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A Review on the Resource Curse

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Abstract

Natural wealth is generally considered as one of the fundamental sources of economic growth. However, a vast majority of the related empirical research verified that resource-rich countries tend to underperform their resource-deficient counterparts. This paradox is known as the resource curse. During the past two decades more sophisticated analyses have revealed that the presence of the curse is conditional and its growth effects are non-monotonic. Recent efforts concentrate on understanding the transmission channels and identifying the decisive conditions on the fulfillment of the curse. This article gives an overview on the progress and depicts the current state of the research.

Keywords

economic growth, resource curse, Dutch disease, institutional quality, genuine savings, crowding-out, sustainable development

1 Introduction

Sachs and Warner (1995) presented the first empirical evidence on the resource curse as a result of a cross-country OLS-regression analysis of per capita economic growth. They showed that resource intensity – if measured as the share of unprocessed commodities within exports – related negatively to growth rates between 1970 and 1989. Since then their results proved to be robust at the level of the broad concept, and have been verified several times using either pure, statistical, or scientific replication. (Davis, 2013) Academic interest is still on the rise as recent events like the Arab Spring or the crisis in Venezuela are principally explained in the context of the resource curse. (Papyrakis, 2016)

First attempts of theoretical understanding were based on the Dutch disease model originally developed by Corden and Neary (1982), in which the resource-driven growth generates losses in international competitiveness and leads to a less diverse and vulnerable economy. In this framework the booming extractive sector distracts resources from manufacturing and boosts the demand for domestic services causing direct and indirect de-industrialization. Windfalls from resource-exports induce the Balassa–Samuelson-effect and the subsequent real appreciation clogs the development in other tradable sectors. Moreover, the manufacturing-related positive externalities lag behind as infant industries fail to achieve the economies of scale. This uneven development exposes the country to the volatility of international commodity prices and exerts adverse effects on economic growth. (van der Ploeg and Poelhekke, 2009)

However, the Dutch disease theory implies a monotone negative growth effect of resource abundance, which seems to contradict the empirical evidences. (Boschini et al., 2007) Countries like Norway, Australia, or Chile have developed a significant resource sector and yet they are regularly listed among the top economic performers. Recent research revealed that the resource curse is a more diverse phenomenon which has widespread effects on economic, social, and political development. (Ross, 2015) This paper aims to overview these results, map the relations between them, and show the current state of the progress. It is organized into six sections: Section 2 outlines the main results from the past two decades, while Section 3 discusses the possible transmission channels and a few illustrative empirical findings on recent datasets. Section 4 is about the political economy of the curse and Section 5 is dedicated to the open questions. Section 6 concludes and gives an overview on the policy proposals.

2 Evolution of the literature

Earlier contributions to the Dutch disease (van Wijnbergen, 1984; Yokoyama, 1989; Matsuyama, 1992) have created a

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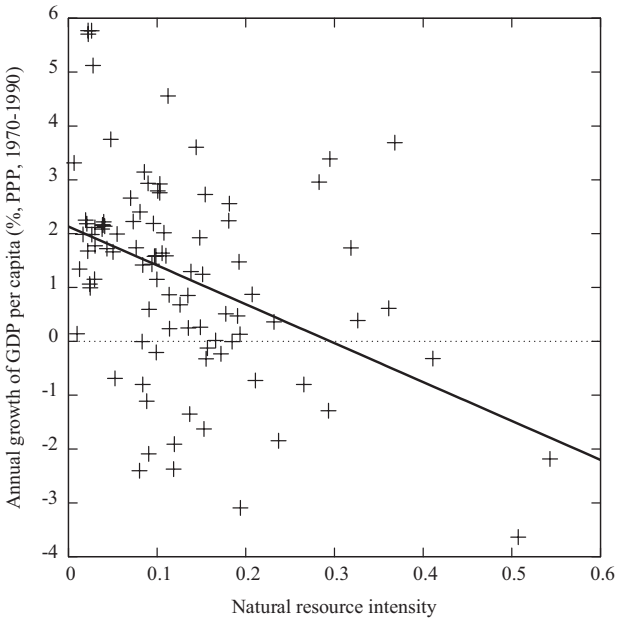

