UPES Centre for Continuing Education

# OIL AND GAS ECONOMIC ANALYSIS


**BY**

KANJARIYA JAGDISH RANAMAL (500059516)

**GUIDED BY**

LALIT KUMAR (ASSISTANT MANAGER- IMC LIMITED)


**A DISSERTATION REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR**

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Signature:

Name: Kanjariya Jagdish Ranamal

Mobile Number: +91-9427943363

Email: kanjariyajagdish4@gmail.com

Date: 12/11/2019

Place: Pipavav

IMC LIMITED
Near IOC Foreshore Terminals, Opp. Shirva Railway Crossing, New Kandla - 370 210, India.
Tel : 271221, 271223 Fax : 91-2836-271222 E-mail : imckdl@imc.net.in URL : www.imc.net.in

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This is to certify that the Mr. Jagdish Ranamal Kanjariya, a student of MBA in Oil & Gas, SAP ID 500059516 of UPES has successfully completed this dissertation report on "Oil and Gas Economic Analysis" under my supervision.

Further, I certify that the work is based on the investigation made, data collected and analyzed by him and it has not been submitted in any other University or Institution for award of any degree. In my opinion it is fully adequate, in scope and utility, as a dissertation towards partial fulfillment for the award of degree of MBA in Oil & Gas.

Signature:

Name & Designation: Lilit Kumar (Assistant Manager)

Mobile: +919634866844

E-mail: lalitchauhan05@gmail.com

Date: 12/11/2019

Place: Pipavav, Gujarat

IMC LIMITED

Near IOC Foreshore Terminals, Opp. Shirva Railway Crossing, New Kandla - 370 210, India.
Tel : 271221, 271223 Fax : 91-2836-271222 E-mail : imckdl@imc.net.in URL : www.imc.net.in

Name: Lalitkumar Chuhan

Designation: Assistant Manager

Contact No: 9634866844

Company Name: IMC Limited, Pipavav

Pipavav Main Road, 365560

**Subject:-**Willingness for Guiding Dissertation of **Jagdish Ranamal Kanjariya** Registration No. **500059516**

Dear Sir,

Jagdish Ranamal Kanjariya is registered for MBA in Oil & Gas, with the University Of Petroleum & Energy Studies, Dehradun in **April-2017 batch**.

I hereby give my acceptance to guide the above student through the Dissertation work 'Oil and Gas Economic Analysis', which is a mandatory requirement for the award of EMBA degree.

Thanking You

Yours Sincerely

# DECLARATION

IMC LIMITED
Near IOC Foreshore Terminals, Opp. Shirva Railway Crossing, New Kandla - 370 210, India.
Tel : 271221, 271223 Fax : 91-2836-271222 E-mail : imckdl@imc.net.in URL : www.imc.net.in

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Signature:

Name & Designation: Lilit Kumar (Assistant Manager)

Mobile: +919634866844

E-mail: lalitchauhan05@gmail.com

Date: 12/11/2019

Place: Pipavav, Gujarat

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# EXECUTIVE SUMMARY/ABSTRACT

The offshore oil and natural gas industry is instrumental to the United States both from an energy supply perspective and due to its contribution to U.S. GDP and job creation. In 2010, over 30 percent of the oil and 11 percent of the natural gas produced in the United States was produced in the Gulf of Mexico (GoM). This production is crucial to
U.S. energy security. In addition, capital investment and purchases of intermediate inputs of the oil and natural gas industry stimulate its entire value chain and ripple through many sectors of the economy, creating jobs, contributing to GDP and generating tax revenue at all levels of government. Oil and natural gas industry activity supports employment across a wide swath of industries in manufacturing and services, including oil and natural gas machinery, air and marine transport, legal and insurance services.

This report builds out the entire value chain of oil and natural gas development and production in the Gulf of Mexico. It quantifies the capital investment and purchases of intermediate goods undertaken by the oil and natural gas industry, identifies linkages to supplying industries, and estimates both job creation and contribution to GDP associated with oil and natural gas development. A unique feature and strength of this study is the primary nature of the capital investment and spending data.

This paper reviews the utilization of Oil and gas, as an emerging trend, in the upstream and downstream oil and gas industry. Big Data or Oil and gas refers to a new technology which can

be employed to handle large datasets which include six main characteristics of volume, variety, velocity, veracity, value, and com- plexity. With the recent advent of data recording sensors in exploration, drilling, and production operations, oil and gas industry has become a massive data intensive industry. Analyzing seismic and micro-seismic data, improving reservoir characterization and simulation, reducing drilling time and increasing drilling safety, optimization of the performance of production pumps, improved petrochemical asset management, improved shipping and transportation, and improved occupational safety are among some of the applications of Big Data in oil and gas industry. Although the oil and gas industry has become more interested in utilizing Oil and gas recently, but, there are still challenges mainly due to lack of business support and awareness about the Big Data within the industry. Furthermore, quality of the data and understanding the complexity of the problem are also among the challenging parameters facing the application of Big Data.

# CHEPTER 1: INTRODUCTION

The oil and gas sector is among the eight core industries in India and plays a major role in influencing decision making for all the other important sections of the economy. India's economic growth is closely related to energy demand; therefore the need for oil and gas is projected to grow more, thereby making the sector quite conducive for investment. The Government of India has adopted several policies to fulfil the increasing demand. The government has allowed 100 per cent Foreign Direct Investment (FDI) in many segments of the sector, including natural gas, petroleum products, and refineries, among others. Today, it attracts both domestic and foreign investment, as attested by the presence of Reliance Industries Ltd (RIL) and Cairn India.

## 1.1 Market Size

India is expected to be one of the largest contributors to non-OECD petroleum consumption growth globally. Oil imports rose sharply to US$ 87.37 billion in 2017-18 from US$ 70.72 billion in 2016-17. India retained its spot as the third largest consumer of oil in the world in 2017 with consumption of 4.69 mbpd of oil in 2017, compared to 4.56 mbpd in 2016.

India was the fourth-largest Liquefied Natural Gas (LNG) importer in 2017 after Japan, South Korea and China. LNG imports increased to 26.11 bcm in 2017-18 from 24.48 bcm in 2016-17. Gas pipeline infrastructure in the country stood at 16,226 km at the beginning of February 2019. Analysis of the impact of high oil prices on the global economy" by Economic Analysis Division, International Energy Agency reports in "Energy Prices and Taxes", 2nd Quarter 2004, wherein it has shown that the vulnerability of oil importing countries to higher oil prices varies markedly

depending on the degree to which they are net importers and oil intensity of their economies. According to the results of a quantitative exercise carried out by the IEA in collaboration with the OECD Economics Department and with the assistance of the International Monetary Fund Research Department, a sustained for10 per barrel increase in oil price from $25 to $35 would result in the OECD as a whole losing 0.4% of GDP in the first and second years of higher prices. Inflation would rise by half a percentage point and unemployment would also increase.

Production of oil and natural gas from the offshore Gulf of Mexico ("GoM") provides a significant share of total U.S. oil and natural gas production. Approximately 1.6 million barrels per day of crude oil or 30 percent of 2010 domestic oil production, and 6.7 billion cubic feet per day of U.S. natural gas production (11 percent) originated from the GoM[7]. The development of these resources provides positive economic impacts to our nation's economy in terms of employment, GDP and tax revenues. It is also crucial to U.S. energy security.

