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The political economy of the ‘resource curse’

A development perspective

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Abstract: This paper reviews the recent literature on the developmental effects of resource abundance, assessing likely effects and channels with respect to income inequality, poverty, education, and health. To date, this area has received less analysis although it is relevant to the Sustainable Development Goals agenda, as a significant number of the world poor live in African resource-rich economies. We argue that the presence of a natural resource sector per se does not necessarily translate into worse development outcomes. The natural resource experience varies to a significant extent. Countries with similar levels of resource rents can end up with significantly different achievements in terms of poverty, inequality, health, and education. The challenge is to explain the different natural resource experiences. A pivotal mechanism behind the developmental effects of the natural resources sector is the type of states and political institutions that resource-abundant economies develop.

Key words: resource abundance, inequality, institutions, Sustainable Development Goals, poverty

JEL classification: O4, P5, N4, D7

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1 Introduction

The effects of natural resource abundance on less-developed economies have been a lively area of research in economics for many years and have produced a voluminous body of studies. Most research has traditionally concentrated on long-term growth effects, initially finding a ‘resource curse’. Subsequent developments in this debate have emphasized political economy explanations, arguing that the long-term effect of specializing in natural resources depends on the type of resources (e.g. Isham et al. 2005) and the quality of political and economic institutions (e.g. Mehlum et al. 2006).

To date, less analysis has been devoted to other significant developmental effects. This is an important part of what the debate on the resource curse should investigate. After all, the challenge of exploiting natural resources is to use subsoil wealth in a way that turns it into above-ground assets, generating income and enhancing the achievement of the broadest possible range of development outcomes. It is also policy relevant to the Sustainable Development Goals (SDGs) agenda because a large number of resource-rich economies are in Africa (e.g., Nigeria, DR Congo), where a significant number of the world poor live. Underexplored areas in the political economy of natural resources include the effects on income inequality and poverty, education, health, and living standards. The objective of this paper is to examine such areas, taking account of existing research and assessing the implications for less-developed economies (defined as low- and middle-income countries). We address three questions.

First, what are the effects? We shall introduce and discuss some basic facts about resource abundance and development. In particular, we shall discuss whether or not a developmental resource curse exists, and, if so, how severe it is.

Second, what are the channels? We shall illustrate how natural resources and development outcomes are linked, focussing on distributive effects, education, and health outcomes.

Third, what would we like to know? We shall discuss the most important gaps in our knowledge, in terms of mechanisms analysed, and methodological and data challenges.

We argue that the presence of a natural resource sector per se does not necessarily translate into worse development outcomes. Some countries do well, and some do not. The challenge is to explain the different natural resource experiences. After assessing progress toward understanding each of the proposed mechanisms, we shall focus on the conditions that make them more likely to foster or hinder development. Natural resources can support developmental progress depending on a set of key state capabilities: (i) the ability to raise revenues; (ii) effective public financial management; and (iii) the ability to develop efficient bureaucracies. Meeting these conditions depends: (i) on elites’ incentives and behaviour; and (ii) on the type of political institutions that a country adopts. Both can change over time and so potentially turn a resource curse into a blessing, or vice versa.

The paper proceeds as follows. Section 2 presents some stylized facts. Section 3 focuses on the effects on poverty and inequality and Section 4 on the effects on health and education. Section 5 illustrates the relevance of political economy explanations. Section 6 speculates about the future of research in this area. Section 7 concludes.

2 Resource abundance and development: a look at the data

2.1 Resource abundance: what does it mean?

‘Resource dependence’, ‘intensity’, ‘boom’, and ‘windfall’ are recurring expressions in the literature assessing the effects of natural resources. The term ‘dependence’ usually refers to the structure of the economy and to what extent it depends on natural resources (e.g. captured as resource exports/gross domestic product (GDP)). ‘Intensity’ refers to the rate at which a country exploits natural resources. ‘Boom’ and ‘windfall’ pertain to shocks, either because new natural resources are discovered or because there is an increase in commodity prices (for a discussion, see Brunnschweiler and Bulte 2008; Norman 2009; Stijns 2006). Here we refer to ‘resource abundance’ as the income generated by the extraction and use of minimally processed natural resources (that are often under the soil in the form of minerals), but we refer to the others when necessary. Indeed, the terms ‘resource abundance’ or ‘resource rich’ refer to the value of the natural resource endowments or the income they generate, measurable as subsoil wealth or resource rents, but they are also used as terms that encompass all the above aspects.

2.2 Some stylized facts

Before plunging into the survey of the literature, we present some descriptive evidence on the relationship between countries’ natural resources and development. Figures 1–3 show a series of scatter plots, where the Y-axis variable is the recent value of a key development indicator, taken as the 2014–18 average. We select them for their policy relevance, such as belonging to the SDG targets, and availability for the largest possible number of countries. We use:

- Income poverty and inequality: Gini index; the income share of the poorest 20 per cent; proportion of people living below 50 per cent of median income (per cent);
- Education: school enrolment, secondary (per cent net); education index, a component of the Human Development Index; and
- Health: mortality rate, under 5 years of age (per 1,000 live births); life expectancy at birth, total (years).

The X-axis variable is a long-run average of natural resource abundance. We use a popular measure of income from natural resources: the total natural resources rents (per cent of GDP). Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents. All variables are from the World Development Indicators (World Bank 2020), except for the life expectancy index and the education index, which are from the United Nations Development Programme (UNDP n.d.). The sample includes all countries available.

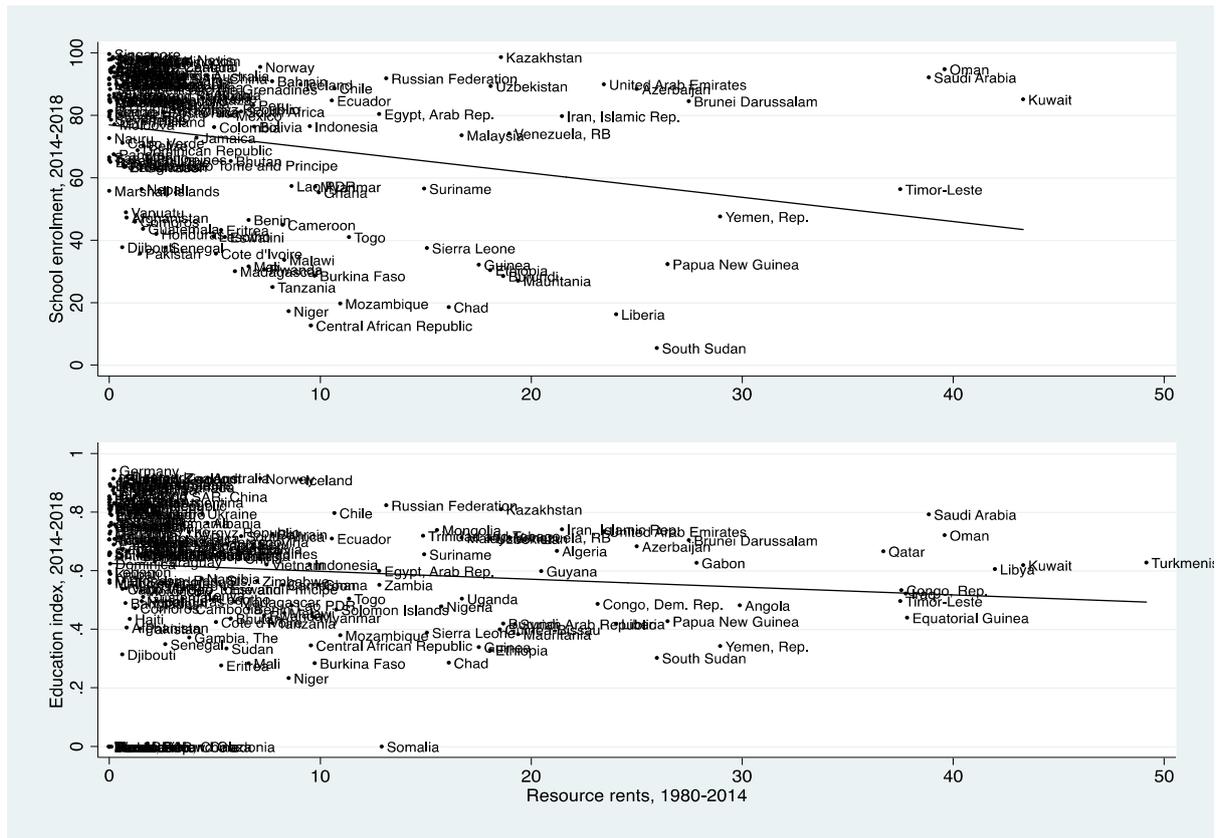
One might expect that countries with greater income from natural resources should also experience an improvement in health and education and have less income poverty and inequality. However, a look at the data suggests otherwise:

1. Having greater income from natural resources seems to have no clear relationship with development. The scatter plots in the figures show that there is a weak negative correlation for education and health outcomes and no correlation for poverty and inequality measures.

- Natural resource experiences vary to a significant extent. Countries with similar levels of resource rents can end up with significantly different achievements in terms of poverty, inequality, health, and education.

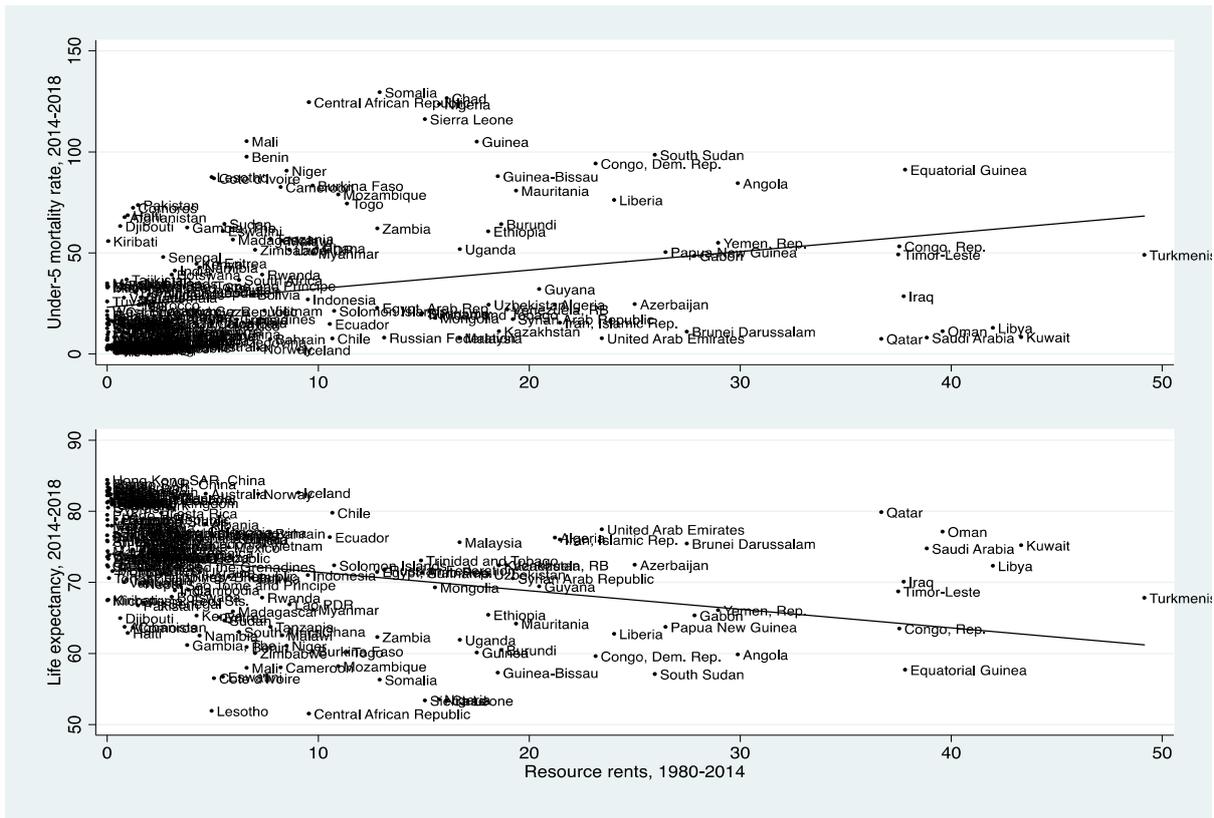
This evidence is descriptive and does not lend itself to any causal interpretation, but it does suggest that the role of natural resources in development may follow more complex mechanisms than one might expect. So, it begs the question of why resource abundance apparently does not appear to systematically support development.

Figure 1: Education outcomes and resource rents



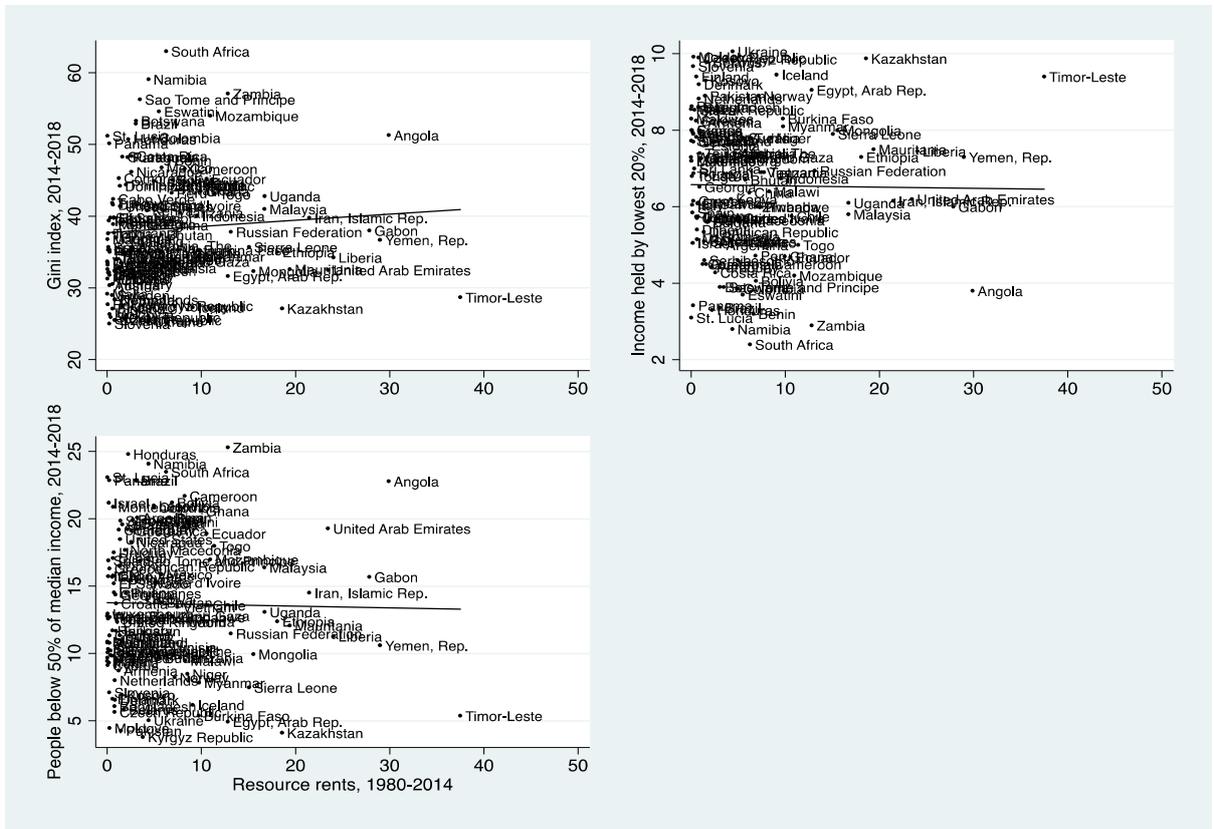
Source: authors' elaboration.

