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The Contribution of Natural Resource Producing Sectors to the Economic Development of the Sakha Republic

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Abstract: This paper provides basic materials for considering the sustainability of natural resource development in the Arctic, taking the Sakha Republic as a case study of the Russian Arctic regions. The author clarifies the contribution of the mining industry to the economic development of Sakha with special attention paid to the contribution to government budgets by numerical and statistical analysis of regional and municipal data. The paper demonstrates that the mining industry has been a driving force of the economic growth of Sakha and that the oil sector has sharply increased its presence while the diamond sector has decreased its presence. Simultaneously, it reveals that the mining industry is unevenly developed in Sakha, which has caused significant inequality in per capita Gross Municipal Product (GMP). Then, the analysis of the paper shows that Sakha's contribution to the federal budget has increased significantly in recent years due to growing oil production and that the diamond sector is still more influential than the oil sector in the contribution to the republican and local budgets.

Keywords: Sakha; diamond; oil; government budget; economic growth; mining industry

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1. Introduction

The purpose of this paper is to provide basic materials for considering the sustainability of natural resource development in the Arctic, taking the Sakha Republic as a case study of the Russian Arctic regions. This paper is a part of the Arctic Challenge for Sustainability II (ArCS II in short), which is a national flagship project of Arctic research in Japan in the period 2020–2025. In this project, I am responsible for one of the sub-programs, entitled "Energy resource development and regional economy," which aims to study the impact of energy resource development on regional economies in the Russian Arctic, particularly in the Sakha Republic and Yamalo-Nenets Autonomous Okrug.

I think that before deciding to launch or continue a natural resource development project, we must evaluate the meaning or merits of this project. For this purpose, it is indispensable to fully understand the present contribution of natural resource production to the economic development in these regions. Fiona Hill and Clifford Gaddy argued in their famous book, The Siberian Curse [1], that it might be a mistake to make a decision to develop Siberia if we consider the full burdens or costs of developing these areas.

Sakha is famous for its diamond production. Until recently, Sakha had produced more than 90% of diamonds in Russia (see Section 2.1), and Russia's share in the world was 32.8% in 2019 [2] (p. 372). Recently, the production of crude oil has increased tremendously. In this paper, I attempted to statistically clarify the contribution of the mining industry to the economic development of Sakha with special attention paid to the contribution to government budgets. There is a big difference in taxation between the oil and diamond sectors. Taxes on oil play an important role in the federal budget, while those on diamond do so in the regional budget. I illustrate this difference in this article. Note that in this article, a subject of the federation (republic, krai, oblast, etc.) is called a region.

To the best of my knowledge, there are few literatures in English and in Russian that deal with these issues in Russia in general, and in Sakha in particular [3–5]. One of

the reasons is the lack of relevant statistical data on the regional level. Gross Regional Production (GRP) data and industrial production data in a region are poor in Russia, while there is a certain improvement on the federal level. Concerning budget execution (performance) data and tax payment data, however, relatively detailed data are available. This paper is a preliminary attempt to take advantage of these data.

In the next section, the contribution to economic growth is analyzed. Section 3 deals with the contribution to government budgets. Website information of data used in this paper is provided in Appendix A.

2. Contribution of the Mining Industry to Economic and Industrial Growth in Sakha

2.1. Contribution to Republican Economy

First, I analyzed the contribution to the GRP growth of Sakha by industry. The largest contribution by the mining industry is evident from Figure 1. In this figure, the blue line shows the GRP growth rate of Sakha, which was higher than Russia's GDP growth rate in recent years. In the period 2014–2019, while the average growth rate of Russia's GDP was only 0.9%, that of Sakha's GRP was 2.9% (calculated from Rosstat's website). The stacked bars in Figure 1 show the contribution of each industry. The large contribution of the mining industry is followed by the construction and transportation sectors. (Note that there was a change in the classification of economic activities from OKVED to OKVED2 in Russia's GDP and GRP statistics in 2016. Consequently, data until 2015 and those from 2016 are not compatible in Figure 1. For example, the transportation sector was included in the sector called "Transport and communications" until 2015, while it was included in "Transportation and storage" since 2016. In the legend of Figure 1, names of the sector (economic activities) are those of the old classification.) These two sectors are closely related to the mining industry due to the construction of oil and gas pipelines and the transportation of oil and gas through pipelines. In fact, the mining industry accounted for 50.6% of Sakha's GRP in 2019. The share of the construction sector (9.6%) and transportation and storage sector (6.2%) was also significant.

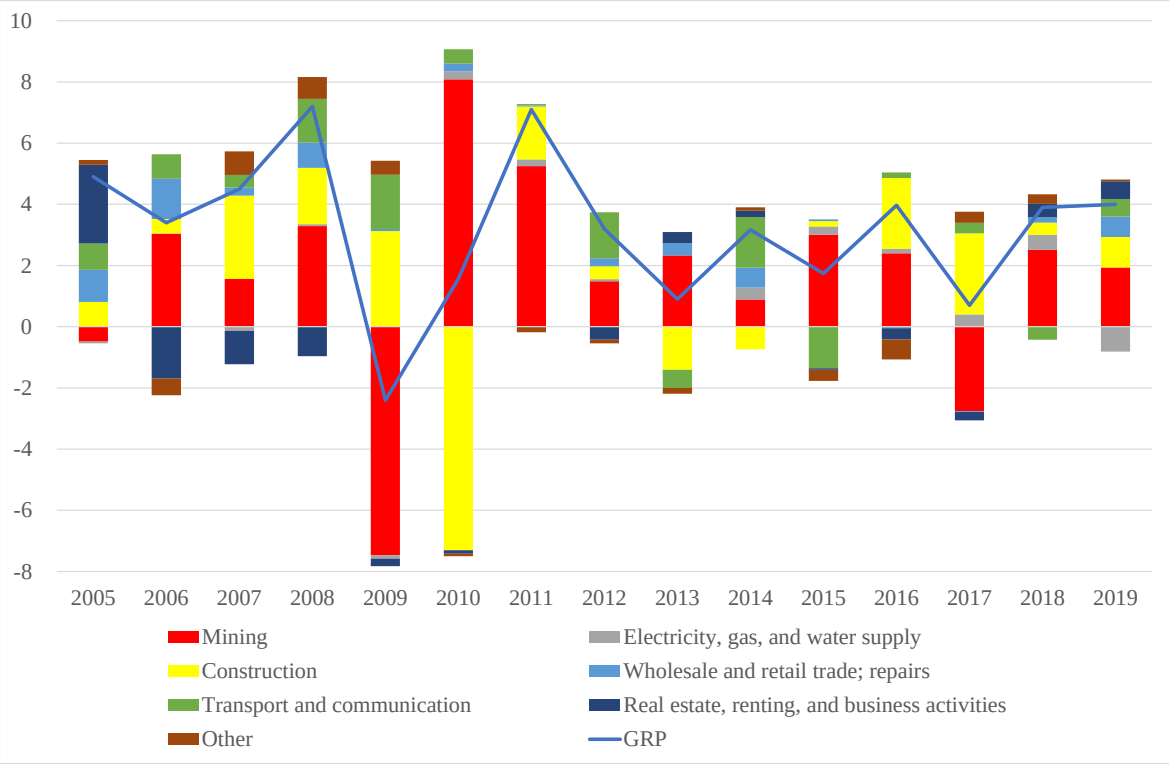


Figure 1. Contribution to Sakha's GRP growth by industry, in percentages, 2005–2019. Sources: Compiled by the author from Sakhastat's website.

