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Dilemma of Natural Resource Abundance: A Case Study of Kuwait

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Abstract

There is a lively debate about the relationship between a nation's natural resource abundance and economic growth. Some view natural resource abundance as a curse, whereas others view it as a blessing. This study examines the economic, social, and political effects of resource abundance in an oil-rich country, Kuwait, using data from 1984 to 2014. This study analyzes the short- and long-run impacts of resource rents on per capita gross domestic product (GDP), productivity, human capital, and institutional quality. The study reveals through autoregressive distributed lag modeling and error correction modeling that resource rents increase per capita GDP merely in the short-run; however, resource rents deteriorate productivity, human capital, and institutional quality in both the short and the long-run. These results indicate that, for Kuwait, the overreliance on its natural resources has been detrimental over the long-run. The study suggests that there is a need to improve the quality of institutions and enhance the level of human capital to get economic sustainability and development over time.

Keywords

agricultural and natural resource economics, economic science, social sciences, human resource development, human resources management, management, political institutions, political science, economic development, political economy

Introduction

The economic effects of the 1973 oil boom on Arab oil-producing countries have been diverse, though, on balance, many of those governments might look back on the period 1973 to 1986 as a mix of curse and blessing (Gylfason et al., 1999; Looney, 1991). Income from oil exports increased rapidly, but so did price inflation, wage rates, and the reliance on foreign labor. Above all, the growth of the oil sector as a contributor to national income tended to reduce the role of non-oil sectors in most Arab states of the Gulf (Schilirò, 2013): The phenomenon has been termed the "Dutch Disease." However, dramatic rises in per capita income were the fruits of rising oil revenues (Hvidt, 2013).

Basic economic theory and historical examples suggest that it should be beneficial for a country to have a rich endowment of natural resources. However, the idea that resources might be more of an economic curse than a blessing began to emerge in debates in the 1950s and 1960s about the economic problems of low- and middle-income countries. The term *resource curse* was coined by Richard Auty in 1993 and it describes how countries rich in mineral resources were unable to use the wealth to boost their economies; hence, these countries had lower economic growth and development. This was also supported by the strong negative correlation between natural resource abundance and economic growth in Sachs and Warner (1995).

The resource curse phenomenon emphasized on the fact that natural resources are not naturally harmful to economic development, rather they cause distortions, which, through transmission mechanisms, harm economic growth (Behbudi et al., 2010; Ross, 1999, 2015). The resource curse is transmitted through the economy via crowding-out logic, in that the resource wealth crowds out growth-enhancing activities (Welsch, 2008). These transmission channels can range from real exchange rate appreciation, neglect of the manufacturing sector, deteriorating institutional quality, government mismanagement, and low levels of human capital (Papyrakis & Gerlagh, 2004), and thus these transmission channels are grouped in economic, social, and political drivers of the resource curse (Badeeb et al., 2017).

According to Du Plessis and Du Plessis (2006), the resource curse is problematic for several reasons. First, these resources are non-renewable, and their rapid extraction can threaten the economic and political structure. Second, resource exports are relatively important in these resource-rich countries, as they may be the greatest source of

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economic growth and development. This makes the resource curse a particularly serious risk in Kuwait. Kuwait has the largest share of oil revenue as a proportion of its economy in the Gulf region. Oil accounts for nearly half of the country's gross domestic product (GDP), 92% of export revenue, and around 90% of government income (Central Intelligence Agency, 2018; World Bank, 2019), which highlights the critical role of these resources to the country. Kuwait is enjoying the benefits of large reserves of oil and the resulting oil windfalls. As the per capita GDP in Kuwait has increased recently, one might have a view that natural resources have been beneficial. In this regard, an examination of the significance of natural resource wealth and the possible impacts of the high dependency on this wealth on socioeconomic development is of great importance. Because Kuwait, as one of the resource-rich countries, is lacking such analysis in the literature, this study bridges this gap. To the author's knowledge, this study is the first of its nature to empirically cover the short- and long-run dimensions of natural resource dependency in Kuwait.