Quest Offshore Resources, Inc. (Quest) was commissioned by the American Petroleum Institute (API) and the National Ocean Industries Association (NOIA) to provide an evaluation of the impacts of offshore GoM oil and natural gas development. Quest is a full-service market research and consulting firm focused on the global deepwater oil and natural gas industry. Much of the analysis in this report relies on information that Quest has received directly from companies operating in the GoM. This report assesses the total economic impacts of GoM development (both shallow and deepwater) on the U.S. economy as a whole as well as estimates of economic contributions to individual states.

## 1.2 STATEMENT OF PROBLEM

Oil and gas investing does not appear to be going anywhere. Despite the risks, there is still a very real demand for energy, and oil and gas fills part of that demand. Investors can still find rewards in oil and gas, but it helps to know the potential risks that go along with those potential rewards.

## 1.3 NEED FOR THE RESEARCH

Oil and gas investors look for specific economic indicators to help them understand future movements in the petroleum industry. Like any commodity market, oil and gas companies, and petroleum futures are sensitive to inventory levels, production, global demand, interest rate policies, and aggregate economic figures such as gross domestic product. Apart from drafting oil and gas contracts, another major area of work for Company Secretary is oil and gas projects which require some special knowledge and skills. These Company Secretaries have to handle oil and gas transactions from upstream to downstream, including pipelines, liquefied natural gas (LNG), distribution networks, trading and petrochemicals.

The oil and gas sector of India is one such sector which requires an overhaul. Most of the producing fields in the country have matured and oil production has more or less been stagnant in the last few years. This has led to India's demand being met by imports, which has impacted the state's finances and the nation's energy security, not to mention the unsustainable nature of energy consumption. Further, due to a techno-institutional 'carbon lock-in' of the global economy.

## 1.4 OBJECTIVES OF STUDY

- On-time performance and allocation of risk for unknown matters (usually bitterly negotiated)
- Risk allocation
- Defining the rights and obligations of parties to ongoing contractual matters (such as joint ventures)
- identifying special rights that may arise in certain circumstances (such as a failure to make capital contributions or achieving earn-in)
- Matters that require precise definition (such as the acceptable deductions in a net profits interest calculation)

Quest Offshore Resources, Inc. is a full- service market research and consulting firm focused on the global deep water oil and natural gas industry. As a function of Quest's core business, the company is daily engaged in the collection and analysis of data as it relates to the offshore oil and natural gas industry. Quest serves the global community of operating oil and natural gas companies, their suppliers, financial firms, and many others by providing detailed data and analysis on capital investment and operational spending undertaken by the offshore industry.

Quest collects and develops market data from a variety of sources at the project-level. A unique feature of this analysis, and which lends it high credibility, is its reliance on primary data through direct contact with the industry's supply chain. This connection with operating oil and natural gas companies through to the smallest of equipment and service providers imparts.

## 1.5 National Impacts

Overall spending for the Gulf of Mexico offshore industry in 2008 was over $28.5 billion which translated into a total GDP impact of over $30.8 billion (Figure 12)[11]. This impact was felt throughout the country and supported over 305 thousand jobs nationwide Approximately 90 thousand of those jobs were directly related to the industry (meaning jobs working directly for oil and natural gas companies or for contractors that are directly paid by the oil and natural gas industry) while 220 thousand In 2009, in part due to the effects of the economic recession, industry capital investment and operational spending fell to $27.1 billion with an associated GDP impact of just over $29.3 billion. This economic activity supported approximately 285 thousand jobs in total of which 80 thousand were direct, and 205 thousand were indirect and induced jobs. The year 2010 saw capital investment and operational spending fall to its lowest level over the period of interest to $24.2 billion. This was primarily due to the moratorium on drilling in the deep water GoM and the subsequent lack of deepwater drilling permits issued and the associated.

Our industry capital investment and operational spending outlook for the GoM in 2011 was predicated on a return to historical permitting rates by the second half of 2011, which was an optimistic assumption not in line with current permitting rates. Spending is expected to reach $30.5 billion, resulting in a total GDP impact of over $32.3 billion. Total supported employment is estimated at 311 thousand jobs of which 80 thousand are direct and 230 thousand are indirect and induced. This would represent a 28 percent increase in employment over 2010 and a 24 percent increase in contributions to GDP. A large portion of this projected spending increase stems from major projects far along in the development cycle which had been delayed in the previous two years. In 2012, again assuming a return to historical permitting rates in the GoM, it is estimated that capital and operational spending in the GoM could reach $35.4 billion resulting in an estimated

GDP impact of over $38.2 billion. Capital spending is projected to grow at the fastest rate at 17 percent due to more and more delayed projects beginning development while operational expenditures are projected to increase by 16 percent as more projects come into production. This uptick in activity should see the industry and its suppliers hiring with total supported employment associated with GoM oil and natural gas development projected to reach 355 thousand jobs of which 90 thousand.

## 1.6 State and Regional Impacts

The Gulf Coast states, with the primary four being Texas, Louisiana, Mississippi, and Alabama, (including the federal waters of these states) are areas which produce oil and natural gas and receive the majority of the spending from the offshore oil and natural gas industry in the Gulf of Mexico. These states are the location of most of the primary spending for capital equipment and purchases of intermediate inputs needed for the operational activities of the Gulf of Mexico oil and natural gas industry.

In 2013 capital investment and purchases of intermediate goods are projected to reach their highest levels in the studied period, assuming that permitting rates in the Gulf of Mexico return to pre-Macondo levels. Total capital investment and spending in the four state region is projected to reach $30.6 billion. More specifically, investment and spending in Alabama associated with offshore GoM oil and natural gas development is estimated at $4.8 billion, Louisiana at $12.9 billion, Mississippi at $0.4 billion and Texas at $12.5 billion. This investment and purchases of intermediate inputs is estimated to increase GDP in the four state area by over $33.2 billion. In particular for 2013, the contributions to GDP in Alabama due to GoM offshore oil and natural gas industry activity is projected to be $4.7 billion, Louisiana $13 billion.

## 1.7 Limitation of Study

This study faced some hurdles arising from the coverage of the study. Some of the limitations

a. The exact impact of fluctuating oil prices is not clear enough, mainly because of government intervention in oil markets in different ways.

b. Related to above (a), the full impact of oil price shocks in the international market may at times be distorted.

c. Some macroeconomic variables that are not at the core of this study, like foreign exchange reserves, access to international capital and the exchange rate may have an explanatory role on the impact.

d. The study seeks to establish the impact of oil price shocks on selected variables in the economy which in turn are influenced by other factors.

e. Critically, the unavailability of data especially in the case of unemployment and its linkages to oil prices in India was limiting problem.

