Forecast of profits from oil production in Russia with regional features of the natural resource base

I V Filimonova¹, ², A V Komorova¹, ², V Y Nemov¹, ², M V Mishenin¹, ² and V A Kazanenkov¹, ²
¹Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of Russian Academy of Sciences, Koptyug ave., 3, Novosibirsk, 630090, Russia
²Novosibirsk State University, 2 Pirogova str., Novosibirsk, 630090, Russia
E-mail: FilimonovaIV@list.ru

Abstract. One of the main difficulties in the formation and increase of revenues from hydrocarbon resources is the deterioration of the quality of the mineral resource base and changes in the geography of production. One can observe an increase in the depletion and water content of the fields, an increase in the proportion of highly viscous and high-sulfur oil; the share of stocks in hard-to-reach and infrastructural underdeveloped regions is growing. One of the tools for encouraging subsoil users to develop such resources is to ensure lower rates of deductions to state bodies. The study presents an improved methodological approach to estimating and forecasting state budget revenues from hydrocarbon resources. The main stages of development are investigated and the main trends of the system of tax deductions from oil production are revealed. Explained the use of an approach focused on the forecast of production indicators of production, taking into account the structure of the mineral resource base. The calculations showed the need to reform the system of formation of government revenues from hydrocarbon resources. In the structure of government revenues from hydrocarbon resources, there is a tendency to increase the role of the mineral extraction tax in comparison with the export duty.

1. Introduction
One of the main difficulties in the formation and increase of revenues from hydrocarbon resources is the deterioration of the quality of the mineral resource base and changes in the geography of production. One can observe an increase in the depletion and water content of the fields, an increase in the proportion of highly viscous and high-sulfur oil; the share of stocks in hard-to-reach and infrastructural underdeveloped regions is growing. One of the tools for encouraging subsoil users to develop such resources is to ensure lower rates of deductions to state bodies.

The reform in the area of seizure of revenues from hydrocarbon resources carried out by the state in recent years confirms the relevance of the study. The main items of state budget revenues are the tax on mining and export duties on hydrocarbon resources and their products. Revenues from the oil industry significantly exceed revenues from gas resources, while in recent years there has been an increase in the role of the mineral extraction tax compared to export duties. However, in some cases, there is a point or manual control of the deduction system, which does not contribute to creating a long-term basis for the stable growth of the country, and may also contribute to the irrational consumption of resources.
Thus, at present there is a need for an integrated approach to estimating and forecasting future state revenues from the development of hydrocarbon resources by subsoil users. The results will help to identify the main trends in the dynamics of income, as well as to analyze the degree and direction of the influence of the main factors.

The main purpose of this study is to improve the methodological approach to forecasting revenues from the extraction of hydrocarbon resources in Russia.

The following researchers were engaged in general issues of the development and management of the oil and gas industry, as well as studying the role of hydrocarbon resources in the Russian economy: A.A. Arbatov, V.I. Epiphany, A.N. Dmitrievsky, V.V. Elgin, A.B. Zolotukhin, A.A. Ilinsky, A.A. Konoplyanik, A.G. Korzhubaev, O.S. Krasnov, V.A. Kryukov, F.D. Larichkin, A.M. Mastepanov, A.S. Nekrasov, N.I. Plyaskina, L.V. Eder and the others [1-3].

Questions of modeling and forecasting indicators of hydrocarbon resource extraction were reflected in the research of the following scientists: L.M. Burshtein, A.I. Varlamov, A.E. Kontorovich, V.R. Livshits, G.M. Mkrtchyan, V.N. Samples and the others [4-7].

2. Methods of research

In this study, the authors analyze the level of hydrocarbon resource extraction of individual production areas and the country as a whole. Thus, the authors use the type of “bottom-up” models, taking into account production at individual oil-producing facilities. However, it is necessary to take into account the effectiveness of the approaches that model in detail the behavior of fluids in the reservoir, and the analysis of dip curves over short-term periods. That’s why authors have chosen an approach to the aggregate assessment of reserves and resources of deposits.

The main purpose of the development of tools is obtaining a quantitative assessment of future budget revenues and assess the degree of influence of the main factors. A distinctive feature of the proposed methodological approach is the assessment and forecast for public administration purposes. Thus, the system of stimulation and regulation of hydrocarbon production is considered by the authors from the point of view of a long-term base for income. The authors suggest that government measures should support the oil and gas complex as one of the key sectors of the country, which is reflected in stable production indicators. Thus, the system of income deductions must offset the influence of highly volatile market factors for the formation of stable deductions to the budget.

The object of assessment is hydrocarbon resources with differentiation by production areas, special attention is paid to the inclusion of the structural elements of the resource base, reflecting the quality and mining and geological features in combination with the features of the subsoil management policy.

For forecasting and economic evaluation of income from the extraction of hydrocarbon resources, the following algorithm has been proposed, consisting of four stages.

Stage 1. Prediction of oil production at various levels of subsoil use objects. Production forecast is based on simulation modeling, which is based on the bottom-up method of data aggregation.

Stage 2. Formation of a system of weights for differentiating oil production in resource-extracting territories by types of benefits. The system of weights allows differentiation of oil production of upper and middle levels by types of tax benefits within the framework of the existing legislation on subsoil use. The coefficients were obtained on the basis of a retrospective analysis and an extrapolation method of data on the structure of the raw material base and current oil production in the medium and long term, as well as expertly on the basis of program documents of the Government of the Russian Federation and large oil and gas companies.