The main objective in this study is to emphasize the three transmission channels of the resource curse, namely, its economic, political, and social drivers. Therefore, a deeper understanding of the resource curse hypothesis and its transmission mechanisms is needed in Gulf Countries. In the first and second models, the impact of natural resource dependence on total factor productivity (TFP) and per capita GDP is examined to determine the general economic aspect of the resource curse phenomenon. Then, the dependency on natural resources is investigated to identify whether it has an effect on human capital in Kuwait as a way to cover the social aspect of the resource curse. In the fourth model, the effects of natural resource dependence on institutional quality are presented to cover the political aspect of the resource curse phenomenon.

To meet these objectives, the following questions will be answered in four models:

1. Do natural resources increase per capita GDP in the short-and the long-run in Kuwait?
2. Do natural resources improve TFP in the short- and the long-run in Kuwait?
3. Do natural resources improve institutional quality in the short- and the long-run in Kuwait?
4. Do natural resources enhance human capital in the short- and the long-run in Kuwait?

The main contribution of this study is to clarify the significance of natural resource abundance when it exists in a country and the challenges it produces, with the aim that such analysis would give a new perspective to the question of the relevance of the resource curse phenomenon in all resource-rich countries and specifically in one of the Gulf Countries—Kuwait—as a reference to adopt and implement optimal policies in the future.

Numerous studies have been conducted about the resource curse. However, this study is novel in several ways.

First, only a limited number of studies have investigated the resource curse in resource-rich countries found in the Middle East and North Africa (MENA) region.

Second, most of the resource curse studies have focused on one aspect of this phenomenon, either economic, social, or political. However, this study examines all three aspects in the case study of Kuwait. This includes key variables: per capita GDP, TFP, human capital, and institutional quality, which the literature shows are important determinants of economic growth, but could be affected by a high economic dependency on natural resources.

Third, as the resource curse, and indeed resource dependency, is unique in every country and conditional on its own settings and experiences, this study revises our understanding of the resource curse (and dependency) phenomenon to deliver more profound understandings into the relevance of the resource curse.

This article is organized as follows: Section "Literature Review" presents the literature review; Section "Measuring the Impact of Natural Resource Abundance on Economic Growth" shows the theoretical background; Section "Empirical Model and Estimation Procedure" presents the empirical model and the estimation procedure, and also explains the data; Section "Results and Discussion" presents the results and the analysis; and finally concluding statements are provided in Section "Conclusion."

Literature Review

Ross (2015) defined the resource curse as "the adverse effects of a country's natural resource wealth on its economic, social, or political well-being." The existence of the resource curse has been shown in several studies (Ahmed et al., 2016; Apergis et al., 2014; Badeeb et al., 2017; Cockx & Francken, 2016; Crivelli & Gupta, 2014; Moradbeigi & Law, 2017; Sarmidi et al., 2014; Satti et al., 2014; Shahbaz et al., 2019; Shao & Yang, 2014). However, since the late 1980s, a growing number of empirical papers, covering different time periods and geographic areas, have challenged the existence of the resource curse in developing countries (Alexeev & Conrad, 2009; Arezki & Van der Ploeg, 2011; Boyce & Emery, 2011; Brunnschweiler, 2008; Brunnschweiler & Bulte, 2008; Cavalcanti et al., 2011; Ding & Field, 2005; Hamdi & Sbia, 2013; James, 2015; Ji et al., 2014; Michaels, 2011; Neumayer, 2004; Oyinlola et al., 2015; Stevens & Dietsche, 2008; Yuxiang & Chen, 2011).

In a recent study, Shahbaz et al. (2019) found that natural resource wealth benefits growth, whereas natural resource dependence depresses economic growth and development. This finding is supported by Taguchi and Lar (2016), James and Aadland (2011), and Atkinson and Hamilton (2003).

There is now a vast literature on this topic and multiple explanations for how, why, and when a resource curse is likely to occur. Moreover, a universally accepted theory of the resource curse is lacking, although most explanations of the resource curse rely on a crowding-out logic, which, as simplified by Sachs and Warner (2001), is when natural resources crowd out certain activities that drive growth. In this case, natural resources harm growth. Hence, there may be evidence for the resource curse for TFP, per capita GDP, human capital, and institutional quality because these factors are important determinants of growth (Badeeb & Lean, 2017; Farhadi et al., 2015). Gylfason et al. (1999) argued that the mere availability of natural resources does not affect the economy, but it affects transitory mechanisms, which in turn affects economic growth. According to Arezki and Van der Ploeg (2011), there have been no serious efforts to disentangle the reasons behind the adverse effect of resources on growth. Hence, several authors have shown that there is a pressing need to identify the different aspects or transmission channels through which the curse works. Here, transmission channels are taken to mean the channels through which revenues from natural resources affect the determinants of growth, that is, productivity, institutional quality, and human capital.

