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# EMPIRICAL STUDY OF THE SHORT AND LONG-TERM IMPACT OF THE OIL BOOMS TO ECONOMIC GROWTH RATES Prof. Hamza Khalilov\*

#### **Summary**

In the article, on the basis of the analysis of relevant data with statistical methods, the short, medium and long-term impact of the sharp increase in hydrocarbon production during short period of economic growth is investigated. The mechanism of the impact of the rapid increase in oil and gas production on economic growth rate depending on the particular oil boom parameters, such as scale, intensity and strength of influence is explained. Author shows as the result of oil boom large GDP base is establish in the country and the relatively low growth rates observed in post-peak period should not be evaluated as manifestations of "resource curse".

In connection with the impact of these effects, formation of weak growth or a reduction of GDP per capita in period of post-peak is not evidence based fact.

According to relevant factors and specific terms economic growth in individual countries can be relatively low.

**Key words:** oil boom, economic growth, growth rate, oil economy, the effect of large base GDP

### **1. Introduction**

The boom in oil and gas extraction<sup>1</sup> as having a strongest impact on country's economic development a phenomenal factor, always attracted attention. As such a factor, the impact of the oil boom on the economic growth in the example of individual countries has been the subject of research (Betty Agnani\_and Amaia Izay 2008; Merlevede & K. Schoors & B. Van Aarle 2007; Pinto, Brian 1987; Junko Koeda & V. Kramarenko 2008; Lewis, J.D. 1995; Anamaría Pieschacón 2009; Zafar Ali 2004; Roger Hosein 2007). The impact of the oil boom on GDP growth and investment were analyzed also on the example of a group of countries (Benhua Yang, Yewfoong Lam2008). Considering that, the impact of oil boom on the economic development has

<sup>&</sup>lt;sup>1</sup> Taking into account a compliance in impact on economic growth increase production crude oil as well as the natural gas in this work they are considered together and under of the oil boom is intended the sharp increases in oil as well as gas production

the specificity for individual countries, this approach in really is of particular importance.

In line with that, in terms of a detailed clarifying the impact of the oil boom on economic growth, is also of interest of the studies devoted to the boom of natural resources extraction and to issues of the growth in natural resource-rich economies (Jeffrey D. Sachs, Andrew M. Warner 1997, Jeffrey D. Sachs, Andrew M. Warner 1999, Rodriguez, Francisco & Sachs, Jeffrey D 1999; David Rudd 1996; Mineral-rich countries and... 2008).

In terms of the approach to investigation of the relationship between the oil booms and economic growth, these studies attract attention from two key aspects:

First, the main focus is directed to investigate the impact of the boom to economic growth rate through the increase in the volume of revenues as a result of oil production rise. Such an approach, in fact, brings the indirect impact of the boom on growth to the fore. The rise in oil extraction as a factor of direct effects on physical growth of GDP is not being considered separately. It does not conform to the requirements of the comprehensive review of the issue.

Second, the effect of the boom on economic growth, is analyzed in terms of the formation of the particular level of growth and its comparative evaluation. Not paid due attention to the features of the impact of the boom on the short, medium and long-term dynamics of economic growth.

Our main idea is that in oil-rich countries, as a result of commencement of operation of the new high-yield fields, large-scale rise of oil production in a short period has a specific and substantial impact on pace and structure of economic growth, both in the short and medium- as well as long-term. We show that in case of not deleting the necessary attention to these aspects can cause inaccurate perception about character of growth and their main factors in the oil economies.

At the same time, it should be noted, that to gain a broader understanding the character the impact of the oil boom on economic development is of interest the investigation of materials of the relevant countries jointly and with a covering of periods with a variety conditions. The steps taken in this direction also opens the way to breakthrough in identifying impact of the oil booms to dynamics of economic growth, as well as of its structure and quality.

The article explaines that the impact of the rapid increase of hydrocarbon resources in oil-rich countries on the character of the economic growth depends on specific parameters of boom. In addition, the characteristic features of the dynamics the economic growth in post- peak phase are determined. Shown that, in same stage the economic growth rate is influenced by dynamics of the oil production, the policy on use of oil revenues received as a result of the boom, also of the effect of large base GDP. This aspect to be considered in the evaluation of the indicators of economic growth in oil economies, in the determination of economic policy in a post-peak period, during the discussion on the issues about demonstration a relatively low growth rates resource - rich, as well as oil-producing countries.

In modern conditions, creation of the data base about the volume and the prices of oil by relevant organizations as well as on sectors of the economy in extractive countries during long period allows acquisition of reliable indicators based on the regression studies. As a result, it is possible to obtain indicators about the character of the relationship of oil boom with the indicators of economic growth as well as the indicators on development of various sectors of the economies of all oil countries based on real data, and to watch on features of their dynamics taking into account various factors.

#### 2. Measuring oil booms

Exploring the impact of the oil boom on economic growth primarily is related to the selection of indicators "reflecting" the boom. This indicator has to comply with requirements of the detailed disclosure the impact sharp rise in hydrocarbon production on economic growth and its structure. To this requirement the indicator of growth rate of the oil and gas production in kind is more consistent.

