State instruments for the development stimulation of Arctic resources regions

I V Filimonova[1,2], A V Komarova[1,2], L V Eder[1,2] and I V Provornaya[1,2]

[1] Trofimuk Institute of Petroleum Geology and Geophysics, Novosibirsk, Russia
[2] Novosibirsk State University, Novosibirsk, Russia

E-mail: FilimonovaIV@list.ru

Abstract. Arctic regions contain significant amounts of natural resources; however, the level of hydrocarbon resources exploration in the region is quite low, which increases the prospect of geological exploration and discovery of new hydrocarbon deposits. The authors studied the features of socio-economic, infrastructural and resource-raw development of the Arctic regions using such indicators as population density, per capita incomes, gross regional product, investments in fixed assets, transport infrastructure, reserves and oil and gas production. It is shown that there is a high differentiation of the regions development in relation to the average Russian indicator. The article considers the state stimulation instruments of oil production in the Arctic regions, with special attention paying to tax benefits. With using cluster analysis, all regions of Russia are divided into groups on tax burden and benefits. The Arctic resource regions are shown to be distributed over two clusters: regions that have a high tax burden due to significant oil production (some of them are traditional and receive fewer benefits); regions that receive significant benefits from the government to intensify oil production. Thus, the analysis revealed that preferential rates for specific industry taxes can be an effective tool for government regulation of strategic industries.

1. Introduction

At present, the geography of oil production is shifting towards the Arctic regions [1,2]. This is due to the decline in production and the exhaustibility of oil reserves in traditional West Siberian and central regions [3,4]. The development of the Arctic regions natural resources is characterized by extremely difficult production conditions (natural and climatic, socio-economic, infrastructural, technological) [5], which causes a low investment attractiveness for subsoil users. In these conditions, instruments of state incentives aimed at creating a favorable investment climate are of crucial importance [6]. One of the most common instruments of state incentives is the provision of tax preferences. Therefore, the aim of the article is to study the features of taxation and the benefits provision to extractive industries (in a regional context) by the example of the oil and gas industry.

1.1. Socio-economic premises for the development of Arctic regions

In accordance with the Decree of the Russian Federation President No. 287 "On the Land Regions of the Arctic Zone of the Russian Federation", as amended on June 27, 2017, the Murmansk Region, Nenets Autonomous Okrug, Chukotka Autonomous Okrug, Yamalo-Nenets Autonomous District, as well as part of the municipal formations of the Komi Republic, the Sakha Republic (Yakutia), the

Table 1. Socio-economic and infrastructural indicators of the Arctic regions.

Subject	Density of population, number of people per km squared	Per capita incomes (per month), rubles	Gross regional product, thousand rubles per person.	Investments in fixed assets, %	Density of transport infrastructure, km per km squared
Arctic regions, total	**0,9**	**34667**	**803**	**15,6**	**8,8**
Yamalo-Nenets Autonomous Okrug	0,7	67521	3383	7,5	3,6
Nenets Autonomous Okrug	0,2	69956	4957	0,6	1,3
Komi Republic	2,0	31527	615	1,4	19,6
Krasnoyarsk Krai	1,2	28030	563	2,9	12,3
Sakha (Yakutia) Republic	0,3	38933	779	1,9	4,0
Chukotka Autonomous Okrug	0,1	63909	1283	0,1	1,0
Murmansk Oblast	5,2	36115	515	0,7	29,2
Arkhangelsk Oblast	2,7	31043	356	0,6	33,6
Russian Federation	**8,6**	**30744**	**443**	**100**	**72,9**

Krasnoyarsk Territory, and the Arkhangelsk Region are territories of the Arctic zone. Regions have a large area and a low population, which is typical for the Arctic regions around the world, primarily due to severe climatic conditions (table 1).

Investment and infrastructure indicators are significantly inferior to the average Russian values. So, investment in fixed assets is only about 16%, while, for example, the Yamalo-Nenets Okrug provides almost 80% of natural gas production in Russia. The density of roads and railways is almost 10 times lower than the national average, and in some regions, for example, the Nenets Autonomous District and the Chukotka Autonomous Area, there are no railways. High incomes of the population in the Yamal-Nenets Autonomous Okrug, the Nenets Autonomous District and the Chukotka Autonomous District are provided by the mining sector and almost double the average for Russia. In the remaining regions of the Arctic zone, this indicator is an average for the country level.

Insufficient volume of investments and weak infrastructural equipment of the Arctic zone regions necessitate a careful choice of instruments of state stimulation of development in order to avoid reduction of economic development indicators [7].