Productivity, as measured by TFP, is the key driver of economic growth, so higher productivity means higher economic growth (Abramovitz, 1956; Caselli, 2005; Hall & Jones, 1999; Solow, 1957). TFP is the portion of output that is not explained by the volume of inputs used in production (Comin, 2017). Productivity is determined by natural resources (Badeeb & Lean, 2017), human capital (Kumar & Chen, 2013), and institutional quality (Tebaldi, 2016). Thus, an increasing number of studies have looked at the impact of natural resource dependence on TFP (Badeeb & Lean, 2017; Chen, 2012; Farhadi et al., 2015; Papyrakis & Gerlagh, 2004) and concluded that natural resources have a negative impact on productivity in that natural resources cause an overinvestment and expenditures in the energy sector and the neglect of tradable sectors, such as the manufacturing sector, that are beneficial for productivity and growth (Corden, 1984; Corden & Neary, 1982; Papyrakis & Gerlagh, 2004).

Several scholars have provided empirical support for the positive effect of human capital on TFP (Aiyar & Feyrer, 2002; Benhabib & Spiegel, 1994; Kumar & Chen, 2013; Liberto et al., 2011). The logic that supports the positive link between education and productivity is that labor skills affect productivity positively because of their inherent contributions to innovation, technological change, and capital productivity. Higher labor skills increase the capability of benefiting from international capital flows and trade, hence stronger TFP (Loko & Diouf, 2009). Growth theory has highlighted that institutions are important for growth and development (Acemoglu et al., 2001; Acemoglu & Robinson, 2010; Hall & Jones, 1999). Institutional quality has been shown to be an important determinant of TFP (Tebaldi, 2016). The rationale is that institutions play an important role in improving the efficient use and allocation of resources and production factors (Acemoglu & Robinson, 2010; Butkiewicz & Yanikkaya, 2006; Farhadi et al., 2015; Pattillo et al., 2004), as well as fostering innovation and technological change (Acemoglu et al., 2005; Dias & Tebaldi, 2012; Hall & Jones, 1999). Some empirical studies have substantiated the adverse impact of corruption on productivity. Corruption, as an important measure of institutional quality, was defined by Aidt (2003) as the use of public power for individual interest, so it affects the economy negatively (Aidt et al., 2008; Lambsdorff, 2007; Meon & Sekkat, 2005; Mo, 2001). Corruption undermines growth and development through a few channels. As classified by Tanzi and Davoodi (1997), corruption lowers government revenues, lowers the quality of public infrastructure, and raises public investment.

Furthermore, natural resource wealth and per capita GDP have been linked through institutions (Acemoglu et al., 2001; Easterly & Levine, 2003). Hence, the relationship between institutional quality and per capita GDP is important to consider in a resource-rich country. The impact of human capital on per capita GDP has been examined in a number of empirical studies (Knowles & Owen, 1995; McDonald & Roberts, 2002). Overall, the likelihood of the resource curse effect on different macroeconomic factors such as TFP and per capita GDP is important to cover the economic drivers of the resource curse. This study is the first attempt to identify these relationships using a time-series approach.

Despite the resource curse literature primarily focusing on the detrimental effects of resource wealth on economic growth rates, evidence has also been provided that resource-rich countries tend to perform relatively poorly against measurements closely linked to growth performance, such as life expectancy and human capital development (Blanco & Grier, 2012; Bulte et al., 2005; Gylfason, 2001; Papyrakis & Gerlagh, 2007; Ross, 2001; Shao & Yang, 2014; Stijns, 2006).

In fact, some studies have found that natural resource richness has a negative impact on social outcomes in general, supporting the view that human capital serves as a transmission channel for the resource curse (Blanco & Grier, 2012; Carmignani, 2013; Carmignani & Avom, 2010; Cockx & Francken, 2016; Kronenberg, 2004; Sarr & Wick, 2010; Shao & Yang, 2014; Welsch, 2008).

