Mechanisms of Resource Curse, Economic Policy and Growth — Source link

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Mechanisms of resource curse, economic policy and growth

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This paper analyzes economic policies in resource rich countries and various mechanisms of resource curse leading to a potentially inefficient use of resources. Arguments are provided in favor of "conditional resource curse" hypothesis: resource abundance hampers growth if institutions of a country are weak. We study the impact of the resource abundance on budget deficit and inflation, foreign exchange reserves and real exchange rate, as well as policies of maintaining low domestic fuel and energy prices. We show that lower domestic fuel prices, that are typical for resource rich countries, have a positive effect on investment in R&D and fixed capital stock, and on long term growth, even though they are associated with losses resulting from higher energy intensity. However, in resource rich countries real exchange rate is generally higher than in other countries. Besides, resource abundance leads to corruption of institutions, especially if these institutions were not strong in the beginning of the period. While there is no solid evidence that, on average, resource abundant countries grow more slowly than the others, there is evidence that they use resources less efficiently, if their institutions are weak.

Key words: resource curse, economic growth, quality of institutions, inflation, industrial policy, lower domestic fuel prices, real exchange rate.

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В статье изучаются особенности экономической политики стран, богатых ресурсами, описаны основные механизмы, порождающие неэффективное использование сосредоточенных ресурсов. Приводятся аргументы в пользу гипотезы «условного проклятия»: ресурсное изобилие замедляет рост, если в стране слабые институты. Рассматривается влияние ресурсного богатства на макроэкономические индикаторы – дефицит бюджета, темп инфляции, накопление золотовалютных резервов, реальный валютный курс. Исследуется политика занижения внутренних цен на топливо. Показано, что, хотя такая политика увеличивает энергоемкость, она может способствовать ускорению роста. В странах, богатых ресурсами, реальный валютный курс при прочих равных условиях выше, чем у других стран. Кроме того, при плохих институтах ресурсное изобилие ведет к еще большему их ухудшению. Хотя нет оснований считать, что богатые ресурсами страны «в среднем» растут медленнее других, имеются свидетельства того, что при слабых институтах увеличение объема сосредоточенных ресурсов в стране сопровождается снижением эффективности их использования.

Ключевые слова: ресурсное проклятие, экономический рост, качество институтов, инфляция, промышленная политика, занижение цен на топливо, реальный обменный курс

ISBN

"So here's my prediction: You tell me the price of oil, and I'll tell you what kind of Russia you'll have. If the price stays at $60 a barrel, it's going to be more like Venezuela, because its leaders will have plenty of money to indulge their worst instincts, with too few checks and balances. If the price falls to $30, it will be more like Norway. If the price falls to $15 a barrel, it could become more like America — with just enough money to provide a social safety net for its older generation, but with too little money to avoid developing the leaders and institutions to nurture the brainpower of its younger generation." (THOMAS L. FRIEDMAN: Will Russia Bet on Its People or It's Oil Wells? - *New York Times*, February 16, 2007)

"How do we know that the God loves the Arabs? If he didn't, why he would give them all the oil?" (*American folklore*)

1. Introduction

It seems obvious that a country endowed with larger quantities of natural resources has an advantage and (other conditions being similar) has to grow faster than resource poor countries. This is not exactly the case, however. Between 1960 and 1990 the per capita incomes of resource poor countries grew two to three times faster than the per capita income of resource abundant countries, and the gap in the growth rates appears to widen with time (Sachs and Warner (1999), Auty (2001)). This surprising phenomenon became a subject of intensive research, both empirical and theoretical. Hundreds of papers were published in recent years supporting the "resource curse" thesis and offering different explanations of mechanisms and effects that may inhibit growth in resource rich economies. Several recent papers, however (Alexeev, Conrad, 2005; Stijns, 2005; Brunnschweiler, 2006), question the mere existence of the "resource curse" and make it necessary to reconsider the hypotheses about the impact of resource abundance on economic growth.

Even without rigorous calculations, it is obvious that not all resource rich countries failed. "Thirty years ago, Indonesia and Nigeria – both dependent on oil – had comparable per capita incomes. Today, Indonesia's per capita income is four times that of Nigeria. A similar patter holds true in Sierra Leone and Botswana. Both are rich in diamonds. Yet Botswana averaged 8.7% annual economic growth over the past thirty years, while Sierra Leone plunged into civil strife." (Stiglitz (2004)). Norway, where large oil deposits were detected in the seventies, was able to avoid Dutch Disease consequences (Gylfason (2001)). Moreover, Norway increased its PPP GDP per capita very significantly, leaving behind its neighbors, and almost catching up with USA.

This paper is a summary of a more extensive research[1] that compares various theories of "resource curse" with a special focus on models allowing for the varying – positive or negative – impact of resources on development depending on the quality of institutions and economic policies. Several mechanisms leading to a potentially inefficient use of resources are being examined; it is demonstrated that each of these mechanism is associated with market imperfections and can be "corrected" with appropriate government policies.

There is no solid evidence that resource abundance, unlike physical and human capital, have a significant impact, either positive or negative, on economic growth. The inclusion of different measures of resource wealth, production and exports into the growth regressions does not produce any stable results, especially after controlling for the population density, initial level of income, population growth rates and the initial quality of institutions[2].

Our empirical investigation presented below shows that resource abundant countries have on average:

- lower budget deficits and inflation, higher foreign exchange reserves and higher inflows of FDI;
- lower domestic fuel prices => positive effect on long term growth even though they are associated with losses resulting from higher energy intensity;
- higher investment/GDP ratio;
- lower income inequality.

However, resource abundance

- leads to higher RER (Dutch disease), distortions of domestic prices, and high energy intensity;

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[1] Полтерович, В., В. Попов, А. Тонис (2007a). This paper, written in Russian, describes results of our projects in greater detail. The main results of our project were published also in: Полтерович, Попов, Тонис (2007b).

[2] Only the indicator of sub-soil assets affects growth significantly and positively in growth regressions after controlling for:

- *Y75* – PPP GDP per capita in 1975, % of the US level,
- *PopDens* – density of the population (persons per 1 square km),
- *n* – average annual population growth rates in 1975-99, %,
- *ICres – residual index of investment climate (residual from the regression of investment climate on Y75).*

y = - 0.03 *Y75**** + 0. 016**PopDens* + - 1.01****n* + 0. 10****ICres* + ***0.012**SSA*** + 4.02,

N= 63, R-squared = 0.4892

Neither of other indicators of the resource wealth (*EXfuel, Imfuel, Prodf, ResOG)* is significant in growth regressions (see the list of notations below).

If we control only for initial income, population density, population size, and population growth rates, but not for the quality of institutions, then generally resource wealth, fuel exports, and resource rent has a negative impact on growth, whereas the impact of the production of fuel is insignificant.

– weakens institutions, if they were poor to begin with, does not contribute to the accumulation of human capital;
- hampers economic growth under low institutional quality, but accelerates growth of economies with high quality of institutions.

Thus, there seem to be two main mechanisms of the conditional resource curse: institutional worsening and Dutch disease. Appropriate industrial policy (or the lack of it) may be the third mechanism that has a major impact on growth in resource rich countries.

For a country that tries to avoid the overvaluation of the currency as a result of a resource boom, there seem to be two extreme policy responses. In the first case, a country keeps the real exchange rate of its currency low enough by accumulating assets abroad (foreign exchange reserves) and getting low but reliable interest income. This used to be the policy of Norway and a number of other countries. To an extent, this seems to be the current policy of the Russia, which accumulated large foreign exchange reserves (nearly $500 billion by the beginning of 2008), although this accumulation was not enough to prevent the real appreciation of the ruble. The second type of policy implies the reallocation of the income flows to stimulate development of manufacturing and machine-building sectors.

The first policy is secure, but it seems to miss a window of opportunity for a developing country. The second policy could give a chance to diversify national economy, so it is less dependent on the world resource prices. This policy is risky since it requires good administration and good coordination of government and business efforts. Besides, a range of mixed policies may be considered. One can try to find an optimal mixture of reserve accumulation and industrial policy redistribution. A compromise between inflation and overvaluation of domestic currency is a part of this problem.

In what follows we run cross country regressions that do not deal with endogeneity problem. Hence, our results have to be considered as preliminary ones, and our conclusions have to be checked using panel data.

2. Review of the literature

Several explanations for the “resource curse” have been offered in the literature. The first explanation, suggested by R. Prebish (1950) and H. Singer (1950), is known as **Prebish - Singer hypothesis**. They pointed to a tendency for primary goods prices to decline relatively to prices of manufactured goods, and suggested that the share of primary goods in GDP will diminish due to technical progress. Therefore countries relying on primary goods sector have to grow slower than economies relying on manufacturing industries. Prebish and his followers ("structuralists") recommended that developing countries temporary close their economies to fully develop manufacturing industries.

There are two major objections to Prebish-Singer (PS) hypothesis, however. First, a number of recent studies used modern econometrics technique to demonstrate that PS- hypothesis holds not for all primary goods and not for all periods (Kelard, Wohar (2002)). Second, few, if any, attempts to follow Prebish advice proved to be successful.

An earlier export based theory of resource-driven growth was suggested by Innis (1954), Baldwin (1956) and Hirshman (1977) (see also Auti, Kiiski (2001)). Innis developed a **"staple theory of economic development"** argueing that countries, in particular Canada, had grown and developed into an integrated economy through exports of primary products. Other scholars studied economic histories of a number of developed and developing countries and demonstrated that primary resource sector influenced positively or negatively their economic growth dependently on its linkages with other sectors. These linkages are defined by technologies of the resource extraction. In some cases development of resource sector stimulates to the rise of industries that supply its inputs (backward linkage) and that process the staple products prior to export (forward linkage). Due to these and other linkages an economy gradually diversifies. However, the diversification does not take place if the linkages are weak (when, for example, inputs are supplied from abroad). In this case production concentrates in the resource sector that has little contact with the rest of the economy. The country falls into a staple trap.

Historical studies of many resource abundant countries show that the Staple Trap Theory, being useful, has a limited explanatory power since it does not take into account the role of macroeconomic and political economy variables (Findlay, Lundahl (2001), Abidin (2001) Gylfason (2001)).