Concerning the breakdown of the mining industry in the GRP statistics of Sakha, available data are limited: I only have data shown in Table 1. (Note that in Table 1, Figures 2 and 3, I regard the production of other mining as diamond production since there seem to be no major minerals other than diamond in the mining industry of Sakha, excluding fuel-energy and metals. In fact, Pulyaevskaya writes that the share of the diamond sector in 2010 was 20.5% [4] (p. 164), which is almost the same as the percentage shown in Table 1 (20.4%). In Table 1, the sum of coal, oil and gas, metal, and diamond is equal to the mining industry, except for a small discrepancy (42 million rubles) in 2010. In Sakha, major products of the metal sector are gold, silver, and antimony [6].) According to this table, the share of the mining industry increased together with the oil and gas sector, while the share of the diamond sector decreased to a certain degree. This tendency is confirmed by the analysis of industrial statistics. Figure 2 shows the contribution by subsectors of the mining industry to the growth of industrial production. The blue line shows the growth of mining production, the average growth rate of which was 9.7% in the period 2010–2019, and the stacked bars show the contribution by each subsector (I calculated these contributions with the volume of goods shipped as weight). We see the largest contribution by the oil sector. The contribution of the diamond and coal sectors was not significant in the past decade. As shown in Figure 3, the share of the diamond sector in the mining industry was larger than 50% until 2009, but since then, it has decreased considerably. (Note that Figure 3 shows the volume of goods shipped (Ob"em otgruzhennykh tovarov), not the volume of goods produced. As is the case with GRP, there was a change in the classification of economic activities in industrial statistics. Data after 2017 in Figure 3 were derived from the new classification format (OKVED2). The service in this figure is a new sector in the new classification. It seems that such activities were included in some of the other sectors until 2016.) On the other hand, the share of the oil and gas sector has grown rapidly since 2010.

Table 1. Structure of the mining industry in Sakha's GRP, 2006, 2010, 2015.

	2006	**2010**	**2015**
		In million rubles	
Total GRP	206,845	386,825	749,987
Mining industry	80,571	154,548	361,253
including			
Coal	9228	18,289	17,890
Oil and gas	2988	43,424	127,718
Metal	6138	14,045	33,933
Diamond	62,217	78,748	181,712
		In percentages	
Total GRP	100.0	100.0	100.0
Mining industry	39.0	40.0	48.2
including			
Coal	4.5	4.7	2.4
Oil and gas	1.4	11.2	17.0
Metal	3.0	3.6	4.5
Diamond	30.1	20.4	24.2

Sources: Compiled by the author from [3] (pp. 82–83).

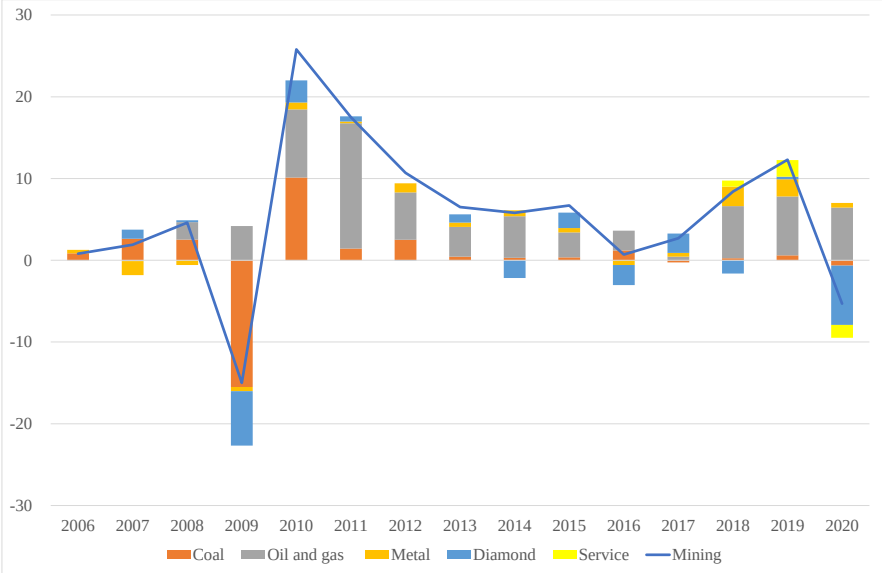


Figure 2. Contribution to the growth of the mining industry by subsector in Sakha, in percentages, 2006–2020. Sources: Compiled by the author from Sakhastat's website.

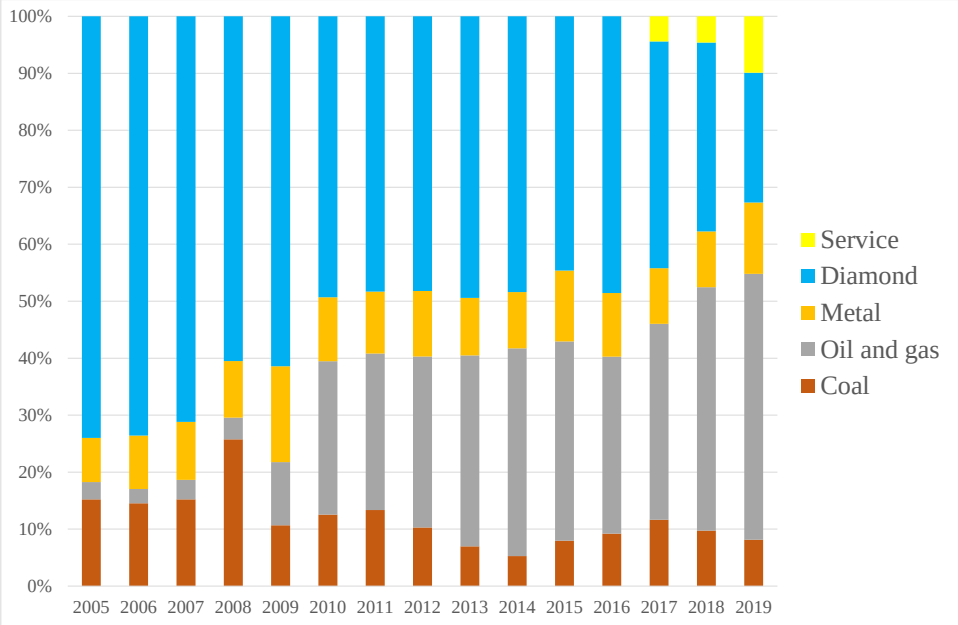


Figure 3. Structure of the mining industry of Sakha, in percentages, 2005–2019. Note: Structure of the volume of goods shipped. Sources: Compiled by the author from Sakhastat's website.

