Natural Resource Curse: Special Experience Of The Persian Gulf States

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Natural Resource Curse: Special Experience of the Persian Gulf States

A study of the effect of oil and gas resources on economic development pattern in Persian Gulf Countries

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Abstract

This paper attempts to study precisely the natural resource (oil& gas reserves) effect on economic development profile in Persian Gulf region. Health, education and political economic variables in these countries have been tested empirically as to what extent has been influenced by oil wealth. First, we will test if economic growth and development is positively changing with more level of oil and gas reserves in cross-country dataset. Second, we try to chase the oil revenue footprints by comparing development and political indicators in Persian Gulf with comparison of different subcategories of countries with non-linear correlation method. The main finding of this paper is that there is positive economic development pattern based on good performance in health and education variables in Persian Gulf countries but the sustainability of this development is a good issue to consider due to the high dependency of oil economies to a volatile source: "oil"

Keywords: natural resource curse, oil abundant economies, growth, development, sustainable development, Human Development Index, Persian Gulf

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I- Introduction

"You think we are lucky. I don't think so. We are dying of indigestion…it brings trouble. Look around you. Look at this … waste, corruption, consumption, our public services falling apart…and debt, debt we shall have for years. We are putting our grandchildren in debt." Those powerful words were uttered by Juan Pablo Pérez Alfonso, a Venezuelan founder of the Organization of Petroleum Exporting Countries (OPEC), during the heady oil boom of the mid-1970s. It reminds me one of our professor's statements in undergraduate studies who said "Iran will be better off if it was not an oil exporter."

On the other hand from economic history, we have the experience of today's developed countries development during industrial revolution. This emphasizes that the developed countries gained great benefits from their endowments of natural resources in 18th and 19th Century[1]. Also high oil income causes most of the oil exporting countries to be categorized as high income countries in World Bank classification report[2].

There seems to be a paradox behind oil rich countries. Empirical evidence shows slow economic growth for these countries. Natural resources have not been helpful as much as it was expected for countries rich in natural resource. Economists named this paradox the "natural resource curse" when applied to natural resource abundant countries and as "oil curse" in particular for oil abundant countries.

There have been many different studies on the theory of natural resource curse. However, the main study by Sachs and Warner (1997) and (2001), excluded most of the high value

[1] See Wrigley (1988)
[2] World Bank Report- http://econ.worldbank.org/

oil exporting countries located in the Persian Gulf due to the lack of data[3]. Later papers also could not determine the exact natural resource curse effect in Persian Gulf countries which Sachs and Warner (2001) described as "Special Experience of Persian Gulf States"[4]. Also there has been no specific study on the effect of oil revenues on Persian Gulf countries in terms of studying health and education pattern.

This was the main motivation for me to offer an insight into whether the oil curse hypothesis applies to Persian Gulf states. I am interested to study the effectiveness of oil driven economic growth in the Persian Gulf in increasing the quality of people's life.

The first analysis is to run non-linear coefficient correlation tests between economic development indicators and oil and gas reserves data. We are interested in observing the marginal economic development effect of moving from oil poor countries to oil rich countries. The economic development variables are health, education and measures of strength of political institution. Health and education can show us the stage of development process in oil countries whilst political economic variables can show us how sustainable this development will be.

The second analysis attempts to assess the sustainability of development. The sustainability of growth indicators will be tested in the GDP equation ($Y = C + I + G + X - M$) for one example country in Persian Gulf. Also I am interested in attempting to find a long term relationship between oil related components variables (price, revenue, etc) and macroeconomic variables (GDP, G, etc). This analysis is necessary due to some economists justify the oil curse paradox by not entering oil sales as government revenue due to the high level of corruption. This is particularly applicable to African oil

[3] Sachs, Jeffery D. and Warner, Andrew M. (1997) p, (2001) p2
[4] Sachs, Jeffery D. and Warner, Andrew M. (2001) p2

economies. Africa accounts for 11.4% of global oil production, holding 9.4% of the world's reserves, whilst African oil countries have low living standard and poor performance in health indicators. If we find long term relationship among GDP and oil price for example, we can make two main conclusions. The first is that oil has long-term effect on GDP and therefore oil revenues enter in the economy actively. The second conclusion is that by measuring the significant test of related coefficients economically and statistically, we can show to what extent the oil economies respond unstably to changes of oil prices.

I hope to not only avoid biased or erroneous results, but also offer some possible conclusions about the pattern of economic development and extrapolate the net effect of oil revenues in those states where the effect are currently unknown. I want to establish strong argument for why the control group should be developing countries and not high income countries[5]. I will try to discuss different theories in economic growth and how they are related to investment in health and education and make sensible conclusion from the empirical outcome of human accumulation, health and political stability in Persian Gulf countries.

Chapter 2 reviews the literature on natural resource curse theory, critiquing the empirical and theoretical results, while discussing the theories I intend to test also.

In chapter 3, I will provide statistical summary and background for Persian Gulf countries. In chapter 4, the economic modelling has been discussed. In chapter 5, I will introduce methodology, description of the data used, the main results and a sample

[5] If the result of developing countries sub category is consistent with the result of all countries analysis this can be concluded as Robustness Check also.

country for Iran. Chapter 6 offers the possible conclusions and outcomes to improve for future studies.

II-Theoretical Framework and Literature

I need to give a review on growth theories because I am interested to interpret the effect of two main variables, health and education, on economic growth. If health and education have positive effect on growth, then the sign of correlation among “health & education” and “oil& gas reserves” in cross country data set can show me if there is any curse story or success story behind Persian Gulf. This means that if I find that the more countries abundant by oil and gas, the more their government invest on health and education, then oil curse can not be true in oil countries and visa versa. Therefore I believe that it is necessary to take attention on the main economic growth theories to realize why health and education investment is a crucial argue and how they influence growth regression based on economic growth theories.

1- Economic growth

Scientists believe that an economy is an open subsystem of the earth ecosystem. They believe that in every subsystem the main condition of survival, is to grow. To grow means "to increase naturally in size by the addition of material through assimilation or accretion." The material dimension in the economy is good and services. As population grow, the main challenge to survive is to increase amount and variety of good and services in the ecosystem optimally. As it is presented in natural resource curse literature

review we will see that most of the papers have been focused on the growth regression of natural resource abundant countries. This shows the main attention of natural resource economists have been on the quantitative variables for example GDP growth rate, GDP per capita and national income (Y).

In this section it is attempted to address economic growth theories which related to the subject of the paper. Classical economists[6] present basic intuitions of modern theories in economic growth for example competitive behaviour, dynamic equilibrium, diminishing return in physical capital, in human capital accumulation, per capita income interaction with population growth and technological progress. Different theories build on neoclassical methodology such as production function and utility function. In 1928 Ramsey's article was the starting point of modern growth theory. He showed[7] a new aspect of growth theory rather than focusing again on classic production function[8], he offered household optimization theory and optimality condition. However his idea was known in academic literature after several decades. In 1956 Solow-Swan model with concentration on neoclassical form of production function, constant return to scale, diminishing return of input and constant saving rate had been considered remarkably in economic growth theories literature. An important prediction of this model is conditional convergence: The lower the starting level of per capita GDP relative to steady state position is the faster the growth rate will be. This condition has been analyzed by Sachs and Warner (1997), in natural resource curse literature by negative sign of coefficient in

[6] Smith, Adam (1776), Ricardo, David (1817) and Malthus, Thomas (1798).
[7] Ramsey(1982)
[8] Y = f (K, L)

the regression[9]. Another character of this model is that in the absence of continuing technological progress, per capita growth declines[10].

More or less growth theories concern on supply side of economy, Solow model, for example. Growth theories do focus on the allocation of labour, capital, type of production function and adding other effective factors in the growth model like R&D theories, intellectual capital and population growth[11].

Here I try to summarize Solow model as a well known economic growth theory:

2- Mathematical framework – Solow model

We start the model by classic Cobb-Douglas function;

Theory:

$$Y = AK^{a}L^{1-a}$$

Y: Amount of output produce in the economy

K: Physical capital (Including natural resource)

L: Labour (human resource)

A: Level of technology (exogenous)

If we impose this assumption on production function: A>0 and $0 < a < 1$ we will have:

[9] "Conditional Convergence theory: conditional convergence hypothesis, which says that different growth rates between different countries are explained by various characteristics of these countries, whereas high-income countries have lower growth rates than Natural resources: a blessing or a curse 5 low-income countries, all other things equal. Thus, per capita economic growth from period *t*0=1975 to *tT*=1996, denoted by *Gi*=(1/*T*)ln(*YT i* /*Y*0 *i*), negatively depends on initial per capita income *Y*0*i*"- Papyrakis, Elissaios and Gerlagh, Reyer (2003) P. 4

[10] This Prediction also comes from diminishing return of capital assumption

[11] For more information on the different variables that Economists has been tested on Growth, please see the link below; http://faculty-web.at.northwestern.edu/economics/chung/growth/growth.html

$$y = Ak^{a}$$

$y = Y / L$ Out put per capita

$k = K / L$ Capital per capita

GDP Equation in supply side of Solow model:

$Y = C + I + G$

C: Individual consumption

I: Investment

G: Government expenditure

Level of investment is a function of income:

$$I = sY$$

SY: a portion of income at each time will save and whole amount of saving is equal to investment (s: saving rate)

$$I(t) = S(t)$$

Physical capital is a function of depreciation rate (δ) and investment

$$\dot{K}(t) = I(t) - \delta K(t)$$

Growth of population is a function of fertility, mortality and migration. We assume population grows at constant, exogenous rate, $\dot{L} / L = n$

Therefore we have:

$$L(t) = e^{nt}$$

Steady State Solutions:

$$k^* = [sA/(n+\delta)]^{1/(1-a)}$$

$$y^* = A^{1/(1-a)}.[s/(n+\delta)]^{a/(1-a)}$$

$$\dot{k}/k = sAk^{-(1-a)} - (n+\delta)$$

The steady-state capital ratio

The steady-state level of output per capita

Growth rate of capital per capita

As we can see in this simple model, growth of production per capita (y*) has been explained by technology level, saving rate, population growth and depreciation of physical capital. However after Solow model, the growth theories expanded and got so many additional analyses for different inputs of the classic production function. As we can see in this basic model, human capital has its role in growth through population growth, but advanced growth theories they do concern about the quality of the human capital and they question that "what quality of human capital can increase economic growth". In all these theories technology is exogenous. Between 1965 until 1980, growth theories lost their contact with the empirical evidences more and more and instead economic development economists; they used applied methods and tend to create models to apply for weak economies. In 1980's Romer (1986) and Lucas (1988) started initial researches to model growth theories with endogenous technology assumption. The

"Research and Development (R&D)" and "Learning by Doing"[12] theories demonstrate that technological progress can help economies to have positive growth rate in the long run. The new growth theories in 1990's try to check their conclusions by empirical evidence and data and study the direct and indirect effects of health, education, income inequality, poverty rate, human development index and so many other development indicators.

3- Modern growth theories concentration on health and education

Modern growth theories expanded with more concentration on human capital characteristics. Economists have identified different direct and indirect significant variables that can affect human capital in the economy based on microeconomic estimates and macroeconomic estimates.

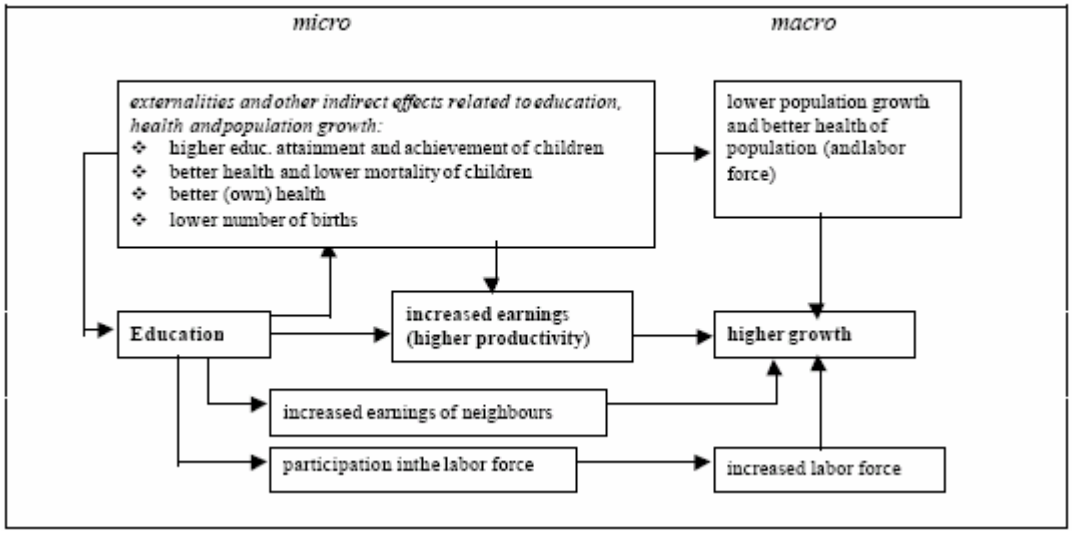
We should emphasize here that there are two dimensions that can be analyzed in the growth study: microeconomic estimates and macroeconomic estimates. Microeconomic studies estimates the effect of education or health in the micro level of economy which if we aggregate these effects, we call it macroeconomic estimates. If the macroeconomic estimates could bring greater value added to the economy compare to the aggregation of microeconomic estimates, then we can conclude that education or health can bring externalities for the economy and can be verifying as a significant variable in the growth regression in the macro level. In this paper I analyze only macroeconomic estimates of education and health studies because economic growth is a macro topic.

[12] Foster, Andrew. And Rosenzweig, Mark. (1995).

4- Impact of education on growth-macro estimation

Economists offer various theories and models to find the relation of growth and education. Education increases potential earning of individuals and also has other positive externalities in microeconomic level. A paper by Michaelowa (2002)[13] has shown the education direct and indirect effect more clearly;

Figure 1: Economic returns to education



Source: Michaelowa, Katharina. (2000)

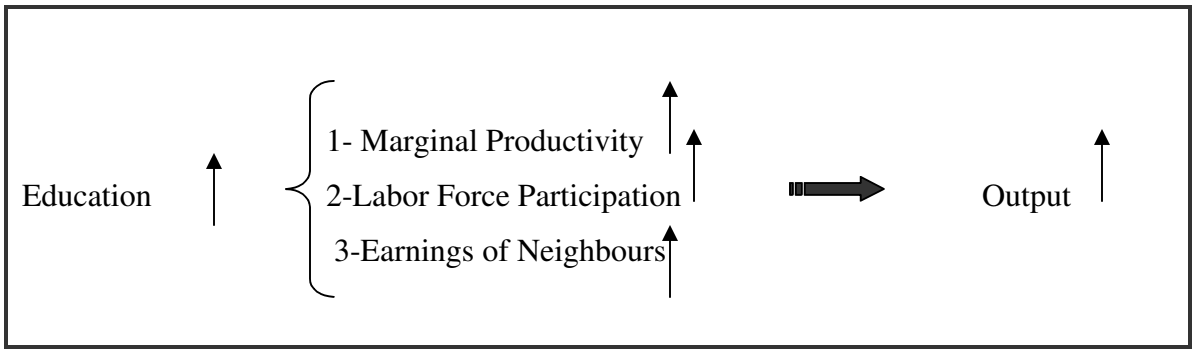
Based on this analysis[14], direct effect means that higher education will result in learning and higher productivity of individuals in the economy. In the competitive market that workers earn equal to the marginal rate of production, higher education leads to higher salary. Another direct effect can be due to increase the level of labour force in the economy. The more educated workers, the more available workforce is in economy to

[13] Michaelowa, Katharina. (2000)

[14] "Assumption on this diagram 1) education results in learning – it is not merely a "signal" of worker 2) demand within the economy is sufficient to consume higher levels of output resulting from productivity gains; 3) monetary and fiscal policy are sufficiently responsive to meet the demands of a growing economy (to prevent deflation, the money supply grows at a rate equal to the growth rate of GDP)". Michaelowa, Katharina. (2000)

join the industry[15]. Also the neighbour effect, she emphasize that "if an educated farmer successfully tries out higher yielding crops or new production methods, other members of his village observing this might copy the innovations and thus also reach higher income."[16] Indirect effects of education through micro level by generating externalities effect on individual's health, mortality rate, birth rate and encouragement of higher education in their children. These effects will result in lower population growth and healthier workforce that in aggregate level again can increase growth. However this analysis would be just in theory and we have to test this empirically. Different surveys have been conducted to confirm the direct and indirect effect theory.

As we discussed the direct effect can be shown by the model below:



Empirical findings on direct effect:

[15] This is very interesting topic for future studies on developing countries. Although they are suffering from high unemployment rate, also they face the lack of number of high skilled professionals in the Economy. This can happen because of different scenarios, first, education system in developing countries is not efficient enough to educate labor force for the high technology industries and secondly some developing countries addition to having efficient education system, the problem of "Brain Drain" will destroy all the efforts of efficient system and again developing country will lose the resources

[16] Michaelowa, Katharina. (2000), P.11

Microeconomic empirical tests[17] suggest strongly that education have positive effect of the rate of return. But macroeconomic estimations still have some complications to approve the positive relationship.

Here we are trying to review the main macro studies and empirical findings to observe if by higher education we can find higher wages or private return of education. The main effect of education on human capital and therefore growth can be through increasing wages of individuals.

Here I present a paper which examines this effect in macro level cross country. The common regression in the literature is Mincerian earnings function (Mincer 1974). Thereby the natural logarithm of wages (w) is regressed on years of schooling (S), a proxy of labour market experience (E), its square (E^2), and, depending on the author, a variety of control variables (X)

Theory:

$$\ln(w) = \alpha_0 + \alpha_1 S + \alpha_2 E + \alpha_3 E^2 + \alpha_4 X + \varepsilon$$

Ln (w): Natural logarithm of wages

S: Years of schooling

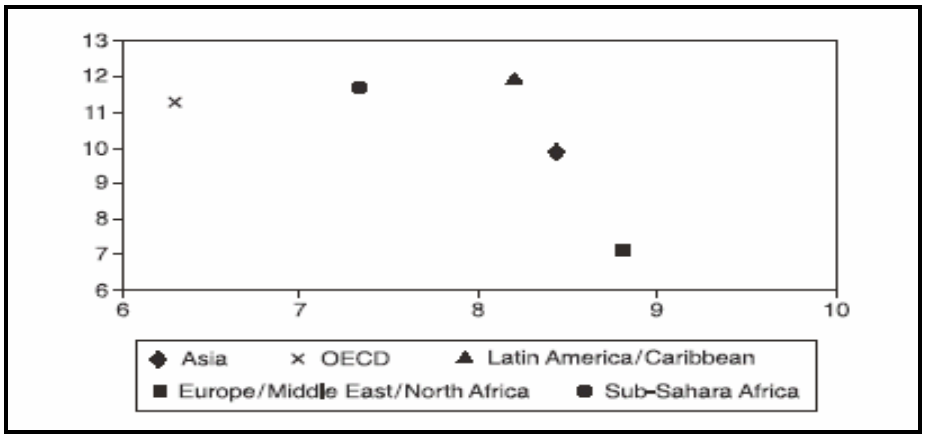
E: Proxy for labour market experience

X: Different control variables

Psacharopoulos (2004) conducted an empirical study for over 70 countries and tested the significance of the coefficient of years of schooling (S).

[17] For example: Harmon, Colm P.and Oosterbeek, Hessel (2003)

Figure 2: Returns to investment in education by level, latest year



Source: Psacharopoulos, George and Anthony Patrison, Harry (2004)

He found, overall, the average rate of return during the past 12 years, have declined by 0.6 and at the same time average schooling levels have increased. Therefore, everything else being the same, an increase in the supply of education has led to a slight decrease in the returns to schooling[18].

The conclusion of his paper is that investment in education behaves in a more or less similar pattern as investment in physical capital. However there is still debate on the macroeconomic studies on the private return on education. It seems microeconomic studies give a clear indication of the positive relation of education and marginal productivity but these findings are not consistent in macro literature.

Indirect effects of education on growth are mainly throughout effect of health in human capital in the economy. I prefer to focus on the direct effect of health in economy on growth which is our main purpose in next section.

[18] Psacharopoulos, George and Anthony Patrison, Harry (2004)

5- Impact of health on growth-macro estimation

Again here I emphasize that the micro studies[19] on the positive relation of health investments and rate of return on the economy has been proved clearly, however it is interesting to find empirical proofs for the macro studies regarding this subject.

A paper by Bloom, Canning and Sevilla (2001), tested the effect of health on economic growth in macro level.

Theory:

They used a production function containing human capital, physical capital and labour.

$$Y = AK^{\alpha} L^{\beta} e^{\phi_1 s + \phi_2 \exp + \phi_3 \exp^2 + \phi_4 h}$$

Y: Out put

A: TFP

K: Physical capital

L: Labour force

Human capital: $\phi_1 s + \phi_2 \exp + \phi_3 \exp^2 + \phi_4 h$

s: Average of schooling

exp: Av of experience of work force

h: health[20]

Based on this study, it is found that 1 year improve in life expectancy (a proxy of health) has increase of 4% in growth. This shows that by investing on health, economies can

[19] For example: Weil, David N (2005)

[20] Life Expectancy had been used as a proxy for health of workforce

increase their out put significantly. According to the empirical suggestions, health investment rate of return is positively correlated with the health investments in macro level in the economy. Therefore micro estimates and macro estimates are in the same direction for health investment where as education investment in macro studies seem to have more complications and need further studies to approve the result of its micro studies.

This is a crucial conclusion from economic growth literature for natural resource curse economists, that empirically health indicators can brings externalities to the economy and has significant effect on growth. We can apply this conclusion to our analysis. The existence of natural resource curse can be examined by concentrating on more quality oriented variables like health in the economy which has significant effect on growth through increasing the productivity of human capital in growth regression.

6- Growth, development and sustainable development

We will not review the development theories here, because knowing different theories in development studies is not so important for our analysis in this paper. But it is worth to mention that growth theorist have difficulty to model GDP due to the fact that growth in GDP is a combination of quantitative and qualitative variables and therefore economists can not study growth models in the frame of physical rules and formulas. Precisely changes in quantitative area or qualitative area are two different issues to discuss.

To grow means to add the number of material by assimilation and to develop means to expand the potential of one unit without necessarily increasing the number of that unit. Development studies try to chase the production and analyze how the GDP of economy

will allocate to the economy. We can conclude that development theorists are worry more about how the income in the economy distribute among individuals.

On the other hand, economists argue that after an economy reached to his potential production and growth, the next challenge is to have sustainable development. They believe sustainable growth theory is impossible because economy as a sub system of Earth can not grow forever as Earth can not grow further. However, they emphasize on sustainable development policy as a challenge for developed countries. “Politically it is very difficult to admit that growth, with its almost religious connotations of ultimate goodness, must be limited. But it is precisely [the] no sustainability of growth that gives urgency to the concept of sustainable development. The earth will not tolerate the doubling of even one grain of wheat 64 times, yet in the past two centuries we have developed a culture dependent on exponential growth for its economic stability” (Hubbert, 1976)

Therefore, after testing if there is any positive sign of growth and development in oil countries, I like to concentrate to what extent this trend is sustainable. How can oil countries government be confident that the growth and development in their economies, which mainly relies on high oil revenues, is sustainable?

Next section will be reviewed the existing literature on natural resource curse.

7- Natural resource curse literature review

By reviewing literature, the main paper has demonstrate a credible regression on this theory is Sachs and Warner paper in 1997 and 2001, in which they found a significant negative linear relationship between share of resource export in GDP and growth of GDP

for 87 countries by average data during 1970-1990[21]. They conclude that countries rich in natural resource tend to grow slower than countries poor in natural resources. They have shown that the export in non-oil sectors in the natural resource abundant economies will lose competitiveness due to the low growth of manufacturing sector and therefore resource abundant economies have no strong export growth to boost their economy.