When using this indicator it is needed to focus on two facts:

First, from the point of view accounting the influence of factors acting in conditions before the sharp rise in production as well as stabilization or decrease in production, is advisable use the average annual indicators, which cover a relatively long period. Monitoring the situation based on empirical data of the length of the abovementioned processes shows that, for these purpose could prove useful the average annual indicators of period a 10-year. As can be seen from the chart below, during first decade of the 2000, (on the results of empirical research which we will comment in the ahead, the rise of oil and gas production volume within a relatively short period than 2 times and more is cause the specific features in the influence on economic growth and are regarded advisable the adoption of this limit of growth, practicability, as the lower border of the boom) is covered by at least 2 phase of oil booms<sup>2</sup>.



Figure 1: the increase in oil and gas production in 2000 (compared to the base year-of times)

 $<sup>^2</sup>$  In terms get extended view, may be considered appropriate investigate the course of the oil boom with separation 3 stage – create of rapid growth base to production (in some cases for this phase characterized by large-scale investments. These investments, in particular, in countries with the small size economies, tend to have the ability to exercise significant influence to the pace and the structure of economic growth), increase production and post-peak period.

Secondly, the volume of crude oil and natural gas should be reduced to a single measure. In this regard, we are summed the amount of natural gas in oil equivalent, by countries (such indicators, for example, is provided in the of relevant information basis by BP) and oil production in natural volume. As source a both indicators has been use, published by BP data for relevant years.<sup>3</sup>

In terms of further investigation the impact of the oil boom on economic development, considered appropriate allocate its following parameters:

• The scale of the oil boom - the maximum level of production growth compared to level the previous period of oil boom. This is level, matching point "peak". This indicator, primarily, leads to increasing the share of oil sector in economic growth. At the same time, playing an important role in determining limits of the increase the base level the GDP, has a significant impact to growth rate in long-term.

•The intensity of the oil boom - the level of speed production rise to "peak". This indicator can be expressed as an indicator of average annual growth rate of production. The intensity of oil boom also determines amount of time required for increase production to maximum level.

• The strength influence of the oil boom - the ratio of revenues obtained as a result of boom to GDP. This indicator is, in fact, expresses a possible influence of the oil boom to growth in other sectors of economy, based on oil revenues use. The strength influence of the boom, besides of the increase in the scale of hydrocarbon resources, is determined by the level of prices of these resources and within the limits of the modern mechanism of oil revenues use, it has an active role in ensuring economic growth during the period of the boom, as well as post-boom period.

### 3. Selection of the countries, the indicators that are attracted to the study

For the purposes of our study, there is a need to allocate countries, in which oil factor is of the real potential for important influence to economic growth.

The relevant empirical analysis allow us to say that selection of these countries should be based on two factors. First, they should be net oil (crude oil and petroleum products) exporters, second, oil should play an active structure forming role.

Being the country of a net exporter of oil allows you to appreciate scale of production size on absolute and relative terms. In terms of quality, the role of oil factor is expressed by caused with them consistently manifested features in the structure of the economy. The structure -forming role of the oil factor expressed:

a) With the significantly higher share of the industry<sup>4</sup> in the structure of the economy, in comparison with the countries group by the same level of development.

b) By of caused with them the high share of net exports in the structure of GDP.<sup>5</sup>

<sup>&</sup>lt;sup>3</sup> BP 2014 http://www.bp.com/en/global/corporate/energy-economics.html

<sup>&</sup>lt;sup>4</sup> By the relevant classification this indicator covers the scope of industry, construction, as well as water, electricity and gas supply.

<sup>&</sup>lt;sup>5</sup> The above structural features the resistant observed on the all oil economies, regardless of the level of development, and first and foremost, act as characteristic feature of the economy. Is controversial based of these features carry out directly a assessments about the level of economic development and the well-being of the population in these countries. In this connection, for example, acceptance a relatively small share in the GDP of manufacturing as indicator weakness of the industrialization of the country and the general, of the low level of economic development, cannot be considered appropriate.

Those characteristics begin to show itself after a certain limit of the oil sector's share of the country's economy. This limit can be set on the basis of empirical research. However, before, there's need for selection of indicators used to assess the oil sector's share of the economy.

This indicator can be relatively accurately expressed as a percentage of value added of oil and gas sector in GDP. At the same time, you have to take into account that this indicator is impossible to be calculated on individual countries WDI's data. In this regard, for the purpose to conduct comparative studies with the relevant countries, as indicator which allows mediocre reflect of the oil sector's share of the economy, can be used percentage of the proceeds from the export of fuel to GDP.

The views on compare of these two indicators allow us to say its possible (Data on Azerbaijan):

	2005	2010	2013
The ratio of value added the oil sector	48.3	52.0	43.2
to GDP (%)*			
The ratio volume of fuel exports to	46.9	48.6	40.1
GDP (%) **			

\* Based on the data of national statistics agency

\*\* Based on WDI

The first indicator is calculated based on the data of the national currency, while the second denominated in US dollars. As we can see, the indicators although do not coincide, however, is observed compliance of the dynamics values and of the differences between them. According to estimates in the economic literature the ratio of value added of oil to GDP in the 2000s in Russia have been close to 20%, up from 50% in Saudi Arabia and in Kuwait 60%. These are they who correspond to the countries second indicator (respectively 19, 50, 52.7 %) calculated for the years of 2000-2010 based on the date WDI.

