Second essay

Natural Resources, Institutions and the Quality-adjusted Human Capital

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Abstract:

This paper empirically analyses the effects of natural resources on both the quantity and quality of human capital. Several recent papers suggest that the negative association between natural resources and human capital can be reversed if quality of institutions is high enough. We confirm this result employing a panel of 170 countries for period 1996-2014 showing a positive interacted effect between natural resources and quality of institutions on human capital, and also check the robustness of our results considering different decompositions of the natural resources and institutional variables. Our analysis emphasizes the importance of using an indicator that incorporates the quantity but also the quality of human capital.

Keywords:

Natural resources, institutions, resource curse, human capital.

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1 Introduction

Why do some countries benefit and others lose from the presence of natural resources? Many recognize the prospects that natural resources provide for development and sustained economic growth. Still, many countries cursed by natural resource wealth. The literature in the resource curse hypothesis focuses mostly on the influences of natural resources on the economic growth, specifically on the levels of GDP per capita. Most of empirical findings in this context point to mixed results (see Van der Ploeg, 2011 and Badeeb et al., 2017 for a detailed survey). Although whether in theory or empirics, natural resources does not cause the "curse" and the resource curse is a red herring (Brunschweiler and Bulte, 2008). Beside, some economists argue that it is not natural resources but economic and socio-political environments that determine the resource curse (Mehlum et al., 2006; Boschini et al., 2013; Kim and Lin, 2015).

In addition, it has been noted that countries blessing from abundance of natural resources appear to have human development indicators far below the levels that would be predicted on the basis of their income (Cockx and Francken, 2016). For example, studies carried out in Brazil, Columbia and Peru indicated that neither economic growth, nor education and health outcomes improved following the collection of large oil or mineral revenue windfalls by subnational governments (The Natural Resource Governance Institute (NRGI) and United Nations Development Programme (UNDP)). The challenges faced by today's developing countries are violence, slowing growth, corruption, and the natural resource curse while several countries have demonstrated that this kind of natural resource curse can be avoided through effective economic and fiscal policies (World Development Report, 2017).

These findings give rise the idea of resource curse extends beyond the hypothesized standard adverse effect of natural resources on economic growth and apparently comes from the contributing factors that themselves drive sustained economic growth. Cockx and Francken (2016) stated that, understanding the complicated dynamics of the resource curse from a broader point of view is of the utmost importance in order to enable the population in resource-rich countries benefit from their vast natural resource endowments. Several authors investigated the nexus between natural resources and human capital development. Natural capital appears to crowd out human capital, thereby slowing down the pace of economic development (Gylfason, 2001; Stijns, 2006).

Afterwards, other economists find out an inverse association between natural resource and human capital indicators (Papyrakis and Gerlagh, 2007; Daniele, 2011; Blanco and Grier, 2012; Cockx and Francken, 2016). However, natural resources can permanently boost income and welfare through higher human capital, and this can offset the direct negative effect of natural resources on the growth rate (Bravo-Ortega and de Gregorio, 2005). Cockx and Francken (2016) claim that natural resource improves education but worsens health and also found that agricultural exports lower education and health whereas non-agricultural primary exports promote both. In particular, Gylfson (2001), Papyrakis and Gerlagh (2004) and Birdsall et al., (2001) demonstrate the negative effects of natural resources on education spending and years of schooling in resource-rich countries. De Soyza and Gizelis (2013) show that oil wealth associated with higher mortality rates. Similarly, Karl (2004) reports that minerals and oil resources are associated with lower life expectancy.

Political economy literature also provides some relevant insights in resource curse hypothesis. Lam and Wantchekon (2003) introduce the term of "political Dutch disease" indicating moving further the spectrum from economic to political causal channels for the resource curse. Many economists such as Hodler (2006), Iimi (2007), Deacon and Rode (2012) argue that in some countries the windfall of resource revenues increase the power of elites. Nevertheless, the role of institutions in determining how natural resources effect on the contributing factors of economic growth has been a point of divergence in the resource curse literature. Some emphasize that resource rents has a corruptive effect on the quality of a country's institutions (Ross, 2001; Hodler, 2006; Iimi, 2007; Arezki and Gylfason, 2011; Tsui, 2011; Bhattacharyya and Hodler, 2010). Others do not find a mediating role of institutions in the resource curse hypothesis (Sachs and Warner, 1995 and 1997; Brunschweiler and Bulte, 2008). Finally, the remaining economists emphasize that it is the exogenous quality of institutions that determines whether resource rents pose a curse or blessing (Mehlum et al., 2006; Torvik, 2009; Mavrotas et al., 2011; Boschini et al., 2013). This group tends to shed doubt on the validity of the resource curse hypothesis. Therefore, it is fair to say that, there is currently no consensus regarding the existence of a natural resource curse (Badeeb et al., 2017).

This paper will contribute to the literature by providing innovative insights into the impact of natural resource rents and institutional quality on human capital. Two dimensions of human capital; the joint effect of education and health is investigated. We concentrate on education and health because of their importance as a driver of sustainable economic growth (Barro, 2001). Moreover, both entails wide-ranging social implications and can be crucial in alleviating poverty, which is important for poor countries featured by low human capital and abundant natural resources (Cockx and Francken, 2016)[1].

In line with the rising literature, this paper thus aims to address an important blind spot by contributing insights on using an indicator that incorporates the quantity but also the quality of human capital. We examined the log-linear relation between education and health indicating quantity and quality of human capital, respectively. World Bank (2011) first identified the term "quality-adjusted human capital" addressing the shortcoming of measuring human capital in declining the quality of human capital. Though, several papers have focused on the association between natural resource and human capital (see Badeeb et al., 2017 for a detailed survey), to our knowledge, this paper provides the first empirical analysis of the impact of resource rents on quality-adjusted human capital over time. We concentrate on the role of institutions in this nexus as a mediating factor.

Using a large panel dataset of 170 countries covering the period from 1996 to 2014, we find that natural resources rents is negatively associated with quality-adjusted human capital while controlling for several additional factors. However, the interaction term between resource rents and institutional quality is positively related to human capital. Therefore, institutional quality seems to play a critical role in mediating the resource curse. The results in our paper further demonstrate that this specific resource curse affect differs according to the type of resource rents. In particular, the dependence in oil rents appears to highly impede the quality-adjusted human capital.

The remainder of this paper is organized as follows; the quality-adjusted human capital is discussed in Section 2, we present the empirical specification and the data in Section 3. Finally, we discuss the results and provide an extension focusing on the difference between fuel and non-fuel resources in Section 4 and Section 5 concludes.

[1] Particularity, education can stimulates economic growth and improves people's lives through man channels: by increasing the efficiency of labor force, by fostering democracy (Barro, 1997) and thus, creating better conditions for good governance, by improving health, by enhancing quality (Aghion et al., 1999, Gylfason, 2001, Stijns, 2006).

