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No. 154

Subnational Resource Curse: Do Economic or Political Institutions Matter?*

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Abstract

The absence or the presence of the resource curse is often explained by the specifics of political and institutional factors. The aim of this paper is to study this effect looking separately at economic and political institutions and at their interaction. Unlike most empirical papers in the literature, this paper considers the intra-national variation of institutional environment and access to political decision-making, using a dataset of the Russian regions. It shows that sub-national variation of the quality of institutions indeed matters for the effects of resources. Economic institutions follow the traditional “resource curse” results: resources have a negative impact on growth if the quality of institutions is low. On the other hand, increasing level of democracy has negative consequences for regions with substantial resources. Finally, this paper studies the differentiation between the resource-extracting regions and regions, exporting, but not extracting resources, in terms of the conditional resource curse.

Key words: subnational variation; conditional resource curse; democracy; economic institutions; transition economies

JEL classification: O13; P28; Q48

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1 Introduction

The idea of a “resource curse”, i.e. negative impact of resource abundance on economic performance, has been subject to empirical scrutiny in a number of studies. An interesting aspect explaining the variation of results looks at the interaction between the resource curse and the quality of economic and political institutions. Since resources have had a significantly different influence on growth in different countries (both supporting and preventing good economic performance), the basic claim of this branch of the literature is straightforward: resources are helpful for growth only if the quality of institutions (economic – property rights, contract enforcement or corruption – and political – political stability or level of democracy) is high enough to restrict the possible rent-seeking activity, which is the determining the adverse effects of the resource abundance. It is thus possible to speak about a “conditional” (on the quality of institutions) “resource curse” (see Karabegovic, 2009, for a survey of recent literature).

This result for economic institutions has been confirmed by several studies in international comparison (Boschini et al., 2007; Mehlum et al. 2006; Polterovich et al., 2008; Collier and Goderis, 2009; Brueckner, 2010). Most of them establish that in countries with “good” institutions (though the definition of what exactly “good” means differ) resources are able to contribute to the economic growth, while in countries with “bad” institutions they prevent economic growth. As mentioned, resource stimulate rent-seeking (cf. Tornell and Lane, 1999), or different institutions (producer-friendly vs. grabber-friendly, as Mehlum et al. call them) generate different incentives to engage in productive or redistributive activity in presence of natural resources. Anyway, institutions seem at least to mitigate negative effect of the resource curse or provide foundation for growth using natural resources in the best case.

The evidence for democracy is less straightforward: Collier and Hoeffler (2005) find a negative effect of the interaction of natural resources with electoral competition, but a positive interaction of natural resources with checks and balances in the political system. Hence, the relation between democracy and rent-seeking is not unambiguous. On the one hand, democracy is able to increase accountability of politicians, which is, according to Robinson et al. (2006), the key to avoiding the resource curse. On the other hand, democracies often increase the incentives for politicians to engage in populist redistribution (to gain support from the electorate), which can have a negative influence on the economic growth: in this case presence of resources reduces incentives to engage in unpopular reforms. And, to make story even more complicated, in addition, redistribution may support the demand and thus create (at least short-term) growth effects (as opposed, for example, to the transfer of all resource rents abroad). The results of Boschini et al. (2009) show that even the type of democracy (presidential vs. parliamentary system or type of electoral rules) is likely to influence the presence of the resource curse.

The aim of this paper is twofold. First, it contrasts the impact of political and of economic institutions on the presence of a resource curse using a single dataset. Economic institutions are defined in terms of governmental regulations and protection of property rights and contracts from bureaucratic predation. Political institutions refer to the level of democracy. My focus, however, is specifically to understand what happens if the improvement of institutions

and of the level of democracy¹ is “imperfect” – hence, if the sample is skewed towards lower quality of institutions. The reason for this choice is, on the one hand, theoretical (if one assumes that there are non-linear effects of institutions on economic performance), and on the other hand, normative (usually, achieving high quality of political and / or economic institutions for developing countries is unfeasible – and therefore what they obtain through reform are more or less advanced hybrids, which deserve special consideration), however, not so easy to solve in an empirical exercise (for a full sample of all countries of the world one had to look at triple interactions, which are hard to identify, while artificial trimming of the sample ought to cause questions and doubts).

Second, and more important, this paper takes a different approach from the literature while looking for the source of variation of the institutional quality and the resource endowment, which can be used in an empirical study: while almost all papers focus on international comparisons, this paper uses the intra-national variation, i.e. differences between individual regions in a federal state. Some recent studies use subnational data variation to analyze the impact of resources on economic performance (e.g. Johnson (2006) and James and Aadland (2010) look at the US states and counties), but there has been to my knowledge no work dealing with the problem of the *conditional* resource curse influenced by the subnational variation of political and economic institutions as the determinants of economic performance. The advantage of this strategy is at hand: one is able to achieve higher compatibility of data, and also restricts the potential of a selection bias. Specifically, data used then often comes from a single statistical authority, which also collects its information directly from businesses and households, and not from other statistical offices (like it is often the case in international comparisons). It is also a way to reduce the impact of the unobserved heterogeneity, provided it is smaller within country than across the world (although in the my case one still obtains a substantial variation of economic and political institutions needed for my analysis, as it will be shown in what follows). The disadvantage is of course the generalization problem: the external validity of this study is not necessary given. However, even in this case evidence from intra-regional comparison may at least contribute to our understanding of the mechanisms of the resource curse.

In addition, analyzing *subnational* variation of economic and political institutions may provide an interesting research topic as such. Basically, political differences between regions – including “more advanced” democratic regimes, as well as “isles of autocracy” – are relatively common for a variety of federations in the developing world (Latin America, India), but also for several developed countries (see introduction to McMann (2006) for a survey). In order for individual regions to develop significantly different political regimes, on the one hand, regional administrations should be strong enough to prevent *regular* federal interventions in the functioning of the regional politics (for example, restricting the development of “specific” regional institutions without “consulting” regional elites), but on the other hand, regions should be different enough to generate different outcomes of political conflicts and different preferences of the population and the elites with respect to the organization of the political systems. Similar logic applies to the economic institutions. However, presence of subnational variation in regimes may have a serious impact on the evaluation of the consequences of democratization or emergence of new economic institutional settings: it is ques-

¹ In the political sciences this subtype of political systems usually falls under the various classifications of the “hybrid” regimes (Collier and Levitsky, 1997; Diamond, 2002).

tionable to make a judgment about the nation's political or economic system just considering the central government.

Since in most countries resources are allocated unequally across their territory, their concentration in jurisdictions with specific subnational political or economic regimes different from the national-level organization of politics and regulation could result in mismeasuring institutions in the analysis of the conditional resource curse in international comparisons. While for some (centralized) resource-extracting countries the problem is not present, for other (formally or informally decentralized) it could be important. There is no comparable quantitative measure of the quality of institutions – political and economic – for a wide set of subnational jurisdictions in different countries, therefore it is impossible to directly analyze the robustness of the results based on international samples to this subnational variation. However, if one finds for one particular country that subnational institutions matter, it shows at least that the attention to the subnational politics and regulation for the accurate assessment of the resource curse is required.

This paper applies the sample of the regions of the Russian Federation between 2000 and 2006 in order to study the impact of institutions on the resource curse.² Russia seems to be a plausible choice for this exercise, first, because its regions experience enormous asymmetry in terms of natural resources (while a small group of regions controls the main mineral deposits, which formed the key factor of the Russian economic growth during this period, others have virtually no natural resources), and second, because of the presence of a strong variation of political and economic institutions between the constituent units of the federation. However, this distribution – as desired for the purpose of this study – is skewed towards lower quality of both democracy and economic institutions: i.e. it is possible to find in Russia examples of outright autocracies, but there are hardly any examples of true “Western-type” democracies or regions with well-protected property rights.³

The paper is organized as follows. The second section presents the major variables used in this paper to measure the quality of political and economic institutions, and also gives a brief summary of the Russian institutional specifics. The third section discusses the model and data in greater detail. The fourth reports the main results. The fifth section provides a number of extensions, and the last section concludes.

2 Russian regions and resource curse

A country used for studying the resource curse in an intra-national setting should exhibit at least three properties. First, one requires a substantial variation of political and institutional

² Although Russia as such has certainly been subject to the discussions of the (potential) resource curse from the point of view of economic development (see e.g. Ahrend, 2005) and democracy (see Treisman, 2010), I am not aware of any studies exploring the variation between Russian regions in an empirical setting considering the problem of this paper.

³ The differences between Russian regions are thus not like those between Norway and Saudi Arabia, but rather like those between Kazakhstan and Saudi Arabia – if one looks at the resource-extracting countries.

environment throughout the regions. Second, natural resources should play an important role at least for a subset of regions. And finally, there should be significant growth differentials between regions. The Russian Federation seems to meet all three criteria, and could be used as a “laboratory” for my analysis. It should be noted that “laboratory” does not imply here a random allocation of political regimes or the presence of a natural experiment. From this point of view the subnational politics is not different from the national politics measured for the international cross-sections (and therefore standard tools of resolving the problem of endogeneity ought to be used, as it will be done in what follows). By referring to a “laboratory” I simply imply that there is substantial variation of the variables I am interested in and thus some differences in the effects should be present.

To start with, Russia includes a variety of regions with different political systems. During the Soviet period all regions of Russia had almost identical political structure embedded in the Soviet hierarchy (although even then some variations of political regimes existed). After the process of democratization started in the 1990s, since the administration of the first president Boris Yeltsin was too weak to directly intervene into the regional political process and regions also were able to gain from conflicts between different centers of power at the federal level, political transformation in each region exhibited its own specific features – depending upon the ethnic and economic legacies, regional leadership, effects of economic transition and external influences (both from federal center and from foreign actors like the EU). Therefore different regions evolved towards different political systems (see Gel'man, 1999, and Obyedkova, 2007 for a detailed discussion).

While in some jurisdictions the old Soviet leadership was able to preserve its power and transform it into a new autocracy, in other regions new leaders managed to acquire supremacy and create new autocratic systems. Other outcomes of transition included “elite pacts” for the division of rents and compromise over the crucial aspects of policy; destructive “warlordist” competition of elites with increasing rent-seeking; but also emergence of institutional systems to protect interests of all parties with limited political competition. At the same time regional elites obtained different degrees of control over regional economies and media.⁴ As a result, Russia in the late 1990s included a multitude of regional political systems – from relatively competitive and pluralist democracies to strict autocracies and even semi-totalitarian regimes. Towards the early 2000s these processes of political evolution in individual regions seem to have achieved a new political equilibrium, thus resulting into emergence of relatively stable configurations of power (cf. Libman, 2009). Although the new administration of Vladimir Putin, who became president in 2000, implemented a variety of measures to restrict the autonomy of regions, regional political machines were often able to survive this centralization movement until at least mid-2000s.⁵ To conclude, regional variation of political regimes in Russia remains high enough to justify the study of this paper.

⁴ Differences in political regimes between Russian regions rarely manifest themselves in differences in formal institutions. Usually one has to look at differences in informal practices, like manipulation of the elections or control over bureaucracy. It should be noted though that on the national level the distinction between political regimes is also often based on informal power relations rather than formal norms of constitutions.