Fig. 1 Correlation of resource intensity and economic growth as in the original 1997 Sachs and Warner dataset. Data source: Center for International Development, Harvard University, available at: https://dataverse.harvard.edu/dataverse/cid

Table 1 Author's replication of the Sachs & Warner OLS-model on economic growth. SW1997 refers to regression 1.5 in Table I., Sachs and Warner (1997a), t-statistics are in parentheses. Minor differences in the result may arise from the different versions of the datasets (n=71 vs. 74). Data source: Center for International Development, Harvard University, available at: https://dataverse.harvard.edu/dataverse/cid

Dependent variable (*gea7090*) Average annual growth of GDP per economically active population (PPP, 1970–1990)		
Regressors / Indicators	**SW1997**	**Replication**
lgdpea70 Natural log of GDP per economically active population (1970)	–1.79 (–8.22)	–1.80 (–8.21)
sxp Share of primary exports in GNP (1970)	–10.26 (–6.89)	–8.28 (–6.67)
sopen Fraction of years the country is rated as an open economy (1970–1990)	1.34 (3.44)	1.57 (3.96)
linv7089 Natural log of the average investment rate (1970–1989)	0.81 (2.63)	0.84 (2.67)
rl Rule of law index (1982)	0.40 (3.94)	0.40 (3.84)
dtt7090 Average annual growth in the log of external terms of trade (1970–1990)	0.09 (1.85)	0.11 (2.43)
Sample size	71	74
Adjusted R^2	0.73	0.75
Standard error	0.92	0.97

plausible platform for the theoretical research. Auty and Warhurst – who have introduced and popularized the term *resource curse* – argued that the Dutch disease leads to resource-dependency and weak economic performance, which threaten welfare and environmental policy goals as well. The development becomes unsustainable as non-resource sectors lose competitiveness and require subsidies from extraction. Consequently, the effects of a mineral downswing are rapid and disastrous. (Auty and Warhurst, 1993) Recovery is protracted, since all forms of capital tend to run down during the subsequent growth collapse, including physical, human, and social capital as well. (Auty, 2001) Sachs and Warner (1997a; 1999) also identified the Dutch disease as the main transmission channel and emphasised the importance of open trade policies. Table 1 shows a replication of their cross-country OLS-model which verified the significant negative link between resource intensity and economic growth while indicated the positive effects of open trade policies as well.

The essence of all the Dutch disease theories is the *crowding-out logic*, that is, natural resources crowd out activities which drive economic growth. (Sachs and Warner, 2001) In the most model variants extraction causes the shrinking of manufacturing (Auty, 1998a), a sector which is assumed to generate positive external effects via learning-by-doing and technology diffusion. In the Ricardian view, the comparative advantage in the resource sector induces export specialization in low-tech extraction (Lee, 2011) and pushes the country onto a less favourable long-term growth path. Papyrakis demonstrated how natural wealth lowers efforts on research and development. (Papyrakis, 2011) Moreover, the crowding-out logic seems to be consistent with the patterns of capital accumulation and foreign direct investments. (Gylfason, 2001b)

Many studies claim that resource abundant countries tend to have low or negative genuine savings rate. (van der Ploeg, 2010) Gylfason (2001b) found several indices of educational quality to be related negatively with natural wealth, whereas England (2000) suggests a general complementarity in the production of natural and other forms of capital. Consequently, abundant economies are likely to develop resource-intensive structures with a relative low level of human capital, which causes them to lag behind the technology frontier. The ineffective extraction raises economic and environmental concerns alike, since most of the productive activity is based on the exploitation of natural wealth. The less the resource product is processed, the stronger are the adverse effects. (Murshed

and Serino, 2011) Atkinson and Hamilton (2003) suggest that countries with lower genuine savings rate experience slower economic growth and lower levels of sustainable consumption. Another branch of the literature emphasises the long-term effects of resource-driven specialization. Drelichman (2005) argues that Spain's economic stagnation in the seventeenth century was due to the resource curse induced by precious metals from the newly conquered American mines, while Etkind (2011) put the curse into a historical perspective as he stated that the boom and depletion of the Siberian fur trade have shaped the Russian development just as fossil resources do today.

