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Resource abundance: A curse or blessing?

Victor Polterovich, Vladimir Popov, and Alexander Tonis

Abstract

Is resource abundance a blessing or a curse? Typically, in resource rich countries, domestic fuel prices are lower, and energy intensity of GDP is higher. But they have higher investment in R&D and fixed capital stock, larger foreign exchange reserves and more inflows of FDI. They also have lower budget deficits and lower inflation. These are conducive for long term growth. We also find that in resource rich countries, real exchange rate is generally higher, accumulation of human capital is slower and institutions are worse, especially if they were not strong initially, which are detrimental for growth.

JEL Classification: O25, O43, Q32, Q43, Q48

Keywords: Resource curse, economic growth, inequality, institutions, real exchange rate, budget deficit, inflation, investment, industrial policy

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Victor Polterovich, Vladimir Popov, and Alexander Tonis

> *"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."*
>
> [*Will Russia Bet on Its People or It's Oil Wells?*–Thomas L. Friedman, New York Times, February 16, 2007]

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

It seems 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. A large number of papers have been published in recent years supporting the "resource curse" thesis and effects that may inhibit growth in resource rich economies. Several recent papers, however (Alexeev and 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 pattern holds true in Sierra Leone and Botswana. Both are rich in diamonds. While Botswana averaged 8.7% annual economic growth over the past thirty years, 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 neighbours, and almost catching up with the USA.

Thus, the relationship between resource abundance and economic growth is not clear-cut; it could be either positive or negative. It is also possible that resource abundance has no significant impact on economic growth, in the absence of other complementary factors. As a matter of fact, searching for growth promoting factors remains largely illusive.[1] The aim of this paper is to draw a statistical portrait of a typical resource abundant country and to establish basic stylized facts and relationships before arguing about causation. We run cross country regressions that do not deal with endogeneity problem. Hence, our results have to be considered as preliminary, and our conclusions have to be checked using panel data, covering a longer period.

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

- lower budget deficits;
- Lower inflation;
- higher foreign exchange reserves;
- higher inflows of FDI;
- lower domestic fuel prices;
- higher investment/GDP ratio;
- lower income inequality.

However, resource abundance is also associated with

- higher RER;
- distortions of domestic prices;
- high energy intensity;
- weaker institutions, if they were poor to begin with;
- slower accumulation of human capital.

Thus, there seem to be both growth enhancing and growth retarding factors that can make resource abundance a blessing or a curse. The next section provides a brief review of literature on the role of natural resources in economic growth. Explanations of the tendency for natural resource abundance to immiserise growth and development (the "resource curse") have traditionally followed four approaches: the "Dutch disease" thesis, the "volatility effect", the "rent-seeking" effect, and the "false security" or "overconfidence effect".

1 Serious methodological concerns are raised regarding the specifications used for estimating the growth effects of one or another growth enhancing variable, in both the cross country and country specific studies. Although most of the studies claim that they are estimating the permanent long run growth effects, there is no distinction between the permanent long run and the transitory short run growth effects of variables. The dependent variable is usually the annual growth rate of GDP (or per capita GDP) in the country specific time series studies or its 5-year average in the cross country studies. Neither of the annual or 5-yearly average growth rates can said to be a good proxy for the unobservable long run growth rate in the steady state. When perturbed, a time span of 5 years is too short for an economy to attain the steady state. Simulations with the closed form solutions show that an economy takes a few decades to converge anywhere close to its steady state. This transition period may be more than 50 years even for small perturbations; see Sato (1963) and Rao (2006). The short run growth rates are also important for the policy makers especially of the developing countries because they persist for more than 5-years and will have permanent level effects (Rao and Cooray, 2009). Many studies also claim that their specifications are based on one or another endogenous growth model, but it is hard to understand how their specifications are derived from the claimed endogenous growth model. Commenting on the unsatisfactory nature of specifications in many such empirical works, Easterly, Levine and Roodman (2004) have noted that "This literature has the usual limitations of choosing a specification without clear guidance from theory, which often means there are more plausible specifications than there are data points in the sample." Consequently, as found by Durlauf, Johnson, and Temple (2005), the number of potential growth improving variables used in various empirical works is as many as 145. Given these reservations it is hard to select a few uncontroversial control variables to estimate the growth effects of any particular variable, such as aid or institutions.

