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Oil Windfalls and Regional Economic Performance in Russia

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Abstract

I construct a novel dataset to investigate the effects of oil income in regions of Russia. My data combines regional level data on oil endowments and a wide range of economic series for 85 geographical regions of Russia. Focusing on exogenous oil windfall gains induced by movements in oil prices, I compare outcomes in oil endowed regions to outcomes in other areas. In doing so, I show that oil resources do not seem to benefit regional economic growth. Indeed, I provide evidence that oil windfalls lead to an expansion of the local public sector and a contraction of the private sector, resulting in lower profitability and a decline in economic growth. Overall, my results indicate that only a small share of revenues benefits the local population and that there are signs of missing money.

JEL-codes: H71, H72, H75, H77, I31, I38, O13, O14, O47

Keywords: Natural Resource Curse, Rent Seeking, Dutch Disease, Regional Windfalls

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1 Introduction

The Russian oil resources have played an important role for the country's economic recovery after the Soviet collapse and political and economic changes of the 1990s. Since the beginning of 2000s and until recently, the oil prices have commonly been viewed as one of the major drivers behind Russian business cycles. According to the World Bank, IMF, and OECD, the Russian economy has performed well during periods of high oil prices and struggled when oil prices were low, however, little is known about how that "oil money" has been utilized by the Russian government and how oil-induced windfalls have affected the country's local economies and social inequalities. At the same time, extensive literature exists on the natural resource curse, which predicts an inverse relationship between resource endowments and economic growth. The volatility of the 90s and the lack of good data are the main reasons for a limited amount of research on the Russian economy.

The aim of this paper is to fill this gap in the literature and provide a better understanding of how oil resources have impacted Russian economic performance in the 2000s[1]. To do so, I construct and employ a novel database that combines regional level data on oil production and oil endowments with a new dataset consisting of a wide range of economic series for 85 geographical regions in Russia. This enables med to focus on the effects of oil windfall gains on local economic performance in Russia and provide the first evidence of a natural resource curse among Russian oil producing regions.

The empirical strategy links the global oil price with the amount of predetermined oil endowments in each oil producing region. Concentrating on the regional impacts of oil abundance enables me to treat oil price movements as exogenous relative to local characteristics and local shocks, and hence avoid the problem of endogeneity. The implemented approach is based on a panel data analysis with region fixed effects. I control both for time-varying and time-invariant region-specific characteristics, as well as time dynamics. I also implement an IV regression, where I use the exogeneity of oil prices and oil endowments as an instrument for local governmental incomes. Exploring the variation among regional economies, I then compare outcomes in oil endowed regions to outcomes in other non-oil regions.

I start by showing that the negative relationship between natural resources and economic growth, first documented by Sachs and Warner (1995), has also been present across the Russian oil regions. Regions with a high ratio of oil resources to their Gross Regional Products (GRP) have tended to have low economic growth rates. Furthermore, by utilizing a fixed effect panel method, I confirm that this relationship is still valid after controlling for region- and time-specific effects, as well as for local changes in demography.

[1]The analysis stops in 2017 and does not include the periods of the COVID-19 pandemic and the Ukrainian conflict.

After having shown the signs of the resource curse in Russian oil regions, I turn to investigate the main mechanisms behind these findings. Speaking to the literature of both Dutch disease (see Corden (1984), van Wijnbergen (1984)) and rent seeking (see Tornell and Lane (1999), Torvik (2002)), I provide evidence that oil windfalls lead to an expansion of the local governmental sector and a contraction of the private sector. In particular, I show that regional revenues increase significantly with increased oil prices, leading to an increase in public investments, average wages, and consumption. According to my estimates a permanent increase in the real oil price by 320 rubles[2] generates annually 200 thousand rules in public investment, half a million rubles in consumption and 1.2 million rubles in real wages within a region. At the same time, I find a substantial reduction in private investments, and firm profitability, which after the same increase in oil prices, fall by more than 2 and 6 million rubles respectively. I also find a reduction in local employment, but the effects turns out to be negligible. While the rise in local wages and private consumption are typical signs of a so called *spending effect*, I do not find evidence for resource reallocation between local traded and non-traded sectors, implying that the traditional Dutch disease mechanisms can not fully explain the negative relationship between oil resources and economic growth. Instead, my findings suggest rent seeking theories and embezzlement of oil revenues as plausible explanations of the Russian resource curse. Investigating how local governments spend the large, oil-induced increases in regional budgets, I find significant increases in reported spending on a variety of public goods and services, such as housing, education, and health. However, when I look at the outcomes of the reported spending, I do not find any improvements in housing quality, construction, or supply of education and health services. Furthermore, despite higher regional income, the poverty rate stays unchanged and there is a slight decrease in social payments. I also find a substantial wage rise for local government officials. Overall, I conclude that the average local population do not benefits from oil windfalls.

This paper speaks to several strands of the literature. First, I contribute to the long and rich literature regarding the relationship between the natural resource abundance of a country and its economic performance (see van der Ploeg (2011) for an overview) by showing that the negative relationship between oil resources and economic growth also can hold within a single country. Some of the known limitations of cross-country analyses is that countries differ across many dimensions, which include institutions, culture, and policies. These differences could potentially confound the cross-country relationship between resources and outcomes, but are held constant in this paper, thereby enhancing our

[2]320 rubles correspond to approximately $10, according to the average exchange rate during the period of the analysis. The annual oil production in an oil producing region during the same period has on average been 115 million barrels per year. Taking into account the regional inflation, an increase in the oil price of $10 would create an annual income of $768 million or 24.6 billion rubles within an oil region.

ability to make inference. Regional level analysis thus has the great advantage of making it easier to isolate the effects of natural resource endowments on economic performance.

Secondly, my paper speaks to a growing body of literature that examines the effects of resource abundance within a country. Studying effects both at the aggregate country level and at disaggregate regional levels, most of the empirical studies have either concentrated on countries that have been the growth winners, see Allcott and Keniston (2018), Charnavoki and Dolado (2014), Bjørnland and Thorsrud (2016), Bjørnland and Skretting (2018); or countries that have experienced civil wars or other internal conflicts, see Sala-i Martin and Subramanian (2013), Dube and Vargas (2013), Arezki and Gylfason (2013). However, as I demonstrate in this paper, while the effects of oil windfalls on Russian oil regions have some similarities with what has been documented for other oil producing countries, there are several important differences. In particular, the increases in personal consumption and real wages following an oil windfall differ from what has been shown for countries such as Brazil (Caselli and Michaels (2013)), Nigeria (Sala-i Martin and Subramanian (2013)) and a number of other African countries (Arezki and Gylfason (2013)), and is more in line with countries like Norway (Bjørnland and Thorsrud (2016)), U.S. (Allcott and Keniston (2018); Feyrer et al. (2017)) and Canada (Charnavoki and Dolado (2014)). At the same time, the finding that higher resource rents lead to more government spending and signs of lost revenue is similar to what has been shown for less democratic countries with a high level of corruption, see Caselli and Michaels (2013), Arezki and Brückner (2011), Monteiro and Ferraz (2010). In fact, the negative relationship between oil endowments and economic growth cannot be explained by a single theory approach and rather speaks to a mix of mechanisms from both the Dutch disease and rent seeking theories.

The new findings presented in this paper are relevant for countries and local areas whose economies rely on the extraction of natural resources. I also contribute to the debate on the importance of the design of political systems to ensure economic growth and the management of natural resources. Given the overall results, I argue that the development of the Russian domestic oil sector and the money coming from oil revenues have not been utilized by the country's government in a way that benefits the average citizen. My analysis shows that the picture is more complex than the view of the World Bank, IMF, and OECD.

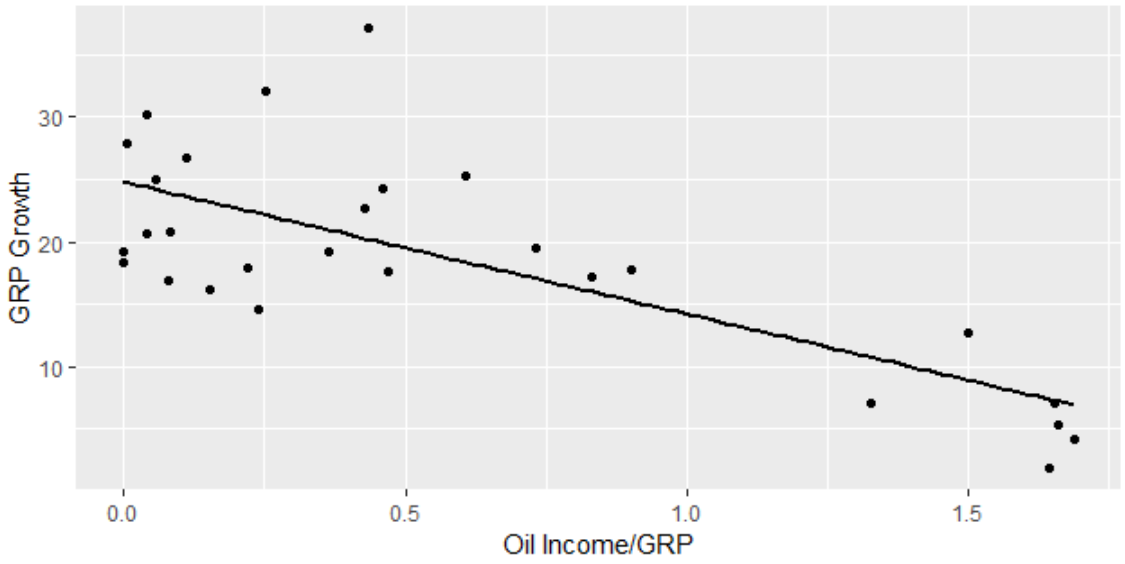
The remainder of the paper is structured as follows. Section 2 begins with stylized facts, where I apply the econometric approach from Sachs and Warner (1995) to the Russian oil producing regions. In Section 3 the two main economic theory models that may potentially explain the mechanisms behind the economic growth and resource endowments are discussed. The empirical framework and the dataset are described in Section 4. In

