

## Impact of High Oil Prices on Pakistan's Economic Growth

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### Abstract

*This paper discussed the impact of higher oil prices on the Pakistan's economy during 1990 to 2008. Pakistan is not oil producing rather oil-importing country. An increase in oil price leads to inflation, increase budget deficit and puts downward pressure on exchange rate which makes imports more expensive. The rising oil prices are the major concern for all the developing economies and Pakistan is suffering from it too. The increase in oil price has further effect the daily consumption pattern of households badly. This study analyzes that, how change in real crude oil price effects the real GDP positively and many other factors differently. For example, a lower government spending, a higher real stock price and a lower interest rate would raise real output for Pakistan.*

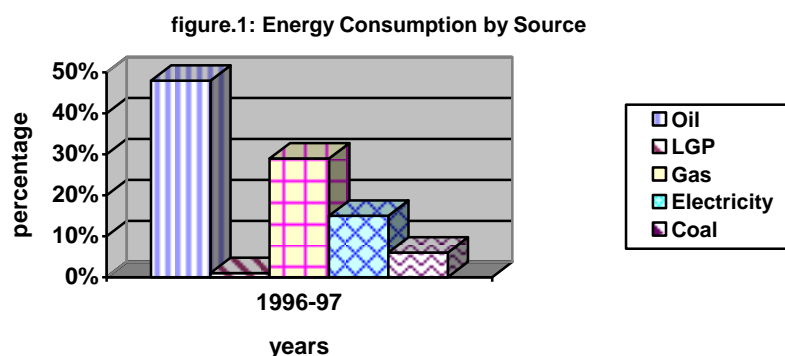
**Keywords:** Expected inflation rate, Energy consumption, Crude oil

**Jel Classification Codes:** O13, Q43, Q47

### Introduction

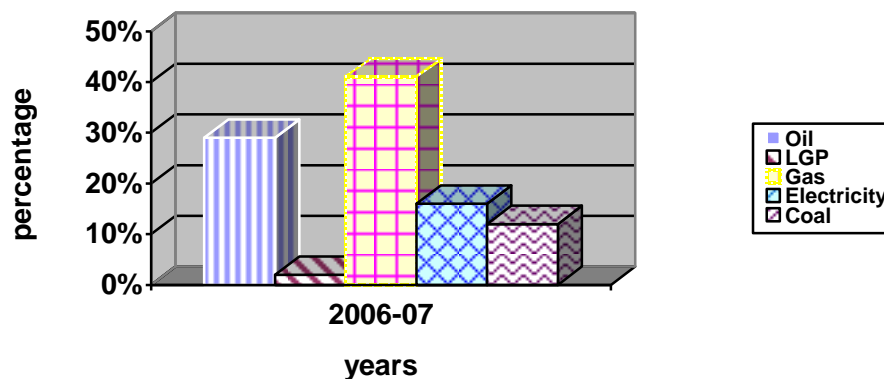
Oil prices are always debatable and remain an important variable in determining the economic activity of any country. The size of oil prices increase depends on the i)- share of the cost of oil in overall GDP, ii)- the degree of dependence on oil (total value of import oil) and iii)- consumption of oil domestically, and iv)- dependence on alternative sources of fuel. It was already projected and estimated globally that the oil demand is expected to increase ninety eight millions barrels/ day in next four year (2015) and 118 millions barrels / day during next twenty years (in 2030). The time of cheap availability of all kinds of fuel has gone because of fast increase in population, which ultimately increase the demand for energy domestically and national and overall worldwide. The price of fuel has tendency to increase further till the demand growth is curbed and new technologies are introduced which reduces dependency on oil. In Pakistan, the justification for this increase is given by Oil and Gas Regulatory Authority (OGRA) on various grounds. Huge rise in world oil price shifted the burden to the consumers as government is already running severe losses and equally shifted this burden to households. Also consumption of kerosene oil, diesel oil and petroleum products at household level also increase. OGRA also justifies to shift this burden to household to some extent which disturb their food budget also.

There has been a continuous increase in the energy consumption in Pakistan since 1996-97. The major change in energy mix has taken place in the share of oil and gas consumption, the major consumption out of all energy sources are gas and oil consumption. The share of gas has increased from 29 % to 41% during 1996-97 to 2006-07 (Figure 1), and the share of oil in total energy consumption mix has declined from 48 % in 1996-97 to 29 % to 2006-07 (Figure 2).