Stage 3. Prediction of oil production by types of benefits, taking into account territorial differentiation. The assessment of the dynamics of oil production includes a forecast of oil production at different levels of subsoil use, adjusted for the system of weights for differentiation by types of benefits.

Stage 4. Assessment of state revenues from the extraction of hydrocarbon resources. At this stage, the assessment of total revenues and lost revenue from the extraction of hydrocarbon resources to the
The federal budget is being carried out. The calculation is made by the authors using data on the forecast of oil production of the upper level, as the tax base, and the effective tax rate on mineral extraction.

The following sources became an information base for processing and using statistical information: the Federal State Statistics Service, the Federal Tax Service, the Ministry of Economic Development of Russia, the State Balance of Russia, reference, statistical information and publications on the results of the development of the fuel and energy complex of Russia.

3. Results and discussion

At the first stage of the algorithm for forecasting and estimating income from hydrocarbon resources, the authors made a forecast of oil production in Russia. A distinctive feature of the methodical approach is the including the size of the deposit and the use of appropriate parameters to calculate the dynamics of production depending on the size of reserves.

The total volume of oil production by regions and by Russia will depend on the volume and financing of geological exploration and on the growth of reliable oil reserves in new deposits, which may be in development in the medium term.

In the optimistic version of the forecast, production in the fields in Russia in 2030 can be increased to 50 - 52 million tons, in 2040 - 160 - 165 million tons. The main increase in production at the new deposits will be within the West-Siberian oil deposits, including the left bank of the Krasnoyarsky Kray, where production at new deposits in 2040 can be increased to 65 -70 million tons. In addition, the promising regions for increasing oil production at the deposits predicted for discovery are the Leno-Tunguska province and the shelf of the seas of Russia, where production by 2040 may increase to 60 - 65 million tons (figure 1).

![Figure 1. Forecast of oil production in the Russian Federation by oil and gas provinces in 2020-2040, mln. tons.](image)

The calculations showed that under the assumption of a general increase in production under the optimistic forecast scenario, an increase in total budget revenues will be observed. First of all, the growth of both production and revenues will be at the expense of privileged categories of oil. At the same time, the volume of lost revenue will increase significantly (figure 2). The growth rate of income from hydrocarbon resources will be lower than production rates.

The optimistic scenario is estimated in terms of high oil prices favorable for the development of the industry. However, the increase in prices has a positive effect primarily on preferential categories of
oil due to the fact that prices have a direct effect on the MET charged [7-9]. Thus, for “preferential” oil there will not be a significant increase in costs, therefore, we can expect an increase in the level of production.

![Figure 2. Forecast of revenues received in terms of produced concessional and non-preferential oil and lost incomes, billion rubles.](image)

The forecast showed that using calculations at comparable effective rates, the value of income from categories of oil that are not subject to preferential taxation will increase slightly. At the same time, the budget deficit associated with the use of benefits will increase significantly.

4. Conclusion
In the structure of government revenues from hydrocarbon resources, there is a tendency to increase the role of the mineral extraction tax in comparison with the export duty. When calculating the real future income from hydrocarbon resources, one of the main parameters of the calculation is oil production.

In this work, the authors improved the methodological approach to forecasting revenues from hydrocarbon resources, which, unlike existing ones, takes into account the parameters of the deterioration of the raw material base and the effective rate of deductions, which makes it possible to estimate the amount of not only received, but also under-received incomes. In the optimistic scenario, the increase in oil prices and the increase in production is assumed due to preferential categories of oil, the effect of additional withdrawals of revenues through MET for them is absent. Calculations showed that in this situation, government revenues from hydrocarbon resources, calculated on the basis of constant effective tax rates, will remain at a constant level in terms of oil not subject to preferential taxation. Due to the increase in production, tax deductions for preferential oil will also increase. However, the revenue loss of the state will also increase. In the current situation, it is necessary to reform the current system of forming state allocations in order to switch from manual management of benefits to oil and ensure a steady increase in state revenues.

Acknowledgements
The authors are grateful for financial support to Russian Foundation for Basic Research No. 18-310-20010 and to Grant of the President of the Russian Federation No. MD-1459.2019.6.
References

[1] Azanova E 2012 Business Russia: Industry, Transport, Social Life 8 34–39
[2] Panskov V G 2016 Economy. Taxes. Right 8(5) 130–138
[3] Prischepa O M and Averyanova O Yu 2013 Mineral Resources of Russia. Economics and Management 1 21-24
[4] Filimonova I V, Eder L V and Larionov V G 2016 Problems of Economics and Management of Oil and Gas Complex 6 13–22
[5] Scarf I V 2018 Journal of Economic Theory 15(2) 325–334
[6] Kontorovich A E, Eder L V, Filimonova I V and Nikitenko S M 2018 Regional Research of Russia 8 92–100
[7] Filimonova I V, Komarova A V and Mishenin M V 2018 APEIE – Proceedings 374–378
[8] Cherepovitsyn A, Metkin D and Gladilin A 2018 Resources 7(3) 47
[9] Sharf I, Grinkevich L and Gerasimovich G 2014 IOP Conference Series: Earth and Environmental Science 21