Another interesting paper on quantitative study which again concentrates of natural resource curse theory is a paper by Alexeev and Conard (2005). They showed that oil and other mineral resource countries have long-term economic growth. They demonstrated that finding natural resource curse in other papers has been conducted with incorrect data as a matter of timing. They claim that the exploration of so many oil, gas and mineral resources took place after the period of considered data in other papers. Another reason is due to use of initial GDP values as control variables. They discuss that "If the natural resources are manna from heaven then per capita GDP increases, whether initial or current without affecting other important variables at least in medium term"[22]. They have showed that after appropriate adjustments for the empirical difficulties, the data do not show a meaningful "curse" of oil and mineral endowments. Also it has shown that large natural resource endowments appear to increase per capital GDP without necessarily improving the country's institution.

A paper by Papyrakis (2002), measure the direct and indirect effect of natural resources on growth. He found that natural resources simulate growth but under special circumstances. The indirect effects of natural resources have a negative impact on growth. He attempted to show that if we control indirect effects, then the net effect of natural resource will be positive on growth. The negative impact of natural resources has

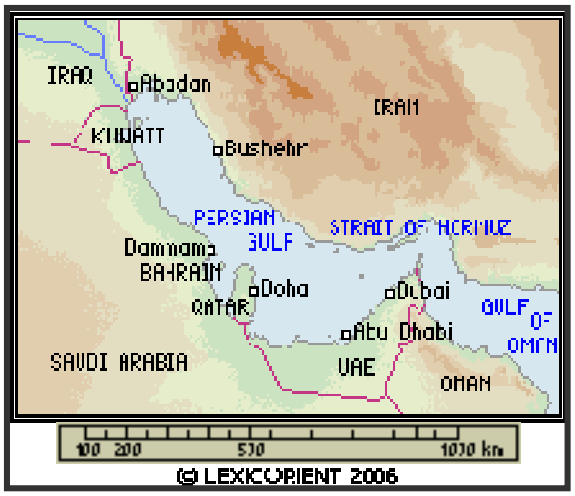
[21] They extend their data set in paper (2001)
[22] Alexeev, Michael and Conard, Robert (2005) P.5

been mentioned as corruption, low investment, protectionist measure, deprecation in terms of trade and low education standards which has a negative effect on growth. At the end he conclude that the indirect effects of natural resources perform like a transmission channel that if we account it, the overall effect of natural resource abundance on economic growth is strongly negative.

Other study by Mahlum, Moene and Torvik (2006), seeks possible explanation for natural resource curse throughout institutions. It is shown that countries rich in natural resources may result in loss or gains in growth. They have shown that contrary to the claim of Sachs and Warner in 1997 who found the role of institutions and rent-seeking mechanism unimportant, institutions play a key role in determining the net effect of natural resources on growth.

A paper by Stijns (2005) and (2001) focuses on the effect of natural resources on human capital accumulation and life expectancy. He found positive correlation between present value of rent gained by different countries from mineral wealth and health and education indicators for cross country dataset.

III-Background



In this section I tried to describe special economic situation in oil selected countries. The reason of necessity of this section is that we can compare the main economic performance indicators of Gulf countries with other countries and observe what their rankings with respect to rest of the world are. In this part three main characteristics will be analyzed; 1- Oil and gas supply 2- Economic growth indicators 3- Economic development indicators

1- Oil and gas supply

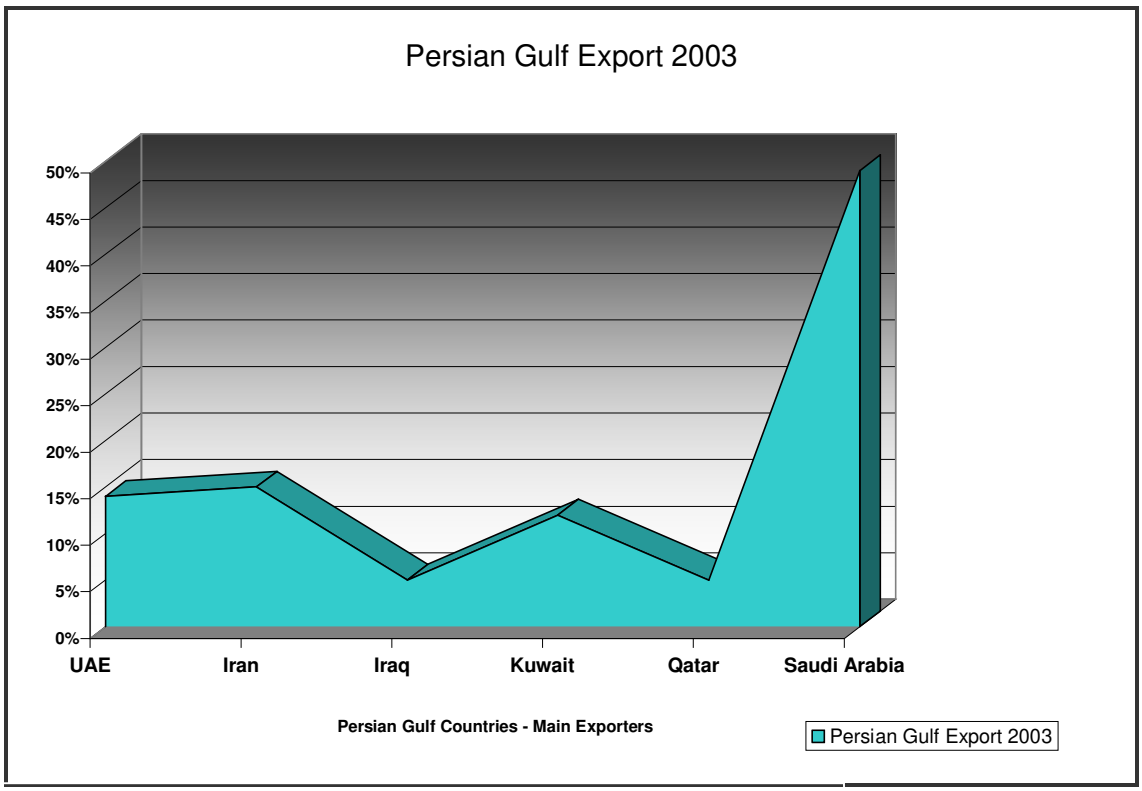
The high level of oil reserve in a small region of Middle East (Persian Gulf) with only 8 countries (Bahrain, Iran, Iraq, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates), contains 715 billion barrels of proven oil reserves, representing over half (57%) of the world's oil reserves, and 2,462 Tcf of natural gas reserves (45% of the world total). According to the Energy Information Administration's International Energy Outlook 2003, Persian Gulf oil production is expected to have about 26 million bbl/d by 2010, and 35 million bbl/d by 2020, compared to about 21.7 million bbl/d in 2000. This will increase Persian Gulf oil production capacity to 33% of the world total by 2020, up from 28% in 2000[23]. The value of export and producing oil and gas in the Persian Gulf countries are remarkable. Persian Gulf is the third biggest supplier region in the world.

[23] For more information please refer to: http://www.eia.doe.gov/emeu/cabs/pgulf.html

Graph 3 and 4 shows the importance role of Persian Gulf countries in oil supply among developed economic entities.

The export distribution among Persian Gulf countries is described below;

Figure 3 - Export Persian Gulf countries 2003

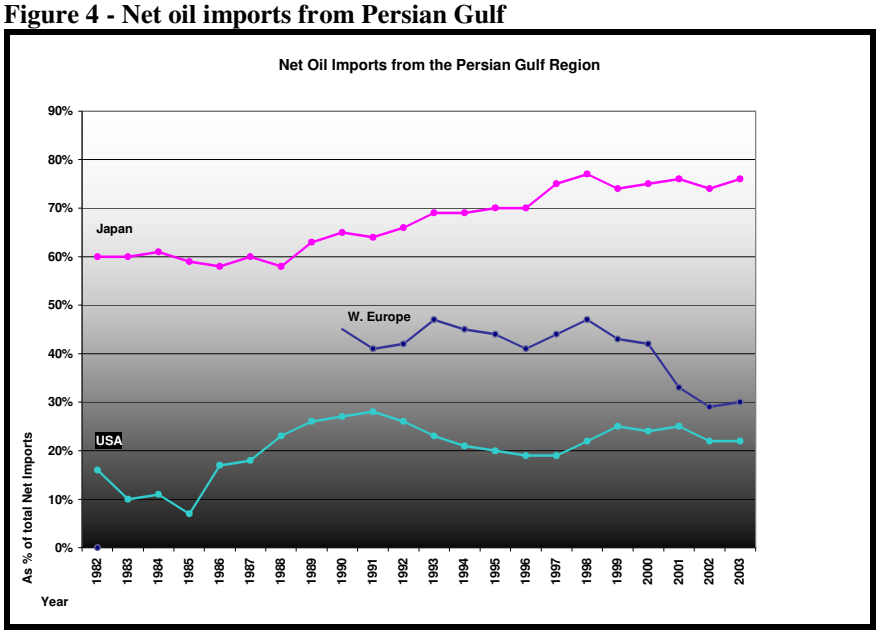


Source: http://www.eia.doe.gov

U.S. gross oil imports from the Persian Gulf rose during 2003 to 2.5 million bbl/d (almost all of which was crude), from 2.3 million bbl/d in 2002. The vast majority of Persian Gulf oil imported by the United States came from Saudi Arabia (71%), with significant amounts also coming from Iraq (19%), Kuwait (9%), and small amounts (less than 1% total) from Qatar and the United Arab Emirates. Iraqi oil exports to the United States rose slightly in 2003, to 481,000 bbl/d, compared to 442,000 bbl/d in 2002. Saudi exports raised from 1.55 million bbl/d in 2002 to 1.77 million bbl/d in 2003. Overall, the Persian Gulf accounted for about 22% of U.S. net oil imports, and 12% of U.S. oil demand, in

2003. Western Europe (defined as European countries belonging to the - OECD) averaged 2.6 million bbl/d of oil imports from the Persian Gulf during 2003, an increase of about 0.2 million bbl/d from the same period in 2002. The largest share of Persian Gulf oil exports to Western Europe came from Saudi Arabia (52%), with significant amounts also coming from Iran (33%), Iraq (7%), and Kuwait (6%). Japan averaged 4.2 million bbl/d of net oil imports from the Persian Gulf during 2003. Japan's dependence on the Persian Gulf for its oil supplies increased sharply since the low point of 57% in 1988 to a high of 78% in 2003. About 30% of Japan's Persian Gulf imports in 2003 came from Saudi Arabia, 29% from the United Arab Emirates, 17% from Iran, 12% from Kuwait, 11% from Qatar, and around 1% from Bahrain and Iraq combined. Japan's oil imports from the Persian Gulf as a percentage of demand continued to rise to new highs, reaching 78% in 2003"[24]. The chart below shows main countries amount imported from Persian Gulf since 1982.

Figure 4 - Net oil imports from Persian Gulf



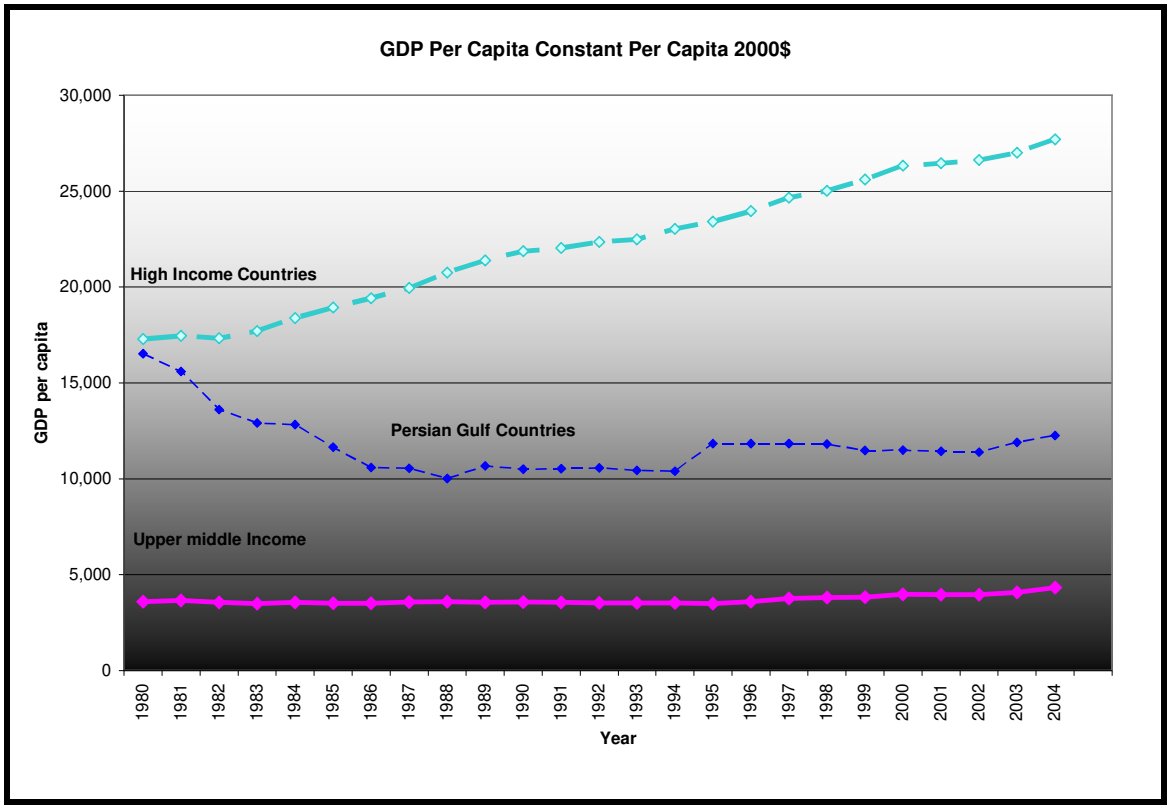
Source: **http://www.eia.doe.gov**

[24] For more information: http://www.eia.doe.gov/emeu/cabs/pgulf.html

2- Economic growth pattern

In figure 5, Persian Gulf countries, GDP per capita is decreasing until 1989 and it has smooth trend (less volatility) later on. Persian Gulf countries have higher GDP per capita compare to upper middle income countries. The reason of this gap could be explained by the oil revenue in these countries.

Figure 5 – GDP Per capita comparison Persian Gulf countries Vs high and upper middle income countries

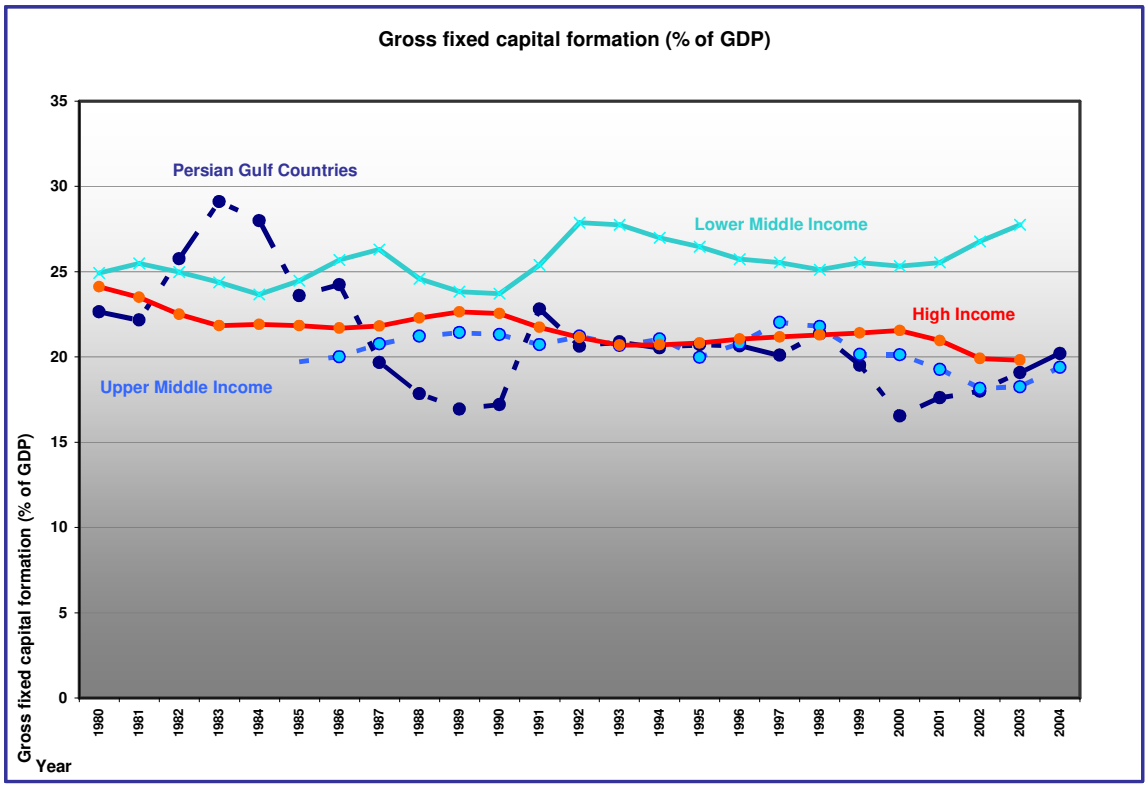


Source: World Bank

In figure 6, we can see that gross capital formation has high volatility in Persian Gulf countries compare to other countries in the world. However Persian Gulf countries are still tracking with high income and middle income countries. Gross capital formation indicates the level of investment in countries. The trend in the chart below shows that investment rate as % of GDP does not have smooth increasing trend and it is volatile

compare to high Income and upper middle income countries. We will discuss about the volatility nature of oil economies in future chapters in detail.

Figure 6 – Gross Fixed Capital Formation (% of GDP)



Source: World Bank

3- Economic development profile

Development indicators in Persian Gulf countries seem to bring a clear picture of the allocation of the oil revenues in these countries. There is a debate among economists that what the real reason of natural resource curse is. Some had studied the role of institutions in the country[25]. They believe that oil revenue enters in the economic system but because of lack of efficient institutions, this revenue will be wasted in the economy and could not

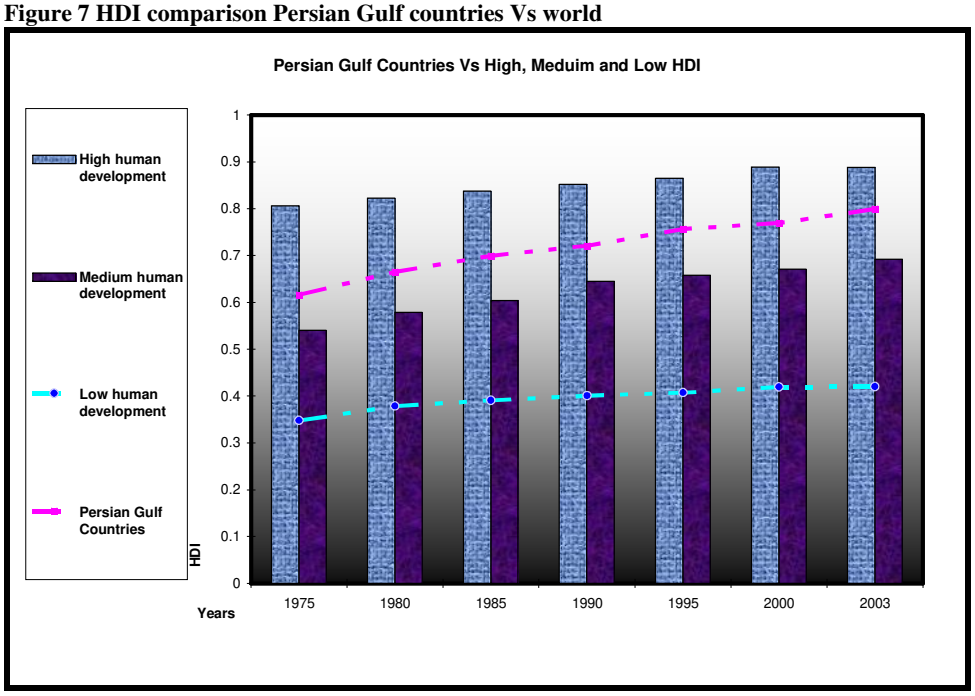
[25] Halvor Mehlum, Karl Moene and Ragnar Torvik (2002)

be invested on the economically feasible projects to increase the competitiveness of manufacturing industry. From development indicators we can have a better picture of how much governments do care on the welfare and public goods. Even if a government has poor institutions, still it may be willing to have good performance to provide least living standards satisfaction to their citizens.

We start our comparison by Human Development Index which each year publishes as standard means of measuring well-being. HDI is an Average of 3 Variable in the Economy;

1- Life expectancy at birth. 2- Adult literacy rate (with two-thirds weight) and the combined primary, secondary, and tertiary gross enrolment ratio (with one-third weight). 3- Gross domestic product (GDP) per capita at purchasing power parity (PPP). As we can see in this graph, Persian Gulf countries in HDI ranking are between high rank and middle rank countries.

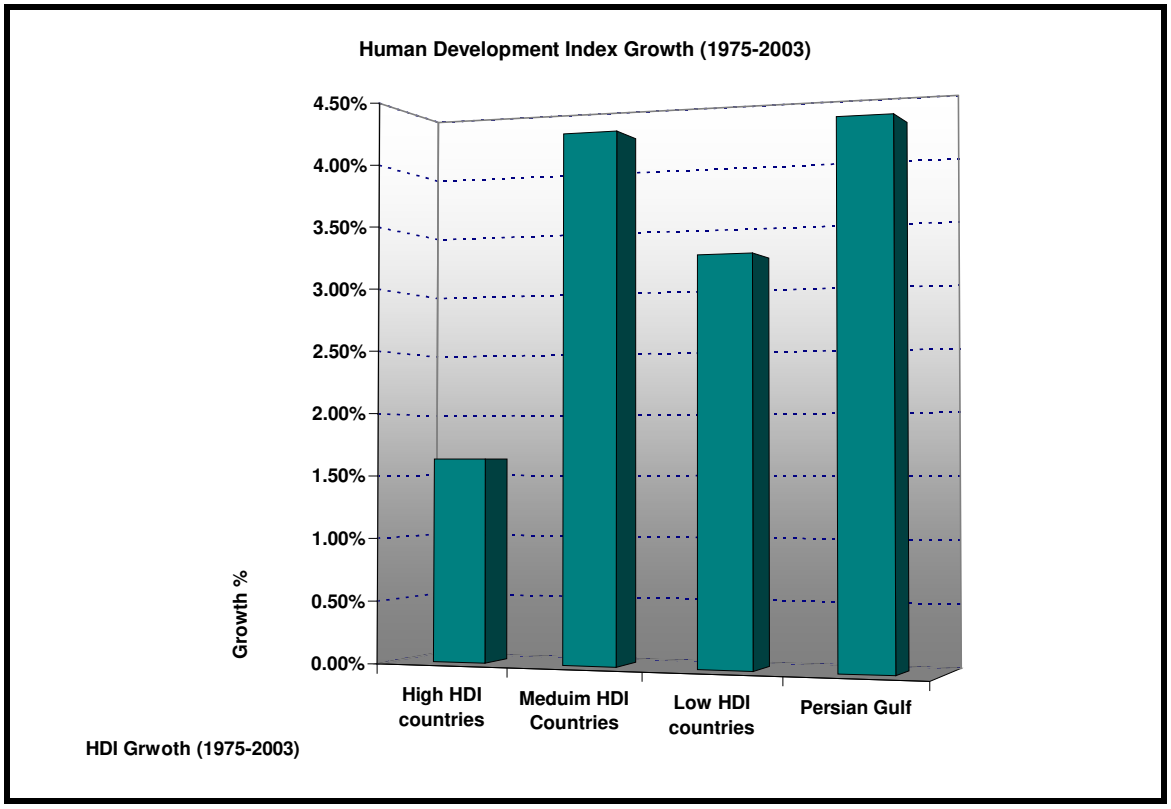
Figure 7 HDI comparison Persian Gulf countries Vs world



Source: http://hdr.undp.org/statistics/data/

This shows that standard of living in Persian Gulf countries can be considered in good level. Next graph shows the rate of growth of HDI during 1975 - 2003. Persian Gulf countries and middle rank countries had highest rate of growth in HDI.