| | Capital Expenditures *(Billions)* | | | | | |
|---|---|---|---|---|---|---|
| | Historical | | | Projected | | |
| | Deepwater | | | Deepwater | | |
| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| G&G | $0.1 | $0.1 | $0.1 | $0.1 | $0.1 | $0.1 |
| Drilling | $2.6 | $3.5 | $1.8 | $2.6 | $3.5 | $4.8 |
| Facilities | $0.0 | $0.0 | $1.2 | $1.9 | $0.8 | $1.9 |
| SURF | $3.0 | $2.9 | $1.3 | $1.3 | $1.9 | $2.9 |
| **Total Deepwater** | **$5.8** | **$6.5** | **$4.3** | **$5.9** | **$6.3** | **$9.8** |
| | Shallow Water | | | Shallow Water | | |
| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| G&G | $0.1 | $0.1 | $0.1 | $0.1 | $0.1 | $0.1 |
| Drilling | $4.0 | $2.4 | $1.6 | $1.3 | $2.5 | $4.3 |
| Facilities | $1.1 | $0.4 | $0.4 | $1.4 | $1.3 | $1.3 |
| SURF | $0.8 | $0.2 | $0.1 | $0.4 | $0.3 | $0.3 |
| **Total Shallow Water** | **$6.1** | **$3.2** | **$2.2** | **$3.1** | **$4.1** | **$5.9** |
| **Total CAPEX** | **$11.9** | **$9.7** | **$6.5** | **$8.9** | **$10.4** | **$15.7** |

| | Operating Expenditures *(Billions)* | | | | | |
|---|---|---|---|---|---|---|
| | Deepwater | | | Deepwater | | |
| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| **Total Deepwater** | **$5.8** | **$6.2** | **$6.7** | **$8.5** | **$9.9** | **$10.3** |
| | Shallow Water | | | Shallow Water | | |
| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| **Total Shallow Water** | **$10.9** | **$11.0** | **$11.1** | **$13.1** | **$15.1** | **$15.4** |
| **Total OPEX** | **$16.7** | **$17.2** | **$17.7** | **$21.6** | **$25.0** | **$25.8** |
| **Total Spend** | **$28.5** | **$26.9** | **$24.2** | **$30.5** | **$35.4** | **$41.5** |

1.1 Capital & Operating Expenditures

From 2009-2010, overall spending (both deep and shallow water) fell by 10 percent. The most affected sector was the drilling sector, which saw a 41 percent decrease in spending during the period as deepwater drilling all but halted for two quarters of the year due to the moratorium and shallow water drilling significantly declined due to the extreme slowing of drilling permit issuances. The drilling sector is also expected to see the most significant growth in spending if a return to historical conditions occurs, with drilling spending in 2013 expected to rise 165 percent from 2010 levels to $9.1 billion.

Facilities spending is also expected to see significant growth from 2010 to 2013, with spending expected to be up by 113 percent over 2008 levels reaching $3.2 billion. For this particular category, 2010 spending was actually 236 percent higher at $1.5 billion than in 2008 as specific large projects, which had already completed exploration and appraisal drilling moved forward. Subsea spending inclusive of hardware, risers, pipelines and umbilicals is expected to grow 125 percent to $3.2 billion in 2013 from $1.4 billion in 2010. This level will still be slightly below the $3.8 billion seen in 2008, due to the drilling moratorium pushing the next big wave of very large projects further out into the future. Such major projects drive subsea spending through major hardware and pipeline installation contracts.

Quest's spending projections are based on actual projects to be developed in the Gulf of operators expected exploration and appraisal programs which are used to take into account yet to be discovered and delineated fields that may be developed in the forecast time frame.

It is important to note that Quest Offshore is providing the spending forecasts used in this report on the U.S. Gulf of Mexico's offshore oil and natural gas industry under the assumption that permits for offshore drilling, which began to be reissued during the first half of 2011, will continue to be issued at an increasing pace throughout the year, and ultimately arriving back at levels seen prior to the Macondo incident.

## 1.8 Domestic vs. International Capital Investment

As many of the service providers employed by the oil and natural gas industry are located overseas, it is important to understand what portion of the capital investment remains in the U.S., and what part flows to other countries. Quest's analysis reveals that while a portion of offshore capital investment flows abroad, the vast majority is used to purchase equipment and structures manufactured in the United States. Most of the internationally purchased equipment is of relatively lower value, consisting of, for instance, steel pipe and floating production system hulls. For floating production systems, while the hull is likely built in an Asian shipyard, the processing and production topsides, which are the more technically complex and thus expensive equipment, are fabricated in the United States. Operating expenditures, which account for the spending required to maintain and operate existing producing assets, account on average for 66 percent of spending over the 2008-2013 period and occur almost exclusively in the United States. From 2008 to 2010, 98 percent of total spending (capital investment and operational spending) was domestic with an

average of only 2 percent occurring overseas. This changed only slightly for the period 2011-2013 with 97 percent of total spending being domestic compared to 3 percent occurring overseas. This is due to a higher share of capital spending.

# CHAPTER 2: LITERATURE REVIEW

The fall in global oil prices may be beneficial to India, but it also has its downsides. Directly, it affects the exporters of petroleum producers in the country. India is the sixth largest exporter of petroleum products in the world, according to media reports. This helps it earn $60 billion annually. Any fall in oil prices negatively impacts exports. At a time when India is running a trade deficit - high imports and low exports, any fall in exports is bad news. Moreover, a lot of India's trade partners and buyers of its exports are net oil exporters. A fall in oil price may impact their economy, and hamper demand for Indian products. This would indirectly affect India and its companies. For example, the share prices of Bharti Airtel and Bajaj Auto fell because of the devaluation of the Nigerian currency - Naira. Both the companies have a significant presence in the African country.

Oil prices matter to the health of an economy, despite a consistent fall in global oil intensity; crude oil remains an important commodity and events in the oil market and continues to play a significant role in shaping global economic and political development. Crude oil is the world economy's most important source of energy and is therefore, critical to economic growth. The price of crude in global market is essentially driven by supply and demand. The performance of world economy in general and the world's largest economies such as US, Japan and recently China have a significant impact on the demand for crude oil and vice versa. The various method developed by IMF, World Bank(WB) and OECD have estimated that 10 dollar increase in crude oil prices would lead to a decline of world production of goods and services by 0.5%. The world economic growth and world oil demand are moving in tandem and there is high correlation between world economic growth and demand for oil. It is essentially the supply that drives the prices of crude oil. Many researchers

agree in opinion that no other economic event in post-World War II era generated as much attention as the series of oil price shocks, mainly produced by OPEC countries. No studies were necessary to see the clear relationship between oil prices and main economic indicators. Nevertheless, this issue was new and researchers posed such a question as the numerical impact of oil shocks and their correlation with the policy conducted by government in order to predict the best instrument to cope with the negative impacts caused by oil price increases. Since then a large number of studies have reported a correlation between increases in oil prices followed by economic downturns.

Later Hamilton (2000) reported clear evidence of nonlinearity-oil price increases is much more important than oil price decreases. An alternative interpretation was proposed based on the estimation of a linear functional form using exogenous disruptions in petroleum supplies as an instrument. His study shows that oil shocks play a crucial role in determining macroeconomic behavior because they disrupt spending by consumers and firms. Hamilton extended his research work (2003, 2005, and 2009) and has presented empirical evidence suggesting that oil price shocks have been one of the main causes of recessions in the United States. Others, including Barsky and Kilian (2004), argue that the effect is small and that oil shocks alone cannot explain the U.S. stagflation of the 1970s. Taking a more intermediate position, Bernanke et al. (1997) argue that an important part of the effect of oil price shocks on the U.S. economy results not from the change in oil prices per se, but from the resulting tightening of monetary policy. In the same line of research, Blanchard and Gali (2007) present evidence showing that the dynamic effect of oil shocks has decreased considerably over time, owing to a combination of improvements in monetary policy, more flexible labor markets, and a smaller share of oil in production. Their results indicate that a 10 percent increase in the price of oil would, prior to 1984, have reduced U.S. GDP by about 0.7

percent over a 2–3 year period, while after 1984 the loss would be only about 0.25 percent. In contrast to the extensive literature on the impact of oil prices on the U.S. economy, there has Outside the U.S., studies of the relationship between oil prices and the macro-economy have almost exclusively been confined to other OECD members, with results suggesting that they tend to be affected in broadly the same way as the U.S. but less strongly.