⁵ Probably, even later: in 2009 deputy head of the federal presidential administration Vladislav Surkov (well known as a key player in the ideology-setting for the administration of Putin and Medvedev) claimed that Russia has a “multi-vector” democracy, i.e. differences in political regimes in individual regions are unavoid-

While regional variation of institutions exists in many developing federations, there is, as mentioned, usually no quantitative measure of the institutions present, which one requires for econometric research. An advantage of Russia is that this information is available. In order to measure the variability of political regimes in Russia I use the index calculated by the Moscow Carnegie Center and based on a survey of a panel of experts carried out for each region in the period of 2000-2004. The experts evaluated each territory using a 5-point-scale applied to ten characteristics. The final index is simply a sum of these 10 grades and thus varies from 0 to 50 (although there has been not a single region which achieved either the worst or the best possible outcome), with 50 being the highest outcome. It is worth noticing that as in all indices based on expert opinion, the evaluation of the level of democracy in the Carnegie index is unavoidably relative: so, the highest possible grade represents rather the “highest possible grade under Russian circumstances”, meaning a more advanced hybrid regime, which is still relatively far from Western democracies. Individual components of the index are listed in the *Appendix*. Most of them seem to fit the “standard” understanding of the concept of “democracy” relatively well, although some refer specifically to the peculiarities of *subnational* variation of political regimes (specifically, freedom of municipalities).⁶

If the political regimes exhibit the variations described in this paper, it is hardly surprising that *economic institutions* in individual regions vary as well. On the one hand, it could be a direct result of the differences in the political system. On the other hand, it is important to take the role of informal differences between the functioning of bureaucracies in individual regions (due to corruption, involvement in regional networks, connections to business groups, organized crime etc.) into account, resulting into differences in law enforcement. In this paper I used an index of the quality of economic institutions developed by Vainberg and Rybnikova (2006) and based on a survey of small and medium entrepreneurs implemented by *Opora Rossii* (one of the largest business associations in Russia) in 2005. The survey asked the entrepreneurs to evaluate, how often they face illicit methods and illegal interventions of public officials. The index is calculated as the share of “positive” responses (no interventions) in percent minus the share of “negative” responses in percent plus 100%. Thus, it increases if the share of illegal interventions as perceived by entrepreneurs is low, and vice versa.

Obviously, this approach to measuring the quality of economic institutions has a number of drawbacks. First, there are traditional disadvantages of surveys (for example, fairness of responses), which hardly could be avoided. Second, the indicator measures only the illegal ac-

able (Gazeta, 2009, July 8). While the existence of variations is not in dispute, one could rather talk about “different versions” of non-democracies and hybrid regimes.

⁶ Two dimensions of the index (out of 10), however, are slightly more problematic. Index includes the variables of “corruption” and “economic liberalization”, which seem to represent rather the economic, than the political dimension. However, in this case it is important to precisely look at the definitions of the respective dimensions. The “economic liberalization” as defined in the index mostly applies to the usage of economic pressure by regional elites in order to control (potential) opposition rather than the casual property rights protection; economic instruments of control may be even more important in a world where the ability to change formal legislature are still limited. The “corruption” dimension, as well, refers to the co-existence and symbiosis of regional elites and large business groups, effectively able to dominate regional political landscape, rather than the usual administrative corruption. More importantly, excluding these two dimensions from the index still yields an indicator, which is highly correlated with the original one (correlation coefficient of 99.01%). In this paper I apply the original index.

tivities of bureaucracy and does not ask for the quality of law itself. It is however less problematic in the Russian context, simply because many regulations are *formally* set by the federal government. Therefore the variation between regions results from *informal aspects*, i.e. their *implementation*, which is exactly measured by the question asked. However, the survey ignores a further aspect of the quality of economic institutions – protection from the non-governmental extortion (say, crime or cheating of business partners). This is a limitation one has to accept given the data availability. Finally, the focus on small and medium enterprises is also somewhat restrictive.⁷

Figure 1 looks at the correlation of the indices of democracy and of economic institutions. Interestingly enough, it is very weak, even if one drops the outliers. This result is important in the context of this paper, as I will show in what follows. One can hypothesize two reasons for the absence of correlation. First, the bureaucracy I am considering is in many cases de-jure controlled by the federal administration and not by the regional governments. Russia is a dual federation, so that the federal government operates in the regions through its own agencies (like in the US) rather than through delegation to regional bureaucrats (like in Germany). There is substantial variation in the practices of regional branches of federal authorities in different parts of Russia as well, caused, for instance, by the appointment and personnel differences. However, this variation does not necessarily correspond to that of regional politics – there may be a complex set of interrelations between the regional governor and political elite (controlling their own bureaucracy and possessing their own political agenda) and the federal appointees in the region. This scenario reduces the problem of interdependence of political and economic institutions and provides an additional argument in favor of using this subnational sample. Second, control over subnational political systems (e.g. elections) by the regional governors should not automatically imply control over low-tier bureaucracy (which is interacting with small enterprises).

⁷ It may potentially provide an incorrect assessment of the institutional quality faced by large companies, which have also a greater impact on the regional gross product growth. Unfortunately, there is no data available for the large companies (which are obviously more difficult to tackle in a survey like used here); nevertheless, finding a significant and theory-consistent effect for the SME-related institutions can per se indicate that the importance of this sub-group of businesses for the Russian regions should not be under-estimated. I will discuss this problem in what follows.

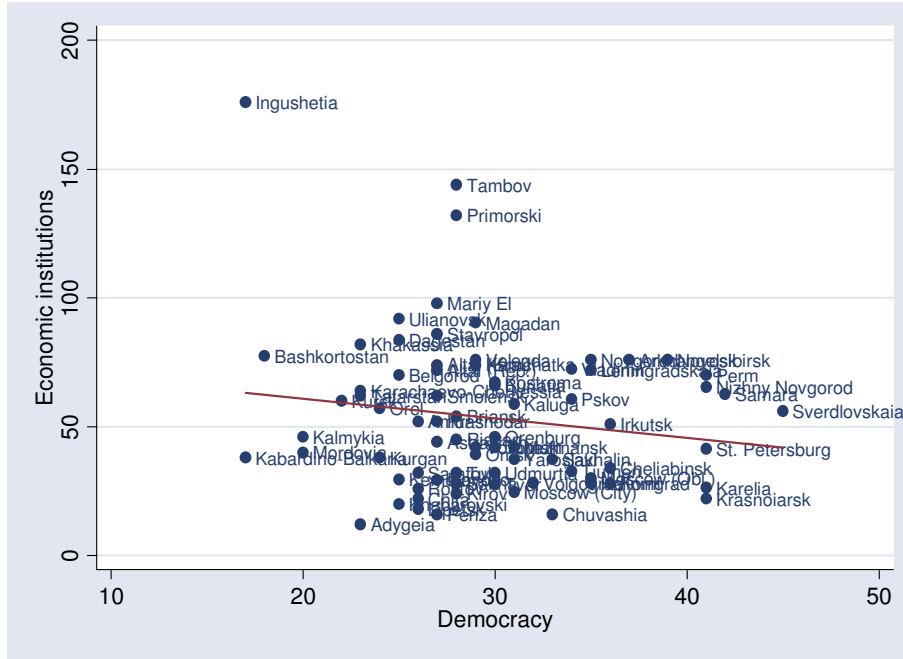


Figure 1: Correlation of economic and political institutions in Russia, 2000-2006

Finally, the last two components of a good laboratory for the studies of a resource curse are also present in the Russian case. First, it goes without saying that for Russia mineral resources (particularly oil and gas, but also ferrous and non-ferrous metals) play a crucial role in terms of economic performance over the last decades. However, given the size of the country, it is also not really surprising that the deposits are allocated unequally and concentrated in a small number of regions. For example, out of 79 regions included in the sample of this study (as it will be discussed in what follows) only 34 have their own oil and gas extraction: particularly those located in Siberia, Volga basin and Northern Caucasus. The situation is similar for almost all other resources, including agriculture (which is heavily influenced by the climatic differences of Russian regions). Second, during the 2000s the average growth rates varied substantially from 0.36% p.a. to 14.11% p.a. A variety of factors contributed to this divergence among Russian regions; my aim is to understand the role of resource endowment differentials and differences in economic and political institutions as determinants of economic growth.

3 Model and data

This paper applies the data for 79 Russian regions (i.e. almost all constituent units of the Russian Federation excluding Chechnya, for which obviously no reliable data is available, and the so-called “autonomous okrugs” – a special group of regions within the Russian state subordinate to other regions, with limited autonomy and, what is particularly important for this paper, limited data availability)⁸ for the period between 2000 and 2006. The choice of the timeframe for the study is primarily motivated by the need to focus on a period of relatively stable political regime in the federal center: otherwise it is difficult to establish the reasons for the observed changes, which may relate to regional specifics or changing patterns of center-region relations. For the Russian case it suggests the choice between the Yeltsin period in the 1990s and the Putin period in the 2000s (an advantage of the Russian data is that it is possible to identify differences in political regimes by looking at individual presidents, given the features in their policies). However, for the Yeltsin period I do not have any reasonable proxies for economic institutions; as for political institutions, they seem to be highly unstable at the regional level, reaching, as mentioned, a certain “institutional equilibrium” only in the early 2000s (moreover, for the “early” Yeltsin period the statistical information is mostly unreliable). Hence, I look at the Putin period; my dataset covers his first and most of his second term. As it is typical in the growth econometrics, in order to avoid short-term fluctuations I average over seven years and estimate the following cross-sectional regression:

$$GROWTH_i = \beta_0 + \beta_1 RESOURCE_i + \beta_2 INSTITUTIONS_i + \beta_3 RESOURCE_i * INSTITUTIONS_i + \beta_4 CONTROLS_i + \varepsilon (*)$$

where index i refers to the individual region, *GROWTH* is the annual inflation-corrected growth rate of the gross regional product (GRP), *RESOURCE* is the measure of resources, *INSTITUTIONS* is a measure of institutions (political or economic), and *CONTROLS* include the set of further control variables. So, the growth rate is regressed on resources, institutions, and an interaction term, which is a product of resources and institutions. The measures of political and economic institutions have been introduced in the previous section; here it is necessary to state that in the first stage I include only political or economic institutions (with the respective interaction term) in the regression (I will, however, explore the possibility of other interactions in what follows). The resources in the basic specification are measured as the oil and gas production in this region (for the aim of the aggregation re-calculated in coal equivalents – it should however be noted that both oil and gas outputs are highly correlated). This choice seems to be reasonable, since it is the oil and gas extraction which forms the basis for the Russian resource-dependent growth. On the other hand, it also has a clear disadvantage: it does not control for the *relative* share of natural resources in the regional economy. Unfortunately, until mid-2000s Russian statistics did not report share of mining for the subnational

⁸ In the statistical records data for autonomous okrugs are always included in the data on the jurisdictions they belong to, so these territories are indirectly captured by my analysis as well. For the quality of economic institutions indicator for some other regions (Tyva, Chukotka, Northern Ossetia and Evreyskaya) were not available and hence these regions were dropped from this particular specification.

GRP, so directly controlling for that is impossible. It should also be noted that many arguments presented below ought to be independent of the *relative* share of mining, if the *absolute* importance of resource extraction is large enough.

For the **economic institutions** the conditional resource curse suggest that the following signs of the variables should be expected: resources *negative* (accounting for “traditional” resource curse discussion); institutions *positive* (accounting for the overall positive correlation between institutions and growth) and, more importantly, the interaction term *positive* (thus showing that in presence of “good” institutions resources facilitate economic growth), see Boschini et al. (2007). For the **political institutions**, as mentioned, no clear prediction can generated: if the “accountability” effect of democracy predominates, one has to expect signs identical to those for economic institutions describe above; if, however, democracy just facilitates the populist redistribution, the interaction term and the variable of political institutions are expected to be *negative*. The conditional resource effect (either positive or negative) is more likely if the interaction term is significant (see more detailed discussion in what follows). Clearly, political and economic institutions are not random and correlated with the resource endowment in the regions (see Barro, 1999; Ross, 2001; Jensen and Wantchekon, 2004).⁹ However, it does not bias my results, but rather makes the efficiency of the estimators given potential high correlation between the covariates lower (because of the multicollinearity problem) - and, since I still find statistically significant results (as it will be shown in what follows), the problem does not seem to be very severe.¹⁰

The set of further controls includes three variables. First, I control for the initial level of the GRP per capita in the year 2000 (which could have influenced the further path of the economic growth in the region). Second, I add the variables measuring the level of education (here approximated as the share of the population with a university degree – for the Russian case, where primarily and even high school attendance covers almost the whole population, this indicator seems to be reasonable) and economic openness (share of foreign trade in the GDP).¹¹ All these variables are standard in growth regressions and, what is even more important, may be correlated with the oil and gas extraction and / or quality of institutions (and therefore should be included in the specification to avoid the omitted variable bias). The exact description and the summary statistics for the variables are reported in the *Appendix*.

