The Oil Market – the Important Phenomena of the Globalisation of the World Economy?

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Abstract

This study is devoted to analysis of different aspects of world oil market development and its role in growth of national economies. This study shows individual aspects and parts of oil market, be it production and consumption of crude oil and its territorial dislocation. It analyses the connections with the growth of competition ability of companies and the establishment of crude oil price and to the most important aspects on which depends it. The study comes to a conclusion that the biggest obstacle in using the crude oil will not be its availability, at least in the short run, but the ever fast increasing price. This high price will enable the use it only to such subjects that will be able to implement the oil in the production process with high efficiency. Such conditions satisfy only products and services that are based on unique technical and scientific know-how, with high added value, etc.

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JEL Classification: B31, D24, E29, E58, F13

1. Introduction

Energy is one of the most important determinants of the world industrial development and the standards of living, too. The growth of global production has led to a rise in energy consumption. Up to the 1900, there was only a moderate increase of consumption. In the post-war decades until the beginning of the 1970s consumption was increasing at a surprising speed. While between 1900 and 1950 a threefold increase in overall consumption can be observed, only

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20 years (1951 – 1970) were needed to come to reach another nearly threefold increase. In the beginning of the 1970s, another abrupt turn occurred, the movement of the energy consumption growth turned to a recession due to the energy crisis. This development can be still observed in the present. Average annual increases of energy consumption, which were in the period 1925 – 1938 only 1.4 per cent increased up to 4.5 per cent in 1951 – 1960 and up to 5.6 per cent in 1961 – 1970. However, in the next decade the energy consumption increases slowed down. In 1971 – 1980 the energy consumption growth decreased to 4.2 per cent and in the 1990s it was reduced to 2.5 per cent. In the last ten years the energy consumption increased on average by approximately 1 per cent per year (International Energy Agency, 2004).

Throughout the 20th century, no energy resource has had such a strong influence on trans-world economic and social development as oil, which has gradually become „resource number one". In the long-term structure of energy resources, it is oil that occupies the top position in the world energy consumption, reaching 40 per cent (if natural gas is included, the share reaches almost 65 per cent). Even though the share is slowly falling, in the future oil will remain the key determinant of energy markets development and thus will influence the flow of the world economy. Oil prices will continue to affect balances of payments, terms of trade and currency exchange rates of world's major oil importing and exporting countries. The objective of this article is to investigate the existence of a direct causal relationship between the situation in the international energy markets, represented by oil prices, and the development of the prices and exchange rates of selected countries and the world economy as a whole.

The influence of the oil market on economic development has been extensively focused by many experts and respected theoreticians. Most of the case studies of OECD, IMF, IEA, OPEC and prestigious national institutes deals with the influence of price shocks on the main macroeconomic indicators, such as inflation, competitiveness, export, GDP, GNP, economic growth, etc. A large body of research suggests that oil price fluctuations have considerable consequences on long-term economic activities. The day-to-day business experiences and the result of these analytic studies confirm that the consequences of the fluctuations are to be different in oil-importing and in oil-exporting countries. Whereas an oil price increase should be considered good news in oil-exporting countries and bad news in oil-importing countries, the reverse should be expected when the oil price decreases. The transmission mechanisms through which oil prices impact on real economic activities include both supply and demand channels. The supply side effects are related to the fact that crude oil is a basic input to production, and consequently an increase in oil price leads to a rise in production costs that induces

firms to lower output. Oil price changes also entail demand-side effects on consumption and investment. Consumption is affected indirectly through its positive relation to disposable income. The magnitude of this effect is, in turn, greater the more the shock is perceived to be long-lasting. Moreover, oil prices have an adverse impact on the intensity of the investment by increasing firms' costs, although investment in the oil sector itself is positively affected. It is worth noting that, in addition to impacts of oil prices on supply and demand, it influences foreign exchange markets and inflation, causing indirect effects on real economic activity.

The early empirical studies found a linear negative relationship between oil prices and real activity in oil importing countries. By the mid-1980s, however, this relationship began to lose statistical significance. In fact, the declines in oil prices that occurred over the second half of the 1980s were found to have smaller positive effects on economic activity than predicted by linear models. Thus, K. Mork (1989), K. Lee et al. (1995) and J. Hamilton (1996) introduced non--linear transformations of oil prices to re-establish the negative relationship between increases in oil prices and economic downturns, as well as to analyse Granger causality between both variables. J. Hamilton (2003) and R. Jiménez--Rodríguez (2004) also find evidence of a non-linear relationship between the two variables in the US economy. To be more specific about non-linear transformations proposed in the empirical literature, Mork (1989) allowed for an asymmetric response of US economic activity to oil price changes by specifying increases and decreases in the real price of oil as separate variables. He found that while the effects of oil price increases were statistically significant, the decreases were not statistically significant. Given that the asymmetry is a very special case of a non-linear relationship between GDP and oil prices, the literature has proposed two other non-linear transformations: scaled specification (Lee et al., 1995), which takes into account the volatility of oil prices; and net specification (Hamilton, 1996), which considers the amount by which oil prices have gone up over the preceding year.