Figure 8 – Human Development Index growth (1975 – 2003)

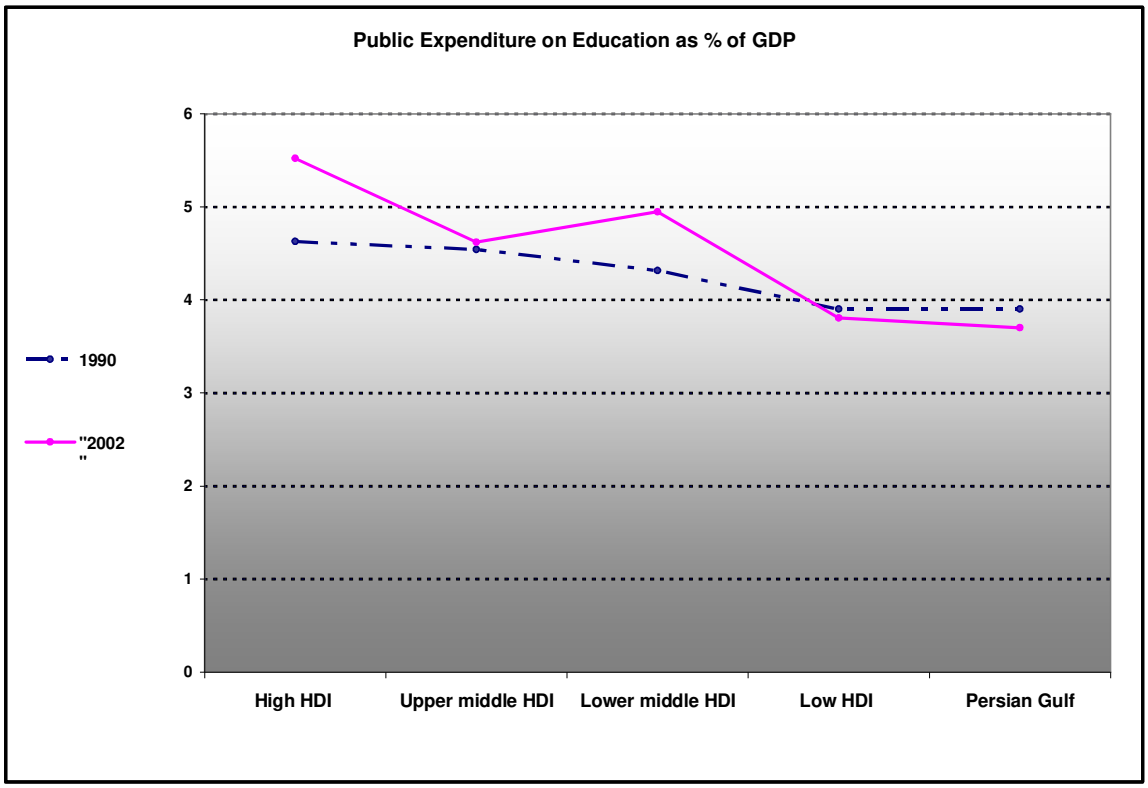


Source: http://hdr.undp.org/statistics/data/

.

Other interesting variable to observe is the percentage of GDP that Government are interested to spend on education. In this figure we can see that Persian Gulf countries performed poor. Despite of their high oil revenues, the percentage of GDP that they are willing to spend for education is the same as low income countries. The worrying trend is that this amount has been decreased from 1999 to 2002.

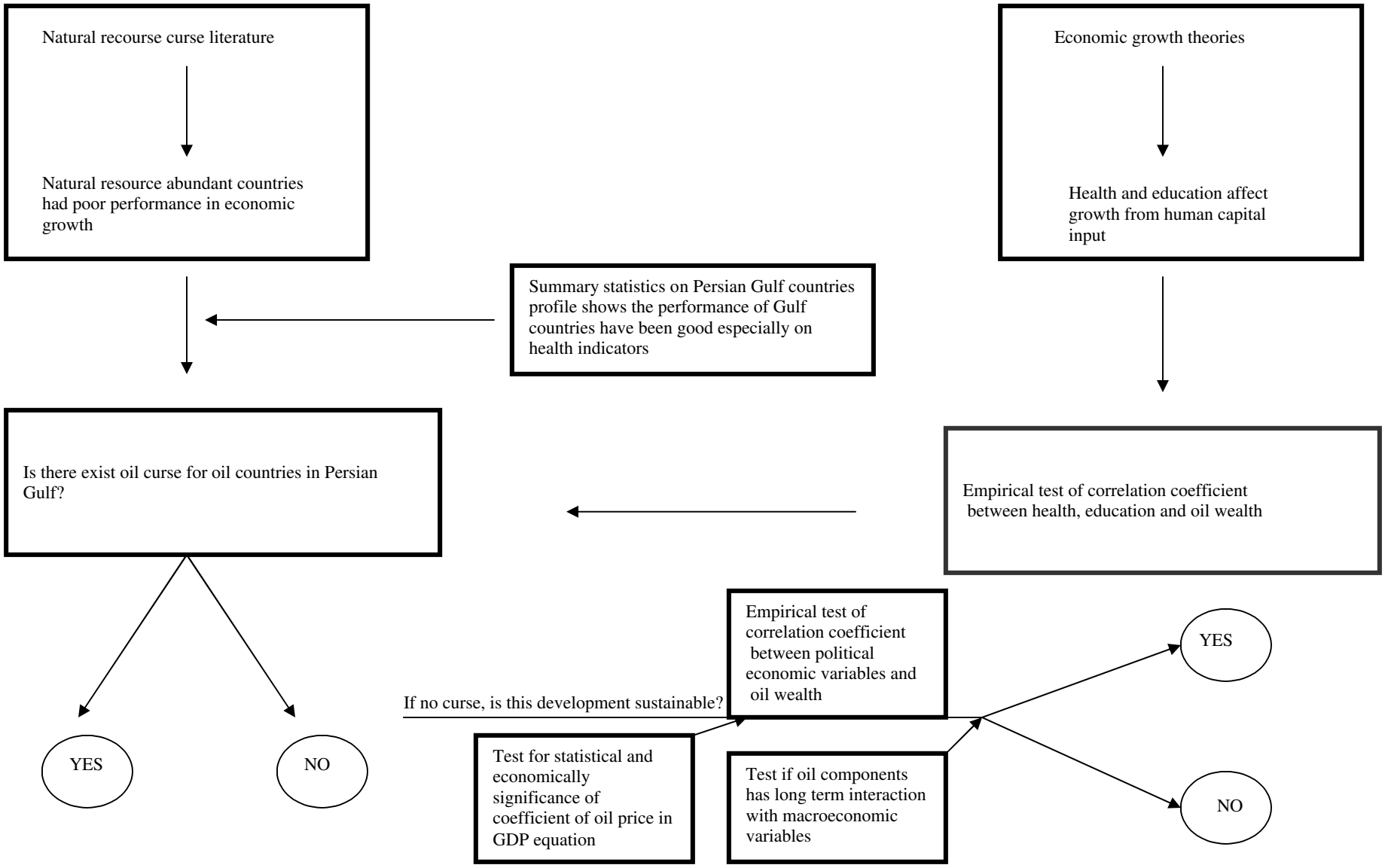
Figure 9 Public Expenditure on Education as % of GDP



Source: http://hdr.undp.org/statistics/data/

From the summary statistics which shortly discussed above, it can be concluded that there is a special situation in Persian Gulf countries. If we compare Persian Gulf countries with rest of the world, oil countries in this region has important role to supply oil in the world. It can be shown that the level of GDP in their economy is heavily dependant on oil exports (it will be tested empirically). Economic growth and economic development pattern in these countries is not showing remarkable poor performance especially from the side of health and HDI. From side of education expenditure clearly oil countries in Persian Gulf did not performed well. Therefore there seems to be worthwhile to discuss and look carefully to the oil economies in this region and test empirically the correlation of health and education Indicators with the level of oil in cross country data set.

III-Economic Modelling



1- Model description

To get a clear picture of what it has discussed so far and what will be shown in next chapters, I tried to set all the missing parts in this puzzle together and give a overall image of it;

We observe three different sections in this area. 1-From literature review as it is discussed most of the economists, suggested natural resource curse for natural resource countries; we are interested to test this hypothesis for oil countries. 2- However summary facts about this country show a special situation that they are not as bad as other resource abundant countries are, for example African countries. 3- On the other hand growth theories suggest that health and maybe education can be considered a good indicator if an economy is performing well in growth and development or not.

From these three different observations we shape two kind of hypothesis. First, is there any curse for oil resource countries and second if there is not any evidence for curse, is there exist a long term and sustainable economic growth and development in these countries?

The first hypothesis will be empirically tested by the non linear method correlation coefficient on the different health and education indicators and oil and gas reserve wealth across countries category and developing countries sub category. The second hypothesis can be examined by two different methods which can complete each other. The sign and significance of the oil components (price, revenues, etc) in GDP equation can help us to see any possible long-term foot print of oil components in their macroeconomic variables of oil countries. The second method is to test the significance of correlation of economic political variables with oil wealth can help me to build the main conclusion.

IV- Empirical analysis of the Model

IV-I- Empirical test of oil effect on health and education indicators:

IV-I-I- Methodology

Health Indicators Vs oil& gas wealth Spearman Correlation method:

In this Section, we test empirically the correlation of oil and gas wealth and economic indicators. I use the method that Stijns (2001) and (2005), used in a paper to analyze the possible non linear correlation between oil wealth rank and education and indicators. In his paper, he analyzed the coefficient correlation for all countries and developing countries subcategory. I try to use his method with introducing new variable of oil wealth to measure the effect of oil resources. I used oil and gas reserves resources per capita for each country. The data set is for 170 countries[26]. Non linear correlation method is interesting to use if there is non linear relationship that can be captured where as in normal linear regressions the existence of curse had been found.

We run the correlation coefficient test among two kinds of categories of the countries [27]

1- All countries in our dataset (170)

2- Developing countries

Health indicators

In this part we examine 6 health variables and Human Development Index in all countries. I make a different interpretation from health variables and HDI. Health indicators are showing the level of individual's accessibility to the wellbeing and medic

[26] Between Persian Gulf Countries Iraq and Qatar excluded from this analysis due to the lack of data

[27] We were interested to observe the correlation coefficient on High Income Countries category also but most of the coefficients were not significant.

centres and availability of the standard updated technology of health facilities, physicians and sufficient knowledge for patients. Human Development Index differs from pure health indicators slightly because it is combination of health, education and income in the economy. It is considered as a measure of standard of living in the economy. The summary of the tables[28] and important graphs has shown in this section. Survival rate and life expectancy has shown separately for men male and female. This separation is important for our analysis due to the fact that in Islamic countries there may be possible differences in the health indexes among male and female. We are interested to observe if there is any difference in the data.

Education indicators

We chose 5 variables in this model as human capital accumulation indicators.

Education expenditure public on levels (pre-Primary & primary school) can show us how much countries are concerned to invest on education. Enrolment ratio, net ratio %(secondary level) and literacy rate, youth the percentage of people ages 15–24 can show us how much learning and education is important in a country among it's people. At the end I was interested to analyze the combination enrolment ration among male and female separately.

IV-I-II- Data Description

Oil & gas: Sachs and Warner for measuring this variable calculate the share of primary exports to GDP cross countries. Stijns (2001) used subsoil wealth ranking indicators from World Bank. I use data to measure oil and gas resources together. The reason of adding gas reserves is that as mentioned in the profile of Persian Gulf countries, they are

[28] Full detail of tables and graphs are available in appendices

abundant with gas reserves also which can be explore and produce in their countries [29]. Also the export of gas in some countries of Persian Gulf countries has started recently and their economy gain large amount of revenue by exporting only gas reserves[30]. Therefore the main exporters of oil and gas in the world are the countries which have high large endowment and reserves of oil and gas. The variable that we choose should 1- Represent the oil and gas resource level for countries. 2- Should be adjusted for population.

Here I used the oil and gas (Billion Barrels) available reserves and calculated for per capita updated in 2004. The source is from Energy Information Administration (EIA) from US Government[31].

Health Indicators: The variables I choose for my study got from the Human Development Report by UNDP[32].

The data are from 2002 – 2004

1- **Health expenditure, private as % of GDP** Direct household (out of pocket) spending, private insurance, spending by non-profit institutions serving households and direct service payments by private corporations. Together with public health expenditure, it makes up total health expenditure.

2- **Health expenditure per capita (PPP US$)** the sum of public and private expenditure (in PPP US$), divided by the population. Health expenditure includes the provision of health services (preventive and curative), family planning

[29] (Bahrain, Iran, Iraq, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates), contains 715 billion barrels of proven oil reserves, representing over half (57%) of the world's oil reserves, and 2,462 Tcf of natural gas reserves (45% of the world total)

[30] For example, recently Iran and Qatar has started large amount of gas export different countries

[31] http://www.eia.doe.gov

[32] http://hdr.undp.org/statistics/data/

activities, nutrition activities and emergency aid designated for health, but excludes the provision of water and sanitation.

3- **Probability at birth of surviving to a specified age (65) - Female**

The probability of a newborn infant surviving to a specified age if subject to prevailing patterns of age specific mortality rates.

4- **Probability at birth of surviving to a specified age (65) – Male**

5- **Life expectancy at birth – Female:** The number of years a newborn infant would live if prevailing patterns of age-specific mortality rates at the time of birth were to stay the same throughout the child's life

6- **Life expectancy at birth Male**

Human development index (HDI) A composite index measuring average achievement in three basic dimensions of human development —a long and healthy life, knowledge and a decent standard of living.

Education Indicators:

7- **Education expenditure, public on Levels (Pre-Primary & Primary School)**

8- **Enrolment ratio, net ratio %(Secondary Level):** The number of students enrolled in a level of education who are of official school age for that level, as a percentage of the population of official school age for that level.

9- **Literacy rate, youth** The percentage of people ages 15–24 who can, with understanding, both read and write a short, simple statement related to their everyday life.

10- **Enrolment ratio, gross, combined for primary, secondary and tertiary schools Female the** number of students enrolled in primary, secondary and

tertiary levels of education, regardless of age, as a percentage of the population of official school age for the three levels.

11- Enrolment ratio, gross, combined for primary, secondary and tertiary schools Male

IV-I-III Summary Result

The summary result of all 3 categories has shown in this table[33]

	oil gas reserves	Health Private Expenditure % of GDP	Health expenditure per capita (PPP US$)	Probability at birth of surviving to a specified age (65) - Female	Probability at birth of surviving to a specified age (65) – Male	Life expectancy at birth – Female	Life expectancy at birth Male
All countries	oil gas reserves	-0.152*	0.178*	0.189*	0.213**	0.185*	0.212**
Correlation analysis	oil gas reserves	weakly negative relationship	weakly positive relationship	weakly positive relationship	weakly positive relationship	weakly positive relationship	weakly positive relationship
Developing countries	oil gas reserves	-0.207*	0.214*	0.279**	0.289**	0.266**	0.291**
Correlation analysis	oil gas reserves	weakly negative relationship	weakly positive relationship	weakly positive relationship	weakly positive relationship	weakly positive relationship	weakly positive relationship

	Oil gas reserves	Human development index	Education expenditure, public on Levels (Pre-Primary & Primary School)	Enrolment ratio, net ratio %(Secondary Level):	Literacy rate, youth The percentage of people ages 15–24	Enrolment ratio, gross, combined for primary, secondary and tertiary schools Female	Enrolment ratio, gross, combined for primary, secondary and tertiary schools Male
All countries	Oil gas reserves	-0.221**	-0.241*	0.224**	0.249**	0.177*	0.191*
Correlation analysis	Oil gas reserves	weakly negative relationship	weakly negative relationship	weakly Positive relationship	weakly Positive relationship	weakly Positive relationship	weakly Positive relationship
Developing countries	Oil gas reserves	-0.303**	-0.288*	0.304**	0.302**	0.196*	0.224*
Correlation analysis	oil gas reserves	weakly negative relationship	weakly negative relationship	weakly Positive relationship	weakly Positive relationship	weakly Positive relationship	weakly Positive relationship

[33] For the details of graphs and coefficients please see appendices

* 5% Significant (2tail test)
** 1% Significant (2 tail test
*** 5% Significant (1 tail test)
**** 1% Significant (1 tail test)

Compare Mean Values:

Health/education/ HDI	H	H	H	H	H	H	HDI	E	E	E	E	E
Mean Value	1	2	3	4	5	6	7	8	9	10	11	12
High OECD	2.4	1405	82.9	72.4	76.6	70.6	41.6	36	83.7	97.2	89.6	36
High non OECD	2.2	882	84.2	77.1	76.9	72.2	50.9	34.3	77.2	98.9	71.5	34
Oil countries	0.8	650	84.8	78.8	76.9	73.1	52.6	40.7	73.1	96.1	75.5	41

The coloured cells indicate that oil countries have lower mean compare to the mean of High OECD and high non OECD countries in health and education indicators. Mean value of normal cells are higher mean value or between "high OECD" and "high non-OECD" countries that shows oil countries had the same level of mean in the health and education indicators.

IV-I-IV- Robustness check

One way of robustness check is to rerun the calculations for a sub sample of the data. The robustness check has been initially done, as we did the calculation for both the data set (all countries) and subcategory (developing countries). The result of sub sample was consistent with the result of sample. The detail of robustness has calculated in the appendices.

IV-II- Empirical test of oil effect on economic political indicators:

IV-II-I- Methodology:

We examine the correlation coefficient between oil wealth and political variables which is described in data description. The method is again Spearman correlation coefficient. The result of this section can help me to conclude if the development pattern in oil countries is sustainable or not.

Political indicators:

There are two available variables regarding political stability situation in the countries.

1- Military service
2- Political stability index

Also other one variable are to define freedom of speech.

1- Vice and accountability

Both of them can help us to examine the oil countries either do have more conflicts or not.

IV-II-II- Data description:

Political system and institutions variables: A good source of the variables can be found on World Bank database (Data are for 2004)[34]

1- Military expenditure: All expenditures of the defence ministry and other ministries on recruiting and training military personnel as well as on construction and purchase of

[34] http://www.worldbank.org/wbi/governance/pdf/Governance_Indicators_eng.pdf

military supplies and equipment. Military assistance is included in the expenditures of the donor country.

2- Voice and accountability: is one of the six governance indicators, and refers to the extent to which citizens of a country are able to participate in the selection of governments, as well as freedom of expression, association and in the media. Source for data and detailed country ratings: 'governance matters IV: governance indicators for 1996-2004', by D. Kaufmann, A.Kraay and M. Mastruzzi[35],

3- Political stability: Is an index published by World Bank indicates that to what extent a country has stable settlements inside the country and politically is stable.

IV-II-III- Summary Result:

	Oil gas reserves	Military service expenditure	Voice and accountability	Political stability
All countries	Oil gas reserves	0.226****	-0.198****	-0.15***
Correlation analysis	Oil gas reserves	weakly Positive relationship	weakly negative relationship	weakly negative relationship
Developing countries	Oil gas reserves	0.242*	-0.227****	-0.152**
Correlation analysis	Oil gas reserves	weakly Positive relationship	weakly negative relationship	weakly negative relationship

III-II-IV- Robustness check

One way of robustness check is to rerun the calculations for a sub sample of the data. The robustness check has been initially done, as we did the calculation for the data set (all countries) and subcategory (developing countries). The result of sub sample was consistent with the result of sample. The detail of robustness has calculated in the appendices.

[35] www.worldbank.org/wbi/governance.

IV-III- Empirical test of oil component effect GDP equation:

IV-III-I- Methodology

As it is discussed in economic modelling, I am interested to examine the effect of oil components for example world oil price which can affect oil exporter's economy on the macroeconomic variables. Higher volatility in World oil price, can affect oil revenues and therefore GDP of oil exporting countries can not support the economy system in a stable and confident level. One of the possible reasons of high volatility is the high political instability in Middle East in past decades[36].

However we are interested to test this effect empirically that World oil price changes will affect the GDP level of economies in oil resource countries.

Therefore, by adding World oil price changes in the GDP equation we test the significance of the coefficient of World oil price changes variable.

Also we are interested to observe which variables are interacting with GDP in long-term.

We are keen to see if Changes in oil price has long-term effect on the GDP or not.

The theory behind this story can be seen as macroeconomic level, as in GDP equation.

We can write GDP equation for oil exporting countries as the model in the next page.

[36] For more information please refer to the World Oil Price Chronology: 1970-2000, most of the high volatility in the trend of Oil Prices has occurred based on conflicts in Middle East.
http://strata.geol.sc.edu/petroleum/Chronology%20of%20World%20Oil%20Market%20Events%201970%20-%202000.htm

$$Y = C + I + G + (OX + NOX - M)$$

Y: Gross Domestic Product

C: Consumption

G: Government spending

OX: oil export

NOX: Non-oil export

M: Imports

OX = oil revenues = P. X

P: Price of export

Shock X: Billion Barrels export

$$Log(GDP) = \alpha_0 + \beta_1.C + \beta_2.I + \beta_3.G + \beta_4.(OX + NOX - M) + \beta_5.Woilchang$$

Hypothesis to test:

1) $\begin{cases} H_0 : \beta_5 = 0 \\ H_1 \ \beta_5 \ \# \ 0 \end{cases}$

2) Residuals of regression are stationary ⟶ There is long run relationship

IV-III-II- Data Description

1. **Log GDP quarterly (1988-2005)**: Gross Domestic Product - The data is at Constant 1997/98 Prices after seasonal Adjustment-Billion Rials (Data Source: Central Bank Iran[37])
2. **Log Private Consumption Expenditure quarterly (1988-2005)**: The data is at Constant 1997/98 Prices after seasonal Adjustment-Billion Rials (Data Source: Central Bank Iran)
3. **Log Public Consumption Expenditure quarterly (1988-2005):** The data is at Constant 1997/98 Prices after seasonal Adjustment-Billion Rials (Data Source: Central Bank Iran)
4. **Log Gross Fixed Capital Formation quarterly (1988-2005):** The data is at Constant 1997/98 Prices after seasonal Adjustment-Billion Rials (Data Source: Central Bank Iran)
5. **Log Net Export quarterly (1988-2005):** I calculate her (oil export + Non-oil export – Import) at Constant 1997/98 Prices after seasonal Adjustment-Billion Rials (Data Source: Central Bank Iran)
6. **Change in World oil price:** % of change in World Real oil price- Data is deflated by CPI Index US Bureau of Labour Statistics: CPI for all US Bureau of Labour Statistics: CPI for all urban consumers, base = 1982-1984[38] – (Data Source: Energy Information Administration US Government[39])

[37] www.cbi.ir
[38] Source of deflator: http://www.bea.gov/bea/dn/nipaweb/TableView.asp?SelectedTable=13&FirstYear=2002&LastYear=2004&Freq=Qtr

[39] www.eia.gov

IV-III-III- Summary Results

Engle Granger – Error Correction Model approach:

Now in our model the results from eviews are described as below. This is long run regression among growth of GDP, macroeconomic variables and oil price in Engle Granger approach.

Engle Granger Regression Model

$$GDP_t = \underset{[2.52]}{(0.289)}Consmuption_t + \underset{[3.39]}{(0.809)}Gov_t + \underset{[3.85]}{(0.469)}GCF_t + \underset{[2.58]}{(0.151)}NX_{t-1}$$

$$+ \underset{[2.15]}{(132.7)}\,WRoil + \underset{[7.81]}{(0.551)}\,GDP_{t-1} \underset{[-3.45]}{(-287.6)}\,WRoil_{t-1} + \underset{[2.35]}{(156.1)}\,WRoil_{t-2}$$

Durbin Watson stat: 2.022

ADF Test on Residuals t-Statistic: -8.2797**

MacKinnon's Critical Values at 5% Significance Level: -4.944

** **Reject the null of at 5% level critical values in Mackinnon table for unit root test on residuals.**[40]

The rejection of null hypothesis gives us this conclusion that there is long run relationship among dependant variable and explanatory variables.