In addition, I include four dummy variables for four individual regions. First, two of them account for the two “city-regions” City of Moscow and St. Petersburg: obviously they have zero resources, but at the same time accumulate a significant portion of the financial flows

⁹ Polterovich et al. (2008a) also provides a model where the democratization depends on the resource endowment and the quality of institutions. As mentioned, the structure of the Russian dual federation with active regional branches of federal bureaucracy makes the case of this paper a rather appropriate empirical playground for analyzing conditional resource curse given a limited impact of these effects.

¹⁰ An exception is when the causality goes from the resources to growth and then from growth to the institutions. This is however just a modification of the general reverse causality problem discussed in the next section, and hence requires identical solutions.

¹¹ I do not control for trade between regions, since this data for Russia (as for many other federations) is not available. It should be noted though that the rents from resource export in the heavily regulated Russian market are significantly larger than those from domestic sales. It is certainly true for gas with the state-controlled prices; oil sales on the domestic market are profitable (for instance, petroleum prices are often subject to local monopolies creating significant gains), but still to a lesser extent than on international markets.

due to their “capital status”, and are therefore hardly compatible to other regions in the sample.¹² Second, there are two variables controlling for two “traditional” outliers, which seem to be exceptional in almost all growth regressions for Russia: Chukotka (in the Far East at the American border) and Ingushetiya (in the Northern Caucasus at the border of Chechnya). Both regions were active in establishing themselves as “financial havens” for Russian companies and thus derive a substantial part of their wealth from the economic activity outside their territory. In addition, in both cases there have been significant political factors influencing their performance and making it highly volatile and little trustworthy in terms of the quality of statistics: in Ingushetiya it has been Chechnya, which slowly but surely “exported” its conflict to the surrounding regions (parallel to the reduction of direct warfare in Chechnya itself), and for Chukotka it has been the role of Roman Abramovich, one of the wealthiest businessmen in Russia, who became governor of the territory during this period, thus providing to the region the benefits of investments and also involving it in a variety of tax optimization schemes. In addition, I also look at the estimations excluding these dummies and thus assess the robustness of results to outliers.¹³

4 Main results

4.1 Resource extraction, institutions and growth

Table 1 reports the main results of the paper, estimating the impact of economic and political institutions on the economic performance. Regression (1) illustrates the relation between growth and resources ignoring the institutional factors. It is hardly surprising to find that in Russia during the period of 2000-2006 (with extremely high oil prices on international markets) regions with substantial oil and gas reserves grew significantly faster than the rest of the country. So, in fact, during this period oil did not seem to be a “curse” for the Russian economy. Certainly, it is necessary to point out that the arguments for the “resource curse” are often of a long-term nature, while this paper limits its attention to a relatively short perspective of less than a decade with extremely favorable conditions. Adding the level of democracy (regression (2)) or the quality of political institutions (regression (4)) to the specification does not change anything at the first glance: resources still remain a significant positive factor for economic growth, while institutions are insignificant.

The situation changes, however, if one also includes an interaction term between the natural endowment and the quality of institutions. In regression (3) it is done for political institutions. The interaction term is significant and negative, while the oil and gas production remains positive and significant. Thus, it looks like increasing the level of democracy in the region

¹² City of Moscow seems to receive substantial rents from its status of the federal capital, which is particularly important in the Russian economy with strong governmental interventions, as well as from the accumulated potential of the Soviet past. St. Petersburg gains not only from its unofficial status of the “second capital”, but also (and foremost) because of the informal support from Vladimir Putin, who was born in St. Petersburg and seemed to recruit a substantial fraction of his staff from his home city.

¹³ It is obvious that including a dummy as described above is identical to excluding the region from the sample. Nevertheless, I still used the first option to get an impression about the significance of this “region-specific” effect. For the TSLS estimations, however, these four regions are dropped from the sample and do not appear neither in the second stage nor among the instruments in the first stage.

makes the resource abundance less efficient in terms of promoting economic growth. This result can be clearly seen at the *Figure 2*, which shows the marginal effect of oil and gas production for different levels of democracy. It is also helpful because one can notice the differences in the confidence intervals for different parts of the sample. Oil and gas have a significant and positive effect on growth for the low level of democracy (which is going down with the relative improvement of the democratic regime), and (at least, marginally) significant and negative effect if the level of democracy is relatively high (with 5% confidence intervals: for the size of the sample of this paper even 10% confidence intervals is reasonable). For the economic institutions (regression (5) and *Figure 3*) the result is the opposite: in this case I find evidence for the classical conditional resource curse scenario as it is reported for example by Boschini et al. (2007). First, the interaction term is significant and positive: hence natural resources increase economic growth if the economic institutions are sufficiently good. Second, the sign of the natural resources variable turns: it is now negative and significant – once again, as the “conditional resource curse” argument would suggest. From *Figure 3* it follows that the natural resources reduce growth for the low quality of economic institutions (although the result is just marginally significant at 10% level), while for the high quality of institutions the effect of resources is positive.

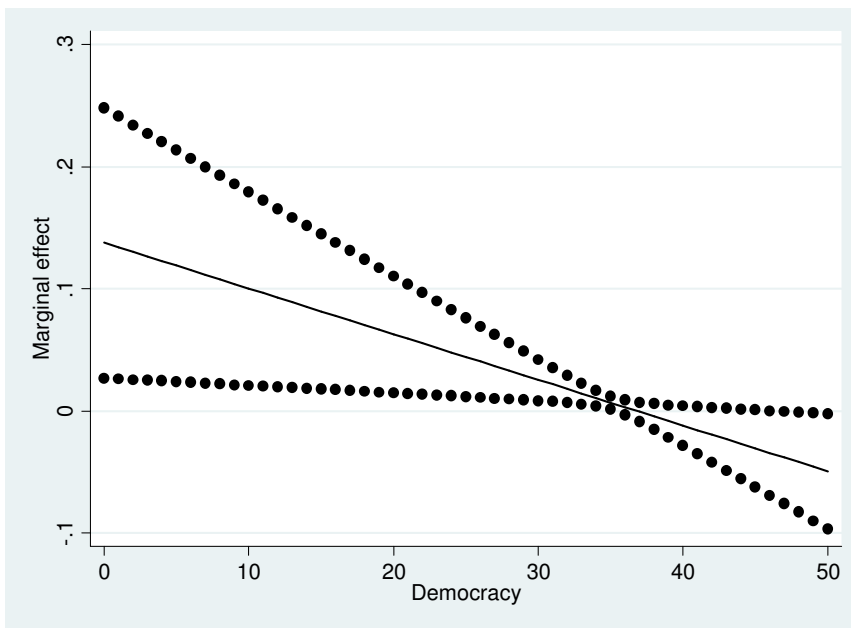


Figure 2: Marginal effect of oil and gas on growth for different levels of democracy

Note: confidence intervals are at 5% significance level

While interpreting these results, it is necessary first of all to keep in mind that in the sample the improvement of democracy and of economic institutions is always *imperfect*. Hence, the outcomes of the regression suggest that small improvements of the level of democracy in the

resource-rich regions make the resource abundance a negative factor for growth. It is in fact consistent with the idea of Collier and Hoeffler (2005), who claim that for resource-abundant economies only *special forms of democracy* (with strong checks and balances counteracting the negative effect of political competition) are efficient. Imperfect democratization could simply increase the redistribution pressure in the society as opposed to “pure” dictatorship, without imposing any restrictions on the redistributive appetites of interest groups (as the “more developed” democracy could do). In this case presence of a significant pool of natural resources does not support economic growth: in fact, it simply reduces the chances of regional political elites to find a consensus over a growth reforms agenda (since the more attractive option of redistribution of rents is always out there). This result seems to contradict the intuition of Barro (1996), which suggest that exactly the hybrid regimes (i.e. cases of “imperfect” democratization) should experience less redistribution – because both the power of public pressure and of dictatorial interests is smaller.

The situation with improvements of the quality of economic institutions seems to be different. Even slightly restricting the ability of bureaucrats to intervene in the economic processes for their own rent-seeking purposes shifts the balance towards a positive impact of the resources on economic growth. At this stage it is however once again important to notice that the variable of economic institutions used measures one *particular aspect* of the role of economic institutions – the protection of entrepreneurs in the region from illegal activities of the bureaucracy. Using the language of the “New Comparative Economics” (Djankov et al., 2003), it looks at the costs due to state expropriation, but ignores the losses through private expropriation, which may be even more important than the public interventions. Therefore these results cannot be interpreted as an unambiguous indicator of the “rule of law” and just shows that improving the quality of public administration (or, more specifically, taming the rent-seeking appetites of bureaucracy by a legal procedure) make resources an effective instrument of growth.¹⁴

¹⁴ I have also re-estimated regressions for the economic institutions excluding Tambov and Primorski krai, which seem to be outliers in the Figure 1 with a very high quality of economic institutions from the sample (notice that Ingushetiya, which is also an outlier, is already controlled for). I find a significant and negative interaction term, the figure 3 re-plotted for this case still demonstrates the same effect, although the lower confidence bound crosses zero for high level of economic institutions. Therefore in this case effect is sustained only for the intermediate levels of economic institutions – however, this “interval of significant effect” includes all regions with the index below 100, what is in fact the whole sample for which regression without Tambov and Primorski krai has been estimated.