The famous **"Dutch Disease"** story is another possible mechanism of resource curse. Assume a resource boom, a sudden windfall gain. This may be associated with temporary increase in the price of oil or natural resource discoveries. Resource boom seems to open a window of opportunity for a developing country, a possibility to start a catching up process. However, market forces do not lead an economy in the right direction. The resource boom causes a currency appreciation, an increase in import and a rise in wages and in relative prices of non-tradables. Capital accumulation decreases. New opportunities divert capital from manufacturing and machine-building sectors. If there are learning by doing effects or positive externalities from human capital accumulation in these sectors and not in the resource extraction sector, then resource boom may have negative effect on long run economic growth (Corden, Neary (1982), Krugman (1987), Matsuyama (1992), Auty (2001, Ch. 7)). This phenomenon is known as Dutch

Disease since it was clearly observed in the Netherlands in the 1960-80s, after the giant Groningen gas field was discovered in 1959.

Another example of market failure explanation is the "**overshooting model**". Rodriguez and Sachs (1999) argued that resource abundant economies tend to have higher, not lower levels of GDP per capita with respect to resource poor countries. They introduce a factor of production which (like oil) expands more slowly that labor and capital into a Ramsey model and show that the economy demonstrates overshooting effect. The economy surpasses its steady state level of income in finite time and then comes back to its steady state, displaying negative rate of growth. Using a dynamic computable general equilibrium model, authors show that Venezuelan negative growth path in 1972-1993 may be explained by their theory.

A shortcoming of the Rodriguez- Sachs approach, however, is that it does not explain why the steady state is not moving fast enough to catch up with developed economies. One can try to construct an endogenous growth model to take into account technical progress as well as institutions and to continue this line of research.

The Dutch Disease theory explains macroeconomic consequences of a resource boom, whereas the Rodriguez- Sachs approach implies that the economy is not able to adjust in an optimal way to the shock of discovery of resource deposits. Market failure is actually at the heart of both explanations. A question arises, however, if a government is able to correct it.

Another strand of the modern literature emphasizes **government failure story** – political economy aspects of a resource boom. Revenues from resources increase so drastically that investments into **rent seeking** to capture the resource control turn out to be much more profitable than investments into production. Lobbing, dishonest competition, corruption flourish hampering economic growth (Auty (1997), Sachs and Warner (1999a, b), Bulte at al. (2003)). This is why so many attempts to use resource sector profit for industrial policy projects were unsuccessful. Governments taxed primary resource producers and invested the money into new industries. However, the projects failed due to bad investment climate. Instead human capital deteriorated and inequality increased hampering economic growth (Leamer at al (1998)). Low quality of institutions is analyzed in Leamer et al (1998), Sala-i-Martin, Subramanian (2003) Gylfason (2004), Stijns (2005), whereas Gylfason (2001), Suslova, Volchkova (2006) provide explanations and evidence of deterioration of human capital in resource rich countries. Our own hypothesis examined later in this paper is that resource orientation stimulates corruption in countries with poor initial quality of institutions, but not in countries with strong institutions. Non-linearity in this relationship is also found by Mehlum, Moene, Torvik (2005), Robinson, Torvik, Verdier (2006), Chystyakov (2006). The latter paper provides a modification of (Leite, Weidmann, 1999).

We consider three channels of “resource curse”:

- Macroeconomic: poor management of resource rent (budget deficits, inflation).
- Institutional:
  - Struggle for resource rent
  - Instability of democracy
- «Technological” – inability to reap externalities from the development of non-resource industries due to poor industrial policies

Obviously, there is a fundamental contradiction here: market failure requires government intervention, but low institutional quality results in government failure.

3. Data

We use the general economic statistics from the *World Development Indicators (WDI)* – this gives us data on growth rates, inflation, budget deficits, reserve accumulation, price levels, energy intensity, R&D expenditure, tariffs, income inequalities, etc. for about 100 countries for the period of 25 years (1975 –99). Also, WDI contains data on the share of fuel in exports and mineral rent. Most of the data are generally for the period 1975-99 or similar with several exceptions. Data on income inequalities are for the latest available year of 1993-2003 period – they are taken from *World Development Indicators, 2006*, table 2.8 (http://devdata.worldbank.org/wdi2006/contents/Section2.htm).

For the indicators of the institutional capacity we use average corruption perception index for 1980-1985, CPI, from *Transparency International* and various indices of the *World Bank* (government effectiveness in 2001, GE; rule of law in 2000, RL; control over corruption indices – all available from 1996; they vary from -2.5 to +2.5, the higher, the better). We also use the investment climate index, available since 1984 from the *International Country Risk Guide* (it varies from 0 to 100, the higher the better investment climate; *IC*- average investment climate index in 1984-90, and *IC2000* – same for 2000).

Proven reserves and production of hydrocarbons are taken from the *BP Statistical Review of World Energy, June 2006*[3], whereas data on sub-soil assets[4] are from Kunte et al (1998). Overall we consider five main indicators of resource abundance:

- ***EXfuel*** **-** share of fuel in exports in 1960-99, %.
- ***Imfuel*** – average ratio of net import of fuel to total import in 1960-99, %

[3] These data are available at the BP site: http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2006/STAGING/local_assets/downloads/spreadsheets/statistical_review_full_report_workbook_2006.xls (see also : http://www.bp.com/multipleimagesection.do?categoryId=9011001&contentId=7021619).

[4] Sub-soil assets per capita is the sum of discounted rent (difference between world prices and costs) for the period of the use of proven reserves (Kunte et al., 1998).

- ***Prodf-*** production of oil and gas per capita in 1980-1999, tons of oil equivalent.
- ***ResOG*** **–** proven reserves of oil and gas per capita in 1980-1999, tons of oil equivalent.
- ***SSA*** **–** sub-soil assets per capita in $ US in 1994 [Kunte et al., 1998].

The correlation coefficients between these indicators are shown in table 1. All of them are significant at 1% level. Even though the number of countries for which data on all 5 indicators are available is only 26, the coefficients and significance do not change much, when correlation is computed between any 2 indicators from the list of 5 for a larger group of countries.

Table 1. Different indicators of resource abundance – correlation coefficients

	Prodf	ResOG	Exfuel	Imfuel	SSA
Prodf	1.0000				
ResOG	0. 8110	1.0000			
Exfuel	0. 5776	0. 6885	1.0000		
Imfuel	-0. 5630	-0. 6871	-0.9724	1.0000	
SSA	0.8575	0. 9921	0. 6701	-0. 6727	1.0000

It should be noted that correlation between reserves and production is quite high, whereas the correlation between exports (net or total), on the one hand, and production and reserves per capita, on the other hand, is noticeably lower. This is explained by different energy per capita consumption in countries at different stages of development – rich countries consume several times more energy per person than developing countries. For instance, at current average annual level of energy consumption of Western countries (about 5 tons of oil equivalent per capita, and even 8 tons in US and Canada) some well known fuel exporters, like Azerbaijan, Iran, Iraq, Mexico, Russia, would not be exporters because their fuel production would be just enough to cover domestic consumption (Fig. 1).

In subsequent regressions we include only countries that produce fuel (69 countries), have reserves of fuel (57), and export fuel (181); other countries are not included into regressions.

A complete description of notations used in the paper is given in Appendix.

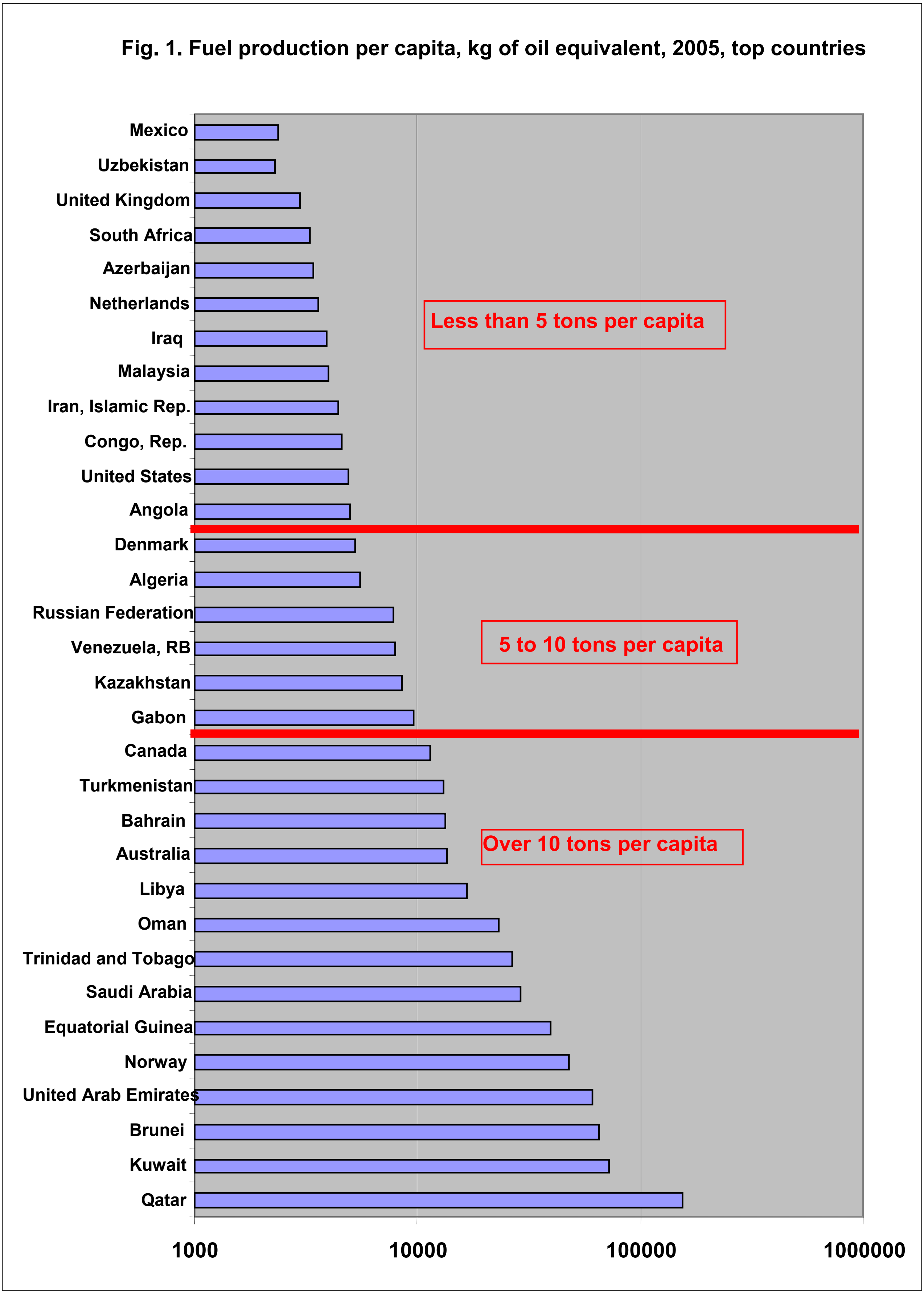

Fig. 1. Fuel production per capita, kg of oil equivalent, 2005, top countries
Mexico
Uzbekistan
United Kingdom
South Africa
Azerbaijan
Netherlands
Iraq
Malaysia
Iran, Islamic Rep.
Congo, Rep.
United States
Angola
Denmark
Algeria
Russian Federation
Venezuela, RB
Kazakhstan
Gabon
Canada
Turkmenistan
Bahrain
Australia
Libya
Oman
Trinidad and Tobago
Saudi Arabia
Equatorial Guinea
Norway
United Arab Emirates
Brunei
Kuwait
Qatar
Less than 5 tons per capita
5 to 10 tons per capita
Over 10 tons per capita
1000
10000
100000
1000000

4. Macroeconomic policy in resource rich countries

A priori, it is not clear how resource abundance influences macroeconomic indicators. On the one hand, high export revenues facilitate the maintenance of low inflation and high investment. On the other hand, a temptation arises to borrow and to spend too much, so that unfavorable change of world prices or other conditions may result in a crisis. Below we investigate which of two tendencies dominates on balance.

