. For analysing the relationship between the dependent and independent variables regression model has been used. The results from regression analysis found that there is a negative relationship between crude oil prices and GDP i.e. if crude oil price increases GDP will come down this means that oil prices were adversely affecting the GDP of India for the period concerned. It was seen that if there is a unit increase in crude oil prices GDP value deteriorates by 0.40% and the results were also significant at 0.01% level of significance.

Next relationship was between crude oil prices and inflation rate. The relationship between crude oil prices and inflation rate for the 10 years period found to be positive. Positive relationship implies that when crude oil price increases inflation rate also increases. Regression results showed that if there is a unit increase in crude oil prices inflation rate will increase by 1.16%. These results were also significant at 0.01% level of significance.

Fourth chapter dealt with how oil and gas PSUs have performed over the years in terms of their profitability by calculating CAGR of profitability ratios. Then the relationship between crude oil prices and the profitability performance of oil and gas

companies in India will seen. The study will cover the period of 13 years from 2006-07 to 2018-19. For analysing the profitability of oil and gas companies 10 public sector undertakings of oil and gas industry have been selected. The following financial ratios Net Profit Margin, Return on Equity (ROE) and Return on Assets (ROA) are used for analysing the profitability of the companies. Two dummy variables namely CRISIS and SLUMP have been used to show the effects of CRISIS during 2008 and effects of SLUMP- drastic fall in the crude prices during 2015.

Following table shows the results of performance evaluation of oil and gas PSUs-

Table 1.2: results of performance evaluation

Performance	Net profit margin	ROE	ROA
Best	Balmer Lawrie (CAGR: 5.51)	HPCL (CAGR: 2.23)	Numaligarh refinery (CAGR:3.54)
Poor	GAIL (CAGR: -5.15)	OIL India (CAGR: -7.88)	Oil India (CAGR: -9.59)

Regression model for the first relationship between crude oil prices and profitability has shown that profitability of the national oil and gas PSUs was negatively with the crude oil prices. The regression coefficients for net profit margin, ROE and ROA were -.0125069, -.0062547, -.0080427 respectively which indicates that if there is a unit increase in crude oil prices, net profit margin, ROE and ROA of the companies will decrease by 1.25%, .62% and .80% keeping other variables constant. For this relationship p-value < 0.05.

Second relationship between dummy CRISIS and profitability is also found to be negative. The regression coefficient of dummy CRISIS with net profit margin, ROE and ROA are -.2409697, -.1638572 and -.188873 which means that if there is a unit increase in crude oil prices, net profit margin, ROE and ROA of the companies will decrease by 24%, 16% and 18% respectively keeping other variables constant. P-value was not significant.

Third relationship between dummy SLUMP and profitability is also found to be negative. The regression coefficient dummy SLUMP with net profit margin is -.2615458 with ROE is -.2635089 and with ROA is -.2666674 which means that if

there is a unit increase in crude oil prices, net profit margin, ROE and ROA of the companies will decrease by 24%, 26% and 26% respectively keeping other variables constant. P-value was not significant.

To sum up, overall, the results have showed that the effects of crude oil prices on India's economy as well as on the oil and gas PSUs of India is not good. Both the dependent variables GDP and profitability are getting adversely affected with the increase in crude oil prices while the other dependent variable inflation rate is positively related with crude oil prices which is also not a good indicator for the economy. Significant results for both the dummy variables namely crisis and slump have not been found which may be because of the fact that India is not much affected by these two events

1.10 Limitations of the study

1. Number of years in the time series analysis are less.
2. The effects of crude oil prices are only seen on two variables GDP and inflation, other major macroeconomic variables have not been taken into consideration
3. Only selected PSUs are taken into account and the analyses has not been extended to other sectors that may also be affected majorly by the changes in prices of crude oil.
4. Results relationship between profitability CRISIS and SLUMP are not significant.

1.11 Recommendations

1. There is an urgent need to look after the usage of crude oil as the demand is on continuous rise. Rising oil prices along with the increasing demand can upset the economy. Consumption of oil can be reduced by capping up the number of LPG connections per household, promoting public transportation etc.
2. Government should come up with the more use of renewable sources of energy like solar and wind energy to provide as a substitute for crude oil. This will not only help in combating the ill effects posed by the usage of crude oil on environment but also helps in reducing the import burden which will ultimately reduce the current account deficit of the government.

3. Domestic production should be increased by attracting new investments etc. and processing of crude oil should be done through new and better exploration and refining techniques so as to reduce the cost of exploration and refining and ultimately the oil dependence.
4. As we have seen that profitability of oil and gas companies is hampered by the changes in crude oil prices these companies should work out on minimising their cost by reducing errors in design or manufacturing errors etc. Moreover, better utilisation of assets and inventories should be done.

1.12 Policy Implications of the Research Findings

1. As the results have shown the negative relationship between crude oil prices and the profitability of the selected PSUs, these research findings are useful to the investors, policy makers and the management of the oil and companies for assessing the performance of the companies and its future prospects.
2. Although only two macroeconomic variables (GDP and CPI) have been taken for the study but the results found are significant with respect to the effects of oil prices on the Indian economy. The results have shown the negative impact of oil prices on the economy. This is helpful for the government to take remedial measures on time so as to minimise the undesirable bearings on the economy.
3. Further, more vast and interesting research work can be performed in the future by adding other important variables.

1.13 Conclusion

To sum in the end the study concludes that crude oil plays a dominant role in the industrial and transport sector of any economy. India being a fastest growing developing economy is dependent on imported crude oil. It pays heavily for the imported oil also the consumption of petroleum products in the country has increased which has placed a heavy burden on the government to pay more. In the event of rising oil prices as seen in the study, our economy as well as the oil and gas industry both have suffered. GDP and profitability of the oil and gas PSUs of India have reacted negatively with the crude oil prices and further inflation rate has also increased with the increase in crude oil prices. So, overall, it can be said that crude oil prices affect our economy and remedial measures to reduce the dependence and the consumption of imported oil should be reduced.