

27th INFORUM World Conference  
Sochi, Russia, 2-6 September 2019

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**Evaluation of the impact of increasing the oil production  
of a major oil producing company on the development of  
Russian economy using the dynamic input-output model**

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2019

### *The objectives of the study.*

1. Assessing the budgetary effectiveness of the project of oil production increase by one of the largest oil producing companies in Russia. In the framework of this work by budgetary efficiency we understand the increase in revenues to the consolidated budget of Russia as a result of one ruble of tax benefits provided to an oil company.
2. The calculation of the multiplier effect of this project, calculated as the increase in gross output and GDP of the Russian economy in the forecast period per ruble of investments made in the project.

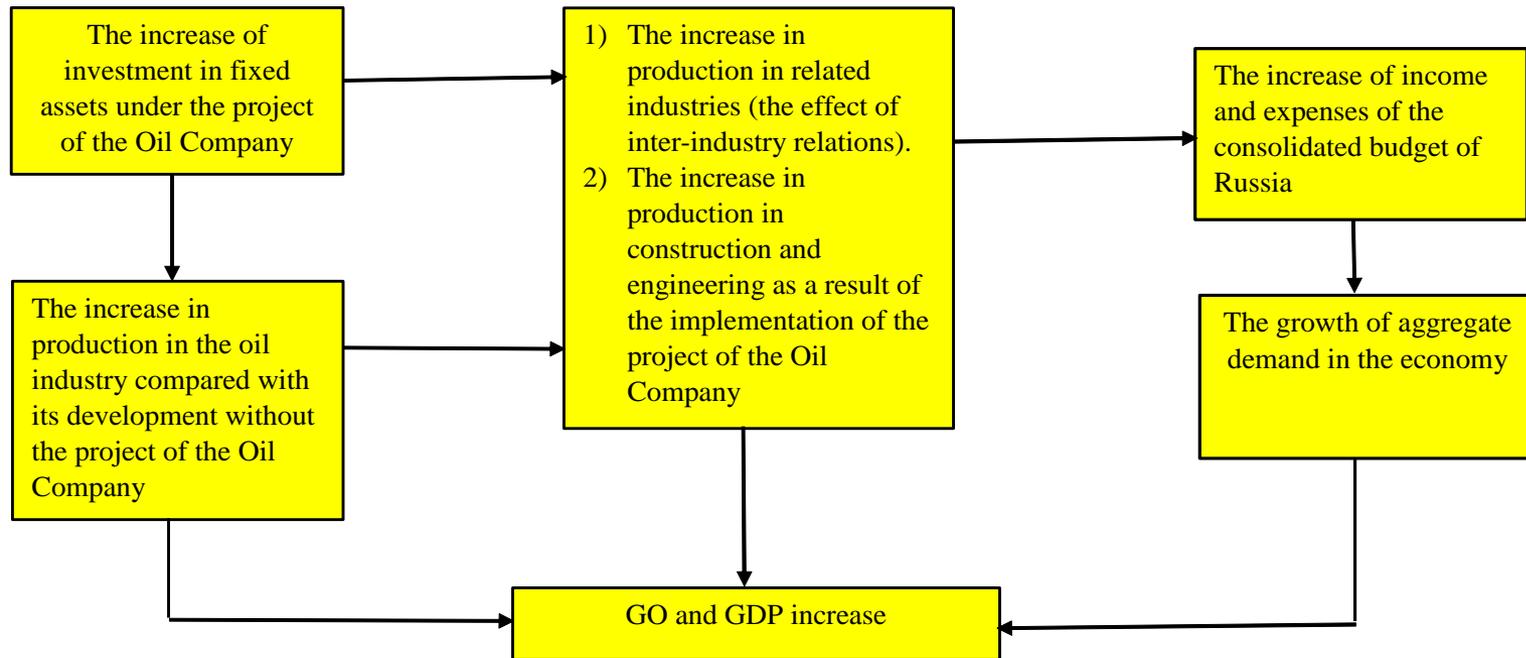
To assess the effectiveness of the implementation of large investment projects, *two different approaches are possible.*