4.1. Inflation and budget surplus

It turns out that higher per capita fuel production is associated with lower inflation[5]:

ln*Inf* = – 0. 00673 ***Y75*** – 2.880362** ***Prodf*** + 2.88036*** ,

R-squared = 0. 015083, N = 41,

where ***Inf*** – average annual inflation in 1975-99, %; **ln*Inf***- natural logarithm of ***Inf***.

The negative impact on inflation persists, even if we control for the level of investment climate in the middle of the period. The coefficient of determination in this case becomes much higher, but the coefficient characterizing the impact on inflation naturally declines, because inflation is negatively correlated with the investment climate:

ln*Inf* = 0. 0163441** ***Y75*** – 0.0568581* ***Prodf*** – 0.0576217*** ***IC*** + 5.581482***,

R-squared = 0.4267, *N* = 41

Using the share of fuel in exports as an indicator of resource abundance, we were able to reveal an institutional threshold: if IC > 49.9, exports of fuel leads to lower inflation, otherwise it stimulates inflation. 49.9% - this is roughly the level of the investment climate in 1984-90 in Argentina, Egypt, Pakistan, Philippines:

ln*Inf* = – 0. 0081041*** ***Y75*** – 0. 0007026*** ***EXfuel_IC*** + 0. 0350539*** ***EXfuel*** + 2.805611***.

R-squared = 0.1420, N = 86

When ***IC*** is included into the last equation as a linear variable, it is significant and negative, but the export of fuel variable looses its significance. This seems to be natural, if we assume that

[5] We use standard notation of coefficient significance: * - the 10% significance level, ** - the 5% significance level, *** - the 1% significance level.

resource abundance worsens institutional quality. Last regression works with and without ***D***, the average government debt to GDP ratio in 1975-99, and with ***Prodf*** instead of ***EXfuel.***

Similar relationship exists between resource abundance and budget surplus. Controlling for the investment climate index and the level of government debt, the higher share of fuel in exports is associated with higher budget surpluses (lower deficits):

BS = 0. 0504827*****IC*** + 0. 0360348 ** ***EXfuel*** - 0. *0549348* D*–* 5.146773***,
R-squared = 0. 3825, N = 92.

Exclusion of the ***IC*** indicator leads to the decrease of the ***EXfuel*** coefficient – an additional evidence that ***Exfuel*** negatively influences ***IC***. If, instead of ***IC***, we control for initial GDP per capita, ***Ycap75***, this indicator turns out to be insignificant. However, ***EXfuel*** keeps its significance in this regression as well:

BS = 0.0000425***Ycap75*** + 0. 0496239*****EXfuel*** – 0. 0166082****D*** – 2.123727**,
R-squared = 0.3916, N = 88.

Per capita production of fuel is also positively linked to the budget surplus.
BS = - 0. 026311***Y75*** + 0. 2669832* ***Prodf*** - *0.0293449****D***– 2.110485**,

R-squared = ***0.2811***, N= 35.

So, resource abundance actually helps to balance the budget and to stabilize prices. This conclusion, of course, is true only in the "average case". Countries like Bahrain, Kuwait, Libya, Qatar, Oman, Saudi Arabia, UAE had very low inflation (some - Bahrain, Oman, Saudi Arabia – even experienced deflation in 1984-91), whereas Angola, Bolivia, Mexico, Ecuador, Venezuela experienced periods of high inflation.

4.2. Domestic investment

One has to expect that resource rent increases savings that under reasonably good institutions could be transformed into higher investment. In linear regressions resource abundance affects the share of investment in GDP positively. But the threshold regression works better:

Inv = – 0. 1307258*****Y75*** + 1.177838*****Prodf*** – 0. 0139361 *****Prodf · IC*** + 0.2737717 *** ***IC*** + 11.84***, R-squared = 0. 25, N = 44.

Rewriting this last equation it in the form that makes the threshold on institutions explicit, we get:

$$\boldsymbol{Inv} = \text{Contr} + a\,\boldsymbol{IC} + b(84{,}5 - \boldsymbol{IC})\,\boldsymbol{Prodf}.$$

This means that in countries with very good investment climate (***IC*** > 84,5, level of Canada, Finland, New Zealand, UK), increase in fuel production does not lead to higher share of investment in GDP, but in all other countries it actually does, and the effect is stronger in countries with bad investment climate. .

Similar results were obtained for the other measures of resource abundance – export of fuel, resource rent and sub-soil assets. Only the proven reserves turn out to be insignificant for explaining the share of investment in GDP.

4.3. Foreign direct investment

The relationship between foreign direct investment (FDI) and resource export and production turns out to be positive – FDI is higher in fuel producing and exporting countries. Controlling for initial per capita income, ***Y75,*** and population density, ***Popdens,*** we obtain that ***FDI,*** net annual average inflow of foreign direct investment as a % of GDP in 1980-99, is positively linked to export and production of fuel:

FDI = – 0. 0189986 *****Y75*** + 0. 0007759*** ***Popdens*** + 0. 0099592 * ***EXfuel*** + 1.404243***,
R-squared = 0. 4131, N = 52.

FDI = – 0.0278247*** ***Y75*** - 0.0028366*****Popdens*** + 0.0558353*** ***Prodf*** + 2.14422***,
R-squared = 0.5517, N = 25.

Perhaps, fuel is so important that foreign companies are willing to invest in its production and export even in countries with poor investment climate, corruption, etc.? We cannot say for sure, because the relationship between FDI and ***ResOG***, proven reserves of oil and gas per capita, is actually negative:

FDI = – 0.0404418*** ***Y75*** – 0.0041042*****Popdens*** – 0.0004962*****ResOG** + 3.460264***,
R-squared = 0.5305, N = 27.

4.4. Income inequalities

Income inequalities, ***Ineq,*** in resource exporting countries turn out to be lower, even after controlling for PPP GDP per capita in 1995, ***Y95,*** density of the population, ***PopDens,*** area and population of the country, ***AREA, POP,*** communist past, ***TRANS*** (dummy variable), and level of authoritarianism, ***DEM***.

Ineq = -0.001*** ***Y95*** + 0.002* ***PopDens*** - 1.21(10^{-08})* ***POP*** + 1.25(10^{-06})******AREA*** - 10.09*** ***TRANS*** - 1.57****DEM*** - 0.06*****EXfuel*** + 54.4***
N= 115, R-squared = 0.4406,
where
Ineq – GINI coefficient in the latest available year of the period 1993-2003,
DEM – average level of authoritarianism (1 to 7) according to Freedom House, in 1970-2002.

It was shown above that ***EXfuel*** positively influences budget surplus; therefore a government has more possibilities to decrease income inequality.

The result also holds if one excludes ***DEM*** from the regression as well as for a number of other modifications of the regression model.

Note that our result contradicts the conclusions of another study (Gylfason, T. G., Zoega, 2002) claiming that resource abundance is the factor that contributes to inequalities. But this study used another indicator of resource abundance (the share of natural resources in total wealth of the country).

5. Institutions

If resource rich countries have a number of advantages – responsible macroeconomic policies (low budget deficits and inflation), higher level of domestic and foreign investment, higher life expectancy (regressions not shown here) and lower income inequalities, why these advantages cannot be transformed into higher growth? Why not a single major exporter of fuel had become a case of "growth miracle", showing growth rates comparable to that of Japan, Taiwan, and South Korea in the 1950s-1980s? As a matter of fact, out of major fuel exporters only Indonesia experienced high growth rates in 1967-97 (per capita GDP grew at an annual average rate of 3,9%, whereas annual population growth rate was about 2%, so that annual average growth of GDP was about 6% for three decades. The share of oil and gas in Indonesian exports increased in this period from 35% in 1960-68 to nearly 80% in 1974-83, but then fell to 23% in 1994-97 (22% in 2005) – (Van der Eng, 2002). According to *WDI*, Indonesian per capita PPP GDP increased from 5.7% of the US level in 1975 to 10.4% in 1997. However, after the currency crisis of 1997, Indonesian GDP fell dramatically and only now, ten years later, surpassed the pre-recession level.

The hypothesis that we are trying to test below is that there are two major hurdles for the rapid growth of resource rich countries – poor quality of state institutions and inadequate industrial policy (maintenance of low domestic fuel prices and high real exchange rate, as the Dutch disease theory predicts).

Does resource abundance influence the quality of institutions? Some authors (Alexeev, Conrad, 2005) claim that there is no link, whereas others (Kartashov, 2006; Chystyakov, 2006) find a more subtle non-linear relationship – no impact of resources on institutions for rich countries with good institutions (or even a positive impact) and a negative impact for countries with bad institutions. Possible mechanisms of such an impact were discussed in the literature more than once. First, resource abundance creates stimuli to fight for resource rent – this struggle becomes possible under weak institutions and, as a result, weakens them even more. Second, the outflow of resources from secondary manufacturing and high tech industries into resource sector inhibits the growth of human capital, which in turn poses obstacles for the perfection of institutions. Third, high budget revenues from resource sector make governments less willing to invest into the creation of strong institutions.

The best result we were able to get is the following threshold relationship:

$$IC2000 = 14.96963^{***}Y75 + 0.0122836^{***}Popdens + 0.2735595^{***}ICr + 0.0151996^{***}Prodf \cdot IC - 0.8323285^{***}Prodf + 46.58238^{***}$$

R-squared = 0.6159, N = 44,

where

IC2000 - investment climate index in 2000,

IC – average investment climate index in 1984-90

ICr – “residual” investment climate index, calculated as a residual from linear regression of ***IC*** on ***Y75,*** PPP GDP per capita in 1975.