Kaushik Bhattacharya et al. (2005) analyzed the impact of increase in oil price on inflation. They studied the mechanism of increase in the prices of petroleum products on the prices of other commodities and the output in India. In February 1999, from an all-time low of 11 U.S Dollars per barrel, it increased to a peak of 35 dollars in the first week of September 2000. Due to this, all oil importing countries faced the threat of oil shock; India, being a major oil importer, was particularly affected. Historically, there have been four oil shocks in the past thirty years. In spite of this, low inflationary pressure has been assisting the developed countries in mitigating the risk associated with oil shocks. Contrary to this, developing countries are affected more because of the absence of advanced technology to conserve oil. Literature reveals that most researchers agree with the fact that inflation has a recessionary effect on oil prices.

Analysis of the impact of high oil prices on the global economy" by Economic Analysis Division, International Energy Agency reports in "Energy Prices and Taxes", 2nd Quarter 2004, wherein it has shown that the vulnerability of oil importing countries to higher oil prices varies markedly depending on the degree to which they are net importers and oil intensity of their economies. According to the results of a quantitative exercise carried out by the IEA in collaboration with the OECD Economics Department and with the assistance of the International Monetary Fund Research Department, a sustained for10 per barrel increase in oil price from $25 to $35 would

result in the OECD as a whole losing 0.4% of GDP in the first and second years of higher prices. Inflation would rise by half a percentage point and unemployment would also increase.

The focus of this chapter is on description of state of oil in Indian economy. This part has been started with an introduction of energy section of the country. This includes; current oil scenario of the country, total oil production and consumption, dependency degree on imported crude oil, main sources of imported crude oil and policies of Indian companies to reduce the risk in importing oil. Change in government's policies on oil and petroleum prices control and a brief review of top players of oil and gas sector include upstream (exploration and production), midstream (storage and transportation) and downstream (refining, processing and marketing) are explained under sector organization. Exploration and production, current proved oil reserves, current amount of productions by region and main reasons which foreign investments have been reduced in exploring new reservoirs are briefly considered.

After explanation of current scenario of strategic petroleum reserve and refining sector, is a discussion about factors affecting the Indian oil sectors. This part contains important concepts like government subsidies on oil and gas products and impact of energy subsidy reformation. At the end of this part there is a discussion on environmental issues about the oil and gas sector in the country.

The last part of this chapter is a review about using unconventional fuels and alternative sources of fossil fuels, developing midstream infrastructures and forming joint ventures or partnerships with foreign players.

## 2.1 Statistical analysis & empirical results

Introduction about implemented econometric model and presentation of its analysis forms the content of this chapter. Vector Auto regressive model is employed to estimate the impacts of oil shocks on selected Indian macroeconomic variables.

These analyses include following steps which are presented in this chapter: Dickey-Fuller test for stationarity or non-stationarity of selected variables, determining the number of optimal lags, determining optimal order, co-integration test based on trace of the stochastic matrix, estimated convergence vectors by Johansson's method, including linear restriction on co-integration relation , generalized impulse responses, generalized forecast error variance decomposition for each variable, Ordinary Least Square estimation for exogenous variable in each equation .multivariate dynamic forecast for level of selected variables, effects of the big shocks to special variables on co-integration vector and error correction method.

## 2.2 Review of Some of Studies about Oil Prices and its Impact on Macroeconomic Variables in Developed and Developing Countries

After the Arab oil embargo in 1973, the study of the effect of oil shocks on macroeconomic variables became popular. Over the past forty years, dozens of researchers have explored the relationship between oil prices and variables such as output growth rate, unemployment, inflation, wages, effective exchange rate, etc. They have used different methods of analysis and have derived different results as well.

In most of them, researchers have focused on studying the impact of crude oil price rise mainly in developed countries. They are mainly related to the U.S. economy and OECD countries. It is a well-known fact that these effects could be different from country to country and time to time. Factors such as the countries' sectoral composition, institutional structures and level of economic

development and other numerous factors could affect the change in oil price impact. It itself shows that these types of studies are important for each country at a particular time.

In the following paragraphs, there are reviews of some selected studies that are conducted on developed economies, developing economies and some selected studies about net oil importing countries. Finally, the researcher had a look at the rare available study on Indian economy.

From the several studies addressing the question of whether there is a relationship between oil price shocks and macroeconomic variables, one of the pioneer work was done by Hamilton (1983). James Hamilton investigated the role of oil price shocks in U.S. business cycles over 1948-1981. He found that the changes in oil price affected GDP and unemployment of U.S. economy.

By using VAR models for Canada, Gemnany, Japan, United Kingdom and United States, Burdbidge and Harrison on "Testing for the Effects of Oil Price Rises Using Vector Autoregressions" (1984) showed that oil price shocks have significant negative impact on industrial production.

Following Hamilton, Mari (1989) proposed a non-linear definition of oil prices and distinguished between positive and negative oil price changes. He concluded that positive oil prices have strong negative and significant relationship with changes in real GDP while negative oil price changes exhibit no significant effects.

Chaudhuri and Daniel on "Long-ain Equilibrium Real Exchange Rates and Oil Prices" (1998) used co-integration and causality test to demonstrate that non stationary behavior of the US dollar's real exchange rate is explained by non-stationary behavior of real oil prices. The authors said that oil price shocks can have long-run effects on real exchange rates even if perfect markets exist in the long run. Again for the case of US economy, Lee. Ni and Raati (1995) studied oil price shocks and real GDP growth over the period of 1944 to 1992. With the use of GARCH model they concluded

that positive oil price shocks are significantly negatively correlated with real GDP growth but negative oil price shocks are not.

Kaneko and Lee in their comparative study (between U.S and Japan) used eight variables VAR model to identify the pricing influence of economic factors on U.S. and Japanese stock market returns. The eight variables used in the study "Relative Importance of Economic Factors in the U.S. and Japanese Stock Markets" (1995) are risk premium, Terni premium, growth rate in industrial production, rate of inflation, changes in terms of trade, changes in oil prices, changes in exchange rates and excess stock returns. They found the average values of excess stock returns, rates of inflation, risk premiums and term premiums to be higher for the United States than for Japan.