*The first approach* is to evaluate the financial flows of the project and evaluate, on their basis, indicators of the economic and social effectiveness of the project. To assess the economic efficiency of the project, standard indicators are calculated - IRR, NPV, payback period, etc. for the project itself. When calculating social efficiency, indirect effects from the implementation of the project in related industries are taken into account. In addition, additional revenues to budgets of various levels associated with the implementation of the project itself are taken into account, as well as an increase in budget revenues associated with the impact of the project on enterprises in related industries. However, within the framework of this approach, it is impossible to take into account all the multiplicative effects that arise in the national economy as a result of investments in the analyzed project, due to interbranch ties.

*The second approach* is based on an intersectoral analysis of the consequences of the project. In this case, the data of the “Input - Output” tables are used, which through inter-industry relations allow us to take into account the impact of the project on the entire set of economic activities. The use of “Input-Output” tables to analyze the impact of extractive industries on the development of the national economy has been undertaken by many authors. However, these studies mainly analyze not individual projects, but the influence of entire extractive industries on macroeconomic and sectoral indicators. In addition, the analysis is carried out using static intersectoral models, which makes it impossible to predict the dynamic effects in the economy that are the result of project implementation.

This approach allows us to estimate the absolute increase in GDP and gross output of the national economy associated with the implementation of the project, as well as its impact on the dynamics of production in other sectors. In addition, it becomes possible to predict a change in the structure of gross output resulting from the implementation of the project. A quantitative assessment of GDP growth and gross output allows us to forecast additional revenues to the consolidated budget associated with direct and indirect effects of the project.

# Figure 1. Schematic representation of the impact of the Oil Company's project on the development of the Russian economy



## **Characteristics of the used analytical tools**

1. To carry out predictive analytical calculations, we used the 64-sectoral (DIOM) of the Russian economy, developed at the IEIE of the SB RAS and at Novosibirsk State University.
2. The model includes 32 sectors producing means of production and services that provide intermediate consumption and the corresponding 32 sectors that produce consumer goods and services that provide household consumption.
3. The list of branches of the model includes “Oil production” (production of crude oil and associated gas; extraction of fractions from associated gas).

## **Characteristics of the used analytical tools (continuation)**

4. A feature of the used DIOM is that it explicitly takes into account investment lags in industries. In other words, the effect of investments in the form of the additional fixed assets put in service and additional growth in production takes place only after a certain time after investment.

5. Another significant feature is that the Machine-Building Industry and Construction sector in the DIOM are divided into capital-creating and non-capital-creating parts. Machine-Building Industry is divided into “Production of machinery and equipment” and “Non-capital-creating engineering” (production of parts and weapons). Construction is divided into "Construction of buildings and structures" and "Construction of non-capital stock" (production of ongoing repairs of buildings and structures).

6. In the DIOM, production of capital-creating industries, investments in fixed assets and fixed capital put in service are linked. Such a link has been fully implemented in relation to the process of reproduction of fixed capital in the oil industry.

## **Information base for calculations**

1. Data of the System of National Accounts of Russia and the Input-Output Tables for 2015.
2. Data of the Oil company about the main parameters of the analyzed investment project.
3. The information base for the DIOM was built at prices of 2015. The calculation results were converted to 2018 prices using the GDP deflator for the period 2016-2018.