Section 5 I present the empirical results. In the first part, I focus on the propagation mechanisms that transfer the oil windfalls to local economies, while in the second part of Section 5 I discuss how oil-induced income affects local government behavior. The discussion of the results follows in Section 6 and Section 7 concludes.

2 Stylized Facts

In this section, I highlight some stylized facts regarding the relationship between oil resources and economic growth in Russia. As a preliminary exercise, I utilize the empirical framework applied in Sachs and Warner (1995), and examine whether the negative correlation between natural resources and economic growth is present in Russian oil producing regions. Thereafter, in Section 3 I discuss the theoretical frameworks that explain the effects of oil income gains on a country's economic performance.

Figure 1: Resource Abundance and Growth in Russian oil producing regions. On the horizontal axes: the average value of produced oil, calculated as the annual regional oil production per capita multiplied by the real price of oil, divided by the real Gross Regional Product (GRP) per capita. The vertical axis: the average annual growth in GRP per capita. The average values are calculated for the period between 2000 and 2017.



One of the main findings in the resource curse literature is that countries richly endowed with natural resources demonstrate worse economic development than other countries (see van der Ploeg (2011) for an overview of the literature). Sachs and Warner (1995) were the first to provide empirical cross-country evidence demonstrating that even after controlling for the most important country-specific characteristics, such as investment, initial income etc., resource-abundant countries experience lower growth on average.
In Figure 1 I apply the well-known regression from Sachs and Warner (1995) to the differ-

Table 1: The effect of resource abundance and economic growth in Russian oil producing regions. The dependent variable in all regressions is the average annual growth in GRP per capita. The explanatory variable in regression (1) is only the average value of produced oil, calculated as annual regional oil production per capita multiplied by the real price of oil, divided by the real Gross Regional Product (GRP) per capita. Regression (2) also includes GRP from the year 2000. Regression (3) also adds investment share as a percentage of GRP, while regression (4) also includes the average crimes per capita. The average values are calculated for the period between 2000 and 2017 for oil producing regions.

	(1)	(2)	(3)	(4)
Resource abundance	−10.601***	−11.339***	−9.552***	−10.100***
	(1.887)	(2.163)	(1.898)	(1.863)
Initial income		0.058	−0.067	−0.100
		(0.081)	(0.078)	(0.078)
Investments			45.120***	50.924***
			(13.457)	(13.466)
Crime				299.911*
				(181.729)
Adjusted R^2	0.531	0.522	0.661	0.684

*, **, or *** indicate that estimate is significant at 5, 1 or 0.1 per cent level.

ent regions of Russia, exploring the relationship between resource abundance and growth in the oil producing regions. However, as I will return to in Section 4, there are several potential problems with such a regression. I discuss how I deal with these below. Nevertheless, given the famous status of the Sachs and Warner (1995) approach in the literature, I also choose to investigate how their approach works with my data for illustrative purposes.

Each point in Figure 1 represents a region. The horizontal axes show the average value of produced oil as the share of Gross Regional Product (GRP) per capita, while the vertical axis shows the average annual growth in GRP per capita between 2000 and 2017. From the regression line, we can see that the correlation between the amount of natural resources and economic growth is negative, and the first column of Table 1 shows that the negative relationship is highly significant. Next, I follow Sachs and Warner (1995) and control for the region-specific characteristics that could drive this result. In the second column in Table 1, I control for regional economic developments by including the initial GRP. Columns three and four control for the regional investment climate and level of corruption, including the average share of investment in GRP and average number of crimes per capita, respectively. As can be seen from the table, the negative correlation between resource abundance and economic growth remains significantly negative at the 1% level in all regressions.

The results presented above indicate that the empirical findings described in Sachs and Warner (1995) also hold within a country like Russia. However, these results only show a correlation between regional oil production and growth and cannot be used to make a

causal inference about the effects of oil windfalls on regional economies and the underlying mechanisms. In Section 4, I look at several potential problems with the approach based on Sachs and Warner (1995) and develop an empirical approach based on a fixed effect regression that deals with these problems. First, however, I discuss the two most famous theoretical models that describe the potential implications of natural resource extraction on economic growth as well as the underlying mechanisms behind these effects.

3 Theories of Dutch Disease and Rent-Seeking

In the previous section, we saw that a negative correlation exists between available oil resources and economic growth in different regions of Russia, which is a potential indicator of a natural resource curse. In this subsection, I present the two main economic theory models that seek to answer why more resources lead to less growth.

Models on the natural resource curse were initially dominated by the theory of Dutch disease (see Corden and Neary (1982), Corden (1984), van Wijnbergen (1984), Krugman (1987)). The main idea behind these models is that natural resource abundance changes the composition of production, which in turn determines productivity. The mechanism is as follows: oil-induced income leads to the expansion of government expenditures, followed by an increase in consumption. While the prices of local non-traded goods go up, the traded sector is not able to increase their prices, as these are determined internationally. This changes the structure of the economy and leads to an expansion of the non-traded or service sector and a contraction of the manufacturing/traded sector. This is called the *spending effect*. In addition, if the booming sectors share the domestic factors of production with other sectors, resources are drawn out of the traded sectors and their production decreases further, which is known as the *resource movement effect*. According to van Wijnbergen (1984) and Krugman (1987), the reduced traded sector results in less learning-by-doing and lower productivity growth. If this effect is sufficiently strong, it will outweigh the initial increase in income that the oil windfall generated.

The second type of models that explains the resource curse phenomenon are rent seeking models. The main idea behind this theory is that new income possibilities lead to increased rent seeking activities, which reduce the net growth in income for the society (Torvik (2009)). As shown by Tornell and Lane (1999), in a country with powerful groups and weak legal political infrastructure, an income possibility will reduce the net growth in the economy through two opposing effects. The first one is the direct effect or an immediate income effect, which increases the income or the profitability of investment. The second is a so-called voracity or displacement effect, which leads each group to attempt to grab a greater share of national wealth, as rent seeking becomes more profitable, i.e.,

there is a shift from production to grabbing. So if there are no institutional barriers to discretionary redistribution, the second effect dominates and the net growth in the economy declines.

Although the mechanisms behind Dutch disease and rent seeking models differ, both theories predict a decline in productivity following oil discoveries/extraction. However, in contrast to the former theory, the latter suggests that productivity in the non-traded sector may decrease (see Torvik (2002)), as fewer entrepreneurs will run firms and more will engage in rent seeking. Furthermore, according to rent seeking models, a positive revenue shock should lead to more than a proportional increase in fiscal spending (Tornell and Lane (1999)). At the same time, these types of models do not predict an increase in consumption and local prices.

So far, the main focus in the literature has been on examining the Russian economy purely for symptoms of Dutch disease (see Algieri (2011), Dobrynskaya and Turkisch (2010), Mironov and Petronevich (2015)). However, none of these studies have properly identified oil windfall gains, as the recovery after the 1990s had not been accounted for. Although the fiscal situation improved substantially after the post-Soviet crisis of the 1990s, and Russia dropped from 47th place on the Transparency International Corruption Perceptions Index in 1996 to 154th in 2010, corruption in Russia is still perceived to be a significant problem.[3] According to Mehlum et al. (2006), in a society with grabber-friendly institutions, more natural resources may stimulate predation, rent seeking, and other destructive and non-productive activities, thus creating negative externalities for the rest of economy. In this case, the theory of Dutch disease alone will not be able to explain all of the developments caused by windfall gains in Russia.

To link the theory discussed above to the case of Russia, it is natural that we would examine how oil-induced windfalls affect different parts of regional economic performance. To do so, I specify an empirical framework that allows me to analyze the effects of regional oil endowments on (i) regional economic indicators, such as firm profitability, employment, consumption etc., and sector-specific characteristics, (ii) regional governmental behavior. This is the topic of the next section.