Rewriting this equation in the form, making the institutional threshold explicit, we get:

$$IC2000 = \text{Control} + a(IC - 54.8)\, Prodf.$$

So, if ***IC*** < 54,8 (level of Algeria, Brazil, Cameroon, Chile, Kenya, Qatar, UAE), export of fuel has a negative impact on the subsequent quality of institutions.

If we control for per capita GDP, the impact of resource exports and production on other indicators of the quality of institutions (GE, RL,CC, CPI) is negative, but no thresholds could be found. The impact of deposits (reserves) is insignificant (significant only for ***CC*** – control over corruption index).

It should be noted that some resource rich countries have relatively high indicators of the quality of institutions. For instance, in Bahrain, Brunei, Kuwait, Oman, UAE, not to speak about Norway, the quality of institutions is comparable to that of Italy. The worst institutional indicators are observed in Angola, Iraq, and Nigeria.

With regards to human capital, it turns out that with weak institutions and high production of fuel there are not so many chances to improve educational levels. As the following regression equation suggests, higher production of fuel in countries with investment climate index below 70 (this threshold basically separates developed countries from developing) has a negative impact on the level of human capital:

$$\boldsymbol{HC} = 0.0664327^{***}\boldsymbol{Y75} + 1.925845^{***}\boldsymbol{TRANS} + 0.0078357^{***}\boldsymbol{Prodf \cdot IC} - 0.5880474^{***}\boldsymbol{Prodf} + 3.234807^{***}$$

R-squared = 0.7276, N = 39,

where

HC– number of years of education per person among people over 25 years old, average for 1975-99.

6. Industrial policy

The most important features of industrial policy in resource abundant countries are the maintenance of the low domestic energy and fuel prices (via export taxes and direct restrictions on export) and the overvaluation of the exchange rate. The latter – overvalued exchange rate – is not usually considered as an instrument of industrial policy, but in fact it is exactly that. As shown in (Polterovich, Popov, 2004), the levels and rates of growth of foreign exchange reserves (FOREX) vary greatly among countries, even after controlling for the objective factors of accumulation of reserves, such as the ratio of trade to GDP, the volatility of trade, the quality of institutions, the GDP per capita, level of external debt[6]. These differences in the speed of reserve accumulation – the policy induced rate of accumulation of reserves – turned out to be very informative for the explanation of cross-country variations in growth rates: whereas for the developed countries the accumulation of reserves in excess of objective needs was detrimental

[6] We tried to regress the increase of foreign exchange reserves to GDP ratios on other factors, including capital flows, government debt, short term capital flows, but they proved to be insignificant, see (Polterovich, Popov, 2004).

for growth, for developing countries, this accumulation had a strong positive impact on growth even after controlling for the usual variables in growth regressions, such as initial income, the quality of the institutions, population growth rates, investment/GDP ratios.

Real exchange rate (RER) is usually considered as an exogenous variable (in the long term), but the fact is that differences among countries in the rates of accumulation of reserves lead to dramatic variations in the level real exchange rates, even after controlling for the GDP per capita (to capture the Balassa-Samuelson effect). The policy of undervaluation of real exchange rate via accumulation of foreign exchange reserves thus results in disequilibrium (underpriced) exchange rate – this effect is quite large and is sometimes called "exchange rate protectionism"[7]. The reason that such a policy spurs growth is at least twofold. First, it allows reaping externalities from exports, especially manufacturing and high-tech exports, providing extra protection to the domestic producers of all tradable goods, increasing their competitiveness vis-à-vis foreign producers, and reorienting them towards export markets. For developed countries export to GDP ratios may be already at the optimal level, whereas for the developing countries they are still low, so special government efforts are needed to raise them to optimum. Second, rapid accumulation of reserves provides a signal to the foreign investors (that the government is strong) and also underprices domestic assets, so that there is an additional inflow of foreign direct investment that contributes to growth. In Polterovich, Popov (2004) and Polterovich, Popov (2006, a,b) we offer a model that demonstrates how these effects work and provide empirical evidence that countries that accumulate excess reserves have lower real exchange rates, higher growth of export and trade to GDP ratios, higher investment to GDP ratios and eventually grow faster. Rodrik (2007) provides evidence that countries with undervalued exchange rates do indeed grow faster.

Theoretically, the same effect can be reached via imposition of import duties and export subsidies (that was a policy of a number of fast growing countries, especially in East Asia), but the advantage of undervaluation of the exchange rate via reserves accumulation is that this latter policy is not selective and hence can be effective even with poor institutions and poor quality of bureaucracy. As argued in Polterovich, Popov (2006, a,b), there is empirical evidence that the effectiveness of import tariffs depends on the quality of institutions, whereas the "exchange rate protectionism" works in all poor countries, even with poor institutional capacity.

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[7]The following equation links growth rates, ***y***, with policy induced accumulation of reserves, ***Rpol***:
y = ***CONST. + CONTR. VAR***. + ***Rpol*** (0.10 – 0.0015***Ycap75us***)
R^2 = 0.56, N=70, all variables are significant at 10% level or less,
where ***Ycap75us*** – PPP GDP per capita in 1975 as a % of the US level.
It turns out that there is a threshold level of GDP per capita in 1975 – about 67% of the US level: countries below this level could stimulate growth via accumulation of FER in excess of objective needs, whereas for richer countries the impact of FER accumulation was negative.

Irrespective of the existence of the long term impact of undervaluation of real exchange rate on growth, most economists would agree that the exchange rate should be at least not overvalued, like it often happens in resource exporting countries (Dutch disease). Below we provide evidence that resource abundant countries really have higher real exchange rates and this has a predictable negative effect on growth. However, at the same time these countries usually keep relatively low domestic prices for fuel and energy that has two effects on growth: negative (due to higher energy intensity, resulting in energy waste) and positive (due to the higher competitiveness of domestic producers enjoying low energy costs), and the second, stimulating, effect predominates. The best policy, thus, is to underprice the exchange rate and to keep domestic fuel prices high, but normally resource abundant countries have the opposite combination.

6.1. Accumulation of FOREX and the level of RER

The data suggest that fuel exporting countries have more FOREX in months of import than the other countries:

FOREX_IM = 0.0014471* ***EXfuel*** + 0.2827523,

R-squared = 0.0279, N = 162,

where ***FOREX_IM*** – average ratio of FOREX to monthly import for 1960-99.

Reserves were also positively and significantly correlated with other indicators of resource abundance – production of fuel, proven reserves of oil and gas, and sub-soil assets:

FOREX_IM = $5.58 \cdot 10^{-6}$*** ***SSA*** + 0.3174006,

R-squared = 0.0388, N = 77,

where ***SSA*** –«sub-soil assets» in 1994, dollars, per capita.

However, the accumulation of reserves in resource abundant countries proceeded more slowly than in other economies, even though to avoid the "Dutch disease" they had to accumulate reserves faster:

FOREXgr* = -10.25FOREX_IMP* -4.01**log*Y75* – 0.13***EXfuel* + 20,55*****

R-squared = 0.1979, N = 88.

***FOREXgr* – increase in reserves to GDP ratio in 1975-99, p.p.**

One could imagine that resource rich countries employ other methods to avoid the overvaluation of the exchange rate (stimulating imports instead of accumulation of FOREX), but the data do not support such a proposition. The ratio of domestic to the US prices is higher in countries exporting fuel:

RER* = 25,88 log *Y75* + 0,33****TRADEav* +0,33*** *EXfuel* - 39,07* ,**
R-squared = 0.5255, N = 106,

where
RER – average ratio of domestic to the US prices for the period of 1980-99, %
TRADEav – average ratio of the value of external trade to PPP GDP in 1980-99, %.

Another regression equation with higher R^2 suggests that there is a threshold on investment climate index, ***IC*** – if ***IC*** < 69.7% (i.e. in developing countries mostly) export of fuel leads to the appreciation of RER:

RER = 0,23** ***Y75*** +1,38******IC*** + ***2,23*** EXfuel*** – 0,032******IC* · *EXfuel*** – 31,99*** **,**
R-squared = 0.6097, N = 92.

This regression demonstrates that countries with bad institutions are not able to avoid Dutch disease. Note that similar regressions show that other resource abundance indicators do not influence RER.

6.2. Low domestic fuel prices

Whereas resource rich countries have generally overvalued exchange rate (”Dutch disease”), they also maintain a relatively low level of domestic prices for fuel. This is another important instrument of industrial policy that has at least two implications: first, the, like the undervaluation of the RER, low domestic prices for fuel provide competitive advantages to domestic producers and stimulate exports and production (especially of energy intensive products); second, low fuel prices lead to energy waste, hence, higher energy intensity and higher costs. Which effect predominates?

To begin with, it is easy to demonstrate that resource rich countries normally maintain lower level of domestic fuel prices:

PFuel **=** – 5.19 $\cdot 10^{-6}$** ***Area*** **–** 0.0969954 ***PopDens*** **–** 0.1293359** ***ResOG*** + 133.2401***

$R^2 = 0.2261$, N = 25,

where

PFuel **–** ratio of domestic fuel price to US fuel prices as a % of similar ratio for all prices in 1993;

Area **–** area of a country, sq. km;
PopDens – density of population in 1999, persons per 1 sq. km.

It is especially true for resource rich countries with the poor investment climate (***IC***<64.4): the higher the share of fuel in exports the lower are domestic fuel prices:

PFuel = - 0.015*** ***PopDens*** - 2.028*** ***IC*** - 4.087******EXfuel*** + 0.063** ***ExfueIC*** + 261.81***,

or

PFuel = ***Contr***. + ***a(IC***- 64.4***)EXfuel***

R-squared = 0.24; N = 55.

It is also obvious that lower energy prices are associated with lower efficiency of energy use: Energy efficiency**,** ***EnEff***, is higher in countries with higher energy prices

EnEff **=** 1.428463* **log(*Y75*)** + 3.20 $\cdot 10^{-7}$*** ***Area*** **+** 0.024037** ***Pop*** **+** 0.0100001* ***PFuel***

– 0.0910948** ***Ind*** + 4.024574*

R-squared = 0.2572, N = 43,

where

EnEff **–** PPP GDP per one kg of used fuel (oil equivalent), dollars, average in 1975-99;

Ind **–** share of industry in GDP in 1995, %;

Pop - population of a country, average for 1980-99, million persons.