## Baseline for calculations

- 1. The total investment in the project for the entire forecast period in 2018 prices is 790.3 billion rubles. (\$ 12.2 billion).** Investments are directed to drilling additional wells, additional development of existing fields, the acquisition of equipment and the development of production infrastructure of the Oil company.
- 2. Increase in oil production by a total value of 245.2 million tons.** One third of the increase in oil production resulting from the implementation of the project will be used for export and two thirds for domestic refining in accordance with the traditional proportions of the distribution of oil produced by the Oil company.
- 3. The increase of sales in prices of 2018 for the period 2019-2033 will amount to 3131.5 billion rubles. (\$ 48.2 billion).**
- 4. The Oil company is asking the Russian Government for benefits from payments for the Mineral Extraction Tax for the period of the implementation of the investment project in 2019-2033 in the amount of 380.7 billion rubles. (\$ 5.6 billion).**
- 5. It is assumed that tax rates in the forecast period will be stable and correspond to the values of 2019.**

## The main assumptions of the calculations

1. The basis of the calculations was an optimistic version of the dynamics of the Russian economy. The “smooth” (crisis-free) trajectory of the dynamics of the gross output and GDP of the Russian economy in the forecast (2019-2033) period was assumed, since the purpose of this study was not to forecast crises. The use of more pessimistic variants for the development of the Russian economy will lead to some reduction in the effects of the project, but will not fundamentally change them.

2. To complete the assessment of economic effect of the implementation of the project of the Oil company we took into account the impact on the economy of additional budget revenues directly generated by the project. It was assumed that these additional revenues will be used as they become available for the development of the economy in the form of investments. This assumption is consistent with plans for the implementation in 2019 - 2024 of national projects. According to our estimate, at least 60% of the costs of these projects will be directed to increasing investments in fixed assets.

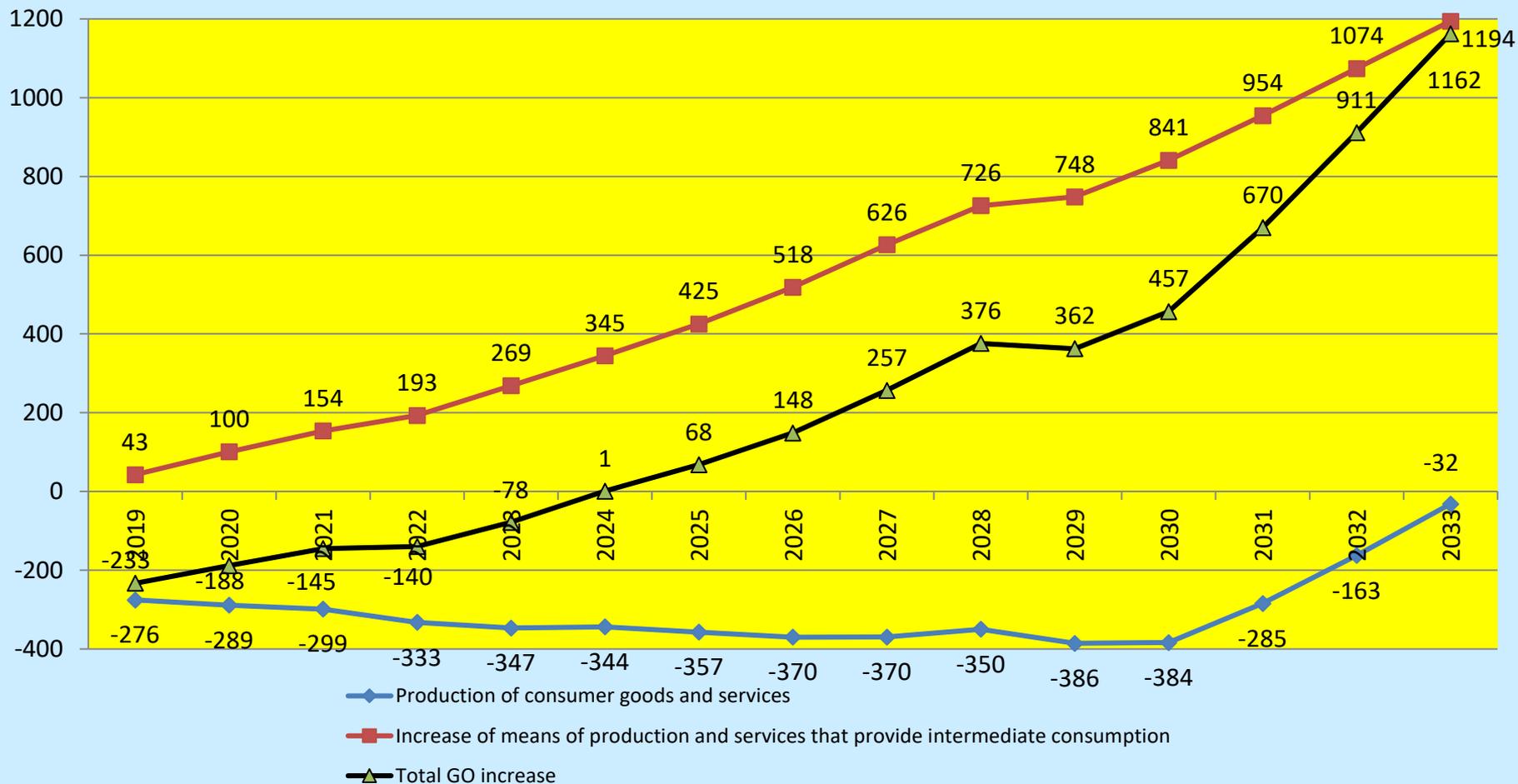
3. Based on the data of the Center for Resource Economics of the IEIE of the SB RAS, it was assumed that all types of taxes in the price of oil sold for export amounted to 57%, and in the price of oil sold in the domestic market, they were 72%.