In fact, crude oil production in Sakha increased quite rapidly thanks to the development of the Talakan oil field (Figure 4). In 2019, Sakha accounted for 2.6% of oil production in Russia (calculated from [7] (p. 726) and Sakhastat's website). It should be noted that more than 90% of crude oil produced in Sakha is exported through the East Siberia—Pacific Ocean (ESPO) pipeline [8] (p. 134). In fact, the percentage of export to production was 94.7% in 2010 and 95.6% in 2013, if we calculate it using export data reported on the same page. It is obvious that the oil sector has become a driving force for the economic development of Sakha.

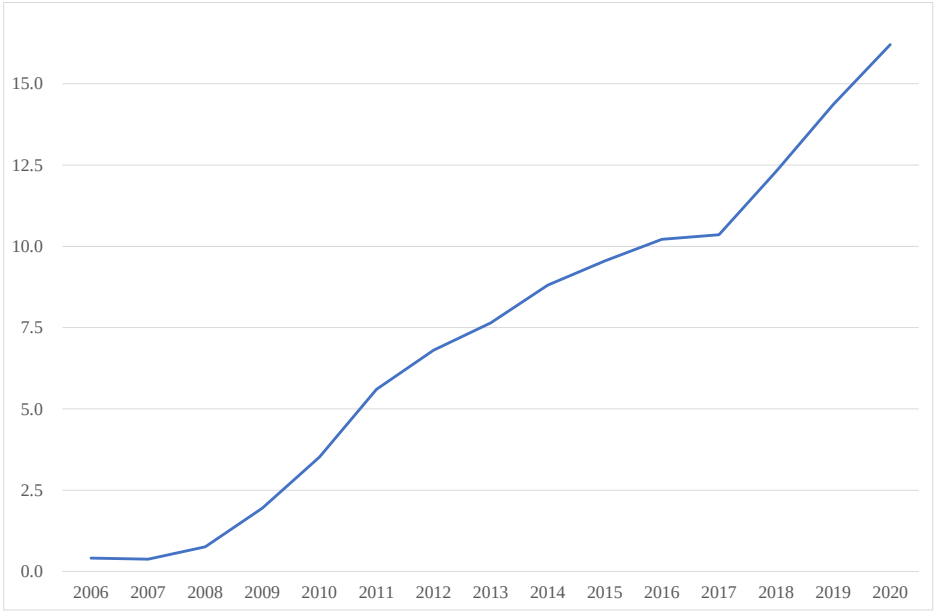


Figure 4. Crude oil production in Sakha, in million tons, 2006–2020. Sources: Compiled by the author from the website and other sources of Sakhastat.

The production of natural gas remained in the range of 1.9–2.0 billion m^3 during the years 2009–2018. It jumped to 2.9 billion m^3 in 2019 and 6.8 billion m^3 in 2020 thanks to the production in the Chayanda gas field, which is one of the main sources of the "Power of Siberia" pipeline going to China (these production data were obtained from the website and other sources of Sakhastat). The share of Sakha in the natural gas production of Russia was 1.0% in 2020, and it is expected to grow rapidly in the near future [9] (calculated from the websites of the Ministry of Energy and Sakhastat).

On the contrary, diamond production is forecasted to decrease in Sakha as well as in the world [10]. In fact, its production in Sakha peaked in 2017 (36.9 million carats) and decreased to 34.3 million carats in 2019 (calculated by the author from the production data of five mining and processing divisions of Alrosa (diamond-producing monopoly, see below) published in its Annual Reports). The share of Sakha in the diamond production of Russia dropped from 97% in 2010 and 87% in 2015 to 76% in 2019 (Data of diamond production in Russia are available from the website of Russia's Ministry of Finance). There was an attempt to create a Territory of advanced development (TOR in Russian), called "Diamond valley" in Sakha, but it was not realized [6,11]. The rest was produced in Arkhangelsk.

The impact of diamond and crude oil production on Sakha's economy is difficult to compare. I can roughly estimate the export value of diamond and crude oil in 2018 as USD 3.9 billion and USD 5.8 billion, respectively. Concerning diamond, Sakha's export value is obtained from the website of the Federal Customs Service. With respect to the crude oil exports of Sakha, we cannot obtain these data from the same source since most of the export data of crude oil are registered in Moscow, where the company headquarters are located. Therefore, I estimated them from Russia's export value of oil and the share of Sakha in the export quantity of Russia, assuming that 95% of Sakha's production was exported, as indicated above.

It seems to follow from this that the impact of the oil sector is larger. The problem, however, is that most of the rents or value-added of the oil sector are not realized in Sakha but transferred to Moscow, where the company headquarters are located. Most of the rents of the oil sector are not realized in the mining industry but realized as trade and transportation margins and taxes due to the low producers' prices [12]. On the other hand, in the case of diamond, the headquarters are located in Sakha. Therefore, it seems that

most of the rents are realized in Sakha. In addition, as we see in Section 3, most of the taxes paid by the diamond sector are used in the Republic, while most of them from the oil sector are transferred to Moscow.

2.2. Contribution to Local Economy

In Sakha, we can use the indicator of Gross Municipal Product (GMP) that shows value-added production in a municipality (as for municipalities in Sakha, see Appendix B). GMP is calculated only in several regions of Russia [5] (p. 136). In this subsection, I examine how the mining industry contributes to the economy of a municipality, taking advantage of this indicator.

Although the mining industry is well developed in Sakha, its distribution is quite uneven. Table 2 shows the share of major producing districts in the production of main mineral resources in Sakha in 2019. For example, Lensk district accounted for 66.4% of crude oil production in Sakha. The production of the other mineral resources is also concentrated in a few districts. As a result, there are considerable differences in the share of the mining industry in GMP (Figure 5). Note that this share in the GRP of Sakha was 51.1% in 2016. This share exceeds 70% in five districts, including Nyurba, Anabar, Mirny, Oymyakon, and Lensk. On the other hand, in the majority of other municipalities, this share is less than 30%.