Figure 2: Health outcomes and resource rents



Source: authors' elaboration.

Figure 3: Income distribution, poverty, and resource rents



Source: authors' elaboration.

3 How do natural resources affect poverty and inequality?

Some historical studies have documented how during colonialism the exploitation of natural resources led to high poverty and inequality and perpetuated this state of affairs by creating economies in many Latin American and sub-Saharan African countries that benefited a small minority of colonial elites. In order to exploit natural resources, labour abundance, and soil fertility, colonizers established production systems in many areas of Central and South America and in Africa which ensured such elites a disproportionate influence, particularly in areas that were rich in minerals (e.g. silver and gold) or had suitable soil for producing large plantations of cash crops (e.g., sugar, coffee, and bananas) using forced labour. Examples of these are found in Brazil, El Salvador, Guatemala, and the Caribbean islands, as well as in Mexico, Peru, and Bolivia (Sokoloff and Engerman 2000).¹ Significant mining operations, benefiting largely European minorities, were in place in many areas of Africa. For example, in Guinea, Sierra Leone, and Liberia, there were important workings of gold, diamonds, iron ore, and bauxite. In South Africa, where rules were introduced to prohibit the acquisition of land by natives, the British and Afrikaners dominated the agricultural and mining resources, and this did not change when political power passed onto European descendants following independence, thereby perpetuating the distributive effects (Rodney 1973). As a result of this initial influence of natural resource endowments, large areas in South and Central American and African colonies were historically associated with high levels of inequality and poverty. Indeed, cross-national comparisons have often suggested that modern-day Africa and Latin America are home to the most unequal countries.²

One mechanism that is consistent with this historical experience is that, if the initial distribution of natural capital is concentrated in the hands of ruling elites and their associates, then the subsequent pattern of economic development perpetuates or magnifies income inequality and poverty.³ This may happen through institutions that grant opportunities to an influential minority rather than a broad cross-section of society (Acemoglu et al. 2005). If, because of existing regulations, the assignment of rights to search and extract natural resources is restricted to accessing the natural resources sector and is subject to significant initial investment, then rents from the exploitation of natural resources will accrue to the few individuals who can access the resources for investing and who have the political connections to do so.

A second mechanism relates to how economic growth driven by the natural resources sector affects employment and wages, via ‘Dutch Disease’. If the non-resource sector sees a fall in employment as a result of an appreciation of the exchange rate due to the export of resources, then income inequality may increase because of increasing income for owners of natural resources and a simultaneous increase in unemployment (Gylfason and Zoega 2003). Dutch Disease can also

¹ This also resulted in societies where political power ensured colonial elites had a disproportionate influence. The voting population being historically very small; franchises having been granted according to wealth and literacy requirements; and a lack of voting secrecy have all been recurring features of political systems in Latin America (Sokoloff and Engerman 2000).

² Easterly (2007) provides evidence of the effect of colonial inequality on modern-day development outcomes consistent with this. Angeles (2007) shows that the presence of a European minority is associated with production systems aimed at exploiting native populations, finding that this is a robust predictor of current income inequality. Dell (2010) uses a regression discontinuity design to estimate the long-run effects of the colonial forced mining labour system (the *mita*) in Peru and Bolivia between 1573 and 1812, finding that this lowers modern household consumption by around 25 per cent and increases the prevalence of stunted growth in children by around 6 percentage points in districts where this system was in place.

³ Gylfason and Zoega (2003) offer a formal exposition, in the context of an endogenous growth model, of how the unequal distribution of natural resource assets can lead both to increasing inequality and lowering growth.

affect income poverty. If it reduces the size of the manufacturing or agricultural sector, rising unemployment may increase the number of households and individuals below the poverty line.

Another mechanism relates to the effects of the instability of international commodity markets. The inherent volatility of the prices for natural resources in international markets can induce growth volatility and instability in the flows of government fiscal revenues and foreign exchange supplies. This can be particularly so when resource-rich economies present low levels of diversification (one of the effects that result from Dutch Disease). A study by Van der Ploeg and Poelhekke (2009) decomposes the effect of resource dependence on growth into direct and volatility effects, finding that the direct effect is positive, but the volatility effect is negative and often dominates the direct effect.⁴

Adverse effects of natural resources on economic growth can increase poverty. Following Bourguignon (2003), the net effect of growth reduction on poverty depends on two components. The first is a pure growth effect. Assuming income distribution stays constant, a reduction (increase) in average income will correspond to a larger (smaller) share of the population below the poverty line. The second component comes from changes in income inequality. An increase in income inequality itself will translate into an increase in income poverty. If average income stays constant, an increase in the variance of the income distribution (i.e. higher inequality) will see a higher share of the population fall to the left of the poverty line. This implies, in the case of natural resource economies, that Dutch Disease and commodity price volatility are likely to result in increased income poverty via a compounded effect on economic growth and inequality. What the total effect will be is an empirical question. So far, the evidence that economic growth reduces poverty is plentiful. For example, Dollar et al. (2016) find that, in the majority of cases, it tends to lift the incomes of the poorest 20 and 40 per cent at the same rate as average incomes. However, whether this is generalizable to the case of resource-rich economies is less clear. Loyaza and Raddatz (2010) find no evidence that growth in the mining sector reduces poverty.⁵

Does this mean that having a sizeable natural resources sector will necessarily be accompanied by high inequality and poverty? Adverse distributive effects following the Dutch Disease can be mitigated or may not materialize if there is sufficient mobility across sectors, i.e. workers can move from manufacturing to a sector related to natural resources. In turn, this will depend on whether the natural resources sector has significant ‘forward’ linkages (natural resources are used to produce other goods) or ‘backward’ linkages (locally produced goods are used as inputs by the resource extraction industry with the rest of the economy).⁶ Aragón and Rud (2013) find that, when creating backward linkages, mining activities can increase income in local communities and reduce poverty at the local level. A second reason why being resource rich may not have adverse redistributive effects for the poor is that such economies do not necessarily grow at slower rates. Much of the early literature argues that there is an adverse effect of natural resource abundance on

⁴ According to van der Ploeg and Poelhekke (2009), economic activity is adversely affected as firms are more likely to hit liquidity constraints in the face of volatile world prices, especially in underdeveloped financial systems.

