

Crude Oil Price Behavior and Its Impact on Macroeconomic Variable: A Case of Inflation

M. Anandan, S. Ramaswamy and S. Sridhar

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Abstract

Energy is a vital infrastructure for the development of any economy. Due to economic development and economic growth, the needs and desire of the people have multiplied in quantity and quality which necessitate the intensity in demand for different sources of energy including the fossil fuel sources like oil (petroleum products).

Oil is an import non-renewable, depletable and exhaustible energy source in meeting the basic needs of human beings i.e., from rural households to urban metropolis and from agriculture sector to transport sector. In case of rural households, kerosene is used for lighting purpose. Similarly, in case of transportation, oil plays the key role.

For the oil importing countries, oil price increase and economic growth are negatively correlated while all things being equal, the relation is positively correlated for oil exporting countries.

The price of oil and inflation are often seen as being connected within a cause and effect framework. As oil prices move up or down, inflation follows in the same direction (Anshul Sharma et al, 2012). In the case of oil and its price has been frequently increasing.

Our import dependence has reached 80.0 per cent and likely to keep growing. At the same time, the world oil prices have also constantly increased. The oil prices have started rising significantly since the beginning of the twenty first century. The immediate effect of the oil price shock is the increased cost of production due to increased fuel cost. As a reaction to inflation in the economy, the cost of production would also rise causing a decrease in supply.

On the other hand, inflation implies a fall in the purchasing power of people; in short, oil price fluctuation has adverse effects on the economy (Jose De Gregorio et al, 2007). The improved macroeconomic policies in many countries today may also have contributed to a smaller pass-through. Finally, oil prices are not entirely exogenous to the general equilibrium of the world economy and the reaction of world inflation and output to an oil price rise will depend on its nature. This paper analyses the impact of international oil prices and domestic oil price pass-through policy on major macroeconomic variables in India with the help of a macroeconomic simulation model.

Keywords: Oil price, Gross Domestic Product and Inflation.

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Introduction

Economic development nexus energy is deeply rooted and inter-related. Affordable energy is critical for sustaining economic growth and for improved living standards of its population, which in turn is driven by increasing energy consumption. Hence, it is recognized that energy security in a fast developing economy like India is of strategic importance. Most studies in theoretical and empirical understanding on the macroeconomic consequences of oil price shocks have been focused on the industrialized economy like USA.

Crude oil has become one of critical commodities, due to its outstanding importance in the supply of the world's energy demand. Nowadays, the importance of crude oil as the main source of energy has alternative forms of energy (such as wind, water, and solar power). Despite this, the importance of oil exceeds economic aspects and affects social life in general. Thus, the prevailing view among the economists is that there is a strong relationship between the growth rate of a country and oil-price changes.

Oil price fluctuations have considerable consequences on economic activity. These consequences are expected to be different in oil importing and in oil exporting countries. Whereas an oil price increase is considered as good news for oil exporting countries and bad news for oil importing countries, and the reverse should be expected when the oil price decreases.

The transmission mechanisms through which oil prices have an impact on real economic activity include both supply and demand channels (**Latife Ghalayini, 2011**). The supply side effects are related to the fact that crude oil is a basic input to production, and consequently an increase in oil price leads to a rise in production costs that induces firms to lower output. Oil prices changes also entail demand-side effects on consumption and investment. Consumption is affected indirectly through its positive relation with disposable income. The magnitude of this effect is inturn stronger and more shock is perceived to be long-lasting. Moreover, oil prices have an adverse impact on investment by increasing firms' costs. It is worth noting that, in addition impacts of oil prices on supply and demand, oil price changes influence the foreign exchange markets and inflation, giving rise to indirect effects on real activity (**Latife Ghalayini, 2011**).

The countries such as India and China are expected to buy more crude oil from international markets as domestic demand rises rapidly. In the case of China, imports are tipped to make up 82 per cent of the country's total oil needs in 2035 compared with only 54 per cent today. India, presently imports around 80.0 per cent of its crude oil requirement, is also expected to become even more reliant on global supplies to fuel economic activity.

Theoretically, an increase in petrol price causes the cost of production to increase. As a result, aggregate supply shifts to the left, implying that productions fall. Most of the studies found out that a hike in petrol price caused inflation, decrease in output, higher unemployment rate and others. The world petrol price has always been decreasing from 1990 to 2007.

In 2008, the world petrol price reached almost 100 per cent change. This change raised many issues across the world especially in developing countries such as China and India. These two countries were largely affected because they were the largest oil consumption countries in the world.