Table 2. Major districts of mining production in Sakha; share in percentages, 2019.

Crude Oil	Lensk	66.4	Mirny	33.6		
Natural Gas	Vilyuysk	63.0	Lensk	30.2	Mirny	6.8
Coal	Neryungri	95.5				
Diamond	Mirny	54.8	Nyurba	30.0	Anabar	15.2
Gold (2015)	Oymyakon	47.1	Aldan	35.1	Olyokminsk	6.6

Note: The share of Anabar in Diamond includes the Bulun and Olenek districts (see below). Sources: Compiled by the author from the website and other sources of Sakhastat and [13] (2020).

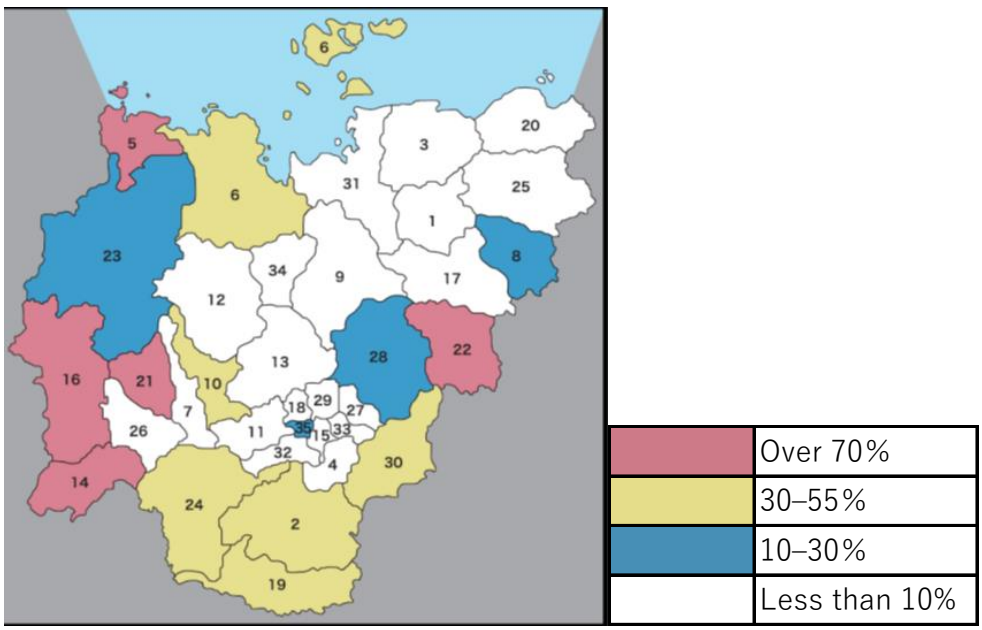


Figure 5. Share of the mining industry in GMP in Sakha, 2016. Note: Refer to Appendix B for the names of municipalities. Sources: Compiled by the author from data obtained from Sakhastat.

There are also big differences in per capita GMP (Figure 6). Note that the average per capita GMP in Sakha was 904 thousand rubles in 2016 (Calculated by dividing total

GMP by total population of Sakha. The arithmetic mean of per capita GMP is 754 thousand rubles and its median is 423 thousand rubles). In only six districts, per capita GMP exceeds one million rubles. This implies that in the other 30 municipalities, per capita GMP is less than the average of Sakha. Inequality seems to be large. The Gini coefficient is 0.50.

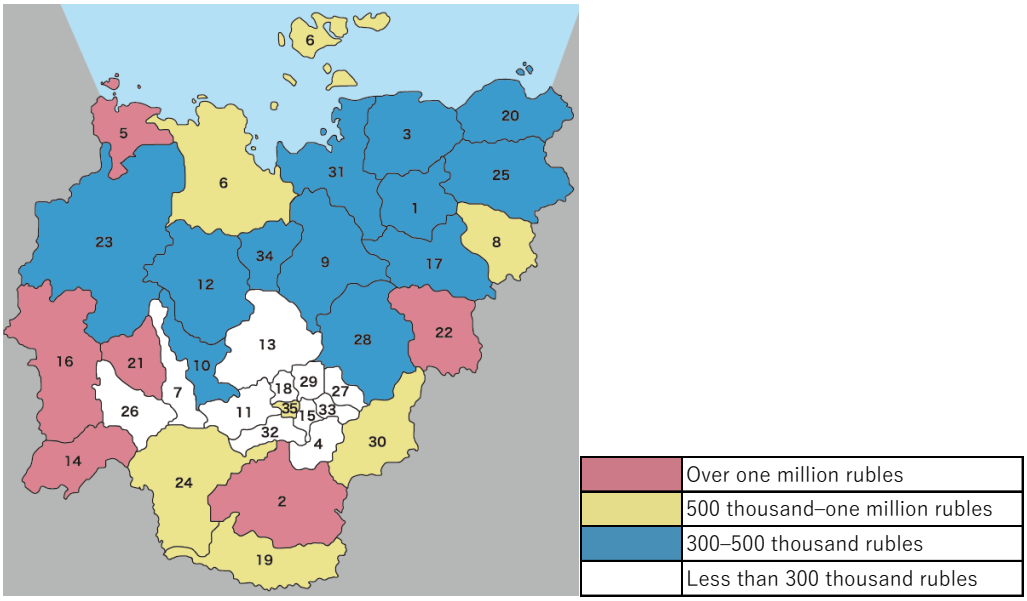


Figure 6. Per capita GMP of Sakha, 2016. Sources: Calculated by the author from the website and other sources of Sakhastat.

The six districts with high per capita GMP include Lensk (4.1 million rubles), Anabar (3.2 billion rubles), Mirny (3.0 million rubles), Nyurba (2.0 million rubles), Oymyakon (1.9 million rubles), and Aldan (1.0 million rubles). In the top five districts in terms of per capita GMP, the share of the mining industry exceeds 70% (Figure 5). In the Aldan district, the share of the mining industry is 44.0 percent. The correlation between the share of the mining industry and per capita GMP is 0.86, which demonstrates the significant contribution of the mining industry to the economy of municipalities.

I conducted a multiple linear regression analysis to compare the impact of oil, diamond, and gold production on per capita GMP in 2016. The result is as follows (R2 of 0.75).