[40] For more information on Critical Values at Mackinnon table please refer to Appendixes

IV-III-IV- Robustness Check

The main robustness check of the regression is to run diagnostic check. The details of robustness check showed that the regression in this section is consistent for other samples or dataset. This analysis can be found in the appendixes.

V- Discussion and Conclusion

We were trying to answer two main questions in our model:

1- Does the oil curse apply to the Persian Gulf countries?

2- If not, is there long term sustainable growth?

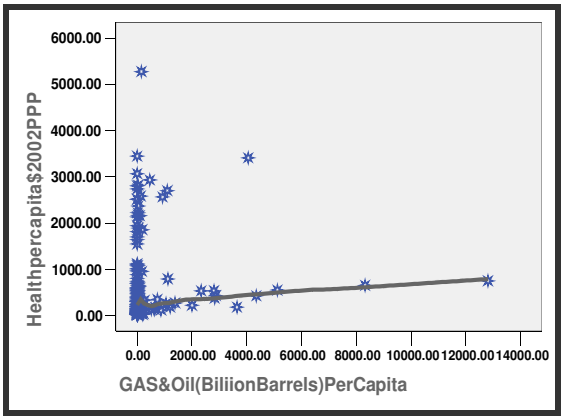
1- Existence of oil curse:

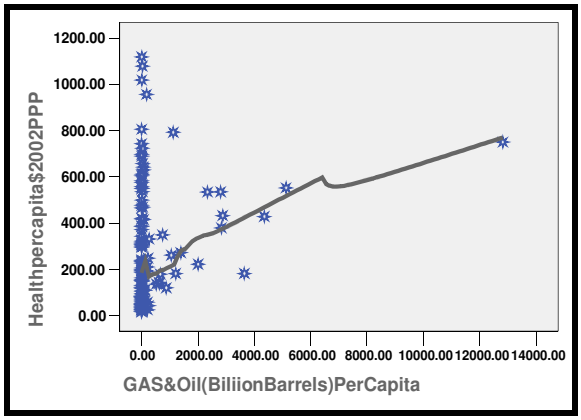
In this paper we were interested in clarifying the "special story" behind Persian Gulf countries with respect to oil resources hypothesis. Firstly we examined the sign of the correlation coefficient between oil & gas reserves, and health & education. Secondly, we did the same analysis restricted to developing countries only. Thirdly, we compared the mean value of each variable (health and education) between 3 categories (high income-non OECD, high income-OECD and Persian Gulf countries)[41]. For example a sample health variable like health expenditure per capita with Spearman Rank Correlation Coefficient and fitted line (Loess method)[42] shows the trend below:

[41] The compare mean method was chosen, as most of the coefficients obtained from the Spearmen Correlation method were not significant due to the small number of observations

[42] LOESS is one of many "modern" modeling methods that build on "classical" methods, such as linear and nonlinear least squares regression. Modern regression methods are designed to address situations in which the classical procedures do not perform well or cannot be effectively applied without undue labor. LOESS combines much of the simplicity of linear least squares regression with the flexibility of nonlinear regression. It does this by fitting simple models to localized subsets of the data to build up a function that describes the deterministic part of the variation in the data, point by point. In fact, one of the chief attractions of this method is that the data analyst is not required to specify a global function of any form to

All countries **Developing countries**





Correlation Coefficient: 0.214* **0.178***

***:** 5% Significant 2 tail test

The charts above show us countries with higher oil and gas reserves have higher expenditure of health per capita. The coefficient correlation is higher in developing countries subcategory.

Comparing the mean values of health expenditure per capita for Persian Gulf with high income countries categories, oil countries spend less.

For example a health variable like health expenditure per capita shows the trend below:

Health/education/ HDI :	Health expenditure per capita
	Mean value
High OECD	1405
High non OECD	882
Oil countries	650

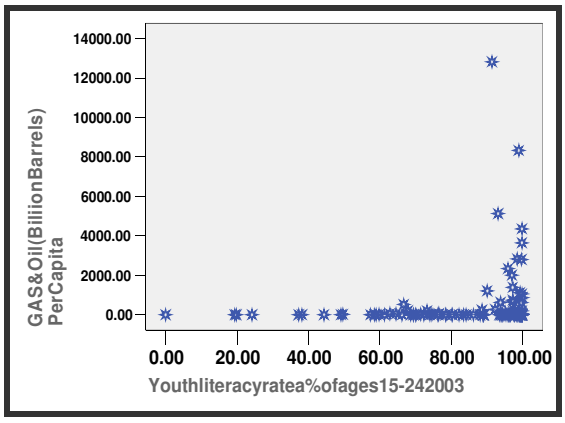
The two graphs and table together show that oil resource countries have lower health expenditure per capita compare to high income countries, but they performed well when

fit a model to the data, only to fit segments of the data. For more information please refer to http://www.itl.nist.gov/div898/handbook/pmd/section1/pmd144.htm

compared to all countries or just developing countries subcategory. Other variables (probability of survival male and female, life expectancy, male and female and human development index) are positively correlated with oil and gas wealth both in all counties and developing countries and the coefficient is higher when we observe the coefficients in developing countries. Among education indicators, public expenditure on primary and pre-primary level has negative correlation with oil and gas in all countries and developing countries both.

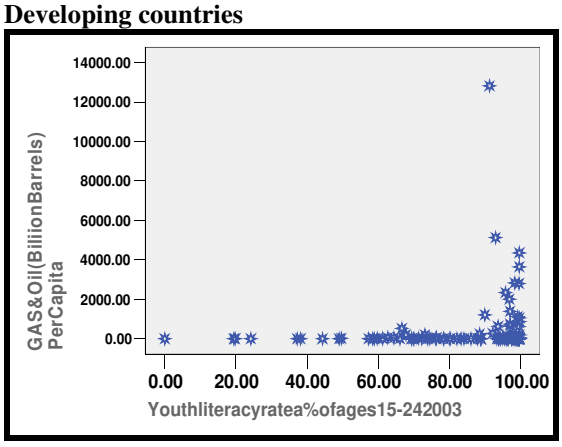
Other variables (enrolment ratio secondary level, literacy level youth and enrolment ratio, gross, combined for primary, secondary and tertiary schools female and male) are positively correlated with oil and gas wealth both in all countries and developing countries and the coefficient is stronger in developing countries. The chart below shows the correlation coefficient on the literacy rate in all countries and developing countries and its coefficient. In both graphs there is a positive weak correlation between levels of oil and gas reserves and the literacy rate. The coefficient correlation is higher in developing countries subcategory.

All countries



Correlation Coefficient: 0.249**

Developing countries



0.302**

****: 1% significant 2 tail**

health/Education/ HDI : Youth literacy Rate	
Mean Value	
High OECD	97.2
High non OECD	98.9
Oil countries	96.1

We get a similar result here for the literacy rate as we did for health expenditure:

Oil resource countries have a lower literacy rate than high income countries, but not when compared to all countries or just developing countries.

For both health and education indicators when we empirically test the data, the conclusions depends on what countries we compare them against.

Persian Gulf countries have good performance in health and education indicators in comparison with all countries or just developing countries, but lower performance in comparison with high income countries category.

When checking for existence of the curse, it is important what group of countries the Persian Gulf countries are compared against. It may be claimed that because most of the Persian Gulf countries are in a high income countries category classification[43], we have to compare their economic performance with the same countries in the high income category. In this case their profile in health and education are not good as and we can confirm the oil curse hypothesis.

However, my reasoning is that we could consider Persian Gulf countries as "special developing countries", which have some characteristics of developing countries but a huge amount of revenue enters in their economies from exporting oil. One reason for this is that the structure of oil economies although they have high income from oil exports is

[43] World Bank Classification

the same as developing countries. Some of the similarities are: lack of skilled labour, lack of high technology, low investment rate, low labour productivity, lack of management knowledge, imperfect competitiveness. However, the most important issue is the existence of bad institutions which are common between developing and oil countries. As Mehlum, Moene and Tarvik (2006) discussed, countries rich in natural resources face both growth losers and growth winners that so depending on the quality of the institutions, curse can be applicable or not.

Oil countries as well as having the same difficulties as developing countries, have additional problems.

- Dutch Disease[44],
- Expansion of non traded goods sector and low concentration to manufacturing sector[45],
- volatility of profits in the non-resource tradable sector[46]
- low Economic performance[47]
- High income inequality [48]

As we discussed in the literature review, health has great importance in economic growth as it has positive externalities[49]. Average health levels are higher in Persian Gulf countries compared with other all countries or just developing countries.

Therefore if we consider Persian Gulf countries as "Special Developing countries":

---

[44] (Corden, 1982, Corden and Neary, 1984)
[45] (Sachs & Warner (1997)
[46] Ricardo Hausmann & Roberto Rigobon (2003)
[47] Sachs & Warner (1997)
[48] Higgins and Williamson (1999)
[49] Weil, David N. (2005)

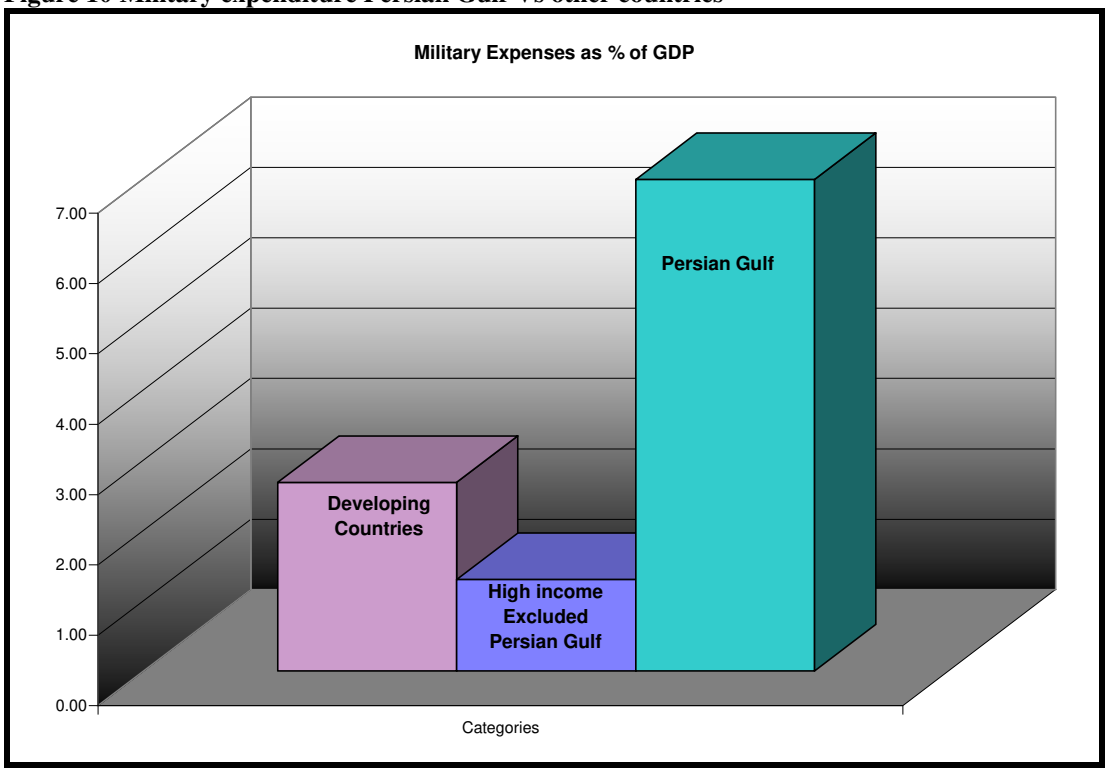
We empirically observe that Persian Gulf countries have performed well to settle on the basis of economic development and then the oil curse hypothesise will be rejected.

2- Hypothesis of Sustainable Development

Economists are not concerned just about growth and development, but about sustainable development. Even when we accept there is no oil curse in Persian Gulf and the countries in this region are developing economically, will this be sustained? Our analysis on the economic and political situation in Persian Gulf countries tells us an interesting story. There is a positive trend in health and education, but political instability and high military spending is a source of concern over sustainable development. The quality of political institutions in oil countries seems to be poor: the countries with more oil and gas resources have less stable political systems, higher military spending and less freedom speech.

This can be shown graphically as follows:

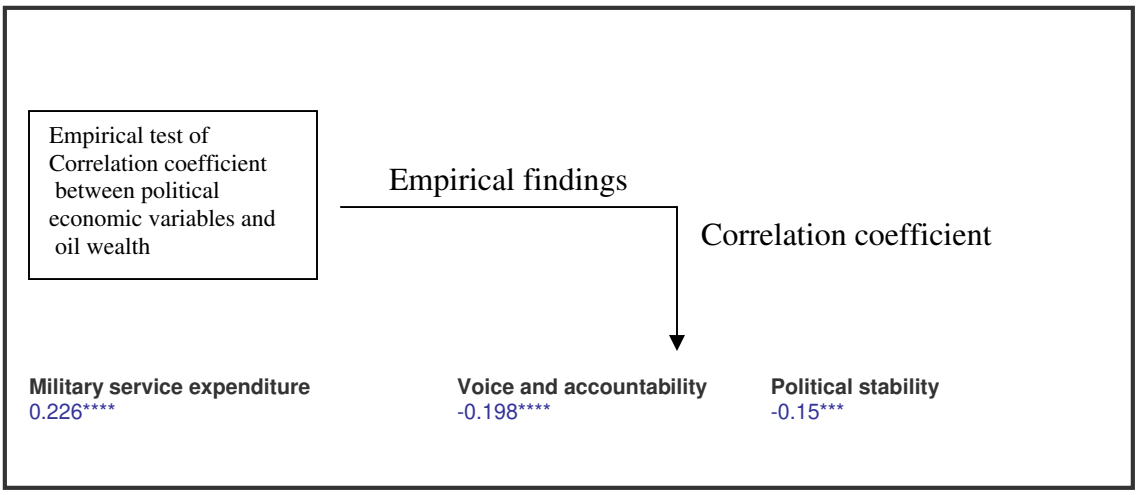
Figure 10 Military expenditure Persian Gulf Vs other countries



Source: Human Development Report

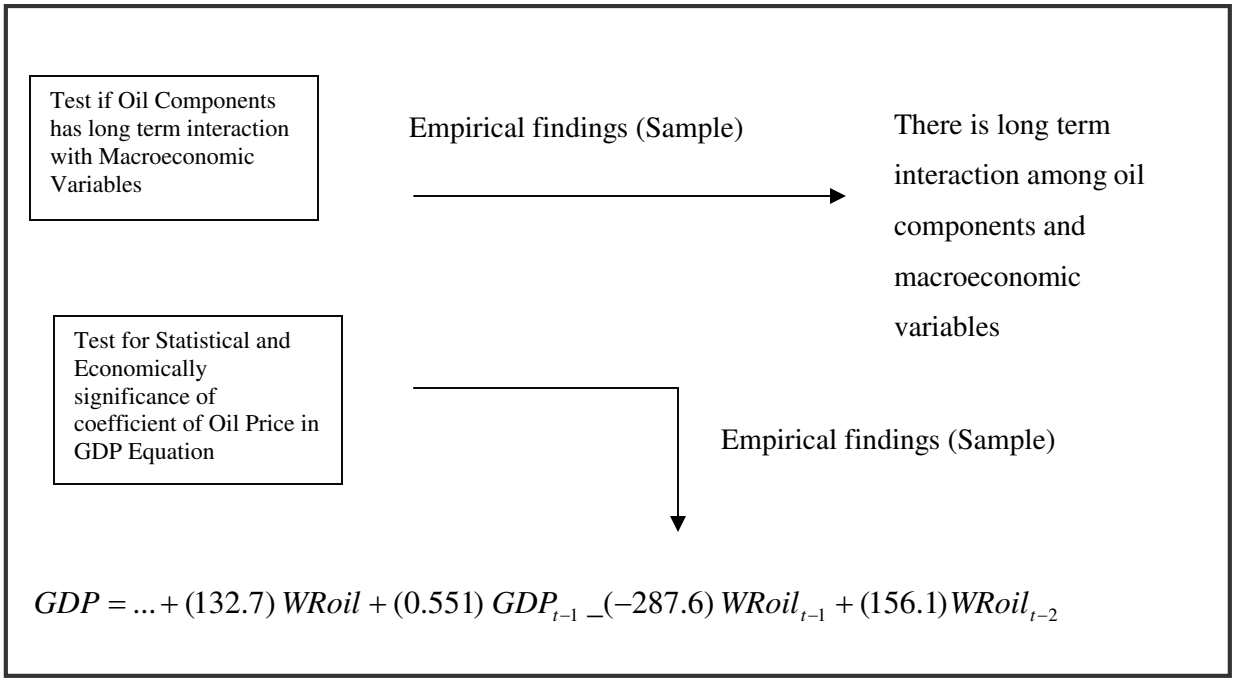
Although there seems to be positive growth in oil countries, this is not as high as what would have been expected given the other explanatory variables. The key question is that why oil revenues in oil countries could not create higher investment in non oil sectors and hence boost growth. The main empirical findings regarding this claim are described below:

Firstly, we tested the significance of oil and gas wealth in determining the quality of political institutions. Secondly, I test if there is any long term relationship between oil (oil price, oil revenue, etc) and macroeconomic variables in one sample country. Secondly, the size and sign of the oil price coefficient in GDP equation showed us the level of dependency on oil. Thirdly, we showed that oil price volatility has significant affect on oil economies.



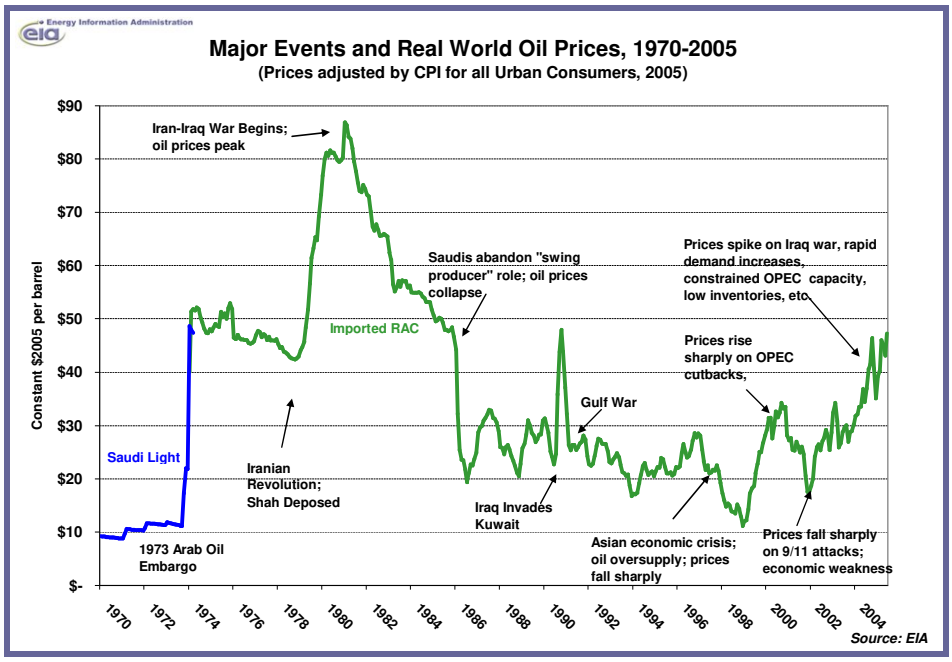
As we can see in this table, higher level of oil and gas is correlated with lower political stability, lower voice and accountability and higher military service expenditure.

If we focus on voice and accountability, the more democratic a country is firstly there should be more transparency in it's reporting of oil revenues and secondly there is more scrutiny by international community, local mass media and the public. Hence less government corruption is possible. However we found the more oil a country has the less accountable and stable they are and the more they spend on military service.



This equation shows us that a change in oil price (WRoil) will affect GDP both this period and for the two subsequent periods. The different signs of the lagged oil coefficients show the oil has volatile effect on growth: the current period affect is positive, the lag one period is negative and the lag two periods is positive. This shows us the heavy dependency of GDP on World oil prices. Further, oil prices themselves are volatile:

Figure 11 Real oil prices (CPI deflated) volatility



Source: **http://www.eia.doe.gov/emeu/cabs/chron.html**

As we can see from graph, wars and conflicts related to the Middle East cause oil shocks. EIA (1970 – 2004)[50]

We can easily conclude that:

[50] For more information please refer to: http://www.eia.doe.gov/emeu/cabs/chron.html
The Nominal Oil price trend is presented in Appendixes – Appendix 1

1- High level of oil resources cause less political stability, less voice and accountability and more military Expenses
2- There is a significant long term effect of oil prices and oil resources in oil Economies
3- . Firstly, oil price has a volatile effect on GDP. Secondly, Oil prices themselves are already volatile. Hence, oil counties will have extremely volatile GDP.
4- Due to the high frequency of Middle East conflicts, Persian Gulf countries are extremely sensitive to the shocks. Therefore they allocate high level of resource to protect and stabilize the political systems. This explains these countries' high level of military spending.

The unstable nature of oil countries leads us to conclude that current level of development can not be guaranteed to continue. Hence, we reject the sustainable development hypothesise for Gulf countries. This means the progress in terms of health and education may not be permanent. Hence,

Oil is not a good resource to rely on.

3- Further Studies

It is interesting to invest more time and energy to clarify the main roots of the development process. There are still interesting questions that can be answered by more studies, is there any evidence that can support this idea that the poor performance of oil countries in Persian Gulf it may not occur of bad institutions or bad policies mainly but it is because of Political Instability? Or can we say that Political Instability has a big role in the poor performance of their economies. Political stability as two effects in their Economy;

1- Through the changes of oil price

2- Through the reduction of military expenses in Persian Gulf countries.

These issues can be interesting for further studies to examine the exact role of stability in the region on the performance and sustainable growth.

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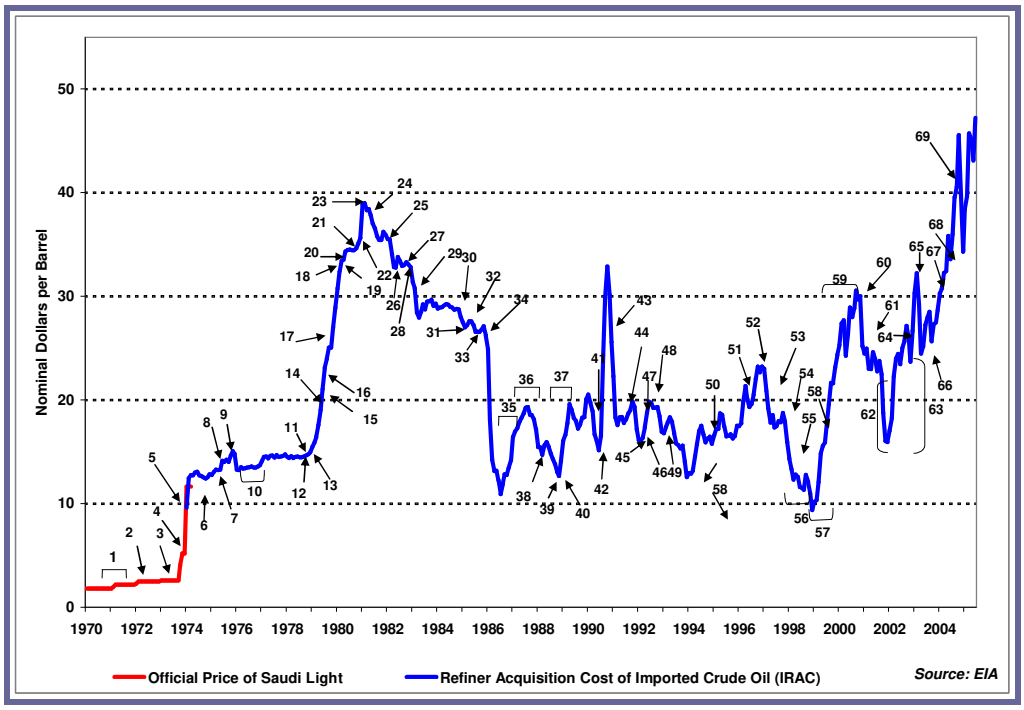
Appendices

Appendix 1- Nominal Oil Price volatility

Figure 1 World Nominal oil Price Chronology: 1970-2005



Source: http://www.eia.doe.gov/emeu/cabs/chron.html

Appendix 2- Health, education and political indicators: Spearman correlation coefficient – fitted line (Loess method)

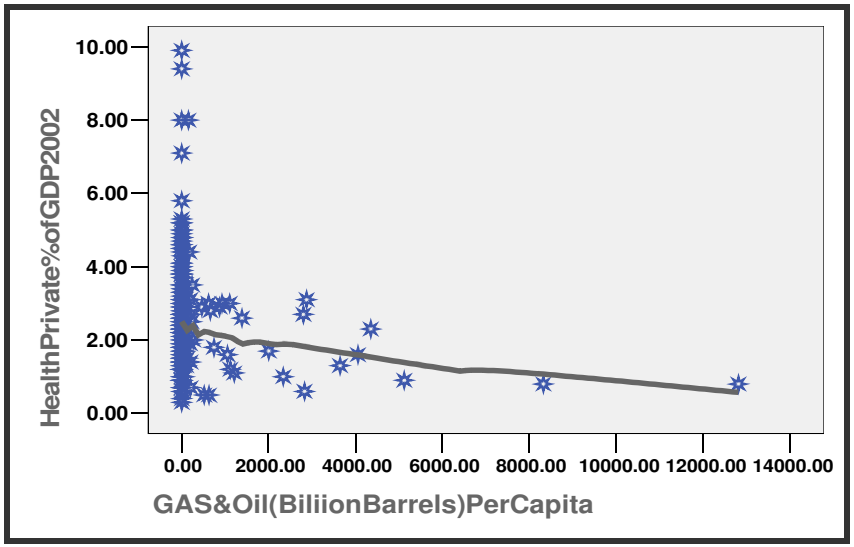
1- Health indicators - **health expenditure, private as % of GDP**

All Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Health Private%of GDP2002
Spearman's	GAS&Oil(Biliion Barrels)PerCapit	Correlation Coeff	1.000	-.152*
		Sig. (2-tailed)	.	.050
		N	170	168
	HealthPrivate%o GDP2002	Correlation Coeff	-.152*	1.000
		Sig. (2-tailed)	.050	.
		N	168	168

*.Correlation is significant at the 0.05 level (2-tailed).