It can be also shown that energy efficiency is lower in fuel producing and exporting countries:

EnEff **=** 1.441066* **log(*Y75*)** – ($1.6 \cdot 10^{-7}$)* ***Area*** **+** 0.024037** ***Pop*** **–** 0.0763032*** ***Prodf*** + 3.59584***,

R-squared = 0.1821, N = 44.

$$\textbf{\textit{EnEff}} = 1.55^{**}\textbf{log}(\textbf{\textit{Y75}}) - 0.017^{*}\textbf{\textit{POP}} - 0.024^{**}\ \textbf{\textit{EXfuel}} - 1.75^{***}\textbf{\textit{TRANS}} - \textbf{\textit{300.53}}^{***}\ \textbf{\textit{(Y99/Area)}} + 0.006^{***}\textbf{\textit{PopDens}} + 0.50,$$

R-squared = 0.2568; N = 78,

where

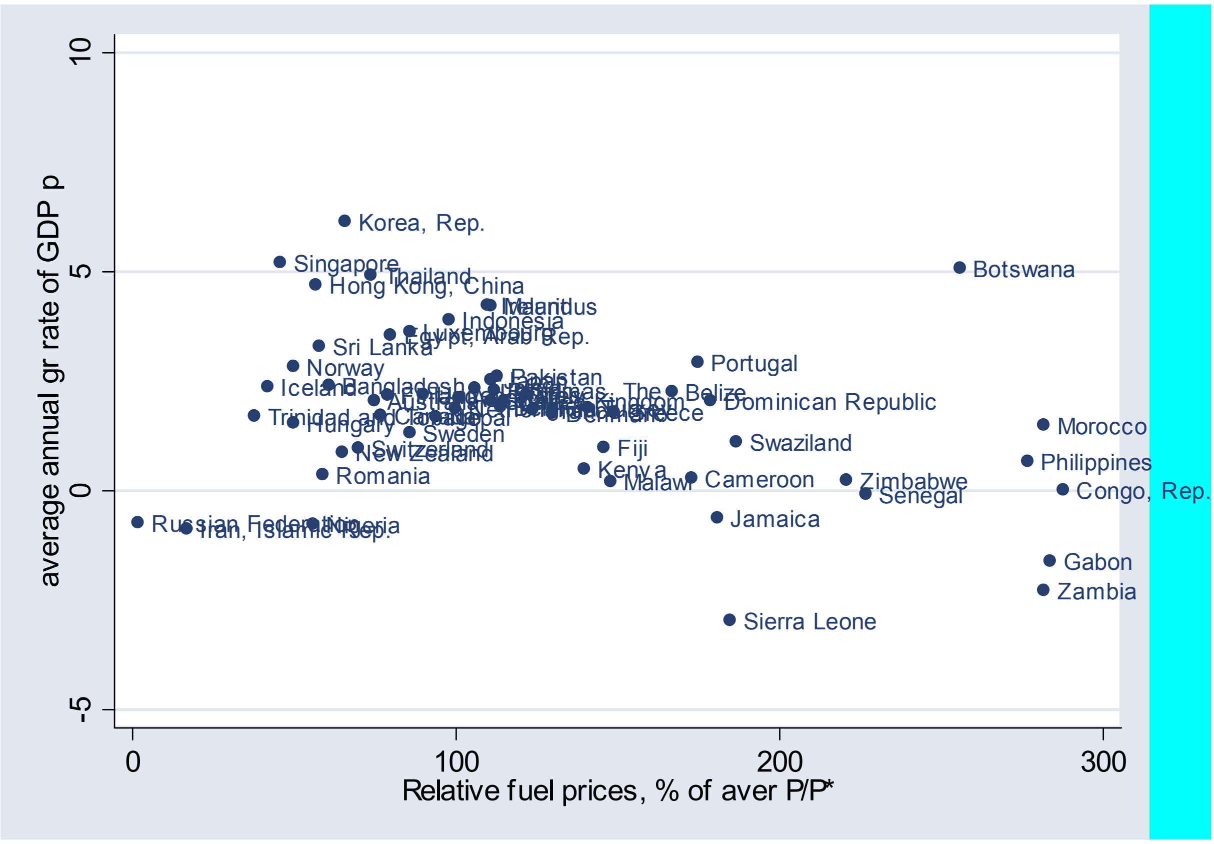
TRANS- dummy for transition economies**,**

Y99/Area – ratio of PPP GDP in 1999 per 1 square km of national territory.

If the indicator ***Y99/Area*** is omitted, ***EXfuel*** keeps its significance though **log(*Y75*)** looses it.

However, low domestic fuel prices lead to higher growth. This negative correlation is in fact visible at the chart below (fig. 2), and more accurate calculations provide additional evidence – controlling for the initial income, the size of the country (population), and the quality of institutions, it turns out that growth rates depend negatively on the level of domestic fuel prices, i.e. lower prices are associated with higher growth rates:

Fig. 2. Relative fuel prices (ratio of domestic to US fuel prices as a % of same ratio for all goods) and annual average growth rates of GDP per capita in 1975-99, %



y = 0.14*** ***IC*** – 0.063 *** ***Y75*** + 0.006** ***Pop*** – 0.011*** ***PFuel*** – 3.72***,
R-squared = 0.5217, N = 50,
where
y – annual average growth rates of GDP per capita in 1975-99, %.

When controlling for energy efficiency, the coefficient of ***PFuel*** increases:

y* = 0.13 *IC* – 0.06*** *Y75* + 0.0048* *Pop* – 0.013*** *PFuel* +0.318*** *EnEff* – 4.13***.**
R-squared = 0. 7183, N = 46.

y = 0. 0686575*** ***IC*** – 0. 2.472695 ***log *Y75*** – 0. 6679008*** ***n*** + 0. 0005785*** ***PopDens*** + **0**. 0028251*** ***Pop*** + 0. 1499302* ***EnEff*** – 0. 8659693,
R-squared = 0. 5349, N = 76,

That is to say that low domestic fuel prices affect growth positively (via increased competitiveness of domestic producers) and negatively (via energy waste), but the first effect predominates.

Adding other control variables to the right hand side does not ruin the regression:

y = 0. 1297457 *** ***IC*** – 0. 0666434*** ***Y75*** – 0. 0140655*** ***PFuel*** + 0. 3219971*** ***EnEff*** + 1.22e-07** ***Area*** –**0**. 8560763** ***TRANS*** – 3.889959***,
R-squared = 0. 7152, N = 45,
where ***TRANS***- dummy variable for transition economies.

It is also of interest to note, that R&D spending is higher in countries with low domestic fuel prices:

RD = 0.0106823****Y75*** – 0. 226082** ***IC*** – 0. 0022511** ***PFuel*** +**0.** 4840302** ***TRANS*** – 0.7641969 ,
R-squared = 0. 73116, N = 37,
where
RD- average ratio of R&D spending to GDP in 1980-99, %.

Or, a similar equation with more control variables:

RD = 0. 0098996****Y75*** + 0. 0285666* ***IC*** – 0. 0019651* ***PFuel***+ **0.** 6071381 ** ***TRANS*** – 0. 0000719****PopDens*** –4.99e-08 ** ***Area*** +**0**. 004741*** ***Pop*** – 1.288969***,

R-squared = 0. 7991, N = 37.

The interpretation of this relationship could be that there probably exists the correlation between different instruments of industrial policy: countries that try to diversify their export and promote growth keep domestic fuel prices low and also support research and development. Low domestic fuel prices allow supporting national producers without resorting to import tariffs – there is a significant positive correlation between the level of fuel prices and import tariffs (R = 0.39).

6.3. Low domestic fuel prices and the quality of institutions

In the following regressions we try to put together both sets of explanatory variables – the ones that characterize the quality of institutions and the ones that measure the relative level of domestic fuel prices. We get a number of threshold relationships that generally suggest that fuel exports hinders growth in countries with poor quality of institutions, whereas low level of fuel prices has a stimulating effect on growth irrespective of the quality of institutions:

y = – 0. 83******n*** – 0. 0006 *** ***Y75*** + 0. 00031*** ***PopDens*** + 0. 059** ***IC*** + 0.0078 *** ***Pop*** + 0.00087****EXfuel·IC*** – 0.058* ***EXfuel*** – 0. 011 *** ***PFuel*** – 2.60******TRANS*** + 2.35**,**

R-squared = 0. 6499, N = 47.

Or, rewriting it in the form that makes the threshold explicit:

y* = Contr – 0.011***PFuel*+ 0.00087**EXfuel* (*IC – 65.8*).**

This relationship suggests that with poor institutions (***IC*** < ***65.8***, close to the threshold were Cyprus, Hungary, Malaysia, Thailand), export of fuel (***EXfuel)*** is associated with lower growth, whereas the lower the level of relative domestic fuel prices, the higher is growth.

To test the robustness of the last equation, we experimented with different control and explanatory variables, such as ***Inv,*** the ratio of investment to GDP, human capital; ***HC,*** production of fuel per capita***; Prodf,*** instead of export of fuel, ***EXfuel;*** corruption perception index***, CPI***, instead of index of investment climate, ***IC***; ratio of fuel prices to clothing and footwear prices as compared to the same ratio in the US, ***PF/PCl,*** instead of ***PFuel*** – ratio of national fuel prices to the US fuel price. The resulting equations are reported below – it appears that the relationship is quite robust and explains sometimes up to 90% of all cross-country variations in growth rates:

y= 0.152****Inv*** – 0.604****n*** – 0.026****Y75*** + 0.006****Pop*** + 0.0014****EXfuel*IC*** – 0.1030835****EXfuel*** – 0. 0146979****PFuel*** – 3.924994*** ***TRANS*** + 2. 114804
R-squared = 0. 7396, N = 48.

With a different indicator of institutional quality:

y = – 1.451*** ***n*** – 0. 0480181****Y75*** + 0.0066** ***Pop*** + 0. 00043*** ***PopDens*** + 0.006** ***EXfuel· CPI*** – 0. 0399* ***EXfuel*** – 0. 0137** ***PFuel*** – 3. 796*** ***TRANS*** + 7.678***,
R-squared = 0. 7080, N = 30,

where

EXfuel·CPI – interaction term (multiple of the share of fuel in total export and corruption perception index). Here the threshold level of ***CPI*** (***CPI*** > 6.6) was close to the actual level in countries like Chile, Malaysia, Spain.