Per capita GMP = 461.4 + 40.8 (share of oil) + 38.9 (share of diamond) + 25.8 (share of gold)

All independent variables are statistically significant ($p < 0.01$). This seems to suggest that the impact of oil production on the economy of a municipality is slightly stronger than that of diamond production. (Note that data of diamond production in carats were obtained from the production data of five mining and processing divisions of Alrosa [13] (2020). One of them is Almazy Anabara, a subsidiary of Alrosa, which produces diamond not only in the Anabar district but also in the Bulun and Olenek districts. I estimated the share of these three districts using data in USD. The data of gold are those in 2015, since data in more recent years are not available.)

3. Contribution of the Mining Industry to Government Budgets in Sakha

3.1. Contribution to the Federal and Republican Budgets

In this section, I examine the contribution of the mining industry to government budgets in Sakha, including the federal, regional, and local budgets. In Russia, tax revenues are divided into federal and regional budget revenues, of which the regional budget includes the budget of a region and its municipalities, i.e., local budgets. Some taxes are exclusively revenues of the federal budget, including value-added tax (VAT), export and import duties, and mineral extraction tax on oil and gas, while some other taxes are those

of regional budgets, including personal income tax, asset tax, and mineral extraction tax on diamond. There are some taxes in which revenues are divided between the federal and regional budgets, including corporate tax and mineral extraction tax on coal. In the case of the extraction tax on coal, 40% of its revenues are revenues of the federal budget, and 60% are those of regional budgets. Until 2006, the extraction tax on diamond was distributed the same as that on coal. By the amendment of the Budget Code (Federal Law No. 237 of 19 December 2006), 100% of these revenues became revenues of the federal budget since the beginning of 2007. According to Sakha News (21 November 2006, https://www.1sn.ru/9169.html), this amendment was made to compensate the losses sustained by the decrease in numbers of Alrosa stocks (diamond-producing monopoly) owned by the Sakha Republic in 2006. However, I was not able to confirm the change in stocks owned by the Republic in 2006 from the Annual Reports of Alrosa. The share of the Russian Federation did increase from 37% to 50.9% in 2008 [13] (various years).

In Russia, revenues from oil and gas are the largest and most important in the federal budget. In 2019, extraction tax and export duty on oil and gas accounted for 40.9% of federal budget revenues (calculated from the Federal Treasury's website). This percentage does not include VAT, corporate tax, and other taxes that oil and gas companies pay to the federal budget. Since diamond production concentrates in Sakha, the republican budget of Sakha received 82.4% of extraction tax revenues on diamonds in Russia in 2020. In other words, the existence of revenues of extraction tax on diamonds is one of the most distinct characteristics of Sakha's budget.

Table 3 demonstrates the difference in the contribution to government budgets between the oil and diamond sectors. (Note that in Table 3 and Figure 7, I regard tax revenues from other mining as those from the diamond sector since there seem to be no major minerals other than diamond in the mining industry of Sakha, excluding the fuel-energy and metal sectors.) In terms of total tax revenues, the contribution by the oil sector is 58.5%, and that of the diamond sector is 15.6% in 2019. In terms of federal budget tax revenue, the oil sector contributed almost all, owing to a large amount of extraction tax on oil. On the other hand, in terms of republican budget revenues, the contribution of the diamond sector (30.3%) is larger than that of the oil sector (18.2%). Particularly, the share of the diamond sector in corporate and asset tax revenues is significant. Since the production of diamond in Sakha is monopolized by Alrosa, the share of the diamond sector in republican budget revenues of Sakha means the contribution of Alrosa to these revenues [10]. In fact, this company almost completely monopolizes diamond production in Russia. Its share in diamond production in Russia was 90%, and its share in world diamond production was 27.5% in 2020 [13] (2021, pp. 12, 28). Alrosa also has its affiliate (diamond mining enterprise) in Arkhangelsk Oblast.

Table 3. Structure of tax revenues by industry in Sakha, in percentages, 2019.

	Total Tax Revenue	Federal Budget Tax Revenue	Republican Budget Tax Revenue	Extraction Tax	Corporate Tax	Personal Income Tax	Asset Tax
All industries	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mining industry	74.3	93.4	59.3	99.8	79.7	27.1	40.9
including							
Oil and gas	58.5	105.3	18.2	83.7	40.1	5.4	14.7
Diamond	15.6	−0.3	30.3	12.6	29.5	12.2	22.7
Other	25.7	6.6	40.7	0.2	20.3	72.9	59.1

Note: In terms of federal budget tax revenue, the contribution of the oil and gas sector exceeds 100% because, in the other sectors of the mining industry, revenues of VAT are large negative values, which means tax refunds. Sources: Calculated by the author from the website of the Federal Tax Service.

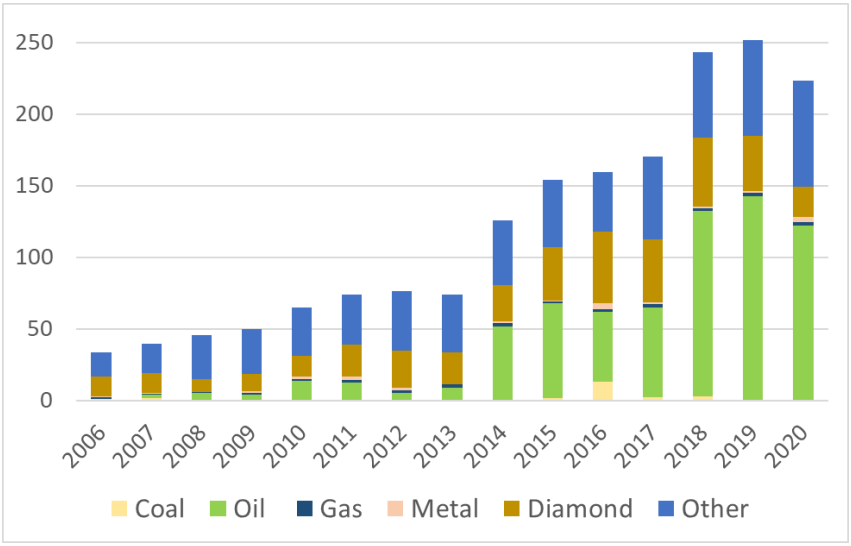


Figure 7. Tax revenues in Sakha by industry, in billion rubles, 2006–2020. Sources: Compiled by the author from the website of the Federal Tax Service.

Since oil production has increased rapidly in recent years in Sakha, tax revenues from the oil sector have grown as well. Figure 7 demonstrates which industry pays taxes. In 2019, for example, 74% of taxes were paid by the mining industry, including the coal, oil, gas, metal, and diamond sectors. The rapid growth of tax revenues from the oil sector is apparent from this figure.

