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## Article

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## Oil and Gas Budget Revenues in Russia after Crisis in 2015

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### ABSTRACT

The paper propose the energy market crisis impact on the Russian budget revenues in 2015. We develop the model to forecast the impact of oil prices on budget revenues in Russia. The practical significance of this work lies in the structuring of existing knowledge on oil crisis impact on the Russian budget. Brent crude oil prices were in the range of 115-79 dollars per barrel in 2014. The cyclical strengthening of US dollar and political factors have led to an increase in supply in the oil market by >20%. In 2015, we saw a decline in oil prices below \$ 40 per barrel. The strengthening of the United States dollar was a major factor in the decline, as it was in the middle of 2001, when the price fell by about a one third before starting a long-term sharp increase.

**Keywords:** Oil Price Forecasting, Budget Revenues, Oil and Gas Impact

**JEL Classifications:** E37, F20, G15

### 1. INTRODUCTION

A significant part of the Federal budget revenues are revenues from taxes and duties collected from oil and gas companies. Revenues depend on the dynamics of asset prices in commodity markets.

In 2014, there was a sharp devaluation of the national currency, which peaked in December and began to have a positive effect on the current balance of payments of Russia.

In order to assess Federal budget revenues, we need to understand how the volume of ruble-denominated tax revenues from the oil and gas sector has changed. If we compare the depth of the fall of the ruble against the depth of the fall in the price of oil brand jurals, it is clear that the rate of decline of the ruble ahead of the rate of fall of oil prices (Figure 1).

Figure 2 shows that the ruble export price of Urals oil even increased compared to 2014, that is, the ruble tax base for income should not suffer much as a result of such sharp changes in asset prices.

But taking into account that the rates of duties and taxes largely depend on the dollar value of exported oil, the Federal budget revenues should be significantly reduced compared to the forecast values of the previous year.

In addition, a sharp change in the situation of commodity markets can lead to a decrease in exports of petroleum products and gas to countries from Russia.

So far this has not been observed. On the contrary, following the results of 2014, oil supplies from Russia to European countries remained unchanged, and to Asian countries - 41 million tons increased to 51 million tons.

In addition, it should be borne in mind that an increase in the share of oil and gas revenues in the budget will automatically increase the dependence of the budget on the oil market and increase the risks of budget policy. Therefore, the task of the Russian Government is to maintain stability with a gradual decrease in this share.

Presumably, it is the stability of the physical volumes of Russian oil and gas exports that will be the main factor influencing budget revenues. Both an increase in exports and a sharp decline may pose risks to Russia's fiscal policy (Table 1).

In accordance with the budget for 2015, the total budget revenues are planned at the level of 14564 bln. Russian rubles, of which a significant share (46.8%) are oil and gas revenues - 6818 bln. Russian rubles.

## 2. LITERATURE REVIEW

Oil prices has been steadily decreasing since 2014. Oil consumption in other countries is growing, but not as fast as previously thought. In developing countries, primarily in China, increasing the efficiency of oil. But given the higher rate of economic growth this group of countries, the total consumption of oil is increasing (Engemann et al., 2011; Nyangarika et al., 2018).

Changes in demand in the energy market determined the rate of extraction of fossil fuel in OPEC and outside of it. Many researchers

found a negative impact of oil prices on the real economy (Estrella, 1998; Hamilton, 1983). This sharp change in oil prices has a significant impact on budget returns in Russia, Norway, Canada, USA, OPEC countries and many others (Mikhaylov, 2018b; Hamilton, 1996).