Nonetheless, the crowding-out logic itself was unable to resolve the monotony problem and explain the differences in cross-country growth experiences. Torvik (2001) and others have extended the Dutch disease framework with learning-by-doing effects in the non-tradable sector and analysed the optimal management of the resource wealth in a normative setting. (Matsen and Torvik, 2005) They showed that the presence of the curse is conditional upon the assumptions on the direct and indirect learning effects. But in spite of their advances, academic interest began to trend towards the more promising political economy explanations. (Saad-Filho and Weeks, 2013)

Kolstad and Wiig (2009a) distinguish two categories; the centralized and decentralized models of political economy. Both suggest that the resource curse is conditional on the *institutional quality*, but centralized models consider the decisions of the political elite, while decentralized explanations focus on the actions of individual entrepreneurs. Several studies found the resource curse to disappear under strong institutions (Mehlum et al., 2006a; Apergis and Payne 2014; Bhattacharyya and Collier 2014; Sarmidi et al., 2014) and concluded that abundance may even foster economic growth. (Szalai, 2011; Boschini et al., 2013) Hence, political economy models are plausible candidates to resolve the monotony problem. See Section 4 for further discussion.

However, empirical research revealed that the adverse effects are likely to be dependent on other conditions as well. Geographical factors seem to play a significant role as many found that point-source resources – like precious metals, gemstones, crude oil, natural gas, or plantations – are more prone to the curse than diffused ones. (Isham et al., 2005; Wick and Bulte, 2006) The *appropriability* hypothesis emphasises the interaction between the physical characteristics of the resource and the institutional environment of the country where its extraction takes place. Technically more appropriable resources are in general easier to trade or smuggle, they need less processing, and have high value-to-mass ratio. The hypothesis states that the curse occurs when appropriable resources couple with weak institutions. (Boschini et al., 2007) Andersen and Aslaksen (2008) suggest a linkage between the growth effects and the country's constitutional arrangement as they claim that the resource curse exists in democratic presidential countries but not in parliamentary democracies. They also found this difference to be more significant than being democratic or autocratic.

3 Transmission channels

Classic theories of economic growth consider natural wealth as a productive asset. Hence, resource abundant countries shall have larger stock of initial capital and better development prospects. However, regarding the aggregate growth effects this concept seems to contradict most of the empirical evidences. To address the paradox Gylfason (2006) identified five intermediate mechanisms which may transmit the curse. All five channels act through the crowding-out logic in terms of the components of capital.

The first one follows directly from the Dutch disease as the loss in international competitiveness distracts foreign investors. Thus, natural wealth crowds-out foreign capital by cutting inward FDI-flows. The second channel concerns rent seeking and income inequality. Carmignani (2013) showed that rents from the extractive sector increase inequality, and higher inequality lowers the average level of human development. In this sense, natural resources tend to crowd-out social capital. The third transmission mechanism arises from the relative high level of non-wage incomes in resource-driven economies. Windfalls lower the excess returns on skilled labour which generate less incentive to invest in education. That is, natural wealth crowds-out human capital. The fourth channel concerns the effectiveness of domestic investments. Resource-deficiency places a premium on allocative efficiency, whereas abundance creates white elephants which have more to do with symbolism than with productivity. Robinson and Torvik (2005) developed a formal model to explain how political incentives drive the misallocation. Consequently, natural wealth crowds-out the productive segments of physical capital. The fifth mechanism suggest that resource revenues deteriorate financial markets and intermediaries by causing insufficient contract enforcement. (Bhattacharyya and Hodler, 2014) Therefore, the crowding-out logic seems to apply for financial capital as well.

The resource curse may be consistent with the classic growth theories if indirect effects are properly considered.