Again, Hamilton's study on "Oil and the Macroeconomy" (2005) asserted that oil price increase is much more important than oil price decrease. He concluded that with the help of linear versus nonlinear analysis. Higher effect of increase in oil price than decrease in price on macroeconomic variables is also explained by Jimenez-Rodriguez and Sanchez for the Euro area. On "Oil Price Shocks and Real GDP Growth: Empirical Evidence for Some OECD Countries" (2004), they empirically examined the effects of oil price shocks on the real economic activities of the main industrialized countries with the help of VAR model. They found a non-linear effect of oil prices on real GDP. Especially, they show that oil price increase has more impact on GDP growth than oil price decline. Another study in Euro area done by Guillaume L'oeillet and Julien Licheron on "Oil Prices and Inflation in the Euro Area: A Nonlinear and Unstable Relationship" (2008) they investigated the relationship between oil prices and inflation in the euro area. By estimating a backward Phillips curve from European data between 1970 and 2007 they showed inflationary effect of current context does not reach to its high level of the seventies. The declining

energy intensity in the countries belonging to the euro area seems to be the major reason for that. Other reason is related to the nature of current oil shocks (unlike seventies oil shocks mainly related to demand side).

Hedayeh Samavati and David Dits in their paper "Petroleum Prices and their impact on Aggregate Economic Activity: Greasing the Skids?" (2007), explained the effect of oil price on US GDP components. Their study examined the period from 1986 to 2006 to determine oil prices impact on consumption, government expenditure, investment and net exports. According to them, consumption, investment and government expenditure were positively associated with oil prices.

In case of developed economy in Euro region, Germany was chosen. According to the EIA, Germany consumed 2.63 million barrels of crude oil per day in 2006 and ranked 5" in the worid for the demand of crude oil. In 2006 domestic production was only 2.57% of total crude oil consumption. To cover domestic demand, Genmany (as 4"largest net oil importing country) imported 2.483 million per day.

Yu Hsing in his paper "Impact of Higher Crude Oil Prices and Changing Macroeconomic Condition on Output Growth in Germany" (2007), examined the impacts of a rising crude oil price and changing macroeconomic conditions in real output in Germany. The result of their study showed that a higher real crude oil price, depending on the level of oil price, may or may not cause a negative impact on the output. Andreas Ldschel and Ulrich Obemdorfer investigated the impact of oil price on German labor market in particular. In doing so, they surveyed theoretical and empirical literature on the oil-unemployment relationship and related them to the Gennan case. And then within the framework of a vector auto regression (VAR), they illustrated the issue. In their paper "Oil and Unemployment in Germany" (2008), they used monthly data from 1973 to 2008 and explained the nature of oil price effects by using three different constructions of oil price

movements: a) simple oil price variable according to Hamilton (1983), b) oil price increase according to Mork (1989) in order to address possible asymmetric oil price effects, and c) the net oil price increase based on Hamilton (1996). They showed that increase in oil price induce a rise in unemployment in the Gennan labor mari.

In case of developed economies, case of Japan is also interesting. Most of the studies that examined oil supply shocks in major industrialized countries, obtained similar conclusions: the typical response to an oil shock is a decrease in the real GDP growth rate and real wage, leading to inflation and so on. This performance is often called stagflation. However, in the study of Blanchard and Gali "The Macroeconomic Effects of Oil Price Shocks: Why are the 2000s so different from the 1970s?" (2010), case of Japan deviates from this general response; an increase, instead of a decrease, was the impulse response of the real GDP in Japan to oil price shocks.

Blanchard Gali (2008) could not explain this phenomenon property. Japan's reliance on oil import is 99.7% (data from OECD: Energy Balances of OECD Countries 2008). This has led to higher dependence of its economy on price of oil in the international market. Tian Hongzhi in his paper "Effects of Oil Price Shocks on Japan's Economy: A DSGE Approach" (2010), used VAR model to investigate the exact effects of oil price shocks during the period 1984-2007 on key macroeconomic aggregate variables of Japan's economy and build a theoretical model for the sake of utilizing the substitution effects of production factors to explain why Japan's real GDP increased when the oil price shocks transpired. His VAR model includes five variables: real GDP, CPI, real wage, oil price and employment. The main finding of this study is that the two recent oil price shocks are different from the previous two occurrences. Based on his definition of oil price shocks, he asserts that the quantity and volatility of shocks have changed across periods, especially in the last oil price shock; oil prices increased in one quarter and then immediately decreased in the next

quarter. This is a very important reason why the effects of oil price shocks have become smaller after the 1980s. Moreover, the paper applies microeconomic theory to successfully account for why the real GDP in Japan continued to rise in the oil price shock periods. Oil is a nominal good; once its price rises, its demand should decrease. During a span of high oil prices, production costs rise and production output decreases. Accordingly, real wage and employment levels also decrease. However, according to Japanese data, the demand for labor (i.e. employment) and capital was seen to have increased. Demand for two of the three production factors increase (oil share is small, hence the output increases). He noted that the impulse response of Japan to oil price shocks have a unique style so Japan is different from other G7 countries. Real GDP, employment and real wage increased, only CPI inflation fitted the typical responses. The four variables affected by oil price shocks is not extreme. This point is a unique characteristic of the Japanese economy.

On the international level, Francois lescarous and Velerie Mignon in their paper "On the Influence of Oil Prices on Economic Activity and Other Macroeconomic and Financial Variables" (2008), with an analysis of short run and long run interaction, showed the existence of various relationships between oil prices and macroeconomic variable with a special focus on the linkages between oil prices and share prices in the short run for three groups of countries, that is, OECD members, oil importing countries and oil exporting countries.

Among the empirical studies carried out on economic activities till date, there are only few studies that exist on net oil importing countries.

In this part, the researcher gathers overviews on impact of oil shocks on some selected net oil importing countries including Kuwait, Nigeria, Iran, Russia and Nonway as a developed net oil exporting economy. The Kuwaiti economy, like the other GCC (Coundl for the Arab States of the Gulf Cooperation) economies, depends heavily on the oil sector. Oil contributes over two thirds

of its GDP and more than 90 % of total exports. Although, Kuwait tries hard to reduce its dependence on oil, it is expected that the country will continue to depend on oil for several years.

M. Nagy Eltony in "Oil Price Fluctuations and Their Impact on the

Macroeconomic Variables of Kuwait: A Case Study Using VAR Model for Kuwait" (2001), showed that oil price fluctuations are a major source of disturt Dance for the economy of Kuwait. In this study, a Vector Auto Regression was conducted by using key macroeconomic variables (Three key macroeconomic variables: oil revenues, CPI and the value of imports; three policy variables: money supply M2, government current expenditure and government development expenditure) for the state of Kuwait. The study was done for the period of 1984-1998. The study indicates a high level of interrelation between oil and major macroeconomic variables. The results also show the oil price shocks and hence oil revenues for Kuwait have a notable impact on both development and current government expenditure. But, government development expenditure has been influenced relatively more.

The objective of the paper titled "Oil Price Shock and Macroeconomic Activities in Nigeria" (2006), was to examine the effect of oil price shock on output, inflation, the real exchange rate and the money supply in Nigeria and measure the magnitude of such impacts. Philip A. Olomola and Akintoye V. Adejumo employed VAR method to analyze quarteriy data from 1970 to 2003. Their model is composed of five variables, namely: the real GDP, the Consumer Price Index, the real exchange rate. Wholesale Price Index (WPI) and the real oil price. They show that oil price volatility is an important determinant of real exchange rates and money supply in the long run and not only the oil price shocks but also monetary policy's response to that caused fluctuations in aggregate economic activities. But money supply rather than oil price shocks has affected output growth in Nigeria.