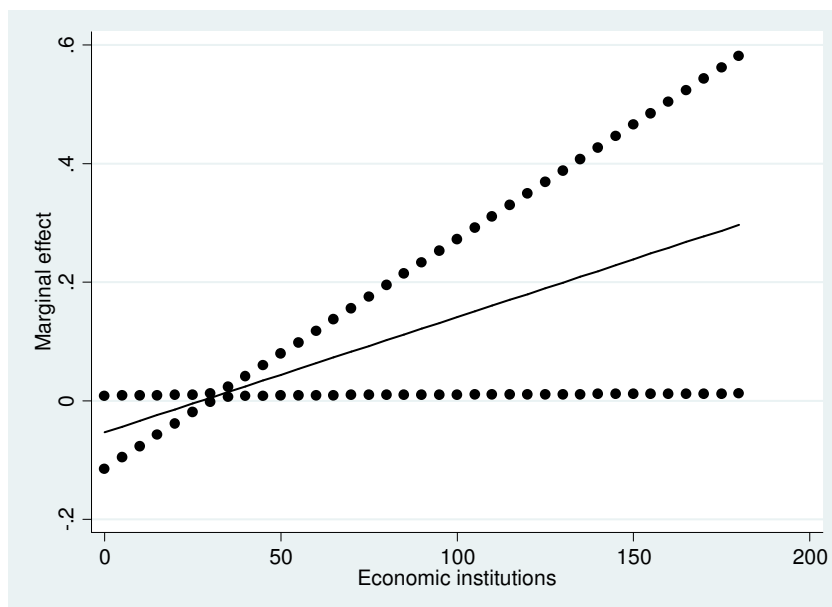


Figure 3: Marginal effect of oil and gas on growth for different levels of quality of economic institutions

Note: see Figure 2

The results were subjected to several robustness checks at this stage already.¹⁵ First, since the Jarque-Bera test rejects the hypothesis of normally distributed residuals, I have excluded the outliers until the test becomes insignificant and then re-estimated the regressions. Basically, no changes were observed. Second, as already notices, the democracy variable is measured for the period of 2000-2004. Towards the end of the year 2004 the regional political systems in Russia experienced a strong and partly unexpected shock, when Putin abolished the free elections of regional governors and replaced it by de-facto appointments through the federal administration. Although the re-appointment policies of Putin in the regions during the first years of this new policy have been particularly cautious and the most influential players were able to keep their positions (Chebankova, 2006), this shift could significantly alter the behavior of regional leaders, thus making the old assessments of the regional political systems invalid. Hence, I have re-estimated regression (3) for the period of 2000-2004 and found the same effects as for the period of 2000-2006. Third, the results could be biased if any spatial interdependence of regions exists. Therefore I re-estimated regressions (3) and (5) using the tools of spatial econometrics, and also confirmed almost all effects reported.¹⁶ Fourth, as mentioned

¹⁵ The results of the robustness checks are available on request

¹⁶ I estimated both spatial lag and spatial error models using ML-estimator for the aim of completeness. The set of covariates in the spatial regressions was identical to that reported in (3) and (5) in *Table 1*. I have used two variations of the spatial matrices: the simplest possible, assigning one to the pairs of region sharing common borders and zero otherwise, and a somewhat more elaborate – the inverse distance matrix, measuring the shortest railway travel distance between capitals of the regions (or, if it is absent, the shortest distance in terms of flights or car transportation – since railroad is the main transportation medium in Russia) reported by Abramov (2008). I find the predicted effects of the interaction terms in all lag regressions; in the error regression the effects for economic institutions are the same, while for the political institutions the interaction term

above, I have re-estimated the regressions (3) and (5) excluding the dummies for four “specific” regions. Basically, excluding three of four dummies (Moscow City, St. Petersburg and Ingushetiya) – hence, letting the particular regions count in the estimation - does not change the results. For Chukotka no information on the quality of economic institutions is available; however, for democracy the results if dummy Chukotka is excluded become not robust – the interaction term loses its significance.¹⁷

An additional robustness check takes into account the fact that one considers a federation and not a collection of independent states. Hence, it is imperative to account for the potential impact of the center-region relations on growth, which can be correlated with the regional political institutions. The most obvious proxy for the federal interventions in the local economy for Russia (with its centralized taxation system) is the size of federal transfers to the regional budgets. Specifically, I use the average share of federal transfers in the regional expenditures in the period of 2000-2006, based on the data of the Russian Federal Treasury. The variable is obviously endogenous to the growth rates; hence the results should be interpreted with great caution. Nevertheless, I find that the interaction terms in specifications (3) and (5) have the same sign and significance (and almost the same magnitude) after including this control variable. Furthermore, I have experimented with adding to the regression several further control variables potentially influencing growth. Specifically, I re-estimated the specifications (3) and (5) with following controls: (a) share of fixed capital investments in the gross regional product; (b) number of doctors in medical system per capita; (c) number of crimes per capita and (d) average temperature in January (an indicator of the severeness of climate highly important for the Russian Federation).¹⁸ However, the interaction term always remained significant (at least at 10% level) and kept the sign of the original model.

Estimating impact of institutions on economic growth is always at least suspected to suffer from reverse causality. In case of democracy there are some reasons to believe that in Russia this problem may be less pronounced (see Libman, 2009, for a more detailed discussion), however, this argument relies on the country specifics of the Russian Federation and hence is not unambiguous from the point of view of a rigorous test. An additional problem can be that the resource extraction as such is conditional on economic growth or, at least, there is a problem of unobserved common factors influencing the economic growth and the extraction. It is certainly less volatile than, for example, oil extraction in the US and is rather based on the exploitation of the existing resources up to the highest possible limit (in addition, the existing facilities are mostly inherited from the USSR, and the investments of the prosperous Russian companies in this area have been notoriously small), but still is influenced by the external conditions (for instance, in 2009/2010 BP World Energy Statistical Review attributed the

holds the sign, but is marginally insignificant (p-value = 0.102). The spatial term (lambda or rho) is never significant.

¹⁷ Furthermore, I re-estimate all regressions excluding Tatarstan – a region of Russia with relatively high oil deposits and very specific political regime, which, on the one hand, received special treatment from the federal government (particularly, in terms of the regional control over the resource rents) since the early 1990s (and enjoyed a somewhat higher autonomy even under Vladimir Putin), and, on the other hand, can significantly bias the results of the OPORA given the quality of the data. However, there are no differences observed in the results in this case. The results are, however, not robust to the exclusion of Tiumen – the largest oil and gas extracting Russian region possessing the major share of the national deposits.

¹⁸ All variables come from the Russian Statistical Authority Goskomstat.

growth of Russian oil extraction to the changes in the natural resource taxation). In this paper I apply a set of instruments to re-estimate the equations (3) and (5) using TSLS, accounting for the endogeneity of the oil and gas extraction, institutions and the interaction term.

Unfortunately, in this paper the choice of instruments is imperfect, and thus the exogeneity of the results reported should be treated with caution. While the Hansen J (in cases of the over-identification) is not significant, supporting the claim of the exogeneity of the instruments, and the variables are not significant if included in the second stage (i.e. added as covariates to (3) and (5) respectively) and also generate high F-statistics for almost all of the instrumented variables, there is no unambiguous theoretical argument behind the choice of the instruments. Nevertheless, their selection is not entirely empiristic and influenced by two considerations. First, as it is usually done, I have attempted to solve the problem by lagging the variables. It is somewhat more meaningful for the Russian case, since sufficient lag allows using the data from the Soviet period, which are obviously driven by very different factors and decision-making procedures. Second, I look for the growth-independent factors potentially influencing the political and economic institutions of the regions (probably, through the “soft cultural” dimension), which, once again, ought to be rooted in the past.

The instruments I have used are the number of criminal convictions in the region in 1985; oil and gas extraction in 1990; age of the capital city of the region and age of the establishment of the region as a separate political entity as well as their various products and squares (a detailed list is provided in the note to the *Table 1*). The *past oil and gas extraction* is a reasonable instrument for the oil and gas extraction today, particularly because 1990 is the last “Soviet” year, and, as mentioned, it is the Soviet period when the infrastructure in oil and gas extraction was mostly created (and probably even for the political and economic regimes, as discussed above). The logic behind the *criminal convictions of 1985* is the following. Criminal conviction (especially in the USSR, where imprisonment was applied as punishment more often than in developed countries) has a strong influence on the socialization of an individual and on her perception of the governmental authorities (particularly in the post-Soviet states, see Oleinik 2003). Those convicted in 1985 should have (mostly) already returned to their home regions in the first half 1990s, when the political and institutional systems of Russian regions were emerging. As a matter of fact, the role of criminal networks (which are often emerging through contacts remaining from the sentence period) in the early transition in Russia is notorious (see Volkov 2002). Thus, significant number of criminal convictions shortly before the start of the reforms should result in greater number of people with prison experience in the region, who, on the one hand, share a specific perception of government and law, but, on the other hand, have a strong position in the emerging market economy.¹⁹

Finally, one can with caution conjecture that *age of the city and the region* can be related to the “maturity” of the political and social networks there and the existence or absence of local traditions (both positive and negative in terms of the institutional development). On the other hand, although older cities may have better infrastructure and human capital, the first men-

¹⁹ One should also mention that the criminal convictions in the Soviet Union were often driven by factors very different from what one could have observed today – the main reason for convictions reported in 1985 were “crimes against the socialist property” (including many aspects of what one would refer today to as “entrepreneurial activity”, but also partly common theft). Unfortunately, more detailed information (i.e. types of convictions per region) was not reported in the Soviet period.

tioning of the city in the chronicles (which is indeed what the variable in question measures) is unlikely to be correlated with short-term growth in the 2000s. The same argument applies for the age of establishment of the region as an independent administrative entity: here it is even more straightforward, since political borders are very often unrelated to the infrastructural and economic developments of the regions and rather reflect power configurations between the regional and central elites or long-term traditions. The regional elites in Russia in many cases were able to emerge only when the region was officially “established” (the territorial division of the country was set by the central government). There have been no new regions (and new regional capitals – with the partial exception of Ingushetiya, which is excluded in TSLs and controlled for in OLS) founded during the period of analysis (the set of regions is inherited from the Soviet past), so the reverse causality in this case is absent. However, these explanations are clearly speculative and, once again, call for caution.

Generally speaking, the results of the estimations confirm the OLS outcomes (equations (6) and (7)). In addition, in specifications (8) and (9) I re-estimate the TSLs regressions excluding two potentially endogenous controls – education and openness – and also confirm the original results. Obviously, excluding variables, which may have a significant impact on growth and be correlated with institutions, can lead to inconsistency through an omitted variable problem. The idea is to assume that the bias through the inclusion of endogenous controls and through the omitted variables is unlikely to run in the same direction. Once again, however, caution is necessary in interpreting these results. In addition, since the past criminal convictions can influence the present crime rates in the regions, for the democracy, where this variable is actually used as an instrument, I have re-estimated two additional specifications, one controlling for current (2000-2006) crime rates and one including current crime rates in the set of instrumented variables, and, once again, did not find any differences in my results (notice though that the past criminal convictions are almost uncorrelated with the present crime rates).

Table 1: Institutions, resources and growth in Russian regions, 2000-2006, dep.var.: average growth rate of the gross regional product

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|--|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | (OLS) | (OLS) | (OLS) | (OLS) | (OLS) | (TSLs) | (TSLs) | (TSLs) | (TSLs) |
| Initial GRP | -0.063*** (0.021) | -0.066*** (0.023) | -0.069*** (0.024) | -0.063*** (0.022) | -0.068*** (0.022) | -0.093*** (0.031) | -0.071*** (0.022) | -0.092*** (0.032) | -0.060*** (0.020) |
| Education | 17.422** (8.451) | 17.412** (8.488) | 17.825** (8.510) | 17.448 (10.594) | 19.287* (10.224) | 18.010** (9.096) | 16.109* (9.659) | | |
| Openness | 47.614** (21.162) | 45.359** (21.202) | 43.222** (20.824) | 47.617** (21.855) | 46.023** (21.744) | 25.593 (20.007) | 36.173 (28.532) | | |
| Dummy Chukotka | 7.332*** (0.868) | 7.665*** (1.122) | 8.038*** (1.222) | | | | | | |
| Dummy Ingushetiya | -4.010*** (0.840) | -3.767*** (0.927) | -3.570*** (0.923) | -3.611** (1.686) | -3.430** (1.691) | | | | |
| Dummy Moscow City | 5.109** (2.329) | 5.365** (2.486) | 5.630** (2.531) | 5.055** (2.495) | 5.177** (2.478) | | | | |
| Dummy St. Petersburg | 0.320 (1.244) | 0.135 (1.240) | -0.030 (1.215) | 0.295 (1.519) | 0.182 (1.475) | | | | |
| Oil and gas | 0.010*** (0.003) | 0.010*** (0.003) | 0.138** (0.056) | 0.010*** (0.003) | -0.053* (0.032) | 0.219** (0.092) | -0.041 (0.028) | 0.238*** (0.092) | -0.033 (0.020) |
| Democracy | | 0.020 (0.042) | 0.038 (0.045) | | | 0.197 (0.120) | | 0.224* (0.123) | |
| Democracy * Oil and gas | | | -0.004** (0.002) | | | -0.006** (0.003) | | -0.007** (0.003) | |
| Economic institutions | | | | -0.003 (0.011) | -0.006 (0.011) | | -0.050 (0.052) | | -0.018 (0.032) |
| Economic institutions * Oil and gas | | | | | 0.002* (0.001) | | 0.002* (0.001) | | 0.001** (0.001) |
| Constant | 4.703*** (1.455) | 4.228*** (1.571) | 3.722** (1.569) | 4.866** (1.964) | 4.728** (1.890) | -0.024 (3.131) | 7.851*** (2.839) | 2.501 (3.158) | 9.038 (1.732) |
| Observations | 79 | 79 | 79 | 75 | 75 | 75 | 72 | 75 | 72 |
| R² | 0.335 | 0.337 | 0.347 | 0.28 | 0.307 | | | | |
| Centered R² | | | | | | 0.130 | 0.017 | 0.024 | 0.147 |
| J.-B. test | 13.52*** | 12.40*** | 14.83*** | 14.38*** | 16.33*** | | | | |
| F-test first stage (oil and gas) | | | | | | 28682.57*** | 45887.20*** | 39217.41*** | 53883.65*** |
| F-test first stage (institutional variable) | | | | | | 17.20*** | 8.53*** | 21.61*** | 14.53*** |
| F-test first stage (interaction term) | | | | | | 23296.96*** | 9621.64*** | 31097.88*** | 12289.03*** |
| Hansen J | | | | | | 0.730 | | 1.109 | |