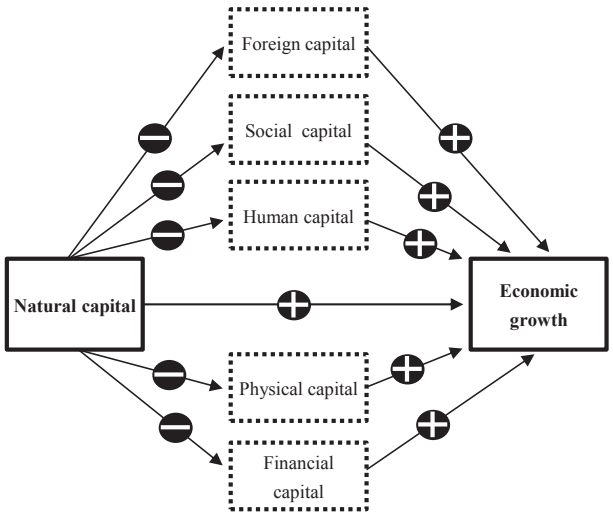

Fig. 2 Natural wealth crowds-out other capital components

Papyrakis and Gerlagh (2004) showed that resource abundance does exert positive direct impacts, but negative indirect effects outweigh them by a reasonable order of magnitude. Following Sachs and Warner they adopted the conditional convergence hypothesis and explained cross-country growth differences in terms of resource intensity. This basic regression verified the negative aggregate effect of resource abundance. Then they extended the model with additional explanatory variables inspired by earlier empirical studies on economic growth. (Sachs and Warner 1997a; Sala-i-Martin, 1997; Mo, 2001) Resource intensity turned out to be less significant after controlling for possible indirect channels, while the change in the sign of its coefficient revealed the positive direct impact. Moreover, Papyrakis and Gerlagh were able to calculate estimations for the importance of each transmission channel as their relative contribution to the aggregate.

According to them the most significant negative indirect effect evolves through the international channel, which counts for 42% of total contributions. This mechanism is principally associated with the Dutch disease, because it reflects the effects of extraction on the country's trade openness and external terms of trade. The investment channel has a slightly smaller relative importance with 41%, and acts similar to Gylfason's first and fourth channel. An additional argument is that resource revenues create a false sense of security in the private and public sector alike, which generates less incentive to invest but more to take risk. (Gylfason and Zoega, 2006) The education channel – or schooling channel as Papyrakis and Gerlagh refer to it – weighs for 11% and transmits the crowding-out of skilled labour and human capital just as Gylfason's third mechanism does. The proxy for this channel was the average secondary enrolment rate between 1970 and 1989. Fig. 4 shows a similar correlation on more recent data indicating a negative relation between resource intensity – now measured as ratio of rents to GDP – and secondary schooling. Lastly, the corruption transmission channel turned out to be the least significant with 6% of relative importance. Resource abundance is likely to increase corruption (Vicente 2010; Brollo et al., 2013), but this effect is conditional on the institutional quality. (Bhattacharyya and Hodler, 2010) While perceived corruption may resemble a component of Gylfason's second channel, Wadho (2014) argues that the effects of education and corruption are transmitted jointly.

Van der Ploeg (2011) suggests eight plausible intermediate mechanisms which can be summarized as follows: (*i*) Dutch disease, (*ii*) learning-by-doing, (*iii*) institutions, (*iv*) constitutional arrangement, (*v*) corruption, (*vi*) volatility, (*vii*) rent seeking, and (*viii*) unsustainable public policies. Most of them overlap with the channels discussed above, but the role of institutions is somewhat unique. Strong empirical evidence supports that good institutional quality can turn the curse into a blessing. The possibility of transforming the adverse effects of resource abundance does not associate to any other channel. Hence, the institutional approach may resolve the monotony problem and explain outliers like Norway. (Larsen, 2006) Theories of political economy offer several methods to demonstrate how institutions affect resource-driven economies. Bulte and co-authors showed that not just economic growth, but many other measures of human development are conditional on the institutional quality. (Bulte et al., 2005)

4 Political economy of the curse

Some early studies already recognized that differences in governmental economic policies are more pronounced in case of resource abundance. (Auty, 1997; 1998b) The state-centered explanations of the curse argue that abundant countries are likely to develop into *rentier states* (Ross, 1999), where politicians engage in rent-seeking and patronage which induce poor economic governance, investment misallocation, and ineffective public employment. In this framework the adverse growth effects are conditional on the institutional quality of the public sector. (Kolstad, 2009)

Robinson and co-authors developed a formal two-period model of clientelism which features an election at the end of the first period with a politician wishing to