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figure.2 Energy Consumption By Source



As Figure.2 shows around 41 % need of energy is provided by the indigenous gas, 29 % met by domestic and also by oils imports. LPG is only 2 %, nuclear and coal share to energy use is 16 % and 12% respectively, while the petroleum products consumption is overall large exhibiting a declining trend, particularly since 2000-01, the consumption of gas, coal and electricity are showing a rising trend.

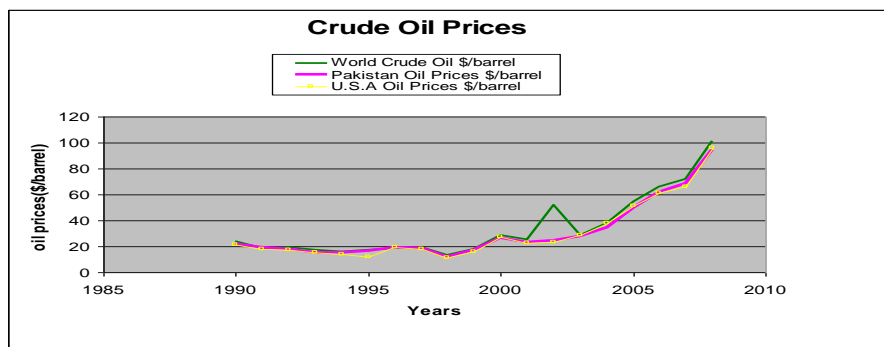
1.2: Comparison of Crude Oil Prices

Table1: Comparison of Crude Oil Prices

Years	World Crude Oil \$/barrel	Pakistan Oil Prices \$/barrel	U.S.A Oil Prices \$/barrel
1990	23.83	22.17	21.51
1991	18.44	19.18	18.15
1992	19.5	18.24	17.39
1993	17.14	15.65	15.3
1994	15.88	15.39	14.27
1995	17.01	16.75	11.91
1996	18.56	19.4	19.41
1997	19.31	18.71	17.92
1998	13.27	12.15	11.47
1999	18.03	17.38	16.3
2000	28.75	26.83	27.45
2001	25.05	23.11	22.83
2002	52.3	24.34	23.32
2003	28.68	27.67	28.46
2004	37.72	34.56	37.71
2005	54.35	50.26	51.26
2006	65.82	62.17	61.17
2007	72.31	68.73	65.73
2008	101.38	94.77	95.77

Pakistan Energy Yearbook 2008

Figure.3: Crude Oil Prices



The above figure shows that the comparison of crude oil prices of World, USA and Pakistan from 1990 to 2008. It is shown that from year 1990 to 1995, the oil prices of Pakistan and USA are equivalent to world oil prices. In 1995, Pakistan's oil prices are equivalent to world oil prices while USA's oil prices fall down. Then from 1996 to 2001, there is not much difference in oil prices but again in 2003, world oil prices increased as compared to USA and Pakistan's oil prices and in 2002 to till now oil prices of all worlds got almost equivalent. Hence, the above graph showed that in years 1995 and 2002 a great slump in crude oil prices of USA and world respectively and Pakistan's oil prices are rising frequently.

### **Literature Review**

Ghani (2007) analyzed that we produced about 20 percent of our oil requirements. Due to shortcoming efforts to find new reserves and greater consumption, this percentage will fall coming next years which will result in quantitative pressures. Ishaque (2007) studied that world economy has been hit hard by a sudden jump in oil prices recently. Abstract of oil prices, are highly associated with stints of inflation and moving towards the economic instability from the last 30 years, have risen sharply and consistently. Global oil demand, currently around 85 million barrel a day, is likely to touch 116 million barrels a day by 2030. prices of oil and inflation rate are directly proportional and always change in the same direction, which oftenly offset the budget of the government and is made them deficit, which ultimately burden to the transport user with an increase in the prices of all kinds of fuel. Higher oil prices touching \$100 a barrel will hit domestic economy hard. It is not the question of oil importing countries or low income countries but also the concern of high income and oil exporting countries.