2 The quality-adjusted human capital: theory and evidence

After 2001, the resource curse literature incorporated and extended by Thorvaldur Gylfason who focused attention on broader channels through which natural resource dependence could be affecting sustained economic growth: saving, investment and human capital (Badeeb et al., 2017). Gylfason (2001) claimed that the adverse effects of natural resource abundance on economic growth since the 1960s that have been reported in the literature may in part reflect, and possibly displace, the effect of education on growth. Many researchers point out the importance of the quality of human capital, and support alternative quantitative measures of human capital that have been extensively used in the existing literature. Since, most of the papers investigated effects of natural resources on human capital by using "average years of total schooling"(Gylfason, 2001; Douangngeune et al., 2005; Stijns, 2006[2]), "literacy rates"[3] (Birdsall et al., 2001; Stijns, 2006), "school enrolment rates" (Gylfason et al., 2001; Birdsall et al., 2001; Douangngeune et al., 2005; Stijns, 2006), "public educational expenditure"[4] (Gylfason, 2001; Stijns, 2006, Cockx and Francken, 2016), "life expectancy at birth" (Stijns, 2006) and "average years of total schooling and life expectancy at birth" (Kim and Lin, 2017).

World Bank (2011) in the 5th chapter of "The changing wealth of nations; Measuring Sustainable Development in the New Millennium" addressed some shortcoming for measuring human capital in declining the quality of human capital, regarding the impact of human capital and institutions on intangible capital. In order to measure human capital, they used a log-linear relation between earning and years of schooling which is first formulated by Mincer (1974), and then they augmented indicator of human capital to account for health introducing adult survival rate as a proxy for health status.

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[2] Gylfason (2001) uses this data for females. Stijns (2006) believed that reporting this data for females is important because it captures the median level of human capital accumulation and labor market participation in developing countries.

[3] The adult literacy rate is particularly increasing in the context of developing countries and when the distribution of human capital is concern. Indeed, literacy rates tell us more about the median skill levels than other average indicators (Stijns, 2006).

[4] Public expenditure is admittedly an imperfect measure of a nation's commitment to education, because some nations spend more on private education and may be supply-led and thus fail to foster efficiency, equality and growth, in contrast to private expenditure which is generally demand-led and likely to be of a higher quality.

Inspired by the literature, we employ a unique indicator of human capital as a dependent variable that incorporates also the quality of human capital beside the quantity. Hence, we test the joint effect of the quantity and quality of human capital which is indicated by the two dimensions of human capital; education and health, respectively. In this section, we discuss how the joint effect of quantity and quality of human capital can be derived. Therefore, we want to first explain the log-linear relation between education and health and then apply in our estimations. To do this, we start the analysis by presenting the simple Cobb-Douglas approach. Following the Hall and Jones' (1999) production function, a country's GDP, (Y), is

$$Y_t = K_t^a (A_t H_t)^{1-a}$$

Where K_t denotes the stock of physical capital, H_t is the amount of human capital-augmented labor used in production, and A_t is a labor-augmenting measure of productivity. We use a Mincerian framework to derive our functional form. To simplify notation we abstract from average level of human capital. Hall and Jones (1999) assume that the human capital H of a worker can be expressed as:

$$H = e^{(Education)}$$

So, each unit of labor has been trained with E years of schooling (education). Due to lack of data for annual years of schooling, so we opt to use secondary-school enrolment ratio as a proxy for education of a worker[5].

This approach of specifying human capital stocks based on the Mincerian framework has already been used in several studies, including Hall and Jones (1999), Grossman and Stiglitz (1980), Galor and Zeira (1993), Psacharopoulos (1994) and Davidsson and Honig (2003). Besides, differences in the quality of human capital should be introduced into the measurement. In this regards, Wo¨ßmann (2003) suggested that an encompassing specification of human capital should consider the whole range of other investments which people make to improve their productivity, including informal education, cognitive skills and furthermore medical care and improvements in working conditions to improve health. Moreover, he believed that health capital is one component of human capital and

[5] The reason for using gross enrolment rate has been discussed in the next section.

recommends considering the joint determination of health and education. After that, Caselli (2005) first introduced log-linear relation of human capital by allowing for differences in the quality of schooling and health status of the population.

Hence, the joint effect of education and health considering the log-linear relation can be written as

$$h = e^{health} . e^{education}$$

This relation between education and health can properly measure the human capital across countries in different period of times. So, we use this measure of human capital in our model that has been called "quality-adjusted human capital"[6]. Next section, I will explain the empirical model that has been employed and also discuss about different variables that have been used.

3 The empirical specification and data

3.1 The empirical specification

Our empirical investigation has two objectives. First is to examine the long-run association between Quality-adjusted human capital (QAHC), natural resources rents and institutions, while the second objective is to examine the interaction effect between natural resources rents and institutions on QAHC. Earlier, as a first step in examining empirically the relationship between natural resource rents, institutions and QAHC we plot the QAHC measure against natural resource rents and institutional quality. To simplify the presentation, we use average values for each variables over the sample period (1996-2014). The graphs are suggestive of a negative association between QAHC and natural resource rents besides a positive association between QAHC and institutional quality. Fig. 3 shows that QAHC is relatively small in countries like Equatorial Guinea, Turkmenistan and Angola while blessing from large amount of natural resources rents. Moreover, Kuwait has been able to keep on rising both natural resources rent and QAHC. A considerably different picture emerges from Fig. 4 that plots the QAHC against the average quality of institutions. Now Equatorial Guinea,

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[6] This term first used by the World Bank (2011) in "The changing wealth of nations; Measuring Sustainable Development in the New Millennium"

Turkmenistan and Angola have weaker quality of institutions. Nevertheless, Finland and Denmark quality of institutions looks stronger from this perspective. While the two figures are suggestive of negative and positive association between QAHC and natural resources rents and institutions, respectively, they are of course silent on both the confounding influence of other factors as well as the impact of institutions on natural resources rents. In what remains in this section we explain how we address those two important concerns.

We estimate the following empirical strategy:

$$QAHC_{it} = a + \beta_1.Rent_{it} + \beta_2.Inst_{it} + \beta_3 Z_{it} + \delta + \varepsilon_{it} \quad (1)$$

Where i refers to countries and t to years, a is a constant, *QAHC* is the quality-adjusted human capital, *Rent* is the share of total natural resources rents in GDP, *Inst* is the average quality of institutional indicators, and Z stands for the vector of control variables including GDP per capita, population growth, GDP growth, total government expenditure and Gini index. We also control regional dummy variables[7]. We allow time specific effects, controlling for the unobservable time varying characteristics and shocks, which are common to all countries. Furthermore, we can address the spurious business cycle effects by including time fixed effects (Keller, 2004). Given our previous discussion we expect $\beta_1 < 0$ and $\beta_2 > 0$. We run this regression both for a panel of 4-year averages and also for a yearly panel. Again, by allowing the error term (ε_{it}) to include time dummies (δ), one can easily capture common macroeconomic shocks that might have significant impact on quality-adjusted human capital in the sample of countries.

[7] The regional dummies cover for Sub Saharan Africa, Middle East and North Africa, Latin America, Europe, Asia, Oceania and North America.