D. Lilien (1982) has formulated the so-called dispersion hypothesis, which relies on the argument that a change in the oil price alters the equilibrium allocation across various sectors. This explanation is related to adjustment costs resulting from the implied sectoral reallocation of resources. According to this argument, an increase (decrease) in oil prices would lead to a contraction (expansion) in sectors that make use of oil in the production process. Moreover, the increase (decrease) in oil prices would generate an expansion (contraction) of energy-efficient sectors relative to energy-intensive sectors. However, given that in the short run the cost of reallocation of resources between sectors is high, oil shocks that imply readjustment between energy-efficient and energy-intensive sectors

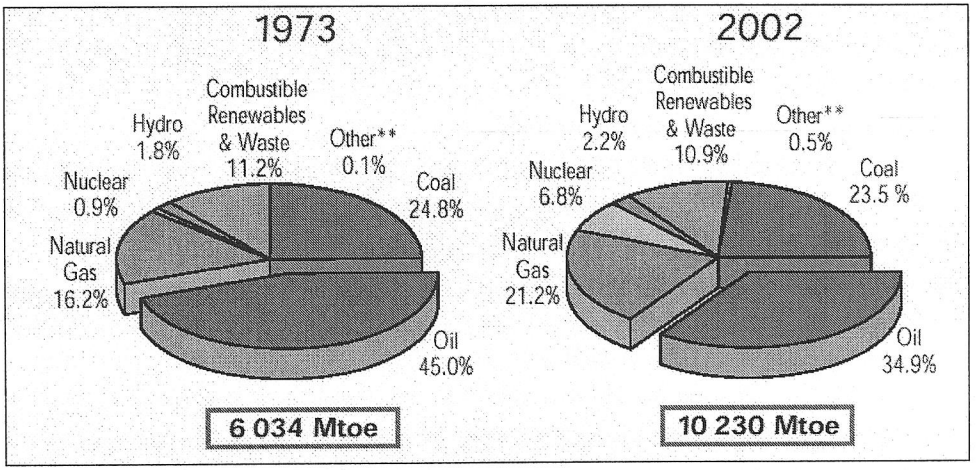
will give rise to an overall loss in output. While this loss will aggravate the economic contraction when oil prices increase, it will constrain the economic expansion when oil prices decline, thereby giving rise to the asymmetric effect.

2. The Development of Energy Consumption and the Shares of Energy Carriers

The growth of energy consumption was accompanied by radical changes in the structure of fuel-energetic balance, which changed in a relatively short time due to the scientific and technological revolution. Oil and natural gas replaced coal as the leading energy source and, since the middle of the 1960s became the main source of primary energy. The preference for oil had some outer basis (heat value, easier transport, less difficult labour). It was also very cheap: its prices were very low and almost fixed for a long time. However, in the beginning of the 1970s the prices of oil rose sharply, which affected the share of oil in the world energy consumption. While until the late 1970s the share still showed moderate increase (in 1979 it reached 45 per cent), in the 1980s it slowly started to decrease down to 38 per cent in 1986.

Figure 1

Fuel Shares of Primary Energy Consumption in 1973 and 2002



Source: International Energy Agency (2004).

In the middle of the 1980s an assumption was prevalent that the share of oil would continue to decrease and oil will no longer be the main energy resource, however according to the most recent predictions the share of oil in the energy production is going to be highest in the year 2010 – about 40.2 per cent.

Table 1 shows the total shares of separate energy carriers in the world energy consumption as well as the development of consumption of separate energy carriers from 1989 to 2002 when converted to MToe (mil. ton oil equivalent).

Table 1

World Energy Consumption by Fuel 1989 – 2002

Mtoe	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Petroleum	3 406	3 428	3 457	3 467	3 464	3 528	3 593	3 669	3 745	3 786	3 872	3 920	3 981	4 017
Natural Gas	1 872	1 889	1 929	1 936	1 991	1 988	2 040	2 131	2 130	2 155	2 206	2 294	2 323	2 387
Coal	2 270	2 279	2 197	2 170	2 178	2 200	2 244	2 264	2 326	2 278	2 288	2 388	2 426	2 477
Hydroenergy	548	568	580	574	607	610	640	654	659	660	672	683	655	669
Nuclear energy	497	511	532	535	553	563	584	606	600	613	632	643	665	676
Alternative	40	43	46.3	50	52	54.5	56	58	62	64	69	73	75	82
Other	66	54	53	56	54	57	60	62	59	54	55	55	50	50
Total Energy	**8 702**	**8 774**	**8 797**	**8 792**	**8 907**	**9 002**	**9 220**	**9 445**	**9 584**	**9 612**	**9 796**	**10 058**	**10 176**	**10 362**

Source: International Energy Agency (2004).

3. World Oil reserves

The analysis confirms that the one of the main problem of the oil market disparity is the dislocation and concentration of oil reserves. Large deposits are located in a few areas: the Near and Middle East, former Soviet Union, the Caribbean area and the North America. These centres hold more than 90 per cent of them.

Table 2

World Oil Reserves

Million of barrels	1995	1997	1999	2000	2001	2002	2003	2004	Change 2004 – 2003 (in %)	2004 share total (in %)
North America	89.0	89.0	76.2	75.6	73.7	65.5	62.2	61.0	–2.0	5.1
South America	83.7	93.3	97.5	97.7	98.7	100.0	100.3	101.2	0.9	8.5
Europe	81.5	87.8	112.7	115.5	132.6	135.8	138.6	139.2	0.4	11.7
Mid. E.	661.5	672.8	674.8	691.0	695.3	728.9	733.9	733.9	0.0	61.7
Total Africa	72.0	75.3	84.7	93.4	96.8	104.6	111.8	112.2	0.4	9.4
Total Asia Pacific	39.2	40.2	42.4	42.6	42.5	42.0	41.6	41.1	–1.1	3.5
TOTAL WORLD	**1 026.8**	**1 058.4**	**1 088.4**	**1 115.8**	**1 139.7**	**1 176.9**	**1 188.3**	**1 188.6**	□	**100.0**
Of which OECD	111.3	113.3	100.0	100.0	98.3	88.5	84.6	82.9	–2.0	7.0
OPEC	785.1	806.0	818.2	840.5	847.9	881.7	891.1	890.3	–0.1	74.9
Non-OPEC	179.7	185.9	177.8	180.6	180.1	178.5	177.5	177.4	□	14.9
Former SU	62.1	66.5	92.3	94.7	111.7	116.7	119.7	120.8	0.9	10.2

Source: British Petroleum (2005).