Review of the literature

Several explanations for the "resource curse" have been offered in the literature. The first explanation, suggested by Prebisch (1950) and Singer (1950), is known as Prebisch-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[2]. Therefore countries relying on primary goods sector have to grow slower than economies relying on manufacturing industries. Prebisch and his followers ("structuralists") recommended that developing countries temporary close their economies to fully develop manufacturing industries.

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

An earlier export based theory of resource-driven growth was suggested by Innis (1954), Baldwin (1956) and Hirschman (1977) (see also Auty and Kiiski, 2001). Innis developed a "staple theory of economic development" arguing 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 depending on its linkages with other sectors. These linkages are defined by technologies of the resource extraction. In some cases, development of resource sector stimulates the rise of industries that supply its inputs (backward linkage), and industries 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, while being useful, has a limited explanatory power since it does not take into account the role of macroeconomic and political economy variables (Findlay and Lundahl, 2001; Abidin, 2001; Gylfason, 2001).

The "Dutch Disease" story is another possible mechanism of resource curse. Assume a resource boom—a sudden windfall gain. This may be associated with a temporary increase in the price of oil or natural resource discoveries. Resource boom seems to open a window of opportunity—a possibility to start a catching up process—for a developing country. However, market forces may not lead an economy in the right direction. The resource boom causes a currency appreciation or a rise in relative prices of non-tradables, and a rise in wages, leading to a decline in competitiveness, and hence an increase in imports. The rise in the relative price of non-tradables, thus causes resources to shift towards non-tradables (due to higher prices) and expenditure switches to tradables (due to lower prices). Assuming full-employment, wages in non-tradables rise, which also pushes the wages in tradables. This is the source of the decline in competitiveness of tradables and hence their decline. If there are learning by doing effects or positive externalities from human capital accumulation in the tradable sectors and not in the resource extraction sector, then resource boom may have negative effect on long run economic growth (Corden and Neary, 1982; Krugman, 1987; Matsuyama, 1992; Auty, 2001, Ch. 7).[3]

2 Bhagwati (1958) showed that growth in foreign countries as a result of the spread of new technologies abroad could reduce welfare of the country exporting these technologies by reducing its terms of trade.

3 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 than labour 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.

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 $600 billion by mid 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 the manufacturing sector and infrastructure.

The first policy is secure, but can have significant opportunity cost for a developing country in terms of lost opportunity to build-up infrastructure and a universal social protection system. The second policy could give a chance to diversify national economy, so it is less dependent on the world resource prices. But this policy 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.

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, Damania, Deacon, 2003). This is why attempts to use resource sector profit for industrial policy projects were unsuccessful in many countries. Governments taxed primary resource producers and invested the money into priority industries. However, most projects failed due to selection of industries influenced by non-economic factors, such as lobbying or cronyism. There is also evidence of deteriorating human capital and increased inequality.

Government failure can be rampant when institutional quality is poor. Low quality of institutions is analyzed in Leamer et al. (1998), Sala-i-Martin and Subramanian (2003), Gylfason (2004), Stijns (2005), whereas Gylfason (2001), Suslova and Volchkova (2006) provide explanations and evidence of deterioration of human capital in resource rich countries.

Thus, there seems to be a dilemma here: market failure requires government intervention, but low institutional quality results in government failure. The question is why some resource rich countries do not use their windfall gains in improving institutions. Based on regression analysis, the next section provides a statistical profile of resource rich countries. It is hoped that this profile will shed some light into the complex interplay of factors that may result in either a resource curse or a resource blessing for a country.

Regression analysis and statistical portrait

Data

We used *World Development Indicators (WDI)* for 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 a similar period 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 used 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 used 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 for 1984-90, and *IC2000*—for 2000).

The caveats of using these subjective indices for measuring institutional capacity are well known. The capacity of the state is the ability to enforce its rules and regulations, the ability to force individuals and companies to comply with these regulations, so a good natural objective measures of the institutional capacity are murder rate (non-compliances with the monopoly on violence) and the share of shadow economy (non-compliance with tax, customs, safety, and other regulations). The crime rate would be a good indicator as well, but crimes are registered differently in various countries, so higher crimes rates in Western countries are believed to be the result of under-registration of crimes in poorer countries. But grave crimes, especially murders, are reasonable well registered even in less developed countries.

