



Natural resource dependence, human capital accumulation, and economic growth: A combined explanation for the resource curse and the resource blessing



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HIGHLIGHTS

- We conduct normative research combining a conceptual model and a mathematical model.
- We discuss the potential impact of resource dependence on human capital and growth.
- We explain the co-existence of the resource blessing and resource curse phenomena.
- Allocation efficiency of production factors is a critical factor to evade the curse.
- Sufficient human capital is an essential guarantee to evade the curse.

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ABSTRACT

In existing studies, no consensus has been reached on the relationship between natural resource dependence and human capital accumulation. To narrow the divergence, this paper carries out a normative research to explain the co-existence of the phenomena of the resource curse and the resource blessing based on an organic combination of conceptual and mathematical models. It first establishes a conceptual model to analyse the potential effects of the government's policy preference and natural resource development activities on human capital accumulation and economic growth. Furthermore, it develops an endogenous growth model to normatively illuminate the effects in the conceptual model and to explore the condition for the occurrence of the resource curse. The conceptual model analysis indicates that the rate of return on education investment and government behaviours play the crucial role in promoting the formation of the economic virtuous circle at the micro-level and macro-level, respectively, while resource development activities exert dual impacts on the circle. The main mechanisms in the conceptual model can be validated in the mathematical model. The rise in the subjective discount rate, the elasticity of intertemporal substitution, and resource goods price are adverse to the economic virtuous circle, while high-quality education and the institutional environment giving priority to manufacturing can become the necessary condition and sufficient condition for forming the circle, respectively. The allocation efficiency of production factors plays a decisive role in whether the blessing occurs, whereas sufficient human capital is an essential guarantee for evading the curse.

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1. Introduction

Since the 1990s, many studies have empirically discovered that quite a number of countries and regions with abundant natural resources, especially oil and gas, are trapped in their resources advantages, causing their arduous and even economic growth. In the

last two decades, studies on this phenomenon have identified the presence of the “resource curse”, which refers to a phenomenon of encumbering growth caused by a series of negative effects from the excessive dependence on natural resources in a country or a region.²

² Some literature, e.g., Ding and Field (2005), Černý and Filer (2007), Brunnschweiler and Bulte (2008), and Shao and Yang (2010), have distinguished and defined the two confusable concepts of natural resource abundance and natural resource dependence and have empirically demonstrated that the real root of triggering the resource curse is the excessive dependence on natural resources or resource-based industries rather than abundant natural resources per se. Hence,

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The paradox phenomenon has been extensively discussed in the context of non-renewable resources, such as oil and gas (Eisgruber, 2013). The previous studies have testified that the resource curse exists at both the transnational level (e.g., Sachs and Warner, 1995, 2001; Gylfason, 2001; Papyrakis and Gerlagh, 2004a; Gylfason and Zoega, 2006; Mehrara, 2009) and the regional level within a country (e.g., Papyrakis and Gerlagh, 2007; Zhang et al., 2008; Shao and Qi, 2009a; Shao and Yang, 2010; James and Aadland, 2011).

Gradually, human capital enters into the visual field of researchers as a crucial factor. Some empirical studies have found that natural resource development activities closely relate to human capital accumulation. It has been a consensus that human capital plays a vital role in driving economic growth. However, some researchers argue that resource-abundant countries and regions tend to lack human capital and consider the crowding-out effect of natural resource dependence on human capital as a crucial transmission mechanism of the resource curse. Using transnational cross-sectional data, Gylfason (2001) found that natural capital exhibits a negative correlation with public educational expenditure, expected years of schooling for girls, and gross secondary-school enrolment and concluded that natural capital crowds out human capital and slows down growth. Behbudi et al. (2010) consolidated this argument through the empirical evidence from petroleum exporting countries. Taking Brazil and South Korea as examples, Birdsall et al. (2001) carried out a comparative analysis on the negative correlation between resource abundance and human capital investment. Douangneune et al. (2005) validated the crowding-out effect of land resources on education investment by comparing the levels of education and economic development in Thailand, Japan, and South Korea. Wang et al. (2009) also found that regional spatial mismatching among natural capital, human capital, and economic capital exists in China. The basic viewpoint of the studies above is that human capital investment gains no expected income as compensation and thus households' desire to receive education declines in the resource-based economy, causing the deficiency in the driving force of human capital accumulation.