## **Analysis of the results of forecast calculations in the situation with the Project and in the situation without the Project**

1. The impact of the Oil Company project on the development of the Russian economy in the forecast period at the macro level is very limited. Total GDP for the period 2019-2033 according to the forecast with the inclusion of the Oil Company's project is growing by 0.8% compared with the forecast without the project. Total investment in fixed assets for the period 2019-2033 according to the forecast with the inclusion of the project, compared with the forecast without the project increases by 0.6%.

2. Comparison of the values of absolute macroeconomic indicators in the forecast with and without the project allows us to evaluate the multiplier effects of the Oil company's project implementation. Gross output increase for the period 2019 - 2033 in prices of 2018 is 3627 billion rubles, GDP increase 2095 billion rubles. Given that the total investment in the project is 790.3 billion rubles, the *multiplier of the Oil Company's investments in terms of gross output growth is 4.6 times* ( $3627 / 790.3$ ), and *2.7 times in terms of GDP growth* ( $2095 / 790.3$ ). The multiplier of the growth in gross output of the Russian economy in terms of the increase in the Oil company's output is 1.2 ( $3626 / 3131.5$ ), where 3131.5 billion rubles is the increase of the Oil company's output for the entire forecast period (Table 1).

**Figure 2. Difference between the increases of gross output as a whole, production of means of production and intermediate services and production of consumer goods and services by Russian economy in versions with and without the Oil company's project in 2019 - 2033 , billion rubles, 2018 year prices.**



# Table 1. Main results of calculations for the project of the Oil company, billion rubles, 2018 year prices.

Source: the results of the calculations of the authors using the DIOM of Russian economy

Indexes	2019-2033
Total GO increase	3627
including	
increase production of means of production and services that provide intermediate consumption	8211
increase of consumer goods and services production	-4584
GDP increase - total	2095
Tax revenues from additional GDP growth - total	744
Oil company investment multiplier by gross output, times	4,6
Oil company investment multiplier by GDP, times	2,7
Multiplier of tax benefits (total increase in tax revenue for the forecast option with the project, divided by the amount of tax benefits received by the Oil Company), times	2,0
Multiplier of the gross output increase of the Russian economy by the increase in production at the Oil Company (the ratio of the increase of gross output of the Russian economy to the increase in output of the Oil company)	1,2