1.2. Resource prerequisites for the development of the Arctic regions

Arctic regions have a significant resource potential and are characterized by varying degrees of exploration. The traditional regions of oil and gas production can be attributed Yamalo-Nenets Autonomous Okrug, Nenets Autonomous District, Komi Republic (Table 2). Part of the Arctic regions, for example the Krasnoyarsk Territory and the Republic of Sakha (Yakutia), currently provides the main increase in oil production in Russia and is classified as promising. The development advantage of such regions as the Chukotka Autonomous District, the Murmansk and Arkhangelsk

Table 2. Resource and raw indicators of the Arctic regions.

Subject	Reserves of oil and gas,%	Accumulated production of oil and gas,%	Oil production in 2017, million tons	Gas production in 2017, cubic meters
Arctic regions, total	**53,8**	**44,7**	**136,3**	**576,2**
Yamalo-Nenets Autonomous Okrug	43,7	41,2	56,6	558,2
Nenets Autonomous Okrug	1,6	0,5	14,0	0,3
Komi Republic	1,1	2,4	32,0	2,2
Krasnoyarsk Krai	3,8	0,4	23,3	12,6
Sakha (Yakutia) Republic	3,7	0,3	10,4	2,9
Chukotka Autonomous Okrug	0,0	0,0	0,0	0,0
Murmansk Oblast	0,0	0,0	0,0	0,0
Arkhangelsk Oblast	0,0	0,0	0,0	0,0
Russian Federation	**100,0**	**100,0**	**546,8**	**691,1**

regions is not so much the energy potential as the proximity to the sea transport routes and the port infrastructure.

The development and production of minerals in the Arctic regions is associated with a number of difficulties, related not only to natural and climatic, but also to geological, infrastructural and other factors. In this connection, the mineral reserves in the Arctic regions can be classified as hard-to-recover. Since in recent years the deterioration in the quality and structure of the hydrocarbon resource base has been observed in Russia as a whole, the state is pursuing a large-scale policy of stimulating production, including in the regions and on the shelf of the Arctic zone [8,9]. So, in the Russian legislation in the RF Law "On Subsoil" and the Tax Code of the Russian Federation, the following benefits are provided [10,11]:

1. Benefits in Mineral extraction tax (MET) for the taxation of natural gas and gas condensate produced in the Yamalo-Nenets Autonomous District and used for the production of liquefied natural gas (LNG);
2. When calculating mineral extraction tax for oil and natural gas, a number of coefficients characterizing the geographic location of the subsoil plot are applied. If the subsoil area is located in the Arctic regions, the coefficient is calculated in a special way to reduce the tax burden.
3. Exemption or privileges for mineral extraction tax for oil with special physicochemical properties (viscosity, sulfur content).
4. When conducting geological study of subsoil within the subjects of the Russian Federation relating to the Arctic zone, the study period is 7 and 10 years respectively for the continental part and the shelf of the Arctic seas.

2. Method

To analyze the current and retrospective analysis of the tax burden of the main oil-producing regions, including the Arctic, the authors used cluster analysis. For the clustering of the oil-producing regions, two variables were chosen:

- Accumulated oil production;

- Average real tax burden for the period.

To delineate the boundaries of clusters, the median values of these indicators were calculated.

The clustering algorithm can be written in the following sequence:

1. Calculation of real income from mineral extraction tax for oil. For the analysis, the period from 2007 to 2017 was taken, therefore, tax revenues were cited by 2007. To bring tax revenues to 2007, the deflator, calculated on the basis of the base rate and the price coefficient, is used as equations (1), (2):

$$D_{t/t-1} = \frac{T_t}{T_{t-1}} \times \frac{K_{pt}}{K_{pt-1}}, \quad (1)$$

$$D_{t/2007} = D_{t/t-1} \times D_{t-1/t-2} \times \ldots \times D_{2008/2007}, \quad (2)$$

where $D_{t/t-1}$ – deflator, leading indicator of year t to year t-1, T_t – tax rate in year t, K_{pt} – price coefficient of year t.

Then real tax revenues in year t from oil production in region i, cited by 2007 (equation (3)):

$$N_{it}^r = \frac{N_{it}}{D_{t/2007}} \quad (3)$$

where N_{it}^r – real income tax in the year t from oil production in the region i, N_{it} – actual tax revenues in the year t from oil production in the region i, $D_{t/2007}$ – deflator, leading to the base year 2007.

2. Calculation of the real tax burden as in equation (4):

$$n_{it}^r = \frac{N_{it}^r}{B_{it}} \quad (4)$$

where n_{it}^r – real tax burden in the year t in the region i, N_{it}^r - real tax revenues in year t from oil production in the region i, B_{it} – tax base in the year t in the region i.

3. Calculation of the average deflated tax burden for the period from 2007 to 2017 as in equation (5):

$$n_i^r = \sum_{t=2007}^{2017} N_{it}^r \left(\sum_{t=2007}^{2017} B_{it} \right)^{-1} \quad (5)$$

where n_i^r – average deflated tax burden for the period, N_{it}^r - real tax revenues in year t from oil production in the region i, B_{it} – tax base in the year t in the region i.