The world petrol price started to decrease after being at the highest level of 114.6 US dollar in 2012 (**Arvind Jayaram, 2012**). The world experienced a decrease in petrol price; it actually eased the burden of many people especially poor people. In India, people suffered from the increase in petrol price by Rs 5 a litre. This was the steepest increase since December 2008. The Government of India decontrolled the petrol price in 2010. As a result, the goods price increased by almost Rs 7, the petrol price was at Rs 63.37 on May 2011 which was Rs 15.44 higher than the petrol price on 2010. India always faced the increase in petrol price from 2010 to 2011. The hike in petrol price caused the inflation by 8.98 per cent in India. This inflationary pressure made the Gross Domestic Product below the target of 9 per cent (**P&GD Group, 2011**).

Genesis of Crude Oil Prices and Inflation

According to the historical statistics, the direct relationship between oil price and inflation was evident in the 1970s. The cost of oil rose from a nominal price of \$3 per barrel before the 1973 oil crisis to close \$40 per barrel during the 1979 oil crisis. This helped cause the Consumer Price Index (CPI), a key measure of inflation, to more than double from 41.10 in January 1972 to 86.30 by the end of 1980.

However, this relationship between oil and inflation started to deteriorate after the 1980s. During the 1990's Gulf War (oil crisis), crude oil prices doubled in six months from around \$20 to around \$40, but CPI remained relatively stable, growing from 134.6 in January 1991 to 137.9 in December 1991. In this relationship, it is even more noticeable during the oil price hike from 1999 to 2008, in which the monthly average nominal price of oil started rising from the recent low point (\$11.32) in January 1999 to \$109.05 in April 2008. During the same period, the CPI rose from 164.30 to 214.82 (**P&GD Group, 2011**).

The impact of world economic growth on oil price can be seen in the light of the oil market power. In fact, as World economic growth increases the demand for oil increases which pushes up oil prices. Oil prices then, tend to be volatile, at least partly due to variations in the business cycle. In the

last quarter of 1998, economic growth decreased and pushed down the demand for oil and therefore reduced oil price to \$20 per barrel. While the world economy continued its recovery in 2003 and through the year 2004 and 2005 with Gross Domestic Product (GDP) growth rates increasing in many regions, the world oil market was characterized by strong oil demand growth and the oil price increased from \$27 to \$35 the barrel. In the first quarter of 2005, the oil price increased to \$50 per barrel approximately \$15 per barrel higher than in the first quarter of 2004, and remain above this level for the rest of 2005 and 2006.

Leading upto 2008, a strong world economic growth driving growth in oil use and, thus crude oil prices increased dramatically during 2007, with oil prices climbing from an average of nearly \$55 per barrel in the first quarter of 2007 to over \$95 per barrel in the last quarter of 2007. The decline in the value of the dollar against other currencies supports continued oil consumption growth in foreign countries, because oil is traded globally in dollars, and a declining dollar has made the increase in oil prices less severe in foreign currencies. Oil prices fell to less than \$62 a barrel in last quarter of 2008 amid continuing concerns about a global economic recession, while the hope in an economic recovery increases oil prices in the second quarter of 2009 to continue in 2010. Analysis above the data, perceptibly, it seems that the strong correlation between oil prices and inflation. As a matter of fact, the effects of oil price changes on inflation rates may be comparatively insignificant in the long run, but they could be significant relatively in the short run.