With production of fuel instead of export:

y = – 0.0638591*** ***Y75*** + 0.0769304** ***IC*** + 0.0049113* ***POP*** – 1.05178* ***n*** – 2.781959*** ***TRANS*** – 0.0069054 ***PFuel*** + 0.0043451** ***Prodf ·IC*** – 0.3640217** ***Prodf*** + 1.887194.
R-squared = 0.7429, N = 27.

y = – 0.0779992*** ***Y75*** + 0.5354141*** ***HC*** – 0.0009169* ***PopDens*** + 0.0025545* ***POP*** – 1.058412*** ***n*** – 4.799443*** ***TRANS*** – 0.0108899*** ***Pfuel*** + 0.010235*** ***Prodf ·IC*** – 0.9241075*** ***Prodf*** + 5.460552***.
R-squared = 0.9218, N = 24.

The R-squared in this latter regression is astonishingly high – 92%, but the number of observations is only 24, so the regression may not be considered reliable. However, it is quite robust: exclusion of some variables, like ***POP, PopDens, TRANS, Pfuel***, does not destroy the relationship:

$y = -\,0.0635^{***}\,\boldsymbol{Y75} + 0.3260514^{*}\,\boldsymbol{HC} - 1.140682^{**}\,\boldsymbol{n} + 0.0094633^{***}\,\boldsymbol{Prodf \cdot IC} - 0.7770783^{***}\,\boldsymbol{Prodf} + 4.465173^{***}$

R-squared = 0.4977, N = 38.

With a different indicator of the relative fuel prices:

$y = 0.944^{***}\boldsymbol{n} - 0.0275^{***}\boldsymbol{Y75} + 0.00799^{***}\boldsymbol{Pop} + 0.00049^{***}\boldsymbol{Popdens} + 0.00125^{***}\boldsymbol{EXfuel \cdot IC} - 0.0798^{***}\boldsymbol{EXfuel} - 0.0092^{**}\boldsymbol{PF/PCl} - 2.769^{***}\boldsymbol{TRANS} + 5.095^{***}$,

R-squared = 0. 5880, N = 47,

Same, but with investment/GDP ratio and without population density:

$y = 0.137^{***}\boldsymbol{Inv} - 0.568\boldsymbol{n} - 0.0234^{***}\boldsymbol{Y75} + 0.00699^{***}\boldsymbol{Pop} + 0.0013^{**}\boldsymbol{EXfuel \cdot IC} - 0.09296^{***}\,\boldsymbol{EXfuel} - 0.010621^{***}\,\boldsymbol{PF/PCl} - 3.393^{***}\,\boldsymbol{TRANS} + 1.717$

R-squared = 0. 6540, N = 48.

Adding the index of residual investment climate, ***ICr*** (calculated as a residual from linear regression of ***IC*** on ***Y75,*** PPP GDP per capita in 1975) as a linear term, we get pretty much the same results – only the significance of the interaction term falls to 13%.

Using the alternative indicators of the resource abundance (production instead of export of fuel) and relative fuel prices (***PF/PCl*** instead of ***Pfuel***), we get the following threshold regressions:

$y = -\,0.0290086^{***}\,\boldsymbol{Y75} + 0.0947086^{***}\,\boldsymbol{ICr} - 0.6805491\,\boldsymbol{n} - 2.297492^{***}\,\boldsymbol{TRANS} - 0.01295^{***}\,\boldsymbol{PF/PCl} + 0.0039714^{**}\,\boldsymbol{Prodf \cdot IC} - 0.3602921^{**}\,\boldsymbol{Prodf} + 5.463706^{***}$

R-squared = 0.7869, N = 27.

$y = -\,0.0163475^{**}\,\boldsymbol{Y75} + 0.1199287^{***}\,\boldsymbol{RISK87res} - 1.207602^{***}\,\boldsymbol{TRANS} - 0.0167533^{***}\,\boldsymbol{PF/PCl} + 0.0039267^{***}\,\boldsymbol{Prodf \cdot IC} - 0.3752063^{***}\,\boldsymbol{Prodf} + 4.23377^{***}$

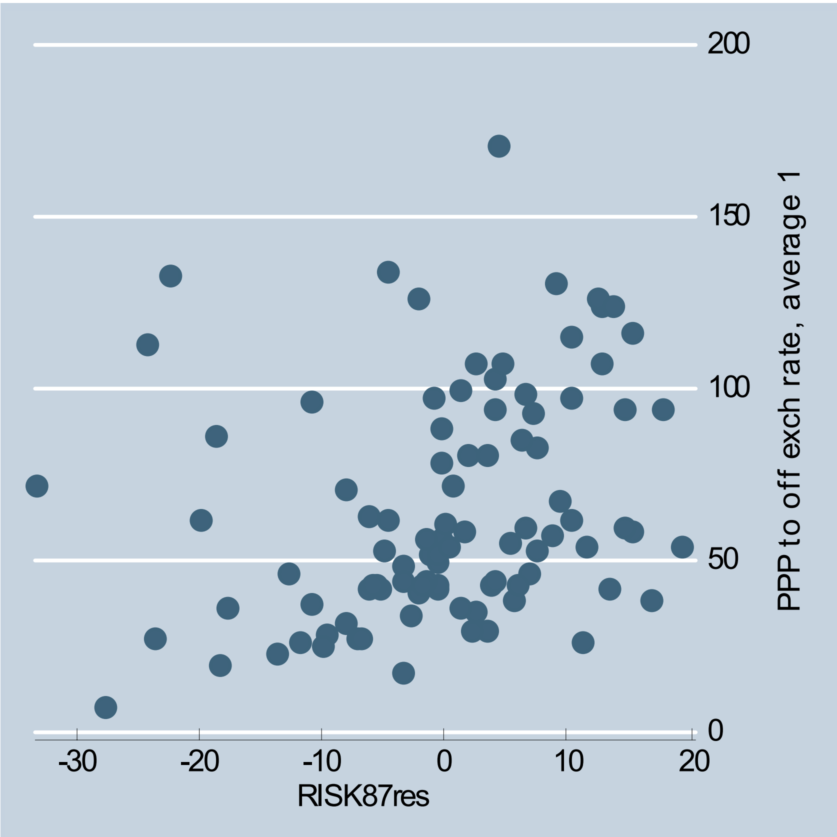
R-squared = 0.7532, N = 27.

$y = -\,0.0580233^{***}\,\boldsymbol{Y75} + 0.4207379^{***}\,\boldsymbol{HC} + 0.0503021^{*}\,\boldsymbol{RISK87res} - 0.4864664^{*}\,\boldsymbol{n} - 3.32293^{***}\,\boldsymbol{TRANS} - 0.01316^{***}\,\boldsymbol{PF/PCl} + 0.00767^{***}\,\boldsymbol{Prodf \cdot IC} - 0.7065034^{***}\,\boldsymbol{Prodf} + 4.295662^{***}$

R-squared = 0.9277, N = 24.

We were not able to find a good regression equation if RER is added to the right hand side as another explanatory variable together with the ones already mentioned – the RER in this case turns out to be insignificant, even though the sign of the coefficient is "correct" (negative). The explanation could be that the RER even after controlling for the GDP per capita is positively correlated with the quality of the institutions, so it is difficult to distinguish between the impact on growth of these two factors – the quality of institutions and the level of RER. As the chart below suggests (fig. 3), the RER is higher in countries with the better "residual" quality of institutions (after controlling for the level of income), ***ICres***.

Fig. 3. Residual index of investment climate in 1984-90 (after controlling for GDP per capita) and real exchange rate of national currencies to the US dollar in 1980-99 (ratio of domestic to the US prices), %



6. 4. Low RER versus low domestic fuel prices

Undervaluation of RER has the same stimulating effect on growth as the low level of domestic fuel prices, so in a sense these two policies are substitutes:

$y = -3.58^{***}\boldsymbol{TRANS} + 0.135^{***}\boldsymbol{Inv} - 0.00045^{***}\boldsymbol{Y75} + 0.0053^{**}\boldsymbol{Pop} + 0.11^{***}\boldsymbol{IC} - 0.578^{*}\boldsymbol{n} - 0.0136^{***}\boldsymbol{PFuel} - 0.0178^{***}\boldsymbol{RER} - 4.006$

R-squared = 0. 6819, N = 50,

It is also important that these two policies are both largely non-selective – they give advantages to most producers. However, both policies are costly. Low domestic fuel prices result in energy waste and stimulate exports of energy intensive products, not high-tech products that usually have very low energy intensity. Undervaluation of RER is usually connected with foreign exchange reserve accumulation that means the waste of resources as well.

If one excludes investment from the last regression then ***RER*** loses its significance since ***RER*** decrease may require extraction of resources out of the economy (accumulation of FER).

It can be shown that the increase in external trade/GDP ratio was the fastest in countries that underpriced their RER most:

$\boldsymbol{TRADEgr} = 0.0063^{***}\boldsymbol{Y75} + 0.1047^{***}\ \mathbf{POP} - 0.4984^{***}\boldsymbol{RER} + 4.86$

R-squared = 0.2402, N = 93,

where

TRADEgr – increase in the share of foreign trade in PPP GDP in1980-99, p.p.

According to the equation above, even controlling for the size (***POP***) and level of development (***Y75***) of the country, the strongest growth of external trade to GDP ratio was observed in countries with low real exchange rate.

In fact, because it was shown above that most resource rich countries suffered from the Dutch diseases (overvalued exchange rate), it can be expected that the growth of external trade was less pronounced in resource rich countries. The following equations for ***EXPgr*** (increase in the share of export in GDP in 1960-99, p.p.) and ***TRADEgr*** (increase in the share of foreign trade in PPP GDP in1980-99, p.p.) confirm that this was indeed the case:

$\boldsymbol{EXPgr} = 0.64^{***}\boldsymbol{EXPav} + 0.14^{***}\ \mathbf{POP} - 0.19^{**}\ \boldsymbol{EXfuel} - 7.44^{**}$

R-squared = 0.2956, N = 74,

where ***EXPav*** – average share of export in GDP in 1960-99, %.

$\boldsymbol{TRADEgr = 0.17^{***}Y75 - 0.68^{***}EXfuel - 5.1^{*}}$

R-squared = 0.3551, N = 90.

Meanwhile, recent research suggests that industrial policy aimed at stimulating hi-tech exports has important externalities for growth (Hausmann, Rodrik, 2003; Hausmann, Hwang, and Rodrik, 2006; 2006). To put it differently, export of resources and energy intensive goods is not so beneficial for growth as exports of high tech goods. From this point of view, it is better to underprice the exchange rate, not the domestic prices for fuel. However, in practice, as was already shown, most resource abundant countries keep high RER and low domestic fuel prices. Further research is needed to understand what the best compromise between these two options is.