⁵ The central hypothesis is that the composition of economic growth matters for poverty alleviation, as well as its size. Empirically, the largest contributions come from unskilled labour-intensive sectors: agriculture, construction, and manufacturing. Mining has, instead, a positive coefficient in regressions that explain changes in poverty headcount, but it is statistically insignificant. Similarly, Davis and Cordan (2013) find no evidence that resource extraction is more likely to be associated with pro-poor growth.

⁶ The ‘enclave’ nature of the extractive sector (e.g. offshore oil extraction) may restrict opportunities for the development of backward and forward linkages between these activities and the rest of the economy (Hirschman 1958, 1981). Growth from backward or forward linkages can have a ‘multiplier effect’ by stimulating other sectors (e.g. infrastructures built for the mining sector can also be useful for linking farmers to the world market).

economic growth (see Van der Ploeg (2011) for an authoritative survey of the hypotheses and evidence). The recent literature, however, has disputed the claim that natural resources have negative effects on growth. For example, Alexeev and Conrad (2009) and Michaels (2011) show that large endowments of oil have a positive effect on long-term economic growth. Much depends on the policy responses and quality of institutions, as emphasized by Addison and Roe (2018). A third reason why there may be no systematic distributive impact concerns the role of states in resource-rich countries. States can effectively regulate access to and exploitation of natural resources (e.g. how property rights to natural resources are assigned). They can also tax income from this sector and address rising inequality and poverty via redistributive policies (e.g. how rents from natural resources are distributed). Ross (2007) provides an early discussion of how the public sector can mitigate the distributive effects. The foregoing review suggests that there are reasons to expect that the net distributive effects of natural resource abundance may be ambiguous. This, in turn, could explain why we observe weak correlation between natural resources and measures of inequality and poverty in Figures 1–3.

The empirical literature has produced relatively little analysis of the distributive impact of resource wealth. Table 1 describes a selection of studies. Existing studies on income inequality are largely based on cross-country studies. Some evidence relies mainly on cross-section regressions and find a positive effect on income distribution (Carmignani 2013; Gylfason and Zoega 2003). Cross-section methods have well-known limitations. However, they are an appropriate approach for explaining the variation of phenomena, like income distribution, that evolve slowly over time and so vary mostly between countries. Panel studies offer mixed findings, suggesting that the effect may change over time (Goderis and Malone 2011) or that it depends on the level of resource revenues (Parcero and Papyrakis 2016). However, while helpful for handling endogeneity concerns, panel methods conditioning on country fixed effects may end up throwing away most of the variation that one wants to explain. As income inequality and poverty present substantial time series variation only in the long run, case studies relying on suitable time series complement panel and cross-section findings well. Case studies on Iran (Farzanegan and Krieger 2019) and Australia (Bhattacharyya and Williamson 2016) find that hydrocarbon and mining commodities increase inequality in the short and long run.

Another point to bear in mind is that data limitations can be significant when assessing the distributive effects of natural resources in cross-country studies. First, it is well known that cross-national inequality (and to some extent poverty statistics) present significant comparability problems, reflecting different income notions, units of analysis, collection methods, and other methodological choices in national income surveys across and within individual countries over time. Second, cross-country studies have been forced to leave out a significant number of developing economies. Even the most comprehensive datasets report only a very limited number of observations for sub-Saharan Africa and the MENA (Middle East and North Africa) region.⁷ Therefore, comparability and sample selection limitations have prevented cross-country studies from reaching firm conclusions.

While cross-country studies are a valuable tool for quantifying the importance of potentially relevant factors and for testing the validity of generalizations, and cross-country regressions often explain a great deal of variation in the dependent variable, an emerging literature is looking at the

⁷ Bhattacharyya and Williamson (2016: 224) and Ross (2007: 239) show that measures of natural resource wealth are negatively correlated with the availability of income distribution observations. Parcero and Papyrakis (2016) try to address likely sample selection bias using Heckman correction.

effects of natural resources within countries.⁸ In part, this is because cross-country studies often present significant identification challenges. But perhaps the main advantage of this approach is that it enables appreciation of the variation of the impact of natural resources on development outcomes beyond the national averages, by studying how the effects of the exploitation of natural resources are spread across regions or at the local level. This is an area that has produced a limited, yet growing, number of studies on poverty outcomes.

Loayza and Rigolini (2016) find that mining districts in Peru have higher per capita consumption, fewer poor and extreme poor but higher levels of inequality. Similarly, Zabsonré et al. (2018) find that the boom in gold mining in Burkina Faso has reduced poverty but has increased local income inequality. Baziller and Girard (2020) show that the effect on poverty reduction in Burkina Faso reflects the role of artisanal, rather than industrial, mining. Evidence from mines in 44 developing economies suggests that mining can increase household asset wealth, with the wealthiest ones benefiting more (Von der Goltz and Barnwal 2019). However, due to the effects of pollution on agricultural productivity, Aragón and Rud (2016) find that mining activity increases rural poverty in Ghana. The increase in gold production between 1997 and 2005 is associated with an increase of almost 18 percentage points in the poverty headcount. Looking at the impact of oil, Gallego et al. (2020) find evidence of poverty reduction in Colombia, while Caselli and Michaels (2013) find that an increase in oil revenues had no significant effect on local living standards in Brazilian municipalities.

4 How do natural resources affect health and education outcomes?

The idea of a resource curse has been extended to other human development outcomes. For example, it has been suggested that oil-led development comes with unusually high child mortality, lower life expectancy, lower education outcomes, and poorer health and education provision (Karl 2004). Is there a resource curse for health and education? What are the mechanisms?

As in the case of distributive effects of resource abundance, economic growth can be an important mechanism for impacting health and education through its effect on fiscal revenues. Resource wealth provides governments with additional revenues that can finance health and education expenditure. However, Dutch Disease and the volatility of prices in international commodity markets can induce growth volatility and instability in the flows of government fiscal revenues, hampering the possibility for health and education expenditure. Faced with more volatile fiscal positions or tighter fiscal space, governments may be less likely to prioritize longer-term health and education goals (Arezki et al. 2011; Venables 2016).⁹

Cross-country studies present empirical evidence consistent with this mechanism, finding that resource-rich countries have lower rates of public spending on and enrolment in education (Gylfason 2001) and worse long-run health and education outcomes (Edwards 2016). However, empirical findings on the effects on human capital accumulation have been mixed. First, evidence of adverse effects does not seem to be robust (Stijns 2006). Second, further cross-country evidence from panel data finds that the effects of oil revenues on life expectancy and child mortality are positive (Cotet and Tsui 2013) and that oil revenues are associated with higher education expenditure but lower educational quality (Farzanegan and Thum 2020). Regional US evidence

⁸ See Aragón et al. (2015), Cust and Poelhekke (2015), and Van der Ploeg and Poelhekke (2016).

