

The effect of changes in oil revenues on the welfare of the Russians

Abstract: The paper investigates what is the impact of oil abundance on the Russian economy given the results of previous research on the topic. The research is undertaken on the level of federal districts (“okrug”) as well as on the level of regions (“oblast”). In order to test whether there is an effect of oil revenues a number of macroeconomic indicators used, such as gross domestic product, income per capita, poverty threshold, housing availability, number of mobile and internet users per 100 inhabitants. There are two main outcomes from the research undertaken. First of all, the amount of the oil revenues is statistically and economically significant for the housing availability variable as the control for the region specific characteristics is included and it is also significant in defining level of housing availability for oil producing regions (unlike non oil producing regions). Secondly, it is economically and statistically significant for the level of the income per capita in oil abundance regions, although, it demonstrates no significant impact on the oil-poor areas’ level of the income per capita. The results are helpful in terms of understanding whether oil revenues act as the driver for the evolution of the Russian economy.

Keywords: oil revenues, oil price, resource abundance, macroeconomic indicators, Russia

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I. Introduction

Over the last 20 years since the collapse of the Soviet Union the social-economic situation in Russia changed dramatically and a lot of economists claim that oil price increase over these years has played its part since the oil price rose from around 22 dollars per barrel in 1991 to 80 dollars in 2010 (almost 4 times increase). As it can be seen on the graph (Picture 2) there is quite clear relation between Russian GDP and the price for crude oil, even though causal relation is not proven yet. Moreover, if analysis of the structure of GDP is undertaken, it can be shown that extraction of natural resources is among those having the highest portion in the GDP (Picture 3). The topic of dependence of Russian economy on the oil price's fluctuations is highly discussed and each time that the price for crude oil drops significantly there is panic in Russian financial markets.

Even though logically the connection between the oil revenues, development of Russian economy and improvement of Russians' welfare seems to be rather evident there is not that much empirical work done about it. However, there is a number of studies of the effect resource abundance has on other regions' economies. One of the effects of natural resources on economy is called "Dutch disease" (a term introduced in 1977 by the Economist) which stands for a situation when a country rich with some kind of natural resource has its manufacturing sector underdeveloped. Other studies find a more positive effect of natural resources on economic situation in the country such as higher income per capita compared to resources-poor country.

There is a number of authors which look more from the political and the macroeconomic perspectives. Caselli and Michaels (2011) investigate the effect of resource windfalls on the government's behavior in Brazil and find that there is definitely an increase in municipal revenues. Moreover, 90% of municipal revenues are spent on education and culture, health and sanitation, housing and urban development, and transportation and transfers to households. Then Lei and Michaels (2011) search for the relation between discovery of giant oilfield and probability of internal armed conflict. They conclude that such a discovery indeed increases the probability of internal armed conflict. However, they point out that there are other characteristics driving the increase in probability such as the recent history of political violence. Another paper is by Aragon and Rud (2011) who were looking at how the presence of a gold mine affects the wealth of the region where it is located. Davis and Aliaga-Diaz (2008) in their paper were analyzing the effect of oil price's shocks on US economy, Federal Reserves' policy, and global equity markets. Ewert, Hult (2006) investigated if the oil price can forecast stock prices using the experience of three Asian countries (Indonesia, India, and China).

In this paper the relation between oil revenues and Russian macroeconomic indications will be considered. According to Picture 4, Khanti-Mansi Autonomous Okrug is responsible for approximately 78% of the oil extracted in Russia per day. Yamalo-Nenets and Tatarstan are the second and the third by oil extraction with 8% and 7% respectively. Furthermore, in the most of oil extracting regions the portion of the value added by mining operations in the economy of the region is quite stable and high and in some other regions it is growing (Picture 5). Picture 6 suggests that it is not very obvious that there is a direct effect of the oil revenues on the wealth of population of the region. However, what is very evident is that the average income per capita for the oil extracting regions is significantly higher than that of the “non-oil” regions (sometimes it is twice that of the non-oil-extracting regions).

Consequently, the hypothesis to test is whether the oil abundance affects the welfare of the oil-extracting regions estimating regressions of different macroeconomic indicators which witness improvements in the living standards of people in both oil-extracting and non-oil extracting regions on the oil revenues. Macroeconomic indicators which will be tested are as follows: gross domestic product, average income per capita, housing availability (meaning improvement of situation with housing), poverty threshold level, number of mobile users per 100 inhabitants and number of internet users per 100 inhabitants. The last two economic characteristics are supposed to indicate development of Russian infrastructure.

In order to make the following research more prominent two datasets are used in order to test the main hypothesis. First of all, the hypothesis will be tested on the federal level, meaning that macroeconomic data for the whole Russian economy is used. Secondly, research will continue on the regional level with help of panel data including information for different oil-rich and oil-poor regions.

In Part II of the thesis the history of oil industry in Russia will be covered to provide an overview of the historical background which led to the current situation in Russian economy and made oil export such an important ingredient for the development of Russia. Part III is focusing on the previous research done on the topic of natural resources’ effect on the social-economic and political situation in different regions. Methodology, which will help to answer the question of how oil revenues impact Russian economy, is explained in more detail in Part IV. After claiming what is going to be done it is important to identify variables to be used and sources of them which are included in Part V. Then all the empirical findings are in Part VI; and Part VII is devoted to conclusions which can be done, limitations of the following research and some directions for further research regarding resource abundance’s effect on the economic development of Russia.

II. Development of the oil industry in Russia

Oil was discovered on the territory of contemporary Russia already in XVIII century. The first well was drilled in 1846 in Baku, Azerbaijan which was on the territory of what was the Russian Empire at that time. At the beginning of the twentieth century the Russian Empire provided 30% of all the oil produced worldwide. After revolution in 1917 extraction of oil in Russia decreased significantly and most of foreign companies sold their parts in Russian oil companies and left the country as new government made a decision to nationalize those companies. However, some of those foreign companies continued to invest in Russian oil sector and thanks to these foreign investments export of oil was back to pre-revolution level.

The Caucasus and Caspian Sea area were those regions on the territory of the Soviet Union, where most of the oil was extracted until the 1950s. Then lots of effort was spent on discovery and development of oilfields in other regions, such as the Volgo-Uralsky region. Since 1950s they made 45% of all oil extraction in the Soviet Union. Then the Soviet Union was trying to become a leader in the oil market and in the beginning of 1960s was on the second place in the world by the oil extraction (previously Venezuela was ranked number two in the world). Due to the sudden inflow of big volumes of cheap oil most of the oil companies all over the world decreased price for the oil produced in the Middle East which caused a drop in the revenues for the oil extracting companies there. As the way to protect them, Middle East countries set up OPEC (Organization of Petroleum Exporting Countries).

In the next decade most of the oilfields were located in the West Siberian region and the main goal was to extract the oil in accordance with a plan from the Communist Party until signs of depletion were noticed. Due to underinvestment in the oil industry, volume of the oil extracted in the Western Siberia started to decline in 1977 and then it happened again in the period between 1982 and 1986. The situation became even worse with the collapse of the Soviet Union and the financial crisis in the country, hence volumes were falling down further and the decline was over in 1997.

According to some industry experts, remaining resources in the Western Siberia account for more than 20 billions of tones and in the Eastern Siberia 1.25 billions of tones. However, what is left in operating wells is already hard to extract. As the result new regions for research works are chosen, such as the island Sakhalin. Nowadays, three main sources for the crude oil are Vankorskoye, Verkhnechonskoe and Talakanskoye which are all located in the Eastern Siberia and where extracting started recently, while the volume of the oil extraction is going further down in Khanti-Mansi Autonomous Okrug (RIA Novosti Analytics).

According to RIA Novosti, one of the largest Russian news agencies, in year 2011 oil extraction slightly increased in Russia (by 0.8%) while export of the oil showed decline. However, the income from the oil export increased by one third which could be due to 40% increase in the oil price during the year. Currently, there are 9 main players on the Russian oil market which are Surgutneftegaz, Russneft, Lukoil, Slavneft, Bashneft, Tatneft, Rosneft, TNK-BP and Gazpromneft (associated company of Gazprom). Russian Ministry of Energy emphasizes that the oil industry provided approximately half of the tax revenues and has the highest investment multiplier which means that particular increase in the investments in the oil industry results in higher than in other sectors of the economy increase in the revenues.