With the use of VEC model, Katsuya (2008) attempted to empirically investigate the effects of oil price and monetary shocks in the Russian economy for the period between 1997 and 2007. The economy of Russia, as the world's second largest oil producer and fourth major oil consumer in the world, is highly dependent on oil industries. The purpose of his paper titled "Oil Price and the Russian Economy: A VEC Model Approach" is to empirically investigate the effects of oil prices on the level of realGDP and inflation for Russia with extended sample periods.

The analysis leads to the finding that a 1% increase in oil prices contributes to real GDP growth by 0.25% over the next 12 quarters, whereas that to inflation by 0.36% over the corresponding periods. He also found that the monetary shock through interest rate channel immediately affects real GDP and inflation. He also illustrates that the impact of the monetary shock on the economy is greater than that of the oil price shock. This finding is against the report by Hamilton and Henrera (2004). In the case studies regarding net oil exporting countries, Iran is another example.

Due to the high dependence of the economy of Iran on oil revenues, oil price volatility has a special impact on its economy. Mohammad Reza Farzanegan and Gunther Maricwardt, in their paper "The Effects of Oil Price Shocks on the Iranian Economy" (2007), analyzed the relationship between oil price shocks and major macroeconomic variables in Iran, by applying a VAR approach. They illustrated that oil price increase/decrease has a significant positive /negative impact on industrial output. But they didn't find the effect of oil price fluctuation on real government expenditures. In contrast to other mentioned cases about net exporting countries, "Oil Price Shocks and Stock Maricet Booms in an Oil Exporting Country" (2009), has looked at the economy of Norway. Among the first ten net oil importing countries, Norway is the only developed country (CIA Worid Fact book 2005). Hilde C. Bjomland discusses about the transmission channels of oil prices for macroeconomic behavior, stmctural VAR model to capture the interaction between oil price and

the different macroeconomic variables and stock returns. He found that following a 10% increase in oil prices, stock returns increase by 2.5%. All variables in his model indicate that the economy of Norway responds to higher oil prices by increasing aggregate wealth and aggregate demand. South Korea, as a gradually developing country now considered by IMF as an advanced economy is a good case for an overview. The Republic of Korea is important to worid energy markets because it is the tenth largest oil consumer and the fifth largest net oil importer in the worid (October 2010). For answers to questions like: "How important are oil price fluctuations and oil price volatility for equity martinet performance?" or "What are the policy implications vis a vis a change in oil price?

Rumi Masih, Sanjay Peters and Lurion De Mello use a VEC model in their article-Qil Price Volatility and Stock Price Fluctuations in an Emerging market: Evidence from South Korea" (2010). They explain the impact of oil price changes and volatility on real stock returns, industrial production and interest rates in South Korea. Results indicate that a long run equilibrium relationship does exist among the variables considered in the study (interest rates, economic activity, real stock returns, real oil prices and oil price volatility). Main conclusion of the research is that oil price movements significantly affect the stock market but the entire system adjusts back to equilibrium models quickly. Among the Asian countries, China, Indonesia and Pakistan are other cases chosen to be mentioned here.

China with the highest GDP growth in the world (10.3 in 2010 and 7.8 for 2012), (INF) became the second largest oil consumer behind the United States. China emerged from being a net oil exporter in the early 1990s and became the world's third largest net importer of oil in 2006. China's oil consumption growth accounted for about a third of the world's oil consumption growth in 2009. It has accounted for 40% of the world's oil demand growth between 2000 and 2004. China now

imports one-third of its overall oil consumption. With the use of dynamic input-output price model, Jing He, in his paper "An Empirical Analysis of Macrocosmic Response to Crude Oil Price Volatility in China by Using the Input-output Models" (2005), tried to develop a price dynamic model to measure the impact of the price volatility of crude oil on the Chinese economy. The study was carried out in two steps. First, Jing developed a new model of input output price analysis based on the discrete time functions to measure the impact of oil price.

Second, Jing applied the price volatility model to explain the macroeconomic responses between 1999 and 2004. This process enabled them to establish measure between the oil prices and the price system. It is an important tool for planners and decision-makers. He concluded that the economies of oil-importing developing country such as China (Beijing now imports one-third of the oil it consumes), would suffer most from higher oil prices because their economies are more dependent on imported oil. In addition, energy-intensive manufacturing generally accounts for a larger share of their GDP and energy is used less efficiently. So in China, higher oil price has a depressive effect on its economic activities. Marcel Gozali under title of "Impacts of Oil Price levels and Volatility on Indonesia" (2011), empirically examines the impact of oil price levels and volatility on key macroeconomic indicators of Indonesia. The relationships between oil price levels, the two volatility measurements - historical volatility and realized volatility – and macroeconomic indicators are explored with the Granger-causality test and the vector autoregressive system (VAR). For empirical analysis he chose two sets of data – one over the period between 1990 and 2008 and another between 1999 and 2008. Results from both sets of data show that realized oil shock is a significant predictor of growth rates of GDP. Another important result is that oil price levels have statistically meaningful impact on government consumption and investment.

Afia Malik in her study titled "Crude Oil Price, Monetary Policy and Output: Case of Pakistan" (2008) explored Pakistan's economy as a developing country in Asia. Pakistan with a population of more than 150 million has been on the path of rising GDP growth in the last couple of years. Energy sector has a direct link with the economic development of a country. In line with the rising growth rate of GDP, demand for energy has also grown rapidly. According to studies, although in Pakistan the intensity at which oil is used in total energy consumption, has declined in the last few years but still it is the second largest source of energy used after natural gas. So Pakistan is heavily dependent on oil imports mainly from Middle East exporters. The goal in this paper was to shed light on the nature of the impact of oil shocks on the macroeconomic conditions for Pakistan. The study analyzed the impact of oil price on the output growth and it examined the non-linear relationship between oil prices and output. The study found that oil prices and output are strongly related. And to a greater extent this relationship is non-linear.

### 2.3 Review of Some of Previous Studies about Oil Prices and its Impact on Macroeconomic Variable in India

A study conducted by the Asian Development Bank (2004) showed the impact of temporary/sustained high oil prices in some Asian economies without accounting for any policy changes. It also showed that oil intensity in India was about 2.5 times higher than that of OECD countries.

Another assessment of the impact of high oil prices made by International Energy Agency (2004) shows the negative impact of oil price increase on GDP of India and some other countries. Also, IEA mentions in its report (2006) about the fiscal imbalances in India that continue to provide direct subsidies to oil products to protect poor households and domestic industries. According to

IEA (2005), a 10 USD increase in oil price caused 1% decrease of the Indian GDP, a year after the price increased. B.B. Bhattacharya and Sabyasachi Kar (2005) in their analysis about the effect of shocks on Indian economic growth, find that the industrial growth was affected negatively during the first oil hike (1973-1974). But the second hike (1979) did not seem to have any effect on industrial production. According to them, the hike in 1990 coincided with the fall in industrial growth rate but hikes during 1999-2000 again did not seem to have any impact on industrial growth. Federation of Indian Chambers of Commerce and Industry in their report (2005) had reassessed the impact of oil prices on the Indian economy. Negative impact of high oil prices on the manufacturing sector. They also show the linear relationship between oil prices and construction and service sector of the country.