The observations based on empirical data show that, in all economies with oil export revenues above 10% of GDP manifested the structural features mentioned above. The share of industry in GDP structure of these countries, as well as a share of net exports in GDP significantly above in comparison with the indicators of the countries in the same region and with same the size and level of development economies. In terms of the relevant criterion in 1980-1990 have been 10, in 1990-2000 16, in 2010-2013 22 countries in which oil played an important role in the economy. (List of country and relevant indicators is provided in Appendix)

Of course, the application of the relevant criteria has resulted in limiting the number of countries of oil extraction included in the list:

First, the list doesn't include a number of major<sup>6</sup> (the US, China, Canada, the UK, Brazil, Mexico) or large<sup>7</sup> (Netherlands, Colombia, Egypt, India) oil and gas producers, in which oil factor doesnt play important role in shaping the structure of economy.

Secondly, in separate examined periods, in some of countries oil and gas production was increased rapidly, but oil sector does not hold an important place in economy a (1980-1990 years in Malaysia, Syria, Vietnam in 1990-2000, Thailand,

<sup>&</sup>lt;sup>6</sup> The annual production capacity over 100 million tones

<sup>&</sup>lt;sup>7</sup> The annual production capacity over 50 million tones

Yemen Argentina, in the years 2000-2013 in Peru, Bolivia). According with relevant criterions these countries not taken into account in the list for those periods;<sup>8</sup>

Third, for some countries (Iraq, Chad, Bahrain 1980-1990 and in 1990-2000, 1980-1990 Burney, Angola, Iran) have not been possible to obtain the necessary data.

The observations on empirical data show that, in all economies with of oil export revenues above 10% of GDP manifested the structural features mentioned above. The share of industry in GDP structure of these countries, as well as a share of net exports in GDP significantly above in comparison with the indicators of the countries in the same region and of the countries with same the size and level of development economies. In terms of the relevant criterion in 1980-1990 have been 10, in 1990-2000 16, in 2010-2013 22 countries in which oil played an important role in the economy. (List of country and relevant indicators is provided in Appendix)

# 4. The selection of indicators of economic growth: taking into account the effect of population occupancy of the oil factor

Assessment of the oil boom impact on economic growth, usually, conducted on the basis of indicator GDP per capita. However, in our study would have to take into account one important point. In the developing countries, factors associated with the development of the oil sector has a direct or indirect impact on a more wide range to the number of population, compared to other countries. The positive, in general, this influence, at the same time, in connection with specific features countries, leads to emergence of sharp differences in the rate of population growth, as well as in some countries, to the formation of very large rates. Last case, at unchanged of other conditions, and leads to a significant decline the growth rate of GDP per capita. Due to the high population growth, in circumstances increase at the same pace the volume of GDP, these countries demonstrates the lower growth rate the per capita or it takes is a negative sign. This also can be called the effect of population occupancy of oil factor.

As source of above-mentioned the effect, the rapid increase number of population in the oil countries occurs in two main directions:

First, due to the widespread use of oil revenues, occurs improvement of the welfare of the country, the development of public health, the formation the favorable demographic conditions and acceleration of the natural growth of the population. Progress on this direction shows itself in all oil economies like demographic revolution even occurred in Gulf countries.

Secondly, due the expansion of oil production and of large use oil revenues, occurs the increase of the migration on relevant countries. This growth is particularly pronounced in countries, with relatively low labor resources.<sup>9</sup>

<sup>&</sup>lt;sup>8</sup> The main part these countries can be called "the emerging oil economy" of relevant period. The impact of the oil factor in economic growth in those countries has disclosed in its entirety subsequent periods. Along with them, in modern conditions "interim booms", i.e. a sharp increase oil production as a result of the commissioning of new fields in economies that have already formed the oil and gas sector also can be open the way to significant changes. Exploring this side of the problem is of interest both in terms of clarify the private role "interim booms" in economic development as well as with slightly different angle consider to the features of oil economies against the backdrop of the boom.

	Country	1980-2000		2000-2010		
		%	Compared to the average indicator for the region (index)	%	Compared to the average indicator for the region (index)	
1.	Azerbaijan			1.2	6.0	
2.	Kazakhstan			0.9	4.5	
3.	Russia Federation			-0.3		
3.	Saudi Arabia	4.0	1.5	3.1	1.7	
4.	UAE	5.1	2.0	9.1	5.1	
5.	Kuwait	3.4	1.3	3.4	1.9	
6.	Yemen	3.6	1.4	3.1	1.7	
7.	Qatar			10.9	6.1	
8.	Oman	3.9	1.5	2.1	1.2	
9.	Bahrain			6.8	3.8	
10.	Algeria	2.4	0.9	1.5	0.8	
11.	Ecuador	2.3	1.3	1.6	1.3	
12.	Venezuela	2.4	1.3	1.7	1.4	
13.	Trinidad and Tobacco	0.9	0.5	0.4	0.3	

A positive effect on the oil factor in population growth, in general, has a stable character (Table 1). As well as occurs differences in its scale and structure on countries. Table1.The average annual growth of the population in oil-rich countries

Sources: WDI 2002 Tab 2.1, WDI 2012 Tab 2.1,\*

http://data.worldbank.org/indicator/SP.POP.GROW

Obviously, the growth pace of population varies considerably between countries. Such a situation which can be continued for the long term, manifests itself in comparison of the countries both different and the same region. Synchronicity between an occurrence of the oil boom and course of the process of formation of a very high population growth rate in the country is observed. Watching the peak level of population growth rate on Oman and Qatar in 2000 can also be explained to this.