From the first glance, affect of those discoveries looks like “Dutch disease”, as the oil industry is flourishing, and the manufacturing is stagnating. Living in Russia, one will easily notice that very few things that you use daily are actually produced in Russia, sometimes even those that are typical Russian things. On the other hand, thinking of improvements in the living standards of Russians due to the oil revenues, it can be definitely said that during years that the oil price was booming Russia became in most consumption categories second or third largest country in Europe closing the gap on Germany pretty fast (according to Business New Europe journal and Euromonitor International) and middle class came into existence. Moreover, there are few more facts as well which can be highlighted as showing the connection between the oil price and the Russian economy. First of all, according to the Russian legislation, part of tax revenues collected on the regional level is redistributed through the federal government; hence, there can be an “oil revenues’ effect” not only on the oil-producing regions but the rest of the regions as well. Secondly, the Russian government’ budget for a year includes an assumption on the oil price during a year, which is around 110 dollars per barrel for the year 2012.

III. Literature

A number of works discuss the effect of resources in general and different types of resources in particular on economic and social development of the country. As we look at different papers focusing on different spheres where researchers test whether there is an effect of the resource abundance in different countries and what kind of the effect it is, and their conclusions are very controversial.

Auty (2001) show resource abundance countries as “cursed” because, according to his research, since 1960s income per capita of resource-poor countries was growing significantly faster than that of resource-abundance countries. It is also emphasized that economic growth has been inversely related to the share of rents from the natural resources in country’s gross domestic product. Moreover, he highlighted that dependence on the export of the primary products in the long-run delays industrialization, increases income inequality and retards skill accumulation. Sachs and Warner (1999) have studied seven Latin American countries to test the hypothesis of whether resource boom can be a “big push”, catalyst for the low-income economies needed for their development. In their paper it is pointed out that even though from the theoretical point of view impact from the resource abundance on economy can be positive as well as negative, empirically it was shown that it had little effect on the long-term growth or even hindered it on average. In the other paper by Sachs and Warner (2001), they also conclude that the resource abundance results in slower growth of the economy which in accordance with their view is not explained by omitted geographical or climate variables.

From the political point of view it is argued that oil and non-fuel resources hinder democracy (Ross, 2001). The effect from the oil is much worse in poor states than in rich ones and the decrease in the oil-revenues would have much severe consequences for resource-poor countries. These conclusions are based on the data for different geographic areas, such as the Middle East, Malaysia, Indonesia, Nigeria and Mexico for oil and Angola, Chile, the Democratic Republic of Congo, Cambodia and Peru for non-fuel types of resources. Other research shed the light on the way resources influence politics as it argues that, on the one hand, politicians tend to set high extraction rates as they discount future by the probability of them staying in power, and, on the other hand, resource boom tend to increase this probability and, hence, make them discount future to less extent (Robinson, Torvik and Verdier, 2006). Consequently, these two forces work in the opposite directions and diminish the risk of over-extraction. Another conclusion from this paper is that such resource booms also leads to inefficiency in the rest of the economy as it encourage politicians to engage in the inefficient redistribution to influence the results of the elections. However, it is also stressed that the effect resources has on the politics depends on whether there are any organizations controlling for “clientelism” among politicians to bias the results of elections. Monteiro and Ferraz (2009) in their paper highlight that an oil windfall boom provides politicians with advantages in the following two

elections, while this effect disappears in the mid-term. They point out that oil windfall is associated with an increase in the number of employees; however, it does not significantly affect education or health care supply. It is also proven that while creation of public jobs is perceived by voters as the politician's ability, this impression is disappearing along the years if no real improvement in living standards is observed.

In other works, on contrary, resources-rich countries have higher growth of the population, higher income per capita and better infrastructure (Guy, 2011). Black, McKinnish and Sanders (2005) base the research on the coal industry experience from the area near Appalachia, Pennsylvania and they highlight that a spillover effect from the coal sector to other sectors of the region in case of boom or bust is much smaller than it was expected previously. While some researchers claim that the natural resources abundance results in higher income per capita in country, Torvik (2002) provides explanation of the reason why natural resources lower income per capita. In his point of view, it happens because the number of entrepreneurs involved in rent seeking increases while the number of entrepreneurs running productive firms decreases.

Mehlum, Moene and Torvik (2006) demonstrate that whether natural resources curse occur or not depends on the quality of the country's institutions. They argue that only "grabber friendly" institutions cause the resource curse with low growth while "producer friendly" ones lead to more efficient exploration of the opportunities which natural resources give. Dalgaard and Olsson (2008) prove this point of view in some way, since they found that natural resources' rents are positively correlated with level of corruption. Other researchers also claim that effect from resource abundance depends on the quality of institutions (Boschini et al, 2007) and the type of resources country possess influence the severance of the effect. It is argued that for countries rich with minerals both positive and negative effects are less severe than for those that are rich with diamonds or precious metals.

Given all those papers covering natural resource abundance, it is not possible to make a conclusion on whether natural resources have positive or negative impact on the economy. Moreover, some researchers make opposite conclusions such as the one about level of income per capita with Guy (2011) claiming that it is higher for resource-rich countries; and Torvik (2002) arguing that it is indeed lower. Hence, no verdict is announced yet, we can just see that different researchers are trying to test resources' impact from different perspectives.

IV. The methodology

Federal level

Unit-root tests

Before starting out with regressions it is appropriate to check time-series for unit-root as Russian economy is expanding and specified macroeconomic indicators can be growing simply because of this factor. Then if those indicators are found to be stationary, OLS regression can be done. Otherwise, it is better to move on directly to regressions which use differences. To check for unit-root, Dicker-Fuller test is applied to all of the dependant variables.

Naïve regressions

The hypothesis defined earlier is tested with help of the series of different regression specifications in order to identify the relation between the social-economic conditions in Russia and the oil revenues' fluctuations. It is worth mentioning that oil revenues were chosen as independent variable instead of the oil price in order to capture changes in both the price of crude oil and the extraction volume which was fluctuating in the range of approximately 2 213 - 3 794 million of barrels during 1990 - 2010.

To begin with, simple OLS regression is conducted to define the relation between the gross domestic product and the oil revenues. It sounds logical to start with GDP as it shows development of the Russian economy at generalized level.

$$GDP_t = \alpha_1 + \beta_1 \cdot Oil\ revenues_t + \varepsilon_t \quad (1)$$

Where t is the time period, a year in the range from 1995 to 2010.

Next variable of interest is income per capita, which is argued to emphasize improvements in the welfare of Russian citizens on individual level:

$$Income\ per\ capita_t = \alpha_2 + \beta_2 \cdot Oil\ revenues_t + \varepsilon_t \quad (2)$$

Where t is the time period, a year in the range from 1990 to 2010.

Third regression specification is poverty threshold level on the oil revenues. Poverty threshold is the income which makes households able to consume a low cost, nutritious diet and purchase non-food necessities. It is the amount of money which is enough for people to live in acceptable conditions rather than in grinding poverty. This amount is constantly revised by Goskomstat (Federal Statistical Agency).

$$Poverty\ threshold_t = \alpha_3 + \beta_3 \cdot Oil\ revenues_t + \varepsilon_t \quad (3)$$

Where t is the time period, a year in the range from 1992 to 2010.

Housing availability, which stands for a number of square meters per capita, is a proxy for the changes in the situation with housing in Russia. It can be a good indicator because currently a lot of people living in bad conditions with a lot of people living in the same flat. According to Goldman Sachs analysts, level of the housing penetration in Russia is around 23 square meters per capita while European average is in the range of 30-40 square meters per capita. The ground for this problem is, in particular, the fact that price for square meter is quite high and as the results children cannot move to their own place; hence, they continue to live in their parents' place.

$$Housing\ availability_t = \alpha_4 + \beta_4 \cdot Oil\ revenues_t + \varepsilon_t \quad (4)$$

Where t is the time period, a year in the range from 1990 to 2010.

The last but not least, two indicators are used which show development of the infrastructure in Russia as the component of daily life of each Russian. These are number of mobile users and internet users per 100 inhabitants, both of them were growing dramatically during the last 20 years. Mobile coverage changed from 2 users per 10 000 people in 1991 to 167 per 100 in 2010 (which means that some people have few SIM cards and some of them are not used). Internet penetration evolved from 6 users per 10 000 in 1992 to 43 per 100 in 2010.

$$Mobile\ users_t = \alpha_5 + \beta_5 \cdot Oil\ revenues_t + \varepsilon_t \quad (5)$$

$$Internet\ users_t = \alpha_6 + \beta_6 \cdot Oil\ revenues_t + \varepsilon_t \quad (6)$$

Where t is the time period, a year in the range from 1991 to 2010.