⁹ For example, Gylfason (2001) argues that abundance of natural resources induces a false sense of confidence, which may lead to the importance of investing in education being overlooked by governments.

finds that the effect on public expenditure on education is higher in resource-rich states (James 2017). Third, evidence on the impact at the local level finds that an increase in oil revenues in Brazil (Caselli and Michaels 2013) and revenues from gold mining in Colombia (Mejía 2020) are not associated with significant improvements in health and education inputs. However, evidence from a reform of the allocation of oil revenues in Colombia suggests that there is a positive effect on household employment, health, and education (Gallego et al. 2020). Further evidence suggests that human capital formation can be affected because the presence of a natural resources sector may distort the allocation of talent. Ebeke et al. (2015) show that oil resources tend to orient university students toward specializations that provide better access to resource rents (as opposed to more productive ones), but this is contextual to developing economies where governance is weak.

Another channel through which the natural resources sector can affect health and education is the effect on private incomes. Higher incomes can improve health and education outcomes via reduced poverty. But higher private incomes can also weaken the incentive to invest in human capital. A growing natural resources sector may attract, and so absorb, a greater share of the working population in low-skilled employment, which does not require accumulation of human capital in the form of education. This could increase the labour participation of children and young adults, in particular, if wages are attractive. In turn, this would mean neglecting education (e.g. fewer years in education for children or foregoing higher education for young adults).

The emerging area of empirical research on the impact of the natural resources sector at the local level has investigated this mechanism. The existing evidence suggests that the results are mixed. Ahlerup et al. (2020) find that there is a negative effect. Assessing the long-run impact of gold mining at subnational level in 30 African countries using geocoded data about the discovery and shutdown dates of gold mines, they find that individuals who had gold mines within their district when they were in adolescence have significantly lower educational attainment as adults, with child labour being the likely channel. Michaels (2011) finds that the long-run effect of oil on education levels is positive in countries in the southern USA. Mejía (2020) finds that gold mining in Colombia improves some education outcomes at primary level but has adverse effects on students' performance and enrolment in higher education, while prevalence of child labour is unaffected. Mamo et al. (2019) find no health effects from a sample of mining districts in 42 sub-Saharan African countries. Similarly, Bazillier and Girard (2020) find that the gold boom in Burkina Faso has not affected health and education, either for artisanal or for industrial mining.

Pollutions is a further mechanism that has received attention in recent work on the local impacts of mining. Extractive industries, particularly large-scale mining, have the potential to affect human capital accumulation because they generate a significant amount of pollutants, affecting the quality of air, soil, and water.¹⁰ The emerging empirical literature based on within-country studies illustrates this. Studying the impacts of 12 gold mines in Ghana on local agricultural production, Aragón and Rud (2016) show that pollution has a negative effect on agricultural productivity. In turn, decreasing productivity, by increasing poverty, is likely to hamper human capital development because of an increased prevalence of malnutrition and respiratory diseases. Similarly, drawing on evidence from 800 mines from 44 developing economies, Von der Goltz and Barnwal (2019) find that mining activity, although increasing wealth, leads to worse health outcomes for women and young children because of pollution. Increases in pollution levels from mining activities can affect educational outcomes as well as health. Rau et al. (2015) find that early exposure to toxic waste has long-run consequences. Children living in the vicinity of mineral waste deposits (in Arica, Chile)

¹⁰ Aragón et al. (2015) offer a survey of mechanisms and evidence of this growing area of research. Cust and Poelhekke (2015) discuss studies on the environmental effects of shale gas extraction at the local level.

had higher concentrations of lead in their blood, poorer academic performance, and a significant loss of labour income over their lifetime.

A thriving natural resources sector could contribute to increasing the income of the poor and so provide additional resources for human capital accumulation in local communities. However, it could also have adverse effects on education (via labour market participation) and health outcomes (via pollution). The net effect may be ambiguous. The existing, and still rather thin, within-country empirical literature offers contrasting findings with respect to education. It finds that there are negative health effects for communities in the proximity of extractive activities due to pollution.

The empirical literature, in this and the previous sections, reveals that the effects of natural resource abundance can vary by type of natural resources, context of the analysis, and time horizon. This suggests that the effects may be heterogeneous. Understanding the sources of such heterogeneity will be important. The next section turns to this.

Table 1: Resource abundance and development outcomes: selected empirical studies

Author(s) and year	Analysis	Methods	Findings
Income distribution and poverty			
Gylfason and Zoega (2003)	Cross-country, 74 countries, natural capital	Cross-section, OLS	Natural resources, as share of natural capital in national wealth in 1994, increase income inequality (Gini index) and, via this channel, reduce growth.
Carmignani (2013)	Cross-country, 84 countries, natural capital	Cross-section, 1970–2010, 2SLS and 3SLS	Total stock of oil, coal, gas, and mined minerals (as share of GDP in 1970) increases income inequality and, via this channel, negatively affects the human development index.
Goderis and Malone (2011)	Cross-country, 90 countries, commodity prices	Panel data, 1965–99, FE and OLS	Resource booms lead to a decrease in income inequality (Gini index) in the short run and to an increase in the long run which compensates for the initial increase.
Parcerro and Papyrakis (2016)	Cross-country, 81 countries, oil	Panel data, 1975–2008, OLS, FE	Nonlinear effect. Oil reduces income inequality, measured as Gini index, in countries at low and medium levels of oil rents. But it increases inequality in oil-rich countries.
Loyaza and Raddatz (2010)	Cross-country, 55 countries, mining	Panel data, OLS and IV	Economic growth in the mining sector has no effect on income poverty reduction.
Farzanegan and Krieger (2019)	Country level, Iran, oil and gas	Time series, 1973–2016, VAR	Oil and gas revenue shocks increase Gini coefficient and top 10% income share.
Bhattacharyya and Williamson (2016)	Country level, Australia, mining commodities and wool	Time series, 1921–2008, Cointegration and ECM	Mining commodities price shocks increase the top 1, 0.05, and 0.01% income shares in the short run and long run. Wool commodities price shocks increase top income shares in the short run but reduce them in the long run.
Loayza and Rigolini (2016)	Within-country, Peru, mining (silver, zinc, tin, lead, copper, gold)	Panel data, district level, matching and propensity score	Mining districts have 9% larger per capita consumption and 2.6% less poor and extreme poor population, but also 0.6% higher consumption inequality (Gini index).
Aragón and Rud (2013)	Within-country, Peru, gold (Yanacocha mine)	Panel data, household, Diff-in-Diff	Short-run effect on incomes. A 10% increase in the mine's demand for local inputs is associated with a real household income increase of 1.7%.
Human development outcomes			
Gylfason (2001)	Cross-country, 85 countries, natural capital	Cross-section, 1985–98, SUR estimation	Natural resources, as share of natural capital in national wealth, are associated with lower secondary-school enrolment rate and public spending on education.