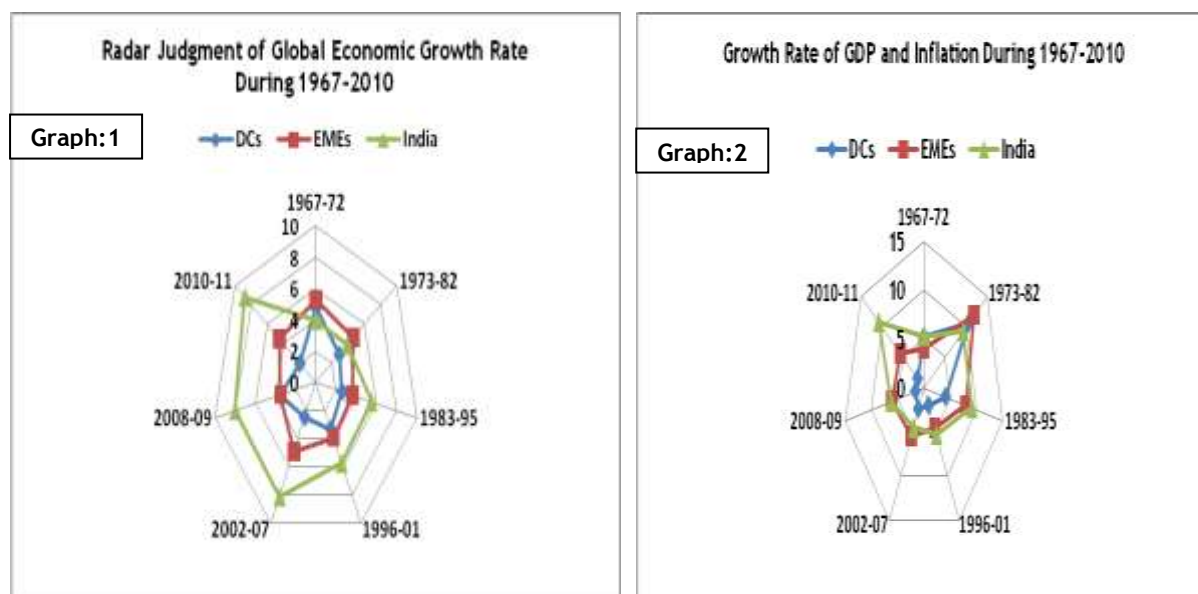
Economic Growth and Oil Price Trends

Oil has always been an indicator for economic stability in modern times, much due to the World's high dependence on oil products. Furthermore, the price of oil is of critical importance to today's world economy, given that oil is the largest internationally traded good, both in volume and value terms (creating what some analysts have called a "hydrocarbon economy"). In addition, the prices of energy intensive goods and services are linked to energy prices, of which oil makes up the single most important share. Finally, the price of oil is linked to some extent to the price of other fuels (even though oil is not fully substitutable for natural gas, coal, and electricity, particularly in the transportation sector). For these reasons, abrupt changes in the price of oil, have wide-ranging ramifications for both oil producing and consuming countries. Thus, the prevailing view among economists is that there is a strong relationship between the growth rate of the world and oil-price changes. But whether the oil price can be seen as an economic indicator on GDP growth is however not as clear (Adelman, 2004).

Impact of OPEC on India

Although India partly subsidizes few products of the refined petroleum to check inflation and it extracts huge tax revenues from import of crude oil. The rate of change of market prices of refined products largely remains unaltered compared to the fluctuations in the international market largely due to regulated pricing mechanisms. As a result, India is suffering from vast fiscal deficits and is reflected in the recent outstanding balance of payment to Iran. Iran, is India's second biggest crude oil supplier after Saudi Arabia, accounting for about 13.0 percent of its total crude oil imports. If the present issue of payment with Iran remains unsolved it would potentially hit Indian imports of 400,000 barrels per day of Iranian crude oil, forcing Asia's third-largest economy to look for more expensive alternatives that would swell its already high current account deficit (Ajith Basil, 2011). After 2006, India has steadily moved its oil imports and made Saudi Arabia is the largest oil source by 2010. Given a growing convergence with Saudi Arabia even on security issues, India is likely to find that both the Saudis and the UAE would be more than willing to make up the loss of oil imports from Iran (Ajith Basil, 2011).

Global Economic Growth Rate and Inflation



Source: Oxus Research Report 2011

Growth in Developed Countries' (DCs)

These have seen a steady fall in their GDP growth from about 5.0 percent in the late sixties to near 2.5 percent until the Great Recession of 2008. How long the developed countries take to return to 2.5 percent growth is a subject of much debate, if not speculation. But it is important to note that