Differencing regressions

After simple OLS regressions are run, it is appropriate to move on to regressions of differences of normal logarithms of macroeconomic variables on those of oil revenues, which can help get rid of the permanent component of all variables and take into account only percentage changes. Running regressions with changes in normal logarithms of the variables make it possible to explore the fact that such regressions show elasticity of economic factors. It implies that one percentage change in the oil revenues will result in the percentage change in the dependent variable which is approximately the same as the coefficient in front of the oil revenues variable in the regression.

$$\Delta \ln(GDP_t) = \alpha_7 + \beta_7 \cdot \Delta \ln(Oil\ revenues_t) + \varepsilon_t \quad (7)$$

$$\Delta \ln(Income\ per\ capita_t) = \alpha_8 + \beta_8 \cdot \Delta \ln(Oil\ revenues_t) + \varepsilon_t \quad (8)$$

$$\Delta \ln(Poverty\ threshold_t) = \alpha_9 + \beta_9 \cdot \Delta \ln(Oil\ revenues_t) + \varepsilon_t \quad (9)$$

$$\Delta \ln(Housing\ availability_t) = \alpha_{10} + \beta_{10} \cdot \Delta \ln(Oil\ revenues_t) + \varepsilon_t \quad (10)$$

$$\Delta \ln(Mobile\ users_t) = \alpha_{11} + \beta_{11} \cdot \Delta \ln(Oil\ revenues_t) + \varepsilon_t \quad (11)$$

$$\Delta \ln(Internet\ users_t) = \alpha_{12} + \beta_{12} \cdot \Delta \ln(Oil\ revenues_t) + \varepsilon_t \quad (12)$$

Where t is the time period and taking into account that the regressions above use differences that the number of years is less: it is from 1991 for housing availability and income per capita, from 1992 for mobile and internet penetration, from 1993 for the poverty threshold and from 1996 for GDP level.

Regional level

Relations specified on federal level are very useful in identifying in more generalized way whether there is an effect of oil revenues on the economic development of Russia. It is as it is said in Russia “average temperature [of patients] in hospital”. To understand what this “temperature” really is, it can be useful to check it for different “patients”. And it is the same for such a big economy as Russia. It is necessary to look at the effect of oil revenues for different regions. The amount of data available on regional level is very limited; hence, not all the variables mentioned previously are used when moving on to regional level.

Fixed-effect regressions

First step is to apply region fixed effect to variables to diminish the impact of regional characteristics which are constant over time and can also affect dependant variable and make regression results biased.

$$Income\ per\ capita_{i,t} = \alpha_1 + \beta_1 \cdot Oil\ revenues_t + \sum_{i=1}^{Region-1} \beta_i \cdot Region_i + \varepsilon_{i,t} \quad (13)$$

$$Housing\ availability_{i,t} = \alpha_2 + \beta_2 \cdot Oil\ revenues_t + \sum_{i=1}^{Region-1} \beta_i \cdot Region_i + \varepsilon_{i,t} \quad (14)$$

Where $Region_i$ means just the sequence number of the region varying in accordance with the number of regions included which is explained in more details in the Data section of the thesis.

Difference-in-difference regressions

Another way to identify relation between oil revenues and economic situation in Russia is to estimate difference-in-difference regression which can also help to get closer to identifying if there is a causal link between those variables.

$$Income\ per\ capita_{t,i} = \alpha_1 + \beta_{1,1} \cdot Oil\ revenues_t + \beta_{1,2} \cdot Oil\ revenues_t \cdot Oil_non_oil_i + \varepsilon_{t,i} \quad (15)$$

$$Housing\ availability_{t,i} = \alpha_2 + \beta_{2,1} \cdot Oil\ revenues_t + \beta_{2,2} \cdot Oil\ revenues_t \cdot Oil_non_oil_i + \varepsilon_{t,i} \quad (16)$$

The “Oil_non_oil” is dummy variable which is equal to 1 when it is oil-producing region and 0 when it is not. Introduction of the interaction term specified above shows how the effect of the oil revenues on the economy of a region changes, taking into account the fact of oil extraction on its territory. It shows if the fact that particular region is oil-rich or oil-poor has positive or negative impact on the level of income per capita and housing availability. This approach is similar to one used in the paper by Aragon and Rud (2011) where they apply interaction using dummy variable of distance to Yanacocha city where gold mine is located.

V. Data

Oil revenues

In order to test the hypotheses, daily price for the WTI crude oil is used, while data on it is downloaded from the site of the U.S. Energy Information Administration. The price for the oil is denoted in dollars per barrel and converted to rubles at exchange rate set by the Bank of Russia. Amount of the oil extracted is taken from the Goskomstat (Federal Statistical Agency) site and expressed in the billion of tones with consequent conversion into barrels ($1 \text{ barrel} \approx 0.1360 \text{ tones}$). As long as macroeconomic data which is used in regressions is in annual format hence the oil price is averaged for one year. Oil revenues proxy is constructed as oil price converted into rubles multiplied by the volume of oil extracted in barrels in respective time period.

Macroeconomic data

There are number of levels for dividing all the territory of the Russian Federation in administrative units. The first level is a federal district (“okrug”) of Russia and there are eight federal districts. Then each district consists of few smaller units which are called regions (“oblast”) and the Russian Federation is composed of 83 regions. Consequently, there is a number of regressions which are run at both federal and regional levels and they were specified in more detail previously.

Federal level data

In order to show improvements in Russians’ wealth macroeconomic data from the Goskomstat (Federal Statistical Agency) is used. Macroeconomic data for the federal level regressions is for year from 1990 till 2010, although, for some of the indicators it is starting from 1991-1992 and from 1995 for the GDP level.

Gross domestic product is used to show development of the Russian economy as a whole and is stated in the billions of rubles. One of variables of interest which is supposed to show improvements in the living standards of the Russians is the average income per capita denoted in rubles. Square meters of the residential area per capita (“housing availability”) serve as the indicator of the improvement in housing situation in Russia. Also poverty threshold is the witness of increase in income of poorest people in the country which can be signaling the decrease in amount of people living in grinding poverty. Finally two infrastructure indicators, mobile and internet penetration, are introduced. They are expressed in number of users per 100 inhabitants.

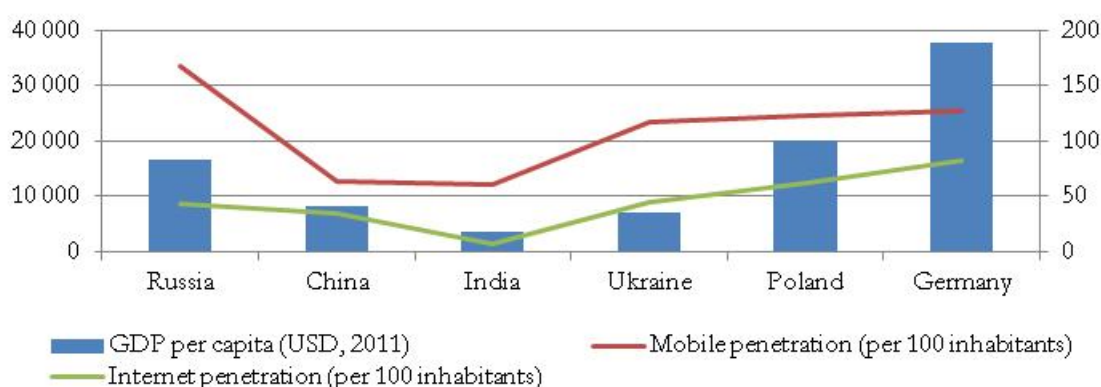
Furthermore, all data which is originally stated in dollars (e.g. oil price) is converted into rubles at the respective official exchange rate is taken from the site of the Bank of Russia.

Table 2 Summary statistics of data on federal level

	Mean	Standard deviation	25p	Median	75p	Observations
Oil output (in bn RUB)	2803.2	3133.5	189.6	1936.6	5440.4	21
GDP (in bn RUB)	29859.3	7192.0	22722.2	28308.6	37091.5	16
Income per capita (in RUB)	5132.0	6116.8	515.9	2281.1	8111.9	21
Housing availability (sqm)	19.4	1.9	18.0	19.2	20.9	21
Poverty threshold (RUB)	1962.2	1841.0	369.5	1500.0	3422.0	19
Internet users (per 100 inhabitants)	10.1	12.9	0.3	3.0	18.2	19
Mobile users (per 100 inhabitants)	43.9	61.5	0.1	3.8	94.8	20
Crimes (tsn)	2882.3	413.2	2627.0	2780.2	2998.3	20
Retail sales per capita (mln RUB)	33615.1	37764.1	4188.5	18578.1	55291.3	20

Comparison to some peer group in terms of the level of some of the macroeconomic characteristics specified above might help to understand how good or bad Russia is doing if we compare it to other countries. However, it is found out to be rather challenging to identify this peer group as the Russian economy is very big. Nevertheless, there are 5 other countries which are set as comparable to Russia in some way. These are two BRIC countries (China and India), one ex-Soviet union country (Ukraine), one East European country (Poland) and the one that is the European country which is ahead of Russia in terms of consumption (Germany).