In countries with low demographic indicators before the oil boom, impact and duration of effect are greater. In some countries the in connection of continuation a strong migration flows ( by demand from the expansion of the service and manufacturing sectors), the effect of population occupancy can save the high impact even after reached some progress in the area of demographic development, strengthening the process of urbanization. Such a situation is typical for countries with the scarce labor resources, as well as with lack of qualified workforce.

In the oil economies, in conditions which operate the effect of population occupancy, a comparison between countries on rates of economic growth on the basis of GDP per capita is not suitable to carry out adequate assessments. For example, in the years 2000-2013 the average annual GDP growth rate in Qatar was 13.6%, and it is the highest of the countries involved in the survey data. At the same time, in that period in Qatar the average annual growth rate of population was 10%, other words, the number

<sup>&</sup>lt;sup>9</sup> According to the researchers, the increase number of the population to Gulf oil-producing countries has been conditioned of positive natural increase and with by significant migration flows, mainly Muslim, country. See: Краснова Н. В. 2010: 12

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of people living in the country increased by 3.5 times. Indeed, in addition to the natural growth of the local population, has been great role of migration. As a result, by indicator the growth in GDP per capita by countries, according to the study, Qatar lost high-end position and took up position in the middle ranks.

In connection with above-mentioned, for a comparative study the impact of the oil boom on dynamics of economic growth by country is advisable use the indicator of the GDP in physical volume.

# 5. The impact of the oil boom on pace of economic growth: conditions of the rapid production growth

The dynamics of extract in oil economy, in all cases, is one of the main factors in the growth. At the same time, in the character of impact of the extractive boom on economic growth is evident also the private features. As seen in the chart below, the period of 1980-2013 in countries with a rapid increase oil and gas production average annual growth rate of GDP has been relatively high. According to the points the in timetable we can say that the decline or raise of rates of oil production causes appropriate trend in the dynamics of GDP.

However, to a certain level of production growth (cases, of average annual production growth rate of about 1-5%) GDP growth becomes relatively slow pace. After a certain level, GDP growth accelerates significantly. Mentioned above allows us to say that the considered dependence is non-linear and it wear of polynomial character. The results of analysis shows, in this case of non-linear regression are more appropriate the polynomial function of the 3rd degree (Figure 2).



Figure 2 Oil and gas production and the average annual growth rate of GDP in the oil economy (%)

\* Schedule information Figure No. 2 have been prepared on the basis of appendix 2

Receive a R2 0,628 indicate that preferred schedule on sufficient level is consistent to the relationship between the respective indicators. (r =0.792, significant at 1persent)

Another point of interest in that part of the schedule is that the group of countries where production speed is higher almost is demonstrated very high GDP

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growth rates. The graphic description of the curve in this field is expressed in the form of strong growth. At the same time, higher oil production growth is accompanied by an increase in the slope curve.

Feature in the character of the relationship between these indicators appears and in the grouping data on the basis of the relevant sign. (Table 2).When identified the intervals on groups, the aim was to cover them under the increase oil and gas production to 1.5 (average annual growth rate of 4.2%), 2.0 (7.2%), 2.5 (9.6%), and 3 (11.6%) times.

			The difference of	The increase the
Observation	The number of	The average	the average GDP	growth rate of GDP on
groups on	observations	annual growth	growth rate with	each percentage
production		rate of GDP	an indicator	production growth
growth rate			previous	compared to the
			group(% points)	previous group (%
				points)
Until 1	13	1.1	-	-
1-4	21	3.9	2.8	0.9
4-7	8	4.3	0.4	0.1
7-10	5	9.0	4.7	1.6
10-13	2	14.8	5.8	1.9

-1 and $2.00501$ values $20005010110110110000000101101000001011000000$	Table 2.Observation	groups of	n oil and	gas production	growth rate*
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\* The author's calculations

As can be seen from the data, the increase in hydrocarbon production in oil countries with relatively high rates has a significant impact to acceleration of GDP growth. This case is observed when the volume of production is increased of more than 2 times under the 10-year period and manifests itself more vividly after growth of 2.5-3 times.

2nd diagram reflects the impact booms in oil producing countries to acceleration of growth in these countries. At the same time, we have to take into account, that the indicators on the chart, as a means of evaluating of the impact the oil boom in the development in generally, have certain restrictions.

First, in the above-mentioned cases the analysis covers only the oil countries. In this regard, the chart data reflects the impact booms to activation "internal forces" oil economy; do not allow carry out assessments on the background of the development in the broadest sense.