Natural resource wealth dampens the need for human capital development due to a false sense of security (Gylfason, 2001), which reduces public and private incentives to save and invest (Papyrakis & Gerlagh, 2004; Welsch, 2008) and causes countries to assign inadequate attention and expenditure to human capital (Behbudi et al., 2010; Birdsall et al., 2001), as well as causing countries to reduce investment in public capital (Bhattacharyya & Collier, 2014). Cockx and Francken (2014) and Butkiewicz and Yanikkaya (2010) proposed that resource-rich countries may invest less into the development of human capital, which impedes the development of non-resource sectors, resulting in lower productivity and overall growth rate.

Some studies have been conducted in different resource-rich countries (Akpan & Chuku, 2014; Sun et al., 2019), which shared the same basic viewpoint that investment in human capital does not deliver the expected earnings and outcomes (Filmer et al., 2017); consequently, the public desire for education declines, causing a deficit in the driving force of the accumulation of human capital. For example, Blanco and Grier (2012) found that, when natural resource dependence is disaggregated into subcategories, petroleum export dependence shows a positive effect on physical capital and a negative effect on human capital, and that this effect held in the long-run for 17 Latin American countries. Papyrakis and Gerlagh (2007) found that natural resource wealth in the United States decreased human capital investments. Another empirical analysis by Sun et al. (2018) of provincial panel data from China identified a crowding-out effect of natural resource dependence on human capital accumulation in the western and central regions of China. The same results were achieved by Douangngeune et al. (2005) in Japan, South Korea, and Thailand; by Birdsall et al. (2001) in South Korea and Brazil; and by Wang et al. (2009) in China. Although the implications of vast natural resource endowments have been examined through their effects on primary outcomes, such as human capital, in many different countries, it is clear that the literature lacks studies in the Gulf region. For this reason, it is important to examine the effects in Kuwait to gain a complete perception of the impact of natural resource wealth on human capital.

Also, some scholars have observed that resource wealth lowers human capital development through its effect on institutional quality (Akpan & Chuku, 2014; Bulte et al., 2005; Costantini & Monni, 2008). Torvik (2002) developed a new mechanism to explain why resources may decrease welfare and income by combining rent-seeking and increasing returns to scale to capture the idea that more resources might lower social welfare.

Finally, resource-rich countries that have effectively escaped the resource curse tend to have higher levels of human capital (Bravo-Ortega & De Gregorio, 2005), as higher educational levels help in the management of these resources in efficient ways which support technology absorption and encourage the development of productive economic sectors (Kurtz & Brooks, 2011; Stijns, 2006). As shown by Shao and Yang (2014), the efficient allocation of factors of production plays a critical role in whether natural resources are a blessing or a curse—thus, sufficient human capital is crucial to evade the curse.

The resource curse explanation that focuses on institutional quality and political factors (Caselli & Cunningham, 2009; Rosser, 2006) has the principal argument that natural resource revenues tend to increase corruption, rent-seeking behavior, democracy deterioration, and armed conflict which in turn reduces economic growth and per capita GDP (Ades & Di Tella, 1999; Apergis & Payne, 2014; Bhattacharyya & Hodler, 2010; Boschini et al., 2013; Costa & Santos, 2013; Dalgaard & Olsson, 2008; Di John, 2011; Isham et al., 2005; Kalyuzhnova et al., 2009; Leamer et al., 1999; Mavrotas et al., 2011; Olayungbo & Adediran, 2017; Woolcock et al., 2001). The state typically owns natural resource industries in resource-rich countries, which encourages the abuse of resource windfalls by public officials and damages the quality of political institutions. This mismanagement could delay economic progress; consequently, the resource curse arises because of resource rents, rather than from the existence of natural resources in the country (Antonakakis et al., 2017; Baland & Francois, 2000; Bulte et al., 2005; Kalyuzhnova et al., 2009; Karl, 1997; Kolstad & Wiig, 2009; Leite & Weidmann, 1999; Ologunla et al., 2014; Robinson et al., 2006; Sala-i-Martin et al., 2013).