However, other literature hold that the crowding-out effect of a resource boom on human capital is not inevitable and that those countries, which have successfully evaded the resource curse, tend to have a higher level of human capital. For instance, the empirical results of Stijns (2006) showed that the negative correlation between resource wealth and human capital is not robust. He argued that the rational allocation of resource rent in resource-abundant countries is a prerequisite to promoting human capital accumulation. Bravo-Ortega and De Gregorio (2007) found that an important measure of Scandinavian countries to successfully evade the resource curse is to enhance human capital investment because a higher level of human capital investment is able to compensate and even eliminate the negative effect induced by a resource boom. Dahlman et al. (2007) also held the importance of improving human capital through fair and high-quality education in transforming Finland's economy from the resource-driven mode to the knowledge-driven mode. Based on a province-level panel threshold regression analysis, Hu and Xiao (2007) concluded that human capital investment could play a critical role in mitigating the resource curse in China. Using transnational cross-sectional data over 1979–2007, Kurtz and Brooks (2011) found that human capital is a conditional variable for the occurrence of the resource curse and that a higher level of human capital can promote natural resources management to convert towards encouraging technological absorption. Weber (2014) also argued that in the

2000s, increased natural gas production in the south-central US did not lead to a less educated population.

Therefore, no consensus has been reached on the relationship between natural resource dependence and human capital accumulation, while human capital tends to play a crucial role in the economic growth of resource-rich countries and regions. However, most existing studies focus on the empirical or case analysis of this issue, whereas only a few studies conduct normative research on the action mechanism of human capital in the occurrence of the resource curse. For instance, through a conceptual framework of a virtuous growth circle based on human capital accumulation, Birdsall et al. (2001) argued that a resource boom can reduce the expected return of human capital investment and break the virtuous circle. Based on an endogenous growth model, Bravo-Ortega and De Gregorio (2007) concluded that resource dependence presents a composition effect—a positive effect on national income and a negative effect on its growth rate—and argued that this effect can be ameliorated by a high level of human capital. Although previous theoretical studies can provide some valuable enlightenment for further exploring the relationship between natural resource dependence and human capital accumulation, they still exhibit the following shortages.

First, overall, the existing theoretical literature can be divided into two categories: (1) the economic logic analysis based on the conceptual model; and (2) the normative deduction analysis based on the mathematical model. Although the former can provide the logical mechanism of the resource curse at the microeconomic level, it lacks the normative description and vigorous support of the mathematical model. The latter is too simplified in model specification to reflect the reality. For instance, Bravo-Ortega and De Gregorio (2007) considered all agents in the economy as high-skilled human capital and did not distinguish between low-skilled and high-skilled labour. Thus, they failed to reflect the important effect of education on human capital accumulation. Hu and Xiao (2007) directly introduced natural resources into the production function of the final goods sector as a production factor but did not take into account a resource-based industry sector. Thus, they failed to describe the industrial structure characteristics in a resource-based economy.

Second, the perspectives and conclusions in most existing studies are unidirectional; they only focus on how natural resource dependence causes the resource curse by crowding out human capital. However, as mentioned above, human capital may not only become a transmission channel of the curse, but also a crucial factor in evading the curse. Therefore, most current studies fail to provide a satisfactory general explanation for the influential condition and mechanism of human capital in the occurrence and avoidance of the curse. There are few studies simultaneously explaining the two contradictory phenomena of the resource curse and the resource blessing based on a theoretical framework.

In view of the limitations, this paper first develops a conceptual model of an economic operating mechanism based on human capital accumulation to analyse the effects of the government's policy preference and resource development activities on the mechanism. Furthermore, we establish a three-sector endogenous growth model to normatively illuminate the potential effects of policy preference and resource dependence on human capital accumulation and economic growth in the conceptual model and to explore the condition for the occurrence of the curse.

The possible contribution of this paper is to incorporate the resource curse and the resource blessing into a uniform mechanism framework to simultaneously explain them based on the organic combination of conceptual and mathematical models. We find that the allocation efficiency of production factors reflected by the substitution elasticity of production factors in a resource-based industry sector is a decisive factor of economic

(footnote continued)

this paper focuses on the effect of natural resource dependence on human capital accumulation and economic growth.

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