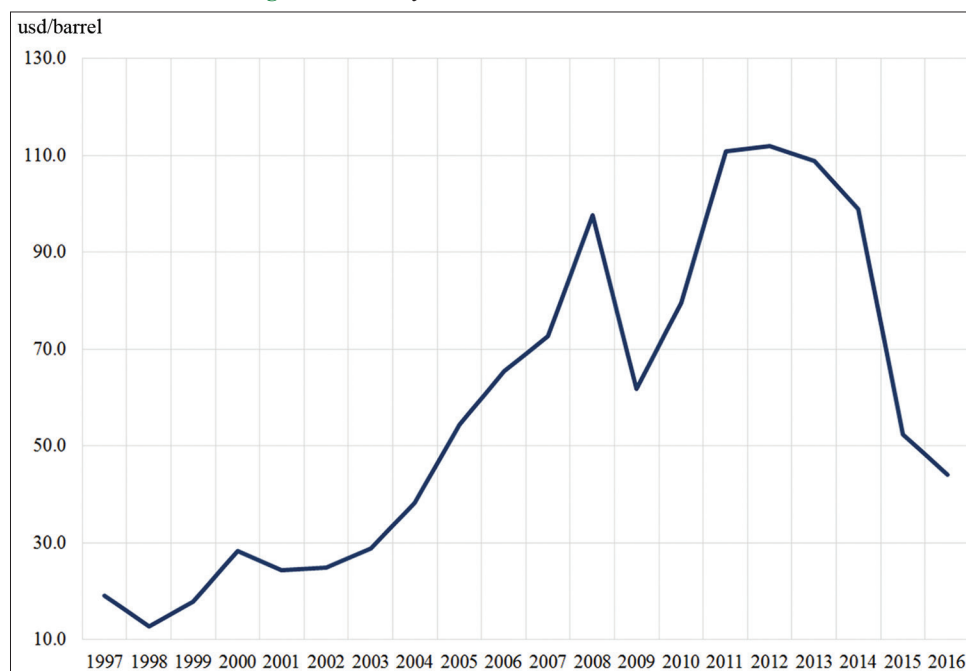
In addition, we investigated the effect of oil prices on budget revenues in oil exporting countries and it was found that positive shocks in oil prices negatively affect federal budget returns (Mikhaylov et al., 2018; Hamilton, 2011).

A few years ago we studied the impact of oil crisis on the budget revenues because the economy enters into a recession. However, the total predictability of budget returns and the predictive power of changes in oil and gas revenues varied significantly between countries (Mikhaylov, 2018a; Jiménez-Rodríguez, 2015).

## 3. METHODS

In this paper we believe that the Russian budget revenues depend on five major factors:

**Figure 1:** Price dynamics of Brent oil in 1997-2016



Source: Compiled according to the World Bank. Electronic resource <http://www.worldbank.org/en/research/commodity-markets>

**Table 1: Forecast structure of budget revenues**

Indicator	2014	2015	2016	2017
Revenues, total	14,238.8	14,564.9	15,905.7	16,272.7
Percentage of GDP	19.9	18.3	18.3	18.1
Oil and gas revenues	7480.2	6818.6	6843.1	7590.9
Percentage of GDP	10.5	8.6	7.9	8.4
Nonoil and gas revenues	6758.6	7746.3	9062.6	8681.8
Percentage of GDP	9.5	9.7	10.4	9.7
Share of total income (%)				
Oil and gas revenues	52.5	46.8	43.0	46.6
Nonoil and gas revenues	47.5	53.2	57.0	53.4
Income growth rate in nominal terms compared to the previous year (%)	109.4	102.3	109.2	105.0

Source: Ministry of Finance of the Russian Federation. GDP: Gross domestic product

1. The US dollar against the Russian ruble.
2. The price of oil in US dollars.
3. Oil production volume.
4. The volume of oil exports.
5. Export duties and mineral extraction tax.

The changes in the factors listed above determine the changes in revenues from gas production and exports (Kilian and Park, 2009; Leung et al., 2000). We will use the following formula to estimate the change in oil and gas revenues compared to the forecast values:

$$\delta D = a \sum D_o + b \sum D_g - \sum D_b \quad (1)$$

Where is the change in revenues compared to budget 2015, a - correction factor for oil revenues, - the amount of planned revenues from the production and export of petroleum products in 2015, b - correction factor for gas revenues, - the amount of planned oil and gas revenues in 2015, Db - the amount of oil and gas revenues, which is equal to  $\Phi(D_o + D_g)$ .

Thus, the problem boils down to finding correction factors a and b on the basis of the above-mentioned factors of influence on revenues from the production and sale of petroleum products and gas. The formula for calculating the correction factor a is as follows:

$$a = \frac{\sum R_n * P_n * S_n * E_n * T_n}{12}$$

$$n = [1 \dots 12] \quad (2)$$

Where R is the coefficient of change in the average monthly exchange rate of the us dollar to the Russian ruble, P is the

coefficient of change in the average monthly prices of Urals oil, E is the coefficient of change in the average monthly volumes of oil exports, S is the coefficient of change in the average monthly oil production, T is the coefficient of change in the average monthly tax rates, n is the number of months.