Picture 7 Cross-country comparison of macroeconomic indicators



In terms of the level of the gross domestic product per capita, it is obvious that Russia is far behind developed country level if as it is compared with Germany and it is also behind Poland but it is way higher than the GDP per capita level of its peers from BRIC and Ukraine. It is similar picture as we look at internet and mobile penetration, even though the level of mobile penetration for Russia is much higher than that for other peers which can be due to the fact that in Russia some of SIM cards are “dead” as they are bought but not used. Looking at these indicators, it can be concluded that if we rank developing countries by macroeconomic indicators Russia will fall at the high end of the range, meaning that its indicators will still have lower levels than for developed countries but higher than those of other developing countries. It is hard to say if it is due to the oil revenues or not, but this can be field for future investigation.

Regional level data

Regional data is in the panel format for four years from 2007 till 2010, as earlier regional data is not available. Due to data availability problem for purposes of this paper regional level data does not cover all of the 83 regions but most of them. Although data for Moscow (not Moscow region but for the capital city itself) was in sight, it was not used as it could seriously bias estimated regressions. For instance, as it is well known, a lot of investments in the infrastructure improvements are done in Moscow while in some regions it is underdeveloped and living standards in general can be improving simply because it is capital city.

Income per capita is also used on the regional level just like on the federal one. There are annual observations for years 2008 – 2010 on 81 regions, excluding Moscow for the purpose stated above and for Chechnay as there is no data available). Next dependant variable is housing availability just as it was for the federal level regressions and it includes data on 59 regions. However, it is not available for regions but constructed by author. The total amount of residential area in the region is taken and divided by the population of the region for the respective period.

Table 3 Summary statistics of data on regional level

	Oil-extracting regions	Non-oil-extracting regions	Observations
GDP (2009, bn RUB)	6 054.5	26 018.0	81
Population (2010, tsn)	18 346.9	128 165.9	81
GDP per capita (2009, RUB)	761 500.9	167 963.2	81
Income per capita (2010, RUB)	27236.6	15451.2	81
Housing availability (2010)	21.0	22.4	59

Population of oil extracting regions 7 times less than that of other regions, which can be explained by the fact that most of oilfields are located in the areas where conditions are not very comfortable for living and, oil extraction plants are typically the only employers in such areas, a lot of people move there just for work. Also important to highlight the fact that average GDP per capita is approximately 4.5 times higher in oil abundance regions than in all other regions. This conclusion was expected though since oil rich areas less crowded and produce high value product which is reflected in the GDP number for those regions. As it was shown on the graph previously income per capita in oil producing region is significantly higher than that of the oil poor regions (in economic terms). However, the number for housing availability is higher for those regions where oil is not extracted. This result can be caused by housing supply which is not developing at the same pace as the demand for it while workers can move from other non oil extracting regions due to lack of work opportunities there.

VI. Empirical findings

Federal level

Unit-root tests

To begin with augmented Dicker-Fuller tests for all macroeconomic variables are performed (see Table 4 – 9, Appendix) and they proved that most of the variables are unit-root as long as test statistics are not higher in absolute value than critical values even at 10% level. This feature implies that they evolve with time which is logical as Russian economy is expanding and it inevitably results in improvement in those macroeconomic indicators which were specified earlier. Presence of the unit-root makes OLS regressions' results meaningless; hence it is better to move on directly to the regressions which use differences of normal logarithms of macroeconomic variables on those of the oil revenues.

Differencing regressions

Previously it was proved that level data has unit-root feature which made author skip OLS regressions and go on with differencing regressions. Consequently, it is also necessary before estimating those regressions to test changes in normal logarithms for unit-root as well. Tables 10 – 15 (see Appendix) provide results from augmented Dicker-Fuller test of those changes. As we see all changes are found out to be stationary except income per capita which is unit-root again, hence all differencing regressions except one for the income per capita level can be estimated (Formula 7, 9 – 12).

Running regressions of normal logarithms differences of macroeconomic indicators on those of the oil revenues can help to get rid of the other factors apart from the oil revenues, permanently having an effect on the changes in those macroeconomic factors such as the development of GDP over time due to growth of the economy, the development of technologies resulting in higher level of mobile and internet penetration and etc.

First of all, the regression of changes in normal logarithms of GDP level on those changes in the oil revenues is estimated (Formula 7) and the result is as follows:

Table 16 Difference regression of the gross domestic product on the oil revenues

						Number of obs = 15 F (1, 13) = 2.34 Prob > F = 0.1498 R-squared = 0.1583 Root MSE = 0.05057
Change in ln(GDP)	Coefficient	Robust Std. Err.	t-stat	P > t	[95% Confidence Interval]	
Oil output	0.0637	0.0416	1.53	0.150	-0.0262	0.1537
Const.	0.0203	0.0194	1.05	0.314	-0.0216	0.0622

According to the results from the regression, the changes in the gross domestic product are not explained by the changes in the oil revenues as t-statistics is not statistically significant (1.53) and it has low predictive power as well (R-squared 15.83%). It supports the idea that the GDP development can be merely the result of the development of the economy through time as implied by unit-root earlier. Gross domestic product can be also the result of the booming consumption as incomes increase and more and more products are available on Russian market and people spend more money.

Following table presents the result of regression testing the relation between differences in normal logarithms of the poverty threshold and those of the oil revenues (Formula 9)

Table 17 Difference regression of the poverty threshold on the oil revenues

						Number of obs = 18 F (1, 16) = 5.36 Prob > F = 0.0342 R-squared = 0.5079 Root MSE = 0.44043
Change in ln(poverty threshold)	Coefficient	Robust Std. Err.	t-stat	P > t	[95% Confidence Interval]	
Oil output	1.1555	0.4990	2.32	0.034	0.0976	2.2133
Const.	0.0407	0.1058	0.38	0.706	-0.1835	0.2649

T-statistics is 2.32 which witnesses that change in oil revenues is statistically significant for the development of the poverty threshold. As regression using changes in normal logarithms of variables has a good feature of estimating elasticity of dependant variable on independent one. Consequently, 1 percentage change in the oil revenues is approximately equal to 1.16 percent change in the poverty threshold. Positive sign of the coefficient in front of the oil revenues is in accordance with common sense.

Moreover, regression has strong predictive power with R-squared being equal 51%. According to Caselli (2011), oil revenues in municipalities of Brazil also had positive effect on the income of the poorest households but the effect was found to be so tiny that it was claimed that it does not reduce the poverty.

Table 18 Difference regression of the housing availability on the oil revenues

						Number of obs = 20
						F (1, 18) = 0.75
						Prob > F = 0.3982
						R-squared = 0.0771
						Root MSE = 0.00646
Change in ln(housing availability)	Coefficient	Robust Std. Err.	t-stat	P > t	[95% Confidence Interval]	
Oil output	0.0046	0.0053	0.87	0.398	-0.0065	0.0157
Const.	0.0147	0.0021	6.87	0.000	0.0102	0.0192

After the regression of changes in normal logarithm of housing availability (square meters per capita) on that of oil revenues (Formula 10) is estimated, it is claimed that oil revenues have no significant effect on the housing availability (t-statistics = 0.87). Furthermore, its predictive power is very poor as well (R-squared 7.71%). One of the possible explanations of this insignificance can be that creation of new residential area undergoing is not connected to inflow of revenues from oil industry but simply the result of inevitable replacement of housing.

Table 19 Difference regression of the number of mobile users per 100 inhabitants on the oil revenues

						Number of obs = 19
						F (1, 17) = 0.13
						Prob > F = 0.7268
						R-squared = 0.0110
						Root MSE = 0.65889
Change in ln(mobile users)	Coefficient	Robust Std. Err.	t-stat	P > t	[95% Confidence Interval]	
Oil output	-0.1747	0.4918	-0.36	0.727	-1.2123	0.8629
Const.	0.7734	0.2950	2.62	0.018	0.1510	1.3958

Results of the regression specified by Formula 11 suggest that the impact of the oil revenues does not prove to be statistically significant as well (t-statistics = -0.36) while the constant is significant which can be result of omitted variables' bias.

Table 20 Difference regression of the number of internet users per 100 inhabitants on the oil revenues

Number of obs = 18
 F (1, 16) = 2.03
 Prob > F = 0.1734
 R-squared = 0.3141
 Root MSE = 0.58033

Change in ln(internet users)	Coefficient	Robust Std. Err.	t-stat	P > t	[95% Confidence Interval]	
Oil output	1.0141	0.7116	1.43	0.173	-0.4945	2.5225
Const.	0.2605	0.1386	1.88	0.078	-0.0333	0.5542

Results from the last differencing regression reported above (Formula 12) do not demonstrate that the oil revenues effect the number of internet users per 100 inhabitants serving as indicators of the infrastructure development since t-statistics found out to be statistically insignificant (1.43). Insignificance of the oil revenues variable for mobile and internet coverage can be logical as it could be merely technical progress which improved those characteristics as oil-poor countries according to the World Bank data also demonstrated quite significant improvement in the last 20 years.