This growth of tax revenues from the oil sector resulted in significant increases in federal tax revenues since extraction tax revenues on oil are federal budget revenues. In fact, as shown in Figure 8, federal budget tax revenues have increased tremendously in recent years. They were only 5 billion rubles in 2013 but increased to 122 billion rubles in 2019. You may ask why oil tax revenues were so small until 2013 and increased abruptly in 2014 (Figure 7), although oil production increased rather smoothly in the period 2009–2016 (Figure 4). The reason was exemptions from oil extraction taxes for new oil fields in the Sakha Republic, as well as Irkutsk Oblast and Krasnoyarsk Krai, to promote new oil field development in these regions [14] (p. 167).)

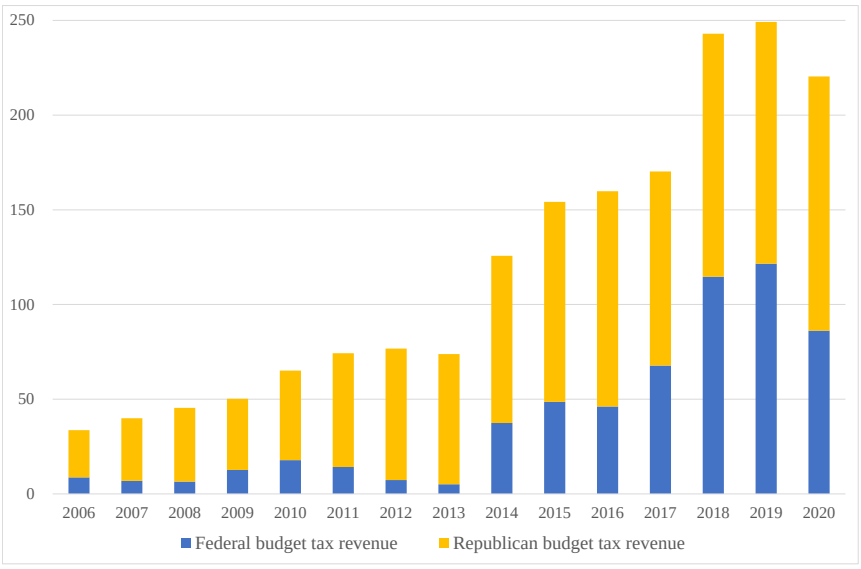


Figure 8. Tax revenues in Sakha, in billion rubles, 2006–2020. Sources: Compiled by the author from the website of the Federal Tax Service.

I have devised such indicators as the gross and net contribution of a region to the federal budget [15]. The gross contribution of a region is defined as federal budget tax revenues of the region, while net contribution is defined as gross contribution minus transfer. The transfer includes dotation, subsidy, subvention, and other inter-budgetary transfers that a region receives from the federal budget.

The result of the calculation is shown in Figure 9. The gross contribution of Sakha was modest until 2013, but since then, it has rapidly grown thanks to the increase in extraction taxes on oil. On the other hand, Sakha received a relatively large amount of transfer due to the high cost of public services caused by severe climate conditions. Consequently, the net contribution was negative until 2016. However, it turned positive in the following year. We confirm the great contribution of the oil sector to this change in net contribution.

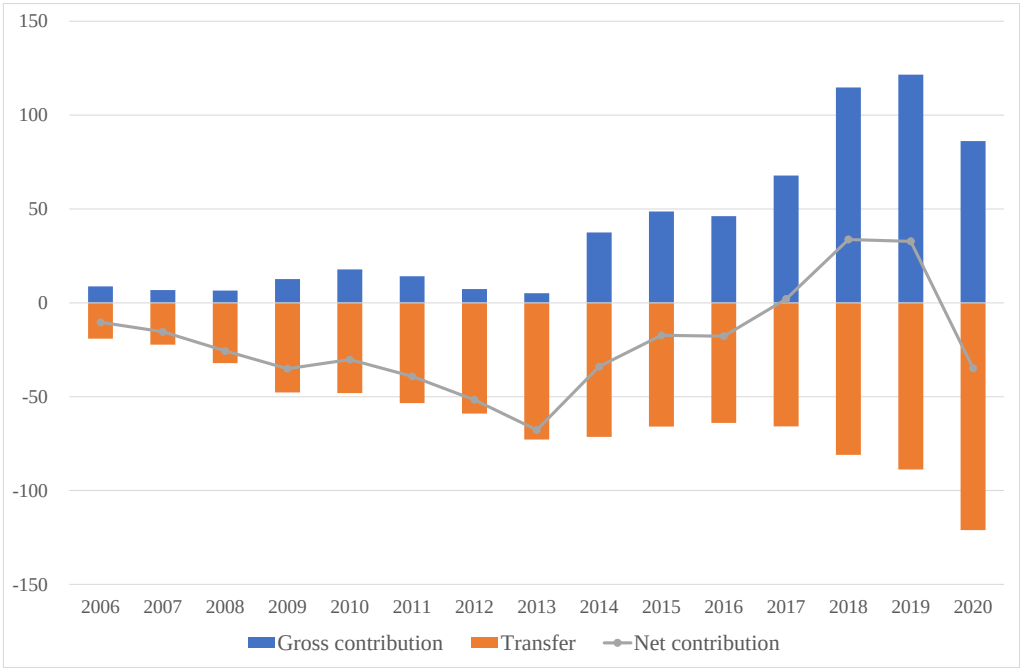


Figure 9. Contribution of Sakha to the federal budget, in billion rubles, 2006–2020. Sources: Compiled by the author from the websites of the Federal Tax Service and Federal Treasury.

It should be noted that this gross contribution includes only tax revenues collected by the Federal Tax Service of Russia. There are other federal budget tax revenues collected by the Federal Customs Service of Russia, including export and import duties, as well as indirect taxes (VAT and excise) on imported goods. They are exclusively revenues of the federal budget. However, the problem here is that there are no statistics that show which regions pay these duties and taxes. I attempted to make a preliminary estimate of these revenues in 2015 [15] (pp. 15–21). According to this estimate, Sakha's gross contribution increased from 49 billion rubles to 91 billion rubles (increase by 88%), and its net contribution increased from minus 17 billion rubles to 25 billion rubles. Thus, the contribution of the oil sector becomes more significant when we take into account export duties on oil. Note that there are deficiencies in this estimate. Basically, in my estimates, export duties on oil were distributed among regions in proportion to the share of each region in the production of crude oil in Russia. By adopting this method, I disregarded the special measures (exemption or reduction in export duties) in some areas taken by the Federal Government to promote the development of new oil fields [14] (pp. 166–168). Note also that export duties on diamond were abolished on September 1, 2016, since Russia promised to abolish them within four years of joining the WTO in 2012.

If we calculate gross and net contribution rates by dividing gross and net contributions by total tax revenues of a region, Sakha ranks 38th and 49th among 85 of Russia's regions

in 2015 [15] (p. 17). The lower ranking of the net contribution rate of Sakha compared with the gross net contribution rate was a result of receiving a relatively large transfer from the federal budget.