Second, the oil- rich countries belong to different regions of the world. In separate periods, act the specific factors that have a significant effect on the differentiation of rates of economic growth rate by regions. This leads to substantial differences in GDP growth during the same oil production growth.

Third, the global growth rate can have significant differences under the influence of the relevant factors at the individual periods (decades). Due to the fact that the observations of the study include different periods, when using the indicators of GDP growth in absolute figures, is emerging the issue "neutralize " of impacts this factor.

Taking into account the above, it is considered to be appropriate to investigate the influence of the oil boom on economic development also on basis indicator of the relative growth rates of GDP (calculated as the ratio each country's GDP growth rate to appropriate indicator by group of countries of region to which belong country according to WDI). This indicator allows you to eliminate the above-mentioned restrictions. The use of this indicator in the process of research also opens opportunities to conduct relatively more a close to reality of evaluations on the effects of the oil factor on economic growth. At the same time, the use of this indicator, in connection with differences in the character of the growth by levels of development of countries also opens the possibility for removal of obstacles in the way of carrying out the relevant comparisons. In this case is possible and advisable analysis of impact of oil production to economic growth in the developing and developed countries in a single plane.

Of the reflecting the dependence between oil production growth rates and the GDP relative growth rate, in the 3rd graph, the indicators on boom countries is pointing with the red dots.





As can be seen, in all countries with the high increased oil and gas production, value of the GDP relative growth rates is more than 1. In conditions of moderate growth rates of production, this trend not observed. In fact, for a group of countries with growth rate less 6%, a direct link between the annual growth rate increase in production and the change a relative GDP growth rate is not clearly felt. In other words, we cannot say that of the available a significant correlation between the above-mentioned levels increase in oil-gas production and of absolute growth rates of GDP, true also for to the relative rate of growth. The oil boom, in all cases, acts as an important factor of much faster economic growth compared to neighboring countries.

At the same time, by countries in which has been an oil boom, significant differences in relative GDP growth pace are observed. We can say that this is related to the parameters of the booms and with a character their compatibility in individual countries. Respective analyzes show that impact of the boom to of absolute and relative growth rates is determined with the oil sector share in the economy and by the boom parameters.

As is clear from the data table 3, during the period of rapid rise of the oil production, the economic growth rate has close ties with scalability and with the intensity of the boom.

N	Country	Revenue from fuel exports to GDP, ratio	The scale of the oil boom (increase production quantities in	The intensity of the oil boom (average annual growth rate oil and gas	The strength influence of the boom outside the oil sector (growth of volume of oil	The average growth rate during the p oil producti growth	e annual of GDP period of on rapid
		(2000, in %)	the point "peak", times)	period before point peak)	a result of the boom to GDP, ratio <sup>11</sup> )	%	
1.	Azerbaijan	28.3	3.3 (2004-2010)	13.1	0.428	21.6	3.79
2.	Kazakhstan	25.1	2.3 (2000-2010)	8.0	0.257	8.3	1.54
3.	Trinidad and Tobacco	38.3	2.2 (2001-2010)	9.1	0.228	6.7	1.72
4.	Sudan	10.1	2.7 (2000-2009)	11.5	0.109	7.3	1.43
5.	Qatar	59.2	3.6 (2002-2013)	12.2	0.652	15.9**	3.68

Table 3.The basic parameters of the oil booms in the 2000s by countries 10 \*

\* The author's calculations

\*\* Indicator of calculation. Calculated on the basis of GDP growth rates in the years 2000-2013 on WDI and carrying out appropriate adjustments based on the dynamics of the oil and gas production for the years 2000-2002

Based on the analysis of the table, we can say with strong positions on all the parameters the oil boom leads to rapid economic growth. In this case, very large base level the share of oil sector in the economy is not the main condition.

Relevant data on Azerbaijan and Qatar will allow confirming this idea. (The causing of the oil boom on the formation on Azerbaijan of much higher indicator also has been associated with the low base effect for this country. In 2000, the volume of GDP per capita Azerbaijan was US \$ 0.7 thousand, Qatar the US \$ 29.7 thousand). In countries, which oil and gas production boom caused the rapid economic growth, value of the relative growth rates is also very high.

In countries where the relevant parameters of the boom are not very strong has been demonstrating not rapid growth, but when this growth rate has been significantly higher than the regional average. In other words, these countries in conditions of the increasing in oil production have shown of enough high economic rate of growth.

Not full compliance between indicators influence of boom outside the oil sector and GDP growth rate by countries can be explained by differences in policies in the field the use of oil revenues for the purposes of economic and social development. The

<sup>&</sup>lt;sup>10</sup> Angola's oil and gas production in 2001-2008 has increased by 2.5 times. However, due to lack of relevant indicators, was impossible to calculate the full of the country's boom parameters

<sup>&</sup>lt;sup>11</sup> Calculated as a of the difference the amounts between received from the fuel exports revenues in peak year and in previous of the rapid increase production year to GDP in the peak year

analysis the relevant empirical data shows that, the increase in oil production by increasing revenues can become a main driver into non-oil sector (Figure 4)





As seen of the charts, in 2001-2010 in connection with the oil boom in the Republic of Azerbaijan has been of conformity between growth dynamics the volumes of oil revenues allocated to the economies and the value added in the non-oil sector.