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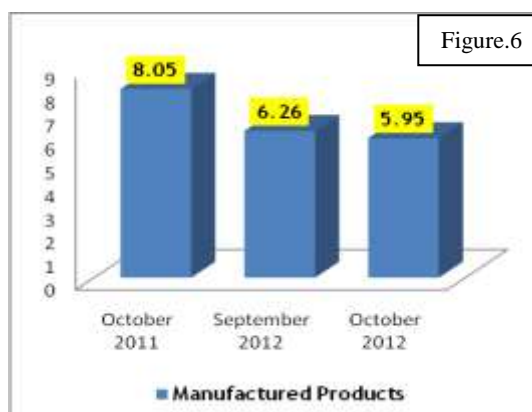
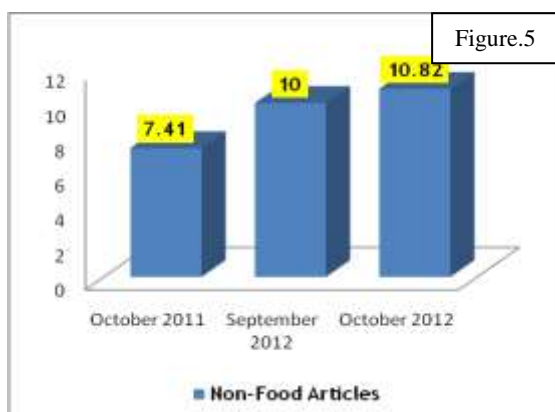
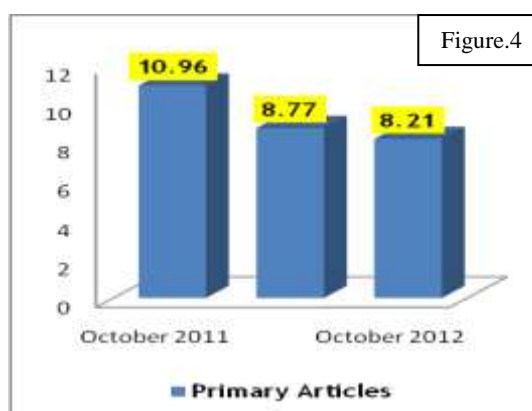
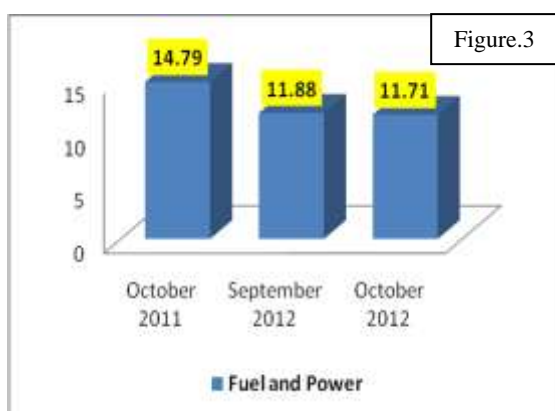
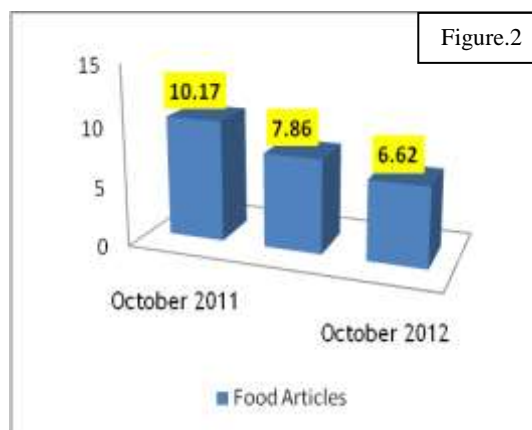
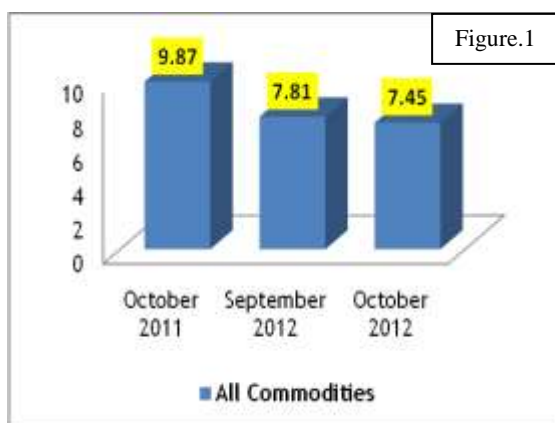
2.5 percent growth was the “norm” during the go-go growth years preceding the recession. The story of GDP deflator inflation in the DC economies is one of gradual decline (excepting the oil price decade 1973-1982) to around 2.5 percent per year during 2002-2007. Somewhat surprisingly, aggregate GDP deflator inflation has declined in the Western world by almost a full percentage point to 1.5 percent in the commodity boom period 2008-2010 (**Surjit Bhalla et al, 2011**).

Emerging Market Economics (EMEs)

If you had to pick a number for the median growth over the last near 50 years for EMEs, it would be 4.5 – 5.0 percent. The Latin American debt crisis, and its after-math, brings down the median growth to slightly less than 4.0 percent during the 1980s and 1990s. And since the dawn of the new century, EME growth is back to near 5.0 percent. EME inflation follows a similar path to DC inflation. After ranging around the double digit level for some 20 years after the first oil price hike of 1973, EME inflation has declined somewhat precipitously to only 5.0 percent for the period 1996 to 2007. Post the Great Recession and despite food and oil prices ranging at record levels, EME inflation is less than one percentage point higher than the halcyon and calm period 1996 to 2007.

The Case of India

That India started to break out from the pack in the 1980s is clearly brought out by the data on GDP growth. From near 4.0 percent, Indian growth accelerated to the 5.5 percent range for the twenty odd years: 1980-2001. The growth gap with other emerging economies during this period: approximately 2.0 percentage points higher for India. From 2002 onwards, India has grown steadily at 8.0 percent plus, and the growth gap has doubled to about 4 percentage points. India follows a near identical path to other emerging economies until 2009. But something seems to have gone dreadfully wrong since then. Indian inflation jumped to 10.6 percent from an average of 6.3 percent during the preceding two years (**The World Bank, 2012**). It is this fact that perhaps propelled the RBI to take extreme action. But appearances can be deceiving – which is appearance, and which is deception, is the subject matter for extreme analysis.