There is now wealth of evidence supporting the view that the resource curse manifests as an impact of resource rents and their deleterious effect on institutional quality. Institutional quality is a concept that captures the individual rights, beliefs, and rules that shape behaviors and formulate collective action, hence conditioning development (Islam & Montenegro, 2002; North, 1990). Few studies have argued that the resource curse can be avoided if political regimes enhance institutions by enforcing property rights and showing a predictable legal system (Bulte et al., 2005; Ross, 1999). Sarmidi et al. (2014) found empirical evidence to conclude that good institutional quality was an important element in fostering economic growth in resource-rich countries and that institutions could neutralize the effect of the resource curse; this view was also supported by Apergis and Payne (2014), Costa and Santos (2013), and Rodrik et al. (2004).

Moreover, Bulte et al. (2005) found that first natural resources damaged institutional quality, then these institutions harmed human capital, and thus resource-rich countries tended to experience lower levels of human development. This strand of the resource curse and, precisely, the direct and indirect impact of natural resources on human capital through institutional quality will be tackled in this study. Human capital shows an important role in the resource curse literature, as per Gylfason (2001) that low investment in education in resource-rich countries is a critical reason behind their slow development as it relates to the income security from the resource rents and the fact that resource extraction is very capital intensive. An alternative explanation introduced by Isham et al. (2005) was that the ruling elite in countries with point-source resources are encouraged to impede modernization including education and modern industry, as they consider it as a risk to them losing power and present this as a “delayed modernization” effect.

However, most studies have suggested that, rather than being separate, institutional quality tends to be interdependent with human capital. Several studies have analyzed the link between human capital and institutions from different angles (Castello-Climent, 2008; Coe et al., 2009; Dias & Tebaldi, 2012; Engerman & Sokoloff, 2002; Glaeser et al., 2004; Tebaldi & Elmslie, 2013). These studies found that countries with a strong institutional quality such as the protection of property rights, control of corruption, market-friendly policies, and effective judiciary system experienced higher rates of innovation (Tebaldi & Elmslie, 2013), higher rates of research and development investments, and human capital formation (Coe et al., 2009). It has been argued that human capital accumulation contributes positively to institutional quality, which fosters growth (Castello-Climent, 2008; Galor et al., 2009; Glaeser et al., 2004; Lipset, 1960). Human capital introduces awareness, creativity, and behavior in the society, hence increasing institutional quality (Lau et al., 1991; Psacharopoulos, 1994). In addition, Faria et al. (2016) highlighted the important role of human capital in enhancing institutional quality.

Overall, there is no consensus over the link between institutional quality, human capital, and resource rents, and many suggest that the link varies for each country (Badeeb et al., 2017; Brunnschweiler & Bulte, 2008; Bulte et al., 2005). As a result, the impact of resource rents on institutional quality has to be addressed in this study.

In particular, natural resource wealth is beneficial to some resource-rich countries in the Gulf region, with national income from their exports being associated with higher life expectancy, lower child mortality rates, higher electricity use per capita, higher income per capita, higher consumption levels, and better physical infrastructure than oil-poor countries (Hvidt, 2013; Karl, 1997; Ross, 1999; Sachs, 2007). For instance, the case in Kuwait where jobs and wages are guaranteed in the public sector, which offers highly preferred conditions from an individual's perspective, nevertheless, the public sector productivity is limited, which reduces the incentive to improve the level of education. In addition, jobs in the energy sector are accessible, which require less skills and qualifications with higher earnings (Gatti et al., 2013), thereby making Kuwait prime candidates for the undesirable effects of the resource curse.

Measuring the Impact of Natural Resource Abundance on Economic Growth

Solow (1956) presented a simplified but powerful framework for the analysis of the causes and the dynamics of economic growth and then divided the growth rate of the aggregate output between the production factors and technological changes. Solow used the following specification of the production function with Hicks-neutral technology because the change does not affect the balance of labor and capital, rather only affects technological progress:

$$Y(t) = A(t) \times F\left[K(t),\, L(t)\right], \tag{1}$$

where $Y(t)$ is the level of aggregate output, $K(t)$ is the level of capital stock, $L(t)$ represents the labor force in the economy, and $A(t)$ represents the level of technology. To obtain the expression for per capita output, the Cobb–Douglas production function is used:

$$Y_t = AK_t^{\alpha} L_t^{\beta}, \tag{2}$$

where α and β represent the shares of capital and labor in total output, respectively. The production function is assumed to depict a constant return to scale. To obtain the per capita output form, we divide Equation 2 by L_t on both sides:

$$\frac{Y_t}{L_t} = AK_t^{\alpha} L_t^{\beta} \frac{1}{L_t}. \tag{3}$$

Now, by multiplying and dividing Equation 3 by L_t^{α} and L_t^{β}, respectively, we get the following form:

$$\frac{Y_t}{L_t} = A\left(\frac{K_t^{\alpha}}{L_t^{\alpha}}\right) L_t^{\alpha} \left(\frac{L_t^{\beta}}{L_t^{\beta}}\right) L_t^{\beta} \frac{1}{L_t}, \tag{4}$$

where $Y_t / L_t = y_t$, $K_t^{\alpha} / L_t^{\alpha} = k_t^{\alpha}$, $L_t^{\beta} / L_t^{\beta} = 1$.

$$y_t = A k_t^{\alpha} L_t^{\alpha} L_t^{\beta} \frac{1}{L_t}. \tag{5}$$

By imposing the condition of $\alpha + \beta = 1$ in Equation 5, we obtain

$$y_t = A k_t^{\alpha}, \tag{6}$$

where y_t represents the output per capita and k_t represents the physical capital stock per worker. Now, by taking the natural logarithm of both sides of Equation 6, we obtain

$$\ln(y_t) = \ln(A) + \alpha \ln(k_t), \tag{7}$$

where A represents the Solow residual or TFP, which explains the unexplained part of the output. "A" can be any economic or noneconomic variable, which explains the output.

This article develops the traditional approaches outlined in the previous section, by introducing resource rents (RR), education (Edu) as a proxy of social development, and institutional quality (IQ) in the form of law–order, and corruption in place of A.

By placing resource rents (RR), law and order (LO), corruption (CRP) and education (Edu) in Equation 7, we get

$$\ln(y_t) = \alpha \ln(k_t) + \theta_1 \mathrm{RR}_t + \theta_2 \mathrm{LO}_t + \theta_3 \mathrm{CRP}_t + \theta_4 \mathrm{Edu}_t. \tag{8}$$

As indicated earlier, it has been argued that the resource curse phenomenon means that resource rents will show negative impacts on countries' growth. This study tests the impact of resource rents on growth and development via TFP. Thus, TFP from Equation 8 can be explained as follows:

$$\ln A = \ln y_t - \alpha \ln(k_t), \tag{9}$$

$$\ln A = \text{TFP}. \tag{10}$$

The central determinants of TFP of this study are RR, LO, CRP, and Edu. Thus

$$\text{TFP} = f(\text{RR, LO, CRP, Edu}) \tag{11}$$

or

$$\text{TFP} = \theta_1 \text{RR}_t + \theta_2 \text{LO}_t + \theta_3 \text{CRP}_t + \theta_4 \text{Edu}_t. \tag{12}$$

Furthermore, to reveal whether the resource rent growth is inclusive or exclusive, this study tests the impact of resource rents on social development and institutional quality (IQ):

$$\text{Edu}_t = \theta_1 \text{RR}_t + \theta_2 \text{LO}_t + \theta_3 \text{CRP}_t + \theta_4 \text{PGDP}_t \tag{13}$$

and

$$\text{IQ}_t = \theta_1 \text{RR}_t + \theta_2 \text{Edu}_t + \theta_3 \text{PGDP}_t. \tag{14}$$

Empirical Model and Estimation Procedure

In this section, we explain the dilemma of resource abundance empirically. We can write Equations 8, 12, 13, and 14, respectively, as follows:

$$\ln(y_t) = \alpha_0 + \alpha \ln(k_t) + \theta_1 \text{RR} + \theta_2 \text{LO} + \theta_3 \text{CRP} + \theta_4 \text{Edu} + \mu_t, \tag{15}$$

$$\text{TFP}_t = \alpha_0 + \theta_1 \text{RR}_t + \theta_2 \text{LO}_t + \theta_3 \text{CRP}_t + \theta_4 \text{Edu}_t + \mu_t, \tag{16}$$

$$\text{Edu}_t = \alpha_0 + \theta_1 \text{RR}_t + \theta_2 \text{LO}_t + \theta_3 \text{CRP}_t + \theta_4 \text{PGDP}_t + \mu_t, \tag{17}$$

$$\text{IQ} = \alpha_0 + \theta_1 \text{RR}_t + \theta_2 \text{Edu} + \theta_4 \text{PGDP}_t + \mu_t. \tag{18}$$