Table 2 contains a survey of existing oil reserves in the oil-producing countries. Figure also shows shares in the world oil reserves by regions as well as about their service life, assuming that production continues in the same pace. Most of the world's reserves, 61.7 per cent are situated in the Middle East where the largest oil fields are in Saudi Arabia (with 22.9 per cent of the world oil reserves – mostly in the inshore shelf and in Hasa area). More than 1/3 of oil (38.3 per cent) is located in the following countries:

Iraq (10.0 per cent) – Mosuesian area in Kirkuk

Iran (11.4 per cent) – Charasan and Karmanasah province

Kuwait (8.4 per cent) – around Ahmadi and Shuaiba

U.A.E. (8.5 per cent) – Abu Dhabi

Other major oil reserves are located in Venezuela (6.8 per cent), former Soviet Union -FSU (7.5 per cent), Libya (3.1 per cent) and Nigeria (3.0 per cent). The important reserves in Europe (outside the FSU) are in the British and Norwegian sectors of the North Sea.

3.1. Theory of Peak Oil

It generally assumes that the assessment of the world oil reserves is a sensitive subject with grave political implications and influenced by many different interests. Some published reserve numbers are incorrect, and a lax definition has led to misconceptions. Oil reserves are defined as median probability reserves in which the risks of the estimate proving above or below the real reserves are evenly matched. The numbers refer to conventional oil, i.e. that which has supplied more than 95 per cent of all oil to date and which will continue to dominate supply for next years.[1] The Yet-to-Find estimate takes into account the discovery rates and the results of exploration drilling. It also recognizes that the world has now been thoroughly explored; few, if any, major new provinces await discovery. About half of the Yet-to-Produce reserves lie in just five Middle Eastern countries. In any event, by 2010, production will have commenced its inevitable long-term decline from resource constraints. It is widely accepted that oil is a finite resource. There are basic laws describing the depletion of any finite resource:

– Production starts at zero;

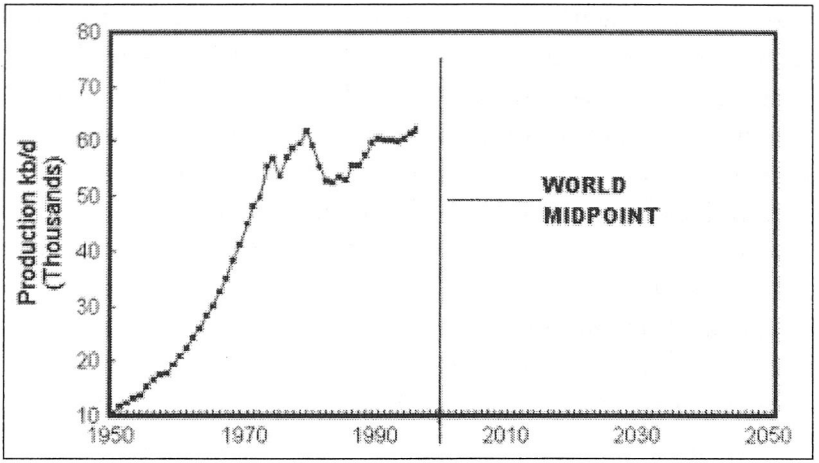
– Production then rises to a peak which can never be surpassed;

– Once the peak has been passed, production declines until the resource is depleted.

[1] All the above data comes from the official statistics provided by oil producing countries and oil companies. It is possible that not all numbers reflect reality. I will therefore present here an alternative concept of the world oil reserves – the so called Peak-Oil Theory.

Figure 2

World Oil Production to Date



These rules of the „oil-peak theory" were first described in the 1950s by M. King Hubbert (1956), and apply to any relevant system, including the depletion of the world's petroleum resources. The rate of production of a natural resource can be plotted on a graph against time. This gives a picture of the lifetime of that resource The vertical line indicates the probable midpoint of depletion. It is important to note that the point of maximum production (known as the Hubbert Peak) tends to coincide with the midpoint of depletion of the resource under consideration. In the case of oil, this means that when the Hubbert Peak is reached, half of all the recoverable oil that ever existed on our planet will have been used. The area under the curve of oil production over time corresponds to cumulative production – the area under the curve from 1970 to 1980 gives the total amount of oil produced between the years 1970 and 1980. Thus the area under a curve describing the total lifetime of a natural resource corresponds to the total amount of that resource that was ever and will ever be available for production. This quantity is known as the Ultimate for that resource. Since we will not know the exact value of the Ultimate for petroleum until we have run out, the next best thing we can do is estimate it. There are four important concepts, which have to be considered when estimating it for oil production:

– Cumulative Production (Known)
– Reserves (Knowable)
– Undiscovered (Predictable from past trends)
– Ultimate.