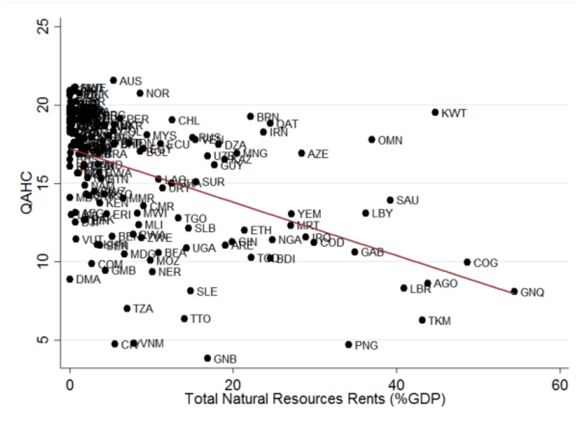

Fig. 3 Quality-adjusted human capital and total natural resources rents in GDP (average values over the period 1996-2014) Note: Timor-Leste excluded in order to show the figure apparently and smooth the data.

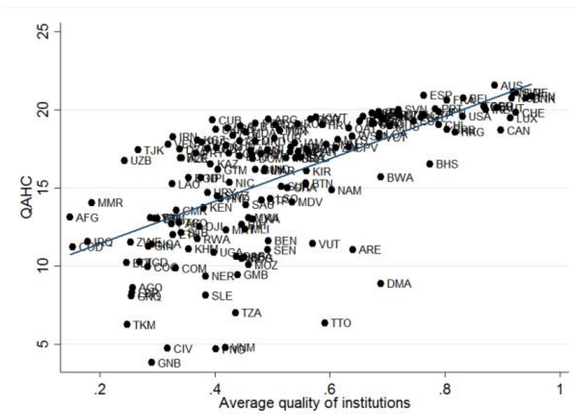

Fig. 4 Quality-adjusted human capital and average of institutional quality (average values over the period 1996-2014)

The next step is to estimate whether the association between natural resources rents and QAHC varies systematically with the degree of the institutional quality. Mehlum et al. (2006) and Boschini et al. (2007) showed empirically that the interaction effect between resources and institutions have positive effect on economic growth.

Hence, we estimate the following model:

$$QAHC_{it} = a + \beta_1.Rent_{it} + \beta_2.Inst_{it} + \beta_3 Z_{it} + \beta_4 \, (Rent_{it} * Inst_{it}) + \delta + \varepsilon_{it} \quad (2)$$

*Rent*Inst* is the interaction term between natural resources rents and quality of institutions. Our prediction is that the natural resources rents are harmful to human capital only when the institutional quality is good enough. At the margin, the total effect of increasing resources rents can be calculated by examining the partial derivatives of QAHC with respect to the resource rents variable:

$$\frac{\partial(QAHC)}{\partial(Rent)} = \beta 1 + \beta 4\ Inst \qquad (3)$$

Based on the theoretical predictions, we expect the sign of β_4 to be positive. This means that as long as institutional quality is good enough, natural resources will have a positive effect on human capital.

The differences within the samples are only slight; while the variation between the samples shows that there are considerable differences in Quality-adjusted human capital, natural resources rent and institutional quality for countries in our survey over time and within countries (see Appendix 2 Table 7 for the summary statistics). So, we do not apply fixed effects. The alternative that we instead explore is to use pooled OLS regressions with time fixed effects. This at least partly addresses time effects account considering time varying characteristics and shocks. We use both yearly panel and 4-year averages and discusses the relative merits of each.

3.2 Data

Our dataset is mainly from the World Development Indicators (WDI, 2012) of the World Bank. Throughout our main analysis we use a panel dataset of 170 developed, developing and economies in transition[8] covering the period from 1996 to 2014.

As mentioned earlier, our measure of the human capital is the joint effect of the log-linear relation between education and health. Education is a quantity index of human capital per person calculated by using data on the gross enrolment ratio, secondary schooling for both sexes from UNESCO institute for Statistics. Secondary-school enrolment is probably the most commonly used indicator of education in empirical growth research, and it is the one that is mostly correlated with economic growth while reflects the quantity of education provided rather than the quality of education

[8] See Appendix 1 Table 6 for the list of countries.

received (Gylfason, 2001). While, health capital is considered as a proxy for the quality of human capital measured by the life expectancy at birth, output of both mortality and morbidity sourced from WDI. Health is considered to be an important components of workers" efficiency often depends critically on their health conditions, particularly in developing countries while should also be more informative than average indicators regarding the medial level of human capital accumulation (Stijns, 2006). The quality-adjusted human capital (QAHC) has been used to explain the joint effects of both the quantity and quality of human capital in stimulating productivity growth by Islam and Madsen (2014) and also the association between intangible capital, human capital and institutions by the World Bank (2011).

The data for resource rents are obtained from the World Bank (2012). The total natural resources rents are the sum of oil, natural gas, coal, mineral and forest rents. Most of literature focus on the natural resource dependence[9] variables specially share of resource rents in GDP (Ross, 2006; Auty, 2007; Collier and Hoeffler, 2009; Bhattacharyya and Hodler, 2014; Bhattacharyya and Collier, 2013) and also primary exports in GDP (Shachs and Warner, 2001; Neumayer, 2004; Arezki and Van der Ploeg, 2011; Boschini et al., 2013) due to some facts; First, these are appropriate measures for theoretical settings. In models where individuals can become producers or grabbers (see for example Mehlum et al. 2006), it is the share that resources make-up of the economy at the point of deciding that matters. Thus, measure of reserves would not be appropriate from this perspective[10]. Second, we want to check the disaggregating total natural resources rents into fuel (oil, natural gas and coal) and non-fuel (mineral and forestry) resources in order to examine the unique effect of different types of resources on human capital. For this purpose, resource rent (%GDP) is the only available measure of the natural resource dependence.

Fig. 1 illustrates how the average values of resource rents as a share of GDP including the different resource types have varied from 1996 to 2014. Oil rents in resource rich countries have constituted a larger share of GDP comparing to other types of resources. In particular, the average oil rents share

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[9] Natural resource dependence measures the extent to which a country relies on natural resources for its livelihood, While abundance indicates that the amount of natural resources that a country has at its disposal..

[10] Boschini et al., (2013), for example, note that the share of the economy that resources represent affect a politicians decision between grabbing resources in the present or developing other sectors of the economy in the expectation of future gains, and/or the choice between becoming rent-seekers or entrepreneurs.

of GDP almost doubled from 1996 to 2008; because of the dramatic rise during 2008 and subsequent sharp decline in oil prices in 2008 onwards. Furthermore, the average shares of mineral rents have been increased from 2004 onwards. Hence, in the next section we examine the decomposition of natural resources rents in our analysis.