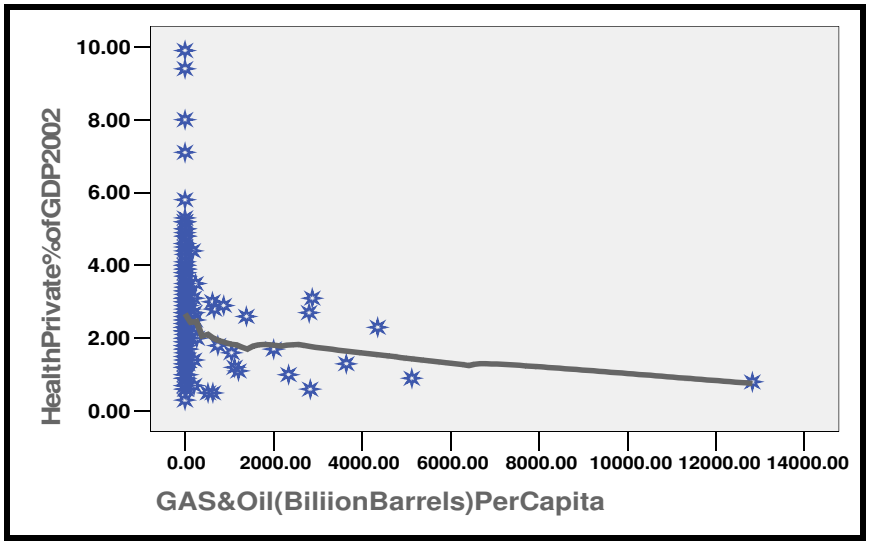


Developing Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Health Private%of GDP2002
Spearman's r	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coeff	1.000	-.207*
		Sig. (2-tailed)	.	.018
		N	130	130
	HealthPrivate%o GDP2002	Correlation Coeff	-.207*	1.000
		Sig. (2-tailed)	.018	.
		N	130	130

*.Correlation is significant at the 0.05 level (2-tailed).



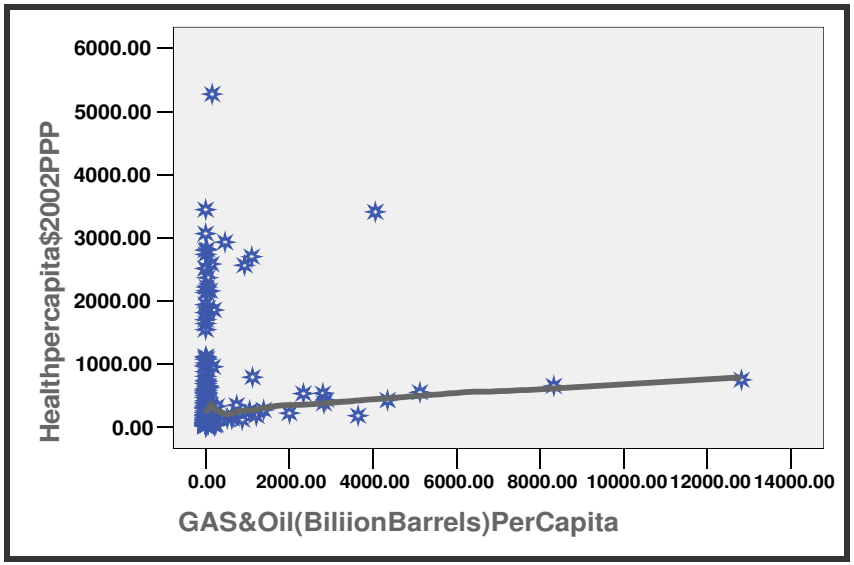
2- Health indicators - **health expenditure per capita (PPP US$)**

All Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Healthpercap a$2002PPP
Spearman's	GAS&Oil(BiliionBa PerCapita	Correlation Coef	1.000	.178*
		Sig. (2-tailed)	.	.021
		N	170	168
	Healthpercapita$2(PPP	Correlation Coef	.178*	1.000
		Sig. (2-tailed)	.021	.
		N	168	168

*.Correlation is significant at the 0.05 level (2-tailed).

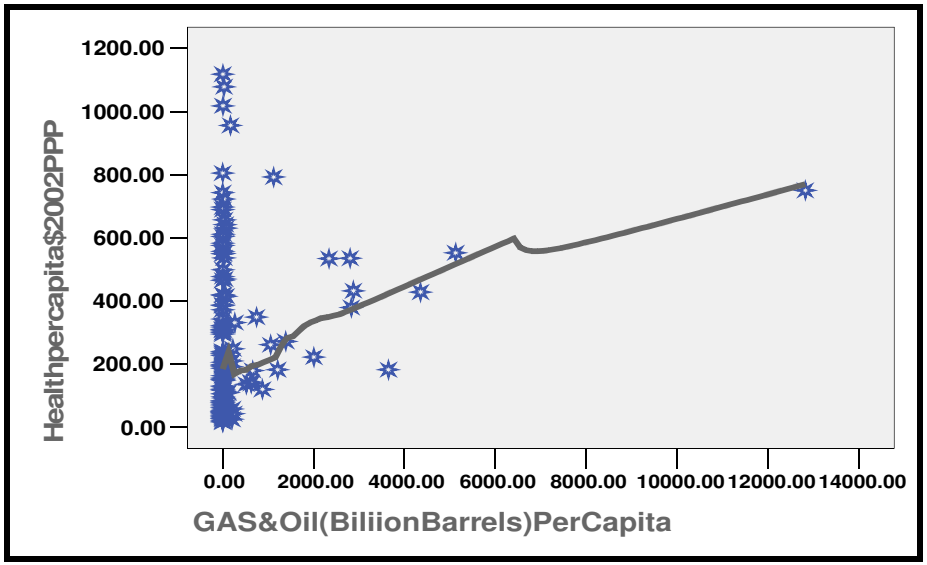


Developing Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Healthpercap ta$2002PPP
Spearman's r	GAS&Oil(BiliionBarr PerCapita	Correlation Coeffi	1.000	.214*
		Sig. (2-tailed)	.	.014
		N	130	130
	Healthpercapita$200 PPP	Correlation Coeffi	.214*	1.000
		Sig. (2-tailed)	.014	.
		N	130	130

*.Correlation is significant at the 0.05 level (2-tailed).



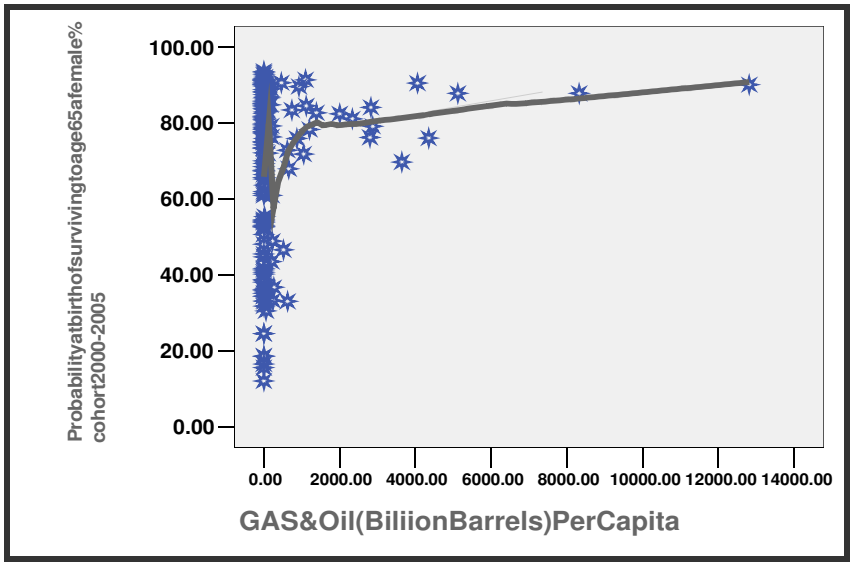
3- Health indicators - **Probability at birth of surviving to a specified age (65) – Female**

All Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Probabilityatb thofsurviving age65afema e%cohort200 0-2005
Spearman's	GAS&Oil(Biliion Barrels)PerCapit	Correlation Coeff	1.000	.189*
		Sig. (2-tailed)	.	.015
		N	170	166
	Probabilityatbirth rvivingtoage65af e%cohort2000-2	Correlation Coeff	.189*	1.000
		Sig. (2-tailed)	.015	.
		N	166	166

*.Correlation is significant at the 0.05 level (2-tailed).

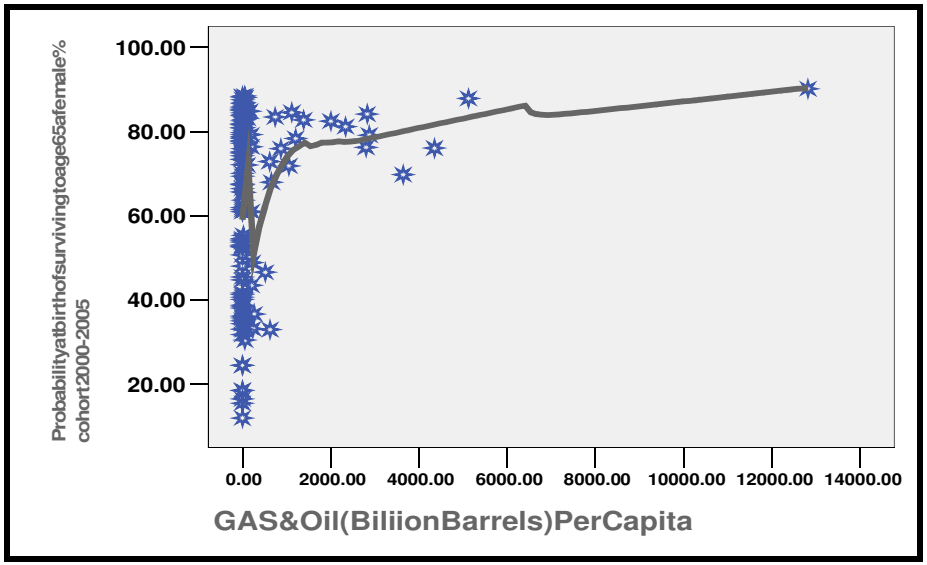


Developing Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Probabilityatbi thofsurvivingt age65afema e%cohort200 0-2005
Spearman's rl	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coeffic	1.000	.279**
		Sig. (2-tailed)	.	.001
		N	130	127
	Probabilityatbirtho rvivingtoage65afe e%cohort2000-20	Correlation Coeffic	.279**	1.000
		Sig. (2-tailed)	.001	.
		N	127	127

**.Correlation is significant at the 0.01 level (2-tailed).



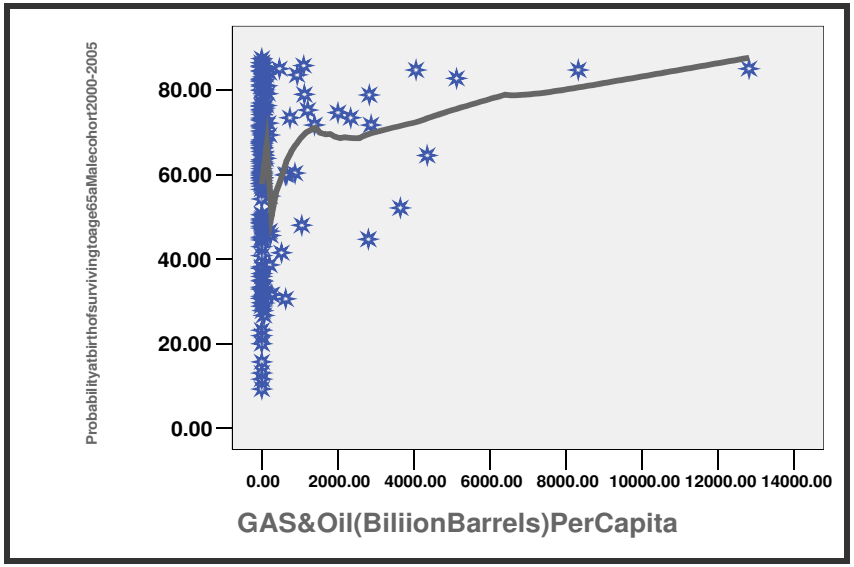
4- Health indicators - **Probability at birth of surviving to a specified age (65) - Male**

All Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Probabilityat birthofsurviv ngtoage65a Malecohort2 000-2005
Spearman's r	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coeff	1.000	.213**
		Sig. (2-tailed)	.	.006
		N	170	166
	Probabilityatbirth vivingtoage65a Malecohort2000-	Correlation Coeff	.213**	1.000
		Sig. (2-tailed)	.006	.
		N	166	166

**.Correlation is significant at the 0.01 level (2-tailed).

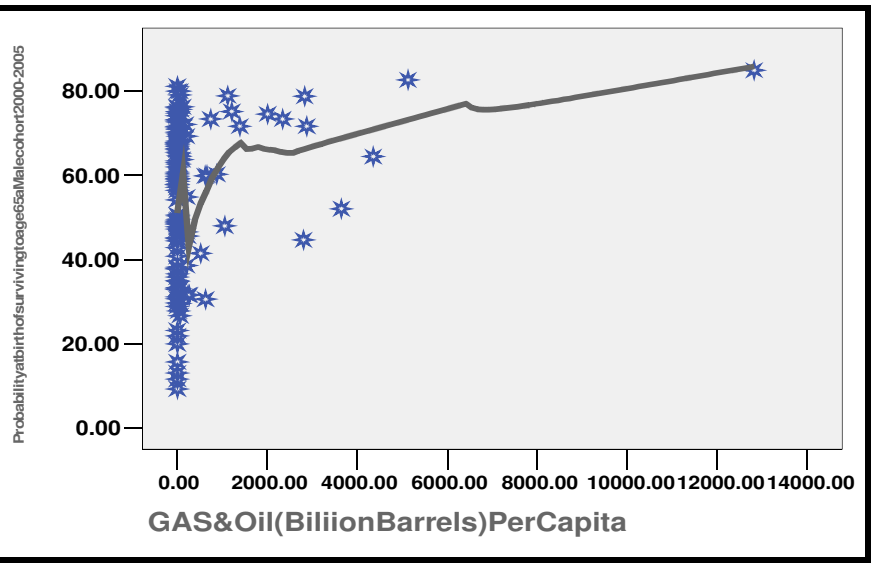


Developing Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Probabilityat birthofsurvivi ngtoage65a Malecohort2 000-2005
Spearman's rh	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coeffic	1.000	.289**
		Sig. (2-tailed)	.	.001
		N	130	127
	Probabilityatbirthof vivingtoage65a Malecohort2000-2(	Correlation Coeffic	.289**	1.000
		Sig. (2-tailed)	.001	.
		N	127	127

**.Correlation is significant at the 0.01 level (2-tailed).



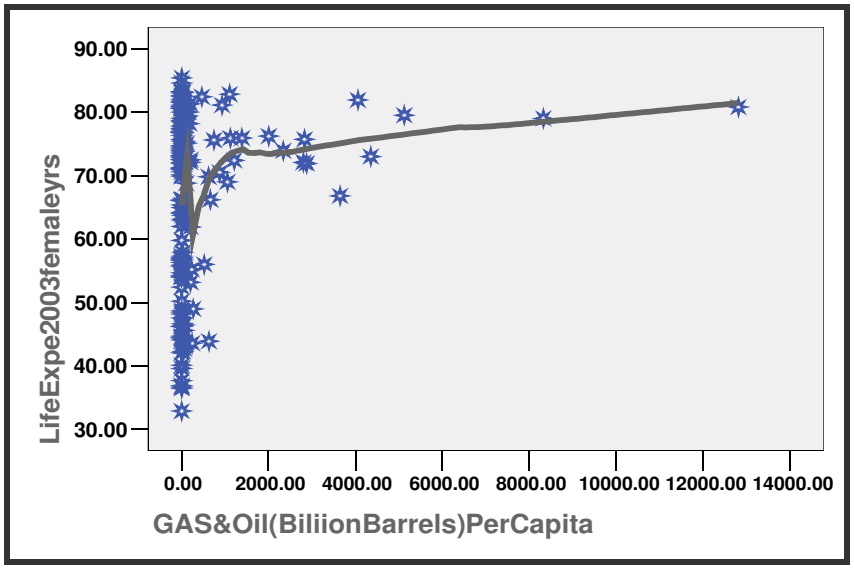
5- Health indicators - **Life expectancy at birth – Female**

All Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Life Expe2003f emaleyrs
Spearman's r	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coeff	1.000	.185*
		Sig. (2-tailed)	.	.017
		N	170	166
	LifeExpe2003fema	Correlation Coeff	.185*	1.000
		Sig. (2-tailed)	.017	.
		N	166	166

*.Correlation is significant at the 0.05 level (2-tailed).

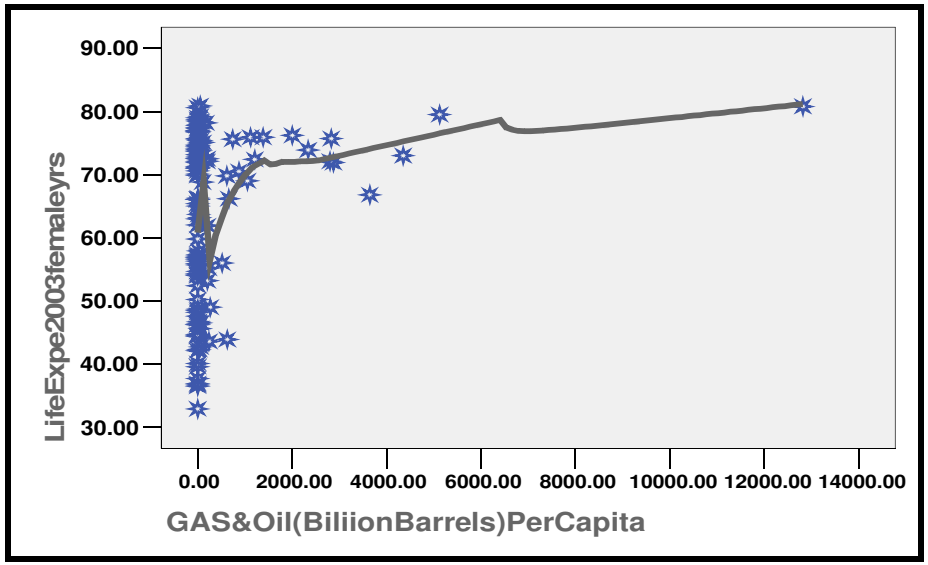


Developing Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Life Expe2003f emaleyrs
Spearman's rh	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coeffic	1.000	.266**
		Sig. (2-tailed)	.	.002
		N	130	127
	LifeExpe2003femal	Correlation Coeffic	.266**	1.000
		Sig. (2-tailed)	.002	.
		N	127	127

**.Correlation is significant at the 0.01 level (2-tailed).



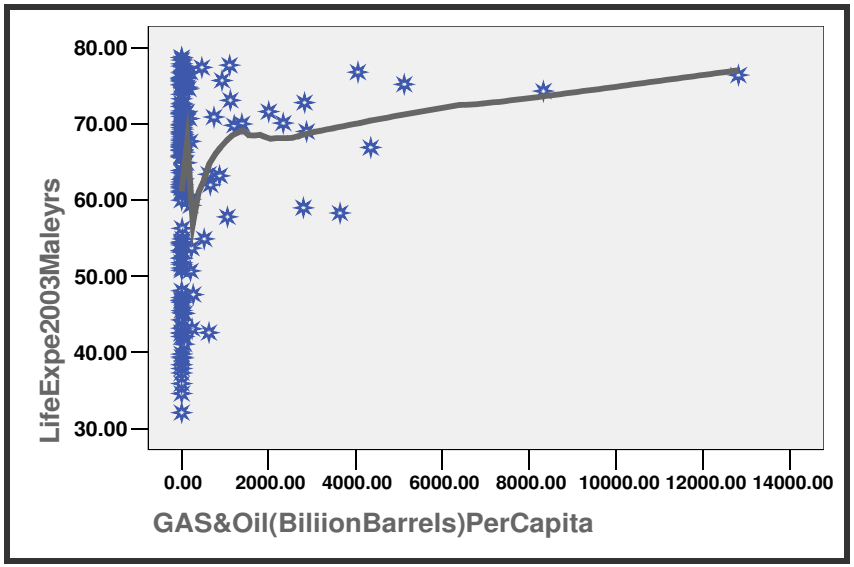
6- Health indicators - **Life expectancy at birth – Male**

All Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Life Expe2003 Maleyrs
Spearman's	GAS&Oil(Biliion Barrels)PerCapit	Correlation Coeff	1.000	.212**
		Sig. (2-tailed)	.	.006
		N	170	166
	LifeExpe2003Ma	Correlation Coeff	.212**	1.000
		Sig. (2-tailed)	.006	.
		N	166	166

**.Correlation is significant at the 0.01 level (2-tailed).

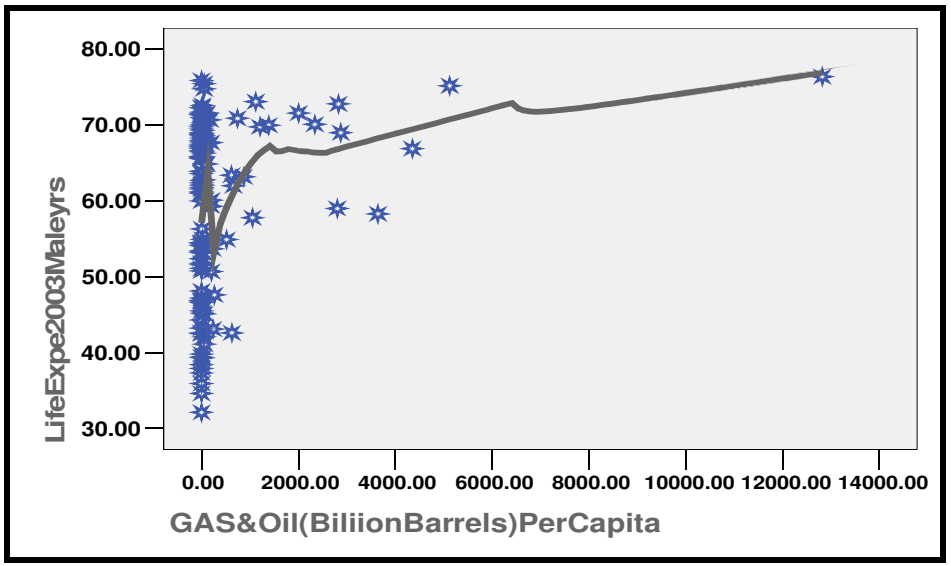


Developing Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Life Expe2003 Maleyrs
Spearman's rh	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coeffic	1.000	.291**
		Sig. (2-tailed)	.	.001
		N	130	127
	LifeExpe2003Male	Correlation Coeffic	.291**	1.000
		Sig. (2-tailed)	.001	.
		N	127	127