Ultimate = Cum. Production + Reserves + Undiscovered

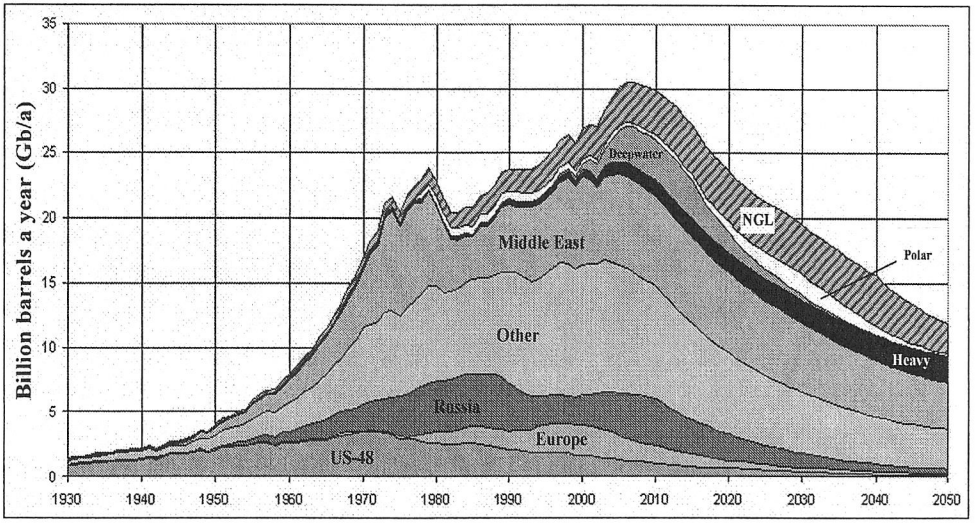
Many studies are based on reserve estimates directly from the producing countries themselves.[2] Another problem with surveys such as the USGS (United States geological survey) is that when predicting the amount of oil remaining to be discovered they use very flexible definitions of the different types of oil involved. It is split in conventional and unconventional oil. Briefly, these break down as follows: Tar Sands; Oil Shales; Oil not recoverable with today's technology (USGS, 1995).

This distinction is important because the global economy was based on cheap petroleum, which comes exclusively from conventional oil. What is needed therefore, is an estimate of the global ultimate for oil production, which takes into account both „political reserves" and the different kinds of oil that exist.

C. J. Campbell (1994), on behalf of Petroconsultants of Geneva, and using their data, has conducted in 1994 such a study. The conclusions reached in his study are ominous: 1 750 Gb (billion barrels) for the global ultimate. This means that the midpoint of depletion was in 1999. Today's predictions based on new, revised data show the midpoint in 2008.

Figure 3

Production of the Oil and Gas Liquids (Mbd) over Time (Years), Based on Campbell's Data (Scenario 2004)



Source: Campbell (1994).

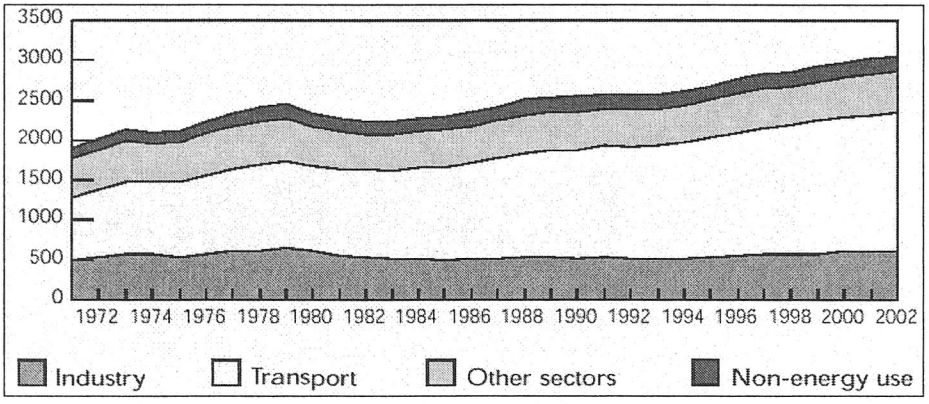
[2] There lies the problem. Many OPEC countries have been announcing reserve numbers, which are very strange. Either their reported reserves remain the same year after year, suggesting that new discoveries exactly match production, or they have suddenly increased their reported reserves by unfeasibly large amounts. Also curious are the instances of reserves remaining identical over a period of years, despite intensive production. These data are less odd when one realizes that OPEC takes into account a country's reserves when fixing production quotas: the more oil you say you have, the more you are allowed to sell. Additionally, oil reserves can be used as collateral for loans – an example of this is the 50 billion USD loan from the USA to Mexico.

The „premature peak" in the early 1970s corresponds to the oil crisis of 1973. This does not mean that the world is running out of oil; the study concludes that the world economy is running out of the cheap oil that has supported the economic development of the 20th Century. This Figure shows that the Middle East (1993: 951.1 mil. tons: 29.84 per cent – 2003: 1093.7 mil. tons: 29.58 per cent) was still the world's dominant producer because the production drop caused by the conflict between Iraq and Iran, the Kuwait and Iraq war was basically eliminated. The second position belonged to Europe, which overtook America in the last five years mainly due to the increase in Russian production. The world's third largest oil producing region is North America. The crucial area for supplying the international market with oil was still the Middle East and its share in the world production will be growing. On the other hand, the decay of the oil production industry in the USA will continue and oil production will remarkably fall. More potential for growth of oil exploitation is in developing oil production in Iraq, Nigeria and Canada.[3]

4. The World Oil Consumption

Oil has been an important raw material, mostly used as a source of energy. Figures 4 demonstrate the breakdown of oil consumption by individual sectors. Oil consumption, as a raw material for chemical industry is very small – it forms only 7.5 per cent out of the overall oil consumption.