7. Conclusions

We were able to show that resource rich countries suffer from several shortcomings that hinder their growth. First, the quality of their institutions is inferior to that in other countries – if a country had a poor institutional capacity to begin with, it is very likely to deteriorate in the future proportionately to the magnitude of resource export/production. Second, resource rich countries suffer from the Dutch disease – overvaluation of the exchange rate that creates obstacles for exports, especially exports of high-tech goods, and hinders growth. To promote growth resource rich countries generally keep domestic fuel prices at low level – this policy really helps to stimulate growth, but at a cost of high energy intensity (that kills part of the growth stimulating effect and diverts resources away from high tech industries). No surprise, resource rich countries have relatively lower quality of human capital. Besides, in resource abundant economies the volatility of growth rates is higher and the chances to develop a stable democratic political regime are lower (Polterovich, Popov, Tonis, 2007). .

Nevertheless, it does not appear that resource rich countries grow less rapidly due to their resource wealth. This is explained by the fact that they pursue good policies in some areas and enjoy the advantages of having resource rent. In particular, resource abundant economies have lower budget deficits and inflation, higher investment/GDP ratios, higher inflows of FDI as compared to GDP, and more equitable distribution of income. So, our analysis supports the thesis of conditional, but not absolute resource curse – resource abundant countries do not grow more slowly than others, but they do lag behind the growth path that could have been possible for them due to their resource wealth.

Whereas it is difficult to improve the quality of institutions in the short run, it is theoretically possible to switch to a more promising industrial policy. Government has to try to attract business for joint projects that would borrow new technologies from the West to increase productivities of main non-resource sectors. One should keep RER low enough to promote high technology export and gradually raise fuel domestic prices to increase efficiency of energy use. Under weak institutions, government interference is always risky. Up to now, there were no resource abundant countries with this combination of policies. However, this seems to be the only catching up strategy with a reasonable chance for success.

The underperformance of resource rich economies is a relatively recent phenomenon. At the end of the nineteenth century they grew fast so that their average per capita income was higher than that of the average resource poor countries in the early 1960s (Auty, 2001, p.5). Therefore a hypothesis arises that current underperformance is a result of globalization. It is noteworthy that Norway does not hurry to participate in the European integration processes. It would be very important to reveal which particular globalization channels are responsible for successes and failures of resource abundant countries.

Chang (2002) suggests that globalization may have negative impact on developing countries due to the following reason. When the West was industrializing it was protectionist; it did not protect intellectual property, the Western states were interventionist and regulated banking industry very tightly. Now developing countries are required to decrease the role of the state in their economies, to liberalize trade and the movement of capital, to protect intellectual property rights and environment, to deregulate banking system, etc. If a developing economy follows these strong recommendations, it basically loses instruments of fostering the catch up development. The conclusions of another paper (Polterovich, Popov (2002, 2004)) are very much in line with this general approach: optimal economic policies for countries with low per capita GDP and poor quality of institutions turn out to be different from optimal set of policies for developed countries.

Russian economy suffers from the shortcomings of a rather typical resource country – it has poor institutions, low domestic fuel prices and relatively overvalued RER. The increase in domestic fuel and energy prices together with the lowering of RER seems to be desirable, but has to be gradual, carefully managed and supplemented by other appropriate industrial policies.

REFERENCES

Волчкова, Н. (2005). Причины сырьевой зависимости российской экономики: «голландская болезнь» или недостаточно развитые институты, *Trade policy and WTO.*

Воробьев М. (2006). Роль государства в преодолении ресурсного проклятия, *NES Master Thesis*.

Гурвич, Е. Т. (2004). Макроэкономическая оценка роли российского нефтегазового сектора, *Вопросы экономики* 10.

Гурвич, Е. Т. (2006). Формирование и использование Стабилизационного фонда, *Вопросы экономики* 4.

Дмитриева, О. (2006). Формирование стабилизационных фондов: предпосылки и следствия. Вопросы Экономики, 8, 17-30.

Жукова, Н. (2006). Изобилие природных ресурсов и экономический рост: роль институтов, *NES Master Thesis* BSP/2006/079.

Kartashov, 2006. Карташов, Г. (2006). Экономический рост и качество институтов ресурсоориентированных стран, *NES Master Thesis* BSP/2006/082.

Кудрин, А. (2006). Механизмы формирования нефтегазового баланса бюджета России. Вопросы Экономики, 8, Август, 4-16.

Милов В. (2006). Может ли Россия стать энергетической сверхдержавой? Вопрсы Экономики, 9, Сентябрь, 21-30.

Полтерович В., В. Попов (2006a). Эволюционная теория экономической политики. Часть I. Опыт быстрого развития. Вопросы экономики 2006, No. 7, 4-23.

Полтерович В.М., В.В. Попов (2006b). Эволюционная теория экономической политики. Часть II. Необходимость своевременного переключения. Вопросы экономики, 2006, No. 8, 46-64.

Полтерович В., В. Попов, А. Тонис (2007a). Экономическая политика, качество институтов и механизмы «ресурсного проклятия». Издательский дом ГУ ВШЭ. 98 с.

Полтерович В., В. Попов, А. Тонис (2007b). Механизмы «ресурсного проклятия» и экономическая политика. Вопросы экономики. Вып. 6, 4-27.

Chystyakov, 2006. Чистяков, Е. (2006). Природные ресурсы, коррупция и обрабатывающая промышленность в малой открытой экономике, *NES Master Thesis.*

Яковлев А. А. (2006). Агенты модернизации. М: ГУ ВШЭ, 426 с.

Abidin, M. Z. (2001). Competitive Industrialization with Natural Resource Abundance: Malaysia, in: Auty, R.M. (ed.), Resource Abundance and Economic Development, Oxford University Press, 147-164.

Acemoglu, D., Johnson, S., Robinson, J., and P. Vared (2005).Income and Democracy. MIT, Working paper 05-05, February, 35 pp.

Ahrend, R. (2006). How to sustain growth in a resource based economy? The main concepts and their application to the Russian case, *OECD* Economics Department Working Papers 478, OECD Publishing.

Alexeev, M., and R. Conrad (2005). The elusive curse of oil, Working Papers Series SAN05-07.

Auty, Richard M. (1998). Resource Abundance and Economic Development. Improving the Performance of Research-Rich countries. Research for Action 44. Helsinki: UNU/WIDER.

Auty, R.M. (ed.) (2001). Resource Abundance and Economic Development, Oxford University Press, 340 pp.

Auty, R.M. (2001). A Growth Collapse with High Rent Point Resources: Saudi Arabia, in: Auty, R.M. (ed.), (2001). Resource Abundance and Economic Development, Oxford University Press, 193-207.

Auty, R.M. (2001). Large Resource-Abundant Countries Squander their Size Advantage: Mexico and Argentina, in: Auty, R.M. (ed.), Resource Abundance and Economic Development, Oxford University Press, 208-222.

Auty, R.M. and J.L. Evia (2001). A Growth Collapse with Point Resources: Bolivia, in: Auty, R.M. (ed.), (2001), Resource Abundance and Economic Development, Oxford University Press, 179-192.

Auty, R.M. and A.H. Gelb (2001). Political Economy of Resource-Abundant States, in: Auty, R.M. (ed.), (2001), Resource Abundance and Economic Development, Oxford University Press, 126-144.

Auty, R.M. and Sampsa Kiiski (2001). Natural Resources, Capital Accumulation, Structural Change, and Welfare, In: Auty, R.M. (ed.), Resource Abundance and Economic Development, Oxford University Press, 19-35.

Baldwin, R.E. (1956). Patterns of development in newly settled regions, Manchester School of Social and Economic Studies, 24, 161-179.

Barro, R.J. (1996). Democracy and growth, Journal of Economic Growth 1 (1), 1-27.

Barro, R.J. (1996a). Determinants of economic growth: a cross-country empirical study, NBER Working Paper 5698.

Barro, R.J. (1999). Determinants of democracy, The Journal of Political Economy 107, S6, S158-29.

Ben-David, D. (1996). Trade and Convergence Among Countries. Journal of International E Ben-David, D. (1996), Trade and Convergence Among Countries. Journal of International Economics, 40(3): 459-472.conomics, 40(3): 459-472.

Boyce, J.R., and J. C. H. Emery (2005). A Hotelling explanation for the 'curse of natural resources', University of Calgary, Department of Economics Discussion Paper 06.

BP (2006). BP Statistical review of world energy. (http://www.bp.com/statisticalreview).

Brunnschweiler, C. N. (2006). Cursing the blessings? Natural resource abundance, institutions, and economic growth, Economics Working Paper Series 06/51, ETH Zurich.

Bulte, E.H., R. Damania, and R. Deacon (2003). Resource abundance, poverty, and development, Working paper 21-04, Department of Economics, University of California, Santa Barbara.

Bulte, E.H., R. Damania, and R. T. Deacon (2003). Resource Abundance, Poverty and Development. (http://www.econ.ucsb.edu/papers/wp21-03.pdf)

Corden, M., and J.P. Neary (1982). Booming sector and de-industrialization in a small open economy, Economic Journal 92, 825-848.

Davis, J., Ossowski,R., Daniel, J. and S.Barnett . (2001). Stabilization and Savings Funds for Nonrenewable Resources. Experience and Fiscal Policy Implications. International monetary Fund, Washington DC, Occasional paper 205, 43 pp.

Deacon, R., and B. Mueller (2004). Political economy and natural resource use, Department of Economics, UCSB, Departmental Working Papers 01-04.

Egorov, G., Guriev, S and K. Sonin (2006). Media Freedom, Bureaucratic Incentives, and the Resource Curse. CEDI Working Paper, No. 06-10 (http://ctdi.org.uk).

Findlay, R. and M. Lundahl (2001). Natural Resources and Economic Development: the 1870-1914 Experience, in: Auty, R.M. (ed.), Resource Abundance and Economic Development, Oxford University Press, 95-112.

Gaddy, C.G. and B.W. Ickes (2005). Resource rents and the Russian economy, Eurasian Geography and Economics 46, 559-583.

Gelb, A. and Associates (1988). Oil Windfalls: Blessing or Curse? New York: A World Bank Research Publication. 357 pp.

Glassburner B.(1998). Indonesia: Windfall in a Pure Rural Economy. In: Gelb , A. and Associates. Oil Windfalls: Blessing or Curse? New York: A World Bank Research Publication. 197- 226.