**.Correlation is significant at the 0.01 level (2-tailed).



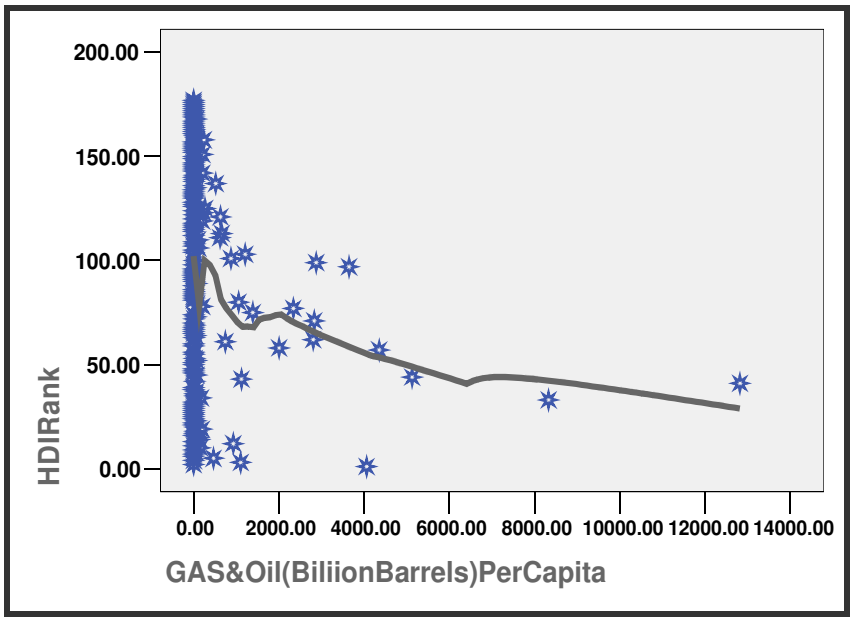
7- Health indicators - **Human development index (HDI)**

All Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	HDIRank
Spearman's rl	GAS&Oil(Biliion Barrels)PerCap	Correlation Coeffic	1.000	-.221**
		Sig. (2-tailed)	.	.004
		N	170	170
	HDIRank	Correlation Coeffic	-.221**	1.000
		Sig. (2-tailed)	.004	.
		N	170	170

**. Correlation is significant at the 0.01 level (2-tailed).

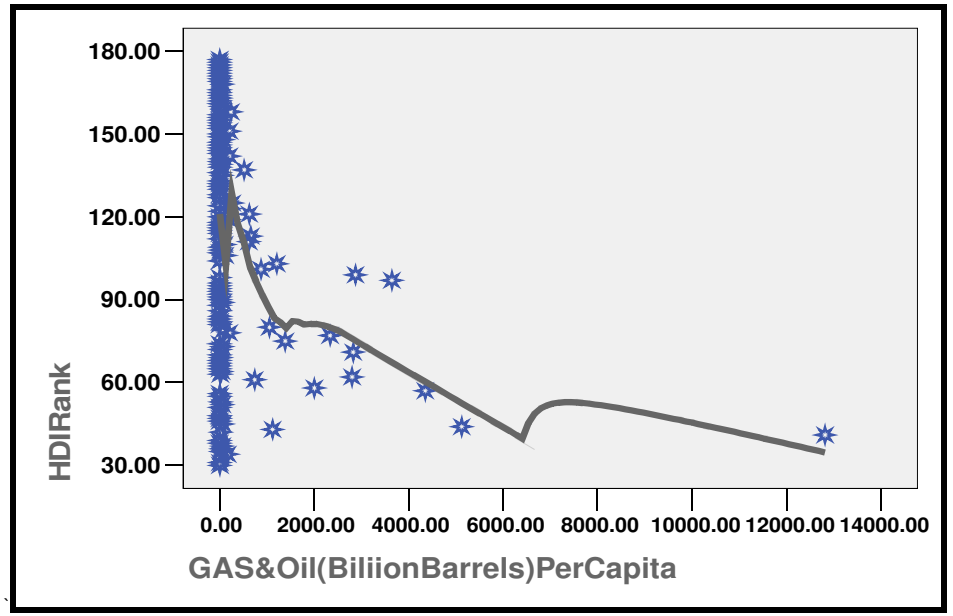


Developing Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	HDIRank
Spearman's rhc	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coefficie	1.000	-.303**
		Sig. (2-tailed)	.	.000
		N	130	130
	HDIRank	Correlation Coefficie	-.303**	1.000
		Sig. (2-tailed)	.000	.
		N	130	130

**. Correlation is significant at the 0.01 level (2-tailed).



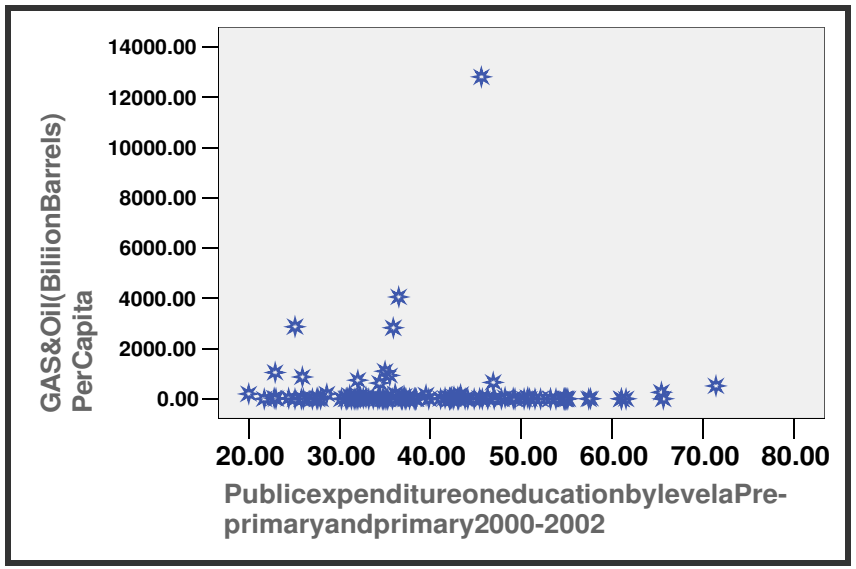
1- Education indicators - **Education expenditure, public on Levels (Pre-Primary & Primary School)**

All Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Publicexpend ureoneducat onbylevela Pre-primaryar dprimary2000 -2002
Spearman's r	GAS&Oil(Biliior Barrels)PerCap	Correlation Coeff	1.000	-.241*
		Sig. (2-tailed)	.	.012
		N	170	107
	Publicexpenditu neducationbyle Pre-primaryand mary2000-2002	Correlation Coeff	-.241*	1.000
		Sig. (2-tailed)	.012	.
		N	107	107

*. Correlation is significant at the 0.05 level (2-tailed).

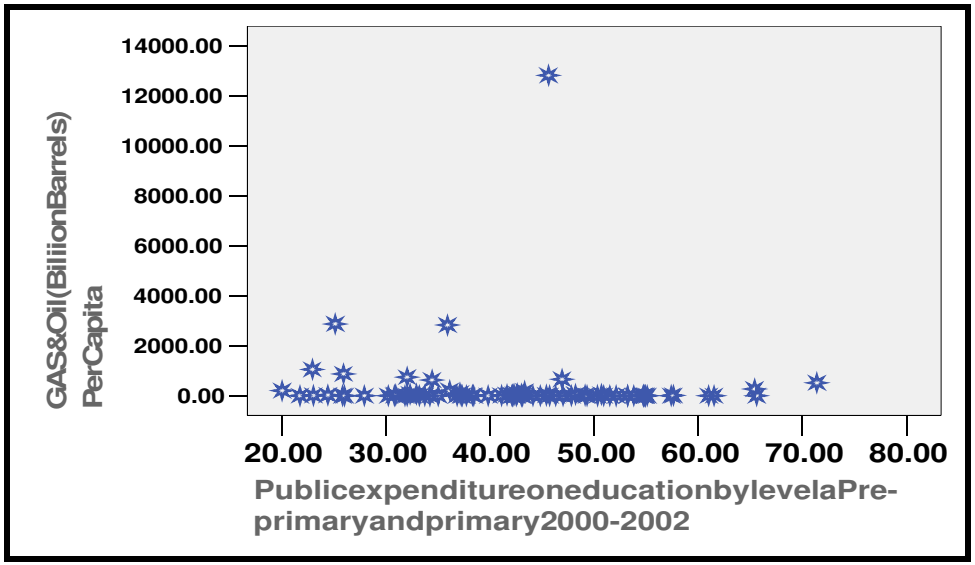


Developing Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Publicexpendi tureoneducati onbylevela Pre-primaryan dprimary2000 -2002
Spearman's rh	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coefficie	1.000	-.288*
		Sig. (2-tailed)	.	.010
		N	131	79
	Publicexpenditure neducationbyleve Pre-primaryandpr mary2000-2002	Correlation Coefficie	-.288*	1.000
		Sig. (2-tailed)	.010	.
		N	79	79

*. Correlation is significant at the 0.05 level (2-tailed).



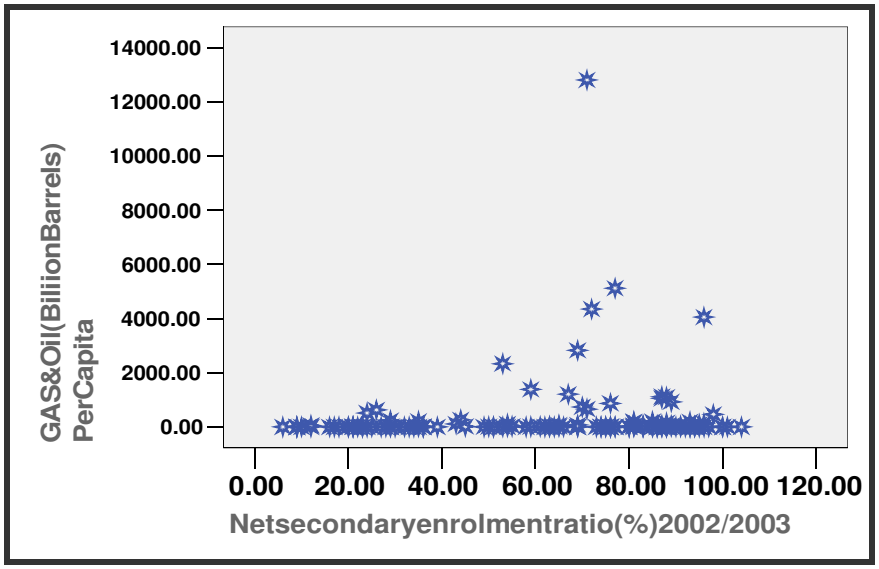
2- Education indicators - **Enrolment ratio, net ratio %(Secondary Level)**

All Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Netsecondaryenrolmentratio(%)2002/2003
Spearman's r	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coeffi	1.000	.224**
		Sig. (2-tailed)	.	.009
		N	170	135
	Netsecondaryenrc ntratio(%)2002/20	Correlation Coeffi	.224**	1.000
		Sig. (2-tailed)	.009	.
		N	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

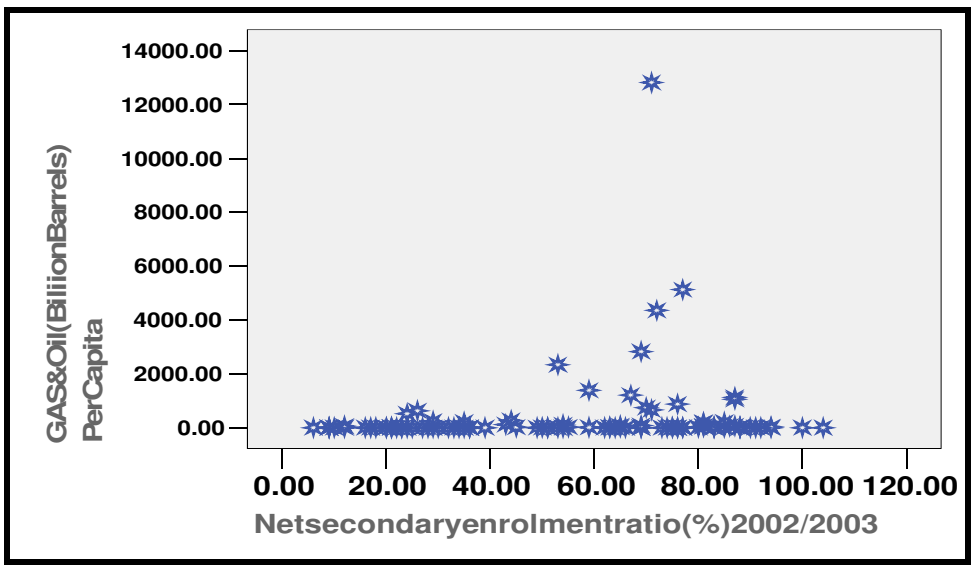


Developing Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Netsecondaryenrolmentratio(%)2002/2003
Spearman's rh	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coefficie	1.000	.304**
		Sig. (2-tailed)	.	.002
		N	131	102
	Netsecondaryenroln ntratio(%)2002/2003	Correlation Coefficie	.304**	1.000
		Sig. (2-tailed)	.002	.
		N	102	102

**.Correlation is significant at the 0.01 level (2-tailed).



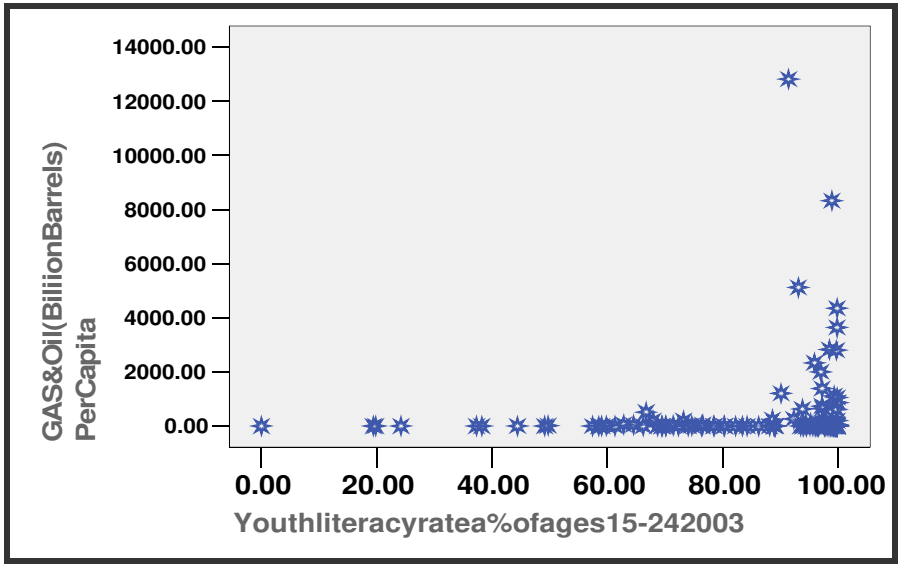
3- Education indicators - **Literacy rate, youth (15-24)**

All Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Youthliteracy ratea%ofage s15-242003
Spearman's rl	GAS&Oil(Biliion Barrels)PerCapit	Correlation Coeffic	1.000	.249**
		Sig. (2-tailed)	.	.006
		N	170	122
	Youthliteracyrate ofages15-242003	Correlation Coeffic	.249**	1.000
		Sig. (2-tailed)	.006	.
		N	122	122

**.Correlation is significant at the 0.01 level (2-tailed).

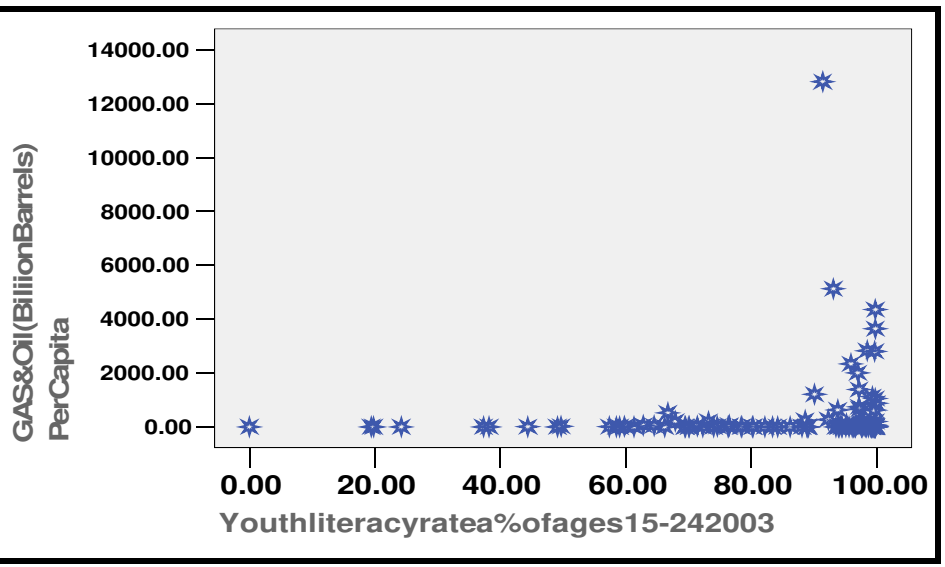


Developing Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Youthliteracy ratea%ofage s15-242003
Spearman's rh	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coefficie	1.000	.302**
		Sig. (2-tailed)	.	.001
		N	131	112
	Youthliteracyratea ofages15-242003	Correlation Coefficie	.302**	1.000
		Sig. (2-tailed)	.001	.
		N	112	112

**.Correlation is significant at the 0.01 level (2-tailed).



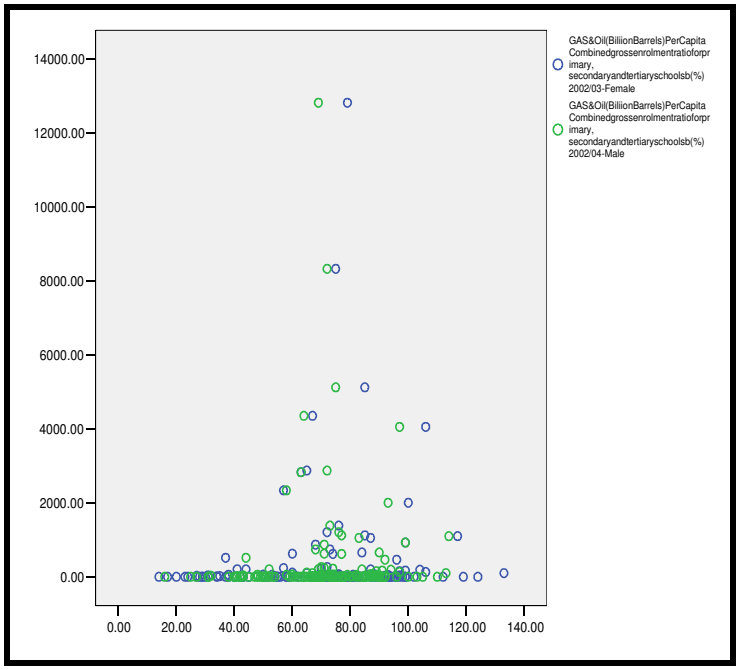
4- Education indicators - **Enrolment ratio, gross, combined for primary, secondary and tertiary schools – All Countries**

Female

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Combinedgro ssenrolmentr atioforprimary secondaryanc tertiaryschool sb(%)2002/03 -Female
Spearman's r	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coeffi	1.000	.177*
		Sig. (2-tailed)	.	.027
		N	170	157
	Combinedgrossenr entratioforprimary,s ndaryandtertiarysch b(%)2002/03-Fema	Correlation Coeffi	.177*	1.000
		Sig. (2-tailed)	.027	.
		N	157	157

*.Correlation is significant at the 0.05 level (2-tailed).



Male

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Combinedgro ssenrolmentr atioforprimary secondaryanc tertiaryschool sb(%)2002/04 -Male
Spearman's rl	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coeffi	1.000	.191*
		Sig. (2-tailed)	.	.017
		N	170	157
	Combinedgrossenr mentratioforprimar condaryandtertiarys olsb(%)2002/04-Ma	Correlation Coeffi	.191*	1.000
		Sig. (2-tailed)	.017	.
		N	157	157

*.Correlation is significant at the 0.05 level (2-tailed).

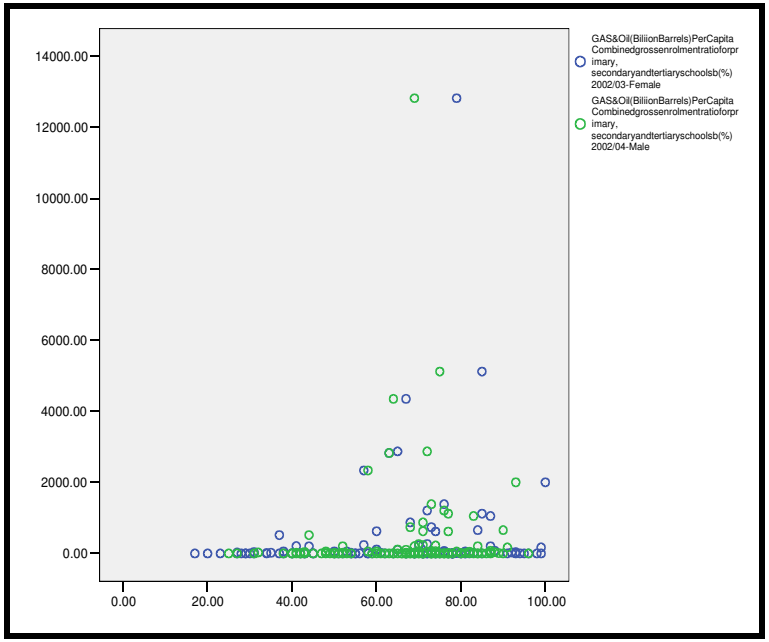
5- Education indicators - **Enrolment ratio, gross, combined for primary, secondary and tertiary schools – Developing Countries**

Female

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Combinedgrossenrolmentratioforprimary, secondaryandtertiaryschoolsb(%)2002/03-Female
Spearman's rh	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coefficie	1.000	.196*
		Sig. (2-tailed)	.	.031
		N	131	121
	Combinedgrossenrolr entratioforprimary,sec ndaryandtertiaryscho(b(%)2002/03-Female	Correlation Coefficie	.196*	1.000
		Sig. (2-tailed)	.031	.
		N	121	121

*. Correlation is significant at the 0.05 level (2-tailed).



Male

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Combinedgrossenrolmentratioforprimary, secondaryandtertiaryschoolsb(%)2002/04-Male
Spearman's rh	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coefficie	1.000	.224*
		Sig. (2-tailed)	.	.014
		N	131	121
	Combinedgrossenrol mentratioforprimary,s condaryandtertiarysc olsb(%)2002/04-Male	Correlation Coefficie	.224*	1.000
		Sig. (2-tailed)	.014	.
		N	121	121

*. Correlation is significant at the 0.05 level (2-tailed).