4. Calculation of median levels of the average deflated tax burden and accumulated production by region.
5. Drawing up a table and a graph of regions division into 4 clusters.

The result of the algorithm is the clusterization of the oil-producing regions of Russia into groups with similar characteristics. This makes it possible to analyze groups of regions and develop common principles of state stimulation of oil production in regions from the relevant groups.

3. Result and discussion

The clustering method allowed the distribution of 32 oil-producing regions of Russia into 4 clusters, depending on the accumulated oil production for 2007-2017 and the average deflated tax burden on the severance tax for oil. The results of this distribution are presented in table 3.

Cluster I is represented by nine regions with low tax burden and small oil production, they can be called low-productivity, *cluster II* - seven regions with high tax burden and oil production below the median level. *Cluster III* included nine regions with high oil production and a significant tax burden, which can be described as highly productive.

Table 3. Clustering of regions on tax burden and accumulated production.

	The tax base is less than the median - 29.2 million tons			**The tax base is more than the median - 29.2 million tons**		
	Subject	Tax burden, rubles / t	Accumulated production (2007-2017), million tons	Subject	Tax burden, rubles / t	Accumulated production (2007-2017), million tons
	Cluster II (7 regions)			**Cluster III (9 regions)**		
The average deflated tax burden is above the median (more than 2043 rubles per ton)	Kirov Oblast	2483	0	Tyumen Oblast	2386	71
	Penza Oblast	2425	2	Udmurt Republic	2137	108
	Omsk Oblast	2446	7	Tomsk Oblast	2400	111
	Ulyanovsk Oblast	2142	7	Komi Republic	2067	138
	Stavropol Krai	2289	9	Perm Krai	2305	152
	Novosibirsk Oblast	2376	11	Samara Oblast	2046	163
	Kaliningrad Oblast	2276	12	Orenburg Oblast	2099	234
				Yamalo-Nenets Autonomous Okrug	2225	282
				Khanty–Mansi Autonomous Okrug – Yugra	2373	2 830
	Cluster I (9 regions)			**Claster IV (7 regions)**		
The average deflated tax burden is below the median (less than 2043 rubles per ton)	Kabardino-Balkar Republic	1874	0	Volgograd Oblast	1861	35
	Republic of Ingushetia	1066	1	Sakha (Yakutia) Republic	1261	67
	Republic of Kalmykia	1776	2	Irkutsk Oblast	1095	98
	Republic of Dagestan	2007	2	Nenets Autonomous Okrug	1631	143
	Astrakhan Oblast	552	7	Republic of Bashkortostan	1922	157
	Chechen Republic	2033	10	Krasnoyarsk Krai	1817	162
	Krasnodar Krai	1860	12	Republic of Tatarstan	2040	366
	Saratov Oblast	1924	15			
	Sakhalin Oblast	1495	24			

Seven regions located in the *cluster IV* are characterized by high oil production and low tax burden, that is, they are privileged.

The data obtained suggest that there is no direct correlation between the level of oil production and the tax burden. Approximately the same number of regions were included into all four clusters, that is, it can not be said that the level of the tax burden is growing (or decreasing) as production from the region to the region increases. There are regions with high tax burden and low production, such as the

Novosibirsk, Omsk, Penza regions, etc., and there are also subjects with low load and high production, such as the Irkutsk Region, the Krasnoyarsk Territory, and the Nenets Autonomous District.

Despite the fact that the Khanty-Mansiysk and Yamal-Nenets Autonomous Districts are one of the most favored regions (in 2017, the amount of tax lost from granting benefits in these regions amounted to about 40% of the total amount of benefits), the tax burden in them is anyway high.

At the next stage, clustering of 32 oil-producing regions was carried out according to the average for 2007-2017 real tax burden and accumulated production for the same period. Based on the data obtained, it can be assumed that the severance tax for oil is not characterized by a stable direct relationship between the tax burden and the tax base. In the cluster of low-performing regions, nine regions were included, among which the Astrakhan region with the lowest tax burden, the Republic of Ingushetia, Dagestan, Kalmykia and others. The cluster of high-performing regions includes the Khanty-Mansiysk Autonomous District, the Yamalo-Nenets Autonomous District, the Orenburg Region, the Tomsk Region with the highest tax burden, and others. Thus, despite the significant application of benefits for the sums and amount of preferential oil, Khanty-Mansiysk, Yamalo-Nenets Autonomous Districts, Orenburg region, etc. are regions with a relatively high tax burden.

The Arctic resource regions were divided into two clusters - III and IV: regions that have a high tax burden due to significant oil production, but some are traditional and receive fewer benefits; regions with significant benefits from the state to intensify oil production.

Thus, the analysis revealed that preferential rates for specific industry taxes can be an effective tool for government regulation of strategic industries.

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