



## Original Article

# Technological dynamics and the resource curse: Between macro-economic policy and local corporate social responsibility (CSR)



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## ABSTRACT

This paper argues that the resource curse discourse, particularly in the context of expectations for economic development from mining activities, has under-examined the significance of the transparency of, and responsiveness to, technological changes at sites. It suggests that further knowledge and awareness of the industry's technical processes would allow for less vulnerability and more adaptive responses at the regional level of development to create economic linkages. An illustration of the effects of technology change from the copper mining industry in Chile is presented. It is then discussed in relation to the larger literature examining technological change and knowledge management systems of the oil industry.

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## 1. Introduction

The relationship between the extractive industries and society is exemplified, and often generalised, through the on-going debate surrounding the resource curse (Corden, 1984; Auty, 1993; Sachs and Warner 1995, revised 1997, 1999; Auty and Mikesell, 1998; Sachs and Warner, 2001; Collier, 2010). The problem identified as the “resource curse” – the failure of resource-rich countries to realise long-term prosperity – is primarily discussed with reference to the spaces and scales of financial flows from the extractives industries to society. As the economic and social dimensions of the resource curse are expanded and explored through different academic discourses, greater emphasis is being placed on the role of institutions. Within this, there is a growing focus on the significance of the transparency of information and knowledge, particularly concerning the oil industry (Bridge and Wood, 2005; Appel, 2012; Barry, 2013).

This paper highlights some of the similarities and differences of this focus when applied to the mining industry. In doing so, it aims to illustrate the potential for greater incorporation of studies

purposely addressing the systems of technical change and knowledge management in the mining industry within the resource curse discourse. It then argues specifically that this greater inclusion of research on the changing technology and management of knowledge in industry practice and performance could help in understanding the development of regional economic productivity from resource wealth.

Research conducted at the regional level on the resource curse is minimal and often blurred into conceptual research and policy work that further directs attention towards national level policy or local corporate responsibility. Since the late 1980s, academia, the public, and the private sector have been engaged in a discourse over the validity of the resource curse theory: how it is measured, which actors are responsible, and, critically, how to address it (Corden, 1984; Auty, 1993; Sachs and Warner 1995, revised 1997, 1999; Auty and Mikesell, 1998; Ross, 1999; Sachs and Warner, 2001; Humphreys et al., 2007; Frankel, 2012; Dobbs et al., 2013). Entwined in this discourse are the increasing engagements of civil society and the private sector to counter the identified state and industry structures and practices that channel the “transmission” of the resource curse (Papyrakis and Gerlagh, 2004). For example, there is the Extractive Industries Transparency Initiative (EITI), a UK-led global governance programme to reduce corruption related to the extractive industries through increasing the transparency of

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revenue payments between corporations and the government (Barry, 2013). Within industry, the expansion of corporate social responsibility (CSR) and attention to an ambiguous social license to operate (Owen and Kemp, 2013) has led to myriad socio-economic engagements. These include corporate foundations, trusts and funds; capacity building for small and medium enterprises (SMEs); local content; and shared infrastructure (Yakovleva, 2005; Esteves and Barclay, 2011; Esteves et al., 2011; Wall and Pelon, 2011; McElroy, 2012). This paper participates in this perpetual reframing of the resource curse discourse by highlighting what it argues is a linked two-part gap: that information or knowledge about technological changes in the processes of the extractive industries are neither well disseminated nor critically observed, an issue of knowledge transparency, and that as a result there are particular vulnerabilities and missed opportunities at the regional level of resource-driven development.

This argument is explored through an approach that connects the traditional economic focus of the resource curse with the ways in which it has been taken-up for examination through science and technology studies in anthropology (Ferguson, 2005; Appel, 2012), and geography (Bridge and Wood, 2005; Bridge, 2008) as well as research in political ecology (Bebbington, 2012; Bury, 2004). These perspectives have complicated, or made problematic, the separation of resource curse research into economics, politics, and social studies. They bring both alternative framing to the problems of the resource curse as well as to the methods of understanding solutions. It is especially work that is driven by studying the significance of technological change that is drawn on here for its potential to contribute to and alter the more dominant narratives of the resource curse.