Source: The Hindu November 15, 2012

The above figures 1 to 6 exhibit the overall in Indian's economy Inflation dropped marginally to 7.45 percent in October as price increases in some food items such as rice and pulses eased during period. Inflation as a measure of Wholesale Price Index (WPI) stood at 7.83 percent in September 2012 and at 9.73 percent in October last year (2011). The inflation rate for fuel and power decreased marginally to 11.71 percent in October 2012 from 11.88 percent in September 2012 on drop in aviation fuel prices. However the price rise of liquefied petroleum gas (LPG) and high speed diesel saw a marginal increase during the period 2012 (**The Hindu, 2012**).

There is always a direct relation between prices of certain commodities and inflation. Let's take the price of oil. Price and inflation are connected in a cause and effect relationship. Oil is a major input in the economy - it is used in critical activities such as fueling transportation - and if input costs rise, so does the cost of end products. However, even when inflation comes down, prices in the market do not come down immediately. The reasons may be many. Inflation comes down due to: fall in consumption, low industrial output, fall in industrial commodity prices, especially crude, steel, etc., and Industrial slowdowns. Market prices for ordinary citizen are not like that. When supply is more than demand, industries slow down the output and the prices go up. When Inflation is down RBI reduces the interest rate, and prime lending rate, which increases the liquidity in the economy. Excess money is then often used for speculation with traders cornering the stock and creating artificial scarcity, thereby increasing the prices or not letting it come down.

Production and Consumption of Petroleum Products in India

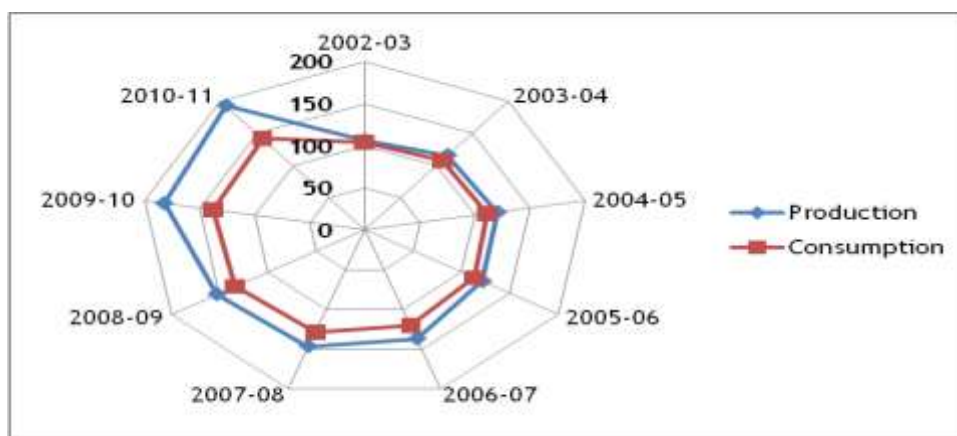
There was an increase of 5.78 percent in production of petroleum products during 2010-11 compared to the year 2009-10. The indigenous consumption of petroleum products increased by 2.88 percent during 2010-11 compared to the previous year. During the year 2010-11, net consumption of petroleum products was 141.785 MMT against total production of 192.532 MMT. Year-wise production and consumption of petroleum products during 2003-04 to 2011-12 are illustrated in the Table-1 and Graph-3 below. It is evident from Table-1 that production and consumption of petroleum products are substantially higher than in the overall periods.

Table-1 Production and Consumption of Petroleum Products (In MMT)

Year	Production	Growth Rate	Consumption	Growth Rate
2002-03	106.51	-	104.126	-
2003-04	115.783	8.71	107.751	3.48
2004-05	120.819	4.35	111.634	3.6
2005-06	121.935	0.92	113.213	1.41
2006-07	137.353	12.64	120.749	6.66
2007-08	146.99	7.02	128.946	6.79
2008-09	152.678	3.87	133.599	3.61
2009-10	182.012	19.21	137.808	3.15
2010-11	192.532	5.78	141.786	2.88

Notes: * Includes LPG Production from Natural Gas ** Excludes Refinery fuels and includes imports also. Source: GOI: Ministry of Petroleum and Natural Gas, New Delhi

Graph-3: Radar Judgments of Production and Consumption of Petroleum Products During 2002-2010