# 6. The growth in post-peak conditions: the role of the main factors in the short and long-term periods

Given the fact that impact of the oil boom covers medium and long-term periods, there is a need for separate study of its impact on economic growth for the post-peak conditions.

Empirical analysis show, that after the peak of the oil boom in short-run economic growth has falls sharply. This is evident from the relevant data of countries where beginning of the 2000s there has been a rapid growth in oil and gas production and also replacing of this process with a decrease. (5- Tm graphic)

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Figure 5. The economic growth of post-peak period: the short-term

As seen, the start of the decline in production first almost creates a shock in economic growth. Economic growth rate the very sharp falls down, or, as in the case of Trinidad and Tobacco, observed the decline in the volume of GDP. Later, as a result of adaptation of the economy the regime of the production decline going a certain extent of revival, although the medium-term growth rate is kept low.

In post-peak conditions, the main reason of decline in growth rates and even the acquisition it a negative sign, is a closure as a source of accelerated growth a rise in oil production and its transformation to factor a decline physical volume of GDP.

In cases of prolonged decline in oil production can be occur the long-term economic stagnation. About it can express thoughts on the basis of the 2nd diagram.

As seen of the form expressing the dependence between oil production and economic growth, of section trend in the 1st and 3rd quadrant, in the study period, was clearly visible a connection between the rate of decline in production and a slowdown in economic growth. In addition, the process of production decline is able to act as a sustainable influencing factor on scale of falling in the economy. So, after the mining

boom in Saudi Arabia in 1960-1980 (in this country in the years 1965-1980 the volume of oil and gas production increased 4.7 times and 2.9 times in 1970-1980), the decline in hydrocarbon production in conditions absence of non-oil sector with a large power of increase in the economy, led to the reduction of the average annual quantity the physical volume of the GDP in 1980-1990. In this time, the average annual decline in oil and gas production amounted 3.2%, average annual decline of GDP 1.3%.

In Libya, more prolonged the duration of reducing oil production, in a similitude conditions, led to a profound stagnation. After the oil boom in the 1960s in Libya oil and gas production in 1970-1990s was steadily reduced and the overall reduction was of more than 2 times. In 1980-1990 the physical size of the GDP reduction in the average annual rate was 7.0%. The pace of decline in GDP has been 2.9 times higher than the rate of decline in oil and gas production.

At the same time, indications 1st quadrant 2nd diagram shows that, sometimes it is possible to maintain a positive growth rate in circumstances in a relatively quickly reducing of oil production. In relative cases, (in the years 1980-1990 Kuwait, Yemen 2000-2010, Venezuela 2000-2013), it was provided with by large-scale use of oil revenues collected during the boom, for the purposes of economic and social development and formation of a certain potential for growth in non-oil sector.

## 7. The effect of large base GDP

The oil boom causes a sharp increase GDP through increasing oil production speeds, as well as through giving an impetus the development other related areas and in general, of non-oil sector. In this regard, to top a post-peak period is formed great base GDP. At the same time, in the conditions of termination of the accelerated increase of oil production is difficult to maintain relative high growth rates to a such base. Hence, the oil boom, by increasing the volume of the economy in a short time, able creates a basis for the low rate of economic growth in post-peak period.

In other words, in post-peak conditions, rates of economic growth are affected by the effect of large base GDP. This effect is based on the formation the pace of which contribute to a jump in growth of base volume of GDP in stage of rapid increase in the oil production and on the weakening of the role of oil factor as a source of growth in the next stage. Due of rapidly increase of the production during the boom, is going expanding the scale of the oil sector in the economy.

Large base GDP formed from the same sector. Real strength of impact of the effect, mainly, is determined with the rate of increase in the share of oil sector in the economy and by the value of the share the "oil GDP" at in peak level of production. After reaching a peak of production, the oil and gas sector does not act as an active source of real growth. At the same time, at this stage, due to the fact that the decline of production, as a rule, does not occur rapidly, the base volume of GDP remains large.

At connection with the provision of large base GDP also through relatively high growth rates in other sectors on the basis the use of oil revenue received resulting of the boom, for an understanding of the power of influence of this effect, we can make a comparison with the indicators of GDP a calculated on the basis of the growth pace of the pre-boom period, as well as on the basis the region's average growth rate in post-peak period. The effect of large base GDP was formed in the practice of all the countries, in which oil and gas sector's share in the economy is high, than of the above critical limit.

At the same time, according to the results of empirical analysis, this effect more clearly manifests itself in the event of large-scale boom, as well as of great intensity of the boom (6 in the diagram). The relevant parameters of oil boom in Azerbaijan in the early 2000s, is consistent with these indicators. As a result, the above-mentioned effect is clearly shown himself. As is clear from the diagram data, considered effect have a significant impact on the formation relatively low growth rates in the post-peak period. It, also, during this period, regardless of the dynamics of change in the volume of oil production, acts as an independent factor of relatively low growth rates.