Notes: robust standard errors in parentheses. *** 1% significance, ** 5% significance, * 10% significance. Outlier according to the J.-B. test is Dagestan in regression (1)-(5). After exclusion of outliers all significant effects in OLS remain significant and hold the original sign. Instruments in (6) and (8) are the number of convictions in 1985, oil and gas extraction in 1990, as well as the products of convictions and oil and gas extraction in 1990,

age of the city and oil and gas extraction in 1990 and age of the region and oil and gas extraction in 1990. Instruments in (7) and (9) are squared oil and gas extraction in 1990, oil and gas extraction in 1990 and product of the age of the city and squared oil and gas extraction in 1990

Finally, including past oil and gas extraction can be problematic since it can also influence the current GRP growth through the initial GRP variable. Therefore I re-estimated (8) and (9) including initial GRP in the set of instrumented covariates. In this specification, following Libman (2010), I also added two additional instruments: income per capita in 1990 and in 1985 (note that for the Soviet period GDP or GRP was not calculated as part of the Russian statistical accounts). In both cases Hansen J is insignificant and the F-statistics in the first stage are above 10 for all instrumented variables; I obtain a significant and negative interaction term for democracy regression and a significant and positive interaction term in the economic institutions regressions – so, the results are, once again, confirmed by this approach.

The existence of the differentiated effects for economic and political institutions suggests that it may be also important to look at their interaction (and, possibly, interaction with the oil and gas variable), particularly because, as mentioned above, there is virtually no correlation between the institutional variables. In this paper I proceed as follows: first, all regions are divided into four groups: regions with “high” quality of economic and political institutions (i.e. where democracy variable and economic institutions variable is above the average for the sample); regions with “low” (below average) quality of economic and “high” quality of political institutions; regions with “high” quality of economic and “low” quality of political institutions; and regions where both economic and political institutions are of “low” quality. The size of the groups seems to be roughly equal and vary around 20 regions (with the only exception of “high”-“high” group, which is smaller). Then I re-estimate the growth regressions separately for each of the groups, including only the controls and the oil and gas variable.²⁰

The results are reported in *Table 2*. Interpretation of regressions for these very small groups is very difficult, simply because of the limited number of degrees of freedom and potentially strong impact of outliers. In addition, there may be a selection problem since the allocation of regions across these groups is not random (and, as already mentioned, may be linked to their resource endowment, which is known to influence both political and economic institutions). Hence, the findings may provide some hints regarding the question at hand rather than be treated as strong evidence.²¹

²⁰ Ingushetiya, Chukotka, Moscow City and St. Petersburg are not included in any of the samples.

²¹ I have also estimated specifications of the whole sample including both political and economic institutions (and their interaction among each other, as well as interactions with oil and gas and the “triple interaction” variable – in different combinations) in the regression. However, none of these specifications provided any significant results. The approach of dividing the sample is often used in conditional resource curse literature (e.g. distinction between democracies and autocracies).

Table 2: Impact of resources in growth in four groups of regions, 2000-2006, dep.var.: average growth rate of the gross regional product

| | (10) | (11) | (12) | (13) |
|-----------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|
| | (OLS) | (OLS) | (OLS) | (OLS) |
| Democracy | Low | High | Low | High |
| Economic institutions | Low | Low | High | High |
| Initial GRP | -0.057*** (0.017) | -0.040 (0.036) | -0.148*** (0.036) | 0.411** (0.123) |
| Education | 41.644** (17.263) | 10.430 (13.403) | 10.444 (11.271) | 35.335 (24.905) |
| Openness | 114.429* (55.864) | 36.774*** (9.457) | -7.037 (50.745) | 1.677 (80.039) |
| Oil and gas | 0.042 (0.027) | 0.007 (0.005) | 0.112*** (0.031) | -0.486** (0.166) |
| Constant | -0.254 (2.816) | 5.362** (2.337) | 8.144*** (2.076) | -9.928** (4.141) |
| Observations | 22 | 17 | 23 | 13 |
| R ² | 0.469 | 0.438 | 0.551 | 0.622 |

Notes: see Table 1

The results of *Table 2*, nevertheless, provide some interesting observations. Natural resources have a significant impact on growth only for regions with “good” economic institutions: however, the impact is positive only if at the same time the level of democratization is low. If the democracy is relatively well-developed (as opposed to the overall Russian sample), the impact of resources on growth is negative. One could cautiously interpret it as an indication that redistributive activity through a more democratic system “over-compensates” the positive impact of economic institutions. The optimal combination for resource-abundant regions in the sample seems to have low level of democracy (once again, if the “high” level is just associated with a limited improvement and a specific hybrid regime) and good quality of economic institutions.²² In the same way, I have re-estimated the *Table 2*, but separating the sample according to the median (and not mean) quality of institutions and growth. The result is then significant (and positive) just for the high quality of institutions and low quality of democracy, all other combinations yield insignificant coefficients.

Finally, although this approach is not consistent with the standard growth econometrics tools, I have also estimated the regressions (3) and (5) from the *Table 1* in a panel data setting with the two-way fixed effects. In this case a growth rate in each particular year in each region constitutes a unit of observations. While it is clear that this approach can cause problems be-

²² It is also interesting to notice that other determinants of the GRP growth (initial GRP, education and openness) have different significance for different subsamples.

cause of the potential short-term effects (for instance, business cycles), it also has advantages as to reducing the impact of unobserved heterogeneity. The regressions included all time-variant controls: oil and gas extraction in the region, economic openness and the product between the oil and gas extraction and the economic (or political) institutions – and were estimated for the full sample of regions. For the economic institutions the results of *Table 1* are confirmed: one finds a significant and negative impact of oil and gas on economic growth and significant and positive interaction term. Analysis of the changes of the confidence intervals over the sample reveals almost the same picture as in the cross-sectional regressions (see *Figure 4*) with effects being marginally significant at the 5%-level (the absolute size of the effect is much larger though, reflecting a greater annual variation of the growth rates). For the interaction term with democracy, however, I do not find any significant effects in the panel data setting. Nevertheless, given the high volatility of growth rates of Russian regions in individual years (which is “smoothed” in the average cross-section), it would be reasonable not to over-interpret the panel data findings, which should be treated just as an additional robustness check.

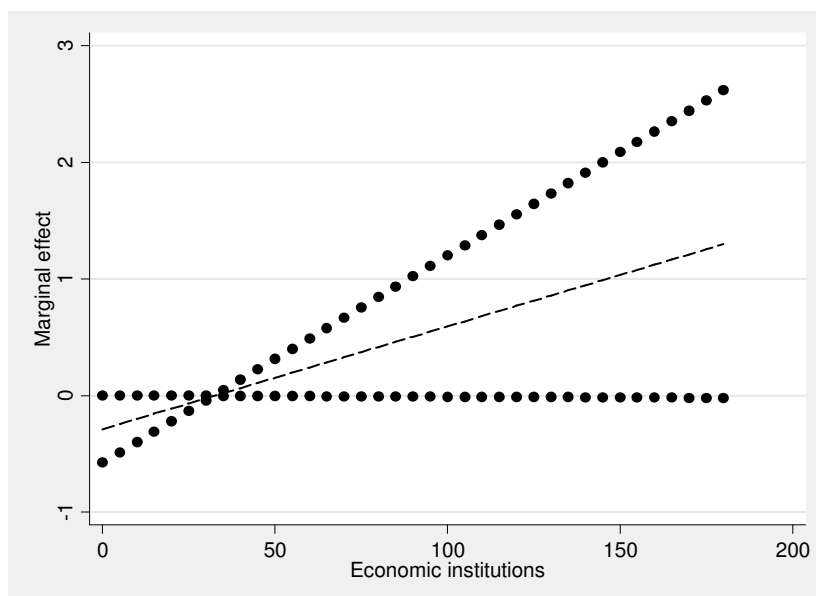


Figure 4: Marginal effect of oil and gas on growth for different levels of quality of economic institutions, panel fixed effects

Note: see Figure 2

4.2 Export or production? Disentangling the channels of the resource effects

The analysis so far seems to demonstrate that in the sample of Russian regions the impact of natural resources on growth does depend upon the economic and political institutions of a particular region. Nevertheless, it would be interesting to attempt to “disentangle” the causes of the effect one observes and to find out the driving forces for the conditional resource curse. In this section I will attempt to do it by focusing on yet another feature, which could be explored using the subnational sample even easier than with an international sample: revenues from exporting oil and gas do not necessarily (directly) go to the regions producing oil and gas. In the 1990s oil and gas companies often used transfer pricing to reduce taxes, thus turning non-producing regions into significant oil and gas exporters (Jones Luong and Weinthal, 2004). Under Putin the options for the transfer pricing were reduced, but still the export and the production of oil remain disentangled. Indeed, City of Moscow and Leningradskay region (surrounding St. Petersburg) are among the key exporters of energy in Russia without having any significant extraction facilities.

Thus, I have re-estimated regressions (1), (3) and (5) from the *Table 1* using instead of the domestic oil and gas extraction in a region, first, the total value of exports of energy goods from the region (in USD million), and second, share of energy exports in the total exports of the region (see also Mishura (2010) on the application of this variable). The results are re-

ported in *Table 3*. As in case of the oil and gas extraction, I find a strong and significant positive correlation between this variable (which is of course even more likely to be subject to the endogeneity than the oil and gas extraction) and the economic growth. This correlation persists even if controlling for oil and gas extraction (for the share of exports both extraction and export variables are highly significant and positive). So, at this level no differences are observed. However, if one adds the measures of economic or political institutions and the respective interaction term, the situation is very different: the export variables become insignificant, as are the interaction terms – suggesting that under this approach the regression is misspecified. Hence, one does not find any conditionality of the impact of exports on growth depending upon economic or political institutions, while there effects of the oil and gas extraction are conditional upon the institutional quality.

In what follows I attempt to provide several speculative arguments explaining the difference observed in the paper. It should be noted that the explanations cannot be tested directly empirically given the data at hand and are under no conditions unambiguous in terms of their argumentation, and therefore rather constitute a set of conjectures, which require caution for the interpretation, but give some possible intuition about the reasons for the observed difference. However, these conjectures may indicate a number of interesting effects for the studies of the resource curse.