Figure 4
Evolution of Total Final Consumption by Sector (in Mtoe)



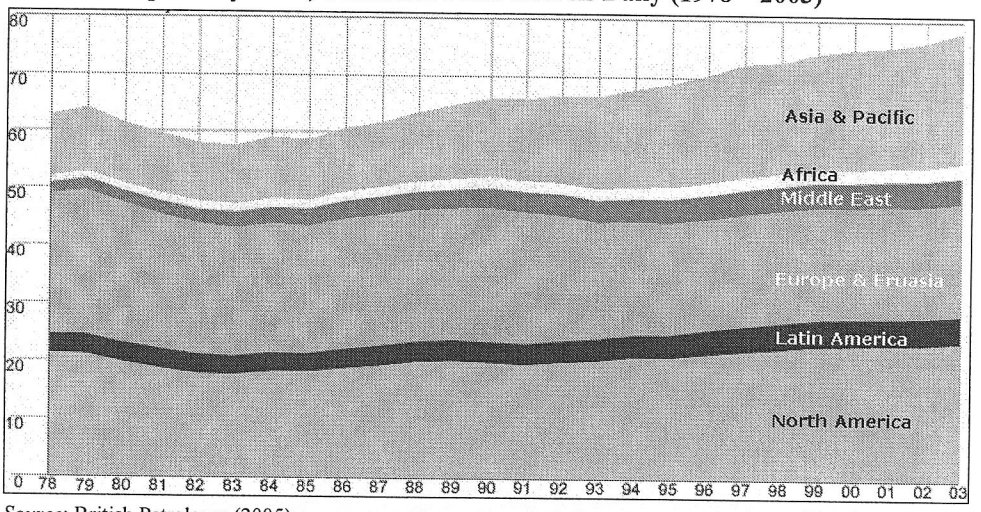
Source. US Energy Information Administration (2002 – 2004).

[3] In the Far East China has an ever increasing share (1993: 144.0 mil. tons: 42.70 % of Asia – 2003: 169.3 mil. tons, 45.05 % of Asia). Approximately 2/3 of the overall national production sticks to the traditional oil areas of north-eastern and eastern China, but there is some growth in the shelf areas.

The development of oil consumption in different world regions demonstrates Figure 5. There is a certain fall in the world consumption in the main regions (mostly in the USA and EU) in 1979 when a remarkable rise in the prices occurred – more than double compared to the previous year (from 13 to 35 USD/bbl). This level remained steady until 1986 when it dropped again to the level of 1978. In 1986 the beginning of another significant consumption growth can be observed (2 per cent a year). A further factor was a remarkable fall in consumption in the countries of the FSU that went hand in hand with the regress of industrial production in these states after the disintegration of the Soviet Union. The period 1990 – 1996 saw the most significant decrease, of over 55 per cent which was bellow the level in the 1970s. The decrease did not stop in the late 1990s, though the pace slowed down from almost 10 per cent to 1.5 per cent a year. In the beginning of 3rd millennium it started picking up again by about 1 per cent a year.

Figure 5

Oil Consumption by Area, Cumulative mil. Barrels Daily (1978 – 2003)



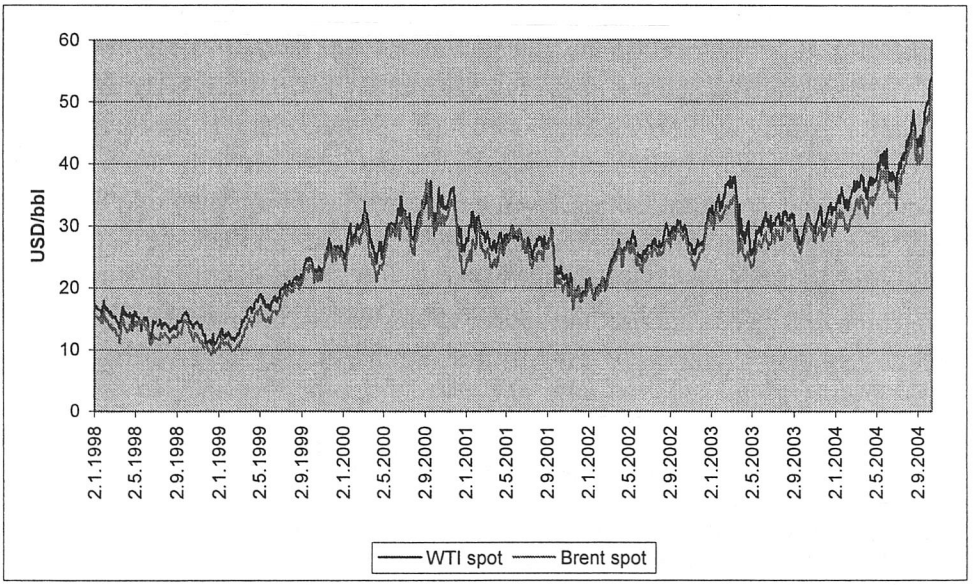
Source: British Petroleum (2005).

The consumption fall in this region was from the worldwide point of view balanced by the oil consumption in south-eastern Asia which grew from 499.2 mil. tonnes in 1985 to 1 049.1 mil. in 2003 (an increase by 110 per cent). This was a result of a significant growth in industrial production. Oil consumption within Western Europe remained almost unchanged, due to rationalisation measures applied during the years of oil shocks. The growth rate since 1993 was 1 per cent on average. In 1974 – 1975 its consumption fell, due to a remarkable rise in prices. In the following years until the end of the 1970s together with the growth of oil shares in the structure of fuel-energetic recourses, consumption of oil grew as well. In the early 1980s, the developed industrial countries began to cut their energy

demands that resulted in a drop in oil consumption. This falling tendency continued until 1986 when the drop in oil prices caused another growth in consumption. Up until 1993 oil consumption was again growing but its pace was slow – 1.7 per cent a year. In 1993 there was a slight decrease in consumption caused by the Iraq crisis. In the next year there was another growth that has continued up to today.