H-Kazim (2007) analyzed that Pakistan's daily crude oil production has remained significantly low compared to the demand. To facilitate development of alternative energy sources, the develop countries are trying to keep crude oil prices above \$50 a barrel. However, the blame OPEC for rising crude oil prices.

Saleem (2007) reviewed that the government reviews fuel prices every two weeks, but despite increasing in global oil prices, fuel prices were not heighten in the country during the last 19 months to save the public from additional financial burden. According to caretaker Finance Minister Dr. Salman Shah, the fuel prices adjustment will not be done in one go. We will be increasing prices gradually. He said the fuel prices were being adjusted according to budgetary targets. "We have to keep in mind many things- our targets, the state of the economy, and the inflationary impact".

Fazal-e-Haider (2007) discussed that Balochistan is rich in gas and oil resources. PPL (Pakistan petroleum limited), Pakistan's largest production of petroleum and exploration company, has also been leading the field of gas and oil exploration for many years in the province.

Husing, Yu (2007) evaluated the function given in an open economy using monetary policy, the study found that it is not necessary that increased prices of oil always reduce GDP growth/ output it may or may not reduce the output, and this was proved for German, and he obtained nonlinear relationship between the real crude oil price and real output for German economy.

Ishaque (2008) suggested that there are three types of economic impacts with an increase in the price of oil for Pakistan's economy. One,  $\zeta_{pd}$  (Price elasticity of demand) in the short run for petroleum related products is very low because of increased cost of oil import. Two, the international prices of oil have not been shifted to domestic consumers of oil and this led to further enhance the inflation. Three, with these two effects, overall GDP growth effects overall either by the direct change in the fuel prices or by the adjustment made due to increase in prices of oil or both.

Bashar (2008) quoted Mohammad Wasi Khan, President \$ CEO Boscior, said that there are some basic factors which usually make the difference in oil prices internationally and in the domestic market. The major factor determining oil prices is of course the supply and demand. The D (demand) and S (supply) is not a simple matter: one has to look into complexities of this factor. Another overwhelming factor distributing oil prices is the rate of exchange following weakening of the US dollar. Hence the major factor for oil price hike is the weakening of the dollar against different currencies.

H-Kazami (2008) said that Crude oil price have touched its peak of more than \$145/barrel has receded to nearly half. As the developed countries are plunging into deeper into financial problems it is feared that price may go below \$50/bareel. Neither the OPEC nor the US is interested in letting the prices slip below \$75/bareel.

Asghar (2008) viewed and named winter fuel supply crunch for the year 2008, for such a huge price of \$100 a barrel in early 2008, rather continuous increase in the price of oil and making new records every next day, obsessed by a sprawling dollar, political instability. A slither in the dollar was one factor behind the convention in oil prices. Some patrons bought oil in large quantity to protect themselves against the continuously weakening dollar. The continuous boom in price of oil created worries for oil importing countries as they have to bear the high economic cost.

Ishaque (2008) suggested that Oil prices affect the whole economy due to various factors including cost of production, income effects, reallocation of resources, terms of trade and by uncertainties. In Pakistan, falling foreign exchange reserves have created immediate problem of oil import. Primary causes of sudden fall in oil prices deeply concerns with energy demand that was shrinking because of a US-led global economic slowdown. As a matter of fact among all major developing countries, Pakistan during 2008 had the worst levels of foreign deficit and inflation of GDP of about 8.5 % and 17% respectively; it was the weakest and most vulnerable situation for Pakistan’s economy.

Bashar (2008) criticized on statement of Khan, for the unusual increase in the international oil prices and sharp decline in prices suddenly, viewed that there were some fundamentals as well as some sentimental which played a role in pushing up the oil prices. The primary reasons for price hike were the increase in demand globally as well as advance purchases anticipating future demand. The geo political conditions in different regions also aggravated the situation. However, the primary reason of rising oil prices was depreciation of different currencies including dollar and exchange rate.

Malik, (2008) studied the possible outcomes and confronts presented of increase in oil prices in Pakistan. The continuous increase in the international oil prices had affected negatively the BOP (balance of payment) and the budgetary position of Pakistan and added inflationary pressures on the economy.

In less developed countries like Pakistan, most of the fuel is used by transporters, farmers and heavy machines and indirectly consumers have to pay, which effects their households budget through the increase in the food prices.