For instance, compare two regions: exporting, but not producing, and producing and exporting (the third variety of producing and not exporting is absent in our sample). The former is, as mentioned, probably a region where headquarters of oil and gas companies are located (and their owners and managers reside) or a region used for transfer pricing schemes. One can conjecture that the main difference between this region and a producing region is how resource rents are distributed and dissipated: if there is also production in the region, there exist additional channels of redistribution of rents from the owners and management of oil and gas companies through the resource movement effects (increasing wages in the resource-extracting industry). In the post-Soviet economies with huge social responsibilities of companies, particularly if they are the dominant ones in a city or region (as it is often the case with oil and gas), the benefits obtained by those related to the oil and gas extraction sector will be even larger. Hence, if the region extracts and exports oil and gas, a relatively large part of its population benefits from the spoils of resources, as opposed to the other type of the regions discussed below.²³

In the exporting regions without production the main channels of redistribution should be spending effect (Corden and Neary, 1982), which benefits the domestic non-tradable goods, but also the luxury goods acquired in other countries or regions. One can assume that in this scenario the dissipation of the rents is smaller – particularly if a significant portion is spent abroad or invested in savings abroad, what is very likely: the capital flight has been considered a key feature of the Russian economy for the last two decades. Of course, the rents do dissipate from owners and managers of companies – through the goods and services acquisitions or through taxes (which are however very low in the Russian case) – the claim is rather that the *relative* scope of dissipation of rents (i.e. the benefits the “majority” of the population

²³ But, certainly, it is still very likely to be the case that the rents are very unequally distributed and /or spent abroad – my analysis rather concentrates on comparing two types of regions than on making statements regarding each of them.

receives from the rents) is larger if the region exports and produces resources than for the regions which just export without production.²⁴

Then it is reasonable to assume that the rules of the game governing the interaction between the elites (and largest enterprises) and the government, on the one hand, and the “mass” of smaller and medium-sized companies and larger population, on the other hand, are different (particularly in the systems studied in this paper). For instance, it is possible that for SMEs protection of property rights is relevant, while for larger companies it is simply not important (for example, since they can gain support through informal channels and hidden bargaining). Then, also particularly given the *measures of the institutions* I apply in this paper (which explicitly takes just the SMEs into account), it is clear that the effects are observed for producing regions, but not for exporting regions: it may indicate that the economic and political institutions (or more specifically, political and economic institutions as measured in this paper) matter more if the resource rents are less concentrated. Certainly, in the extracting regions the contribution of the small and medium-sized companies to the GRP is smaller – and maybe even tiny (it is certainly the case in Russia, where at least in some extracting regions large oil companies and Gazprom have the absolute dominance); however, this (smaller) fraction of the GRP will then experience systematic variation with the changes of the political regime and economic institutions;²⁵ in the exporting regions, on the other hand, resource benefits are obtained by a smaller number of actors, which act independently from the quality of institutions.²⁶

²⁴ Of course, the rent dissipation in the exporting regions should not be underestimated. In the Russian economy the old Soviet patterns of using oil resources to support inefficient production in the manufacturing sector still exist and proliferate (Gaddy and Ickes, 2006). However, once again, their *relative* importance might be smaller.

²⁵ It is also the case that although the statistical significance of my findings is high, their economic significance is not so large: for example, the negative effect from the highest level of democracy never exceeds 0.5 percent points of growth, what is quite limited compared to the high growth rates reported by many Russian regions during the period. Nevertheless, even this small variation is robust and significant in the statistical sense.

²⁶ Once again, it is necessary to point out that I do control for the City of Moscow, which has a unique position in the redistribution within Russia and obtains special public support and substantial rents.

Table 3: Institutions, resources and growth in Russian regions, differentiating between export and extraction of resources, 2000-2006, dep.var.: average growth rate of the gross regional product

| | (14) | (15) | (16) | (17) | (18) | (19) | (20) | (21) | (22) | (23) | (24) | (25) |
|--|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|
| | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS |
| Initial GRP | -0.036* (0.018) | -0.072*** (0.021) | -0.036** (0.018) | -0.035** (0.017) | -0.067*** (0.020) | -0.032* (0.017) | -0.072*** (0.023) | -0.071*** (0.024) | -0.073*** (0.023) | -0.068*** (0.022) | -0.067*** (0.022) | -0.067*** (0.022) |
| Education | 19.274** (9.588) | 18.824** (8.778) | 19.179* (9.625) | 19.415* (11.531) | 19.152* (10.748) | 21.121* (11.874) | 17.206** (8.609) | 17.176* (8.768) | 17.939** (8.548) | 17.096 (10.724) | 16.997 (10.926) | 17.371 (10.936) |
| Openness | 22.019 (15.586) | 25.030 (15.660) | 21.961 (15.699) | 24.170 (15.490) | 29.372* (16.018) | 24.208* (14.185) | 36.727** (16.432) | 34.628** (15.239) | 34.967** (16.645) | 40.070** (17.134) | 37.713** (14.996) | 38.353** (15.369) |
| Dummy Chukotka | 5.935*** (0.921) | 7.594*** (1.026) | 6.020*** (0.896) | | | | 8.102*** (1.175) | 8.077*** (1.182) | 8.203*** (1.193) | | | |
| Dummy Moscow City | 0.597 (2.341) | 3.990* (2.341) | 0.610 (2.325) | 0.441 (2.487) | 3.460 (2.406) | 0.691 (2.577) | -15.231*** (4.598) | -20.455 (13.841) | -17.283*** (4.894) | -14.766*** (4.651) | -20.630 (13.477) | -12.957** (5.544) |
| Dummy St. Petersburg | 0.249 (1.474) | 0.370 (1.319) | 0.306 (1.499) | 0.269 (1.704) | 0.580 (1.559) | -0.048 (1.762) | -0.233 (1.282) | -0.333 (1.414) | -0.273 (1.253) | 0.035 (1.527) | -0.072 (1.607) | -0.007 (1.565) |
| Dummy Ingushetiya | -4.776*** (0.910) | -5.036*** (0.885) | -4.550*** (1.192) | -4.626*** (1.609) | -5.142*** (1.636) | -8.893* (5.244) | -3.486*** (0.772) | -3.383*** (0.803) | -3.343*** (0.830) | -3.312** (1.533) | -3.156** (1.549) | -3.201** (1.542) |
| Oil and gas extraction | | 0.008*** (0.003) | | | 0.008*** (0.003) | | | -0.003 (0.007) | | | | -0.003 (0.007) |
| Oil and gas export | 3.682*** (1.047) | 3.235*** (0.969) | 2.710 (4.255) | 3.712*** (1.030) | 3.213*** (0.959) | 1.023 (2.452) | 0.001*** (0.000) | 0.001* (0.000) | 0.001 (0.001) | 0.000*** (0.000) | 0.001* (0.000) | 0.000 (0.000) |
| Democracy | 0.004 (0.048) | 0.030 (0.046) | -0.003 (0.060) | | | | 0.029 (0.045) | 0.029 (0.046) | 0.040 (0.048) | | | |
| Democracy * Oil and gas export | | | 0.034 (0.153) | | | | | | 0.000 (0.000) | | | |
| Economic institutions | | | | -0.002 (0.010) | -0.002 (0.010) | -0.009 (0.012) | | | | -0.004 (0.011) | -0.005 (0.011) | -0.005 (0.011) |
| Economic institutions * Oil and gas export | | | | | | 0.054 (0.055) | | | | | | 0.000 (0.000) |
| Constant | 3.152* (1.824) | 3.490** (1.689) | 3.373 (2.045) | 3.211 (2.037) | 4.177** (1.896) | 3.191 (2.052) | 4.152** (1.625) | 4.115** (1.715) | 3.711** (1.694) | 5.075** (1.938) | 5.052** (1.972) | 5.047** (1.965) |
| Observations | 79 | 79 | 79 | 75 | 75 | 75 | 79 | 79 | 79 | 75 | 75 | 75 |
| R ² | 0.368 | 0.436 | 0.369 | 0.321 | 0.387 | 0.334 | 0.370 | 0.372 | 0.374 | 0.316 | 0.318 | 0.318 |
| J-B test | 5.381* | 6.755** | 5.581* | 6.538** | 9.564*** | 3.688 | 15.29*** | 15.91*** | 16.34*** | 19.03*** | 20.1*** | 19.92*** |
| Oil and gas export | Share | Share | Share | Share | Share | Share | Volume | Volume | Volume | Volume | Volume | Volume |

Notes: see Table 1. Dagestan is an outlier in all regressions according to the J-B test (where it is significant); after exclusion of Dagestan all effects for resource export and extraction, institutions and interaction terms remain the same in terms of sign and significance.

To conclude, the “conditioning” for the resource effect could be caused by the greater spread of resource rents in the extracting than in the exporting regions and therefore could influence the behavior of the smaller companies and households outside the elite: if the resource rents were contained just to a small group of recipients (as it can be the case in the exporting regions), the conditionality of the resource effect could disappear (in my sample the direct effect still remains and is significant – it rather does not depend on economic or political institutions). One can also claim that under these conditions it is more likely that the results I observe are influenced rather by the issues of corruption and costs of doing business (economic institutions) and public demand for wasteful expenditures in the electoral campaign (political institutions) than by the classical “purely economic” explanations of the resource curse.²⁷

5 Extensions

5.1 Disaggregating the index of democracy

As already mentioned, the outcomes of the estimations reported so far are mostly consistent with the Collier and Hoeffler (2005) outcomes for the interaction between democracy and resources as factors of growth. However, the main claim of Collier and Hoeffler – democracy as electoral competition and openness has a negative interaction term, while democracy as a system of “checks and balances” has a positive one – could be (with several caveats) tested explicitly in the Russian sample. In order to do it I apply four sub-indices of democracy, which, as noticed, are used by the Carnegie Center in Moscow to construct the overall index. First, I use two indices of openness and freedom of elections to account for the “negative interaction term” prediction by Collier and Hoeffler. Second, with respect to the “checks and balances” it is much more difficult to find the appropriate indicators, particularly because in the Russian sample the formal differences in political system are smaller, than in an international comparison (although the informal differences – which, in fact, constitute the core of distinction between individual political regimes – are strong enough to make this study reasonable). However, I apply the indices of “political organization” (which also measures the “real balance of power in the region”, as noticed in the *Appendix*) and elites (which looks at the multiplicity of the elite groups) as possible proxies to obtain the positive interaction term predicted by Collier and Hoeffler.

²⁷ Another reason for differences can emerge since the energy export captures also coal and electricity. However, although Russia does export these commodities, during the period of study the gains from them have been significantly smaller (if present at all) than from the oil and gas exports (the situation with coal changed somewhat towards the end of the 2000s, but this energy source is still much less lucrative than oil or gas). It is also the case that the regions where difference between exports and production is positive and very large are mostly not those where coal mines are located.