Source: Table 1

Imports and Prices of Crude Oil

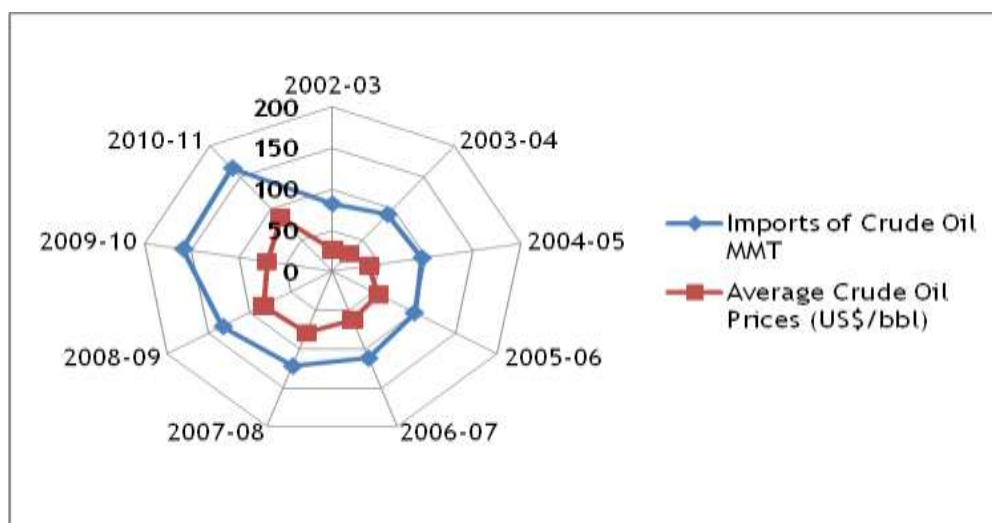
Imports of Crude Oil during 2010-11, was 163.594 MMT valued at Rs.4,55,909 Cr, and this marked an increase by 2.72 per cent in quantity terms 159.259 MMT during the year 2009-10 and an increase by 21.45 percent (Rs.3,75,378 Cr) in value terms over the year of 2009-10. In terms of US\$, the extent of increase in value of Crude imports was 25.73 percent. It may be noted that the imports of crude oil has doubled during this period, when analyze in relation to imports in 2002-03. During this period, the average price of International crude oil has increased from US\$ 26.59 per barrels in 2002-03 to US\$ 85.09 per barrels in 2010-11 i.e. an increase of about 220 percent. The trend in growth of crude oil imports and crude oil International prices are depicted in the Table-2 and Graph-4.

Table -2 Imports of Crude Oil and average Crude Oil Prices

Year	Imports of Crude Oil MMT	Per cent in Growth	Average Crude Oil Prices (US\$/bbl)	Per cent in Growth
2002-03	81.989	-	26.59	-
2003-04	90.434	10.3	27.98	5.23
2004-05	95.861	6	39.21	40.14
2005-06	99.409	3.7	55.72	42.11
2006-07	111.502	12.16	62.46	12.1
2007-08	121.672	9.12	79.25	26.88
2008-09	132.775	9.13	83.57	5.45
2009-10	159.259	19.95	69.76	-15.77
2010-11	163.594	2.72	85.09	21.97

Source: GOI: Ministry of Petroleum and Natural Gas, New Delhi

Graph-4 Percentage Growth in Imports of Crude Oil & Average International Crude Oil Prices During 2002-2010



Source: Table 2

Imports and Exports of Petroleum Products:

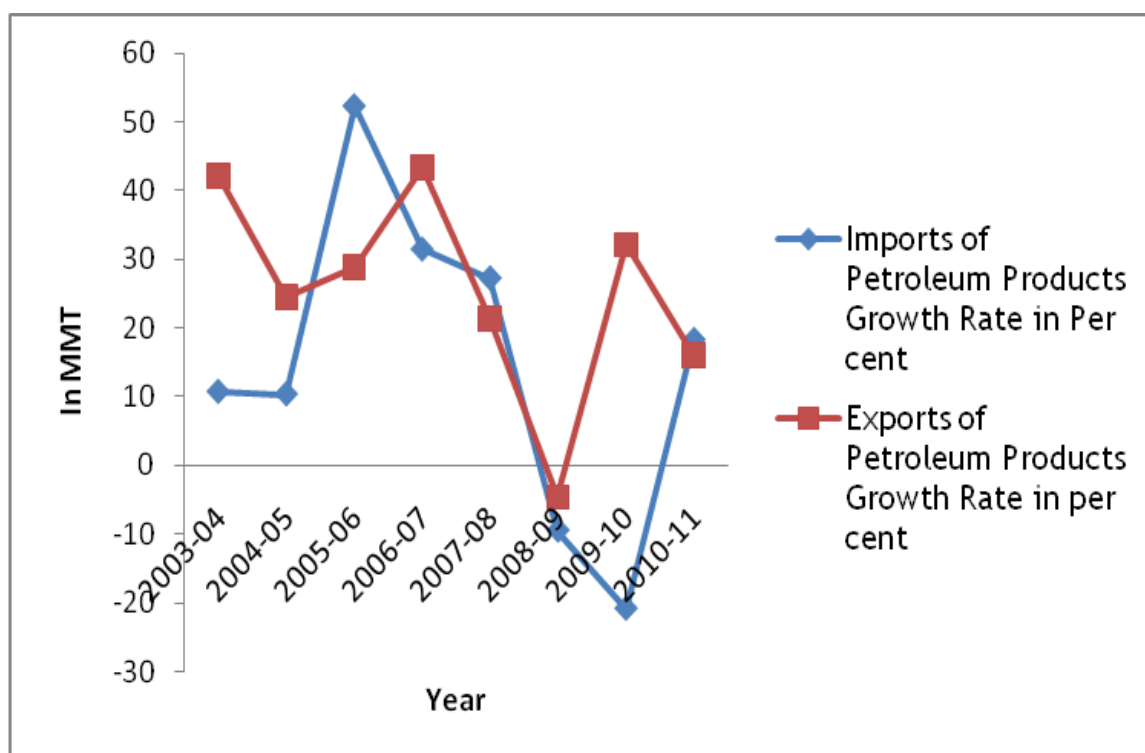
It may be seen that despite considerable variations in International prices of crude oil, imports have followed a steady growth primarily to meet domestic demand of a burgeoning economy, apart from re-exports of petroleum products. With substantial increase in refining capacity in India, exports of petroleum products have picked since 2002-03 although declined shortly in 2008- 09 due to slowdown in global economy. Exports of petroleum products during 2010-11, in terms of quantity was 59.133 MMT valued at Rs.1,96,112 Cr, which marked an increase of 16.01 percent in quantity terms (50.974 MMT during the year 2009-10), and an increase of 36.15 percent (Rs 1,44,037 Cr) in value terms in Indian rupees over the year of 2009-10. In terms of US\$, the extent of increase of exports in value was 41.12 percent. The exports of petroleum products, it may be seen, has steeply increased by 475 percent up to 2010-11. Imports of petroleum products are relatively limited with greater focus on imported crude oil to utilize domestic capacity as may be seen in Table-3 and Graph-5 below:

Table -3 Imports and Exports of Petroleum Products

Year	Imports of Petroleum Products	Per cent in Growth	Exports of Petroleum Products	Per cent in Growth
2002-03	7.228	-	10.289	-
2003-04	8.001	10.69	14.62	42.09
2004-05	8.828	10.34	18.211	24.56
2005-06	13.44	52.24	23.461	28.83
2006-07	17.66	31.4	33.624	43.32
2007-08	22.462	27.19	40.779	21.28
2008-09	18.524	-9.5	38.902	-4.6
2009-10	14.662	-20.85	50.974	32.15
2010-11	17.337	18.24	59.133	16.01

Source: GOI: Ministry of Petroleum and Natural Gas, New Delhi

Graph-5 Growth Rate of Imports and Exports in Petroleum Products



Source: Table 3

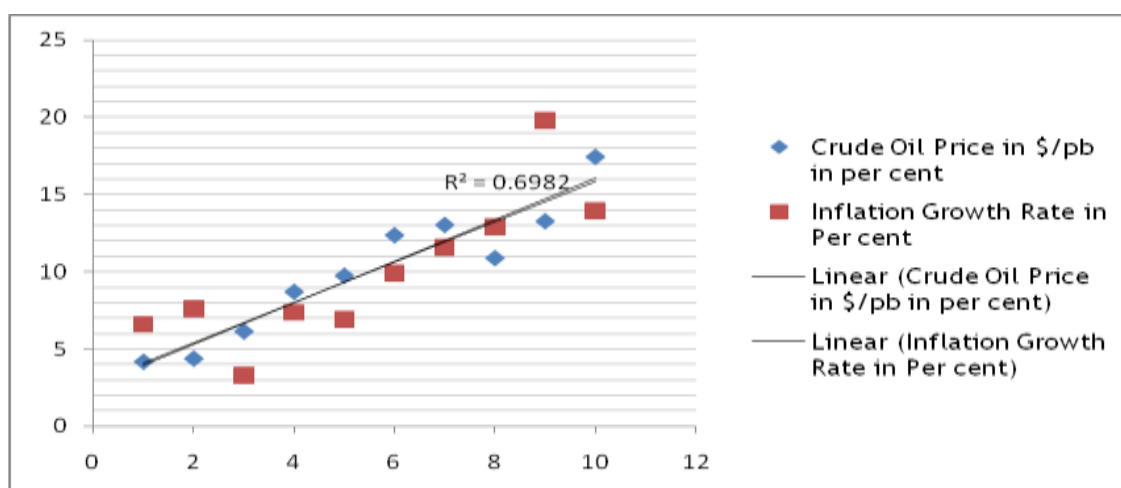
Table 4: Crude Oil Price Behaviours and it's Inflation Growth Rate in India and