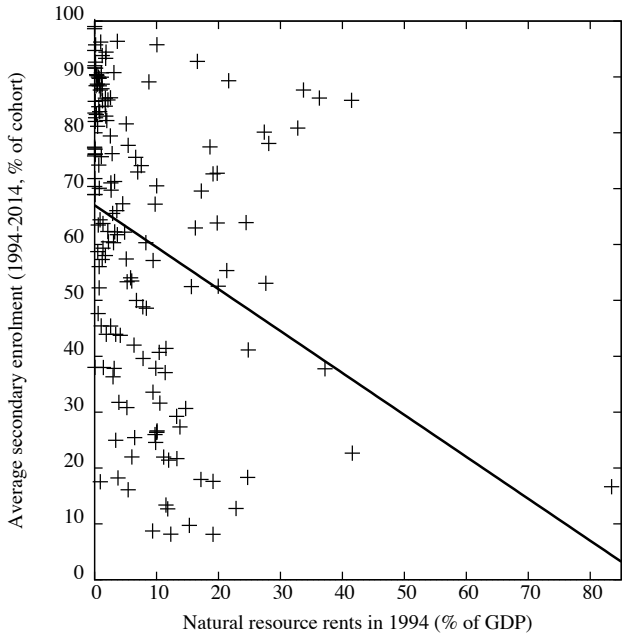

Fig. 3 Natural resources and education
Data source: The World Bank, available at: http://data.worldbank.org/

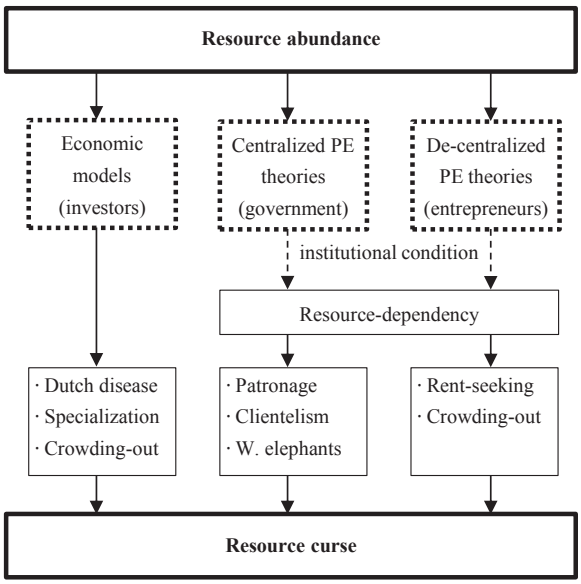

Fig. 4 Different theories of the resource curse with the acting agents shown in parentheses

be re-elected, an alternative candidate, and a unit mass of voters. (Robinson et al., 2006; 2014) The public institutional quality is captured through the ability of the incumbent to affect the elections by hiring ineffective public employees. Put differently, it means that under weak institutions the incumbent can buy votes for wages. The model was designed to demonstrate the key results of the centralized theories of political economy. Firstly, politicians tend to over-extract natural resources relative to the socially optimal path, because they discount the future with the probability of being re-elected. Secondly, a resource boom improves the efficiency of the extraction path, but increases resource misallocation in the rest of the economy. And thirdly, the overall growth impact depends critically on the political institutions. If the incumbent has small chance to influence the elections, then the expected returns on clientelism are low. Hence, under strong institutions the incumbent is interested in an economically efficient allocation. The model concludes that natural wealth impedes growth only if public institutions are weak.

The de-centralized models focus on the actions of individuals or groups outside the political elite (Torvik, 2002; Mehlum et al., 2003; Hodler 2006) and thus on institutions governing the private sector. (Mehlum et al., 2006b) In this framework entrepreneurs choose to allocate efforts whether to productive or rent-seeking activities based on their relative profitability. According to the model by Mehlum and co-authors the productive sector features positive demand externalities and increasing returns to scale, whereas the low-tech resource sector creates opportunities for rent-seeking – or grabbing as they refer to it. A commodity boom induces a positive income effect in the resource sector but it generates a negative displacement effect in the production as well. The overall impact is conditional on the quality of institutions protecting property rights, which gives two equilibria for the model. In the producer equilibrium all entrepreneurs are producers and resource rents are a blessing for the economy, whereas in the grabber equilibrium the displacement effect dominates, and resources turn into a curse. De-centralized models describe the microeconomic foundations of the phenomenon.