The main consumption centres from the beginning of the 1980s were the USA and the developed European countries. Their share in the oil consumption was 50 per cent. They were followed by the Soviet Union – 10 per cent and Asia with the same share. The shares of the Middle Eastern countries – the biggest oil producers-reached less than 3 per cent. Today the picture is changing again. The USA still remains the dominant oil consumer with 25.1 per cent of total world oil consumption. Europe including Russia uses 25.9 per cent of annual world oil consumption. Relatively new is the world's 3-rd biggest oil consumer – China (7.8 per cent), and the whole region of Asia-Pacific whose share is gradually increasing by 2 – 4 per cent per year. The importance of oil has not changed even after many decades – it is still a significant resource and its use in the chemical industry is more extensive. In spite of the fact that the reserves are apparently sufficient, there is a need to realize that they cannot be renewed. Energy has been cumulated in them for millions of years, but their consumption takes a very short time. The estimated economic growth and gradual growth in population will require a growth in energy consumption that means also the increase in the oil consumption.

Figure 6
Crude Oil Spot Prices 1998 – 2004



Source: British Petroleum (2005).

The development during the last five years has not avoided considerable volatility, which has become a norm rather than an exception. This Figure 6 demonstrates a record decrease in prices to 10 USD/b in 1998. This was followed by a gradual increase up to 35 USD, effectively another shock (at least the sixth one in the history of prices of oil). The situation repeated itself in 2002, but compared to the year 1998, there was only a moderate fall. In 2003-2004 a trend of high prices continued.

5. Oil Price and its Influence on the Development of the World Economy

Oil prices remain a key determinant of global economic performance. There are many different theoretical views of the macro-economical effects of the oil price. They differ in the magnitude of the effect as well as in claims about which areas of economic life are most affected. An increase in oil prices led to a transfer of income from the importing to the exporting country through a shift in the terms of trade. For net oil-importing countries, an increase in oil prices directly reduced real national income because spending on oil rises and there is less national income available to spend on other goods. For net oil-exporting countries, a price increase directly increases real national income through higher export earnings. Higher oil prices adversely affected the trade balance, drive up inflation and exacerbate unemployment in oil-importing countries. The boost to economic growth in oil-exporting countries provided by higher oil prices was generally smaller than the loss of economic growth in oil-importing countries, such that the net effect of higher oil prices on the global economy was therefore negative.[4]

As showed development of the world economy in 70´s and early this millennium for as long as oil prices remained high, global economic recovery was being slow. But the fragility of the global economy was caused by to other macroeconomic and structural factors. Even a rapid resolution of the Middle East crisis and sharply lower oil prices in the coming months may not be sufficient to stimulate a rapid growth in the world economy. It also depended on the extent to which natural gas prices rise in response to an oil-price hike and the gas-intensity of the economy. Naturally, the higher the oil-price increase and the longer higher

[4] The vulnerability of oil-importing countries to higher oil prices varies. Various case studies suggested that a sustained increase of 10 USD in the crude oil price would reduce economic growth in the OECD as a whole up to 0.5 per cent. The impact on growth in developing countries was thought to be significantly higher because energy-intensive manufacturing generally accounts for a larger share of their GDP and energy was used less efficiently. On average, oil-importing developing countries used more than twice as much oil to produce a unit of economic output as the developed countries.

prices were sustained, the greater the macroeconomic impact. For net oil-exporting countries, a price increase directly real national income through higher export earnings, though part of this gain would be later offset by losses from lower demand for exports generally due to the economic recession suffered by trading partners.

Adjustment effects, which result from real wage, price and structural rigidities in the economy, add to the direct income effect of an oil-price increase. Higher oil prices, in net oil-importing countries, lead to inflation, increased input costs, reduced demand for goods and services other than oil and lower investment. Tax revenues fall and, due to rigidities in government expenditure, the budget deficit increased driving interest rates up. Because of the resistance to real declines in wages, an oil price increase typically resulted in a upward pressure on nominal wage levels. Wage pressures together with a reduced demand tended to lead to higher unemployment. These effects were greater the more sudden the price increase and more magnified by the impact of higher oil prices on consumer and business confidence.

An oil-price increase also changes the balance of trade between countries and exchange rates. Net oil-importing countries normally experience deterioration in their balance of payments, putting downward pressure on exchange rates. As a result, imports become more expensive. The economic and energy policy response to a combination of higher inflation, higher unemployment, lower exchange rates and lower real output also affects the overall impact on the economy in the long run. Government policy cannot eliminate the adverse impacts described above but it can minimize them. Highly contractionary monetary and fiscal policies that would contain inflationary pressures could exacerbate the recessionary income and unemployment effects. Conversely, expansionary monetary and fiscal policies may simply delay the fall in real income necessitated by the increase in oil prices, stoke up inflationary pressures and worsen the impact of the price shock in the long run.

While the general mechanism by which oil prices affect economic performance is generally well understood, the precise dynamics and magnitude of these effects – especially the adjustments to the shift in the terms of trade – are uncertain. Quantitative estimates of the overall macroeconomic damage caused by past oil-price shocks and the gains from the 1986 price collapse to the economies of oil-importing countries vary substantially. This is partly due to differences in the models used to examine the issue. Nonetheless, the effects were certainly significant: economic growth fell sharply in most oil-importing countries in the two years following the price hikes of 1973/1974 and 1979/1980. The impact of the first oil shock was undoubtedly accentuated by inappropriate policy responses.[5]

Empirical analysis suggests that the impact of an oil-price change is asymmetric: the economic stimulus resulting from a fall in oil prices is significantly less intense than the depressive effect of a price increase. Similarly, the boost to economic growth in oil-exporting countries provided by higher oil prices in the past has always been smaller than the loss of economic growth in oil-importing countries, so that the net effect has always been negative.