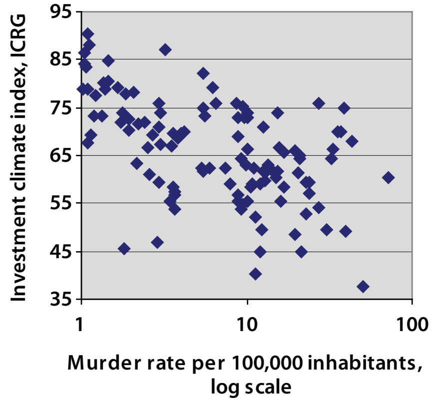
As fig. 1 suggests, index of investment climate and corruption perception index are quite correlated with the murder rate, although there are important inconsistencies and possibly—biases. It is possible to show, for instance, that out of two countries with the same murder rate (or the share of shadow economy), government effectiveness is higher in a more democratic country. [4]

4 **GE2002** =1.36 - 0.03**MURDER2002** - 0.22**DEMaver** - 0.08**DEM02**
(-4.83) **(-4.93)** **(-2.11)**
Adj R-squared = 0.52, Number of obs. = 186, T-statistics in brackets, significance - 4% or less.

GE2002 – government effectiveness index in 2002 (ranges fro -2.5 to +2.5, the higher, the better),
MURDER2002 – murder rate per 100,000 inhabitantsin 2002,
DEMaver and **DEM02** – levels of authoritarianism: average for 1972-2002 and in 2002 respectively (index of political rights from the Freedom House; ranges fro 1 to 7, the higher the more authoritarian).

Same result holds for all 6 subjective indices (not only for government effectiveness, but rule of law, control over corruption, regulation quality, voice and accountability, political stability) and also if the shadow economy is used instead of the murder rate as an objective indicator of the capacity of the state.

Figure 1:
Risk index (ICRG), Corruption perception index (CPI) and murder rate (per 100,000 inhabitants), 2002



Source: WDI, WHO, Transparency International.

Nevertheless, we use institutional indices as a more conventional measure that is normally used in the literature (murder rate and the share of shadow economy are normally not regarded widely accepted proxies for the institutional capacity).

Proven reserves and production of hydrocarbons are taken from the *BP Statistical Review of World Energy, June 2006* [5], whereas data on sub-soil assets[6] 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, %
- *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

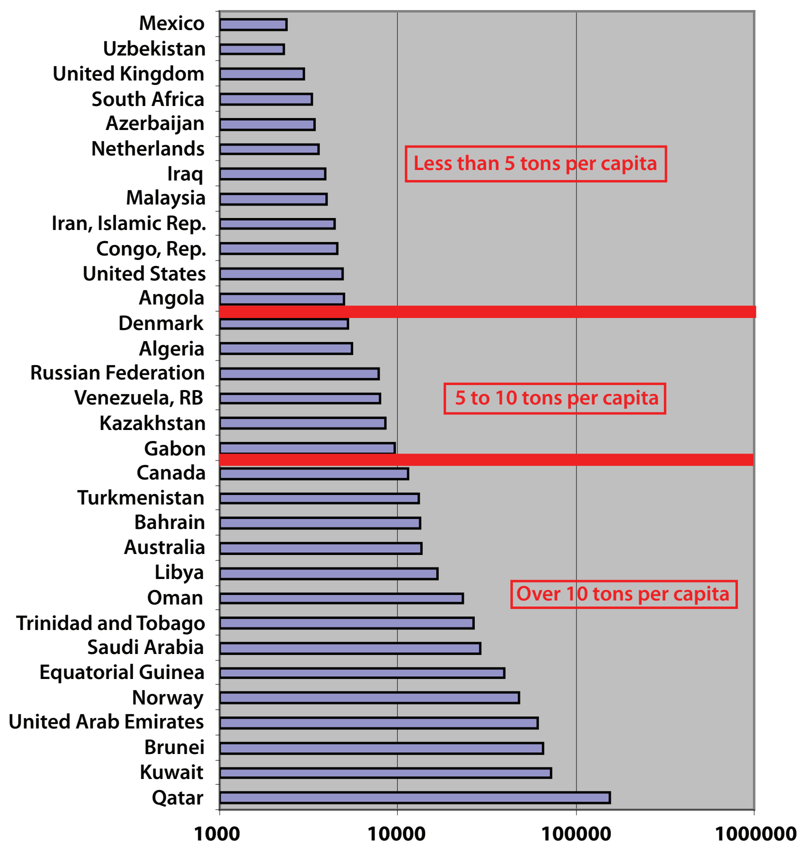
	Prodf	ResOG	Exfuel	Imfuel	SSA
Prodf	1.0000				
ResOG	0.8110	1.0000			
Exfuel	0.5776	0.6885	1.0000		
Imfuel	– 0.5630	– 0.6871	– 0.9724	1.0000	
SSA	0.8575	0.9921	0.6701	– 0.6727	1.0000

5 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).