[3]According to an index based on the Environment, Social & Governance, Environment, Stability & Rule of Law, Control of Corruption developed by the World Bank, Russia is among the most corrupt countries in the world, with an average score of -0.95 for the period 2000 to 2017. For comparison purposes, the scores in Nigeria, Brazil, and United States for the same time period were -1.16, -0.09, and 1.48 respectively.

4 Empirical Framework

Although the findings outlined in Sachs and Warner (1995) have attracted considerable research interest, there are several concerns related to the empirical framework used by the authors. One such concern is the ability to control for all relevant country-specific effects, known as the problem of missing variable bias. As is pointed out in Torvik (2009), although we know a great deal about why countries differ, the robustness of the correlation between resource abundance and growth merely provides us with an indication that there may be a causal effect from resources to growth.

Concentrating on a single country and exploring a variation within the country's regions partly solves this problem, as we expect there to be much less variation within a country than across countries. Differences in, for instance, institutional quality, level of industrialization and trade openness should vary substantially less. However, although within country analyses raise fewer concerns about variation across the regions than across countries, it is still important to control for all relevant region-specific effects. In practice, we will never be able to know whether all relevant characteristics have been considered, especially given that some of the effects may be unobservable.[4] For this reason, I stick to panel data analysis with region-fixed effects to control for region-specific characteristics. In Section 2, the regression analysis included the average measures for oil producing regions. In the rest of this paper, I will include the whole set of Russian regions, where non-producing regions will be a control set, intended to capture common developments within the country. In addition, instead of analyzing average values, I use the annual dataset over a certain sample period, controlling for time fixed effects to control for dynamic effects.

Another key concern is that causality may run from economic variables to the measure of resource abundance, rather than the other way around. In the empirical analysis of Sachs and Warner (1995), the authors have used the value of the exported resources as a measure for a country's resource abundance. However, under some circumstances it may be more tempting to extract natural resources, or to explore the potential for doing so, than under other circumstances (Torvik (2009)). Hence, the challenge is to find a measure of natural resources that is truly exogenous. In my empirical analysis, I focus on oil windfall gains identified by movements in international oil prices. I interact real-oil prices with the amount of predetermined regional oil endowments. The exogeneity of oil prices to local characteristics and local shocks is a reasonable assumption, as each of the regions is too small to be able to influence global oil prices.[5] Furthermore, as I use

[4]For instance, there are no good measures for the regional quality of institutions in Russia.

[5]Each of the regions is not a big player in the global oil market and the production in all but one region is far below 1 per cent of global daily output. Furthermore, the results are fully robust for the exclusion

oil endowments that existed before the analyzed sample period, the exogeneity of this measure should be less of a concern.[6]

4.1 The Panel Data Models

I present results from the two types of empirical models below. The first set of results are generated by the regression specified below:

$$Y_{st} = \delta_s + \beta_1 Oil_{st} Res_{s2000} + X'_{st}\rho + D_t + e_{st} \quad (1)$$

where Y_{st} is a set of regional outcomes of interest in region s at time t, D_t is a year fixed effect. δ_s is a region fixed effect that captures all time-invariant region-specific characteristics, such as geographical location, territory, distance to other regions etc. X_{st} is a vector of time-varying regional controls, which are changes in the population living in cities, and the working age population. The oil windfalls are estimated by the interaction term $Oil_{st}Res_{s2000}$, where $Res_{s,2000}$ is the oil endowments in region s in year 2000, and Oil_t is the average real price of oil in year t.

In order to analyze how the oil income affects local governmental behavior and how money coming from oil is used within the oil regions, I specify an IV regression. The approach is based on the model proposed in Caselli and Michaels (2013), however, it departs in several important ways. First, because many of the region-specific characteristics, such institutional differences in Russian regions, are hard to measure, instead of using pooled OLS with a lot of controls, I concentrate on the fixed effect regression. Secondly, because the majority of Russian oil production takes place onshore, I concentrate on oil production that is happening within the territory of the regions. As I have discussed above, the use of annual oil production as an instrument for revenues coming from oil will therefore be problematic: economic circumstances within the regions can affect how much oil will be produced (exogeneity problem). For this reason, in contrast to Caselli and Michaels (2013), my instrument is specified as disposable oil endowments at the start of my sample period multiplied by the average real price of oil.[7] The IV regression is specified as follows:

of the top oil producing regions.

[6] In addition, as I describe in Appendix B decisions concerning oil production are taken at the central level and local governments are unlikely to influence these. Also, Russian oil production has been fairly stable since the Russian oil boom during the early 21st century, with an average annual increase of 1.3%. A common perception has been that Russian oil production is not very sensitive to changes in oil prices and there is evidence (which is not presented in this paper) that, if anything, the responses of Russian oil companies to a fall in oil prices has been to increase oil production in order to compensate for governmental income loses.

[7] As a robustness check, instead of oil reserves, I use the average oil production over the analyzed sample period.

$$Y_{st} = \delta_s + \beta_1 R_{st} + X'_{st}\rho + D_t + e_{st} \tag{2}$$

where Y_{st}, X_{st} ,δ_s , D_t are defined in the same way as in Equation 1. R_{st} is the regional budget revenues that are available to the local government, which is instrumented with the interaction term $Oil_{st}Res_{s2000}$. That is, specification 2 uses specification 1 (with Y_{st} being regional revenues) as its first-stage regression.

By instrumenting local revenue budgets with the real price of oil, I ensure that the identified variation in regional income is coming from exogenous variation in oil income. In order for this instrument to be valid, it has to fulfill two criteria: relevance and exogeneity. In Section 5.2, I confirm that in oil producing regions, increase in oil prices is strongly associated with higher regional revenues and hence fulfill the relevance criteria. Next, for exogeneity criteria to hold, the set of outcome variables in Equation 2 considers series that can only be affected by oil prices through governmental expenses.[8]

4.2 The Data

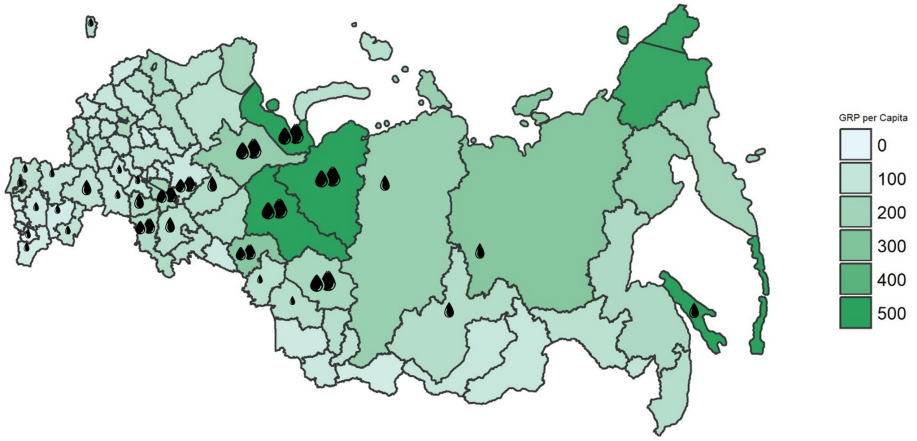
In this paper, I construct a novel panel dataset, which combines regional level data on oil production and oil endowments with a new dataset consisting of wide range of economic series for 85 federal subjects (regions) of Russia. The dataset is at annual frequency and covers the sample period from 2000 to 2017. The domestic data panel covers economic, demographic, and oil-related data series for federal subjects in Russia. In order to investigate the effect of oil windfalls on regional economic performance, I also include the real price of oil, measured by Urals crude oil, which is the benchmark oil price for Russia.

The regional data series, except for oil-related data, are obtained from annual reports available at the Russian Federal State Statistics Service. The data-set can be split into nine main categories: (1) Population series, which in addition to the total population includes the working age population and number of inhabitants living in cities. (2) Employment series. (3) Income and living standards, including, among other things, wages, social payments, and the poverty rate. (4) Housing standards and construction. (5) Education and health series. (6) Indicators of economic activity, such as investment, value added, firm profitability, GRP. (7) Budget items, including regional disposable revenues, divided into sub-items depending on the source of income, and reported expenses divided into different areas. (8) Regional price levels. (9) Oil-related series: oil reserves and oil production in onshore oil producing regions, obtained from Rystad Energy. All nominal series are CPI deflated by the annual regional CPI index, in order to account for inter-

[8]For instance, regional budgetary investments or social payments paid by the government come directly from the regional budget.