Another significant body of research suggest that institutions are endogenous to resource endowment. Wiens (2014) created a game theory model to show how weak institutions induce the resource curse, which in turn clogs the institutional development. He concludes that the adverse effects are conditional on the quality of institutions *prior* to the windfalls from extraction. International resource revenues make the political elite largely independent from the citizens which reduces the demand for democratic accountability (McGuirk, 2013), whereas reliance on taxes improves institutional quality as an essential factor in state-building. Case studies involving Kazakhstan, Russia (Weinthal and Jones Luong, 2001), and Nigeria (Sala-i-Martin and Subramanian, 2013) found

supporting evidence for the taxation effect. (Ross, 2001) The negative feedback on the institutional quality causes resource-dependency and locks the country into a staple trap. In this case the long-run economic and political development is likely to be conditional on external agents (Auty, 2004), which appreciates the role of international institutions. (Keenan, 2014)

Political economy explanations describe a variety of cross-country growth experiences and seem to resolve the monotony-problem. All other transmission channels are conditional on the quality of institutions which in turn may be endogenous to natural wealth. Most measures of institutional environment – corruption, rule of law (see Table 1), accountability, government effectiveness – are proved to be significant in terms of economic growth and human development. (El Anshasy and Katsaiti, 2013) However, a considerable minority of the researchers found contradictory results.

5 Open questions

The first and most important ongoing debate concerns the resource curse phenomenon itself. Alexeev and Conrad (2011) examined the relationship between point-source resource abundance and economic growth, quality of institutions, investments in physical and human capital, and measures of social progress like infant mortality and life expectancy as well. They found no significant evidence for the adverse effects and concluded that the resource curse simply does not exist. Stijns (2005; 2006) argues that resource abundance is not a structural determinant of growth, but he recognizes both the positive and negative intermediate transmission channels. He also found a positive link from resource rents to human capital accumulation, particularly in case of subsoil minerals. Moreover, Brunnschweiler (2008) reported empirical evidence on the positive direct growth effects of resource abundance. Together with Bulte, they designated the resource curse as a *red herring* since they found that (*i*) resource abundance and institutions determine resource dependence, but (*ii*) resource dependence does not affect economic growth, whereas (*iii*) resource abundance has positive impacts on growth and institutional quality. (Brunnschweiler and Bulte, 2008) Smith (2015) confirmed the positive effects in case of developing countries but he claims the institutional and other indirect channels to be less significant. Using the structural breakpoint methodology Mehrara (2009) revealed a threshold effect, that is, natural resources hinder economic growth only if the share of rents are big enough compared to the size of the economy. He found that the resource curse appears when the sum of rents exceeds 18% of the production and claims that growth impacts are positive below the threshold. However, evidences supporting the curse on the level of the broad concept still outnumber the contradictory findings.

The second substantial question concerns the indices of natural wealth. Van der Ploeg and Poelhekke (2010; 2016) argue that using resource intensity as an explanatory variable suffers from endogeneity issues and measures the dependency on resources instead of the abundance from the same. They found no evidence of adverse growth effects if natural wealth is estimated with the *not yet* extracted reserves per capita. Norman (2009) and Daniele (2011) also emphasise the distinction of dependence (flows) and abundance (stocks) as they suggest that the resource curse theory is corresponsive with the former, but not with the latter. Essentially, all indices measuring natural wealth proportional to current or past economic activities are likely to be fraught with endogeneity.