6 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).

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, is noticeably lower. This is explained by different fuel per capita consumption in countries at different stages of development – rich countries consume several times more fuel and energy per person than developing countries. For instance, at the 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 (Figure 2).

Figure 2:
Fuel production per capita, kg of oil equivalent, 2005, top countries



Source: BP Statistical Review of World Energy.

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.

Macroeconomic indicators 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 accumulation of foreign exchange reserve (provided that the monetary authorities are willing to do it—either with the fixed exchange rate regime or with the dirty float) and high investment. On the other hand, a temptation arises due to a false sense of security or over confidence to borrow and to spend too much, so that unfavourable change of world prices or other conditions may result in a crisis. Below we investigate which of two tendencies dominates on balance.

Inflation and budget surplus: It turns out that higher per capita fuel production is associated with lower inflation, after controlling for the level of income *Y75* [7]:

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

ln*Inf* = – 0. 00673 *Y75* – 2.880362** *Prodf* + 2.88036*** ,
R-squared = 0. 15083, 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 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

Where *IC* is investment climate that is used here as a proxy for institutional quality.

Using the share of fuel in exports as an indicator of resource abundance, we were able to reveal an institutional threshold by introducing the interaction variable - *EXfuel*IC,* share of fuel in total exports multiplied by the index of investment climate : 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:

lnInf = – 0. 0081041*** *Y75* – 0. 0007026*** *EXfuel*IC* + 0. 0350539*** *EXfuel* + 2.805611***=
R-squared = 0.1420, N = 86

This equation can be re-arranged by taking *EXfuel* out of the brackets, so as to make the threshold explicit:

ln*Inf* =– 0. 0081041*** *Y75* – 0. 0350539*** *EXfuel (49.9 – IC****) + 2.805611***

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

The threshold level of investment climate is no more than a general principle that suggests that the quality of macroeconomic policy depends on institutional capacity: if this capacity is low, chances are that governments would not be able to capture the revenues from increased fuel exports and use these revenues for balancing the budget and lowering inflation. And this threshold may vary for different countries. The point is, however, that increased resource revenues do not automatically lead to low inflation; in order to benefit from the increased resource revenues the country should have a minimal state capacity to distribute these revenues in public interests.

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.

The 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:

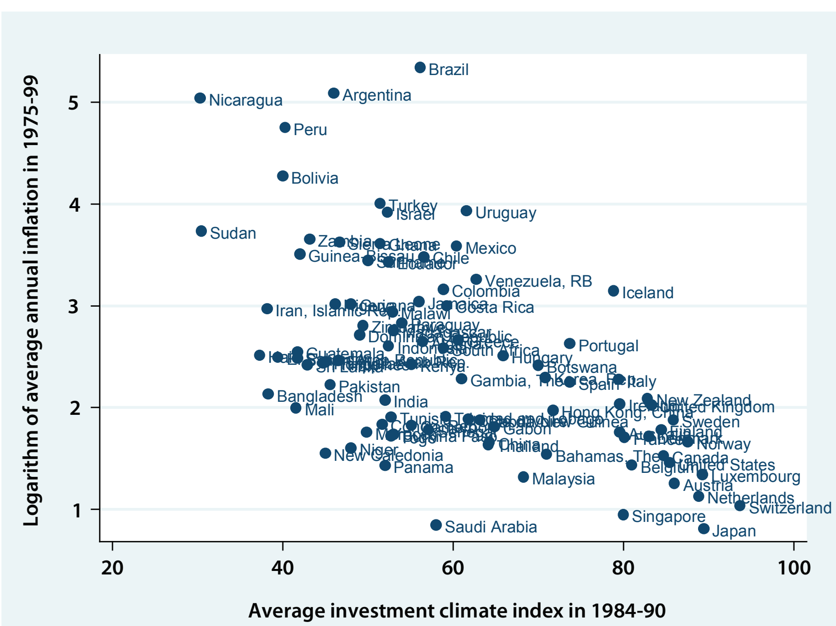
$$BS = 0.0000425\,Ycap75 + 0.0496239^{**}EXfuel - 0.0166082^{*}D - 2.123727^{**},$$
R-squared = 0.3916, N = 88,
where *BS* is the average ratio of government surplus to GDP in % in 1975-99,
D is the average government debt to GDP ratio in % in 1975-99.