Autoregressive Distributed Lag Model

To derive the short-and long-run impacts of the resource rents, this study applies the autoregressive distributed lag (ARDL) model. The ARDL framework (Pesaran et al., 2001; Pesaran & Shin, 1999) is an appropriate choice in this study for dealing with variables that are integrated of different orders: I(0) or I(1) or a combination of both. The general forms of the ARDL model of Equations 15 to 18 are as follows:

$$\begin{aligned}\Delta\text{PGDP}_i = {} & \alpha_0 + \sum_{i=1}^{t}\delta_i \Delta\text{PGDP}_{t-i} + \sum_{i=1}^{t}\vartheta_i \Delta k_{t-ii} + \sum_{i=1}^{t}\rho_i \Delta\text{RR}_{t-1} \\ & + \sum_{i=1}^{t}\varnothing_i \Delta\text{Edu}_{t-i} + \sum_{i=1}^{t}\omega_i \Delta\text{Crp}_{t-i} + \sum_{i=1}^{t}\varphi_i \Delta\text{LO}_{t-1} \\ & + \lambda_1 \text{PGDP}_{t-1} + \lambda_2 k_{t-1} + \lambda_3 \text{RR}_{t-1} + \lambda_4 \text{Edu}_{t-1} \\ & + \lambda_5 \text{CRP}_{t-1} + \lambda_6 \text{LO}_{t-1} + \mu_t,\end{aligned} \tag{19}$$

$$\begin{aligned}\Delta\text{TFP}_i = {} & \alpha_0 + \sum_{i=1}^{t}\delta_i \Delta\text{TFP}_{t-i} + \sum_{i=1}^{t}\rho_i \Delta\text{RR}_{t-1} + \sum_{i=1}^{t}\varnothing_i \Delta\text{Edu}_{t-i} \\ & + \sum_{i=1}^{t}\omega_i \Delta\text{Crp}_{t-i} + \sum_{i=1}^{t}\varphi_i \Delta\text{LO}_{t-1} \\ & + \lambda_1 \text{TFP}_{t-1} + \lambda_2 \text{RR}_{t-1} + \lambda_3 \text{CRP}_{t-1} \\ & + \lambda_4 \text{LO}_{t-1} + \lambda_5 \text{Edu}_{t-1} + \mu_t,\end{aligned} \tag{20}$$

$$\begin{aligned}\Delta\text{Edu}_i = {} & \alpha_0 + \sum_{i=1}^{t}\delta_i \Delta\text{Edu}_{t-i} + \sum_{i=1}^{t}\rho_i \Delta\text{RR}_{t-1} + \sum_{i=1}^{t}\varnothing_i \Delta\text{PGDP}_{t-i} \\ & + \sum_{i=1}^{t}\omega_i \Delta\text{Crp}_{t-i} + \sum_{i=1}^{t}\varphi_i \Delta\text{LO}_{t-1} + \lambda_1 \text{Edu}_{t-1} + \lambda_2 \text{RR}_{t-1} \\ & + \lambda_3 \text{CRP}_{t-1} + \lambda_4 \text{LO}_{t-1} + \lambda_5 \text{PGDP}_{t-1} + \mu_t,\end{aligned} \tag{21}$$

$$\begin{aligned}\Delta\text{IQ}_i = {} & \alpha_0 + \sum_{i=1}^{t}\delta_i \Delta\text{IQ}_{t-i} + \sum_{i=1}^{t}\rho_i \Delta\text{RR}_{t-1} + \sum_{i=1}^{t}\varnothing_i \Delta\text{PGDP}_{t-i} \\ & + \sum_{i=1}^{t}\varnothing_i \Delta\text{Edu}_{t-i} + \lambda_1 \text{IQ}_{t-1} + \lambda_2 \text{RR}_{t-1} \\ & + \lambda_3 \text{Edu}_{t-1} + \lambda_4 \text{PGDP}_{t-1} + \mu_t,\end{aligned} \tag{22}$$