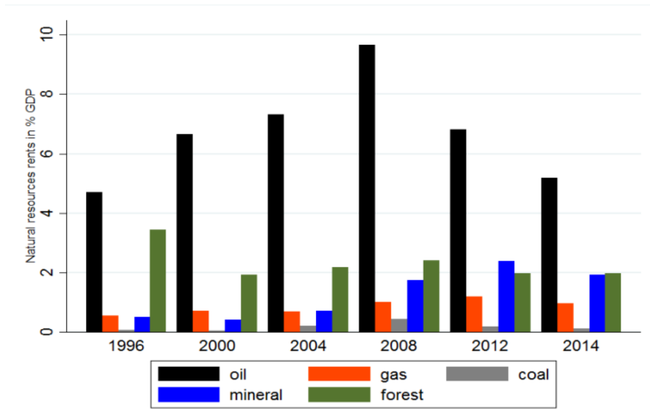

Fig. 1 Average natural resources rents in our sample of 170 countries of oil, gas, coal, mineral, and forest in 1996, 2000, 2004, 2008, 2012 and 2014.

In addition, in some countries earnings from natural resources, especially from fossil fuels and minerals, account for sizable share of GDP, and much of these earnings come in the form of economic rents-revenues above the cost of extracting the resources[11]. The estimates of natural resources rents are calculated as the difference between the price of a commodity and the average cost of producing it. This is done by estimating the world price of units of specific commodities and subtracting estimates of average unit costs of extraction or harvesting costs (including a normal return on capital). These unit rents are then multiplied by the physical quantities countries extract or harvest to determine the rents for each commodity as a share of gross domestic product (GDP). Since resource rents are largely depletable, the central policy issue in resource-rich countries is the transformation of depleting rents into more sustained forms of income (Collier and Hoefller, 2008).

The institutional quality index is the simple average of six governance indicators from Kaufmann et al. (2009), also known as World Governance Indicators (WGI): voice and accountability; political

[11] Natural resources give rise to economic rents because they are not produced, for produce goods and services, competitive forces expand supply until economic profits are driven to zero, but natural resources in fixed supply often command returns well in excess of their cost of production.

stability and absence of violence; government effectiveness; regulatory quality; rule of law; and control of corruption, for all available years between 1996 to 2014 (available for 1996, 1998, 2000 and annually from 2002 on). In the country sample of Kaufmann et al. (2006), each index ranges between -2 and 2 for the vast majority of countries which we recalibrated to assume values between 0 (weakest) and 1 (strongest).[12] The Democratic Republic of Congo has the weakest and Finland the strongest institutions in our sample of countries (see Appendix for the summary statistics). The advantages of employing the WGI measure of institutional quality are threefold. First, these indicators are based on averaging information from many different data sources measuring perceptions of governance. Second, they provide very broad country coverage, greater than that provided by any individual data source on governance (Kaufmann et al., 2016). Three, the WGI index is widely used in the resource curse literature (see, for example, Bulte et al., 2005; Brunnschweiler, 2008; Brunnschweiler and Bulte, 2008).

Our set of control variables is chosen to minimize omitted variables bias. In particular, we control for the logarithmic of real GDP per capita *(GDPPC)*; population growth in annual percentage *(Popgrowth)*; total government expenditure in percentage of GDP *(Totexp)*; economic growth *(GDPgrowth)* and a measure of income inequalities *(Gini)*.[13] Accounting for the level of economic development allows us to control for the effect of income. Wealthier countries may be able to afford better quality of public institutions (Islam and Montenegro, 2002). We control for population growth since larger countries may be difficult to govern (Treisman, 2002) and also the evolution of population over time is likely to influence positively the demand for enrolment rate. The need to control for GDP growth rate takes account of the idea that human capital could generate long-term sustained growth (Romer, 1990). We also control for the total government expenditure due to the fact that an abundance of natural resources may lead to government increasing its spending (Williams, 2011). Finally a measure of income inequality has been introduced controlling for the distribution of income among citizens (Bhattacharyya and Collier, 2013).

[12] Following Mehlum et. al., 2006 and Brunschweiler and Bulte, 2008, the measure of institutional quality has been rescaled to positive values in order to directly compare the coefficients.

[13] See Appendix 3 Tbale 8 for the data definitions and sources.

Table 1. Correlation matrix for the entire sample

	QAHC	*Rent*	*Inst*	*GDPPC*	*popgrowth*	*GDPgrowth*	*Totexp*	*Gini*
QAHC	1							
Rent	-0.2	1						
Inst	0.63	-0.33	1					
lGDPPC	0.52	-0.1	0.73	1				
Popgrowth	-0.48	0.28	-0.3	-0.04	1			
GDPgrowth	-0.17	0.16	-0.16	-0.1	0.16	1		
Totexp	0.24	0.08	0.33	0.21	-0.19	-0.15	1	
Gini	-0.08	-0.17	0.05	-0.08	-0.15	-0.01	-0.11	1

Note: all figures are significant at 5 percent level.

Table 1 report the correlations between these main variables and allows us to address a number of matters. First, it indicates that the quality-adjusted human capital and institutions to be highly correlated with GDP per capita. In the opposite of the discussion by Glaeser et al., (2004) as well as the hypothesis in Bravo-Ortega and De Gregorio (2005), Boschini et al., (2007) claimed that there is no support for the view that human capital either proxies for institutions or works as an alternative explanation for the reversal of the resource curse. Possibly this reflects the income effects of resource booms and discoveries, enabling countries to introduce superior institutions (Brunnschweiler and Bulte, 2008). Second, in Table 1, we find institutions to be quite modestly (negatively) correlated with the natural resources rents. Resource dependence has negative effects on institutions which in turn to have a negative effect on growth (Isham et al., 2005; Sala-i-Martin and Subramanian, 2003). Moreover, we note that by looking at the development of the institutional measures in our time period of analysis we see that resource rich (above average) countries from 1996 to 2014 have a different average development of their institutional measure, as compare to countries that are relatively resource poor (below average).

Fig. 2 shows these developments for the five measures of natural resources rents over the period 1996-2014. These figures are not proof of anything except the fact that countries with below average of resources (except coal resources) have been able to advance further the quality of institutions. However, it seems that countries with abundance of coal rents generating higher quality of institutions.