Stijns (2006)	Cross-country	Cross-section, 1975–2000	The correlation of natural resources abundance on education and life expectancy is sensitive to the choice of resource measure.
Cotet and Tsui (2013)	Cross-country, 124 countries, oil	Cross-section and panel data, OLS and FE	Oil revenues increase life expectancy and reduce infant mortality. The effect appears to be stronger in non-democracies than democracies.
Edwards (2016)	Cross-country, 157 countries, mining	Cross-section, IV	Larger mining share in the economy has a negative long-run effect on infant mortality, life expectancy, and education attainments.
James (2017)	Within-country, USA, 48 states	Panel data, 1970–2008	Resource-rich states have higher education expenditure.
Gallego et al. (2020)	Within-country, Colombia, oil	Panel data, Diff-in-Diff and IV	Oil rents have a positive impact on a range of poverty and living standards indicators following a reform changing their allocation across districts.
Fenske and Zurimendi (2017)	Within-country, Nigeria, oil	Panel data, individuals, Diff-in-Diff	Positive oil price shocks in early life increase years of education, reduce fertility, delay marriage, but reduce health outcomes for women of southern ethnicities compared to northern ones.
Zabsonré et al. (2018)	Within-country, Burkina Faso, gold	Panel data, municipality, 2003-09, Diff-in-Diff	Areas hosting gold extraction have better average living standards in terms of headcount ratios, poverty gaps, and household expenditures than areas without gold. The gold boom can also increase local inequality and child labour in areas with these income gains.
Mejía (2020)	Within-country, areas of prevalent small-scale illegal gold mining, Colombia	Panel data, Diff-in-Diff, IV	Gold mining increases enrolment in primary school and reduces dropout rates. But it also reduces standardized test scores and college enrolment. Municipal revenue and expenditure increase in mining municipalities, but there are no substantial improvements in education spending or school inputs. Child labour is unaffected.
Von der Goltz and Barnwal (2019)	Within-country, mineral mining in 44 developing countries	Panel data, 800 mines, health and demographic surveys, 1986–2012, Diff-in-Diff	Significant medium-run gains in asset wealth for households near the mines, but wealthiest households benefit most in the long run. Negative health effects: higher incidence of health conditions linked to heavy metal toxicity (anaemia among women and stunting in young children). Observed health effects are due to pollution.

Source: authors' elaboration.

5 Why do some countries see a developmental resource curse and others do not?

The stylized facts on the relationship between resource abundance and development outcomes described in Section 2 suggest that, regardless of the sign of the correlation, there is a great deal of variation in this relationship. For example, as we observed in Figure 1, Chad and Malaysia have very similar levels of resource rents as a ratio of GDP, but Malaysia's school enrolment rate is over 70 per cent while the corresponding figure for Chad is approximately 20 per cent. Likewise, Somalia and Egypt have similar levels of resource abundance, but Egypt's under-five mortality rate is less than 30 per 1,000 live births, while the corresponding figure for Somalia is about five times bigger (Figure 2). This suggests that there is no innate feature of resource-abundant countries that can explain why so many of these countries have performed poorly in human and social development outcomes. What, then, can explain why some countries are able to escape the resource curse when it comes to development outcomes?

The literature has pointed out the role of institutions as a crucial determinant of whether a country suffers a resource curse or not (e.g., Bhattacharyya and Hodler 2010; Boschini et al. 2007; Brunnschweiler 2008; Collier and Hoeffler 2009; Ebeke et al. 2015; El Anshasy and Katsaiti 2013;

Masi and Ricciuti 2019; Melhum et al. 2006; Omgba 2015).¹¹ Two explanations have been put forward to understand the role of institutions: one emphasizes rent-seeking mechanisms (Melhum et al. 2006; Tornell and Lane 1999; Torvik 2002) and the other patronage (Caselli and Cunningham 2009; Robinson et al. 2006). According to the former, the economic institutions that govern the private sector are key. Thus, natural resources hinder economic growth only if the quality of the institutions that govern the profitability of productive enterprise is such that individuals switch from productive to unproductive activities. For example, Melhum et al. (2006) argue that the combination of resource abundance and ‘grabber friendly’ institutions is detrimental to economic development as with ‘grabber friendly’ institutions there are gains from specialization in unproductive activities. On the other hand, ‘producer friendly’ institutions help countries to take full advantage of their natural resource endowments as rent-seeking is complementary to production in this case. While rent-seeking and the presence of grabber friendly institutions can be a powerful explanation of why some resource-abundant countries observe high rates of economic growth (such as Botswana and Norway), it is less obvious why rent-seeking per se would lead to poor outcomes in education, health, and other development outcomes.

A second explanation of why some countries avoid the political resource curse focuses on patronage and on the institutions governing the use of public sector resources. Robinson et al. (2006) provide a theoretical model where political incentives that resource endowments generate are key to understanding whether they are a curse or not. In their model, under the assumption that resource revenues accrue to the government, politicians need to decide how much of the resources to extract in the current period and how much should be left for the future. Resource income can be used in either of two ways: the incumbent politician can ‘consume’ the income or distribute it as patronage in the form of public employment to influence the outcome of the election. Robinson et al. (2006) show that, if the resource boom is permanent, politicians have an incentive to stay in power and, in order to do so, increase public sector employment inefficiently. However, their model predicts that political institutions which promote the accountability of politicians and state institutions which favour meritocratic appointment over patronage in the public sector may ameliorate the perverse political incentives that resource booms generate.

A related theoretical argument is provided by Brollo et al. (2013), who show in a model with endogenous entry of political candidates that resource windfalls lead to two types of political effects. The first is a moral hazard effect: larger budgets allow politicians to grab more rents without disappointing rational but imperfectly informed voters. The second is the selection effect: a larger budget induces a decline in the average ability of individuals entering politics, as political rents are more attractive to individuals with lower ability. The selection effect magnifies the adverse consequences on moral hazard: an incumbent facing less able opponents can grab more rents without hurting their re-election probability. Thus, resource windfalls increase corruption and lower the quality of state institutions.

Several empirical studies support the argument that resource booms can lead to increased patronage and reduced efficiency of the public sector. Using a regression discontinuity design exploiting the fact that federal transfers to Brazilian municipalities change exogenously and discontinuously at given population thresholds, Brollo et al. (2013) causally establish that large federal transfers increase corruption and lead to lower quality of political candidates in Brazil, .