(a) Average Population and Oil Production in Russian Regions (millions of people)

(b) Average Gross Regional Product (GRP) per Capita and Oil Production in Russian Regions



(c) Average Poverty Rate and Oil Production in Russian Regions

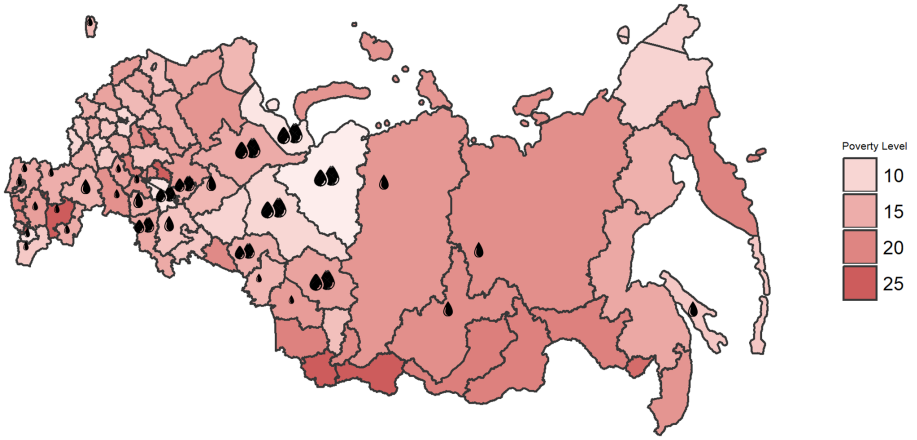


Figure 2: Map of Russia with regional boundaries and oil reservoirs. Subfigures show the average (a) population, (b) real GRP per capita, (c) poverty rate, in the period between 2005 and 2017. In addition, the maps show the location of oil reservoirs, where all oil regions are indicated with "oil drops". A double oil drop indicates that the average oil production in the region is above 100 kbbl/day. Figure 4 in Appendix B shows the map of Russia with the names of the regions.

regional price variations. Furthermore, all series are either transformed into per capita terms or rendered in percentage points. Most of my analyses start from 2005 or 2010, due to data availability.

Figure 2 shows a map of Russia with regional boundaries and oil reservoirs.[9] In addition, each of the subfigures illustrates the distribution of average values for the following series: Population (2a), GRP per capita (2b), and poverty level (2c). As can be seen from these subfigures, there is a lot of heterogeneity between the regions in terms of territory, population, and economic conditions. While the biggest region in geographical terms of area (the Sakha region) has a relatively small population of around one million, the Moscow region, which has the both status being a city and a separate region, has a population of more than 12 million. The economic situation is also substantially different across the regions. In the period between 2000 and 2017, the average gross regional domestic product per capita was in the range of less than 30,000 RUB and more than 750,000 RUB, while the average poverty rate was between 8% and 47%.[10] The differences between the regions indicate the importance of controlling for regional fixed effects. Furthermore, as there is no apparent relationship between oil producing and non-oil regions, the use of an appropriate empirical framework that can fully utilize the whole dataset is important to understand the effects of oil on the Russian economy.

The full overview and description of the data, together with source information, is given in Appendix A.

5 Empirical Results

In Section 2 we have seen that oil resources and economic growth are negatively correlated on average. This section begins by analyzing whether these results are still valid in the fixed effect framework described in the previous section. Then, I look at how oil windfall gains affect two aspects of regional economies: First, I test the predictions from the theory models presented in Section 3 and investigate the mechanisms behind the negative correlation between local oil reserves and economic growth. Next, I turn to the question of how oil-induced income affects local governmental behavior.

[9] Figure 4 in Appendix B shows the map of Russia with names of the regions.

[10] The regional poverty rate is defined as the share of the population that has an income below a given level.

5.1 Oil Resources and Regional Economic Performance

In this subsection, I first compare the responses in GRP growth to growth in public spending. I then examine how different aspects of regional economies respond to the oil windfalls and compare my findings with the predictions from the theory models discussed in Section 3.

A. Economic Growth vs Public Spending

Table 2 shows the effects of an oil windfall. The windfall is estimated by the fixed effect regression model, c.f. Equation 1, on growth in gross regional product (GRP) and regional budgetary revenues. Column (1) shows that the oil endowments lead to a reduction in economic growth in oil producing regions relative to non-oil producing regions. This confirms that the relationship between oil resources and local growth, described in Section 2, is still valid after controlling for region- and time-specific effects, local changes in demography, and properly identified oil income gains.

Table 2: The Effect of an Oil Windfall on Regional Economic Outcomes. The results are obtained from regression 1 where the dependent variables are: (1) Real Growth in GRP per capita; (2) real growth in revenue budget per capita; (3) Difference in growth rates in columns (1) and (2). The frequency is annual. The sample period is 2005-2017. *, **, and *** indicates that estimate is significant at 5, 1 or 0.1 per cent level.

	Dependent Variables:		
	Growth GRP	Growth Budget Income	Growth Diff
	(1)	(2)	(3)
Oil Resources	−0.886**	1.213**	2.099***
	(0.348)	(0.616)	(0.604)
Observations	1,014	1,014	1,014

*, **, or *** indicate that estimate is significant at 5, 1 or 0.1 per cent level.

From column (2) we can see that the budgetary revenues in these regions experience a significant boost. Hence an oil windfall leads to an increase in local governmental spending, while growth in GRP decreases. Column (3) shows that the difference between the growth rates in GRP and budgetary revenues is significantly positive. I discus these findings towards the end of this subsection.

One important point to be aware of throughout the rest of the paper is that the increase in budgetary revenues after an oil windfall does not come directly from taxes on oil extraction. Most of the proceeds from received oil revenues accrue to the federal budget, which then in turn transfers a considerable amount of these revenues back to the region where the production is actually taking place. This will be discussed in more detail in Section 5.2. I now turn to the effects of an oil windfall on other aspects of regional economies.

B. The Mechanisms Behind the Negative Growth

Table 3 presents the effects of an oil windfall on central variables expected to change according to the theories of rent seeking and Dutch disease (see Section 3). First of all, we can see that an oil windfall leads to a decrease in firm profitability. This reduction is associated with a decline in investments and employment, which explains the negative GRP growth. At the same time, the income effect from windfall gains results in higher wages and increased consumption.

Table 3: The Effect of an Oil Windfall on Regional Economic Outcomes. The results are obtained from regression 1 where the dependent variables are: (1) Share of working age population registered as employed; (2) Firm profits (average) per capita in real values; (3) Real Investments per capita; (4) Real Consumption per capita; (5) Real monthly wage. The frequency is annual. The sample period is 2005-2017.

	Dependent variables:				
	Employment	Profit	Investment	Consumption	Wage
	(1)	(2)	(3)	(4)	(5)
Oil Resources	−0.207**	−16.103***	−5.570**	113.011***	263.267***
	(0.084)	(1.786)	(2.514)	(26.918)	(34.916)
Observations	1,014	1,014	1,014	1,014	1,014

*, **, or *** indicate that estimate is significant at 5, 1 or 0.1 per cent level.

While I find significant coefficients for all variables, the magnitude of the effect differs substantially. To compare the the impact on regional economies, I consider an increase in oil prices by 320 rubles, which is approximately $ 10 according to the average exchange rate during the period of my analysis.[11] Such a windfall leads to a reduction of profits by more than 6 million rubles within an oil region, which on average corresponds to a decline in corporate profits by 14 percent relative to other non-oil regions. The estimated reduction in investment is calculated to be more than 2 million rubles, which corresponds to around 2 percent of the investment in oil regions. Interestingly, while I find that fall in employment is significant at 1 per cent level, the effect turns out to be sparse: an increase in oil prices by 320 rubles results in a reduction by less then 1 employee within an oil region. Further, I find that monthly private consumption and monthly real wages increase approximately by 42000 and 100000 rubles, respectively. This corresponds to half a million and 1.2 million rubles per year. While these numbers seem to be large, the increase in welfare is considerably smaller than the decrease in corporate profits and investment. In terms of per capita, the changes in households consumption and wage are near zero.

[11] As it was mentioned in introduction, the annual oil production in an oil producing region has on average been 115 million barrels per year. Taking into account the regional inflation, an increase in the oil price of $10 would create an annual income of $768 million or 24.6 billion rubles within an oil region.

Table 4: The Effect of an Oil Windfall and Regional Budget Revenues on Regional Economic Outcomes. The top row is a fixed effect regression from 1, the middle row is an IV regression from 1; the last row is a fixed effect regression with budgetary revenues as the explanatory variable. The dependent variables are: (1) Investments financed by own funds per capita; (2) Investments financed by credits in banks per capita; (3) Investments financed by the regional budget per capita; (4) Poverty rate defined as the share of regional population with income under the regional poverty line; (5) Monthly real wages of governmental officials. The frequency is annual. The sample period is 2005-2017. * Wage to governmental officials is available only from 2010.

	Dependent variable:				
	Investments			Poverty Rate	Wage
	Own Funds	Bank Credits.	Regional Budget		Government Officials
	(1)	(2)	(3)	(4)	(5)
Oil Reserves	-8.238^{***}	2.574	0.615^{***}	0.069	$1,029.278^{***}$
	(1.401)	(2.632)	(0.125)	(0.134)	(57.202)
Budget Revenue (IV)			181.151^{***}		$344,869.500^{***}$
			(33.097)		(38,705.590)
Budget Revenue (FE)			161.244^{***}		$84,338.450^{***}$
			(14.773)		(7,760.463)
Observations	1,014	1,014	1,014	1,014	624

*, **, or *** indicate that estimate is significant at 5, 1 or 0.1 per cent level.