Outcomes of the differencing regressions were mixed, with the oil revenues having statistically significant effect on the poverty threshold, insignificant for gross domestic product, housing availability, number of mobile and internet users. Federal level regressions provide not very promising results in terms of finding any effect from oil revenues' fluctuations on the welfare of Russia. However, it can be simply due to the small number of observation in the sample and also it can be that they have more clear effect on the regional level as taking average of some macroeconomic indicator can wind away any possible effect. That is the reason for digging into the regional level data as it can provide brighter picture of what is going on in across the country while oil revenues are changing.

Regional level

On the regional level, there are two approaches to be implied: region fixed-effect and difference-in-difference regressions. The first one tests effect of changes in oil revenues controlling for permanent regional characteristics and the second one check how effect changes when we move from oil-producing region to non oil-producing one.

Fixed-effect regressions

First of all, region fixed-effect regression for the income per capita is run (Formula 13) and its outcome is reported below:

Table 21 Region fixed-effect regression of the income per capita on the oil revenues

					Number of obs = 243 F (1, 161) = 0.01 Prob > F = 0.9348 R-squared = 0.9563 Adjusted R-squared = 0.9343 Root MSE = 1822.6	
Income per capita	Coefficient	Robust Std. Err.	t-stat	P > t	[95% Confidence Interval]	
Oil output	-0.0087	0.1066	-0.08	0.935	-0.2194	0.2019
Const.	15294.26	776.3176	19.70	0.000	13761.18	16827.34

After having run region fixed - effect regression it is found out that oil revenues' effect on the income per capita is not explained by the region's characteristics and it is statistically insignificant (t-statistics = - 0.08). Nevertheless, estimated regression has high predictive power (R-squared = 95.63%) and constant is highly significant (t-statistics = 19.7) which can be due to severe omitted variable bias.

Next regression is focusing on region fixed – effect regression for the housing availability stated in Formula 14 earlier.

Table 22 Region fixed-effect regression of the housing availability on the oil revenues

					Number of obs = 236 F (1, 176) = 35.49 Prob > F = 0.0000 R-squared = 0.9816 Adjusted R-squared = 0.9754 Root MSE = 0.66808	
Housing availability	Coefficient	Robust Std. Err.	t-stat	P > t	[95% Confidence Interval]	
Oil output	0.0003	0.0000	5.96	0.000	0.0001	0.0003
Const.	19.4001	0.3658	53.03	0.000	18.6788	20.1226

T-statistics is positive and significant (5.96), consequently, oil rents affect housing availability in different Russian region even after controlling for permanent regional characteristics not related to oil extraction. The coefficient in front of the oil revenues witnesses that as oil rents increase by 1000 billion in ruble

terms housing availability increases by 0.3 square meters. Even though regression's results prove positive effect from increase in oil revenues, it seems like this effect is very tiny as such a substantial increase in oil rents provide such a small increase in housing availability. Hence, this effect is not very significant in economic terms.

Region fixed – effect look like a good explanation for the housing availability development and rather poor one for income per capita level improvement. Then it is tested how the oil revenues effect on those two characteristics is changing taking onto account if it is oil extracting or non oil extracting region.

Difference-in-difference regressions

Table bellow displays the Formula 15 results of the difference – in – difference regression for income per capita:

Table 23 Difference-in-difference regression of income per capita on the oil revenues

						Number of obs = 243
						F (2, 240) = 15.21
						Prob > F = 0.0000
						R-squared = 0.3027
						Root MSE = 5961.3
Income per capita	Coefficient	Robust Std. Err.	t-stat	P > t	[95% Confidence Interval]	
Oil output	-0.1854	0.4696	-0.39	0.693	-1.1105	0.7397
Interaction	1.4308	0.2603	5.50	0.000	0.9180	1.9436
Const.	15294.26	3895.325	3.93	0.000	7620.87	22967.65

Given t-statistics level, it can be observed that oil revenues' fluctuations are not showing significant effect on the changes in income per capita in the region where there is no oil extracted. However, for the oil producing regions this effect is indeed statistically significant (5.50). The drawback of such regression can be that the increase of income in those areas can be only in the income level of some of people working for oil companies (e.g. management of those companies) and it does not have such an impact on this of simple workers in the same companies. Consequently, it cannot be inferred that increase in oil revenues has positive effect on all people living in the region and at the same time decrease in those revenues does not worsen situation for all people in the region. It brings us back to the paper by Black et al. (2005) who stressed out that if in area which is dependent on some resource related industry, there is no “spillover” effect on the rest of the economy of the region if some problems occur in those resource related industries. Effect for oil-producing regions is positive but not very substantial, as it is just 1.43 rubles per one billion increase in the oil revenues.

Moving on to Formula 16 and effect of oil revenues on housing availability, following outcome is obtained:

Table 24 Difference-in-difference regression of housing availability on the oil revenues

						Number of obs = 236
						F (2, 233) = 4.58
						Prob > F = 0.0112
						R-squared = 0.0239
						Root MSE = 4.2297
Housing availability	Coefficient	Robust Std. Err.	t-stat	P > t	[95% Confidence Interval]	
Oil output	0.0003	0.0003	1.09	0.276	-0.0002	0.0009
Interaction	-0.0002	0.0001	-2.90	0.004	-0.0003	-0.0001
Const.	19.4006	2.2314	8.69	0.000	15.0044	23.7969

It is interestingly to emphasize that housing availability is affected by oil revenue changes both from region to region and depending on whether it is oil-rich or oil-poor region. According to difference-in-difference specification, oil revenues do not have significant impact on non oil-producing regions (t-statistics = 1.09) and is indeed significant for oil-producing ones (-2.90). Moreover, it is surprising that 1 000 billion increase in the oil revenues is followed by 2 square meters decrease in housing availability in the region. Possible reason for worsening of housing situation in the region due to increase in oil revenues is the fact that as oil producer is extracting more oil, more people are moving to the region for work.

As it was expected, regional level regressions gave brighter picture of the connection between oil revenues and macroeconomic indicators of interest. On the one hand, they demonstrated more clear than federal level regressions did, that the topic is fruitful. On the other hand, it also proved that there is a lot to be done to get deeper understanding of this connection.

VII. Conclusion

Conclusions

In the media Russia is often claimed to be “resource-based economy” and RTS, one of the main indices which is supposed to show the structure of the Russian economy, has oil and gas industry as its major components (around 54% of the index composition). Another interesting fact is that for some other sector of the economy (e.g. construction) oil and gas industry is also one of the main consumers, which can result in spillover effect of the revenues from oil and gas into others sectors. As it is seen there are a lot of small facts which signal that resources related revenues are thought to be central for the changes in the social-economic situation in Russia and oil is one of the top revenue generating resources.

Hence, the main hypothesis of the thesis is the presence of the effect of oil revenues on the Russian economy and in order to test it, several regressions were applied. On the level of districts differencing regressions of normal logarithms were run and on the regional level, fixed-effect and difference-in-difference ones were estimated. The hypothesis was tested for the following variables: the gross domestic product, the income per capita, the poverty threshold level, the housing availability, the mobile and internet penetration. As the result, there are two conclusions made which are explained in a more details bellow.

First of all, regressions using first differences of normal logarithms of macroeconomic variables on the federal level helped to discover that the impact of the oil revenues on the poverty threshold level is statistically significant, while it showed to be insignificant for other macroeconomic variables.

Consequently, federal level regressions didn't give that much of an insight into the topic of oil dependence of the economy. The reason for such a poor result could be that averaging of the data for all regions could have removed any possible effect, as the territory of the Russian Federation is just so big and all the regions are the different stage and have a number of other drivers moving their economies. It can be very hard maybe even impossible for all of those regions to move up or down at the same time.

Secondly, as results for the regional level data are analyzed it is observed that housing availability level explained by the oil revenues when region fixed-effect is included into regression. Moreover, inclusion of the interaction term providing information on whether the region is oil-producing or non-oil-producing proves that the level of oil revenues is significant for defining the income per capita level and the housing availability but only for the oil-producing regions.

From the research conducted it is not very clear how strong is the influence of the oil revenues' fluctuations on the development of the Russian economy and the improvement in the living standards of

the Russian citizens. However, it indeed lifted the veil and gave a good starting point for the analysis of the dependence of Russia on the oil industry.

Limitations

The main limitation of the paper is definitely data availability of the macroeconomic indicators as information provided by Goskomstat (Federal Statistical Agency or FSA) is not so systematic. It is on annual basis only starting from year 1990 on federal level and only since 2007 on regional one, which provides us with very few estimation points and worsens the quality of regressions. Another issue was that regional data extracted from RSA's site in Excel format had some empty cells or cells where data was mistyped (e.g. comma was missing before decimals) but only for sub-regions. There were two assumptions made. As for empty cells, it was claimed that it was equal the value in the previous year and for mistyped values comma was put in the place making the value reasonable given values for the same sub-region in the other years. Probably, it had some effect on the results but they assumed to be minor and ignored.