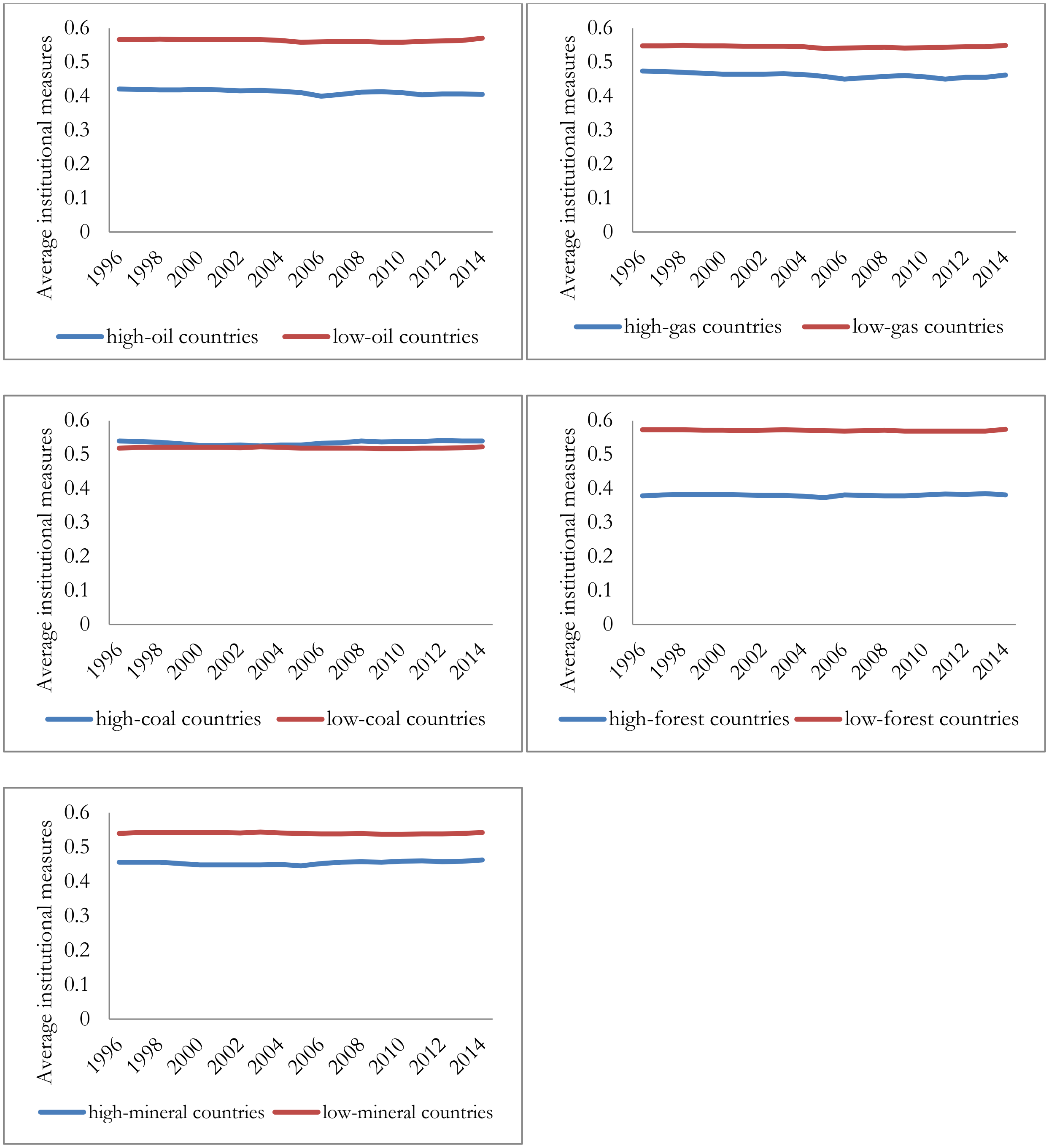

Fig. 2 Institutional development 1996-2014 in countries with above and below average resource intensity (separately for the five main resource components)

The main question posed in the following is: can we understand more about this broad relationship by estimating different components of natural resources? Next section I present the OLS results of Equations (1) and (2), besides different resources of total natural resources will be considered.

4 Empirical results

4.1 Impact of natural resource rents on quality-adjusted human capital

Table 2 presents our main results according to equations (1) and (2). Columns 1-2 employ a yearly panel data, while the last two columns show the results of 4-year means of data. The estimated impact of the control variables is in line with that found in previous studies. The results indicate that the level of income and total expenditure of the government positively associated with QAHC, while population growth is negatively related to QAHC. The results also indicate that a higher growth rate of economy tends to be associated with more QAHC, although this finding is not robust across all specifications.

The results in Table 2 indicate a statistically significant negative effect of the total natural resources "*Re*nt" and positive effect of institutional quality "*Inst"* on QAHC. In column 1, we start by looking at these associations controlling for time fixed effects and regional dummy variables (Oceania is the omitted region). From this base we introduce the interaction term *RentInst* (column 2). The interaction term is positive and significant at 1% level. The interaction term is sufficiently large to outweigh the impact of resources and hence, resources rents tend to increase human capital for countries with good enough quality of institutions. According to equation (3), countries with higher institutional quality (higher than the threshold 0.032/0.069=0.46) the resource curse may not apply. In other words, 92 of the 170 countries in our sample have the sufficient quality of institutions to neutralize the negative impact of natural resource rents on human capital.

The remainder of Table 2 presents the results employing the 4-year averages of data. The significant reduction in the sample size acts as a further robustness check. Because our institutional indicators are almost constant over time, adopting this approach goes some way toward accounting for the possibility that our panel results are being driven by repeated entities. In addition, the use of 4-year averages helps control for the business cycle and thus, to focus on the structural relationship between the main variables of interest. As can be seen in columns 3-4, employing 4-year averages does not alter our main results. The signs are as expected in every regression, although; GDP growth rate and Gini index are not significant anymore. Moreover, in columns 3-4 the coefficients of variables become larger in magnitudes. However, the cutting level of institutional quality is nearly similar to previous check (0.51). Finally, the adverse effect of resource rents is robust to controlling for time fixed effects and regional dummies.

Table 2
QAHC, Natural Resources Rents and institutional quality.

	Annual		4-Year Means	
	(1)	(2)	(3)	(4)
Rent	-0.006***	-0.032***	-0.016***	-0.054***
	(0.001)	(0.006)	(0.005)	(0.017)
Inst	0.68**	0.34	2.19***	1.62**
	(0.271)	(0.280)	(0.78)	(0.82)
RentInst		0.069***		0.104**
		(0.015)		(0.045)
lGDPPC	0.93***	0.94***	0.96***	0.98***
	(0.037)	(0.036)	(0.104)	(0.104)
GDPgrowth	0.018***	0.021***	0.005	0.014
	(0.006)	(0.006)	(0.02)	(0.020)
Popgrowth	-0.43***	-0.44***	-0.56***	-0.59***
	(0.023)	(0.023)	(0.076)	(0.077)
Totexp	0.007**	0.007**	0.016*	0.015
	(0.003)	(0.003)	(0.009)	(0.009)
Gini	-0.004***	-0.004**	0.003	0.004
	(0.001)	(0.001)	(0.005)	(0.005)
Observations	2333	2333	749	749
Adjusted R^2	0.81	0.81	0.70	0.70

*Note: dependent variable: Quality-adjusted human capital. Robust standard errors in parentheses. Ordinary least squares regressions. ***Significant at 1%; **significant at 5%; *significant at 10%. Time fixed effects and regional dummies are included in all regressions.*

Table 3
QAHC, fuel and non-fuel resources rents and institutional quality.