***The Model***

The macroeconomic model [Romer (2000, 2006), Taylor (1993, 1999, and 2001)], in order to see the impact of oil price increase in Pakistan can be expressed as:

$$s = s(y, r, g, t, ps, ee, po) \tag{1}$$

$$r = (\pi - \alpha, y - \beta, ee - \delta, rw^*) \tag{2}$$

$$\pi = \pi^e + \lambda(y - \beta) - \phi.ee + \theta.po \tag{3}$$

Where

- y = real GDP,
- r = the real interest rate,
- g = real government spending,
- t = real government revenues,
- ps = the real stock price,
- ee = the real effective exchange rate,
- po = the real crude oil prices,
- $\pi$  = the inflation rate,
- $\alpha$  = the target inflation rate,
- $\beta$  = potential output,
- $\delta$  = the target real effective exchange rate,
- $rw^*$  = the real world interest rate,
- $\pi^e$  = the expected inflation rate, and
- $\lambda, \phi, \theta$  = positive parameters.

Note that equation (1) is an open economy IS function, equation (2) is a monetary policy function, and equation (3) is an augmented Phillips curve.

Let

$$0 < s_r < 1, s_r > 0, s_g > 0, s_{ps} > 0, s_\varepsilon < 0, s_{po} > \text{or} < 0, \\ r_\pi > 0, r_y > 0, r_{ee} < 0, r_r > 0, \pi_y = \lambda > 0, \pi_{ee} = -\phi, 0, \pi_{po} = \theta > 0.$$

Note that the sign  $s_{po}$  is not clear for Pakistan because of possible reduction in the quantity of oil importing or consumption due to higher oil price and energy-saving measures. Solving for the three endogenous variables of real output, the real interest rate, and the inflation rate, we have the equilibrium real GDP.

$$\bar{y} = \bar{y}(p_o, g, t, ps, ee, rw^*, \pi^e; \alpha, \beta, \delta, \lambda, \phi, \theta). \quad (4)$$

The Jacobian for the endogenous variables has a positive sign:

$$|J| = (1 - s_y) - \lambda r_r r_\pi - s_r r_y > 0. \quad (5)$$

With increase in real crude oil price rises, aggregate government expenditures is not necessarily decreasing it may or may not fall.

$$\frac{\partial \bar{y}}{\partial p_o} = (s_{po} + \delta s_r r_\pi) / |J| > \text{or} < 0. \quad (6)$$

Government deficit is expected to enhance real output in the shot run:

$$\frac{\partial \bar{y}}{\partial g} - \frac{\partial \bar{y}}{\partial t} = (s_g - s_t) / |J| > 0. \quad (7)$$

$$\frac{\partial \bar{y}}{\partial ps} = s_{ps} / |J| > 0. \quad (8)$$

Real exchange rate appreciation may or may not increase real output, depending upon whether the negative impact of the appreciation would be more or less than the positive impact of a lower real interest rate caused by a lower inflation rate due to exchange rate appreciation:

$$\frac{\partial \bar{y}}{\partial ee} = (s_{ee} - \phi s_r r_\pi + s_r r_{ee}) / |J| > \text{or} < 0. \quad (9)$$

Bahmani and Miteza (2003) also not defined the clear effect of devaluation of currency, depending testing, and all other related factors. The model for a nonlinear relationship between real output and the real oil price may be a quadratic function for an empirical work. If the coefficient of the quadratic term is negative but significant, real output and the real oil price exhibit a Inverted U-shaped relationship. It indicates when the real oil price is less than the critical value there is a positive relationship and a negative relationship when that real oil price is greater than the critical value.