Further research

From the author's point of view, the results of the thesis could become the beginning of the research on Russia's dependence on resources and there are some directions in which future researchers can continue the analysis of the topic.

First of all, more data is coming which will let researchers make analysis more sound. It will also let them make more manipulations with data to make conclusions on presence or absence of a causal link. For instance, having more time periods of data gives an opportunity to estimate regressions with lag, because the effect from oil revenues' fluctuations can occur not the same year as fluctuations themselves but with one, two or even more years of lag. Other direction is to identify other macroeconomic indicators which can reflect development in the Russian economy. In fact FSA give access to quite a big pile of different types of data on the regional level. However, it is quite time-consuming to pinpoint those which can witness the improvement in the Russian living standards and it also takes quite some time to collect it as it requires a lot of manual work.

Apart from those two directions, it can also be interesting to test the aggregate impact of different resources (not only oil) on Russian economy, as long as such resources as gas or steel probably have some effect as well. Interesting hypothesis could also be if the resource (or oil) producing regions make more and more people move there if people themselves see these regions as attractive and comfortable for living. Moreover, if resource (oil) abundance improved demographic situation in the region or not, which can also serve as the indicator of the improvement in the living standards as people usually have more

children when they feel confident about their future, e.g. about stability of their income in future. One more uncovered direction is political perspective, meaning that there were quite a lot of papers devoted to the topic of how resource revenues are linked to the political situation in other countries. Similar research can be performed for Russia based on the tools provided by previous research.

Overall, the results of this research are very important in terms of understanding what affect the landscape of Russian economy. It can be useful for people willing to start investing in Russian market or companies thinking of entering Russia. This research also can trigger the further research on the connection between Russian economy and resource revenues. As currently people hear most of thoughts about it from mass media and this paper can be a good starting point for more formal interpretation of the topic based on empirical evidence. It would also be very good if academic research is conducted in cooperation with industry specialists to get the whole picture. This comment is made because there are indeed some industry specialists already investigating the effect of the oil industry on other industries (e.g. research by IT industry consultant IDC which found connection between oil and IT industries).

VIII. Reference

Literature

Aragon, Rud (2011), “Natural Resources and Local Communities: Evidence from a Peruvian Gold Mine”, <http://www.sfu.ca/~faragons/files/mining.pdf>

Aris, Kranchenko (2012) Russia XXL, Business New Europe, March

Auty, Richard M. (2001) “Resource Abundance and Economic Development” Oxford University Press

Black, Dan, Terra McKinnish, and Seth Sanders (2005) “The Economic Impact of the Coal Boom and Bust” *Economic Journal*, April 2005, 115 (503), 449-476

Boschini, Anne, Petersson, Jan, Roine, Jesper (2007) “Resource Curse or Not: a question of appropriability” *Scandinavian Journal of Economics* 109(3), 593–617

Caselli, Michaels (2011) “Do oil windfalls improve living standards. Evidence from Brazil”, <http://personal.lse.ac.uk/casellif/papers/brazil.pdf>

Caselli, Michaels (2011) “Appendix for: Do oil windfalls improve living standards. Evidence from Brazil”, <http://personal.lse.ac.uk/casellif/papers/Brazil%20Appendix.pdf>

C. J. Dalgaard, O. Olsson (2008) “Windfall Gains, Political Economy and Economic Development”, *Journal of African Economies*, vol. 17, pp. i72 - i109

Davis, Joseph H. and Aliaga-Diaz, Roger A 2008 “Oil, the Economy, and the Stock Market”, <http://dx.doi.org/10.2139/ssrn.1136524>

Energetics and Industry of Russia, <http://www.eprussia.ru/epr/35/2371.htm>

Ewert J. and Hult E. 2006 “The Impact of Oil Price Fluctuations on Stock Prices - Evidence from three Asian Countries” <http://arc.hhs.se/download.aspx?MediumId=150>

Gelb A. (1988) “Windfall Gains: Blessing or Curse?”, Oxford: Oxford University Press

Gylfason, T., Herbertsson, T. T. and Zoega, G. (1999) “A mixed blessing: natural resources and economic growth”, *Macroeconomic Dynamics*, vol. 3, pp. 204–25

Krugman, P. (1987) “The narrow moving band, the Dutch disease, and the competitive consequences of Mrs. Thatcher: notes on trade in the presence of dynamic scale economies”, *Journal of Development Economics*, vol. 27, pp. 41–55

Lei, Michaels (2011) “Do Giant Oilfield Discoveries Fuel Internal Armed Conflicts”, http://personal.lse.ac.uk/michaels/Li_Michaels_Oil_conflict.pdf

Michaels, Guy (2011) "The Long Term Consequences of Resource-Based Specialisation" Technical Report 551

Mehlum, H., Moene, K.O., and Torvik, R. (2006) "Institutions and the Resource Curse" The Economic Journal 116(508): pp.1–20

Ministry of Energy 04.09.2011 http://minenergo.gov.ru/activity/day_of_the_miner/8617.html

Monteiro, J. and Ferraz, C. (2010) "Does Oil Make Leaders Unaccountable? Evidence from Brazil's off shore oil boom" unpublished, PUC-Rio

RIA Novosti 22.02.2012 http://ria.ru/research_comments/20120222/572192208.html

Robinson, J. A., Torvik, R. and Verdier, T. (2002) "Political foundations of the resource curse", CEPR Discussion Paper No. 3422

Ross, M. L. (2001b) "Does oil hinder democracy?" World Politics, vol. 53, pp. 325–61

Sachs, Jeffrey D. and Andrew M. Warner (1999) "The Big Push, Natural Resource Booms and Growth" Journal of Development Economics, June 1999, 59 (1)

Sachs, J. D. and Warner, A. M. (2001), "The curse of natural resources", European Economic Review, vol. 45, pp. 827–38

Torvik, R. (2001) "Learning by doing and the Dutch disease", European Economic Review, vol. 45, pp. 285–306

Torvik, R. (2002) "Natural resources, rent seeking and welfare", Journal of Development Economics, vol. 67, pp. 455–70

van Wijnbergen, S. (1984) "The "Dutch disease": a disease after all?", Economic Journal, 1984, vol. 94, pp. 41–55

Data

Wikipedia, "List of main oilfields located in Russian Federation" http://ru.wikipedia.org/wiki/%D0%A1%D0%BF%D0%B8%D1%81%D0%BE%D0%BA_%D0%BD%D0%B5%D1%84%D1%82%D1%8F%D0%BD%D1%8B%D1%85_%D0%BC%D0%B5%D1%81%D1%82%D0%BE%D1%80%D0%BE%D0%B6%D0%B4%D0%B5%D0%BD%D0%B8%D0%B9_%D0%A0%D0%BE%D1%81%D1%81%D0%B8%D0%B8

Federal districts of Russian Federation, http://en.wikipedia.org/wiki/Federal_districts_of_Russia

Russian Statistic Agency, <http://www.gks.ru>

U.S. Energy Information and Administration, http://www.eia.gov/dnav/pet/pet_pri_spt_s1_d.htm

Bank of Russia, <http://www.cbr.ru/eng/daily.aspx>

The World Bank Group, www.worldbank.org/

CIA World Factbook, <https://www.cia.gov/library/publications/the-world-factbook/index.html>

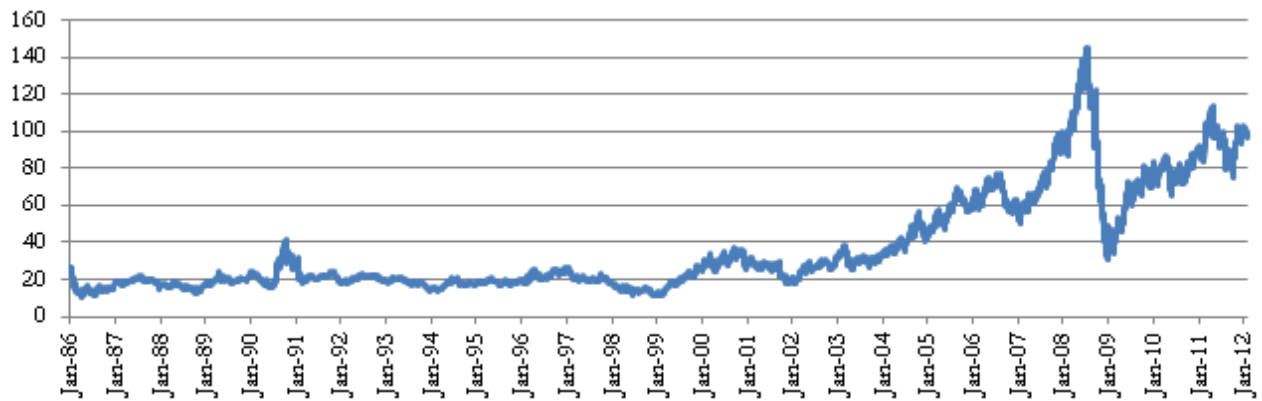
Equity research

Troika Dialog “IBS – Strong Value and Growth story”, July 28, 2011 p.5 (reference to IT industry consultant IDC)