	Annual			4-Year Means		
	(1)	(2)	(3)	(4)	(5)	(6)
FuelRent	-0.004**	-0.039***	-0.004**	-0.013**	-0.088***	-0.012**
	(0.002)	(0.005)	(0.002)	(0.005)	(0.02)	(0.005)
nonFuelRent	-0.028***	-0.030***	-0.025*	-0.046***	-0.051***	0.012
	(0.005)	(0.006)	(0.013)	(0.014)	(0.014)	(0.034)
Inst	0.86***	0.66**	0.89***	2.49***	1.98**	2.99***
	(0.273)	(0.274)	(0.288)	(0.799)	(0.803)	(0.839)
FuelRentInst		0.094***			0.204***	
		(0.017)			(0.502)	
nonFuelRentInst			-0.008			-0.172*
			(0.033)			(0.089)
lGDPPC	0.88***	0.88***	0.88***	0.89***	0.88***	0.85***
	(0.038)	(0.038)	(0.039)	(0.11)	(0.109)	(0.111)
GDPgrowth	0.018***	0.024***	0.019***	0.008	0.026	0.008
	(0.006)	(0.006)	(0.006)	(0.02)	(0.02)	(0.019)
Popgrowth	-0.42***	-0.45***	-0.42***	-0.55***	-0.62***	-0.56***
	(0.023)	(0.024)	(0.023)	(0.076)	(0.78)	(0.077)
Totexp	0.005*	0.005*	0.005*	0.013	0.012	0.013
	(0.003)	(0.003)	(0.003)	(0.009)	(0.009)	(0.009)
Gini	-0.005***	-0.004**	-0.005***	0.002	0.005	0.003
	(0.001)	(0.001)	(0.001)	(0.005)	(0.005)	(0.005)
Observations	2333	2333	2333	749	749	749
Adjusted R^2	0.81	0.81	0.81	0.70	0.70	0.70

*Note: dependent variable: Quality-adjusted human capital. Robust standard errors in parentheses. Ordinary least squares regressions. ***Significant at 1%; **significant at 5%; *significant at 10%. Time fixed effects and regional dummies are included in all regressions.*

4.2 Fuel and non-fuel resource rents

The severity of the resource curse is claimed to depend on the types of resources (Bulte et al., 2005; Boschini et al., 2013; Kim and Lin, 2017). Tsui (2005) finds evidence that discoveries of oil have negative effects on democracy over the long run. Bhattacharya and Collier (2014) claim the adverse effect of point-source natural resources on public capital, but not in the case of agricultural resources. In particular, point-source resources (such as ores, fuels) are argued more likely to cause the curse than diffuse resources (agriculture) (Kim and Lin, 2017).

To explore whether the resource curse effect on quality-adjusted human capital differs according to the type of natural resources, we create two new variables by disaggregating the natural resource rents into fuel resources and non-fuel resources. Fuel resources are defined in this paper as the sum of oil, natural gas and coal resource rents, while non-fuel resources are defined as the sum of mineral and forestry resource rents. In order to compare the results, we test the hypothesis by controlling both fuel and non-fuel resources in the same regression. The results are summarized in Table 3. In the first column by looking at the disaggregating effects when controlling for institutional quality and other control variables, we can notice the negative impact of fuel and non-fuel resources on QAHC. Institutional quality and other control variables remain unchanged. In columns 2-3 we include the interaction term between fuel and non-fuel resources with institutional quality, respectively. We find positive and significant results once fuel resources interacted with institutional quality. In contrast, it seems that quality of institutions may not have significant results with non-fuel resources. In all regressions, the negative effect of fuel and non-fuel rents and positive effect of institutional quality are significantly estimated. Focusing on the significant results, the cutting levels of institutional quality on fuel rents (0.039/0.094=0.41) have been diminished comparing with total resources rents (0.46). In columns 4-6, the same strategy has been examined employing the 4-year means of data. The results remained constant. Although, the interaction term between non-fuel resources and institutional quality become negative and slightly significant at 10%. Overall, the results so far indicate that much of the resource curse is, in fact, driven by fuel (oil, gas and coal) rents, while the other resources seem to behave quite differently depending on the specification and period. This suggests disaggregating fuel and non-fuel resources in order to check the proper results of each. We note that disaggregating resource rents does not alter any of the previously mentioned results on control variables.

In Table 4 we present the results of disaggregating fuel and non-fuel rents in annual data. In the first column, we disaggregate fuel rents into oil, natural gas and coal rents with respect to aggregated non-fuel rents while controlling for institutional quality and other control variables. By looking at the first column, we notice the negative and highly significant effect of oil rents on QAHC, while gas and coal rents positively correlated with QAHC. And simultaneously, aggregate non-fuel rents have negative effect on QAHC. The results for institutional quality and other control variables are unchanged. In columns 2-5 we include the interaction term between disaggregated resource rents and institutional quality. We note that except oil rents, institutional quality may not have significant and positive effect on resources. The interaction term between oil rents and institutional quality shows a positive and highly significant result, while the cutting levels is 0.46 (similar to total natural resources rents). So according to Fig. 1 in Section 3, oil rents in resource rich countries have constituted a large share of GDP and having strong enough institutional quality can reduce the negative effects of resources on human capital. The remainder of Table 3 from columns 6-9 check the disaggregate non-fuel rents into mineral and forest rents with respect to aggregated fuel rents. In columns 6-9 we find positive effect of mineral rents and negative effect of forest and also fuel rents on QAHC. The results are significant at 5% level. Moreover, we notice that countries with higher mineral rents including tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate may have a better human capital. By looking at the column 7-9 and focusing on the significant interaction terms, higher quality of institutions on forest rents have a negative association with QAHC while this dependence is reversed for fuel rents. Bhattacharyya and Hodler (2010) claimed that forestry rents might be endogenous and they excluded the rents from forestry in their estimations because forestry is a renewable resource and hence involves production and is probably not driven by a more temporary nature of price shocks (Bhattacharyya and Collier, 2013).

In Table 5 we repeat strategy of disaggregating fuel and non-fuel rents employing 4-year averages of data. The main results remain unchanged. Although, the level of significance for coefficients of interest have been diminished.

Table 4
QAHC, disaggregated fuel and non-fuel resources rents and institutional quality.