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. As fig. 3 suggests, inflation rates are strongly correlated with the investment climate index (as well as with other measures of institutional capacity, such as corruption index, government effectiveness index, etc.).

Figure 3.
Average investment climate index in 1984-90 and average annual inflation in 1975-99, %



Source: WDI.

<u>Domestic investment</u>: 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. 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.

<u>Foreign direct investment</u>: 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.

Income inequality: 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.

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, 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 from the discussed paper - Kunte et al, 1998, that estimates the value of sub-soil assets). It could be that governments in resource exporting countries have more possibilities to decrease income inequality due to appropriate distribution of resource rent.

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, and lower income inequalities, why cannot these advantages be transformed into higher growth? Botswana and Malaysia may be the only examples of resource rich developing countries that were successfully catching up with the rich countries club, but if we look only at fuel (not all resources) exporters, the picture is even more discouraging. Why not a single major exporter of fuel had become a case of "growth miracle", showing sustained 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.[8]

There is a large body of literature that links economic performance to institutional quality. Could the failure of many resource rich countries to achieve sustained rapid growth be due to low quality institutions? 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 (less stimuli to fight corruption, for instance, since revenues are readily available).

As was stated earlier, we define state institutions as the ability of the government to enforce rules and regulations, contracts and property rights included. Strong institutions are a key factor of growth (Rodrik, Subramanian, Trebbi, 2002), but of course not the only one. Manufacturing growth is like cooking a good dish—all the necessary ingredients should be in the right proportion; if only one is under- or overrepresented, the "chemistry of growth" will not happen. Fast economic growth can materialize in practice only if several necessary conditions are met simultaneously. In particular, rapid growth requires a number of crucial inputs—infrastructure, human capital, even land distribution in agrarian countries, strong state institutions, and economic stimuli among other things. Once one of the essential ingredients is missing, growth just does not take off. Hausmann, Rodrik, and Velasco (2008) talk about "binding constraints" that hold back economic growth; finding these constraints is a task in "growth diagnostics." In some cases, these constraints are associated with a lack of market liberalization, in others, with a lack of state capacity or human capital or infrastructure.

The genesis of institutions (and the determinants of institutional capacity) is too big an issue and is not considered in this paper. Instead we limit ourselves to a more modest analysis of the relationship between institutional capacity and resource abundance.

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.

8 However, after the currency crisis of 1997, Indonesian GDP fell dramatically and only ten years later surpassed the pre-recession level.

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

IC2000 = 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 threshold 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.

If the threshold relationship really exists, it means that countries that have good institutions may not need a special industrial policy to discourage the development of the resource sector. The market with good institutions works and allocates resources in an optimal way. However, if institutions are poor to begin with, leaving it to the market to allocate capital and labor between manufacturing and resource sector can result in excessive resource orientation, which in turn would undermine institutional capacity and hinder growth.

With regards to human capital, it turns out that under weak institutions, high production of fuel does not help 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:

HC = 0.0664327****Y75* + 1.925845****TRANS* + 0.0078357****Prodf·IC* –0.5880474*** *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.

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. As was argued earlier, this combination is a very unfortunate one—low domestic fuel prices discourage energy efficiency, whereas overvalued exchange rate hinders growth. 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 and Popov (2002, 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.[9] These differences in the speed of reserve accumulation—the policy induced rate of accumulation of reserves (i.e. after controlling for objective factors)—turned out to be very informative for the

9 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).

explanation of cross-country variations in growth rates: whereas for the developed countries the accumulation of reserves in excess of objective needs was detrimental 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. Accumulation of reserves, of course, is associated with costs. When reserves are accumulated, they are not spent, so the opportunity cost could be very high in terms of not using them for building infrastructure. The returns on investment into US or other developed countries government securities are very low as compared to the returns in developing countries (Rodrik, 2005).But the other effect—stimuli for the export oriented growth—seems to provide benefits that are greater than costs.

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 of 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 (under-priced) exchange rate—this effect is quite large and is sometimes called "exchange rate protectionism".[10] 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 manufacturing 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 under-prices domestic assets, so that there is an additional inflow of foreign direct investment that contributes to growth. In Polterovich and Popov (2002, 2004) 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 (apparently due to higher manufacturing exports), 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 and Popov (2004), 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.