All the case studies about oil prices and its impacts on macroeconomic variables over the matter of whether the chosen country for study be developed, developing or net importer or next exporter country, shows that they are affected by the oil price shocks. Before statistical analysts we should have a clear idea about state of oil in Indian economy which comes in the following chapter.

# CHAPTER 3: RESEARCH METHODOLOGY

## 3.1 RESEARCH DESIGN:

A research design is the arrangement of condition for collection and analysis of data in a manner which may result in an economy in procedure. It stands for advance planning for collection of the relevant data and the techniques to be used in analysis, keeping in view the objective of the research availability of time.

There are three types of research designs. They are,

- Exploratory research design.
- Conclusive research design.
    1. Descriptive research design.
    2. Causal research design.
- Performance monitoring research.

The Research design used in this study was descriptive research design. It includes surveys and fact-finding enquiries of different kinds. The main characteristic of this method is that the researcher has no control over the variables; he can report only what has happened or what is happening.

### 3.1.1 Data collection method:

The data collection method for the study the researcher should keep in the mind the two sources of data.

- Primary Data
- Secondary Data

## 3.2 STUDY CONDUCTED

The structured questionnaire.

### 3.2.2 Secondary data:

Secondary data has been collected from the Company Website, Internet etc.

Simplex percentage analysis:

Percentage analysis is the method to represent raw streams of data as a percentage (a part in100- percent) for better understanding of collected data.

# CHAPTER 4: DATA ANALYSIS

After presenting an overview of the oil and gas industry in India, it assessed the value chain where interventions have been made. Further, it identified further interventions that can be made by creating a policy framework to foster sustainability. The chapter stated that due to the energy intense nature of the processes of extraction, transport and transformation of hydrocarbons, significant efficiency gains can be made. Finally, it produced a public policy framework to foster such sustainability initiatives within the oil and gas sector, learning from domestic as well as global best practices.

Through much of the first half of the 20th Century, the United States was the dominant world oil producer and was, in fact, a net exporter. By the early 1900s, a bilateral "world" market for oil had developed, but the world price was simply the U.S. price plus the cost of freight. Russia's production did not lag far behind U.S. production during this time, but their relatively closed economy precluded much trade with the rest of the world. Table 1.1 shows the leading -oil producers up to 1970.

**World oil Production, 1910 - 1970, in million barrels per day (mbd).**

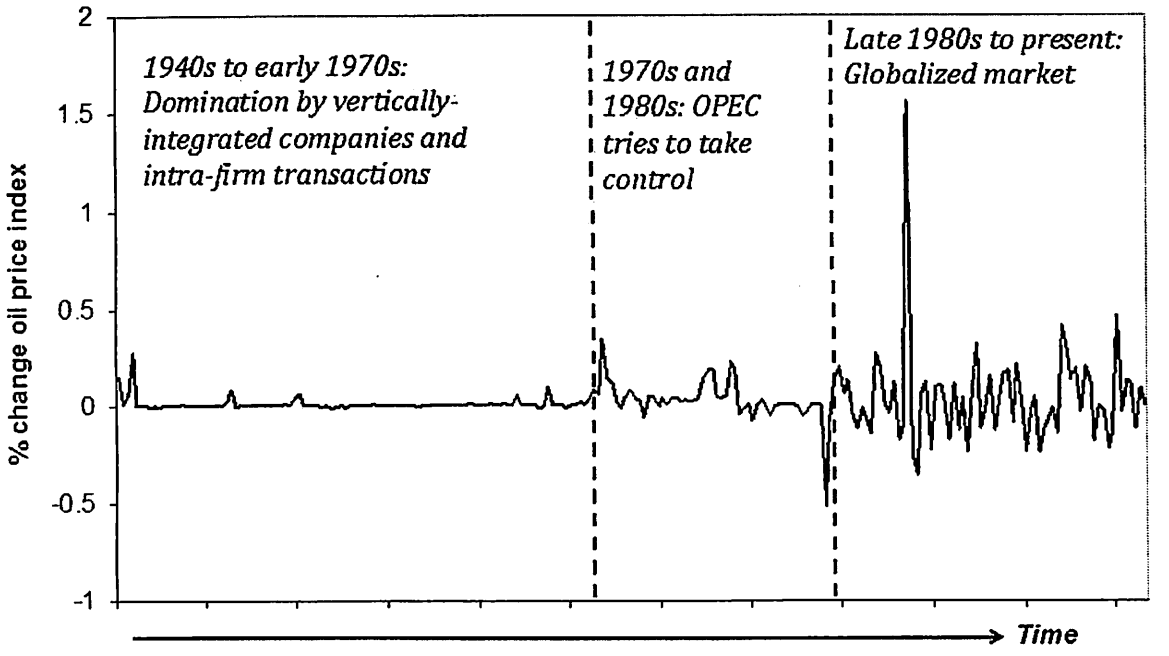
| | | | | | | |
|---|---|---|---|---|---|---|
| **1910** | 575 | 10 | 0 | 170 | 30 | 0 |
| **1920** | 1,214 | 430 | 1 | 70 | 48 | 31 |
| **1930** | 2,460 | 408 | 374 | 344 | 114 | 126 |
| **1940** | 3,707 | 12 | 508 | 599 | 170 | 280 |

| World oil Production, 1910 - 1970, in million barrels per day (mbd). | | | | | | |
|---|---|---|---|---|---|---|
| Year | U.S. | Mexico | Venezuela | Russia | Indonesia | Middle East |
| 1950 | 5,407 | 198 | 1,498 | 729 | 133 | 1,755 |
| 1960 | 7,055 | 271 | 2,854 | 2,957 | 419 | 5,255 |
| 1970 | 9,637 | 487 | 3,708 | 6,985 | 854 | 13,957 |

4.1 Oil Production Data

Oil is one of the most economically mature commodity markets in the world. Even though most oil is produced by a relatively small number of companies, and often in remote locations that are very far from the point of consumption, trade in oil and gas is robust and global in nature. Nearly 80% of international crude oil transactions involve delivery via waterway in supertankers. Oil traders are able to quickly redirect transactions towards markets where prices are higher.

Oil and coal are global commodities that are shipped all over the world. Thus, global supply and demand determines prices for these energy sources. Events around the world can affect our prices at home for oil-based energy such as gasoline and heating oil. Oil prices are high right now because of rapidly growing demand in the developing world (primarily Asia). As demand in these places grows, more oil cargoes head towards these countries. Prices in other countries must rise as a result. Political unrest in some oil-producing nations also contributes to high prices - basically, there is a fear that political instability could shut down oil production in these countries. OPEC, the large oil-producing cartel, does have some ability to influence world prices, but OPEC's influence in the world oil market is shrinking rapidly as new supplies in non-OPEC countries are discovered and developed.