	Annual								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OilRent	-0.009***	-0.044***	-0.008***	-0.009***	-0.009***				
	(0.002)	(0.007)	(0.002)	(0.002)	(0.002)				
GasRent	0.086***	0.080***	0.133***	0.087***	0.086***				
	(0.016)	(0.016)	(0.048)	(0.016)	(0.016)				
CoalRent	0.199***	0.194***	0.200***	-0.148	0.207***				
	(0.041)	(0.041)	(0.041)	(0.236)	(0.042)				
MineralRent						0.016**	0.050**	0.014*	0.015**
						(0.007)	(0.021)	(0.007)	(0.007)
ForestRent						-0.088***	-0.090***	0.020	-0.091***
						(0.008)	(0.008)	(0.021)	(0.008)
FuelRent						-0.004**	-0.004**	-0.004**	-0.040***
						(0.001)	(0.001)	(0.001)	(0.006)
nonFuelRent	-0.032***	-0.033***	-0.032***	-0.032***	-0.019				
	(0.005)	(0.005)	(0.005)	(0.005)	(0.013)				
Inst	1.00***	0.81***	1.03***	0.95***	1.10***	1.05***	1.16***	1.60***	0.84***
	(0.271)	(0.272)	(0.272)	(0.273)	(0.286)	(0.269)	(0.277)	(0.286)	(0.270)
OilRentInst		0.095***							
		(0.018)							
GasRentInst			-0.136						
			(0.133)						
CoalRentInst				0.677					
				(0.452)					
nonFuelRentInst					-0.035				
					(0.033)				
MineralRentInst							-0.078		
							(0.045)		
ForestRentInst								-0.36***	
								(0.066)	
FuelRentInst									0.096***
									(0.017)
lGDPPC	0.87***	0.87***	0.88***	0.87***	0.87***	0.81***	0.81***	0.75***	0.80***
	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.039)	(0.040)	(0.038)
GDPgrowth	0.018***	0.023***	0.018***	0.018***	0.018***	0.018***	0.018***	0.019***	0.023***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
popgrowth	-0.42***	-0.44***	-0.41***	-0.42***	-0.42***	-0.38***	-0.38***	-0.38***	-0.41***
	(0.023)	(0.023)	(0.024)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.024)
Totexp	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Gini	-0.006***	-0.005***	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	2333	2333	2333	2333	2333	2333	2333	2333	2333
Adjusted R^2	0.81	0.82	0.81	0.81	0.81	0.82	0.82	0.82	0.82

*Note: dependent variable: Quality-adjusted human capital. Robust standard errors in parentheses. Ordinary least squares regressions. ***Significant at 1%; **significant at 5%; *significant at 10%. Time fixed effects and regional dummies are included in all regressions.*

Table 5

QAHC, disaggregated fuel and non-fuel resources rents and institutional quality.

	4-Year Means								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OilRent	-0.018***	-0.095***	-0.018***	-0.018***	-0.017***				
	(0.006)	(0.021)	(0.006)	(0.006)	(0.006)				
GasRent	0.090**	0.067	0.075	0.090*	0.091**				
	(0.046)	(0.046)	(0.129)	(0.046)	(0.046)				
CoalRent	0.054	0.043	0.054	-1.10	0.099				
	(0.103)	(0.102)	(0.103)	(0.746)	(0.105)				
MineralRent						0.0002	0.125*	-0.0005	-0.004
						(0.021)	(0.066)	(0.021)	(0.021)
ForestRent						-0.093***	-0.099***	0.066	-0.099***
						(0.021)	(0.022)	(0.048)	(0.021)
FuelRent						-0.013**	-0.012**	-0.012**	-0.088***
						(0.005)	(0.005)	(0.005)	(0.020)
nonFuelRent	-0.047***	-0.052***	-0.048***	-0.048***	0.016				
	(0.015)	(0.010)	(0.015)	(0.015)	(0.034)				
Inst	2.63***	2.13***	2.62***	2.44***	3.20***	2.16***	3.00	3.64***	2.10***
	(0.800)	(0.803)	(0.805)	(0.809)	(0.843)	(0.769)	(0.818)	(0.836)	(0.799)
OilRentInst		0.214***							
		(0.056)							
GasRentInst			0.045						
			(0.366)						
CoalRentInst				2.30					
				(1.46)					
nonFuelRentInst					-0.191**				
					(0.091)				
MineralRentInst							-0.289**		
							(0.145)		
ForestRentInst								-0.57***	
								(0.155)	
FuelRentInst									0.205***
									(0.052)
lGDPPC	0.88***	0.88***	0.88***	0.88***	0.83***	0.83***	0.81***	0.70***	0.82***
	(0.110)	(0.109)	(0.110)	(0.110)	(0.112)	(0.110)	(0.111)	(0.115)	(0.109)
GDPgrowth	0.008	0.026	0.008	0.008	0.007	0.011	0.013	0.006	0.028
	(0.020)	(0.020)	(0.020)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)
popgrowth	-0.55***	-0.62***	-0.55***	-0.55***	-0.57***	-0.51***	-0.52**	-0.52***	-0.58***
	(0.076)	(0.078)	(0.078)	(0.076)	(0.077)	(0.077)	(0.077)	(0.076)	(0.078)
Totexp	0.011	0.011	0.011	0.011	0.012	0.011	0.010	0.011	0.010
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Gini	0.002	0.004	0.002	0.001	0.002	0.001	0.001	0.001	0.003
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Observations	749	749	749	749	749	749	749	749	749
Adjusted R^2	0.70	0.71	0.70	0.70	0.70	0.70	0.70	0.71	0.71

*Note: dependent variable: Quality-adjusted human capital. Robust standard errors in parentheses. Ordinary least squares regressions. ***Significant at 1%; **significant at 5%; *significant at 10%. Time fixed effects and regional dummies are included in all regressions.*

5 Conclusion

This paper examines the effect of natural resources rents on quality-adjusted human capital. Employing data for 170 resource-rich countries over the period from 1996 to 2014, we find clear evidence of a quality-adjusted human capital resource curse. There is a significant adverse association between resource rents and quality-adjusted human capital that is robust to controlling for additional factors such as institutional quality, income, GDP growth, population growth, total government expenditure and income distribution. We also find that high quality of institutions can mitigate the mentioned resource curse.

Generally, the results of disaggregate resources indicate the negative effects of oil and forest rents and positive effects of gas, coal and mineral rents on QAHC. The oil rents coefficients remained negative and highly significant in all regressions, while other resources rents seem to behave differently depending on the different period. In addition, the average of institutional quality shows a positive association with QAHC in all specifications which support the literature. Furthermore, the negative impact of oil rents seems to be recovered with higher quality of institutions. Finally, our findings indicate that the resource curse effect on quality-adjusted human capital mainly stems from oil rents.

Our results are of particular importance for developing countries considering the sustainable management of resource revenues, as they could achieve by investing in public and private goods such as education and health. Resource revenues can be used to fund public investment complementary to private investment such as investment in human capital (Venables, 2016). The evidence suggests that policy toward better economic and political institutions help resource-rich countries to accumulate more education and health capital.