Table 4 reports the effects of an oil windfall on a set of investment and income variables. Columns (1-3) in Table 4 show that the reduction in investment is coming primarily from a decline in private investments, while government investments experience a boost. According to these estimates a 320 rubles increase in the oil prices results in more than 3 million rubles decline in private investment within a region. The increase in government investment is considerably smaller, and is estimated to be approximately 200 thousands rubles. Furthermore, from the top row in Table 4, we can see that the wage level of local government officials increases substantially more than the average wages in the region.[12] An increase in the oil prices by 320 rubles results in more than 388 000 rubles in local government wage income within a region, this effect is almost four times higher than the increase in average wages. Column (4) in Table 4 shows that the regional poverty rate is not affected.

As both regional budget investment and governmental officials' wages are coming directly from the regional budget, I am able to use the IV approach described in Section 4. Rows (2) and (3) in Table 4 report results with the budgetary revenue as the explanatory variable, whereas in the former row revenues are instrumented with the real price of oil,

[12]Unfortunately, I am not able to distinguish between government officials' wages and wages to other employees, so the average wage series includes local governors. For this reason, the reported effect on average wages may be overestimated and the only conclusion we can draw is that regional wages increase less than one fourth of the increase in local government wage.

while in the latter row the results are from fixed effect regression. We notice that the effect for local government officials' wages is substantially higher from oil-induced income than from the general income.[13]

Table 5: The Effect of an Oil Windfall on Regional Economic Outcomes. The results are obtained from regression 1 where the dependent variables are value added in different sectors: (1) Agriculture, fishing, hunting,and mining (2) Manufacturing, (3) Construction and Service. The frequency is annual. All variables are per capita. The sample period is 2005-2017. *Due to missing data, the Tyumen region is excluded from the dataset.

	Dependent variable:		
	Agriculture and Mining	Manufacturing	Service and Construction
	(1)	(2)	(3)
Oil Reserves	0.001	−0.0002	0.002
	(0.003)	(0.0004)	(0.003)
Observations	1,014	1,014	1,014

*, **, or *** indicate that estimate is significant at 5, 1 or 0.1 per cent level.

Having seen the responses for general macro variables at a regional level, I now turn to sectoral regional data. According to the literature of Dutch disease, a resource boom should cause a reallocation of resources between traded and non-traded sectors, where the traded sector is expected to be crowded out due to expansion of the local service sector. Table 5 shows the effect of oil windfall on value added in agriculture and mining, manufacturing, and construction and service sectors.[14] As can bee seen from the table, while the effects from an oil windfall are negative on manufacturing and positive on other sectors, none of these effects are significant.

To sum up, we have seen that oil windfalls have had diverse effects on regional oil producing economies. On the one hand, oil windfalls lead to an increase in governmental expenditure, average local wages, and consumption, that are all signs of a so called spending effect from the Dutch disease literature. On the other hand, we see a decrease in local economic growth, private investment and the profitability of firms, that evidence for presence of a resource curse and are both in line with the theory of Dutch disease and rent seeking. The spending effect is expected to arise when government, that receives money from oil, rebate the income to local population, at the same time as we also typically see the expansion of the public sector. As consumption and demand for local goods go up,

[13]The fixed effect results, here and in the next subsection, do not necessarily identify a causal effect, as regional revenues are potentially endogenous to other regional variables. If these could be interpreted causally, the fixed effect coefficients would describe the allocation of revenue independent of its source, not the effect of oil-related revenues.

[14]Both construction and service sectors are typical local non-traded sectors. These are also among the most positively affected sectors by energy booms according to Bjørnland and Thorsrud (2016). Manufacturing, on the other hand, is commonly viewed to represent the traded sector.

we should see a boost in the local non-traded sector at the expense of local traded sector, that indeed result in slower economic growth and reduced profitability (see Section 3 for more details). In fact, while the results presented above provide evidence of decrease in economic growth and firms profitability, I do not find any significant evidences of the redistribution effects between traded and non-traded sectors. In fact, the results point in the direction of expansion of the local public sector and contraction of the local private sector.

If we consider local government as powerful groups that appropriate natural resources for themselves, then the asymmetry in the income distribution of oil revenues is consistent with the discretionary fiscal redistribution mechanism described in Tornell and Lane (1999) and rent seeking activities could be a possible explanation of negative growth. Such shift from production to grabbing could explain reduction in private investment and negative effect on firms profitability. In addition, the documented, more than proportional, increase in fiscal spending relative to economic growth after an oil windfall further supports the theory of Tornell and Lane (1999), which argues in favor of rent seeking activities (see Section 3 for more details). The fact that we do not see any improvements in the poverty rate, despite the increase in governmental income and public investments, could be another indication that the average population does not benefit from the oil boom and the public revenues coming from oil money is used in an unproductive way through which the mayor favors certain groups, such as local government officials. This hypothesis is exploited further in the next Section.

So far, we have seen that an oil windfall induces a contraction of the private sector, which may explain why oil producing regions grow more slowly compared to the rest of the Russian economy. At the same time, we have seen that oil-induced income leads to an expansion of the local public sector, in terms of growth in budget revenues, investments and government officials' wages. Despite the fact that I find several signs of the spending effect, the overall results speak in favor of rent seeking activities. To further understand where the oil money is going, in the next Section, I examine how local governments utilize oil-induced revenues.

5.2 Missing Money?

In Section 5.1 we have seen that an oil windfall is associated with growth in regional budget revenues. A central question is then how local governments spend the large, oil induced increases in regional budgets. In this Section I will first investigate the channels of the increased income. Next, I will examine how the income influences the reported spending on a variety of public goods and services. Lastly, I will study whether there are any improvements in the areas of housing, education, and health services, where the local

government has reported increased expenditure.

A. Budget Revenues

I start by confirming that oil brings money to local government during the whole sample period, also after 2010, the year when the regional oil tax share fell to zero (see Appendix B for more details). The first column in Table 6 confirms that the effects from oil resources on total budget revenue are significantly positive. The coefficients imply that one ruble in oil windfall increases total local government revenues by nearly 3 kopecks.[15] This applies also after the reform.

Table 6: Effect of an Oil Windfall on Regional Revenues. The results are obtained from regression 1 where the dependent variables are: (1) total budgetary revenues, and three main parts of budgetary revenues coming from (2) tax (3) transfers (4) non-tax. The regressions are estimated over two sample periods: 2005-2017 (top row), and 2010-2017 (bottom row); All variables are per capita and are in real terms. The frequency is annual.

	Dependent variable:			
	Total	Tax	Transfer	Other
	(1)	(2)	(3)	(4)
Oil Resources 2005-2017	3.396***	−0.849***	1.645***	2.600***
	(0.0004)	(0.299)	(0.166)	(0.171)
Observations	1,014	1,014	1,014	1,014
Oil Resources 2010-2017	2.985***	−0.901***	1.591***	2.295***
	(0.0003)	(0.290)	(0.137)	(0.142)
Observations	624	624	624	624

*, **, or *** indicate that estimate is significant at 5, 1 or 0.1 per cent level.

Furthermore, I divide the regional revenue into three parts: tax, transfers from the federal budget, and non-tax. Interestingly, I find that the increase in regional income is not due to tax income, but due to transfers and other income, both being highly significant (see columns (2-4) in this regard). Tax income, on the other hand, declines after an oil windfall.

According to the Russian Tax Code, most of the taxes on oil extraction went to the federal budget before 2010 and all of it in the periods after (see Appendix B for details). Nonetheless, a considerable part of these taxes were transferred back to the regions where production took place. The amount that was transferred back from the federal budget to the regions is based on the local potential tax base, regional budget expenses and political bargaining in the parliament. Furthermore, many oil companies have their head offices

[15]The Russian monetary unit the ruble is divided into 100 kopecks.

in other regions rather than where the oil is produced,[16] thus, most of the taxes on wells and property, as well as corporate and personal taxes, do not remain in the regions and the effect on local corporate and personal taxes is therefore minor.

While the former discussion explains why we do not see an increase in regional tax revenues after an oil windfall, there are at least two possible reasons for why tax incomes are reduced. Firstly, in the previous section we have seen that an oil windfall induces a decline in firm profitability. This in turn should result in a reduction of the regional tax base. Secondly, the reallocation of capital from the formal to informal sector, where it is safe from taxation, is one of the standard implications of an income shock according to rent seeking models.

To sum up, I find that a higher oil price has a clear positive effect on regional budget revenues. The effect remains significant, even after 2010. I show that the main channels for income are transfers from the federal budget and non-tax revenues. The former are the result of political bargaining, while the latter is related to property fees, etc. Next, I turn to the question of how the oil-induced income affects the reported budgetary spending.