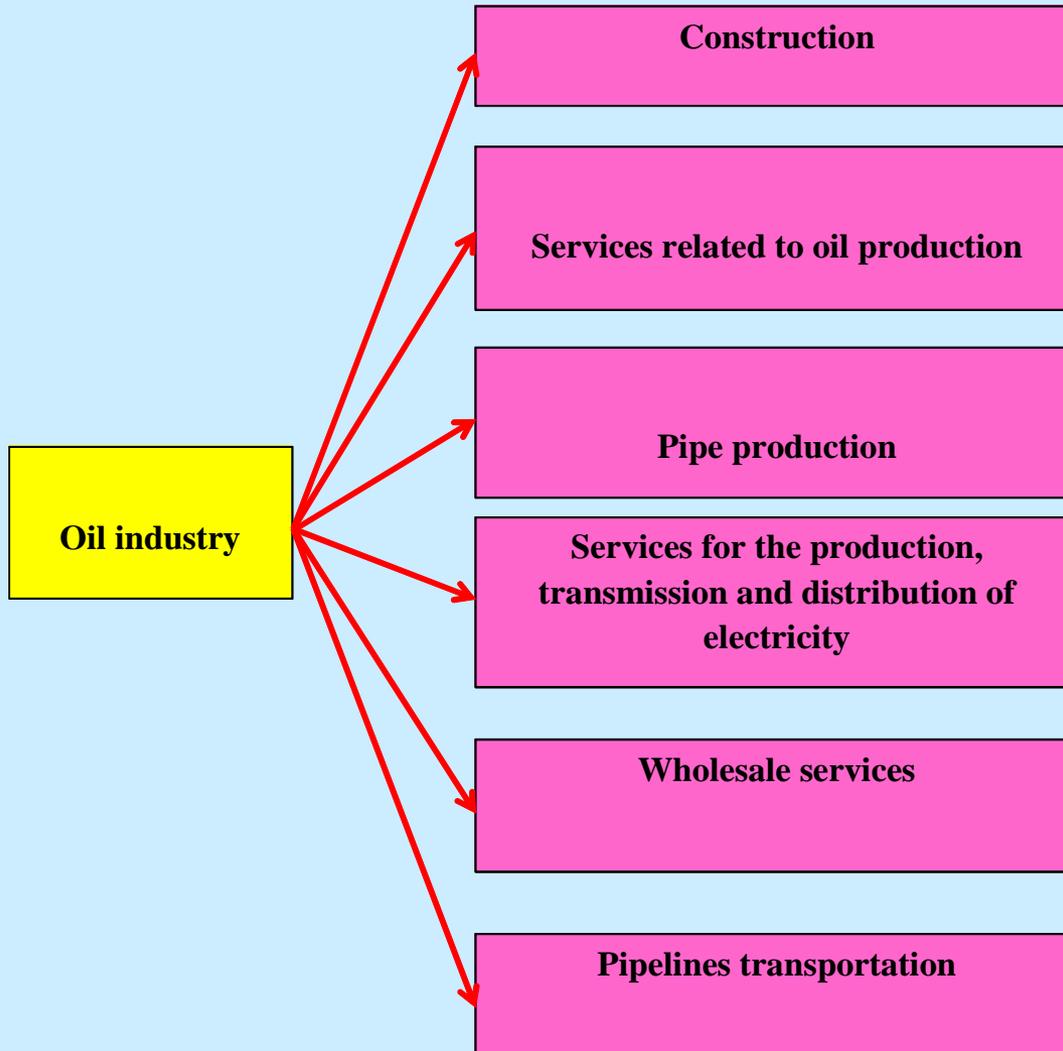
## **Analysis of the results of forecast calculations in the situation with the Project and in the situation without the Project (continuation)**

3. The oil industry is a highly capital intensive sector of economy. According to our estimates, in 2015, the ruble of manufactured products in the oil industry accounted for 2.36 rubles of fixed assets. In the Russian economy as a whole, per ruble of gross output, this indicator was 1.11 rubles of fixed assets, that is, more than two times less. The same can be said about the capital intensity of the gross output of the oil industry for investment in fixed assets. Therefore, the positive multiplier effects from the implementation of the Oil Company project do not begin to appear immediately, but only starting in 2024, gradually increasing towards the end of the forecast period. This is due to the fact that additional investments of the Oil Company, as well as investments related to an increase in revenues and expenses of the consolidated budget, give a return with a delay associated with the investment lag.