3.2. Contribution to Local Budgets

The contribution of the mining industry to local budgets has two channels. One is through transfer that the republican budget provides to local budgets. The other is the dividends that Alrosa pays to eight districts.

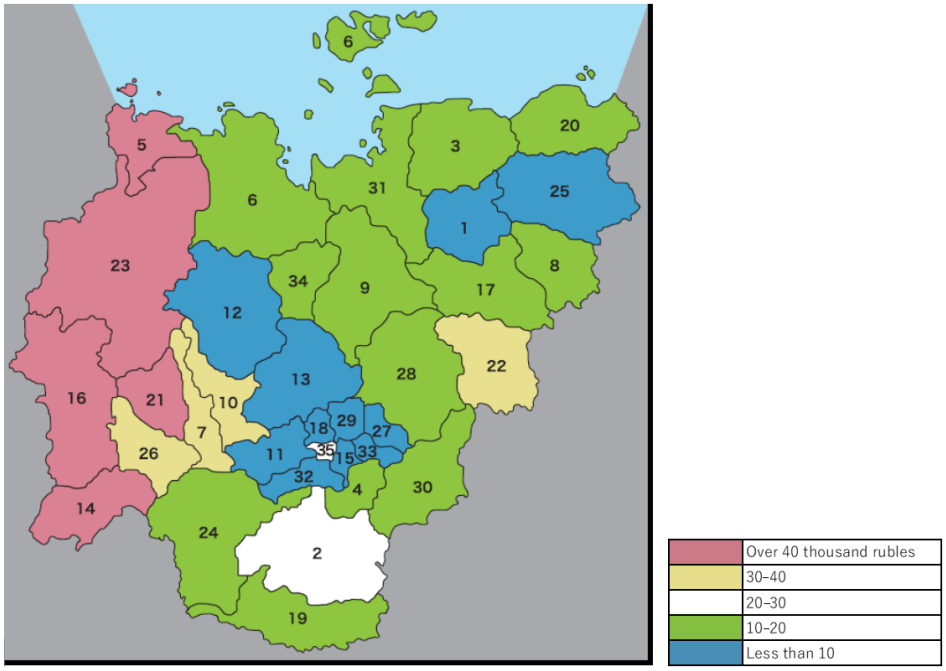
In Sakha, as well as other regions of Russia, transfer plays an important role in the redistribution of revenues in a region [16]. As shown in Figure 10, 82.8% of local budget revenues are transfers from the republican budget in 2019. As indicated above (Table 3), 59.3% of republican budget tax revenues are paid by the mining industry, including 30.3% from the diamond sector. They are the main sources of transfer that local budgets receive from the republican budget.

Figure 10. Structure of local budget revenues of Sakha, in percentages, 2019. Note: The arithmetic mean of percentages of districts is shown. Eight districts are those that receive dividends from Alrosa. Sources: Compiled by the author from Rosstat's website.

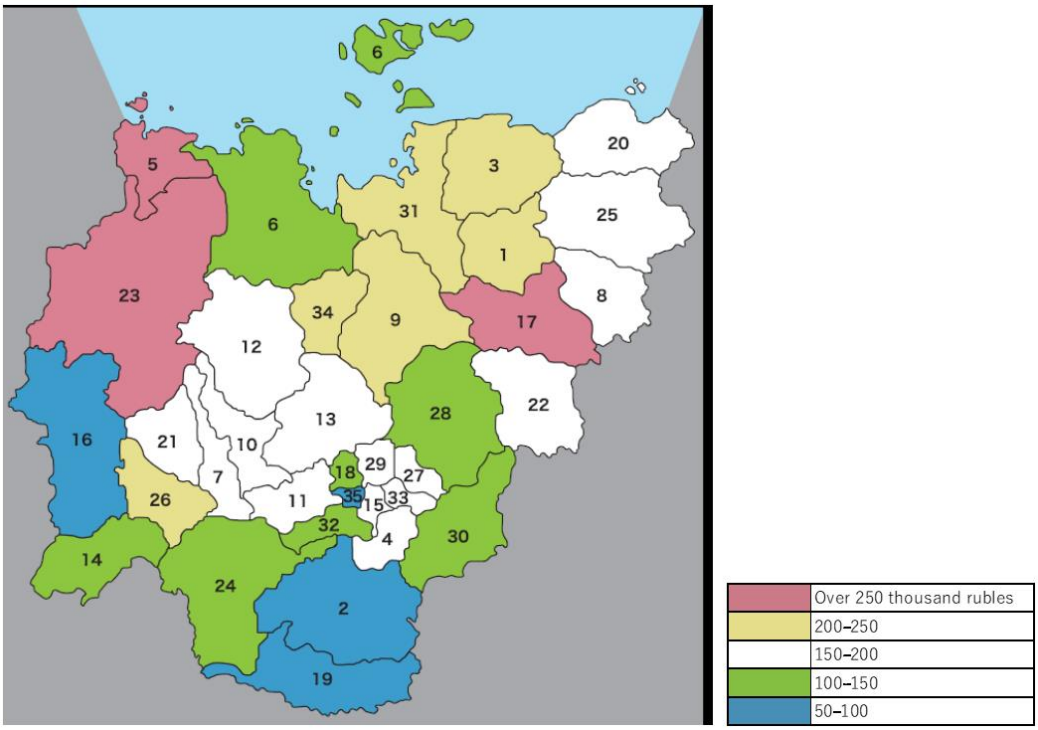
Eight districts receive dividends from Alrosa since they own stocks of this company. Alrosa is a joint-stock company; 33% of its stocks are owned by the Russian Federation, 25% by the Sakha Republic, and 8% by eight districts of Sakha, where Alrosa's production and other facilities are located. They are Anabar, Verkhnevilyuisk, Vilyuisk, Lensk, Mirny, Nyurba, Olenek, and Suntar. They have 1% of stocks each. Other stocks (34%) are owned by private entities. These shareowners received dividends from Alrosa every year. This equity information is obtained from Alrosa's website. Alrosa was transformed from a zakrytoe (closed) to an otkrytoe (public) joint-stock company in 2011. In the period from 2011 to 2016, the share of the Russian Federation and the Sakha Republic decreased from 50.9% to 33% and from 32% to 25%, respectively, and the private share increased from 9% to 34% [13] (various years).

As indicated in Figure 10, the share of public asset income in these eight districts was 21.2%, and that of transfer was 61.9% in 2019. On the other hand, in the other districts, the share of transfer was almost 90%.