B. Budget Expenditure

After establishing that oil brings money to regional governments, the next question is how the money is used. First, I investigate what local government spend their money on, according to what is reported in local budgets. The first row of Table 7 shows the results from the IV model, described in Section 4, where total regional revenues are instrumented by the interaction between oil price and regional oil resources. The results show that the reported spending on housing benefits most from the increase in regional revenues from oil. According to my estimates the government reports spending about 35 kopecks of each ruble from the oil revenues on housing. The reported education and health expenditures increase somewhat less, each of which receives about 10 kopecks from each ruble, still the results are highly significant. On the other hand, other spending (which includes state expenditures and social politics) does not seem to benefit from oil revenues, and, if anything, the effect is negative. The Fixed Effect results, describe the allocation of revenue independent of its source, and is not necessarily identify a causal effect. Still we see that all the coefficients are significantly positive, meaning the reported expenses increases with revenues.

[16]The head offices for the oil companies Gazprom, Rosneft, and Lukoil are located in Moscow and St. Petersburg.

Table 7: Effect of Regional Revenues from Oil (IV regression top row) and General Revenues (fixed effect regression bottom row) on Regional Expenditure. The dependent variables are: (1) total regional government expenditure; part of budgetary revenues related to (2) housing (3) education (4) health (5) social politics and (6) national economics. All variables are per capita and are in real terms. The frequency is annual. The sample period is 2005-2017.

	Dependent variable:					
	Total	Housing	Education	Health	Social Politics	National Economics
	(1)	(2)	(3)	(4)	(5)	(6)
Budget Revenues (IV)	0.670***	0.345***	0.135***	0.117***	−0.052**	−0.068
	(54.039)	(28.764)	(14.123)	(12.764)	(20.782)	(53.454)
Budget Revenues (FE)	0.821***	0.161***	0.112***	0.067***	0.066***	0.294***
	(15.220)	(5.995)	(4.118)	(3.415)	(4.773)	(10.431)
Observations	1,014	1,014	1,014	1,014	1,014	1,014

*, **, or *** indicate that estimate is significant at 5, 1 or 0.1 per cent level.

C. Housing, Health, and Education

Given a substantial increase in reported housing, health, and education expenditures due to oil-induced revenues, one would expect to see improvements in housing standards, and health and education services. Tables 8 and 9 present the results from the IV and FE regressions where I examine whether different housing quality and health and education services change with higher revenues. As it takes time to improve/build houses, I lag the revenues by one year.[17]

Table 8: The Effect of Regional Revenues from Oil (IV regression top row) and General Revenues (fixed effect regression bottom row) on Housing Quality.The dependent variables are: (1) share of houses in the region registered as being in emergency conditions; (2) share of houses in the region that are connected to the water mains (3) share of houses in the region that are connected to the sewer system (4) share of houses in the region that are connected to a central heating system (5) share of houses in the region that are connected to warm water; (6) share of houses in the region that are connected to gas pipelines. The frequency is annual. The sample period is 2005-2017. The regional revenues are lagged by one year.

	Dependent variable:					
	Emergency	Water	Toilets	Heating	Warm water	Gas
	(1)	(2)	(3)	(4)	(5)	(6)
Budget Revenues (IV)	9.877	53.502	1.962	5.776	86.517	4.050
	(476.029)	(2,573.863)	(98.045)	(279.640)	(4,160.130)	(195.067)
Budget Revenues (FE)	−0.022***	−0.029	−0.044	−0.023	−0.005	0.004
	(0.008)	(0.014)	(0.013)	(0.016)	(0.017)	(0.011)
Observations	858	858	858	858	858	858

*, **, or *** indicate that estimate is significant at 5, 1 or 0.1 per cent level.

[17]The results are very similar if I use more than one lag or estimate the IV for the same period.

The first row of Table 8 reports the effect of oil-induced revenues on housing quality. The first column reports the changes in the share of houses registered in emerging conditions, columns two to six report the share of houses that have different infrastructures, such as a connection to the water mains, warm water, gas, etc. As can be seen from the table, I do not find any significant changes in any of these variables. Furthermore, examining the effect of a general increase in local revenues, the only significant effect is a decline in the share of houses registered in emerging conditions, which are those that cover basic needs. According to the coefficient, one extra million rubles of regional revenues, reduces the living area within the region registered in emerging conditions by 9600 square meters.

Table 9: The Effect of Regional Revenues from Oil (IV regression top row) and general revenues (fixed effect regression bottom row) on Health and Education. The dependent variables are: (1) number of available hospital places per capita, (2) number of doctors per capita, (3) number of preschool places per 100 children under the school age, (4) number of teacher per 100 pupal (5) real monthly social payments. The frequency is annual. The regional revenues are lagged with one year. The sampler period is 2005-2017. The number of teacher is available only from 2010.

	Dependent variable:				
	Hospital Places	Doctors	Preschool	Teachers	Social Payments
	(1)	(2)	(3)	(4)	(5)
Budget Revenues (IV)	0.00002	0.00001	−0.086	−0.00000	−4.624*
	(0.00002)	(0.00001)	(0.738)	(0.00002)	(2.600)
Budget Revenues (FE)	−0.00000	0.00001***	0.016	0.00000	6.122***
	(0.00000)	(0.00000)	(0.147)	(0.00000)	(0.684)
Observations	936	936	936	702	1,014

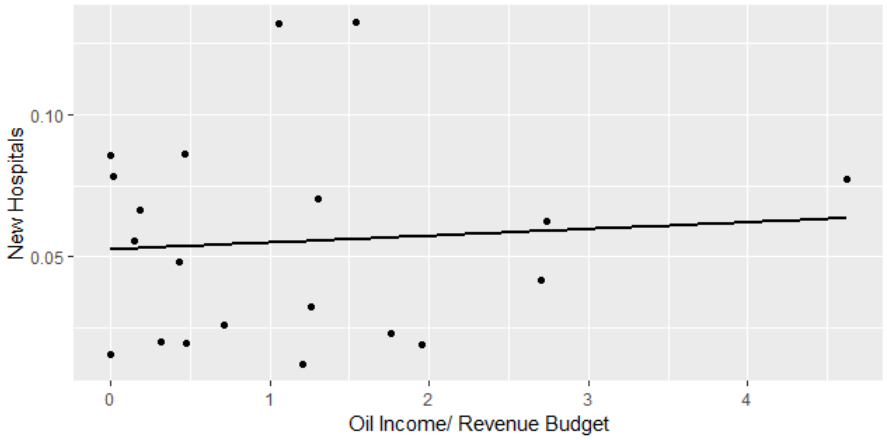
*, **, or *** indicate that estimate is significant at 5, 1 or 0.1 per cent level.

Table 9 reports the results for variables that measure different aspects of health and education: the number of available hospital places and doctors per capita, preschool offers, as well as the number of teachers per 100 pupils. In addition, I also included monthly social payments. As the first row in Table 9 shows, I do not find any improvement in any of these variables. In fact, social payments decline as local governments get more money from oil. The second row shows that a general increase in revenues leads to some more doctors per capita and increases in social payments. One million rubles in overall revenues on average is associated with 0.02 new doctors within a region. The effects on social monthly payments are in fact very small, which increase by no more than 6 rubles.

I also examine the construction data, showing the number of new schools and hospitals built in the regions. Because these data series contain a lot of zeros (new schools/hospitals are not build every year), I chose to look at the average values of new buildings. Figure 3 graphically represents the number of new hospitals and schools that have been built in

the oil regions, relative to the share of the oil value produced in the region in terms of regional budget revenue. As can be seen from the figure, there is no correlation between the number of new buildings and regional oil abundance.

(a) New Hospitals



(b) New Schools

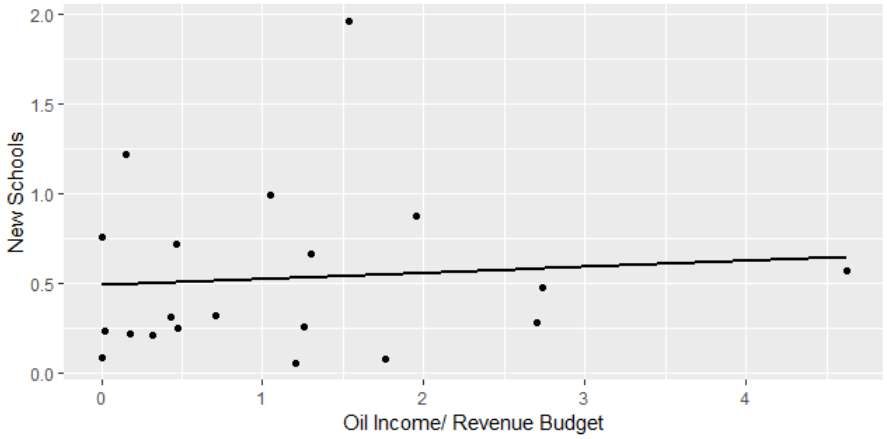


Figure 3: Resource Abundance and New Hospital and School Places in Russian Oil Producing Regions. On the horizontal axes: the average value of produced oil, calculated as the annual regional oil production per capita multiplied by the real price of oil, divided by the real Regional Budget Revenues per capita. The vertical axis: the average number of new (a) hospital places and (b) school places per capita. The average values are calculated for the period between 2005 and 2017.