## **Analysis of the results of forecast calculations in the situation with the Project and in the situation without the Project (continuation)**

4. According to the detailed “Input-Output” tables developed for the Russian economy for 2011, the oil industry is most closely connected with the production of services related to oil production, pipe production, services for the production, transmission and distribution of electricity, construction works, wholesale services and pipelines transportation. The increase in production in the oil industry “pulls” an increase in gross output in these sectors. All these sectors primarily produce means of production and services that provide intermediate consumption. This explains the redistribution of resources in favor of the manufacturing sector of the economy and a decrease in production growth in industries producing consumer goods and services.

# Figure 3. Most important production connections of oil industry



**Table 2. Dynamics of production by industry according to forecast variants**

Industries	Gross output growth rate in the version without the Oil Company project for 2019-2033,%	Gross output growth rate in the version with the Oil Company project for 2019-2033,%	The difference in growth rate, percentage points	The difference between the total gross output in the version with the project compared to the total gross output in the version without the project (2019-2033), billion rubles, prices in 2018	Rank on increasing the growth rate of gross output in the version with the project compared to the version without the project
1. Manufacture of machinery and equipment	420,1	422,3	2,1	1244	2
2. Construction of buildings and structures	305,0	306,2	1,2	2095	4
3. Agriculture, hunting and forestry, fishing and fish farming	190,9	191,0	0,1	-537	14
4. Gas extraction	122,1	122,5	0,4	28	11
5. Oil extraction	125,7	129,8	4,2	3458	1
6. Extraction of other fuel and energy minerals	140,4	140,7	0,3	20	12
7. Extraction of minerals, except for fuel and energy	186,4	187,0	0,6	91	10
8. Manufacture of food products and tobacco	210,7	210,8	0,1	-628	14
9. Textile and clothing manufacture. Manufacture of leather, leather goods and footwear	483,5	484,3	0,7	-156	9
10. Wood processing and production of wood products. Pulp and paper industry, publishing and printing activities	196,0	196,4	0,4	3	11
11. Manufacture of coke	159,5	159,9	0,4	3	11
12. Production of petroleum products	140,8	141,0	0,2	25	13
13. Chemical production. Manufacture of rubber and plastic products	251,9	252,5	0,6	8	10
14. Manufacture of other non-metallic mineral products (building materials)	258,7	259,7	0,9	205	6
15. Manufacture of ferrous metals	219,4	220,3	0,9	340	6
16. Manufacture of non-ferrous metals	218,1	218,9	0,8	203	7