The growth of the world economy has always fallen markedly in the wake of each run-up in oil prices, including the most recent one. The IMF estimates that a 10 USD a barrel increase in oil prices, if sustained for a year, reduces global GDP by 0.6 per cent – ignoring the secondary effects on confidence, stock markets and policy responses. Other studies suggest that a sustained increase in the crude oil price by 10 USD would reduce economic growth by around 0.5 per cent in the industrialized countries and by 0.75 per cent in the developing countries. Despite a fall in oil intensity (the ratio of oil consumption to GDP) since the first oil shock, oil remains vital to the OECD economy. All of the significant economic downturns in the United States, Europe and the Pacific since the 1970s have been preceded by sudden increases in the price of crude oil. There is considerable empirical evidence on the damage caused by past oil-price shocks in OECD countries.[6] The OECD has estimated that the loss of GDP below the baseline trend resulting from the second oil-shock was around 3 per cent (350 billion USD) rising to 4.25 per cent (570 billion USD) in 1981. This suggests that the second oil shock accounted for much of the decline in the economic growth and the increase in inflation and unemployment across OECD in 1981 – 1982. The effect of the 1990 – 1991 crisis was certainly more modest because the price increase was much less dramatic, higher prices did not persist for very long and oil intensity in OECD countries had fallen significantly since the first oil shock. The monetary cost to the OECD in terms of higher import prices is estimated at a little over 40 billion USD in current dollars.

Although oil intensity and the share of oil in total OECD imports have continued to fall in recent years, the OECD economies remain economically vulnerable to higher oil prices.[7] The impact of the simulated price increase varies across

[5] Conversely, economic growth in oil-importing countries was boosted by the fall in prices in 1986, with the full economic impact becoming apparent in 1987/1988.

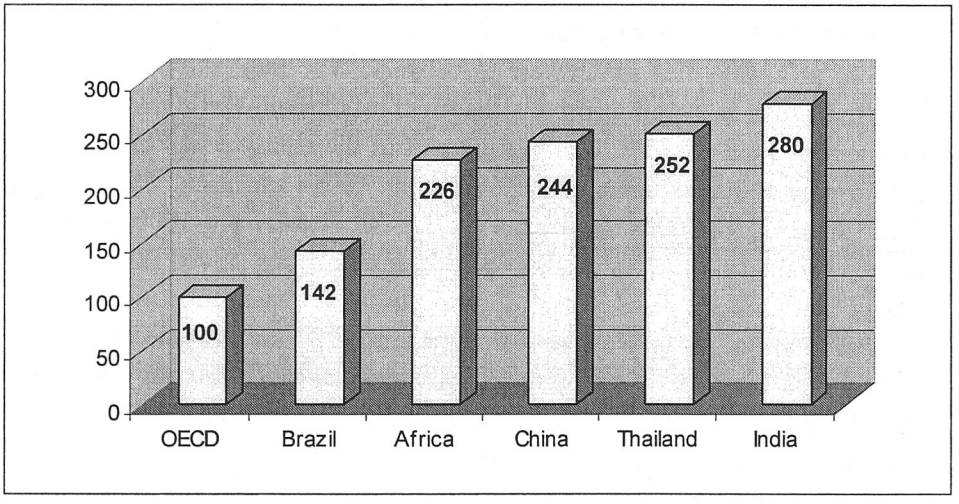
[6] For example, the US Congressional Budget Office (CBO), in a 1981 study, estimated that the total loss of output suffered by the OECD countries in the 1974 –1975 recession following the first oil shock amounted to 350 billion USD in 1981 prices. This was equivalent to a once-and-for-all reduction in real GDP of about 7 per cent. Part of that loss may have been attributable to structural and cyclical economic factors unrelated to the oil-price shock.

[7] The OECD secretariat has estimated the current relationship between oil price increases on the one hand and economic growth and inflation on the other. The simulation assumed a temporary increase in oil prices of 10 USD per barrel from the first semester of 2003 through the end of the

countries, depending mainly on the extent to which they are net oil importers and on the assumed policy responses. Thus, the biggest declines in GDP were seen in Japan and the Euro area. The fall in economic output reached its highest level in the second half of 2003 in Japan (–0.3 per cent) and the Euro area (–0.2 per cent) and in the first half of 2004 in the United States (–0.15 per cent). Inflation rose by 0.45 per cent in Japan; 0.7 per cent in the United States and 0.8 per cent in the Euro area in the first semester of 2003, but fell by almost the same degree in 2004.

Figure 7 compares oil intensity in selected developing countries with that of the OECD economies.[8] Rising oil intensity is reflected in the share of oil imports in total imports, which is increasing in many developing countries. Crude oil and petroleum product imports accounted for 25 per cent of all imports in India in 2000, compared with 15 per cent in the previous year. In the OECD countries, the share of oil in total commodity imports by value fell from 13 per cent in the late 1970s to only 4 per cent in the late 1990s, but has since rebounded due to recent higher oil prices.

Figure 7
GDP Oil Intensity in 2000 (OECD = 100)



Source: Author on base of US EnergyInformation Administration (2002 – 2004).

year, with prices then falling back to the previous level of 25 USD. It is further assumed that the U.S. Federal Reserve and the European Central Bank raise short-term interest rates by 0.25 per cent in response to the temporary rise in inflation. Given deflationary conditions in Japan, no change in interest rates was assumed there. No change in discretionary fiscal policy, wage increases in response to higher inflation or consumer and business confidence effects are assumed in Japan.