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

10 The following equation links growth rates, y, with policy induced accumulation of reserves, $Rpol$:
$y = CONST. + CONTR.\ VAR. + Rpol\,(0.10 - 0.0015Ycap75us)$
$R^2 = 0.56$, 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; control variables are population, population density, and population growth rates, inflation.
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.

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 (growth is higher in countries with low domestic fuel prices despite higher energy intensity).

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:

$FOREXgr = -10.25^{**} FOREX\_IMP - 4.01^{**} \log Y75 - 0.13^{**} EXfuel + 20.55^{***}$
R-squared = 0.1979, N = 88,
where *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, 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:

$RER = 0{,}23^{**}\, Y75 + 1{,}38^{***} IC + 2{,}23^{***}\, EXfuel - 0{,}032^{***} IC \cdot EXfuel - 31{,}99^{***}$,
R-squared = 0.6097, N = 92.

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

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, 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?

We find 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.

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[11]:

$EnEff = 1.441066{*}\ \log(Y75) - (1.6 \cdot 10^{-7}){*}\ Area + 0.024037{**}\ Pop - 0.0763032{***}\ Prodf + 3.59584{***}$,
R-squared = 0.1821, N = 44.

$EnEff = 1.55{**}\log(Y75) - 0.017{*}POP - 0.024{**}\ EXfuel - 1.75{***}\ TRANS - 300.53{***}\ (Y99/Area) +$
$0.006{***} PopDens + 0.50$,
R-squared = 0.2568; N = 78,
where

11 This higher energy intensity in fuel producing countries can be caused by the more energy intensive industrial structure (fuel industries are capital and energy intensive), as well as by differences in the territory, density of population (transportation costs), climate. A more careful comparison is needed to control for objective conditions.

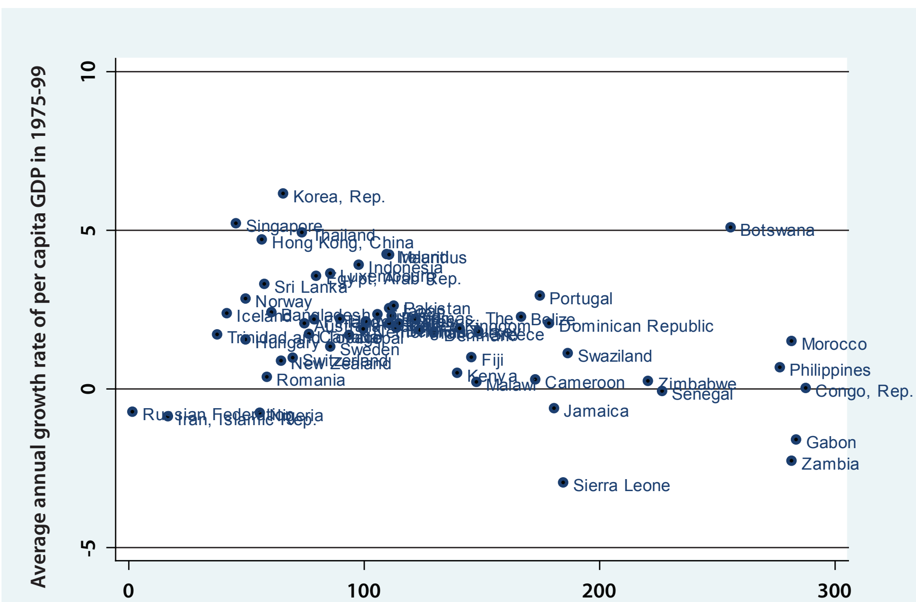
TRANS - dummy for transition economies,
Y99/Area – ratio of PPP GDP in 1999 per 1 square km of national territory.

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 (Figure 4), 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:

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, %.

Figure 4:
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, %



Source: WDI.

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:

$y = 0.1297457^{***}\, IC - 0.0666434^{***}\, Y75 - 0.0140655^{***}\, PFuel +$
$0.3219971^{***}\, EnEff + 1.22e\text{-}07^{**}\, Area - 0.8560763^{**}\, TRANS - 3.889959^{***}$,
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:

$RD = 0.0098996^{*} Y75 + 0.0285666^{*}\, IC - 0.0019651^{*}\, PFuel + 0.6071381^{**}\, TRANS$
$- 0.0000719^{*} PopDens - 4.99e\text{-}08^{**}\, Area + 0.004741^{***}\, Pop - 1.288969^{***}$,
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).