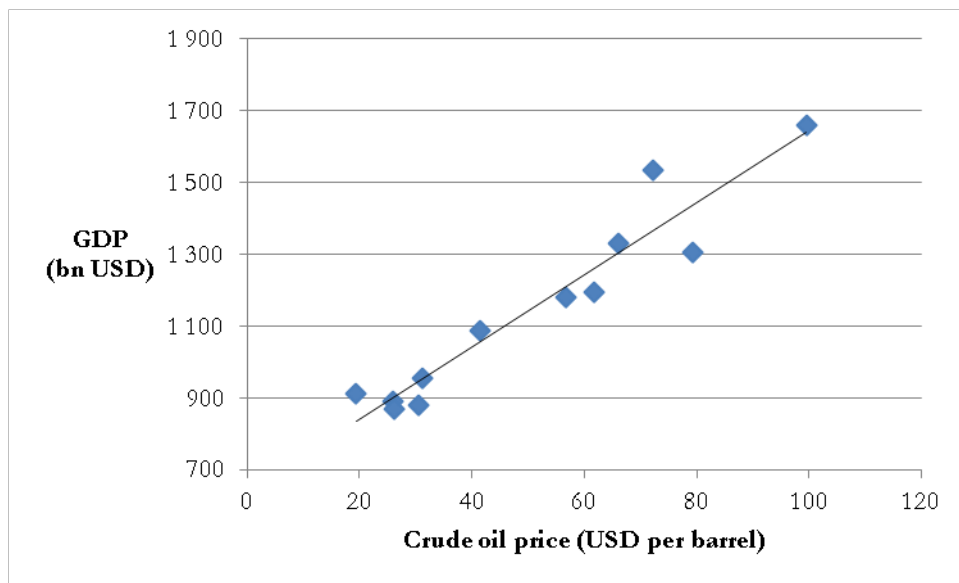
Goldman Sachs “Russian Infrastructure and Construction. Part I. Key beneficiaries to own”, May 9, 2012

IX. Appendix

Picture 1 Crude oil price development in 1986-2012, WTI (dollars per barrel)



Picture 2 Crude oil price versus GDP 1999-2010



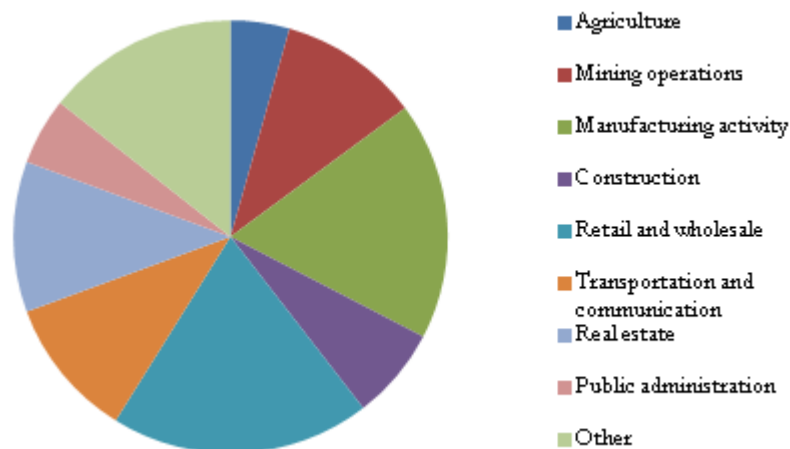
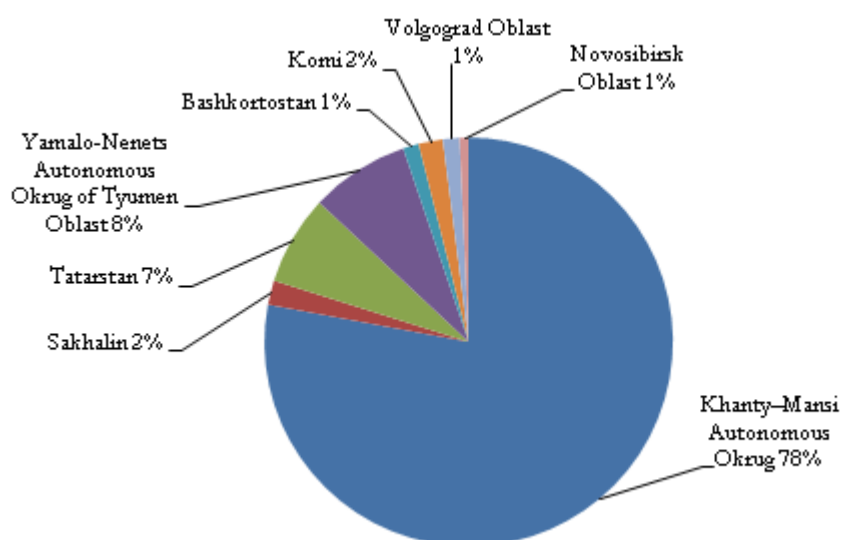


Table 1 List of biggest Russian oilfields

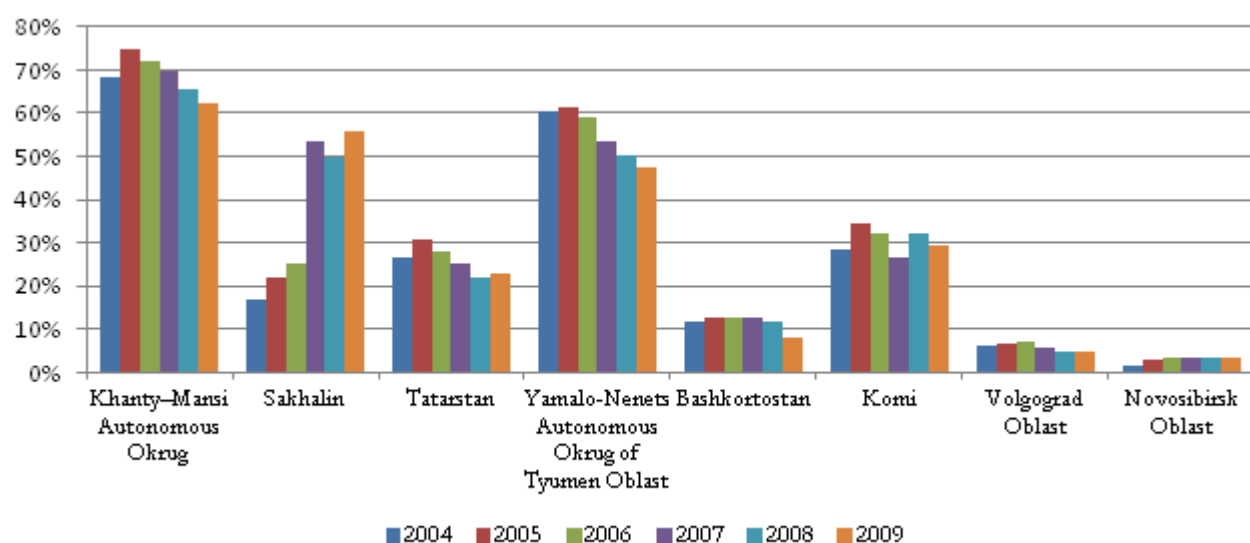
Deposit	Proven resources, mln. tones	Remaining resources, mln. tones	Extraction tsn. tones / day	Region
Samotlorskoe	3200	1000 (2004)	120	Khanty–Mansi Autonomous Okrug
Romashkinskoe	2700	400 (2004)	37	Republic of Tatarstan
Priobskoe	2000	1700 (2005)	64	Khanty–Mansi Autonomous Okrug
Lyantorskoe	2000	380 (2004)	26	Khanty–Mansi Autonomous Okrug
Fyodorovskoe	1800		34,2	Khanty–Mansi Autonomous Okrug
Salim group (incl. Pravdinskoe, Salimskoe, Severnoe, Verkhnee, Zapadnoe, Vadelipskoe)	1800		24,7	Khanty–Mansi Autonomous Okrug
Urengoykskoe (oil and gas)	more than 1500		27	Yamalo-Nenets Autonomous Okrug of Tyumen Oblast
Mamontovskoe	1300		20,5	Khanty–Mansi Autonomous Okrug
Tuymazinskoe	480		2,5	Republic of Bashkortostan
Vat-Eganskoe	325	180 (2005)	22,5	Khanty–Mansi Autonomous Okrug
Povkhovskoe	270	105 (2005)	16	Khanty–Mansi Autonomous Okrug
Tevlinsko-Russkinskoe	250	140 (2005)	31	Khanty–Mansi Autonomous Okrug
Usinskoe	236	80 (2005)	5,8	Republic of Komi
Yuzhno-Yagunskoe	222	104 (2005)	12	Khanty–Mansi Autonomous Okrug