4.2 Oil Price Index

**4.1 Domestic vs. International Capital Investment**

As many of the service providers employed by the oil and natural gas industry are located overseas, it is important to understand what portion of the capital investment remains in the U.S., and what part flows to other countries. Quest's analysis reveals that while a portion of offshore capital investment flows abroad, the vast majority is used to purchase equipment and structures manufactured in the United States. Most of the internationally purchased equipment is of relatively lower value, consisting of, for instance, steel pipe and floating production system hulls. For floating production systems, while the hull is likely built in an Asian shipyard, the processing and production topsides, which are the more technically complex and thus expensive equipment, are fabricated in the United States. Operating expenditures, which account for the spending required to maintain and operate existing producing assets, account on average for 66 percent of spending

over the 2008-2013 period and occur almost exclusively in the United States. From 2008 to 2010, 98 percent of total spending (capital investment and operational spending) was domestic with an average of only 2 percent occurring overseas. This changed only slightly for the period 2011-2013 with 97 percent of total spending being domestic compared to 3 percent occurring overseas. This is due to a higher share of capital spending flowing overseas (primarily floating production units hull and pipelines) relative to the earlier time frame

| *$Billions* | Historical | | | Projected | | |
|---|---|---|---|---|---|---|
| **Spending** | **2008** | **2009** | **2010** | **2011** | **2012** | **2013** |
| *Domestic* | $28.5 | $26.9 | $24.2 | $30.5 | $35.4 | $41.4 |
| *International* | $0.76 | $0.40 | $0.71 | $1.43 | $0.94 | $1.45 |
| **Total** | **$29.3** | **$27.3** | **$24.9** | **$31.9** | **$36.3** | **$42.9** |
| **Percentage of Spending** | | | | | | |
| *Domestic* | 97% | 99% | 97% | 96% | 97% | 97% |
| *International* | 3% | 1% | 3% | 4% | 3% | 3% |

4.3 Domestic Vs International Capital Investment

The majority (roughly three-quarters) of GoM offshore operational spending and investment occurs in the Gulf Coast states: Texas, Louisiana, Mississippi, and Alabama (Table10). Quest estimates that a significant portion of the spending, about one-quarter, occurs over a wider geographic area outside the Gulf. The primary reason spending is significantly higher in the Gulf states is due to supplying firms.

# CHAPTER 5: FINDINGS

This report has documented the decline in capital expenditures and operational spending of the GoM offshore oil and natural gas industry that occurred over the 2008 to 2010 period. The principal reasons for this decline include the economic recession in 2008-09 and the establishment of a moratorium on deepwater drilling and subsequent slowdown of permit issuance in both GoM deep and shallow waters in 2010 and into 2011. We estimate that tens of thousands of jobs have been lost in response to the decline in capital expenditures and operational spending of the offshore GoM oil and natural gas industry over this period. We also demonstrate the near term potential of the offshore GoM oil and natural gas industry to create jobs, boost GDP and generate tax revenues at all levels of government – if the government pursues a balanced regulatory approach that allows for the timely development of the backlog of GoM projects in an environmentally responsible manner. Under such government policy, we estimate total spending by the GoM offshore oil and natural gas industry to increase by over 70 percent by 2013 from 2010 levels, and capital expenditures to increase by over 140 percent. If potential spending levels are reached, total employment supported by the Gulf of Mexico oil and natural gas industry in 2013 could exceed 430 thousand jobs or a 77 percent increase from 2010.

# CHAPTER 6: CONCLUSION

This report has documented the decline in capital expenditures and operational spending of the GoM offshore oil and natural gas industry that occurred over the 2008 to 2010 period. The principal reasons for this decline include the economic recession in 2008-09 and the establishment of a moratorium on deepwater drilling and subsequent slowdown of permit issuance in both GoM deep and shallow waters in 2010 and into 2011. We estimate that tens of thousands of jobs have been lost in response to the decline in capital expenditures and operational spending of the offshore GoM oil and natural gas industry over this period. We also demonstrate the near term potential of the offshore GoM oil and natural gas industry to create jobs, boost GDP and generate tax revenues at all levels of government – if the government pursues a balanced regulatory approach that allows for the timely development of the backlog of GoM projects in an environmentally responsible manner. Under such government policy, we estimate total spending by the GoM offshore oil and natural gas industry to increase by over 70 percent by 2013 from 2010 levels, and capital expenditures to increase by over 140 percent.

- The Gulf of Mexico oil and natural gas industry's operational and capital investment spending is projected to average $35.7 billion from 2011-2013, with spending estimated at $26.5 billion for the 2008-2010 period. In 2013 spending is projected to reach $41.4 billion, a 71 percent increase from the 2010 level of $24.2 billion.
- The majority of the Gulf of Mexico oil and natural gas industry's spending is spent domestically, with an average of 98 percent of industry expenditures occurring within the

United States from 2008-2010 and 97 percent expected to be spent domestically from 2011-2013.

- Direct employment from GoM development expenditures and operations is projected to average 95 thousand from 2011 to 2013, after averaging 75 thousand from 2008-2010, with direct employment reaching a high of nearly 115 thousand by 2013. Total employment supported by the Gulf of Mexico oil and natural gas industry, including indirect and induced (income related) effects, is projected to average nearly 365 thousand jobs from 2011-2013 compared to total estimated employment of 275 thousand from 2008-2010. Employment in 2013 is projected to exceed 430 thousand jobs or a 77 percent increase from 2010.
- The Gulf of Mexico oil and natural gas industry is projected to contribute an average of $38.5 billion a year to U.S. GDP from 2011-2013 as compared to
- $28.7 billion a year from 2008-2010. In 2013 total contributions to GDP are projected to reach $44.5 billion, or a 71 percent increase over the 2010 estimated level of $26.1 billion. These results are likely conservative because they do not take into account the economic impacts of increased government revenue from bonus bids, royalties, corporate income taxes, and certain profit type income associated with oil and natural gas operations.
- GDP impacts in the Gulf of Mexico states of Alabama, Louisiana, Mississippi and Texas, due to offshore GoM oil and natural gas industry activity, are projected to average $28.5 billion a year from 2011-2013, as compared to $21.4 billion a year from 2008-2010. Total contributions to GDP in 2013 are expected to have increased 73 percent from 2010 to $33.2 billion due to offshore GoM oil and natural gas industry activity. Total supported employment in the Gulf states due to offshore GoM oil and natural gas industry activity

is expected to average 270 thousand jobs from 2011-2013 compared to 210 thousand jobs in the 2008-2010 period. In 2013, total supported employment is expected to grow to 320 thousand jobs, an 80 percent increase over the 2010 level.

- While spending from the offshore Gulf of Mexico oil and natural gas industry is focused along the Gulf coast, many states see benefits from the industry. Non- Gulf Coast States are expected to average $9.9 billion in spending from 2011- 2013, compared to an average of $7.2 billion spending per year from 2008-2010. Total supported non-Gulf State employment due to offshore oil and natural gas industry operations is expected to average 94 thousand from 2011-2013, compared to estimated total employment of 67 thousand in the 2008-2010 period.
- Quest's forecast for spending and hence contribution's to GDP and employment for forecast years are predicated on a return to normal permitting activity in the second half of 2011. This may be optimistic given current rates of permitting. A failure to return to historical issuance of drilling permits, as well as implementation of overly excessive regulation, would significantly decrease projections of spending and thus economic and job impacts.
- Quest's estimated and projected spending are based on Quest's proprietary Enhanced Deepwater Development Database and thus provide a high degree of accuracy with relation to both spending levels and the locations of spending. This is likely to yield realistic estimates of economic activity both with respect to magnitude and location.

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