Appendix 1 **Table 6** country codes and countries

Country code	Country	Country code	Country	Country code	Country
AFG	Afghanistan	HRV	Croatia	JPN	Japan
ALB	Albania	CUB	Cuba	JOR	Jordan
DZA	Algeria	CYP	Cyprus	KAZ	Kazakhstan
AGO	Angola	CZE	Czech Republic	KEN	Kenya
ARG	Argentina	DNK	Denmark	KIR	Kiribati
ARM	Armenia	DJI	Djibouti	KOR	Korea, Rep.
AUS	Australia	DMA	Dominica	KWT	Kuwait
AUT	Austria	DOM	Dominican Republic	KGZ	Kyrgyz Republic
AZE	Azerbaijan	ECU	Ecuador	LAO	Lao PDR
BHS	Bahamas, The	EGY	Egypt, Arab Rep.	LVA	Latvia
BHR	Bahrain	SLV	El Salvador	LBN	Lebanon
BGD	Bangladesh	GNQ	Equatorial Guinea	LSO	Lesotho
BRB	Barbados	ERI	Eritrea	LBR	Liberia
BLR	Belarus	EST	Estonia	LBY	Libya
BEL	Belgium	ETH	Ethiopia	LTU	Lithuania
BLZ	Belize	FJI	Fiji	LUX	Luxembourg
BEN	Benin	FIN	Finland	MAC	Macao SAR, China
BTN	Bhutan	FRA	France	MKD	Macedonia, FYR
BOL	Bolivia	GAB	Gabon	MDG	Madagascar
BIH	Bosnia and Herzegovina	GMB	Gambia, The	MWI	Malawi
BWA	Botswana	GEO	Georgia	MYS	Malaysia
BRA	Brazil	DEU	Germany	MDV	Maldives
BRN	Brunei Darussalam	GHA	Ghana	MLI	Mali
BGR	Bulgaria	GRC	Greece	MRT	Mauritania
BFA	Burkina Faso	GTM	Guatemala	MUS	Mauritius
BDI	Burundi	GIN	Guinea	MEX	Mexico
CPV	Cabo Verde	GNB	Guinea-Bissau	MDA	Moldova
KHM	Cambodia	GUY	Guyana	MNG	Mongolia
CMR	Cameroon	HND	Honduras	MAR	Morocco
CAN	Canada	HKG	Hong Kong SAR, China	MOZ	Mozambique
TCD	Chad	HUN	Hungary	MMR	Myanmar
CHL	Chile	IND	India	NAM	Namibia
CHN	China	IDN	Indonesia	NPL	Nepal
COL	Colombia	IRN	Iran, Islamic Rep.	NLD	Netherlands
COM	Comoros	IRQ	Iraq	NZL	New Zealand
COD	Congo, Dem. Rep.	IRL	Ireland	NIC	Nicaragua
COG	Congo, Rep.	ISR	Israel	NER	Niger
CRI	Costa Rica	ITA	Italy	NGA	Nigeria
CIV	Cote d'Ivoire	JAM	Jamaica	NOR	Norway

Table 6 continued

Country code	Country	Country code	Country
OMN	Oman	TUR	Turkey
PAK	Pakistan	TKM	Turkmenistan
PAN	Panama	UGA	Uganda
PNG	Papua New Guinea	UKR	Ukraine
PRY	Paraguay	ARE	United Arab Emirates
PER	Peru	GBR	United Kingdom
PHL	Philippines	USA	United States
POL	Poland	URY	Uruguay
PRT	Portugal	UZB	Uzbekistan
QAT	Qatar	VUT	Vanuatu
ROU	Romania	VEN	Venezuela, RB
RUS	Russian Federation	VNM	Vietnam
RWA	Rwanda	YEM	Yemen, Rep.
WSM	Samoa	ZWE	Zimbabwe
STP	Sao Tome and Principe		
SAU	Saudi Arabia		
SEN	Senegal		
SYC	Seychelles		
SLE	Sierra Leone		
SVK	Slovak Republic		
SVN	Slovenia		
SLB	Solomon Islands		
ZAF	South Africa		
ESP	Spain		
LKA	Sri Lanka		
LCA	St. Lucia		
VCT	St. Vincent and the Grenadines		
SUR	Suriname		
SWZ	Swaziland		
SWE	Sweden		
CHE	Switzerland		
TJK	Tajikistan		
TZA	Tanzania		
THA	Thailand		
TGO	Timor-Leste		
TGO	Togo		
TON	Tonga		
TTO	Trinidad and Tobago		
TUN	Tunisia		

Appendix 2 Table 7 Summary statistics

Variables		Mean	Standard Deviation	Min	Max	Observations
	overall	17.88	2.85	6.34	22.85	N=2351
QAHC	between		2.77	9.15	32.77	n=170
	within		.80	13.01	65.01	T-bar=13.82
	overall	8.93	17.65	0	344.16	N=3230
Rent	between		14.37	.001	119.81	n=170
	within		10.30	-110.88	233.28	T-bar=19
	overall	0.52	0.19	0.04	0.97	N=3230
Inst	between		0.19	0.14	0.95	n=170
	within		0.03	0.36	0.69	T-bar=19
	overall	8.34	1.52	4.80	11.60	N=3198
lGDPPC	between		1.51	5.37	11.45	n=170
	within		0.20	6.26	9.12	T-bar=18.81
	overall	4.24	6.15	-62.07	149.97	N=3230
GDPgrowth	between		2.72	-0.63	25.20	n=170
	within		5.5	-57.20	129.00	T-bar=19
	overall	1.52	1.53	-3.82	17.62	N=3230
popgrowth	between		1.32	-1.25	7.71	n=170
	within		0.77	-5.08	11.43	T-bar=19
	overall	15.21	9.09	0	156.53	N=3230
Totexp(%GDP)	between		7.46	0	77.00	n=170
	within		5.22	-61.79	94.73	T-bar=19
	overall	24.15	19.77	0	65.31	N=3230
Gini	between		13.01	0	50.23	n=170
	within		14.90	-26.07	73.32	T-bar=190

Appendix 3 Table 8 Data definition and sources

Variable name	Definition	Source
QAHC	Quality-adjusted human capital is the log-linear relationship between education and health. Indicator of education is gross enrolment ratio in secondary schooling (%) and health indicator is life expectancy at birth.	Our calculation and World Bank, World Development Indicator (UNESCO Institute for Statistics).
Total natural resource rents (%GDP)	Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents.	World Bank, World Development Indicator
Institutional quality	Average of six indicator of World Governance indicators (WGI); voice and accountability; political stability and absence of violence; government effectiveness; regulatory quality; rule of law; and control of corruption.	World Wide Governance indicators (WGI). WGI methodology paper by: Daniel Kaufmann, Aart Kraay and Massimo Mastruzzi (2009).
GDP per capita (constant 2010 US$)	GDP per capita is gross domestic product divided by midyear population. Data are in constant 2005 U.S. dollars.	World Bank, World Development Indicator
GDP growth	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars.	World Bank, World Development Indicator
Population growth	Annual population growth rate for year t is the exponential rate of growth of midyear population from year t-1 to t, expressed as a percentage.	World Bank, World Development Indicator
Total government expenditure (%GDP)	General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees).	World Bank, World Development Indicator
GINI index	Gini index measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution.	The Standardized World Income Inequality Database (SWIID), Solt 2014.
Government Effectiveness	Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	World Wide Governance indicators (WGI).
Regulatory Quality	Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	World Wide Governance indicators (WGI).
Control of Corruption	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	World Wide Governance indicators (WGI).
Political Stability	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.	World Wide Governance indicators (WGI).
Rule of Law	Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	World Wide Governance indicators (WGI).
Voice and Accountability	Voice and Accountability captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	World Wide Governance indicators (WGI).

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