**Figure 6. The indicators characterizing the of higher GDP** Base effect by countries<sup>12</sup>

In terms of the expansion of ideas of the impact this effect, can note that the GDP growth in the absolute volume of the Republic of Azerbaijan in 2011-2013, was higher than the corresponding indicator Georgia is 2.5 times and 3.5 times in Armenia, but the index average annual growth rate of GDP was respectively 2.9 and 2.4 percentage points lower.<sup>13</sup>

<sup>&</sup>lt;sup>12</sup> The author's calculations based on data from the World Bank

<sup>&</sup>lt;sup>13</sup> The author's calculations based on data from the World Bank ---- (http://data.worldbank.org/indicator/NY.GDP.MKTP.CD/countries/1W?display=default)

The above-mentioned, we can say, in formation the low growth rates of the short- run in the post-peak period, along with a decrease in oil production, the important role has the effect of large base GDP. The loss of this effect influence is related to a continued reduction of production hydrocarbon resources, and (or) expanding non-oil sector of the economy and improving its growth capacity. In connection with these, the effect of large base GDP, can take place among factors contributing to the low growth rate in the case of with the high share of the oil sector of the economy and weak the diversification process, also in medium and long-run periods. In this regard, for example, it is possible to say, of the important role of this factor in the formation of low growth rate in Venezuela 80-90 the last century.

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The rapid increase in oil and gas production, the beginning of the marked period, GDP per capita Venezuela in comparison with the relevant has led to outstrip on Latin America and the Caribbean region average of 2.2 times. In indicator subsequent periods, the decline in oil and gas production, as well as a results the activity of the effect of population occupancy<sup>14</sup> (growth population was significantly higher than the average of the region's), has resulted a formation trend of reduction per capita GDP. In 1980-1990, the average annual growth rate of Venezuela's GDP by 0.4 percentage points was lower than the average for the region. At the same time, if we take the average level of GDP per capita for the region as an basis indicator, the country's economic growth rate it would be more than of the region on 7.7 percentage points. At the end of period of the formation of relatively low growth rates, volume GDP per capita in Venezuela was significantly ahead of the average of the region.

### 8. Conclusion

In the impact of the oil boom, i.e. of rapid growth in a relatively short period of hydrocarbon resources, on an economic growth appears specific moments. The oil boom leads to significant or very large increase absolute (compared to previous periods) and relative (compared to other countries in the region to which this country belongs) pace of the economic growth. Both case, is conditioned with values of specific parameters (scale, intensity, strength of impact) of the oil boom.

In the conditions of the oil boom with high parameters, becomes the rapid economic growth in the oil economies. It is accelerating the growth of the economy in short-term as well as creates the danger of a breach the macroeconomic stability.

In post-peak conditions economic growth rates is formed under the impact of the dynamics of production of hydrocarbon resources, of the scale of the use of oil revenues for the purposes of economic and social development, as well as of the generated with the oil boom the effect of large base GDP and effect of population occupancy.

The effect of large base GDP can become a factor of the relatively low rates of the economic growth in short and long-time. This effect has a higher impact in cases where the oil sector occupies dominant position in the economy, as well as a non-oil sector has relatively small scale and weak growth potential.

<sup>&</sup>lt;sup>14</sup> The results action of the effect of population occupancy in 70-80 years of the twentieth century in Saudi Arabia (In the 1980s, the average annual growth rate of the population in Saudi Arabia, was 3 times higher than the world and 1.7 times higher compared to the corresponding figure for the region.) led to decline GDP per capita in this country. That paved the way for the appearance of assessments about entering into a dead end the country's development - See: Jeffrey D. Sachs, Andrew M. Warner 2001.

With beginning a post-peak period of oil production ceases to be a source of accelerated growth and becomes a factor of reducing the volume of GDP. In this regard, the economy is experiencing a short-term shock: growth rate drops sharply or an observed fall in volume of economy. Following this, in conditions the decrease or stabilization of production of hydrocarbon resources, although is provided of the revival thanks to active role of the use of collected during boom oil revenues, generally, the low growth rate in the medium term is maintained.

The combination of the effect of large base GDP with effect of population occupancy in long-time as a rule, causes a lower level of GDP per capita or to fall of this indicator (in Saudi Arabia during 1990-2000,in Venezuela in the period of 1980-2000, in Malaysia in the period of 2000-2013). When considered against the background of relevant indicators other resource rich countries, this situation generally takes the appearance of the argument for the approval of thought that those countries generally characterized by a low rate of economic growth. At the same time, we must consider that, these cases can be considered as a result impacts of the oil boom in the medium and long term, thanks of the effect of large base GDP and the effect of population occupancy.

In fact, in the post-peak conditions, the result of the oil production decline and sometimes, a combination it with the effect of population occupancy - occurs quantitative reduction the "quality of life" index (the quantity of per capita GDP), which rapidly grew in the stage of the increase the oil production. But in this case, in accordance with the mechanisms of the respective effects, the weak growth or a reduction of GDP per capita, in terms of long-run is temporary.

Term of the impact of effect of large base GDP is different by country. The length of this period is determined by factors of the scale, intensity, and strength influence of the boom. Lack of capacity of non-oil sector to weaken the abovementioned effect, more often, is associated with underdevelopment of the sector before oil boom. For the remove a stay lag in this area, as a rule, are required a long time. On the other hand, the oil boom expands the possibilities for progress in that direction.