Since the factor of the export duty on oil has a significant weight in the structure of oil and gas revenues of the Federal budget.

$$\sum S_n * T_n = \sum \left[ \frac{M_n + 2}{3} \right] \quad (3)$$

Where M is the coefficient of change of export duty on oil products.

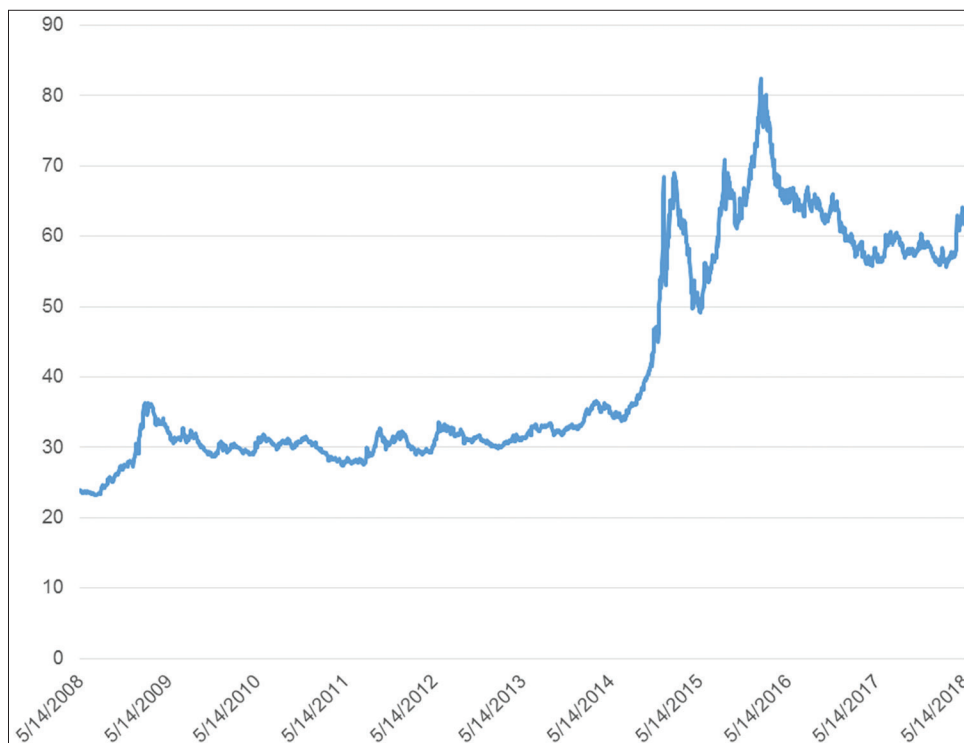
$$a = \frac{\sum (R_n * P_n * E_n * \frac{M_n + 2}{3})}{12}$$

$$n = [1 \dots 12] \quad (4)$$

Gas prices are strongly correlated with oil prices. Most long-term contracts of Russian gas exporters imply that gas export prices are directly dependent on natural gas stock prices with a time lag of about 6-9 months. While European and Asian exporters (Norway, Netherlands, Qatar) sell gas mainly at stock quotes (Kauppi and Saikkonen, 2008; Kilian, 2009).

This means that until June-September 2015 Russian exporters will sell gas at inflated dollar prices, which will allow them to receive super profits when converting foreign exchange earnings into rubles.

**Figure 2:** Prices for oil grade Urals blend and the ruble exchange rate to the US dollar in 2014-2015



Source: Central Bank of Russia, Thomson Reuters

It is quite logical that in the conditions of sharp decrease of exchange gas prices it becomes more profitable for consumers to buy gas from those exporters with whom contracts on the basis of exchange quotations are concluded.

According to Gazprom, physical volumes of gas exports decreased by 25% in January 2015, which proves the effect of substitution of Russian exporters.