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:

$y = -0.83^{***} n - 0.0006^{***}\, Y75 + 0.00031^{***}\, PopDens + 0.059^{**}\, IC + 0.0078^{***}\, Pop +$
$0.00087^{*} EXfuel \cdot IC - 0.058^{*}\, EXfuel - 0.011^{***}\, PFuel - 2.60^{***} TRANS + 2.35$,
R-squared = 0. 6499, N = 47.

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

$y = \text{Contr} - 0.011^{***} PFuel + 0.00087^{*} EXfuel\, (IC - 65.8)$.

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 the ratio of investment to GDP, *Inv;* 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:

$$y = 0.152^{***}\mathit{Inv} - 0.604^{**}n - 0.026^{***}\mathit{Y75} + 0.006^{***}\mathit{Pop} + 0.0014^{***}\mathit{EXfuel}*\mathit{IC} - 0.1030835^{***}\mathit{EXfuel} - 0.0146979^{***}\mathit{PFuel} - 3.924994^{***}\ \mathit{TRANS} + 2.114804$$

R-squared = 0. 7396, N = 48.

With a different indicator of institutional quality:

$$y = -1.451^{***}\ n - 0.0480181^{***}\mathit{Y75} + 0.0066^{**}\ \mathit{Pop} + 0.00043^{***}\ \mathit{PopDens} + 0.006^{**}\ \mathit{EXfuel}\cdot \mathit{CPI} - 0.0399^{*}\ \mathit{EXfuel} - 0.0137^{**}\ \mathit{PFuel} - 3.796^{***}\ \mathit{TRANS} + 7.678^{***},$$

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:

$$y = -0.0638591^{***}\ \mathit{Y75} + 0.0769304^{**}\ \mathit{IC} + 0.0049113^{*}\ \mathit{POP} - 1.05178^{*}\ n - 2.781959^{***}\ \mathit{TRANS} - 0.0069054\ \mathit{PFuel} + 0.0043451^{**}\ \mathit{Prodf}\cdot \mathit{IC} - 0.3640217^{**}\ \mathit{Prodf} + 1.887194.$$

R-squared = 0.7429, N = 27.

$$y = -0.0779992^{***}\ \mathit{Y75} + 0.5354141^{***}\ \mathit{HC} - 0.0009169^{*}\ \mathit{PopDens} + 0.0025545^{*}\ \mathit{POP} - 1.058412^{***}\ n - 4.799443^{***}\ \mathit{TRANS} - 0.0108899^{***}\ \mathit{Pfuel} + 0.010235^{***}\ \mathit{Prodf}\cdot \mathit{IC} - 0.9241075^{***}\ \mathit{Prodf} + 5.460552^{***}.$$

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:

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

R-squared = 0.4977, N = 38.

With a different indicator of the relative fuel prices:

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

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

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

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

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:

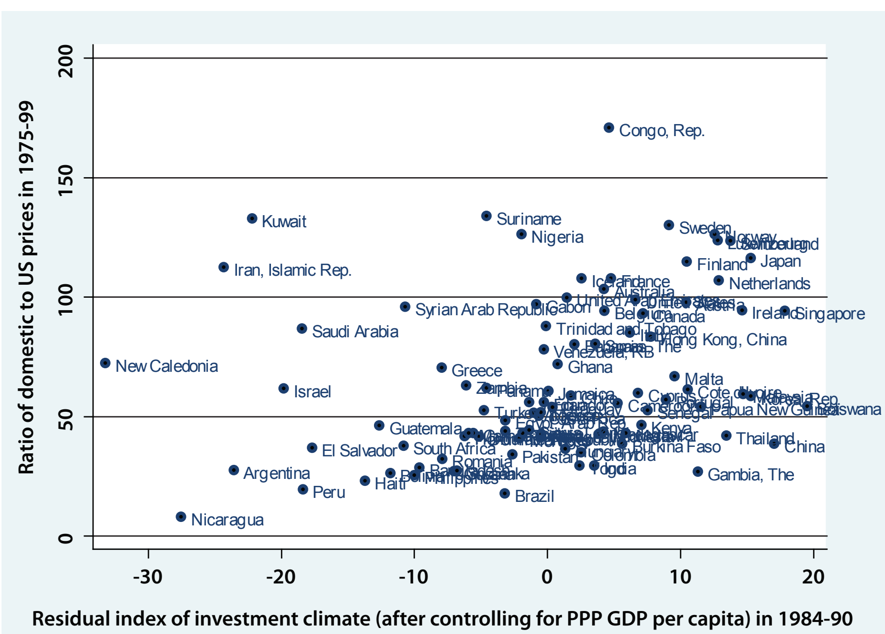
$y = -\,0.0290086^{***}\ Y75 + 0.0947086^{***}\ ICr - 0.6805491\ n - 2.297492^{***}\ TRANS$
$-\,0.01295^{***}\ PF/PCl + 0.0039714^{**}\ Prodf \cdot IC - 0.3602921^{**}\ Prodf + 5.463706^{***}$
R-squared = 0.7869, N = 27.