Association Between Crude Oil Price and Inflation Rate

Year	Crude Oil Price in \$/pb	Inflation Growth Rate	Crude Oil Price in \$/pb in per cent	Inflation Growth Rate in Per cent
2002-03	26.65	4.5	4.15	6.6
2003-04	27.97	5.12	4.35	7.59
2004-05	39.21	2.23	6.11	3.30
2005-06	55.72	4.96	8.68	7.36
2006-07	62.46	4.65	9.73	6.90
2007-08	79.25	6.67	12.35	9.89
2008-09	83.57	7.81	13.02	11.59
2009-10	69.76	8.7	10.87	12.91
2010-11	85.09	13.33	13.26	19.78
2011-12	111.85	9.41	17.43	13.96
Total	641.53	67.38	100	100
CGR	15.2	13.3	-	-

Source: GOI: Ministry of Petroleum & Natural Gas, New Delhi

Graph 4: Correlation between on Crude Oil Price and Inflation Growth Rate



Source: Table 4

The table 4 and Graph 6 analysis that the relation is positively correlated for crude oil prices and inflation growth rate during 2002-2011. The price of oil and inflation are often seen as being connected within a cause and effect framework. As oil prices move up or down, inflation follows in the same direction. The Pearson Correlation value is 0.726 is a positive relationship between crude oil prices and inflation growth rate. In the form of oil has been frequently increasing. At the same time the world oil prices have also constantly increased. The oil prices have started rising significantly since the beginning of the twenty first century. The immediate effect of the oil price shock is the increased cost of production due to increased fuel cost. As a result of inflation in the economy, the cost of production would also rise and inturn causing a decrease in supply. On the other hand, inflation implies a fall in the purchasing power of people; in short, oil price fluctuation has adverse effects on the economy (Jose De Gregorio et al, 2007).

Conclusion

The oil age went into decline roughly ten years ago. Oil's share of total global energy demand, which had been on the rise since the 1930s, peaked in the mid-1970s but held steady for over twenty years until the new millennium. But starting early last decade, through a combination of oil's re-pricing and the industrialization in the Non-OECD, oil's market share in the global energy mix retreated. This decline of oil in the global economy explains perfectly why the weak rebound since 2008 financial crisis which has grown along the contours of the power grid.

Economic development and energy are deeply inter-related. Affordable energy is critical for sustaining economic growth and for improved living standards of its population, which in turn is driven by increasing energy consumption. Hence, it is recognized that energy security in a fast developing economy like India is of strategic importance and energy needs of the country, In the first half of the last fortnight, Crude oil price decline in overall global market due to fall in value of greenback. Controlled for oil intensity, we found that the decline in the economic intensity of oil use over the years helps to explain the limited impact of more recent oil shocks on inflation.

Therefore one can conclude that a significant part of the decline in the oil pass-through around the world is explained by the reduction in the effects of exchange rate changes on inflation and by declining oil intensity. However, our estimates show that, even after controlling for these factors, part of the decline in the oil pass-through remains unexplained. Mankind is using up world's energy resources in a way no other animal has ever done now petroleum based fuel economy is ruling our world. Although we have developed so many alternative fuels, they are still able to meet only small proportion of our actual demand globally.

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References

Ajith Basil (2011) Working Report on “OPEC and its influence on Price of Oil” Energy Sector Structure Policies & Regulations, pp.1-14.

Amalendu Bhunia and Somnath Mukhuti (2012) “An Empirical Association between Crude Price and Indian Stock Market” International Journal of Business and Management Tomorrow Vol. 2 No.1

Anshul Sharma et al (2012) “impact of Crude oil Price on Indian economy” International Journal of Social Sciences and Interdisciplinary Research, Vol.1, No.4, pp. 95-99.

Arvind Jayaram (2012) “Global Crude Oil Production, Changing Crude oil Equation” The Hindu Business Line, pp.8

Jose De Gregorio et al (2007) “Another Pass-through bites the dust? Oil Prices and Inflation” Central Bank of Chile Working Papers, No.417

Latife Ghalayini (2011) “The Interaction between Oil Price and Economic Growth” Middle Eastern Finance and Economics; Issue.13, pp.127-140

Mohd Shahidan Shaari et al (2012) “The Effects of Oil Price Shocks and Exchange Rate Volatility on Inflation: Evidence from Malaysia” International Business Research, Vol. 5, No. 9, pp.106-112

P&BD Group (2011) “Economy Mirror” Corporate Planning and Economic Studies Vol.17

Surjit S. Bhalla et al (2011) “Indian Inflation: Populism, Politics and Procurement Prices” Developing Trends, Oxus Research Report, Vol.1, Issue.2, pp. 1-12

The World Bank (2012) “India Economic Update” Economic Policy and Poverty Team, South Asia Region

<http://www.un.org/esa/policy/wess/wesp.html>

<http://omrpublic.iea.org/>

http://www.opec.org/opec_web/en/

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