Gylfason, T. (2001a). Natural resources, education, and economic development, European Economic Review 45, 847-859.

Gylfason, T. (2001b). A Nordic Perspective on Natural Resources Abundance, in: Auty, R.M. (ed.), (2001), Resource Abundance and Economic Development, Oxford University Press, 296-311.

Gylfason, T. G., Zoega (2002). Inequality and Economic Growth: Do Natural Resources Matter? CESifo Working Paper Series No. 712.

Gylfason, T. (2004). Natural resources and economic growth: from dependence to diversification, CEPR Discussion Paper 4804.

Hausmann, Ricardo, and Dani Rodrik (2003). "Economic Development as Self-Discovery," Journal of Development Economics, December 2003.

Hausmann, Ricardo, Jason Hwang, and Dani Rodrik (2006). "What You Export Matters," NBER Working Paper, January 2006.

Hirshman, A. O. (1977). A generalized linkage approach to development with special reference to staples. In: M. Nash (ed.) Essays on Economic development and Cultural Change in Honor of Bert F. Hoselitz, Chicago III: University of Chicago Press, 67-98.

Innis, Harold A. (1954). The Cod Fisheries: The History of an International Economy. New Haven: Yale University Press, 1940. Rev. Ed., Toronto: University of Toronto Press, 1954.

Kaufmann, Daniel, Kraay, Aart, and Zoido-Lobatón Pablo (1999). Governance Matters. World Bank Policy Research. Working Paper No. 2196.

Krugman, P.R. (1987). The narrow moving band, the Dutch disease and the competitive consequences of Mrs. Thatcher, Journal of Development Economics 27, 41-55.

Kunte, A., K. Hamilton, J. Dixon and M. Clemens (1998). Estimating National Wealth: Methodology and Results. Environmental department papers. Paper No. 57, January, WB, Washington, DC. http://www.bp.com/multipleimagesection.do?categoryId=9011001&contentId=7021619

Leamer, E.E, H. Maul, S. Rodriguez, and P.K. Schott (1998). Does natural resource abundance increase Latin American income inequality?, *Journal of Development Economics* 59, 3-42. (http://www.wcfia.harvard.edu/seminars/pegroup/learner.pdf)

Leite, C., and J. Weidmann (1999). Does Mother Nature corrupt? Natural resources, corruption, and economic growth, IMF Working Paper 99/85.

Matsen, E., and R. Torvik (2005). Optimal Dutch disease, Journal of Development Economics 78, 494-515.

Matsuyama, K. (1992). Agricultural productivity, comparative advantage, and economic growth, Journal of Economic Theory 58, 317-334.

Mehlum, H., K.O. Moene, and R. Torvik (2005). Institutions and the resource curse, *Economic Journal*, Royal Economic Society 116(508), 1-20.

Polterovich, V., and V. Popov (2002). Accumulation of foreign exchange reserves and long term growth, NES Working paper.

Polterovich, V., and V. Popov (2004). Appropriate Economic Policies For Different Stage of Development. NES project paper, http://www.nes.ru/english/research/pdf/2005/PopovPolterovich.pdf.

Polterovich, V., and V. Popov (2005). Resource abundance, globalization, and economic development, New Economic School, Research Project 2005-2006.

Polterovich, V., and V. Popov (2006). Democratization, quality of institutions and economic growth, NES Working Paper 2006/056.

Prebisch, R. (1950). The Economic Development of Latin America and Its Orincipal Problems, Economic Bulletin for Latin America 7, 1-12.

Robinson, J.A., R. Torvik, and T. Verdier (2006). Political foundations of the resource curse, Journal of Development Economics 79, 447-468.

Rodrik, D. (1986). 'Disequilibrium' exchange rates as industrialization policy, Journal of Development Economics 23, 89-106.

Rodrik, D. (1996). Coordination failures and government policy: A model with applications to East Asia and Eastern Europe, Journal of International Economics 40, 1-22.

Rodrik, D. (2006). WHAT'S SO SPECIAL ABOUT CHINA'S EXPORTS? Harvard University, January 2006.

Rodrik, D. (2007). The Real Exchange Rate and Economic Growth: Theory and Evidence**.** Undervaluation is good for growth, but why? - July 2007. (http://ksghome.harvard.edu/~drodrik/RER%20and%20growth.pdf)

Rodriguez, F. (2004). The Political Economy of Latin American Economic Growth. Manuscript.

Rodriguez, F., and J.D. Sachs (1999). Why do resource abundant economies grow more slowly? A new explanation and an application to Venezuela, Journal of Economic Growth 4, 277-303.

Sachs, Jeffrey D. (1996). Resource Endowments and the Real Exchange Rate: A Comparison of Latin America and East Asia. Mimeo. Cambridge, MA: Harvard Institute for International Development.

Sachs, J.D. and A.M. Warner (1995). Natural Resource Abundance and Economic Growth. NBER Working Paper Series, Working Paper 5398. Cambridge, MA: National Bureau of Economic Research.

Sachs, J.D. and A.M. Warner (1997). Natural Resource Abundance and Economic Growth. Revised version. Unpublished manuscript. Harvard Institute for International Development. Cambridge, MA.

Sachs, J.D. and A.M. Warner (1997). Sources of slow growth in African economies. Journal of African Economics, 6(3), 335-380.

Sachs, J.D. and A.M. Warner (1999). The big push, natural resource booms and growth. Journal of Development Economics, vol.59, 43-76.

Sachs, J.D., and A.M. Warner (2001). The curse of natural resources, European Economic Review 45, 827-838.

Sala-i-Martin, X., and A. Subramanian (2003). Addressing the natural resource curse: an illustration from Nigeria, Economics Working Papers 685.

Singer, H. (1950). Comments to the terms of trade and economic development. Review of Economics and Statistics, 40, 84-89.

Stiglitz, J.E., (2004). The Resource Curse Revisited, Project Syndicate. (http://www.project-syndicate.org/commentaries/commentary_text.php4?id=1656&lang=1&m=contributor)

Stijns, J.-P. (2005). Natural resource abundance and economic growth revisited, Development and Comp Systems 0103001, EconWPA.

Suslova E. and N. Volchkova (2006). Human Capital, Industrial Growth and Resource Curse (http://www.the-global-institute.org/act/2006conference/Volchkova-Human%20Capital.pdf)

Torvik, R. (2002). Natural resources, rent seeking and welfare, Journal of Development Economics 67, 455-470.

World Bank (2005). World development indicators.

World Bank (2003). World development Indicators, 2003.

Van der Eng, Pierre (2002). Indonesia's Growth Performance in the Twentieth Century. – In: The Asian Economies in the Twentieth century. Ed. By Angus Maddison, D.S. Prasada Rao and William F. Sheferd. Edwar Elgar, Cheltenham, UK, 2002.

APPENDIX: Notations

Macroeconomic variables

y – annual average growth rates of GDP per capita in 1975-99, %;
Y75 **–** PPP GDP per capita in 1975 in $US;
Inv – share of investment in GDP, average for 1975-1999, %;
PopDens – density of population in 1999, persons per 1 sq. km;
n – annual average population growth rate in 1975-99, %;
Area – area of a country, sq. km;
Pop – population of a country, average for 1980-99, mln. persons;
Inf – inflation, geometric average for 1975-99 period, %;
BD – budget deficit (surplus, if with the "-" sign), average for 1975-99, % of GDP;
FOREX_IM – average ratio of FOREX to monthly import for 1960-99.
RER – average ratio of domestic to the US prices for the period of 1980-99, %
EXPgr – increase in the share of export in GDP in 1980-99, p.p.;
EXPav – average share of export in GDP in 1980-99, %;
TRADEgr – increase in the share of foreign trade in PPP GDP in1980-99, p.p.;
TRADEav – average ratio of the value of external trade to PPP GDP in 1980-99, %;
RD – average ratio of R&D spending to GDP in 1980-99, %;

Ineq – Gini index (of income or consumption distribution) for the latest year of the period 1990-2005, % (WDI, 2006);
TRANS – dummy variable, equal to 1 for (post-) communist countries and to 0 otherwise;
FDI – annual average net inflow of foreign direct investment in 1980-99, % of GDP;
EnEff – PPP GDP per one kg of used fuel (oil equivalent), dollars, average in 1975-99;
PFuel – ratio of domestic fuel price to US fuel prices as a % of similar ratio for all prices in 1993;
PF/PCl – ratio of domestic prices of fuel to prices of clothing and footwear in a particular country as a % of the similar ratio in the US in 1993;
Ind – share of industry in GDP in 1995;
HC – number of years of education per person among people older 25, average for 1975-99.

Indicators of resource abundance

Rent – resource rent from mineral resources in 2001, % of GDP;
EXfuel - share of fuel in exports in 1960-99), %;
Imfuel – average ratio of net import of fuel to total import, %;
Prodf- production of oil and gas per capita in 1980-1999, tons of oil equivalent;
ResOG – proven reserves of oil and gas per capita in 1980-1999, tons of oil equivalent;
SSA – sub-soil assets per capita in $ US in 1994 [Kunte et al.]

Indicators of the quality of institutions

RL - rule of law index in 2000 (World Bank 2002; Kaufmann, Daniel, Kraay, Aart, and Zoido-Lobatón Pablo, 1999); based on opinion of experts and residents, varies from –2,5 to +2,5; the higher, the better the rule of law;
IC2000 - investment climate index in 2000;
IC – average investment climate index in 1984-90;
ICr – "residual" investment climate index, calculated as a residual from linear regression of ***IC*** on ***Y75,*** PPP GDP per capita in 1975;
CPI – average corruption perception index for 1980-85 (Transparency International); changes from 0 to 10; the lower, the higher corruption, so in fact it is the index of cleanness, not of corruption;
CPI02-03 average corruption perception index for 2002-2003 (Transparency International); changes from 0 to 10; the lower, the higher corruption, so in fact it is the index of cleanness, not of corruption;
CC – control over corruption index (WDI, 2001; Kaufmann, Daniel, Kraay, Aart, and Zoido-Lobatón Pablo, 1999; World Bank Governance Indicators dataset , 2007 - **http://info.worldbank.org/governance/kkz2005/tables.asp**); varies from –2,5 to +2,5; the higher, the better the control over corruption;
GE – index of government effectiveness in 2001 (WDI, 2001; Kaufmann, Daniel, Kraay, Aart, and Zoido-Lobatón Pablo, 1999); varies from –2,5 to +2,5; the higher, the higher the government effectiveness (World Bank Governance Indicators dataset , 2007 - **http://info.worldbank.org/governance/kkz2005/tables.asp**).