Further, there is still a need to improve how this expansion of perspectives brought to the resource curse is reconciled with the resource curse roots in economic processes. The physical process of extraction – identifying a mineral resource, removing it from the earth, and altering it into different forms for use in other production processes – is the keystone linking the financial flows drawn to and away from sites of resource extraction. The power of these financial flows is thus inextricably entangled with the technical knowledge of production. However, in the resource-curse-related concern for institutional reform of the management of the mining industry's financial flows, the technical, knowledge-driven, core of this economic process – the physical processes of resource extraction – has received little attention. As is being done for the oil industry, research to account for the impact of technical practices in shaping these financial flows in the mining sector could provide insight into the nature of the managing institutions and their necessary governance.

The paper begins with a consideration of the existing literature about the resource curse and especially the migration of critical perspectives from its economic foundations to its institutional offshoots. Here, it highlights gaps in relating the processes of the resource curse to knowledge of the changing practices of extractive industries in the places critical to the productive enhancement of resource prosperity. Next, the paper illustrates this gap. It describes the effects of changing technology in Chile's copper industry on the regional distribution of wealth in the country. This example engages with the impacts related to the spatial-temporal effects of technological change on the activities of the extractive industries (Ferguson, 2005; Appel, 2012). It also considers the circulation of knowledge within the mining industry (Bridge and Wood, 2005; Bridge, 2008) and the dissemination of knowledge about processes of extraction. The paper concludes by discussing the relationship between these examples of the mining sector's performance and the potential for improved regional development from the increased incorporation of technical knowledge in resource governance and conceptualisations of the resource curse.

## 2. Evolving perspectives of the resource curse

Until the 1980s, the academic literature had largely focused around a positive relationship between natural resources and development (Rostow, 1961; Balassa, 1980).<sup>1</sup> This positive approach was increasingly questioned, and by the early 1990s the work of Sachs and Warner documented a “resource curse” (1995, revised 1997, 1999). This evidenced a negative relationship between resource-based economies and development and amplified the “resource-curse thesis” presented by Auty (1993).

The resource curse theory follows from, and includes, earlier economic observations of a phenomenon referred to as the “Dutch Disease” (Corden and Neary, 1982; Corden, 1984). It reflects the experiences of the Netherlands in the 1960s after the development of a large natural gas field. Here, the concentration of economic activity around a resource extraction boom induced an influx of foreign currency, affected inflation and foreign exchange rates, and made the manufacturing and other export sectors less competitive. Over time, and through the intensification of employment and investment in the extractive sector, the economy failed to further diversify. As a result, the lagging-manufacturing sector shrank and did not keep pace with international innovations. These changes to an economy open it to long-term weaknesses if or when resource extraction slows or the price drops.

The Dutch Disease can be seen as the product of a collection of processes internal to a national economy *and* concerned with the relationship of this economy to its external trading partners. These dynamics can occur wholly or partially in resource dependent economies; however, it is not a complete explanation for the failure of many resource dependent economies to achieve long-term growth. This has sparked a critical re-examination of the resource curse evidence as well as spawned research which seeks further explanations for the persistence of slowed long-term growth – despite resource wealth in these contexts – due to institutional governance problems and conflict (Rosser, 2006).

One strand of the re-examination has questioned whether Sachs and Warner's findings are still valid with changed variables to represent resource dependency. For example, if new statistical data is used to test the original findings and the choice of inputs used by Sachs and Warner (1995, revised 1997, 1999). In particular, this work has focused on the use of resource exports as opposed to the physical abundance of resources (Brunnschweiler, 2008a; Brunnschweiler and Bulte, 2008b) or resource wealth per capita (Stijns, 2005, 2006) as the representative figures defining a “resource-rich” economy. Econometric analysis that examines the use of these different variables brings into doubt if previous work did in fact show that a “resource curse” is a determining factor for slowed growth in identified resource-rich countries (Van der Ploeg and Poelhekke, 2010).

Simultaneously, research has examined the institutions of resource governance. It has moved from the original focus on national economic assessment to taking into account the transmission channels for the direct and indirect effects of the resource curse (Papyrakis and Gerlagh, 2004). This has involved identifying impediments to the development of human capital through skills and education (Gylfason, 2001; Torvik, 2001; Bravo-Ortega and De Gregorio, 2005). It also emphasizes how evolving understandings of available resource wealth, due to changes in technology that create new estimations of accessible resources (Wright and Czelusta, 2004), have the potential to reactively change national economic policy (Weszkalyns, 2011).

Related but different, analysis of institutional governance has also concentrated on corruption and transparency (Williams,

<sup>1</sup> With Bridge (2008) citing some earlier critical views starting in the 1920s by Canadian economic historian Harold Innis and the ‘staples trap’.

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