To sum up, the results show that the regions that receive oil windfalls report significant increases in spending on a variety of public goods and services, such as housing, education, and health. However, when I investigate the outcomes of the reported spending, I do not find any improvements in housing quality, construction, or supply of education and health services. One possible explanation for these results could be that the outcomes variables are to sparse and I do not capture the areas where the improvements have taken place. However, given the broad selection and variation of outcome variables, I would expect to capture at least some of the improvements given the substantial increase in government

spending due to oil revenues.

Furthermore, the results point to a more beneficial picture of the uses of general revenues relative to oil-related revenues, as the fixed effect coefficients are larger than the IV ones. At the same time, in Section 5.1 we have seen that for governmental investments and wages, fixed effect coefficients were significantly smaller. One of the possible explanations could be that oil-related revenues may be embezzled by local governors more easily than general revenues.

6 Discussion of the Results

The results suggest that the negative relationship between natural resources and economic growth, first documented by Sachs and Warner (1995), is also present across the Russian oil regions, and that there are signs of both rent seeking and Dutch disease. However, while these theories may partially explain the mechanisms behind the negative effect of oil windfalls on local economies, they are not able to fully answer why these mechanisms are present in Russia, and not in the oil exporting countries that have been growth winners.[18] One possible explanation for why some oil rich countries are doing well while others are not has been linked to the type of oil and the process of their extraction (see Torvik (2009)). For instance, offshore oil has been considered as being more growth promoting than onshore oil. The main reason for this is that offshore oil has typically demanded more complicated technical solutions and the development of a new high-tech industry, which in turn generated positive knowledge externalities for the rest of the economy. Such positive spillovers have been documented for countries such as Norway (Bjørnland et al. (2019)), known for its development of deep-water technology, but also the U.S. (see Bjørnland and Skretting (2018), Allcott and Keniston (2018)), which has successfully combined horizontal drilling with hydraulic fracturing, making the extraction of unconventional oil economically profitable. Several recent studies that have analyzed the local effects of oil and gas production in U.S. counties, find that despite the rise in local real wages, the local employment benefits from resource booms (Allcott and Keniston (2018), Feyrer et al. (2017)). Further, as Allcott and Keniston (2018) shows at a county level and Bjørnland and Skretting (2018) confirm at an aggregate country level, a selection of manufacturing industries in U.S. has actually benefited from oil and gas sector.

In the case of Russia, where most oil production occurs onshore, I do not find any evidence for such positive externalities, and if anything the effect on local employment is negative. Although Russian oil production has increased substantially over the last two decades, the country's oil sector has typically been characterized by extensive production, almost

[18] e.g. Canada, Norway, and the U.S.

overexploitation, and focused on the most easily accessible fields, which were already being developed during the Soviet era. Lack of stimulation from Russian fiscal systems may be one of the reasons for this poor performance. In contrast to the U.S. and Norway, the tax rate on oil extraction in Russia has remained flat, depending purely on current oil prices and has been imposed equally for on oil extracted from all fields, regardless of their geographical location, geological structure, degree of depletion and production costs. As a consequence, there is no risk sharing between the Russian state and the domestic oil firm. In addition, the monopolization of the oil sector, the government's discrimination in favor of state-controlled companies and significant restrictions imposed on foreign investors have resulted in an insufficient level of investment necessary for the exploration of new fields and the development of existing ones.

Another prediction in the resource curse literature is that resource abundance should work in the opposite manner on growth in countries with good institutions compared to those with bad institutions. According to Mehlum et al. (2006), in countries with poor protection of property rights and a lot of corruption, more natural resources may stimulate predation, rent seeking, and other destructive and/or non-productive activities, in turn creating negative externalities for the rest of the economy. Furthermore, Robinson et al. (2006) claim that while inter-sectoral resource allocation is a key part of the resource curse story, it is driven by political and not economic incentives, which are missed both in the theory of Dutch disease and rent seeking models. In fact, in most countries the resource rents from petroleum resources accrue to the public sector. How these resource rents impact governmental behavior should therefore be an important part of the analysis. As I have already discussed in Section 3, corruption in Russia is still perceived to be a significant problem. Indeed, the results presented in this paper, indicate that a substantial part oil windfall money is lost. These findings are very much in line with Caselli and Michaels (2013), where the authors study the effects of an offshore oil-induced fiscal windfall among Brazilian municipalities. Consistent with my study, their results suggest that some of the revenues from oil disappear before turning into the real goods and services they are supposed to be used for. In turn, the increased wages of local governmental officials and increased regional public spending in Russian oil regions can be seen as signs of rent sharing, that is unproductive uses of public revenues through which the mayor favors certain groups. Similar results have also been found for Brazil (Caselli and Michaels (2013), Monteiro and Ferraz (2010)), where royalty payments from oil have resulted in increases in government payrolls and increases in spending on public goods and services. The incentives behind such bad policy choices may be the politicians' desire to influence the outcomes of elections. The local government may raise the value of being in power and induce politicians to expand public sectors, bribing voters by offering them well paid,

but unproductive jobs for instance (Robinson et al. (2006)).
To sum up, the absence of positive spillovers from the oil sector to the regional economies might partly be explained by Russian fiscal policy that have not been successful in promoting the development in the oil industry, and instead has treated it as a temporary source of budget revenues. In addition, the results suggest that the institutional setup does not seem to be able to utilize the money coming from oil in a way that benefits the average population.

To sum up, the absence of positive spillovers from the oil sector to the regional economies might partly be explained by Russian fiscal policy. The government seems to have failed in promoting developments in the oil industry, but rather treated it as a temporary source of budget revenues. In addition, the results suggest that the institutional setup does not seem to be able to utilize the money coming from oil in a way that benefits the average population.

7 Conclusion

In this paper I have analyzed whether oil is a blessing or a curse for Russian oil abundant regions. I have employed a novel dataset, which combines regional level data on oil endowments and a wide range of economic series for 85 regions of Russia. In doing so, I have shown that oil windfalls have had diverse effects on regional oil economies.

On the one hand, local economic growth experiences a bust and we see a decrease in the profitability of firms, private investment, and employment. On the other hand, oil windfalls lead to an increase in governmental expenditure, average local wages, and consumption. Furthermore, I have shown that the reported budgetary spending on housing, education, and health services is strongly positive to oil-induced revenues, but when I look at indicators of real outcomes in these areas, I do not find any effects. My results suggest that money coming from oil windfalls are unevenly distributed among the local population. There are signs that a large share of oil money is missing and certain groups gain considerably from oil windfalls.

My analysis demonstrates that the Dutch disease theory alone cannot fully explain slow economic growth in oil producing regions. In order to understand the economic performance of these regions, it is important that we consider the consequences of possible corruption and rent-seeking activities. In addition, the government seems to treat the oil industry as a temporary source of budget revenues that tend to be embezzled by local governors more easily than general regional revenues.

I conclude that the picture is more complex than the view of the World Bank, IMF, and OECD, and for oil regions, the high oil price have been more of a curse than a blessing.

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Appendices

Appendix A Data Overview

Table 10 shows the overview of the data series used in this paper. Series 1 to 43 are taken from annual reports published by the Federal Statistics Service of Russia. Series 44 to 45 are taken from the Rystad Energy Database. The Urals Crude Price (no. 46) is taken from Macrobond.

Nr.	Series Description	Mean	St.Dev	Units	Period
1	Population	1610,28	1264,63	thousand persons	2000-2017
2	Working Age Population	973,03	763,34	thousand persons	2000-2017
3	Population Living in Cities	1140,18	952,65	thousand persons	2000-2017
4	Gross Regional Product - Total	147,17	248,78	RUB thousand	2000-2017
5	Fixed Capital Investment - Total	47,43	119,71	RUB millions	2000-2017
6	Regional Consumer Price Index	353,61	164,11	Index	2000-2017
7	Number of Crimes Per Capita	0,02	0,01	number of crimes	2000-2017
8	Gross Regional Product - Agriculture and Mining	29,94	103,68	RUB thousand	2005 - 2017
9	Gross Regional Product - Manufacturing	22,82	16,60	RUB thousand	2005 - 2017
10	Gross Regional Product -Construction and Service	46,05	46,74	RUB thousand	2005 - 2017
11	Employment	47,22	7,18	thousand persons	2005 - 2017
12	Organizational Profit (Revenues-Costs)	15,80	47,96	RUB millions	2005 - 2017
13	Consumption (in month)	6619,19	2415,77	RUB	2005 - 2017
14	Wage - Organizations (in month)	11430,61	5382,34	RUB	2005 - 2017
15	Fixed Capital Investment - Financed with equity	22,86	60,76	RUB millions	2005 - 2017
16	Fixed Capital Investment - Financed with bank credits	25,28	86,65	RUB millions	2005 - 2017
17	Fixed Capital Investment - Financed from Regional Budget	3,55	5,09	RUB millions	2005 - 2017
18	Poverty Level	16,38	6,55	percentage	2005 - 2017
19	Budget Revenues - Total	28,75	27,26	RUB millions	2005 - 2017
20	Budget Revenues - Tax	15,38	17,92	RUB millions	2005 - 2017
21	Budget Revenues - Transfers	7,97	8,61	RUB millions	2005 - 2017
22	Budget Revenues - Non-Tax	5,40	8,24	RUB millions	2005 - 2017
23	Budget Expenses - Total	29,37	27,22	RUB millions	2005 - 2017
24	Budget Expenses - Housing Utilities	3,57	6,07	RUB millions	2005 - 2017
25	Budget Expenses - Health	3,98	3,19	RUB millions	2005 - 2017
26	Budget Expenses - Education	7,39	6,29	RUB millions	2005 - 2017
27	Budget Expenses - Social Politics	4,17	2,94	RUB millions	2005 - 2017
28	Budget Expenses - National Economics	5,03	5,95	RUB millions	2005 - 2017
29	Houses in Emerging Conditions	4,02	4,04	percentage	2005 - 2017
30	Living Area	37,43	31,67	millions square meters	2005 - 2017
31	Houses Connected to Water Mains	73,46	13,22	percentage	2005 - 2017
32	Houses Connected to Sewage System	68,47	13,17	percentage	2005 - 2017
33	Houses Connected to Central Heating Station	79,60	13,44	percentage	2005 - 2017