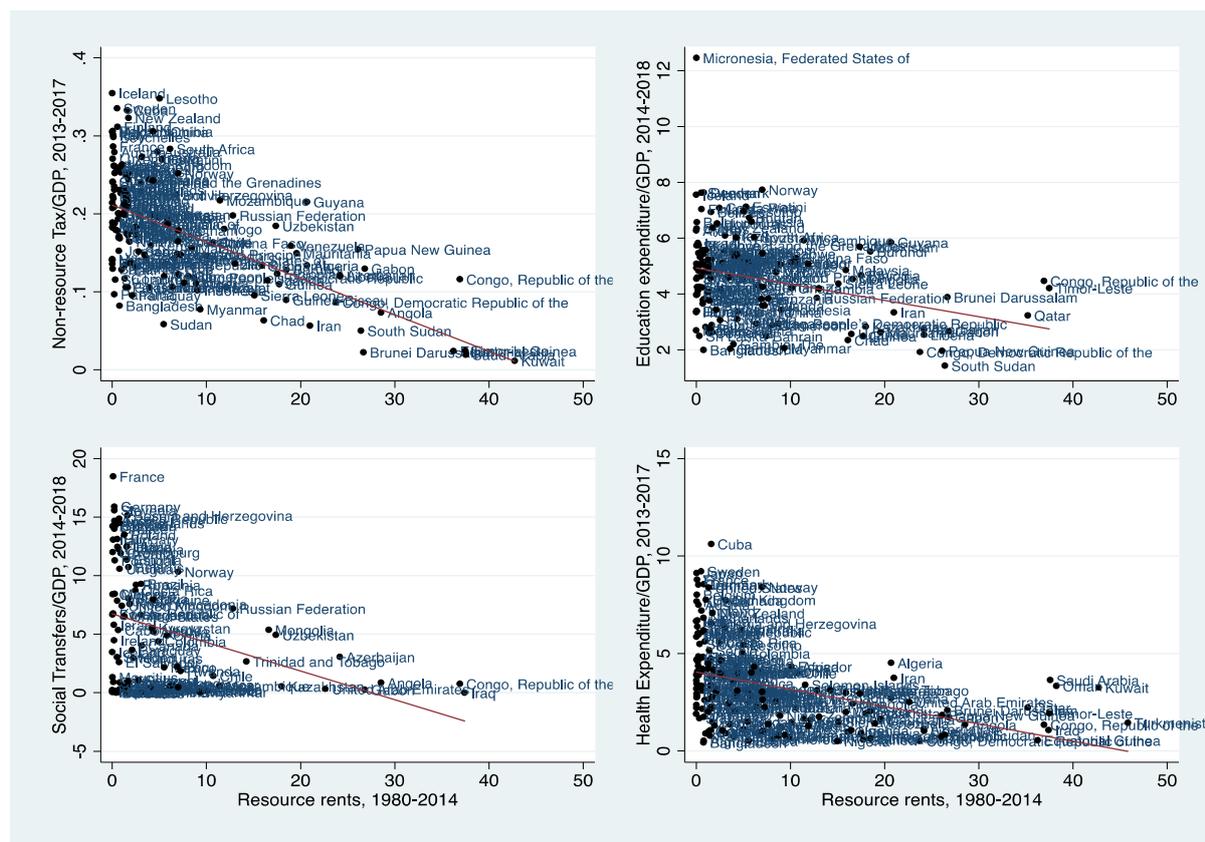
¹¹ The literature that is interested in the effects on growth has proposed additional mitigating mechanisms. Andersen and Aslaksen (2008) argue that what matters in reducing negative effects on growth is the constitutional arrangement: presidential regimes and proportional electoral systems are more likely to be afflicted by the resource curse. The detrimental effect of natural resources on growth may also be reversed by high human capital endowments (Kurtz and Brooks 2011), while public spending could mitigate civil conflicts related to oil wealth (Bodea et al. 2016).

Vicente (2010) finds that the discovery of oil in São Tomé and Príncipe was followed by a large increase in perceived corruption across many public services. Using a clever instrumental variable strategy where hydropower revenues are instrumented by geographical variables which influence the placement of hydropower plants across the country, Borge et al. (2015) find a negative effect of Norwegian local government revenues from hydropower production on the efficiency of the production of public goods. Caselli and Michaels (2013) show that social transfers and public good provision increase less than expected in oil-rich Brazilian municipalities, suggesting a diversion of public revenues from oil extraction into patronage activities. Harris et al. (2020) use a survey experiment with bureaucrats in Ghana and Uganda to show that bureaucrats treated with information on oil revenue disapprove of spending practices that benefit political supporters, and this is particularly true for bureaucrats who are outside government patronage networks. This shows the role that greater autonomy among government officials can play in ameliorating the negative effects of resource windfalls on state capacity.

The positive effect that resource windfalls may have on patronage provides a more plausible explanation of how political factors mediate the effect of resource abundance on development outcomes than the rent-seeking explanation. If, under certain conditions, political leaders in resource-rich countries divert a large proportion of revenues derived from resource extraction to patronage, there will be fewer public resources available for spending on education and health or on social transfers that can contribute to poverty and inequality reduction. Further, if resource abundance leads to weakened state capacity, either due to poor political selection (as argued by Robinson et al. 2006) or if political elites are less interested in investing in state capacity, then resource abundance can have an additional negative effect on development outcomes.¹² As the empirical evidence suggests, countries with lower levels of state capacity tend to perform poorly in education, health, and poverty outcomes (see Asadullah and Savoia (2018) on the relationship between state capacity and poverty outcomes). Consistent with these mechanisms, Figure 4 shows that countries with larger resource rents tend to be associated with lower expenditure on education, health, and social transfers, as well as less non-resource tax revenues.

¹² Fum and Hodler (2010) provide initial evidence consistent with this, showing that income inequality may increase in ethnically polarized resource-rich economies and decrease in homogenous ones. Such mechanisms can perhaps explain why this is the case.

Figure 4: Tax revenues, social transfers, education, and health expenditure vs. resource rents



Note: the Y-axis variables are 'Domestic general government health expenditure (% of GDP)': public expenditure on health from domestic sources as a share of the economy as measured by GDP; 'Government expenditure on education, total (% of GDP)': general government expenditure on education (current, capital, and transfers) includes expenditure funded by transfers from international sources to government. General government usually refers to local, regional, and central governments. Variables are from the World Development Indicators (World Bank 2020).

Source: authors' elaboration.

An indirect political route by which resource abundance can negatively affect development outcomes is through its effects on the type of political regime. A large literature in political science has examined whether resource abundance in general, and oil abundance in particular, strengthen autocratic regimes and delay democratic transitions. Democratic regimes are more likely to invest in broad-based public goods that matter for better education and health outcomes, or are more willing to undertake redistributive measures than can lead to lower inequality (see Acemoglu (2008) and Besley and Kudamatsu (2006) for evidence on the former and Acemoglu et al. (2015) for evidence on the latter). Therefore, if resource reliance leads to a lower likelihood of a democratic transition, this provides an indirect way by which resource abundance may negatively affect development outcomes. Using cross-country panel data, Haber and Menaldo (2011) find that increases in resource reliance are not associated with authoritarianism. Similarly, Herb (2005) does not find consistent evidence that resource abundance harms democracy. Jensen and Wantchekon (2004), on the other hand, find a negative correlation between resource abundance and the level of democracy in Africa. In an authoritative survey of the literature, Ross (2015) argues that 'there is strong evidence that higher levels of oil wealth help authoritarian regimes, and authoritarian rulers, ward off democratic pressures' (Ross 2015: 10).

Under what conditions are patronage and inefficient use of public resources more likely to occur in resource-abundant countries? Besley and Persson (2011) argue that the presence of accountability mechanisms for state leadership can neutralize the perverse incentives that resource

rents create for patronage spending. In particular, political institutions that place effective constraints on a ruler can play a major role, such that an economy can have both private sector and state institutions that avert rent-seeking and patronage mechanisms. Limits on executive power promote a common interest environment in which the ruling minority is unable to hand out favours to cronies or themselves (Besley and Persson 2011). This is because, when subject to institutionalized checks and balances, a ruler has less discretion over public finance decisions than one who is not, including over decisions on the use of natural resource rents.

One mechanism concerns the presence of independent institutional actors within the national government that can control and limit the use of state resources, so as to demand greater accountability with respect to budgetary planning and implementation. For example, in parliamentary systems, an effective parliament can institutionally oversee and audit the state budget. This implies that the executive may be more likely to promote an effective and independent civil service (rather than one based on patronage, which may undermine the competence of the state bureaucracy) and so maintain or innovate fiscal infrastructures and the state's ability to raise revenues. Another mechanism concerns the possibility that chief executives who are subject to formal limitations to their power may be more likely to follow the rule of law, so that an independent judicial system may be more effective against any breach of tax laws or abuse in tax levies. Masi et al. (2020) and Ricciuti et al. (2019a, 2019b) provide evidence consistent with such mechanisms.