Table 4: Different aspects of democracy, resources and growth, 2000-2006, dep.var.: average growth rate of the gross regional product

| | (26) | (27) | (28) | (29) |
|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | (OLS) | (OLS) | (OLS) | (OLS) |
| Concept of | Openness | Elections | Political organization | Elites |
| Initial GRP | -0.063*** (0.021) | -0.065*** (0.023) | -0.072*** (0.024) | -0.067*** (0.024) |
| Education | 17.500** (8.561) | 17.177* (8.632) | 15.836* (8.437) | 17.867** (8.554) |
| Openness | 47.727** (21.167) | 44.676* (22.554) | 42.709** (20.572) | 44.258* (23.275) |
| Dummy Chu- kotka | 7.317*** (1.115) | 7.949*** (1.379) | 8.246*** (1.145) | 7.884*** (1.340) |
| Dummy In- gushetiya | -4.031*** (0.917) | -3.756*** (0.909) | -3.609*** (0.817) | -3.679*** (1.015) |
| Dummy Mos- cow City | 5.163** (2.330) | 5.137** (2.381) | 6.117** (2.608) | 5.774** (2.671) |
| Dummy St. Petersburg | 0.390 (1.302) | 0.151 (1.280) | -0.800 (1.414) | -0.327 (1.564) |
| Oil and gas | 0.066** (0.033) | 0.061 (0.071) | 0.107 (0.135) | 0.070 (0.098) |
| Democracy | -0.035 (0.315) | 0.249 (0.360) | 0.668* (0.372) | 0.335 (0.499) |
| Democracy * oil and gas | -0.014* (0.008) | -0.017 (0.023) | -0.032 (0.045) | -0.020 (0.032) |
| Constant | 4.756*** (1.777) | 4.118** (1.579) | 3.478** (1.542) | 3.778* (1.927) |
| Observations | 79 | 79 | 79 | 79 |
| R ² | 0.341 | 0.339 | 0.363 | 0.34 |
| J.-B. test | 15.83*** | 12.24*** | 8.57** | 12.69*** |

Notes: see Table 1. Outlier according to the J.-B. test is Dagestan in all regressions. After exclusion of outliers all significant effects remain significant and hold the original sign, with the exception of Democracy in regression (28), which becomes insignificant (but is still positive).

The results of the estimations are reported in *Table 4*. To start with, both “checks and balances” variables turn out to provide insignificant interaction terms (and although political

organization as such is significant, the effect is not robust to the exclusion of outliers to make Jarque-Bera insignificant). Hence, the “over-compensating” effect of checks and balances does not seem to be present in this sample. One possible interpretation of this outcome is once again the imperfection of democratic transit: it may be possible to hypothesize that it is easier in the early stages of democratization to create a competitive political system than to institute a stable system of checks and balances (which are to a certain extent the *outcome* of the political competition, which can be reached only when – and if – democracy consolidates). Therefore I could be observing relatively competitive polities in my sample, but simply fail to find any regions where checks and balances were developed sufficiently enough to make resources a source for growth.²⁸

I have also checked the effect of interaction of different aspects of democracy with export (share and absolute value) of resources. For the share of exports all four interaction terms and democracy variables are insignificant, for the total value of exports interaction term for the political organization is marginally significant and negative, but all other interaction terms are still insignificant. So, the findings for the exports of natural resources discussed in the previous section seem to be mostly confirmed.

5.2 Appropriability of resources

One of the key results of Boschini et al. (2007) suggests that the “resource curse” or the “conditional resource curse” are functions of the *type of the natural resources* at the disposal of the government and the society. The reason is that different types of resources can be “appropriated” by rent-seeking groups to a different extent (because of technological specifics of their ability to generate revenue), and thus differ in terms of incentives created. In this extension I explore this opportunity by re-estimating all regressions replacing the originally used measure of natural resources (oil and gas) by natural resources in a sector where the ability to capture rents is usually lower, i.e. agriculture. As proxy I take the share of agriculture, fishing and forestry in the value added of the region and then estimate regressions (1)-(5) once again with this new variable. The results are reported in *Table 5*. On the one hand, agriculture is significant and positive in almost all specifications (although the result is not robust to outliers). However, I find no evidence for statistical significance (alone or in interaction with agriculture) for economic institutions. As for political institutions, the results do not change in comparison to the oil and gas: once again, increasing the level of democracy in this society makes resource-abundance a negative factor for growth. *Figure 5* represents, however, the marginal effect, which seems to be significant (and positive) only for the low level of democ-

²⁸ It should be noted though that these results are once again not robust to the presence of the panel two-way fixed-effects. In fact, for this approach I find significant and positive interaction term for the elections, political organization and the elites and a non-significant one for the economic openness. The result for the last two variables is consistent with the argumentations presented by Collier and Hoeffler (2005) given the relevance of checks and balances – although not consistent with the hypothesis on the hybrid regimes presented above.

racies: it is negative for the high level of democracy, but for this part of the sample zero is within confidence bounds.

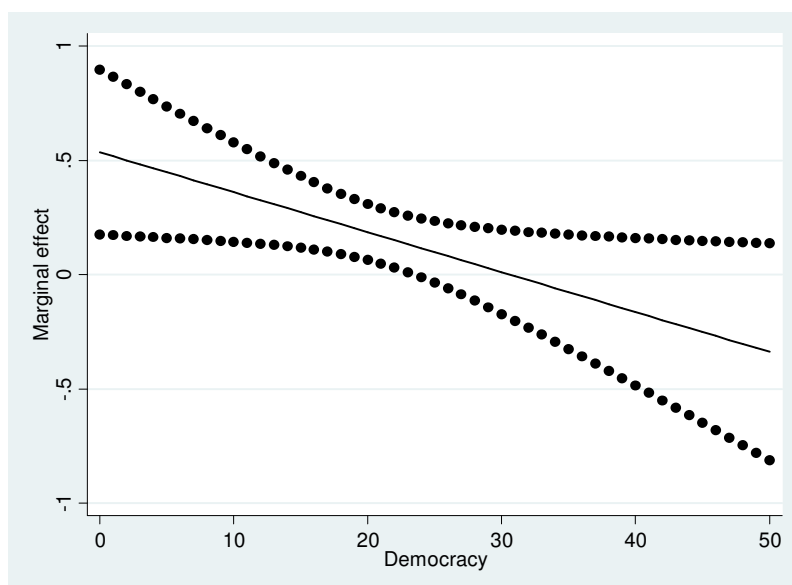


Figure 5: Marginal effect of the share of agriculture on growth for different levels of democracy

Note: see Figure 2

The interpretation of the results is twofold. First, I find partial confirmation for the idea that “resource type” matters for the effects of resource curse. It seems to be straightforward for economic institutions, although for political institutions the results do not change. However, second, it is also important to understand that the resources mentioned differ not only in terms of the ability of interest groups to capture rents generated by them, but also in terms of the “size of the rents” because of the sample chosen in this paper. For the Russian Federation oil and gas are, at it is well known, the traditional export goods responsible for the main part of economic growth in the country in general. Agriculture, on the other hand, has been an area of permanent crises and weaknesses at least for the second half of the 20s century, although the situation in the sector improved in the 2000s as opposed to the 1990s (probably, explaining the positive effect of agriculture observed in this sample – however, for the regressions reported an analysis of outliers shows that the correlation is driven by growth in extremely poor “outlier” regions with large agriculture like Dagestan, an ethnic republic in the Northern Caucasus). Forestry, on the other hand, is still an area of comparative advantages of the Russian export.

Table 5: Agriculture, institutions and growth, 2000-2006, dep.var.: average growth rate of the gross regional product

| | (30) | (31) | (32) | (33) | (34) |
|--|------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | (OLS) | (OLS) | (OLS) | (OLS) | (OLS) |
| Initial GRP | -0.008 (0.018) | -0.008 (0.019) | -0.017 (0.020) | -0.008 (0.018) | -0.011 (0.017) |
| Education | 15.414 (9.278) | 14.881 (9.467) | 10.115 (9.565) | 14.831 (11.588) | 15.135 (11.206) |
| Openness | 54.570*** (20.449) | 52.536** (20.215) | 52.534** (20.353) | 55.090** (21.149) | 53.211** (22.289) |
| Dummy Chu- kotka | 5.644*** (0.670) | 6.140*** (0.911) | 6.691*** (0.953) | | |
| Dummy In- gushetiya | -4.282*** (0.939) | -4.037*** (0.915) | -5.953*** (1.220) | -3.624** (1.703) | -8.187* (4.757) |
| Dummy Mos- cow City | 1.765 (2.250) | 2.073 (2.334) | 2.781 (2.324) | 1.748 (2.516) | 0.979 (2.559) |
| Dummy St. Petersburg | 1.037 (1.432) | 0.932 (1.447) | -0.750 (1.496) | 1.100 (1.730) | 0.743 (1.639) |
| Agriculture | 0.099* (0.055) | 0.122* (0.067) | 0.535*** (0.185) | 0.100* (0.055) | -0.065 (0.126) |
| Democracy | | 0.039 (0.050) | 0.188** (0.079) | | |
| Democracy * agriculture | | | -0.017** (0.008) | | |
| Economic insti- tutions | | | | -0.005 (0.011) | -0.043 (0.036) |
| Economic insti- tutions * agri- culture | | | | | 0.003 (0.003) |
| Constant | 2.292 (1.839) | 1.010 (2.491) | -1.531 (2.359) | 2.614 (2.354) | 4.575* (2.424) |
| Observations | 79 | 79 | 79 | 75 | 75 |
| R² | 0.274 | 0.28 | 0.333 | 0.215 | 0.241 |
| J.-B. test | 12.52*** | 10.91*** | 14.27*** | 13.24*** | 11.00*** |

Notes: see Table 1. Outlier according to the J.-B. test is Dagestan in all regressions. After exclusion of outliers all significant effects remain significant and hold the original sign, with the exception of agriculture in regression (30), (31) and (33), which becomes insignificant, but still positive.

A further robustness test implies the discussion of other mineral deposits. On the one hand, oil and gas is indeed the most significant of Russia's economic resources with strong export potential. On the other hand, for several Russian regions other resources (like diamonds for Sak-

ha or non-ferrous metals for Taimyr) should not be under-estimated. Unfortunately, the statistical data on these resources is much more fragmented than on oil and gas; moreover, in many cases (like, once again, diamonds) the extraction is limited just to one or two regions, what makes econometric testing meaningless. Nevertheless, I attempted to check for the impact of other mineral deposits, using indices suggested by Vainberg and Rybnikova (2006) to capture the resource potential of the region.²⁹ The first one ranks all regions according to their coal, oil, gas and gold deposits. The second estimates the total value of the mineral deposits in the region (in the descriptive statistics and description of variables tables they are referred to as “Natural resources I” and “Natural resources II” respectively). However, neither these variables nor their interaction terms neither for democracy nor for economic institutions were significant. This result calls for different interpretations. On the one hand, it is possible that oil and gas indeed has a unique impact on the economic performance of Russian regions, even as opposed to other resources. On the other hand, it is also possible that other resources are simply mismeasured by these proxies. Finally, it could once again indicate the differences in appropriability even between natural resources – and hence confirm the conjecture I attempted to test in this section.

6 Conclusion

The aim of this paper was to look at the impact of political and economic institutions on the effectiveness of natural resources as driving forces of the economic growth. Specifically, it looked at a “skewed” sample without regions with well-developed democratic regimes and countries with well-protected institutions. Unlike most studies in the literature, my focus has been the intra-national variation of resource endowment and political regimes. Indeed, the paper finds that the resource effects depend upon the variation of political and economic institutions on the subnational level. Hence, the specifics of subnational political and economic regimes should be taken into account in the resource curse studies. The results are, as discussed, not entirely robust to the outliers.

Using a dataset from the Russian Federation, I find that increasing the quality of economic institutions, even if it is a minor improvement, is instrumental in making natural resources a growth factor: “resource curse” is observed in regions with lower quality of institutions. On the other hand, increasing the level of democracy, at least if it is a minor improvement, seems rather to make resources harmful for growth, probably because of stronger rent-seeking. In the world of non-democratic and “hybrid” regimes and generally limited quality of institutions resources seem to generate growth in jurisdictions with low level of democracy and relatively good institutions. The results for democracy are not robust to the panel data estimation techniques though. In addition, I find that exporting and producing natural resources implies different effects: the paper speculates that in the producing regions the spread of rents from resources could be larger than in exporting, but not producing, and therefore the rents “reach” the level of economic and political activity, for which institutions as they have been measured in this paper (and are actually often measured in the literature), are relevant – for the large

²⁹ The regressions are not reported in this paper, but are available on request.

companies one would expect that they are able to bargain with the regional elites in a more informal setting on the bilateral basis.