These dividends caused significant differences in the revenues of local budgets. Figure 11a shows the per capita revenue of local budgets, excluding transfers in 2019. Five districts in which revenues exceed 40 thousand rubles and three of four districts in which revenues are between 30 and 40 thousand rubles receive dividends from Alrosa.



(**a**) Revenue excluding transfer.



(**b**) Revenue including transfer.

Figure 11. Per capita revenue of local budgets of Sakha, 2019. (**a**) Revenue excluding transfer; (**b**) Revenue including transfer. Sources: Calculated by the author from websites of Rosstat and Sakha's Ministry of Finance.

The other mining productions do not seem to contribute as strongly to local budgets as the diamond sector. The correlation coefficient between the share of mining production in GMP (Figure 5) and per capita local budget revenues of a district excluding transfer (Figure 11a) is 0.65. (Note that data in Figure 5 are those from 2016. We do not have data after 2017.) It is safe to say that only diamond production has a direct and distinct influence on local budgets.

Figure 11b shows the per capita revenue after the transfer, i.e., including transfer, while Figure 11a is revenue before the transfer, i.e., excluding transfer. The correlation between these two figures is not so strong (the correlation coefficient is 0.56), which suggests that transfer plays a certain role in equalizing the revenues of local budgets. The Gini coefficient improves from 0.56 before transfer to 0.21 after transfer. Thus, the diamond sector played a prominent role both in creating differences in local budget revenues and reducing these differences through transfer.

4. Concluding Remarks

The findings of this article obtained by numerical and statistical analysis are summarized as follows:

1. The mining industry has been a driving force of the economic growth of Sakha in recent years. In the mining industry, the oil sector has sharply increased its presence, while the diamond sector has decreased its presence in the economic and industrial development of Sakha;
2. The mining industry is unevenly developed in Sakha, which has caused significant inequality in per capita GMP. In other words, the mining industry has considerably increased GMP in several districts;
3. Sakha's contribution to the federal budget has increased significantly in recent years due to growing oil production. The importance of the oil sector of Sakha for the federal budget revenues has been enhanced considerably;
4. Concerning the contribution to the republican and local budgets, the diamond sector is still more influential than the oil sector. While dividends of Alrosa caused considerable differences in per capita revenues of local budgets, revenues from the diamond sector account for 30% of republican budget revenues, from which transfer is provided to local budgets to equalize differences in local budget revenues.

It seems that this paper demonstrated the considerable contribution of the oil and diamond sectors to the economic development of Sakha and the appropriateness of continuing these productions in the future. This paper's main focus, however, was limited to the contribution of the mining industry to economic growth and government budget performance. There are other areas to which the mining industry contributes. For example, Alrosa's contribution to local employment is often pointed out [17] (p. 4). The influence on other welfare, including payments of salaries and other benefits, and the construction of public infrastructure and housing, requires further examination.

On the other hand, the costs of the development of the mining industry remain to be explored. They include costs to compensate for the negative influence extended by mining companies on the natural environment and other economic activities, such as livestock farming and fishery. (Ref. [18] is an excellent previous work on this topic. They also addressed pollutions by underground nuclear explosions in the Soviet era for the purpose of seismic exploration). They are also included in topics of our future joint research.

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Conflicts of Interest: The author declares no conflict of interest.

Appendix A. Website Information on Data Used in This Paper

Alrosa

- Equity information (Information for shareholders): http://www.alrosa.ru/%D0%B8%D0%BD%D0%B2%D0%B5%D1%81%D1%82%D0%BE%D1%80%D0%B0%D0%BC-%D0%B8-%D0%B0%D0%BA%D1%86%D0%B8%D0%BE%D0%BD%D0%B5%D1%80%D0%B0%D0%BC/ (accessed on 9 September 2021)

Federal Customs Service of Russia

- Export data of Sakha: http://stat.customs.gov.ru/unload (accessed on 9 September 2021)

Federal Tax Service of Russia

- Tax revenues: https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/ (accessed on 9 September 2021)

Federal Treasury of Russia

- Performance of consolidated regional budgets: https://roskazna.gov.ru/ispolnenie-byudzhetov/konsolidirovannye-byudzhety-subektov/ (accessed on 9 September 2021)
- Performance of consolidated state budgets: https://roskazna.gov.ru/ispolnenie-byudzhetov/konsolidirovannyj-byudzhet/ (accessed on 9 September 2021)

Ministry of Energy, Russian Federation

- Natural gas production in 2020: https://minenergo.gov.ru/node/1215 (accessed on 9 September 2021)

Ministry of Finance, Russian Federation

- Diamond production in Russia: https://minfin.gov.ru/ru/perfomance/jewels/KimberleyProcess/ (accessed on 9 September 2021)

Ministry of Finance, Sakha Republic

- Local budget revenues of Sakha: https://minfin.sakha.gov.ru/bjudzhet/otchetnost/godovye-otchety (accessed on 9 September 2021)

Rosstat (Federal State Statistics Service of Russia)

- GDP and GRP data: https://rosstat.gov.ru/accounts (accessed on 9 September 2021)
- Local budget revenues of Sakha: http://www.gks.ru/dbscripts/munst/munst98/DBInet.cgi (accessed on 9 September 2021)

Sakhastat (Rosstat's branch in Sakha)

- GRP: https://sakha.gks.ru/folder/32205 (accessed on 9 September 2021)
- Industrial production: https://sakha.gks.ru/folder/35778 (accessed on 9 September 2021)
- Population (year average): https://sakha.gks.ru/folder/32348 (accessed on 9 September 2021)

Appendix B. List of Municipalities in Sakha

1	Abyysky	10	Vilyuisk	19	Neryungri	28	Tomponsky
2	Aldan	11	Gorny	20	Nizhnekolymsk	29	Ust-Aldan
3	Allaikhovsky	12	Zhigansk	21	Nyurba	30	Ust-May
4	Amginsky	13	Kobyui	22	Oymyakon	31	Ust-Yansky
5	Anabar	14	Lensk	23	Olenek	32	Khangalas
6	Bulun	15	Megino-Kangalas	24	Olyokminsk	33	Churapcha
7	Verkhnevilyuisk	16	Mirny	25	Srednekolymsk	34	Eveno-Bytantai
8	Verkhnekolymsk	17	Momsky	26	Suntar	35	Yakutsk
9	Verkhoyansk	18	Namsky	27	Tattinsky	36	Zhatay

Note: There are 34 districts and two cities in Sakha. The district is *raion* in Russian. It is called *ulus* in Sakha. Some of them are called national *ulus*. Two cities are Yakutsk and Zhatay. Since Zhatay is located inside Yakutsk, it is not shown in Figures 5, 6 and 11.

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