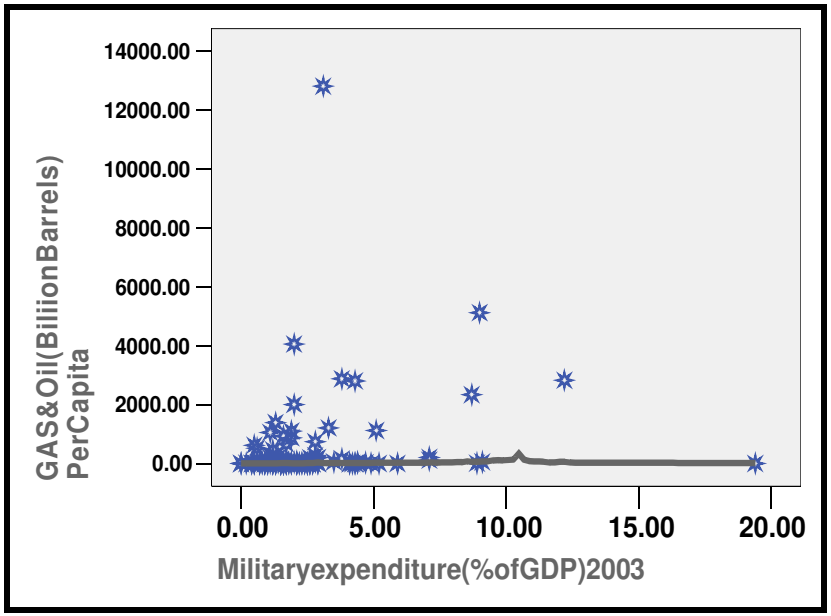
1- Political indicators - Military Service Expenses:

All Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Militaryexpe nditure(%o GDP)2003
Spearman's rho	GAS&Oil(BiliionBa PerCapita	Correlation Coe	1.000	.226**
		Sig. (1-tailed)	.	.005
		N	170	130
	Militaryexpenditure GDP)2003	Correlation Coe	.226**	1.000
		Sig. (1-tailed)	.005	.
		N	130	130

**. Correlation is significant at the 0.01 level (1-tailed).

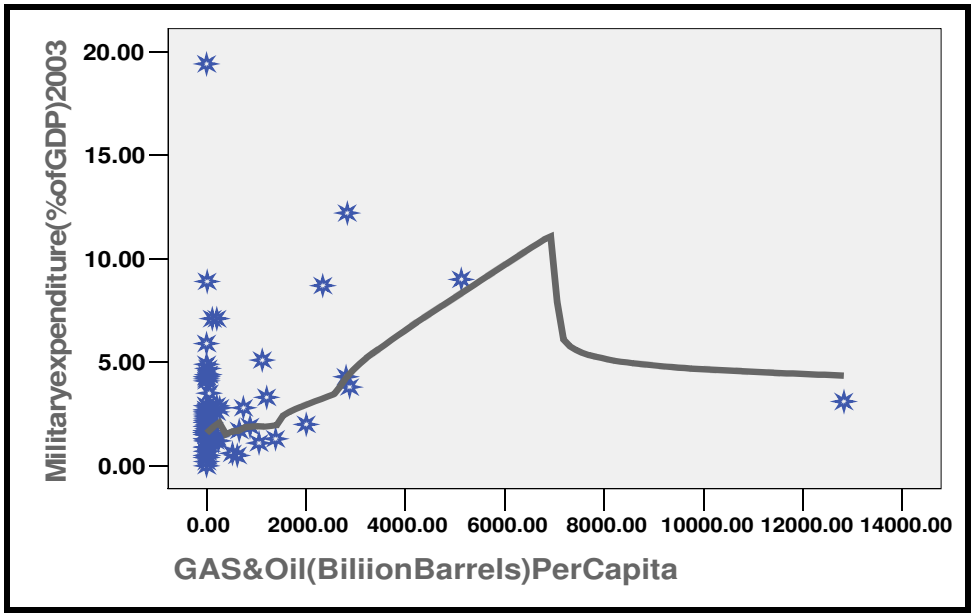


Developing Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Militaryexpe nditure(%of GDP)2003
Spearman's rho	GAS&Oil(BiliionBarrels PerCapita	Correlation Coefficient	1.000	.242*
		Sig. (2-tailed)	.	.017
		N	130	97
	Militaryexpenditure(%o GDP)2003	Correlation Coefficient	.242*	1.000
		Sig. (2-tailed)	.017	.
		N	97	97

*. Correlation is significant at the 0.05 level (2-tailed).



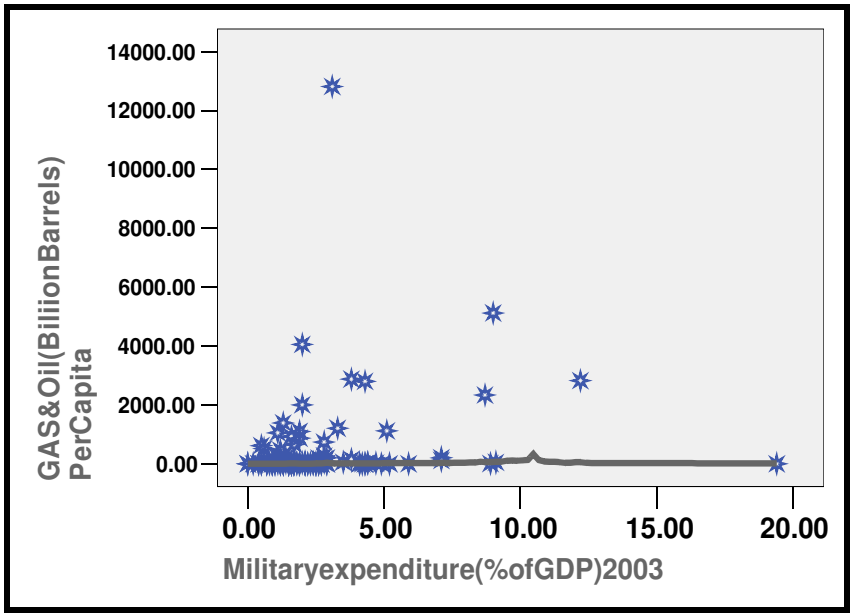
2- Political indicators - Vice and Accountability

All Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Voice& Accountability(VA)
Spearman's rho	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coeff	1.000	-.198**
		Sig. (1-tailed)	.	.005
		N	170	169
	Voice&Accountabil	Correlation Coeff	-.198**	1.000
		Sig. (1-tailed)	.005	.
		N	169	169

**. Correlation is significant at the 0.01 level (1-tailed).

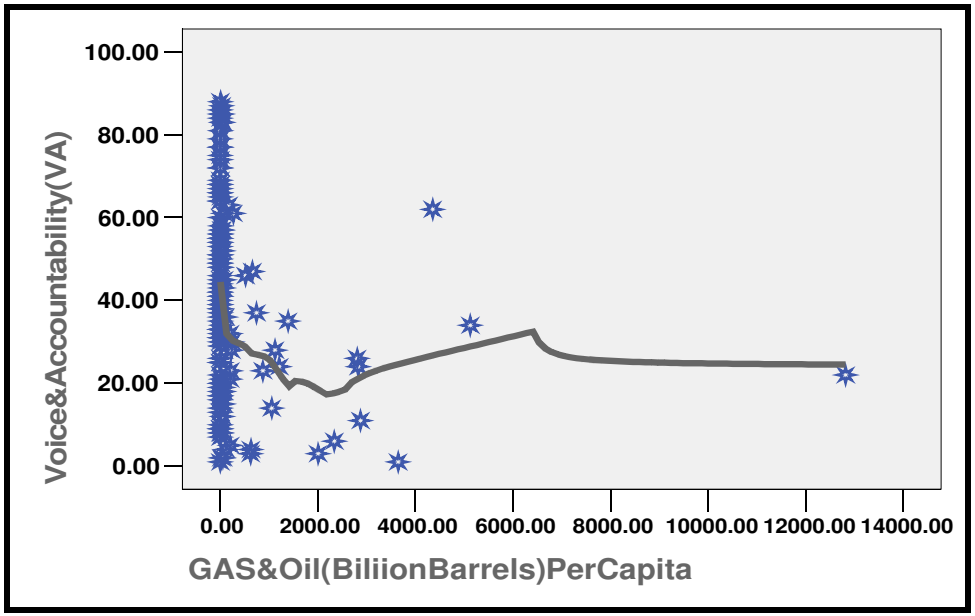


Developing Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Voice& Accountability(VA)
Spearman's rho	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coefficie	1.000	-.277**
		Sig. (1-tailed)	.	.001
		N	130	129
	Voice&Accountability(	Correlation Coefficie	-.277**	1.000
		Sig. (1-tailed)	.001	.
		N	129	129

**. Correlation is significant at the 0.01 level (1-tailed).



3- Political indicators - political Stability

All Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Political Stability(PS)
Spearman's rl	GAS&Oil(Biliion Barrels)PerCapit	Correlation Coeffic	1.000	-.150*
		Sig. (1-tailed)	.	.026
		N	170	169
	PoliticalStability(I	Correlation Coeffic	-.150*	1.000
		Sig. (1-tailed)	.026	.
		N	169	169

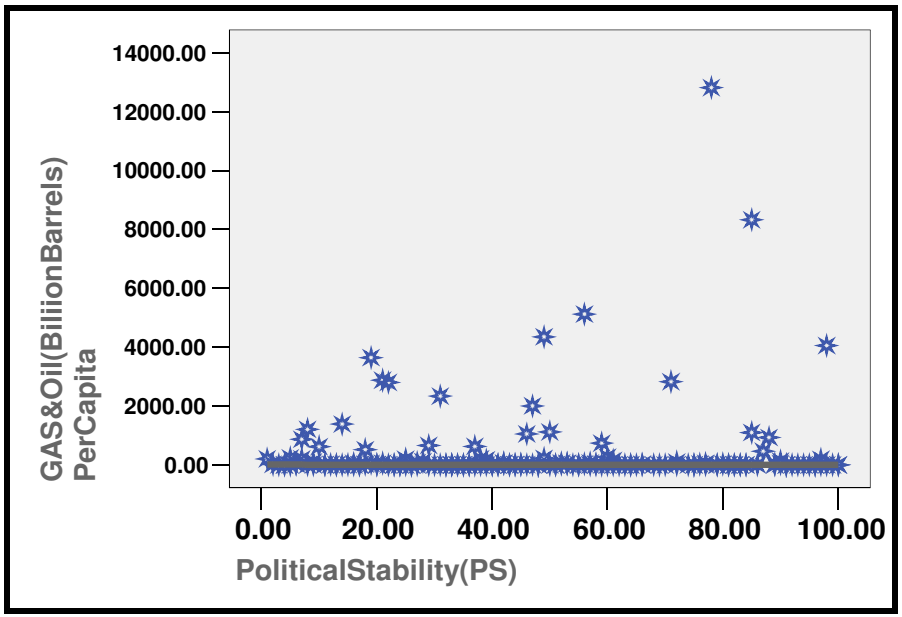
*. Correlation is significant at the 0.05 level (1-tailed).

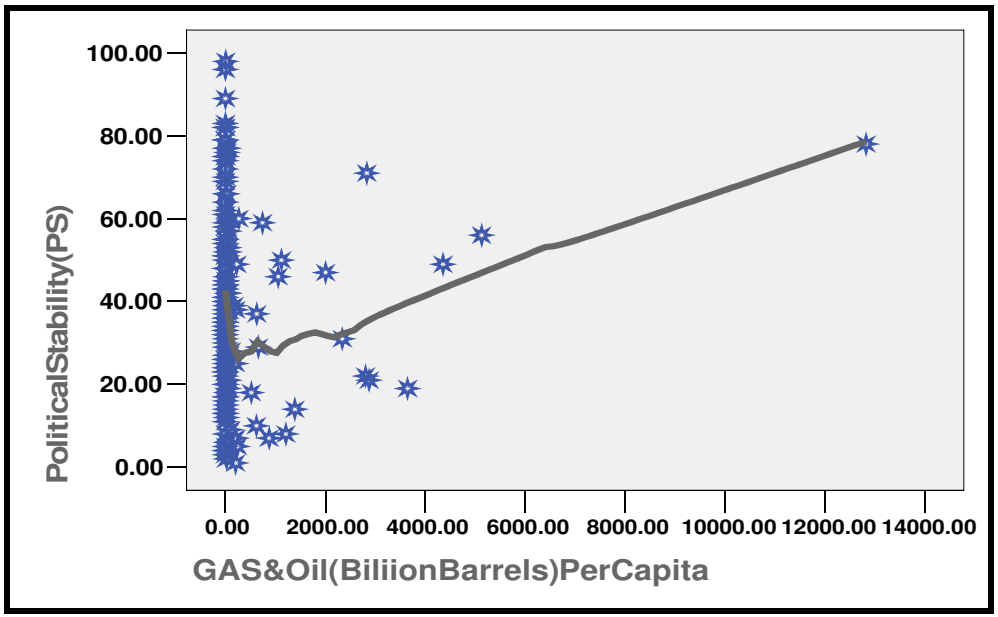
Developing Countries

Correlations

			GAS& Oil(Biliion Barrels)Per Capita	Political Stability(PS)
Spearman's rhc	GAS&Oil(Biliion Barrels)PerCapita	Correlation Coefficie	1.000	-.152*
		Sig. (1-tailed)	.	.043
		N	130	129
	PoliticalStability(P	Correlation Coefficie	-.152*	1.000
		Sig. (1-tailed)	.043	.
		N	129	129

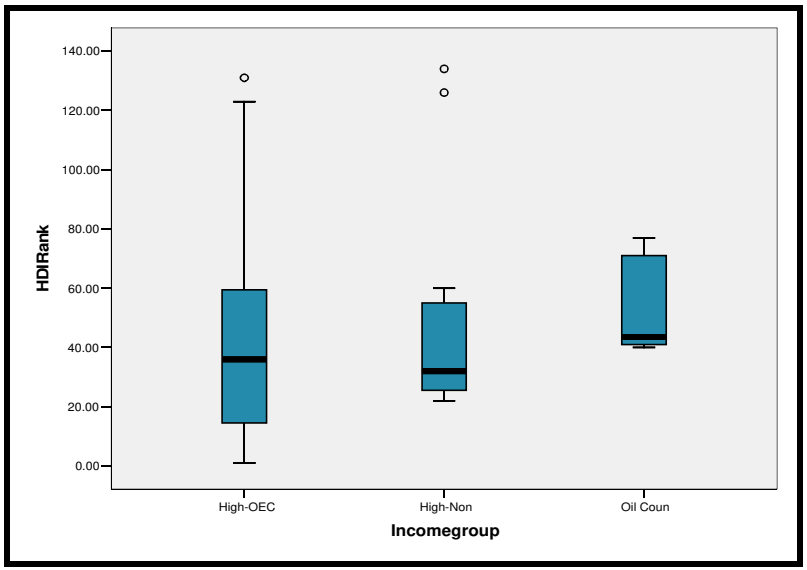
*. Correlation is significant at the 0.05 level (1-tailed).





Appendix 3- Health and education indicators: mean values comparison (high-OECD, high-non OECD and Persian Gulf countries)

1- Health indicator - HDI Rank

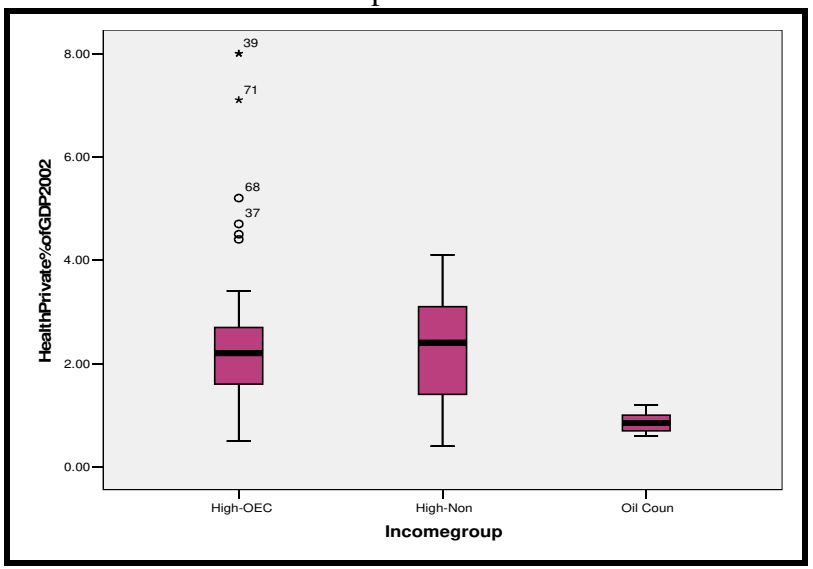


Report

HDIRank

Incomegroup	Mean	N	Std. Deviation
High-OECD	41.6182	55	33.49322
High-Non OECD	50.9091	11	40.85451
Oil Countries	52.6667	6	16.69331
Total	43.9583	72	33.55653

2- Health indicator - health private % of GDP 2002

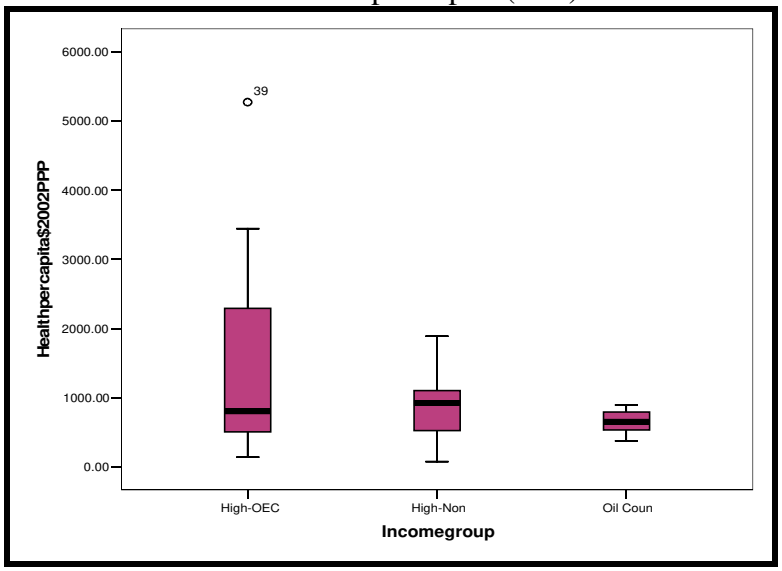


Report

HealthPrivate%ofGDP2002

Incomegroup	Mean	N	Std. Deviation
High-OECD	2.4927	55	1.59975
High-Non OECD	2.2600	10	1.21582
Oil Countries	.8667	6	.21602
Total	2.3225	71	1.54033

3- Health indicator - health per capita (PPP)

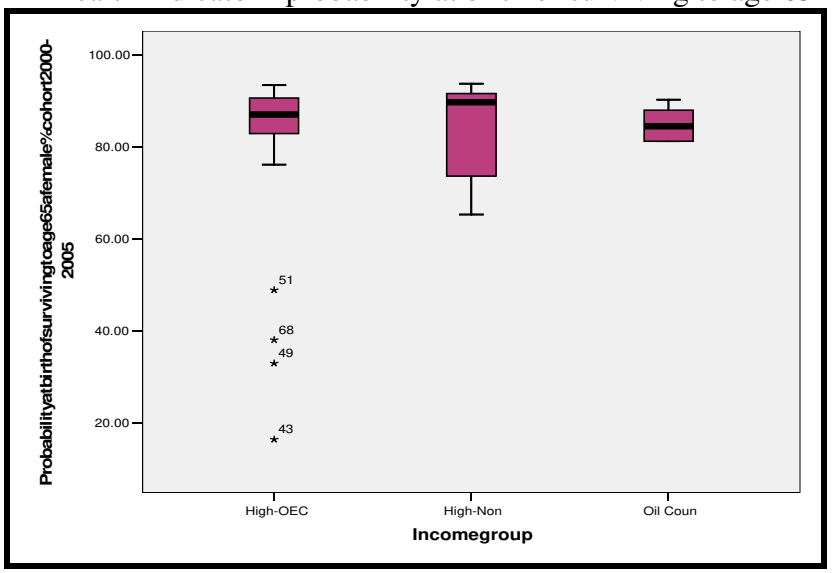


Report

Healthpercapita$2002PPP

Incomegroup	Mean	N	Std. Deviation
High-OECD	1405.2000	55	1135.66680
High-Non OECD	882.8000	10	575.32055
Oil Countries	650.1667	6	192.97711
Total	1267.8169	71	1053.02600

4- Health indicator - probability at birth of surviving to age 65 female

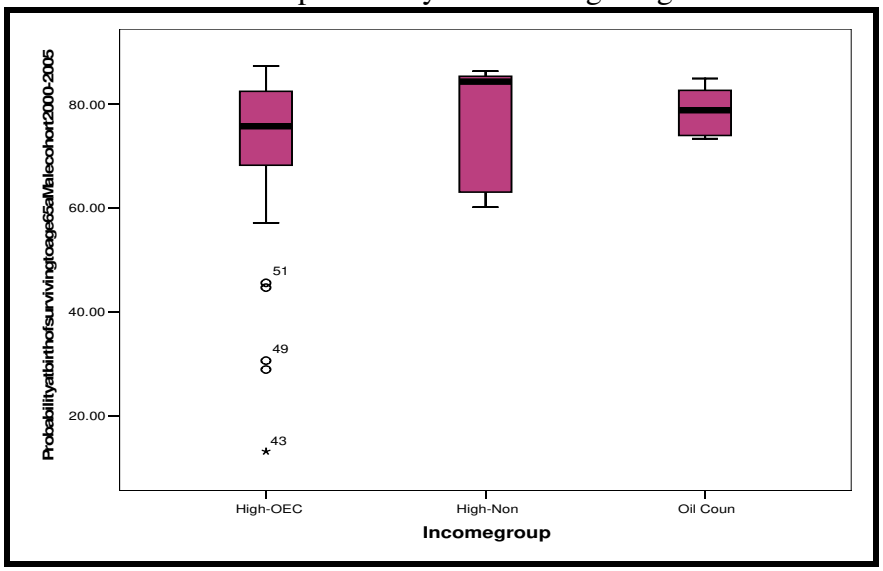


Report

Probabilityatbirthofsurvivingtoage65afemale%cohort2000-2005

Incomegroup	Mean	N	Std. Deviation
High-OECD	82.9558	52	15.20373
High-Non OECD	84.2100	10	10.67952
Oil Countries	84.8833	6	3.60689
Total	83.3103	68	13.88106

5- Health indicators - probability of surviving to age 65 Male

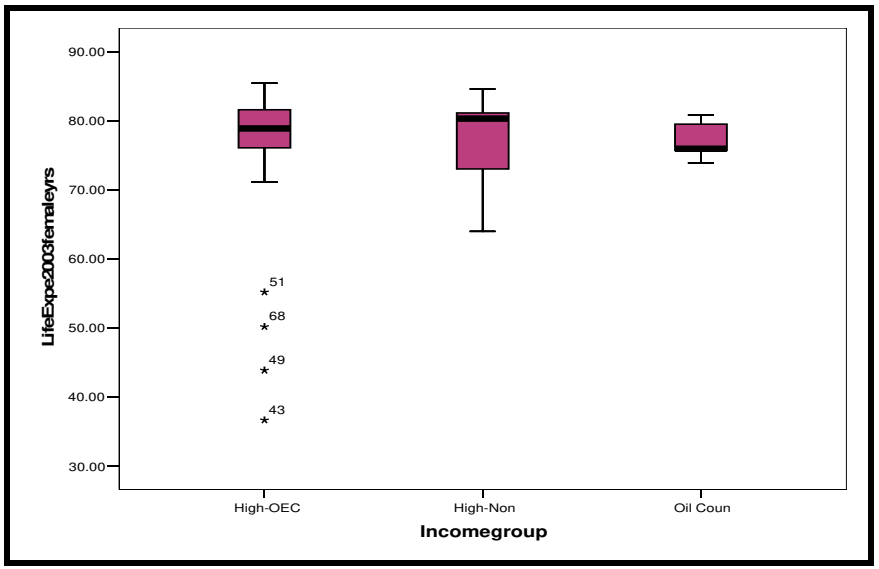


Report

Probabilityatbirthofsurvivingtoage65aMalecohort2000-2005

Incomegroup	Mean	N	Std. Deviation
High-OECD	72.4615	52	15.58616
High-Non OECD	77.1600	10	11.15230
Oil Countries	78.8000	6	4.60130
Total	73.7118	68	14.43983