There are several restrictions for the interpretation of the results of this paper to be mentioned. First and foremost, institutions-and-growth nexus cannot be resolved without a proper instrumentation technique. The instruments used in this paper, although have the necessary statistical properties and some intuition behind their choice, are not entirely unambiguous. Therefore a more cautious interpretation of the result of this paper were to look at them as correlations rather than causal links. Nevertheless, even in this case the outcomes seem to be interesting or at least non-trivial.

In addition, this paper looks at a very short period of time covering only 7 years. It is certainly a natural drawback dictated by the size of the sample (and by the Russian history), but it adds yet another dimension to the question of external validity. It is particularly true because during this period the Russian Federation has been experiencing extremely beneficial conditions on the markets for commodities. So, possibly, what I capture is not the “resource curse” in its classical meaning (which refers to long-term observations), but rather the ability of regions with different types of political and economic institutions to use their resources in a generally speaking positive environment to generate gains for the economy. However, even this cautious interpretation seems to be of interest from both theoretical and policy perspective (as the ability of countries to use their endowment to generate growth in the short run may be crucial for the onset of the more long-term modernization process and the establishment of the reform coalitions).

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Appendix

Table A1: Summary statistics (cross-section)

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|--|-----|------------|-------------|---------|----------------|
| Age of the city | 79 | 435.66 | 297.88 | 12.00 | 1148.00 |
| Age of the city * Oil and gas 1990 | 79 | 8040.43 | 57036.51 | 0.00 | 505403.30 |
| Age of the city * Oil and gas 1990 squared | 79 | 7744181.00 | 67907300.00 | 0.00 | 606727900 |
| Age of the region | 79 | 150.23 | 82.24 | 15.00 | 299.00 |
| Age of the region * Oil and gas 1990 | 79 | 1624.29 | 8768.42 | 0.00 | 75630.41 |
| Agriculture | 79 | 11.10 | 6.23 | 0.00 | 30.91 |
| Average growth rate of the GRP | 79 | 6.58 | 2.37 | 0.36 | 14.11 |
| Convictions 1985 | 79 | 12008.14 | 7947.05 | 2516.00 | 33342.00 |
| Convictions 1985 * Oil and gas 1990 | 79 | 307788.60 | 2260035.00 | 0.00 | 20086481556.00 |
| Democracy | 79 | 29.01 | 6.28 | 17.00 | 45.00 |
| Democracy (Elections) | 79 | 2.95 | 0.75 | 1.00 | 5.00 |
| Democracy (Elections) * Export | 79 | 3923.39 | 17628.18 | 0.00 | 126460.10 |
| Democracy (Elections) * Oil and gas | 79 | 50.14 | 357.65 | 0.00 | 3181.31 |
| Democracy (Elections) * Share of export | 79 | 0.71 | 0.92 | 0.00 | 3.97 |
| Democracy (Elites) | 79 | 3.00 | 0.66 | 2.00 | 5.00 |
| Democracy (Elites) * Share of export | 79 | 0.67 | 0.78 | 0.00 | 2.98 |
| Democracy (Elites) * Export | 79 | 3074.53 | 12347.99 | 0.00 | 84306.71 |
| Democracy (Elites) * Oil and gas | 79 | 49.72 | 357.63 | 0.00 | 3181.31 |
| Democracy (Openness) | 79 | 3.00 | 0.85 | 1.00 | 5.00 |
| Democracy (Openness) * Export | 79 | 4157.65 | 20468.61 | 0.00 | 168613.40 |
| Democracy (Openness) * Oil and gas | 79 | 63.37 | 476.76 | 0.00 | 4241.75 |
| Democracy (Openness) * Share of export | 79 | 0.70 | 0.86 | 0.00 | 3.30 |
| Democracy (Political organization) | 79 | 2.77 | 0.77 | 2.00 | 5.00 |
| Democracy (Political organization) * Export | 79 | 3660.71 | 16237.93 | 0.00 | 168613.40 |
| Democracy (Political organization) * Oil and gas | 79 | 50.30 | 357.74 | 0.00 | 3181.31 |
| Democracy (Political organization) * Share of export | 79 | 0.67 | 0.81 | 0.00 | 2.98 |
| Democracy * Agriculture | 79 | 298.53 | 135.21 | 0.00 | 574.71 |
| Democracy * Export | 79 | 38004.30 | 171385.90 | 0.00 | 1306754.00 |
| Democracy * Natural resources I | 79 | 949.29 | 419.14 | 100.00 | 1722.00 |
| Democracy * Natural resources II | 79 | 155.50 | 41.40 | 50.00 | 246.00 |
| Democracy * Oil and gas | 79 | 552.48 | 4052.89 | 0.00 | 36054.83 |
| Democracy * Share of export | 79 | 6.81 | 8.34 | 0.00 | 33.78 |
| Dummy Chukotka | 79 | 0.01 | 0.11 | 0.00 | 1.00 |
| Dummy Ingushetiya | 79 | 0.01 | 0.11 | 0.00 | 1.00 |
| Dummy Moscow City | 79 | 0.01 | 0.11 | 0.00 | 1.00 |
| Dummy St. Petersburg | 79 | 0.01 | 0.11 | 0.00 | 1.00 |
| Economic institutions | 75 | 53.58 | 29.51 | 12.00 | 176.00 |
| Economic institutions * Agriculture | 75 | 641.14 | 642.68 | 0.00 | 4224.00 |
| Economic institutions * Export | 75 | 45532.50 | 154567.90 | 0.00 | 1041188.00 |
| Economic institutions * Natural resources I | 75 | 1783.32 | 1295.60 | 118.40 | 7392.00 |
| Economic institutions * Natural resources II | 75 | 291.42 | 179.26 | 59.20 | 1056.00 |
| Economic institutions * Oil and gas | 75 | 638.39 | 4010.12 | 0.00 | 34676.27 |
| Economic institutions * Share of export | 75 | 12.79 | 20.04 | 0.00 | 135.81 |
| Education | 79 | 0.17 | 0.04 | 0.11 | 0.36 |
| Export of energy resources | 79 | 1210.57 | 5407.59 | 0.00 | 42153.36 |
| Initial GRP | 79 | 32.76 | 24.41 | 6.67 | 176.92 |
| Natural resources I | 78 | 33.08 | 12.67 | 3.00 | 42.00 |
| Natural resources II | 78 | 5.40 | 1.06 | 2.00 | 6.00 |
| Oil and gas 1990 | 79 | 18.78 | 135.10 | 0.00 | 1200.48 |
| Oil and gas 1990 squared | 79 | 18372.61 | 162129.20 | 0.00 | 1441159.00 |
| Oil and gas 2000-2006 | 79 | 16.63 | 119.24 | 0.00 | 1060.44 |
| Openness | 79 | 0.01 | 0.01 | 0.00 | 0.10 |
| Share of export of energy resources | 79 | 0.23 | 0.28 | 0.00 | 0.99 |

Table A2: Description of variables³⁰

| Variable | Description | Period | Source |
|------------------------------------|---|-----------|---------------------------------------|
| Age of the city | Age of the regional capital, years, as if 2007, years, for Moscow and Leningradskaya regions – age of Moscow and St. Petersburg respectively | 2007 | Petrov (2009) |
| Age of the region | Official age of establishment of the region as a separate first-level administrative entity in Russia (including the Russian Empire, USSR, RSFSR and the Russian Federation, as of 2007 | 2007 | Petrov (2009) |
| Agriculture | Share of agriculture and forestry in the total regional value added, %, average value for seven years | 2000-2006 | Goskomstat ³¹ |
| Average growth rate of the GRP | Growth rate of the GRP in %, inflation-corrected, average value for seven years | 2000-2006 | Goskomstat |
| Convictions | Number of criminal convictions, people (for regions, which did not exist in 1985 or were part of other regions – the value of these larger regions is used) | 1985 | Narodnoe Khoziastvo RSFSR v 1990 godu |
| Democracy | Index of democracy based on expert opinion, higher values represent higher level of democracy | 2000-2004 | Moscow Carnegie Center |
| Democracy (Elections) | Index of freedom of elections, based on expert opinion, higher values represent higher level of freedom | 2000-2004 | Moscow Carnegie Center |
| Democracy (Elites) | Index of multiplicity of political elites and predominance of power shift through elections, higher values represent higher level of multiplicity | 2000-2004 | Moscow Carnegie Center |
| Democracy (Openness) | Index of transparency of regional politics, higher values represent higher level of transparency | 2000-2004 | Moscow Carnegie Center |
| Democracy (Political organization) | Index of real balance of power in the political elite, higher values represent more developed balance of power | 2000-2004 | Moscow Carnegie Center |
| Dummy Chukotka | 1 if region is Chukotka, 0 otherwise | NA | Own calculation |
| Dummy Ingushetiya | 1 if region is Ingushetiya, 0 otherwise | NA | Own calculation |
| Dummy Moscow | 1 if region is Moscow City, 0 otherwise | NA | Own calculation |

³⁰ The description includes only the “primary” variables, and not their interaction terms (since their calculation is obvious as a product of respective variables”.

³¹ Goskomstat is the Russian Federal Statistical Authority

| Variable | Description | Period | Source |
|-------------------------------------|--|-----------------|---|
| City | | | |
| Dummy St. Petersburg | 1 if region is St. Petersburg, 0 otherwise | NA | Own calculation |
| Economic institutions | Share of entrepreneurs claiming to never face illegal activities of bureaucrats – Share of entrepreneurs claiming to often or at least sometimes face illegal activities | 2005 | Opora Rossii (calculated by Vainberg and Rybnikova, 2006) |
| Education | Share of the population with university degree | 2002 | Russian Census |
| Export of energy resources | Total export of energy resources, mln. RUR, average over the period | 2000-2006 | Goskomstat |
| Initial GRP | Gross regional product per capita in 2000, '000 RUR | 2000 | Goskomstat |
| Natural resources I | Ranking of regions from 1 (highest resources) to 42 (lowest resources) based on the deposits of oil, gas, coal and gold | 1998 | Vainberg and Rybnikova, 2006 |
| Natural resources II | Ranks regions from 1 (highest resources) to 6 (lowest resources) depending upon the value of their explored natural resource deposits (USD) | 1996 | Vainberg and Rybnikova, 2006 |
| Oil and gas | Extraction of oil in the region, mln. ton * 1.4 + Extraction of gas in the region, bln. sq. m * 1.2, average value for seven years | 1990; 2000-2006 | Goskomstat |
| Openness | (Export + Import (mln. USD) / GRP (mln. RUR), average value for seven years | 2000-2006 | Goskomstat |
| Share of export of energy resources | Share of export of energy resources in total exports, average of annual data over the period | 2000-2006 | Goskomstat |

Table A3: Components of the index of democracy of the Moscow Carnegie Center

| Component | Comments |
|-------------------------------------|--|
| Civil society | NGOs, referenda, freedom of public political activity |
| Corruption | State capture in a broader sense, i.e. interconnections between political and business elites and their interventions in the political decision-making |
| Economic liberalization | Specific directed interventions of regional administration, ignoring property rights of influential players (e.g. potential opposition) |
| Elites | Existence of a mechanism of leader changes through elections, existence of multiple political elites |
| Freedom of elections | Elections at all levels (national, regional, local) included |
| Freedom of local municipalities | Degree of independence of the local municipalities from the regional government |
| Independence of the media | |
| Openness of regional political life | Transparency of regional politics and its involvement in the overall national politics |
| Political pluralism | Existence of stable political parties, representation of parties in regional legislatures |
| Regional political organization | Real balance of power between the executive and the legislative, elections / appointments of crucial political actors, independence of courts and police, protection of citizen rights |

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