34	Houses Connected to Warm Water	59,10	14,18	percentage	2005 - 2017
35	Houses Connected to Gas Pipelines	66,92	28,95	percentage	2005 - 2017
36	Hospital Places per capita	0,01	0,00	number of hospital places	2005 - 2017
37	Medical Doctors per capita	0,01	0,00	number of medical doctors	2005 - 2017
38	No. of 100 Children Below School Age per Preschool Places	121,41	46,79	number of persons	2005 - 2017
39	Monthly Social Payments	1858,40	684,40	RUB	2005 - 2017
40	New Available Hospital Places	0,06	0,12	number of places	2005 - 2017
41	New Available School Places	0,57	1,38	number of places	2005 - 2017
42	Wage - Local Governmental Officials (in month)	13743,96	8594,12	RUB	2010-2017
43	No. of Teachers per 100 Pupils	0,00	0,00	number of persons	2010-2017
44	Oil Production	583,73	1818,07	RUB million	2000-2017
45	Oil Reserves in Year 2000	2170,33	6273,39	RUB million	2000-2017
46	Crude Oil, Urals, Average Price, USD (Real)	1409,42	284,78	RUB	2000-2017

Table 10: The table shows the full overview of the data series used in this paper. It reports a description, the sample period and units for each of the series. In addition, the average values and the standard deviation are calculated.

Between the years 2003 and 2007 there were 5 merges of regions. In my analysis, I take todays division of regions as the baseline and calculate the aggregate values for the regions that have been merged. The Chechen, Krym and Sevastopl[19] regions are excluded due to missing data in most of the sample. I classify the region as oil producing if production of oil in this region has taken place in all of the periods between 2000-2017. I exclude two of the regions where production has taken place in only parts of the sample, which are Chukotka and North Ossetia-Alania. In my analysis I also take out federal cities: Moscow and St. Petersburg, as their economies differ substantially from the rest of Russia.[20]

Appendix B The Background

B.1 Oil in Russia

Covering an area of more than 17 million square kilometers, Russia is the largest country in the world by area, spanning more than one-eighth of the Earth's inhabited land area and stretching eleven time zones. Russia is populated with 146 million inhabits, living across 85 federal subjects (regions), which are the constituent entities of Russia (see Figure 4). These federal subjects, from here on called regions, are the main focus of the analysis in

[19] Krym and Sevastopl have been included as federal subjects of Russia in the official Russian statistics since 2014.

[20] Another issue with these cities is that many of the oil companies have head offices there, something that may bias the results.

this paper. These regions consist of republics, krais, oblasts, cities of federal importance, an autonomous oblast and autonomous okrugs, all of which are equal subjects of the Russian Federation.

Russia is also among the world's most resource-rich countries.[21] However, there is no doubt that oil and gas have been the most important commodities for the Russian economy. In fact, the country is among the top three largest crude oil exporters and producers in the world, with a federal budget that is highly dependent on oil.[22]

Although, offshore oil production in Russia has been increasing since 2006, in 2017 more than 95 % of crude oil production in Russia happened onshore.[23] Onshore oil production takes place in 34 of the 85 regions.

B.2 Regional Budgets

With the governmental shift, in the 2000s, enormous effort was put into the recentralization of Russia. Today, the relationship between the center and the regions can be described as a combination of cooperative and dual federalism. Compared to other countries, such as the U.S., the Russian tax system can be characterized as relatively centralized, as most decisions are taken at federal level.

In the Russian Federation, taxes are broken down into three categories: federal, regional, and local. Each of these levels are connected to a given level of government legislation responsible for how the taxes are set and the territory the taxes are applied to. However, the current federal legislation does not allow any level of government to introduce taxes beyond those enumerated in the Tax Code decided at the federal level. It implies that regional and local governance can only specify tax rates within certain predetermined intervals. One example of regional and local taxes is a tax on corporate or personal property. On the other hand, taxes on mineral extraction have the same rate for the whole territory and are redistributed between regional budgets according to different criteria, such as population, geographic placement, production potential, etc. These criteria are determined at the national level for different periods at a time. In addition, there is a category of taxes that are divided between different levels of budget. Corporate taxation is based on this principal, where a given share of taxes goes to the federal budget, while the rest is an item in the regional budget and can be reduced by the regional government.[24]

[21] The petroleum industry in Russia is one of the largest in the world. In addition to oil Russia has the largest reserves and is the largest exporter of natural gas, and the second largest coal reserve.

[22] Over the last two decades Russia has almost doubled its production and export of crude oil.

[23] From being under 1% of total production in Russia until 2006, offshore production has increased to more than 5% in 2018.

[24] Russia also operates with an excise tax, which applies to tax from alcohol and petroleum products.

Due to the diversity in geography, natural resource endowment, and industrialization across the regions, there is a large dispersion in regional budget revenues. Excise tax helps to smooth out this horizontal disbalance, however, the most dominant form of federal region transfers is represented by equalization grants. Grant/subsidies are determined based on the need/capacity formula, which considers the regional potential tax base and budget expenses. The potential tax base is calculated according to tax revenues in the regional budget and the level of economic development within the region. Unfortunately, the weights used in this formula are often a result of political bargaining in the parliament. The disadvantage of such a system is that it does not motivate regions to increase their tax potential as it will imply less transfers from the federal budget. In addition, because the need/capacity formula includes estimates about regional future income, it is easier to manipulate.

B.3 Oil Taxation

Tax from oil and gas extraction constitute a substantial part of Russia's federal budget and was responsible for more than a half of all budgetary revenues in 2006. The oil government income is directly connected to oil prices and barrels produced. Interestingly, during the 1990s the tax calculations for oil companies were based on trade rather than production, and hence the official taxable income was easily manipulated. In addition to maneuvering and under-reporting of taxes, after the collapse of the Soviet Union the energy sector in Russia became much weaker and the federal income from oil was substantially smaller.[25]

In 2000, before tax reforms took place, 78% of the rents from the improved oil and gas sales remained in the hands of the energy exporters, with the government gaining only 22% of the 30-billion-dollar windfall, see Luong and Weinthal (2004). The allocation of mineral extraction tax on oil accruing to regional budgets fell from 60% in 2002 to 20% in 2004. At the same time, the tax rate on oil extraction was linked to world oil prices. Later the share declined to 15% in 2005, before it dropped to zero in 2010. The new tax reforms occurred just in time to take advantage of the dramatic growth of the tax base, in which one of the most important growth factors was increases in Russian oil and gas exports and extraordinarily high world energy prices. Although the regions do not get any share from oil extraction directly as disposable income in their budgets, regions still get royalties from well developments.

In addition, many of the Russian oil companies regularly provide voluntary contri-

In this case, some part of the taxes collected from the production of petroleum products goes to the local/regional budget, while rest is redistributed across regional budgets based on the distance of roads in the regions and the number of registered auto vehicles in the region.

[25] By 1998, oil production had dropped to 6 million barrels per day, down from 11 million barrels in 1988.

butions to off-budget funds controlled by regional governors and to regional budgets to maintain good relations with the region's governor. These informal payments may even be relevant for strong oil and gas companies with good federal connections.

To sum up, Russia is a large country with a lot of cross regional variation. Several important reforms have been implemented in the late 90s and early 2000s, which allowed the government to profit from high oil prices. One important factor for fiscal recovery has been the centralization of power and the governments' ability to pass and then implement the reforms. In 2017 there was still a lot of inter-regional variation, while regional revenues distribution is a complicated system with a combination of political bargaining, changing of laws, and advanced and not transparent estimates.

Figure 4: Map with names of federal subjects (regions) of Russia.

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