**Table 2. Dynamics of production by industry according to forecast variants (continuation)**

Industries	Gross output growth rate in the version without the Oil Company project for 2019-2033,%	Gross output growth rate in the version with the Oil Company project for 2019-2033,%	The difference in growth rate, percentage points	The difference between the total gross output in the version with the project compared to the total gross output in the version without the project (2019-2033), billion rubles, prices in 2018	Rank on increasing the growth rate of gross output in the version with the project compared to the version without the project
17. Manufacture of fabricated metal products	317,9	319,3	1,3	195	3
18. Mechanical engineering non-fund forming (production of spare parts, weapons, etc.)	244,8	245,7	1,0	322	5
19. Other production	213,7	214,1	0,4	-6	11
20. Production and distribution of electricity, gas and water	179,1	179,5	0,4	-2	11
21. Collection, purification and distribution of water	182,0	182,4	0,3	-7	12
22. Non-fund forming construction (production of current repair of buildings and structures)	182,1	182,7	0,6	20	10
23. Wholesale and retail trade, repair, hotels and restaurants	191,4	191,6	0,2	-885	13
24. Transport	159,4	159,8	0,4	78	11
25. Communication	193,1	193,2	0,1	-134	14
26. Financial activities	191,1	191,4	0,3	-101	12
27. Operations with real estate, renting and provision of services (with the exception of R & D)	188,9	189,1	0,2	-430	13
28. Public administration and military security. Social Security	203,6	203,7	0,0	-709	15
29. Education	204,1	204,1	0,0	-204	15
30. Health and social services	203,3	203,4	0,0	-363	15
31. Research and Development	180,3	180,6	0,3	-101	12
32. Provision of other communal, social and personal services	230,9	231,3	0,3	-447	12
Gross output	208,9	209,6	0,6	3626	10
GDP	228,1	228,8	0,8	2095	7

## **Analysis of the results of forecast calculations in the situation with the Project and in the situation without the Project (continuation)**

5. In industries in which the difference in total production volumes in the variant with the project compared to the variant without the project is negative, there are significant positive growth rates of gross output for the entire period in both variants. The negative difference in the total production volumes for the entire forecast period in industries that produce mainly consumer goods and services is explained by the lower gross output of these industries in the first years of the project implementation, when an increase in investment in the oil industry distracts resources from the development of other industries. Decrease in total production volumes for the entire forecast period of industries producing mainly consumer goods (agriculture, food and textile industries, retail trade, intangible services industries) and an increase in gross output of industries producing industrial goods, in the variant with the project, relative to the variant without a project, *can be interpreted as “Dutch disease” in the Russian economy.*

## **Key conclusions from the study**

1. Implementation of the investment project of the Oil Company, with the provision of tax benefits to the company in the period 2019 - 2033 generally positively affects on the development of the Russian economy. In the economy as a whole, the additional gross output increase will amount to 3627 billion rubles, GDP increase will amount 2095 billion rubles (in prices 2018).
2. A positive impact of the project on the Russian economy is possible only if the additional income of the consolidated budget received from the project is used for investment purposes. In the absence of investment of additional budget revenues, the result of the project will be a simple redistribution of resources from the sectors of the economy that form the final consumption of households to the sectors that produce manufactured goods. Moreover, in the variant with the project, the gross output and GDP will not necessarily increase compared to the forecast variant without the project.

## **Key conclusions from the study (continuation)**

3. As a result of the study, the multiplier effects of the project for the Russian economy as a whole were evaluated. The multiplier of investments in the project of the Oil Company for gross output is 4.6, for GDP 2.7, that is, one ruble of investments in the project generates an additional 4.6 rubles of gross output and 2.7 rubles of GDP. The multiplier of the growth of gross output of the Russian economy in terms of the increase in the oil company's output is 1.2, that is, per ruble of the growth of the oil company's output, the gross output of the economy as a whole increases by 1.2 rubles. The tax benefit multiplier is two. In other words, for each ruble, provided by the Oil Company of tax benefits, in the future the consolidated budget of Russia will receive two additional rubles of income.

## Key conclusions from the study (continuation)

4. An analysis of the dynamics of the growth of production of industrial and consumer products, taking into account the project of the Oil Company and without it, showed signs of the Dutch disease in the Russian economy.

5. The implementation of the project will lead to structural shifts in the gross output of the Russian economy in the direction of increasing the share of oil production, engineering, construction, metallurgy, while reducing the share of industries producing consumer goods and services.

6. Since the technology of oil production in various Russian oil companies is not fundamentally different, the results can be generalized to the oil industry as a whole. *An increase in oil production in Russia can lead to positive macroeconomic results only if the additional budgetary revenues are effectively used for investment and development in other sectors of the national economy.*

Thank you!