In the process of leveling the exchange and contract gas prices that Russia uses in its calculations, various elements of the strategy of behavior of gas importing countries from the European Union are possible:

1. The maximum replacement of gas purchases at contract prices and the use of own gas reserves from storage approximately until July this year.
2. Filling of storages since July of the current year at the expense of Russian gas or deliveries from other sources. Since Russian gas is likely to become cheaper at this time, the average monthly import growth may be 25% compared to the same months in 2014.
3. If the EU's political interests will prevail over economic interests, the decline in annual gas exports will be more significant.

In our opinion, the scenario of maintaining the average monthly export volumes up to July 2015 at the levels of January 2015 should be considered. After that, importers are expected to increase the volume of gas purchases again to the average monthly levels of the previous year (Jones and Kaul, 2008; Nyangarika et al., 2019a).

Taking into account the peculiarities of taxation of gas revenues (rates of export duties and taxes on gas production are not significantly affected by the dynamics of exchange gas prices), the formula for calculating the coefficient  $b$  is as follows:

$$b = \frac{\sum R_n * P_{n-6} * N_p}{12}$$

$$n = [1 \dots 12] \quad (5)$$

Where  $R$  is the coefficient of change in the average monthly exchange rate of the us dollar to the Russian ruble,  $P$  is the coefficient of change in the average monthly prices for URALS oil price,  $N$  is the coefficient of change in the average monthly volumes of gas exports,  $n$  is the number of months (Du and He, 2015).

## 4. RESULTS

To use the above model, we will use data from the economic development Ministry forecast for 2015. Table 2 provides the initial data for modelling.

When modeling oil revenues we assume the following assumptions:

1. The adjusted price for Urals oil from March to December 2015 is \$ 50 per barrel.
2. The adjusted U.S. dollar from March to December 2015 - 65 rubles per dollar.
3. The coefficient of change in the volume of oil exports in January 2015 (compared to January 2014) was 1.063.
4. The coefficient of change in the volume of oil exports for February 2015-December 2015 (compared with February 2014-December 2014) is equal 1.
5. The rate of change in export duty on petroleum products is calculated on the basis of data compared to the level set out in the budget for 2015.
6. The coefficient of change in the volume of gas exports in January 2015 (compared to January 2014) was 0.75.
7. The coefficient of change in the volume of gas exports for February - June 2015 (compared to February 2014-June 2014) is 0.75; for July - December 2015 (compared to July-December 2014) is 1.

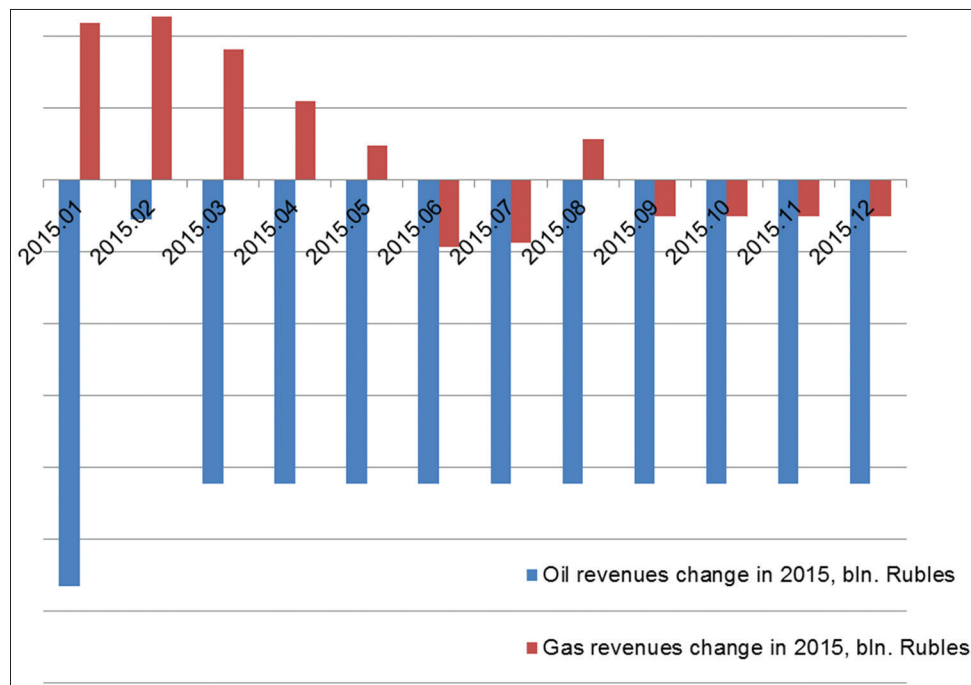
In accordance with the main directions of the budget policy of the Russian Ministry of Finance the budget for 2015 includes the following forecast values:

1. Average annual price for Urals oil is 96 dollars per barrel.
2. Average rate of the dollar to 37 rubles to US dollar.
3. Oil and gas revenues at the level of 6818 bln. Russian rubles. Taking into account the preservation of structural proportions, revenues from the production and export of petroleum products were projected at 5420 bln. Russian rubles

**Table 2: Main factors influencing the oil revenues of the budget**

Year	Month	Average monthly USDRUR rate	Average monthly price of Urals oil	Exports from Russia, thousands tons	Export duty rate
2014	1	33.46	107.20	18,106.90	401.00
2014	2	35.22	107.99	15,522.30	386.30
2014	3	36.21	106.88	18,982.10	384.40
2014	4	35.66	107.08	21,104.60	387.00
2014	5	34.93	107.84	19,127.60	376.10
2014	6	34.41	109.65	16,907.20	385.00
2014	7	34.64	105.64	21,414.60	385.20
2014	8	36.11	101.30	18029.60	388.40
2014	9	37.87	95.67	17,204.50	367.60
2014	10	40.76	86.63	20,572.80	344.70
2014	11	45.86	78.97	17,658.90	316.70
2014	12	55.41	61.28	18,784.30	277.50
2015	1	61.70	46.54	19,247.63	170.20

Source: US EIA, Ministry of energy of Russia, Moscow exchange. EIA: Energy Information Administration, USDRUR: US dollar Russian rubles

**Figure 3:** Revenues change in 2015, bln. Russian rubles

Source: US Energy Information Administration, Ministry of energy of Russia, Moscow exchange

and revenues from gas production and export - at 1398 bln. Russian rubles (Figure 3).

We receive the amount of Federal budget losses in 2015 from the export and production of oil products in the amount of 967 bln. Russian rubles and the positive effect of gas exports in the amount of 94 bln. Russian rubles, which indicates the positive impact of the current situation on the revenues from gas production and export in 2015. Taking into account the lag described above, the negative impact on budget revenues in the decline in gas prices will take place mainly in 2016.

At the same time, the most significant risk of budget revenues declining, taking into account the EU policy aimed at reducing dependence on Russian exports, is the factor of reduction in the volume of Russian oil and gas exports by the European Union.

In accordance with the described model, under current assumptions and factors of influence, we receive a reduction in Federal budget revenues by 874 bln. Russian rubles. Since the Federal budget for 2015 includes a forecast for oil and gas revenues at the level of 6818 bln. Russian rubles, the decline will not exceed 13% of all oil and gas revenues, which will change the income structure and can benefit the Russian economy in the future.

## 5. CONCLUSION

Modeling of budget revenue shortfalls in 2015 confirmed the strong dependence of oil and gas revenues of the budget system on asset prices in commodity markets. At the same time, our calculations show that this year revenues from gas production and exports may even increase due to the peculiarities of long-term contracts concluded by Russian exporters. While the Russian ruble

revenues from oil production and exports will negate the positive impact and lead to a total reduction of Federal budget revenues by 874 bln. Russian rubles, which will be no more than 6.5% of all projected revenues of the Federal budget (Mork, 1989; Mork et al., 1994).

Thus, the share of oil and gas revenues in the budget structure may decrease from 46.8% to 40.3% of all revenues. Given the unstable conditions in the commodity markets, this has a positive impact on the strengthening of the stability of budget revenues in the future (Nandha and Faff, 2008; Narayan and Sharma, 2011).

In recent years, issues of reducing the dependence of the Russian economy on exports of raw materials have often been discussed. Taking into account the peculiarities of Russia's institutional development, it is the crisis that can be an appropriate moment for restructuring the economy towards increasing the share of innovative goods and technologies in the structure of production and exports (Driesprong et al., 2008; Nyangarika et al., 2019b).

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