Another significant debate has evolved regarding not the economic but the political outcomes of different resource endowments. An interesting finding is that resource abundance makes the incumbent regime more durable in autocratic polities (Wantchekon, 2002; Smith, 2004; Andersen and Aslaksen, 2013) and increases the likelihood of international conflicts. (Colgan, 2014) On the contrary, Haber and Menaldo (2011) found no evidence for a negative relation between resources and democracy on the long run. However, more recent studies seem to disprove their results. (Andersen and Ross 2014; Wiens et al., 2014) This contradiction may be resolved as Wright and others argue that the longer autocratic political survival stems not from the ability of resource regimes to withstand the pressure for democratization, but from their ability to protect themselves against seizures of power by other autocratic groups. (Wright et al., 2015) Moreover, Aytaç and co-authors state that – just like the economic impacts – the political curse is also conditional on the institutional quality. (Aytaç et al., 2016)

Rather than focusing on the macroeconomic outcome, an interesting research trend concerns the effects of extraction on the scale of regions and local communities. (James and Aadland 2011; Aragón and Rud 2013a; Gilberthorpe and Papyrakis, 2015) If the resource curse holds for the micro and macro level as well, then meso level communities suffer double damage from both the poor performance of the national economy and the degradation of local social and environmental capital. Labelled as the

anthropology of the resource curse, research agenda aims to recontextualize the process of extraction in its social embedment and emphasises the significance of corporate responsibility. (Gilberthorpe and Rajak, 2016)

Despite the thriving literature on curse, there are still serious controversies to be solved. Future research should be more focused on the measures of resource endowment to address the endogeneity problem and distinguish between abundance and dependency. Further empirical evidences are also required in order to identify the conditions on the evolution of the curse and get a better understanding of its transmission channels. These future findings are prerequisites for the elaboration of more effective policies on resource extraction, revenue management, and sustainability.

6 Concluding remarks

"The Stone Age did not end for lack of stone, and the Oil Age will end long before the World runs out of oil."

– Sheikh Ahmad Zaki Yamani

Venezuela controls over the largest proven oil reserve and yet today the country is a scarce economy devastated by hyperinflation. On the other hand, Norway has the highest rank in the World according to the human development index. Explaining the fundamentally different growth experiences of resource abundant economies within the framework of a coherent concept turned out to be a hard case. However, more than two decades of intense research has made a significant progress. Strong theoretical and empirical evidences support that the resource curse exists, but the adverse effects seem to be conditional on the economic and social norms of the country where the extraction takes place. The institutional environment interacts with resource endowment and the outcome depends on both the physical properties of the resource and the quality of institutions. Windfalls gave rise to rentier populism and caused several growth collapses in Venezuela (Mazzuca, 2013), whereas Norway remained a stable democracy. The latter demonstrates that strong institutions lead to sound revenue management policies (Mehrara, 2008; Holden, 2013) which promote diversification and help to prevent the Dutch disease. (Ville and Wicken, 2013)

Turning natural wealth into a blessing seems to be a question of public and private institutions alike. Common policy recommendations focus on the fundamentals of social development like equal access to land, primary education, or healthcare. More specific suggestions concern the governance of extraction and emphasise the role of transparency and accountability. The Extractive Industries Transparency Initiative (EITI) is an international policy intervention which aims to mitigate the negative effects of resource abundance by promoting public awareness about the revenue management. Results so far are ambivalent (Williams, 2011; Mejía Acosta, 2013) as EITI succeeded to soothe the negative growth effects (Corrigan, 2014) but failed to reduce corruption. Transparency seems to be insufficient in itself (Kolstad and Wiig, 2009a) which inspired more radical policy proposals. Adverse effects may be neutralized either by distributing the revenues directly to the public (Sala-i-Martin and Subramanian, 2013) or aspiring for domestic private ownership over the reserves. (Weinthal and Luong, 2006) However, the emphasis on institutional quality largely ignores under what conditions institutions are formed and changed. (Stevens and Dietsche, 2008)

The concept of impartially enhancing institutions interprets institutional development as a form of an equilibrium outcome. It claims that moderate policy initiatives are likely to fail since the underlying dynamics of the socially embedded institutional change pull back the system to the bad equilibrium. (Kolstad and Wiig, 2009b) This effect may break down all internal efforts and puts the problem on the international level. Wenar (2008) argues that commodity export revenues are simply stolen from the citizens of resource abundant countries by their tyrants. Hence, multinational corporations are dealing with stolen products and this activity needs to be restricted. May it be a bit ironic, but it seems that only resource-deficient countries have the potential to exorcise the curse.

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