[8] Thailand and India, for example, use more than two and half times as much oil as developed countries per unit of GDP.Oil intensity is still increasing in many developing countries as modern commercial fuels replace traditional fuels in the household sector and industrialization and urbanization continue apace. By contrast, intensity has halved since the early 1970s in OECD.

The vulnerability of developing countries is also exacerbated by their limited ability to switch quickly to alternative fuels, the prices of which may increase more slowly than those of oil products. And an increase in the oil-import bill also tends to destabilize the trade balance and drive up inflation more in developing countries, where institutions responsible for economic management and investor confidence are more fragile. The deterioration their terms of trade is often magnified by sharp currency devaluations, as capital inflows decrease. A fall in the exchange rate enlarges the impact of higher oil prices, which are quoted in dollars. It also raises the cost of servicing external debt. This problem is most pronounced in the least developing countries, especially those already running large current account deficits.

Conclusion

This study tried to describe some aspects of the development situation on world oil markets; the oil production, oil reserves and oil consumption. Many analysts say that the world is running out of oil and that the present tendency of world oil consumption growth is not sustainable. There are also analysts, who claim that the world oil reserves are sufficient for many decades, even centuries. The truth, as always lies somewhere in-between. The most important determinant of the situation on oil markets – the oil consumption – will grow in importance over the next decades. The biggest part of the increase will be due to demand in industrialising Asian countries, mainly China and India. Oil consumption in China in 2003 was approximately 3.8 barrel daily pre 1000 people.[9] In India it is even less – 1.9 barrels. By contrast, intensity has halved since the early 1970s in OECD of oil per day per 1000 people. At the same time average country consumption of oil in Western Europe is around 33 barrels per day per 1000 people and in the U.S. – 68 barrels (www.nationamster.com and CIA World Factbook, 2004) The potential for oil consumption growth in those developing countries, as well as in other third world countries, multiplied by their annual GDP growth, is enormous. Given the inevitable consumption growth, oil production will have to follow and grow as well. This may cause earlier exhaustion of cheap, conventional oil. Until recently most statistics showed oil reserves only as reserves of conventional oil, extractable by known technology. From these numbers the estimated lifetime of the reserves was often extrapolated by simple algebra.

[9] Thailand and India, for example, use more than two and half times as much oil as developed countries per unit of GDP. And oil intensity is still increasing in many developing countries as modern commercial fuels replace traditional fuels in the household sector and industrialization and urbanization continue apace.

The mistake was in ignoring the technological progress, which converts the unextractable oil into extractable. A good example are oil sands, that were until recently ignored in most statistics, although they contain more oil than the conventional reserves.[10]

The production of unconventional oil is economical only with higher oil prices. The unit cost for the production of 1 barrel of oil in the Middle East is under 2 USD. It therefore seems reasonable to expect that the prices of oil cannot stay in the region of 40 – 50 USD/bbl. But if we take into account that these „cheap oil" producers in the Middle East are utilising their production capacities at almost 100 per cent, additional oil required to cover the increased consumption can come only from other sources, which do not have so low production costs. Another factor is that since the „cheap producers" know that they will eventually run out of their oil, they are not motivated to invest in the increase of their oil production capacity. The combination of the above factors leads to the conclusion that high oil prices will probably persist and will not fall under the levels required to retain economical feasibility of the unconventional oil projects such as oil sands and deepwater oil. This will be true provided a new source of cheap energy is not discovered, respectively becomes economically acceptable. The biggest impact on the oil consumption would have a new technology that would replace existing car (or other) engines (dramatically lowering the gasoline consumption or running on alternative fuel), because almost oil is used for transport.

Oil and oil prices will continue to influence the development of the world economy. Therefore it is important to predict the impact of oil price changes on the world economy. In this study I have analysed the relationship between the changes in oil prices and the development of exchange rates of oil-importing and oil-exporting countries. I have created a theoretical macroeconomic model, which assumed that the oil price increase has positive impact on oil-exporting countries (such as Russia) where due to an increased inflow of foreign currency (mainly USD) the exchange rate of Russian rubel should appreciate compared to currencies of oil importing countries. The opposite should be true for oil-importing countries (such as Japan).

Theoretically, there should be a negative correlation between the RUR exchange rate and the oil price and a positive correlation between JPY and the oil price. This was not confirmed by the empirical analysis on the given data sample. While correlation between the two variables exists, in contradiction to the theory, the correlation coefficients had opposite signs as predicted. Thus the

[10] In 2003 the U.S. EIA for the first time accepted that the Alberta, Canada oil sands are exploitable with common technology and included part of this giant oil field into the calculation of Canada's conventional oil reserves. This single move made Canada instantly the world leader in oil reserves.

empirical analysis shows that with increasing oil prices the exchange rate of an oil-exporting country depreciates and vice versa. As this result is in sharp contradiction to common economical theory, the only reasonable explanation for this „anomaly" is that the data sample might have been small and/or that additional factors exist that were not included in the model.[11] Another explanation could be the possible over-reaction of central banks to oil price changes. The central bank could try to minimise the impact of oil price increase in an oil exporting country – the inflow of foreign currency by relaxing the monetary policy, enlarging the money supply etc. Those measures can then result in the depreciation of local currency.[12]

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[11] Such factors could be the energy intensity of a country GDP, proportion of financial transactions for oil on the balance of payment, etc.

[12] The statistical analysis confirmed the existence of a relationship between oil prices and exchange rates, however the direction remained contrary to the theoretical predictions.

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