6 What would we like to know?

This section speculates about areas and questions that the future agenda on natural resources and development could address.

First, the existing research has focused on selected development outcomes. It would be interesting to see future research focussing on the impact on other important aspects of development. There is a rather thin literature looking at the effects on a broader range of human and social development outcomes in less-developed economies. Ross (2008) explains why women may have lower levels of participation in the labour force and, in turn, less political influence in oil-rich countries. Fenske and Zurimendi (2017) provide evidence on the economic and social effects of oil income on women in Nigeria. Kotsadam and Tolonen (2016) look at the local employment impacts on men and women of large-scale mining in Africa. Ebeke and Etoundi (2017) focus on the effects on urbanization and living standards in urban areas in Africa. These and other development outcomes will hopefully be a fertile area for empirical research in the economics of natural resources in the future. An important aspect of the political economy of natural resources is social conflict. Its origins, nature, and intensity around the exploitation of natural resources at a local level are the subject of investigation of a qualitative literature in disciplines such as development studies and geography (e.g. Bebbington 2012), but it has not received much attention in economics so far.

Second, the empirical evidence has often focused on cross-country studies or case studies at the national level. However, in many low- and middle-income countries, resources are concentrated in specific areas of the country, which are also the places that are characterized by high levels of conflict and deep economic and social inequalities. For example, resource-rich Mozambique's oil and gas deposits are mostly located in the Cabo Delgado region in the remote northern part of the country, an area that has witnessed violent conflict since 2017 and has high levels of deprivation (Almeida dos Santos 2020). Similarly, in the case of Bolivia, its rich hydrocarbon reserves are concentrated in the Chaco, a narrow band of lowlands in the country, which is also the home of the historically indigenous Guaraní ethnic group, who have not largely benefited from the

production of hydrocarbon in the region (Bebbington et al. 2018). Recent studies have started to look at the impact within countries, at the local level or regional level. As yet, there is no substantial body of empirical research on the effects of natural resources on development outcomes. This is needed before we can assess the consistency of their findings and their robustness on firmer ground. For example, case studies drawing on the experience of countries where a substantial number of poor live will be informative, also in terms of understanding SDGs progress. Further empirical research should also consider case studies on resource-rich economies that are not usually included in cross-country regressions.

Thirdly, while most studies that examine the effects of the abundance of natural resources on development outcomes use cross-sectional or panel data methods, as we noted in Section 3, a limitation of these methods is that they are subject to significant identification challenges. More recently, there has been increasing availability of new datasets such as the panel data set of giant oil discoveries (Arezki et al. 2017). Most notably, the timing of large oil discoveries is arguably exogenous and unexpected due to the uncertainty surrounding oil and gas exploration and, at the same time, there is a long lag between discovery and production. This allows researchers to use quasi-experimental methods with this data, which can reliably establish the causal effect of resource discoveries on a wide range of development outcomes. Another example in the same vein is the innovative approach of Dhillon et al. (2020), who use spatial regression discontinuity methods to look at the effects of formation of new states in India, where two of the parent states contain a large part of India's natural resources. They find that resource-rich constituencies in the new states fared comparatively worse in a range of development outcomes within new states that inherited a relatively larger proportion of natural resources. They argue that the detrimental effects of natural resources may be attributed to the negative effects of resource abundance on quality of governance in the new states.

A fourth area that future research might also assess is why the effects of natural resources may be heterogeneous. One source could be the type of natural resources (e.g. Isham et al. (2005) make this case as far as growth is concerned). For example: Is oil special? Why? Ross (2015) argues that oil is more capital intensive compared to other hard rock minerals. When a mineral is relatively more labour intensive, it opens a mechanism where the larger population benefits from the natural resources sector. The oil sector instead typically does not employ a significant share of the country's labour force. Yet, there are countries that have managed to harness oil income in a way that supports development (e.g. Norway). While the existing literature on natural resource heterogeneity has focused on the physical characteristics of the natural resource in question, Vahabi (2018) argues that the institutional characteristics of the natural resource, such as its appropriability, matters more in explaining the heterogeneity in its effects. More research is needed in understanding how the political and institutional characteristics of different types of natural resources may explain why countries which are reliant on the same type of natural resource have seen different development outcomes (such as the different development trajectories followed by oil-rich Indonesia and Nigeria— see Lewis 2007).

A final area of research is to better understand the mechanisms by which the political resource curse manifests itself when the outcome of interest is not economic growth per se, but a range of development outcomes. As we argued earlier in this article, countries that have political institutions that place constraints on the executive are less likely to witness deleterious effects of natural resource abundance on development outcomes. The key questions here are: Why do such political institutions emerge in some resource-abundant countries and not in others? Do we need these institutions in place prior to the discovery of natural resources? If so, for low-income countries which already had weak institutions of political accountability prior to the discovery of natural resources, how can the political resource curse be avoided? How can development agencies such as multilateral development banks and donor countries contribute to the strengthening of state

institutions in low-income resource-rich countries (such as DR Congo and Mozambique)? What is the role of international agreements such as the Extractive Industries Transparency Initiative in holding political elites in resource-rich countries and multinational corporations operating in the natural resource sector to account in making sure that natural resource revenues reach the citizens of these countries? More research that combines qualitative country and sector case studies with quantitative analysis is needed to better understand how and in what ways political institutions mediate the effects that natural resource abundance has on development outcomes.

7 Conclusions

This paper reviewed the recent literature on the developmental effects of resource abundance. We began by showing that there is no strong correlation between resource rents and a set of key development outcomes on income inequality, poverty, and human development. We tried to explain this on the basis of existing mechanisms and empirical evidence. We argued that there are no compelling reasons to draw firm conclusions from the lack of any systematic correlation. Indeed, countries rich in natural resources can either do particularly well or very badly. The challenge is to explain why, moving beyond the idea of a simple relationship.

We did so by focussing on political economy mechanisms that link natural resources and development outcomes and suggested that it is neither the presence of natural resources per se nor the production sector related to natural resources extraction that drives developmental consequences. It is, rather, the institutional context in which this sector develops and natural resources are exploited that determines the types of distributive, health, and education outcomes that resource-rich countries experience. This may explain why empirical research has produced contradictory findings.

A pivotal mechanism behind the developmental effects of the natural resources sector is the type of states that resource-abundant economies develop. State institutions are involved to a large extent in the provision of health, education, and poverty relief. Hence, having effective states is central to how income from natural resources translates into education, health, and social welfare programmes that may reduce inequality and poverty. Effective states have two requisites: (i) they are insulated from political power; (ii) they are able to raise revenues and spend the proceeds efficiently. Such states are more likely to emerge when countries have political institutions that hold state leadership accountable, as it averts patronage mechanisms.

Future research on the development effects of natural resource abundance needs to look at a wider range of development outcomes than poverty, inequality, education, and health, as well as its subnational effects. There is also a need for more innovative methods that can address the identification challenges that are particularly evident in cross-national studies, as well as more studies that address the heterogeneity observed in the effects of different types of natural resources. Finally, more research is called for to understand the mechanisms by which political institutions mediate the effects of natural resource abundance on development outcomes.

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