Pokachevskoe	185	50 (2005)	9,3	Khanty–Mansi Autonomous Okrug
Sakhalin - 2	182		10	Sakhalin
Kharyaginskoe	160	130 (2005)	7,5	Yamalo-Nenets Autonomous Okrug of Tyumen Oblast
Yaregskoe	130		1,3	Republic of Komi
Vozeyskoe	127	30 (2005)	2,9	Republic of Komi
Urevskoe	119	42 (2005)	5,3	Khanty–Mansi Autonomous Okrug
Talakanskoe	105		4	Republic of Bashkortostan
Severo-Pokachevskoe	76		2,4	Khanty–Mansi Autonomous Okrug
Nivagalskoe	61	45 (2005)	3,5	Khanty–Mansi Autonomous Okrug
Nong-Eganskoe	57	28 (2005)	4,2	Khanty–Mansi Autonomous Okrug
Kogalimskoe	53	30 (2005)	6,7	Khanty–Mansi Autonomous Okrug
Pamyatno-Sasovskoe	52	23 (2005)	6,9	Volgograd Region
Zapadno-Malobalitskoe	35		4,1	Khanty–Mansi Autonomous Okrug
Verkh-Tarskoe	32		3,7	Novosibirsk Region
Yuzhno-Shapkinskoe	23	20 (2005)	4,1	Yamalo-Nenets Autonomous Okrug of Tyumen Region
Tedinskoe	16	14 (2005)	2,4	Yamalo-Nenets Autonomous Okrug of Tyumen Region

Picture 4 Share of oil extracted by region (in accordance with Table 1)



Picture 5 Structure of GDP in regions where the biggest Russian oilfields are located



Picture 6 Effect of oil abundance on the wealth of the region

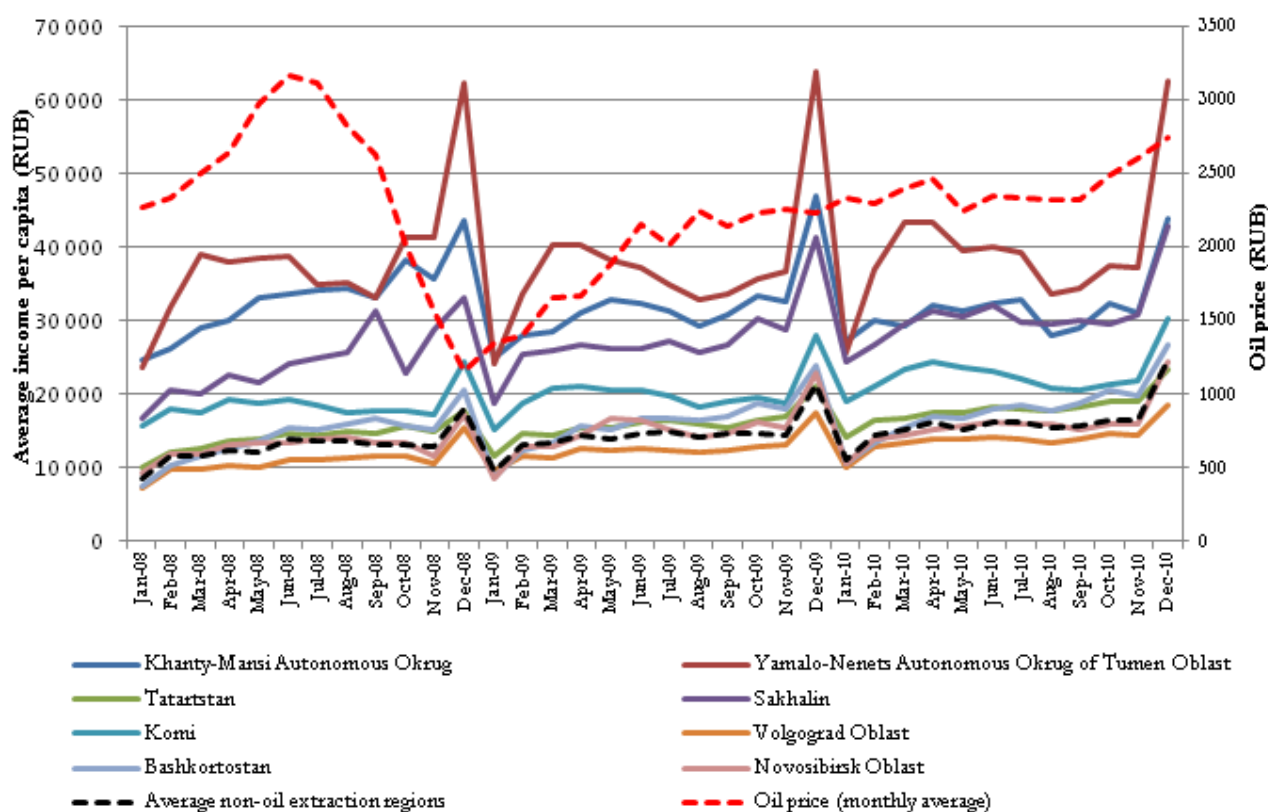


Table 4 Gross domestic product - augmented Dicker-Fuller test for unit-root

Number of observations = 15				
Interpolated Dicker-Fuller				
	Test statistics	1% critical value	5% critical value	10% critical value
Z (t)	0.120	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 0.9674				

Table 5 Income per capita - augmented Dicker-Fuller test for unit-root

Number of observations = 20				
Interpolated Dicker-Fuller				
	Test statistics	1% critical value	5% critical value	10% critical value
Z (t)	8.611	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 1.0000				

Table 6 Poverty threshold - augmented Dicker-Fuller test for unit-root

Number of observations = 18				
Interpolated Dicker-Fuller				
	Test statistics	1% critical value	5% critical value	10% critical value
Z (t)	5.701	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 1.0000				

Table 7 Housing availability - augmented Dicker-Fuller test for unit-root

Number of observations = 20				
Interpolated Dicker-Fuller				
	Test statistics	1% critical value	5% critical value	10% critical value
Z (t)	0.710	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 0.9900				

Table 8 Mobile users per 100 inhabitants - augmented Dicker-Fuller test for unit-root

Number of observations = 19				
Interpolated Dicker-Fuller				
	Test statistics	1% critical value	5% critical value	10% critical value
Z (t)	2.741	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 1.0000				

Table 9 Internet users per 100 inhabitants - augmented Dicker-Fuller test for unit-root

Number of observations = 18				
Interpolated Dicker-Fuller				
	Test statistics	1% critical value	5% critical value	10% critical value
Z (t)	3.937	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 1.0000				

Table 10 Changes in normal logarithm of gross domestic product - augmented Dicker-Fuller test for unit-root

Number of observations = 14				
Interpolated Dicker-Fuller				
	Test statistics	1% critical value	5% critical value	10% critical value
Z (t)	-3.105	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 0.0262				

Table 11 Changes in normal logarithm of income per capita - augmented Dicker-Fuller test for unit-root

Number of observations = 19				
Interpolated Dicker-Fuller				
	Test statistics	1% critical value	5% critical value	10% critical value
Z (t)	-1.349	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 0.6065				

Table 12 Changes in normal logarithm of poverty threshold - augmented Dicker-Fuller test for unit-root

Number of observations = 17				
Interpolated Dicker-Fuller				
	Test statistics	1% critical value	5% critical value	10% critical value
Z (t)	-6.477	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 0.0000				

Table 13 Changes in normal logarithm of housing availability - augmented Dicker-Fuller test for unit-root

Number of observations = 19				
Interpolated Dicker-Fuller				
	Test statistics	1% critical value	5% critical value	10% critical value
Z (t)	-4.738	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 0.0001				

Table 14 Changes in normal logarithm of mobile users - augmented Dicker-Fuller test for unit-root

Number of observations = 18				
Interpolated Dicker-Fuller				
	Test statistics	1% critical value	5% critical value	10% critical value
Z (t)	-6.517	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 0.0000				

Table 15 Changes in normal logarithm of internet users - augmented Dicker-Fuller test for unit-root

Number of observations = 17				
Interpolated Dicker-Fuller				
	Test statistics	1% critical value	5% critical value	10% critical value
Z (t)	-8.590	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 0.0000				