6- Health indicators - life expectancy female

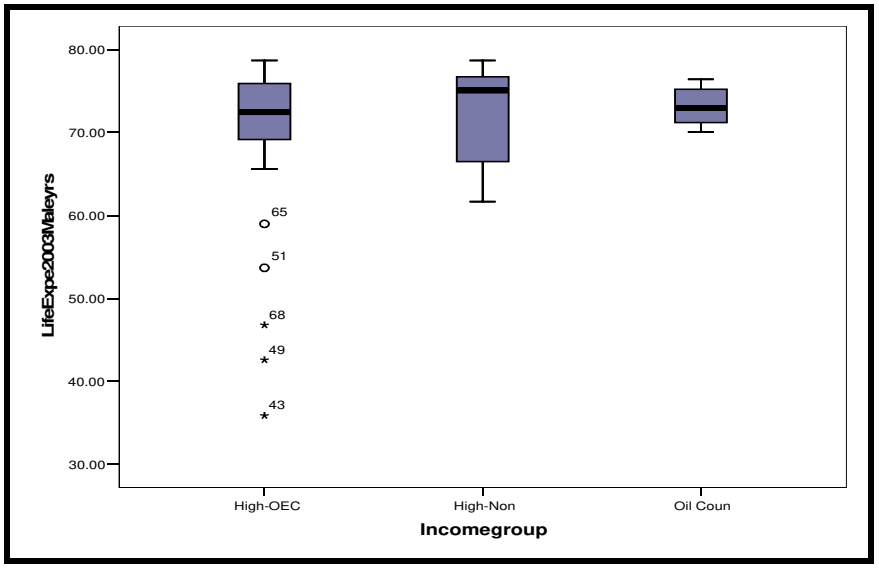


Report

LifeExpe2003femaleyrs

Incomegroup	Mean	N	Std. Deviation
High-OECD	76.6558	52	9.52879
High-Non OECD	76.9000	10	7.34696
Oil Countries	76.9667	6	2.61508
Total	76.7191	68	8.76866

7- Health indicator - life expectancy male

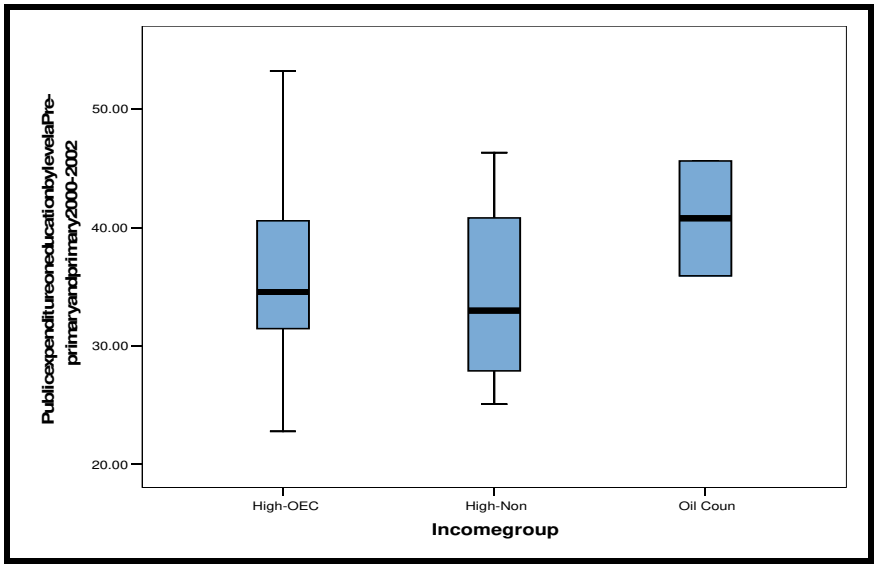


Report

LifeExpe2003Maleyrs

Incomegroup	Mean	N	Std. Deviation
High-OECD	70.6404	52	8.75770
High-Non OECD	72.2200	10	6.42907
Oil Countries	73.1333	6	2.36615
Total	71.0926	68	8.06678

1- Education indicators - public expenditure on education by level on pre primary and primary

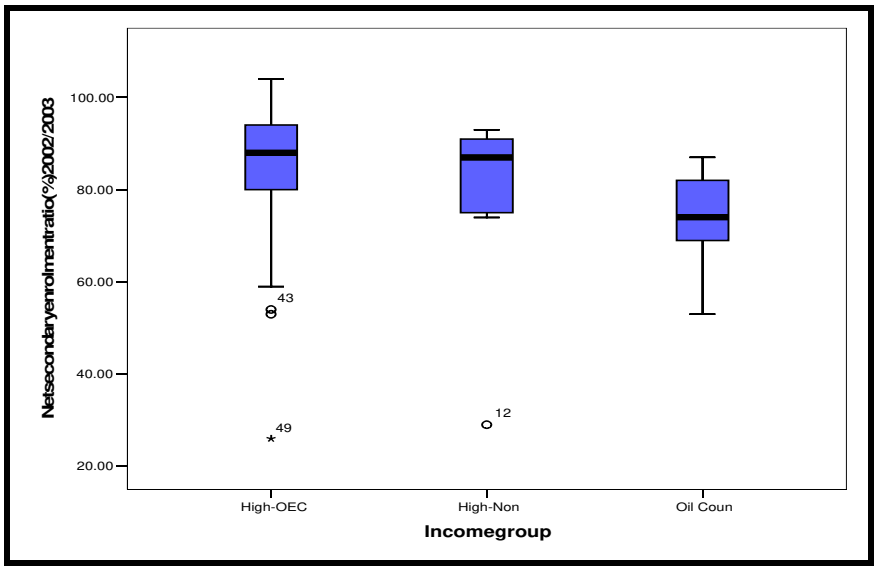


Report

Publicexpenditureoneducationbylevela Pre-primaryandprimary2000-2002

Incomegroup	Mean	N	Std. Deviation
High-OECD	36.0773	44	7.45850
High-Non OECD	34.3500	4	8.99240
Oil Countries	40.7500	2	6.85894
Total	36.1260	50	7.47400

2- Education indicators - net secondary enrolment ratio

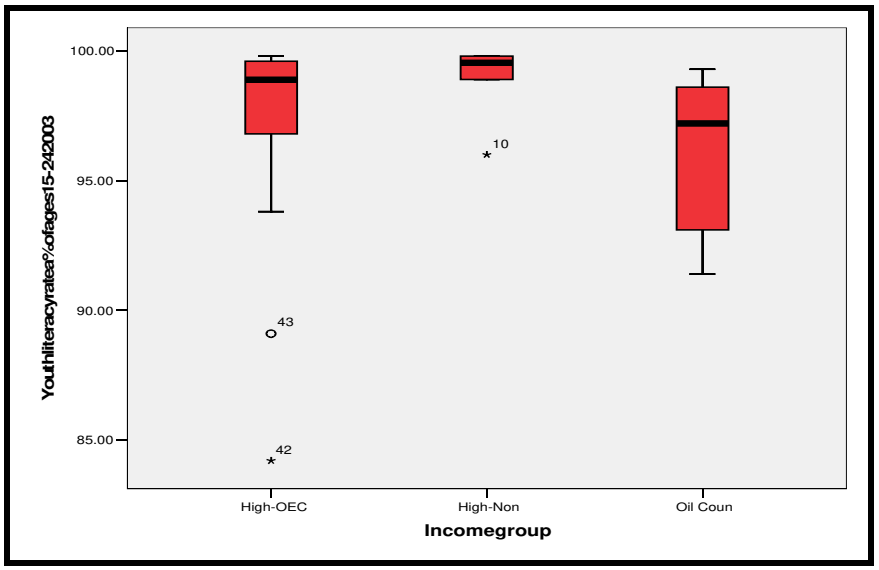


Report

Netsecondaryenrolmentratio(%)2002/2003

Incomegroup	Mean	N	Std. Deviation
High-OECD	83.7000	50	14.89727
High-Non OECD	77.2857	7	22.61794
Oil Countries	73.1667	6	11.94013
Total	81.9841	63	15.77308

3- Education indicators - youth literacy rate

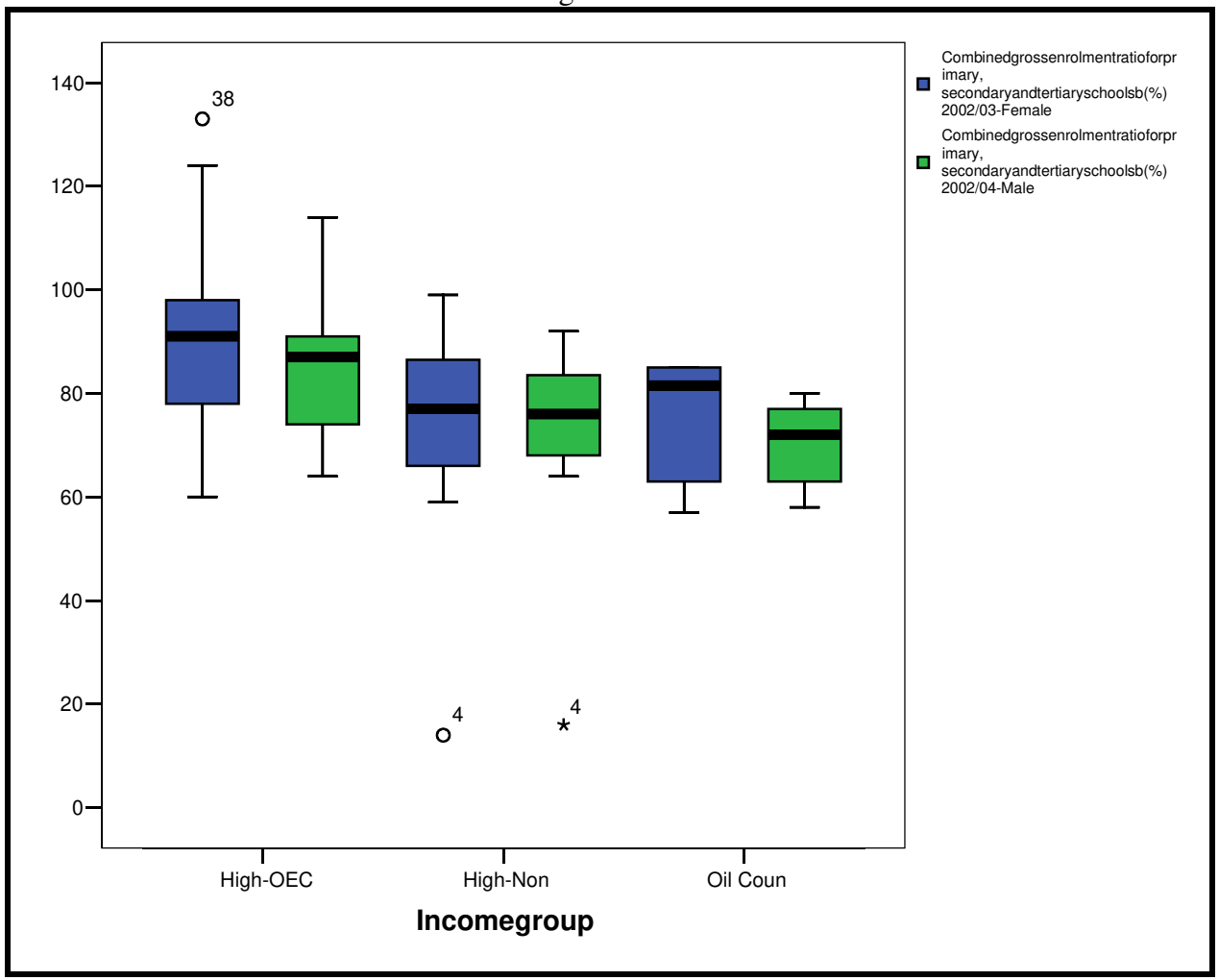


Report

Youthliteracyratea%ofages15-242003

Incomegroup	Mean	N	Std. Deviation
High-OECD	97.2667	27	3.62831
High-Non OECD	98.9333	6	1.47468
Oil Countries	96.1333	6	3.26721
Total	97.3487	39	3.36639

4- Education indicator - combination of gross enrolment



Report

Combinedgrossenrolmentratioforprimary,secondaryandtertiaryschoolsb(%)2002/03-Female

Incomegroup	Mean	N	Std. Deviation
High-OECD	89.6481	54	15.43967
High-Non OECD	71.5000	8	26.25153
Oil Countries	75.5000	6	12.35718
Total	86.2647	68	17.82135

Report

Combinedgrossenrolmentratioforprimary,secondaryandtertiaryschoolsb(%)2002/04-Male

Incomegroup	Mean	N	Std. Deviation
High-OECD	85.5000	54	11.67444
High-Non OECD	70.3750	8	23.73627
Oil Countries	70.3333	6	8.57127
Total	82.3824	68	14.49861

Appendix 5- Sample country regression details

Table 1- Engle Granger Approach

Dependent Variable: GDP
Method: Least Squares
Date: 09/06/06 Time: 01:14
Sample (adjusted): 1988Q3 2005Q4
Included observations: 70 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CC	0.289560	0.114881	2.520521	0.0143
GCF	0.469946	0.121888	3.855562	0.0003
G	0.809293	0.238542	3.392669	0.0012
NX(-1)	0.151637	0.058633	2.586218	0.0121
WROIL(-1)	-287.6973	83.36298	-3.451139	0.0010
WROIL	132.7671	61.73515	2.150591	0.0354
WROIL(-2)	156.1719	66.22305	2.358270	0.0215
GDP(-1)	0.551121	0.070524	7.814675	0.0000

R-squared	0.987255	Mean dependent var	74581.50
Adjusted R-squared	0.985816	S.D. dependent var	15984.14
S.E. of regression	1903.637	Akaike info criterion	18.04813
Sum squared resid	2.25E+08	Schwarz criterion	18.30510
Log likelihood	-623.6846	Durbin-Watson stat	2.022388

Table 2- Unit test of residuals

Null Hypothesis: RESID01 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.279792	0.0000
Test critical values:	1% level	-3.528515	
	5% level	-2.904198	
	10% level	-2.589562	

*MacKinnon (1996) one-sided p-values.

Appendix 5- Robustness Check

Table1- Robustness check of Spearman Correlation method

Correlation Coefficient (oil & gas reserves Vs health, education and political variables	All countries	Developing countries
health Private Expenditure % of GDP	-0.152*	-0.207*
health expenditure per capita (PPP US$)	0.178*	0.214*
Probability at birth of surviving to a specified age (65) - Female	0.189*	0.279**
Probability at birth of surviving to a specified age (65) – Male	0.213**	0.289**
Life expectancy at birth – Female	0.185*	0.266**
Life expectancy at birth Male	0.212**	0.291**
Human development index	-0.221**	-0.303**
Education expenditure, public on Levels (Pre-Primary & Primary School)	-0.241*	-0.288*
Enrolment ratio, net ratio %(Secondary Level):	0.224**	0.304**
Literacy rate, youth The percentage of people ages 15–24	0.249**	0.302**
Enrolment ratio, gross, combined for primary, secondary and tertiary schools Female	0.177*	0.196*
Enrolment ratio, gross, combined for primary, secondary and tertiary schools Male	0.191*	0.224*
Military Service Expenditure	0.226****	0.226****
Voice and Accountability	-0.198****	-0.198****
Political Stability	-0.15***	-0.15***

*	5% Significant (2tail test)
**	1% Significant (2 tail test
***	5% Significant (1 tail test)
****	1% Significant (1 tail test)

Table 2- Diagnostic check of residuals in sample regression

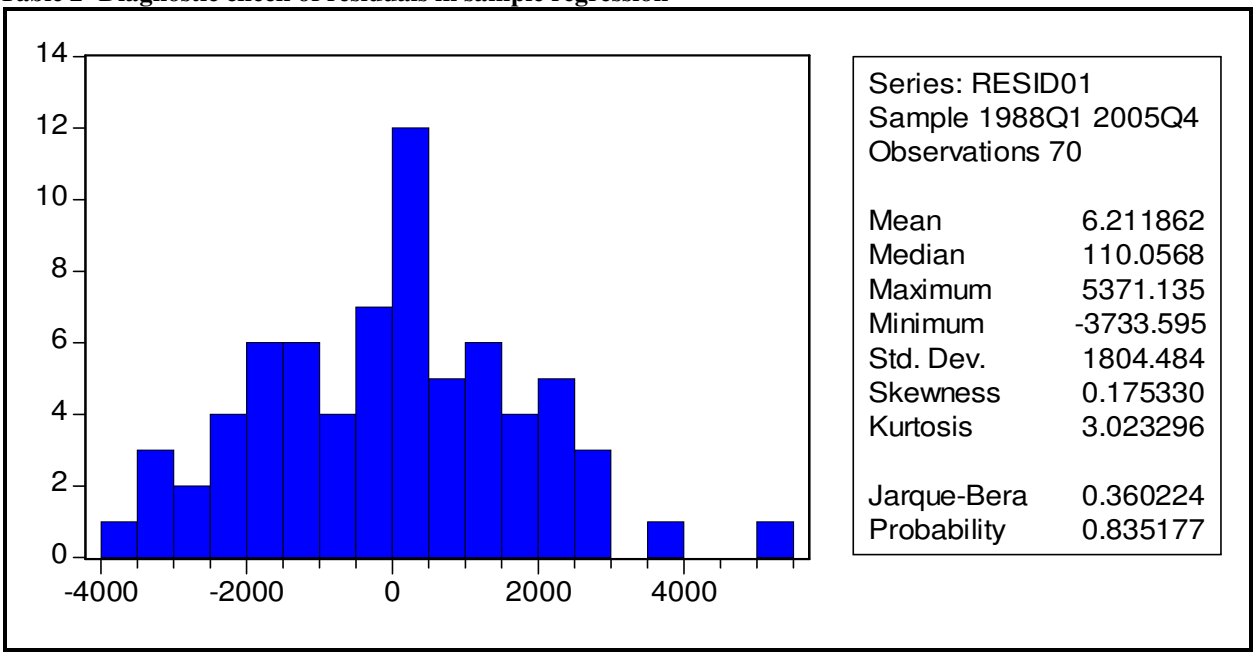


Table 3 Diagnostic check on residuals of sample regression

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.130292	Probability	0.878086
Obs*R-squared	0.301863	Probability	0.859907

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 09/06/06 Time: 00:55
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CC	-0.024166	0.131775	-0.183390	0.8551
GCF	0.001312	0.123671	0.010609	0.9916
G	-0.037365	0.252851	-0.147775	0.8830
NX(-1)	-0.000226	0.060116	-0.003752	0.9970
WROIL(-1)	-9.352407	87.41379	-0.106990	0.9152
WROIL	4.150458	63.80319	0.065051	0.9483
WROIL(-2)	7.384320	68.79548	0.107337	0.9149
GDP(-1)	0.016560	0.082475	0.200792	0.8415
RESID(-1)	-0.028226	0.149272	-0.189090	0.8507
RESID(-2)	-0.071025	0.143048	-0.496510	0.6213

R-squared	0.004312	Mean dependent var	6.211862
Adjusted R-squared	-0.145041	S.D. dependent var	1804.484
S.E. of regression	1930.916	Akaike info criterion	18.10094
Sum squared resid	2.24E+08	Schwarz criterion	18.42215
Log likelihood	-623.5329	Durbin-Watson stat	1.989074

Table 4 -Residuals of regression

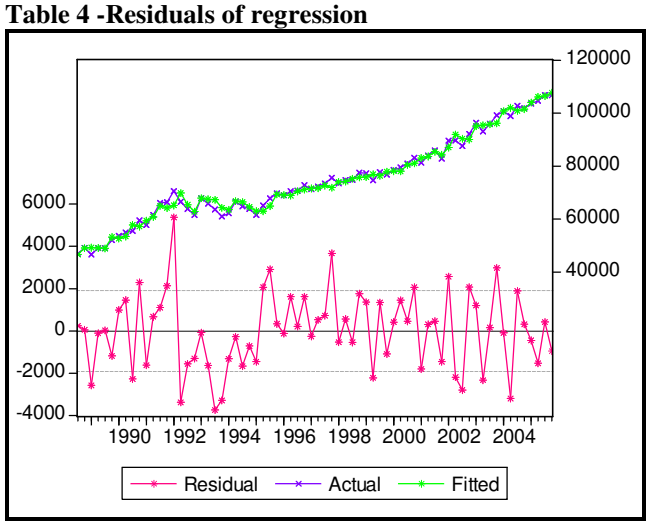


Table 5-Diagnostic check on residuals in sample regression

White Heteroskedasticity Test:

F-statistic	0.910320	Probability	0.562186
Obs*R-squared	15.09002	Probability	0.518056

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 09/06/06 Time: 01:03
Sample: 1988Q3 2005Q4
Included observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	42252431	39944835	1.057770	0.2950
CC	-2140.837	1666.619	-1.284539	0.2045
CC^2	0.032099	0.021810	1.471734	0.1470
GCF	-701.1608	1129.588	-0.620723	0.5374
GCF^2	0.012227	0.026844	0.455476	0.6506
G	-18425.67	10187.79	-1.808603	0.0762
G^2	0.848263	0.506947	1.673278	0.1002
NX(-1)	233.2825	1156.497	0.201715	0.8409
NX(-1)^2	-0.005267	0.021227	-0.248129	0.8050
WROIL(-1)	27109.17	890377.8	0.030447	0.9758
WROIL(-1)^2	2752.846	13247.03	0.207808	0.8362
WROIL	-292688.2	639410.4	-0.457747	0.6490
WROIL^2	2414.052	9815.394	0.245945	0.8067
WROIL(-2)	1027723.	872265.0	1.178224	0.2440
WROIL(-2)^2	-21915.76	15027.24	-1.458403	0.1506
GDP(-1)	2578.238	1057.645	2.437717	0.0182
GDP(-1)^2	-0.017686	0.008036	-2.200964	0.0321

R-squared	0.215572	Mean dependent var	3209683.
Adjusted R-squared	-0.021237	S.D. dependent var	4601263.
S.E. of regression	4649865.	Akaike info criterion	33.75009
Sum squared resid	1.15E+15	Schwarz criterion	34.29615
Log likelihood	-1164.253	F-statistic	0.910320
Durbin-Watson stat	1.928188	Prob(F-statistic)	0.562186

Table 6- Diagnostic check on residuals in sample regression

Ramsey RESET Test:

F-statistic	0.940602	Probability	0.447050
Log likelihood ratio	4.399633	Probability	0.354615

Test Equation:
Dependent Variable: GDP
Method: Least Squares
Date: 09/06/06 Time: 01:06
Sample: 1988Q3 2005Q4
Included observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CC	0.450441	0.478318	0.941718	0.3502
GCF	0.354309	0.791244	0.447788	0.6560
G	0.616274	1.350634	0.456285	0.6499
NX(-1)	0.062161	0.261045	0.238123	0.8126
WROIL(-1)	-220.3351	486.4199	-0.452973	0.6523
WROIL	146.9913	228.0624	0.644522	0.5218
WROIL(-2)	118.0851	270.3042	0.436860	0.6638
GDP(-1)	0.383264	0.908697	0.421773	0.6748
FITTED^2	6.98E-07	8.77E-05	0.007960	0.9937
FITTED^3	1.14E-10	1.74E-09	0.065642	0.9479
FITTED^4	-1.76E-15	1.50E-14	-0.116931	0.9073
FITTED^5	6.94E-21	4.79E-20	0.144711	0.8854

R-squared	0.988032	Mean dependent var	74581.50
Adjusted R-squared	0.985762	S.D. dependent var	15984.14
S.E. of regression	1907.295	Akaike info criterion	18.09957
Sum squared resid	2.11E+08	Schwarz criterion	18.48502
Log likelihood	-621.4848	Durbin-Watson stat	1.948243