### Estimated Model

#### (i). Model 1

The estimated form of the IS Model is as follow:

$$y = y(z_1, z_2, z_3, z_4, z_5, z_6) \\ \ln y = \zeta_0 + \zeta_1 \ln z_1 + \zeta_2 \ln z_2 + \zeta_3 \ln z_3 + \zeta_4 \ln z_4 + \zeta_5 \ln z_5 + \zeta_6 \ln z_6 \quad (11)$$

#### Explanation of Variables:

- y = Real GDP in millions,
- z<sub>1</sub> = The real interest rate in percentage,
- z<sub>2</sub> = CPI in percentage
- z<sub>3</sub> = the real government spending in percentage,

z<sub>4</sub> = The real government revenues in percentage,  
 z<sub>5</sub> = The real stock price in percentage,  
 z<sub>6</sub> = The real crude oil prices \$/barrel.  
 ζ<sub>0</sub> = constant

**Table 2: Dependent Variable: Y**

Variables	Coefficient	S.E.	t-statistics
Constant	3.23	0.23	1.22
z1	-0.03	0.05	-2.31*
z2	0.53	0.06	18.81***
z3	0.16	0.07	1.48**
z4	0.05	0.21	0.47
z5	0.03	0.02	2.18*
z6	0.08	0.03	4.77**
R-squared	0.95	Mean dependent var	4.53
Adjusted R-squared	0.93	S.D. dependent var	0.05
S.E. of regression	0.07	Akaike info criterion	-6.83
Sum squared resid	0	Schwarz criterion	-6.44
Log likelihood	64.63	F-statistic	192.17
Durbin-Watson statistic	1.91	Prob(F-statistic)	0

\* Significant at 5%, \*\* Significant at 10%, \*\*\* Significant at 1%

$$y = 3.23 - 0.03z_1 + 0.53z_2 + 0.16z_3 + 0.05z_4 + 0.03z_5 + 0.08z_6$$

(-2.31) (18.81) (1.48) (0.47) (2.18) (4.77)

We have estimated the macroeconomic model given in equation (4), incorporating the data for Pakistan during twenty nine years (1990-2009). Real GDP is taken as dependent variable while explanatory variables include the real interest rate, consumer price index (CPI), the real government spending, the real government revenues, the real stock prices and the real crude oil prices. The model is estimated in double-log form as mentioned in equation (11). Regression Results are shown in Table 6 most of the explanatory variables are shown significant and positive impact on real GDP Growth rate. Prices of crude oil shows highly significant impact on real GDP growth, estimated coefficient of crude oil is 0.10 which shown the elasticity of real GDP with respect to crude oil price. It indicates that 1 percent change in oil price will change the real GDP by less than 1 percent (0.08) i.e. less elastic price response of crude oil.

Inflation is also incorporate here interim, of cost of price index (CPI) z<sub>2</sub> which is 0.52 less elastic but has highly significant impact on real GDP Growth. It further explains that 1 percent increase in inflation (CPI) will increase real GDP by half (0.52). The elasticity of government revenues and the government expenditures are less than unity. Also, government expenditure shows growth i.e. 1 percent increase in government expenditure will increase the real GDP Growth by 0.16 percent only., while the government revenues are nominal even less than government expenditures and also insignificant. Stock prices also played nominal role in enhancing real GDP but has significant impact in t-statistic is 2.18. Overall, model is best fit and explains 95 percent variation.

**(ii): Model 2**

The estimated form of the IS Model is given below:

$$y = y(z_1, z_3, z_4, z_5, z_6)$$

$$\ln y = y(\ln z_1, \ln z_3, \ln z_4, \ln z_5, \ln z_6)$$

$$\ln z = \eta_0 + \eta_1 \ln z_1 + \eta_3 \ln z_3 + \eta_4 \ln z_4 + \eta_5 \ln z_5 + \eta_6 \ln z_6 \tag{12}$$

**Explanation of Variables:**

y = Real GDP in millions,  
 z<sub>1</sub> = The real interest rate in percentage,  
 z<sub>3</sub> = The real government spending in percentage,  
 z<sub>4</sub> = The real government revenues in percentage,  
 z<sub>5</sub> = The real stock price in percentage,  
 z<sub>6</sub> = The real crude oil prices \$/barrel.  
 η<sub>0</sub> = error term

**Table3: Dependent Variable: Y**

Variable	Coefficient	Std. Error	t-Statistic
C	0.127	0.34	0.373
z1	-0.012	0.012	-0.976
z3	-0.053	0.086	-0.615
z4	0.134	0.11	1.209
z5	0.003	0.017	0.217
z6	0.051	0.026	1.926
y(-1)	0.943	0.064	14.588
R-squared	0.994	Mean dependent var	4.562
Adjusted R-squared	0.991	S.D. dependent var	0.079
S.E. of regression	0.007	Akaike info criterion	-6.698
Sum squared resid	0	Schwarz criterion	-6.359
Log likelihood	60.584	F-statistic	295.379
Durbin-Watson stat	2.643	Prob(F-statistic)	0