$y = -\,0.0163475^{**}\ Y75 + 0.1199287^{***}\ ICr - 1.207602^{***}\ TRANS - 0.0167533^{***}\ PF/PCl + 0.0039267^{***}$
$Prodf \cdot IC - 0.3752063^{***}\ Prodf + 4.23377^{***}$
R-squared = 0.7532, N = 27.

$y = -\,0.0580233^{***}\ Y75 + 0.4207379^{***}\ HC + 0.0503021^{*}\ ICr - 0.4864664^{*}\ n$
$-\,3.32293^{***}\ TRANS - 0.01316^{***}\ PF/PCl + 0.00767^{***}\ Prodf \cdot IC - 0.7065034^{***}\ Prodf$
$+\,4.295662^{***}$
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 is positively correlated with the quality of the institutions, even after controlling for the GDP per capita 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 (Figure 5), the RER is higher in countries with the better "residual" (after controlling for the level of income) quality of institutions, *ICres*.

Figure 5:
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 1975-99 (ratio of domestic to the US prices), %



Source: WDI.

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****TRANS* + 0.135****Inv – 0.00045***Y75* + 0. 0053***Pop* + 0.11****IC* – 0.578**n* - 0.0136****PFuel* –0.0178****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* looses its significance most probably because *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:

TRADEgr = 0.0063****Y75* + 0.1047*** POP – 0.4984****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:

EXPgr = 0.64****EXPav* + 0.14*** POP – 0.19** *EXfuel* -7.44**
R-squared = 0.2956, N = 74,
where *EXPav* – average share of export in GDP in 1960-99, %.

*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 and Rodrik, 2003; Hausmann, Hwang, and Rodrik, 2006; Rodrik, 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 why it is the case and what the best compromise between these two options is.

Conclusions

We were able to show that resource rich countries suffer from several shortcomings that may 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. Resource rich countries also have relatively lower quality of human capital.

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.

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. 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. However, this seems to be the only catching up strategy with a reasonable chance for success.

To conclude, in a typical resource country with typical shortcomings—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

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.

Bhagwati, Jagdish N. (1958). Immiserizing growth: a geometrical note. The Review of Economic Studies, vol. 25 (June) pp. 201-205.

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.

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

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.

Durlauf, S., Johnson, P., and J. Temple (2005) Growth econometrics. In Aghion, P., and Durlauf, S. (Eds.), Handbook of Economic Growth, vol. 1, pp. 555–677. Chapter 8, pp. 555-677.

Easterly, W., Levine, R., and D. Roodman, (2004) New data, New doubts: A Comment on Burnside and Dollar's "Aid, Policies, and Growth", American Economic Review, 94 (3), 774–780.

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.

Hausmann, Ricardo, Dani Rodrik and Andres Velasco (2008). Growth diagnostics. In *The Washington Consensus Reconsidered: Towards a New Global Governance*. Narcis Serra and Joseph E. Stiglitz, eds. Oxford: Oxford University Press.

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.

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

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.

Rao, B. B. (2006) Investment Ratio and Growth, ICFAI Journal of Applied Economics 3: 68-72.

Rao, B., and A. Cooray (2008) Growth literature and policies for the developing countries, MPRA Paper 10951, University Library of Munich, Germany

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. (2005). The Social Cost of Foreign Exchange Reserves, December 2005. Developing countries are paying a high (and preventable) cost for self-insurance against capital-market follies. Revised version published in the International Economic Journal, September 2006. Rodrik, D. (2006). What's so special about China's exports? Harvard University, January 2006.

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)

Rodrik, D., A.Subramanian and F. Trebbi (2002). Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development. October 2002 (http://ksghome.harvard.edu/~.drodrik.academic.ksg/institutionsrule,%205.0.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.

Sato R (1963). Fiscal Policy in a Neo-Classical Growth Model: An Analysis of Time Required for Equilibrium Adjustment, Review of Economic Studies 30: 16-23

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 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).