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Appendix

N	Country	Ratio the value of fuel export to GDP at the beg-inning	The average annual growth	The average annu Gl	ual growth rate of DP
		and end of the period (%)	rate of oil and gas production, (%)	%	The ratio to the average indicator for the region, time
1	2	3	4	5	6
1.	Algeria <sup>4</sup>	39.4 30.0	0.5	3.9	0.9
2.	Angola <sup>3</sup>	79.1 50.5 <sup>2</sup>	9.7	13.5	2.81
3.	Azerbaijan <sup>3</sup>	28.3 40.2	13.1	17.1	3.17
4.	Burney <sup>5</sup>	61.8 68.8	-0.8	1.1	0.13
5.	Congo	$14.8^2$ 52.8	0.7	4.6	0.88
6.	Ecuador	15.1 15.0	2.0**	4.5	1.29
7.	Gabon	$43.1 \\ 60.0^2$	-1.2	2.7	0.52
8.	Iran	25.3 15.6	2.0	4.5	1.04
9.	Kazakhstan <sup>3</sup>	25.1 27.0	8.0	8.3	1.54
10.	Kuwait	48.0 61.4	2.6	5.4	1.26
11.	Libya	$67.9 \\ 32.1^2$	2.1	5.4	1.15
12.	Malaysia <sup>5</sup>	10.0 16.0	1.5	4.9	0.54
13.	Nigeria <sup>5</sup>	45.4 17.4	1.7	8.5	1.63
14.	Oman	45.2 59.1	2.4	3.5	0.81
15.	Qatar	60.1 50.5	10.6	13.7	3.19
16.	Russian	20.4 17.7	2.5	4.6	1.02
17.	Saudi Arabia	37.6 43.7	1.8	6.1	1.42
18.	Sudan <sup>3</sup>	10.0 $16.9^2$	11.5	7.3	1.43
19.	Trinidad and Tobacco <sup>3</sup>	36.3 38.3	8.6	6.5	1.71
20.	UAE	68.1 65.0	2.4	4.1	0.95
21.	Venezuela	25.4 19.7	-1.1	4.2	1.2
22	Yemen <sup>4</sup>	41.2 25.6	-1.6	4.1	0.87

The indicators of the oil economies

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2	3	4	5	6
Algeria	20.0	2.8	1.9	0.48
-	39.4			
Angola <sup>3</sup>	37.8 <sup>2</sup>		1.6	0.7
	79.1	4.6		
Congo	14.3		1.0	0.43
	14.8	5.1		
Ecuador	13.1		2.2	0.71
	15.1	3.4		
Gabon	$37.3^{2}$		2.3	1.0
	43.1	0.2		
Iran	12.4	2.8	3.1	0.79
	25.3			
Kuwait <sup>6</sup>	35.3	8.6	6.9	1.92
	48.0		•••	
Malaysia	12.0		7.0	0.82
5	10.0	5.0		
Nigeria	46.3		1.9	0.83
U	45.4	2.0		
Oman	48.6		4.5	1.15
	45.2	4.3		
Qatar <sup>3</sup>	$35.3^2$		11.1	2.85
	60.1	8.6		
Saudi Arabia	38.2	3.0	2.1	0.54
	37.6			
Syrian	15.4		5.1	1.31
	18.1	4.5		
Trinidad and	25.5		3.2	1.03
Tobacco	36.3	5.6		
UAE	43.1	2.4	4.8	1.23
	68.1			
Venezuela	40.7	3.0	1.6	0.52
	25.4			

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1. The share of oil revenues for the year 1980 is indicator of the calculation (due lack of official statistical data for the year 1980 is necessary to calculate the share of revenues from fuel exports for that year. For this purpose, export revenues in 1990 (WDI 2005) it was divided into indicator growth rates for oil and gas production in1980-1990 and had been multiplied into of the average index of oil prices (for the brand Brent 1980 compared with in 1990, index 1.55).

2. Due to the not bring the necessary data in WDI, as an the volume of the fuel export accepted the indicator obtained on the basis the multiplication EIA data on the oil exports

(Source:http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=5&pid=57&aid=4&cid=QA,&syid=19 90&eyid=2000&unit=TBPD) on Angola, the Democratic Republic of Congo, Gabon, Libya's "Nigerian Facades", on Qatar's " Brent "crude oil prices from the respective years.

3. In order to show exactly the impact of the oil boom on economic growth, as an recent year of indicators of the growth rate in countries where the oil and gas production increased rapidly was adopted a period reached of the production peak (for Azerbaijan, Kazakhstan, Trinidad and Tobacco -2010, for Sudan, Angola - the year of 2009)..

4. Growth indicators calculated for the years 2000-2010.

5. Growth indicators calculated for the years 2000-2010.

6. Taking into, the occurrence of the occupation by Iraq, data on Kuwait taken a covering the years 1993-2000..

7. Taking into the occurrence of processes the deep crisis in the economies due to the system transformations, oil and gas producing countries the entered of the former Soviet Union on the period 1990-2000 was not included on the list.