\* Significant at 5%, \*\* Significant at 10%, \*\*\* Significant at 1%

We have estimated the macroeconomic model given in equation (4), incorporating the data for Pakistan during twenty seven years (1990-2007). Real GDP is taken as dependent variable while independent variables comprising, the real interest rate, the real government spending, the real government revenues, the real stock prices and the real crude oil prices. The model is estimated in double-log form as mentioned in equation (12). Regression Results are presented in Table7 most of the independent variables presented positive impact on real GDP Growth rate. Prices of crude oil presents highly significant impact on real GDP growth, estimated coefficient of crude oil is 0.051 which present the elasticity of real GDP with respect to crude oil price. It point outs that 1 percent change in oil price will change the real GDP by less than 1 percent (0.051) i.e. less elastic price response of crude oil.

The government revenues which are 0.13 less elastic, has highly significant impact on real GDP Growth. Moreover, it also explains that 1 percent increase in government will increase real GDP by 0.13 percent only. The elasticity of government spending is less than unity and is nominal even less than government revenues. Also, the government spending presents insignificant effect on real GDP 1.2. 1 percent increase in government spending will increase the real GDP growth by 0.05 percent only. Stock prices also played nominal role in enhancing real GDP and has insignificant impact in t-statistic is 0.21. Overall, model is best fit and explains 99 percent variation.

### Description of the Variables

In this chapter data collection and variable description is discussed. The framework of survey is of 27 years (1990-2007) and data was collected from IFS, Pakistan Economic Survey and Energy Year Book. We will analyze some of the variables to analyze the situation of real crude oil prices in our sample. The data is collected from International Financial Statistics (IFS), the Pakistan Economic Survey and Energy Year Book. Real GDP is measured in millions. The real crude oil price is taken in dollar per barrel. The real government spending and revenues is measured in percentage. The real stock price is measured by the nominal share price divided by the consumer price index. The inflation rate is derived from the consumer price index.

Table 2 and table 3 show the estimated regression and related statistics. The Ordinary Least Square (OLS) technique is used. Except for the real government revenues, the coefficient of other variables are significant at all three levels 1 %, 5% or 10%. Real GDP is positively related with the real crude oil price, the real stock price and the real government revenues and negatively affected by the real government spending, and the inflation rate. The data taken from 1990 to 2009, have been tested for stationarity using Augmented Dickey-Fuller (ADF) unit root test with critical values of - 3.54, -2.99, and -2.59 at the 1%, 5% and 10% levels, respectively. All variables are stationary at first difference at the 5% level. Using Johansen test, the null hypothesis that these variables have cointegration relationship, cannot be rejected at the 5% level, also the trace statistic showing the value of 258.758 is greater than the critical value of 159.530.

### Conclusion

The paper tried to explore the relationship of sharp rise in the prices of oi with GP growth of Pakistan for te period of 20 years (1990-2009). A macroeconomic model is analyzed for the purpose. Several results can be drawn.

A sharp rise in the prices of crude oil (CO) affects the output negatively, no matter the price of CO is less than or more than the critical value (Yu Hsing 2007). Therefore, though we have negative impact of CO price with the real output and also same relationship of real government expenditures to CO price is examined but it may suggest that only fiscal policy is not effective to increase GDP growth rather a sound market price is expected to raise the government spending and real output because of wealth effect for the household and effect of balance sheet for the firms ((Mishkin, 1995).

Furthermore, the role of fiscal and monetary policy is briefly highlighted and monetary policy will be more effective indirect effect rather than fiscal policy. Internationally and locally the trend of oil price s on increase and same is the case in Pakistan. Its negative and significant effect on real output needs to be highlighted that sharp increase in the prices of crude oil effects the GDP growth of Pakistan's economy negatively, which is not good sign for the development of any country. It is really need of hour to decrease the inflation and have the lower commodity prices of daily use; government should provide the subsidies to the farmers for electricity consumption and diesel use in villages, and also some support to transporters for fuel in cities. This may lessen the overall prices of all commodities of daily use, and help the poor people to balance their family budgets.

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