where α_0 is the drift component and the terms δ_i, $\rho_i, \varnothing_i, \omega_i$, and φ_i are the parameters used for the short-run analysis, whereas λ_1, λ_2, λ_3, λ_4, and λ_5 are used for estimating the long-run parameters. The Wald restriction test is used to test the long-run relationship or cointegration between the dependent and independent variables. The value of the F test is taken by applying the coefficient diagnostic Wald restriction test on long-run variable parameters. The hypothesis for the cointegration test is as follows:

$$H_0 = \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0 \text{ (Absence of cointegration)}$$
$$H_1 = \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq 0 \text{ (Presence of cointegration)}.$$

The F test is based on the number of regressors in the model (Pesaran et al., 2001). The estimated F statistic value is compared with the two sets of critical values of the lower and upper bounds. If the F statistic value is greater than the value of the upper bound, then the null hypothesis is rejected, which indicates that cointegration and a long-run relationship exist between the dependent and independent variables. If the value of the F statistic is lower than the value of the bound critical value, then the null hypothesis that the variables are not cointegrated is rejected. The null hypothesis under the bound test is that "no long-run relationships exist" and not otherwise.

The appropriate lag length in the ARDL model was selected through the Akaike information criterion (AIC). The AIC is considered to be a useful model (Burnham & Anderson, 2004; Profillidis & Botzoris, 2018), so it was employed to determine the ideal lag length incorporated in the model. Cointegration and the error correction econometric method were employed for the estimation of the stated models. The cointegration analysis was performed within the ARDL framework as it is a more statistically significant method that aims to identify the cointegrating relationships in a small sample. ARDL is a major dynamic model.

If the cointegration is statistically significant, then the values of the long-run parameters are found by normalizing the long-run equation and estimating the error correction model for the short-run analysis.

Under the assumption of the steady-state condition, the long-run equations are $\Delta\text{PGDP}_i = 0$, $\Delta\text{TFP}_i = 0$, $\Delta\text{Edu}_i = 0$, and $\Delta\text{IQ}_i = 0$

This means that

$$\begin{aligned}
&\Delta\text{PGDP} = \text{PGDP}_t - \text{PGDP}_{t-1} = 0 \Rightarrow \text{PGDP}_t = \text{PGDP}_{t-1},\\
&\Delta\text{TFP} = \text{TFP}_t - \text{TFP}_{t-1} = 0 \Rightarrow \text{TFP}_t = \text{TFP}_{t-1},\\
&\Delta\text{Edu} = \text{Edu}_t - \text{Edu}_{t-1} = 0 \Rightarrow \text{Edu}_t = \text{Edu}_{t-1},\\
&\Delta\text{IQ} = \text{IQ}_t - \text{IQ}_{t-1} = 0 \Rightarrow \text{IQ}_t = \text{IQ}_{t-1}.
\end{aligned}$$

By applying the above assumption and dividing by λ_1, Equations 19 to 22 can be written in the long-run form as follows:

$$\begin{aligned}\frac{\lambda_1}{\lambda_1}\text{PGDP}_t = \frac{\lambda_2}{\lambda_1}k_{t-1} + \frac{\lambda_3}{\lambda_1}\text{RR}_{t-1} + \frac{\lambda_4}{\lambda_1}\text{Edu}_{t-1}\\ + \frac{\lambda_5}{\lambda_1}\text{CRP}_{t-1} + \frac{\lambda_6}{\lambda_1}\text{LO}_{t-1},\end{aligned} \tag{23}$$

$$\frac{\lambda_1}{\lambda_1}\text{TFP}_t = \frac{\lambda_2}{\lambda_1}\text{RR}_{t-1} + \frac{\lambda_3}{\lambda_1}\text{CRP}_{t-1} + \frac{\lambda_4}{\lambda_1}\text{LO}_{t-1} + \frac{\lambda_5}{\lambda_1}\text{Edu}_{t-1}, \tag{24}$$

$$\frac{\lambda_1}{\lambda_1}\text{Edu}_t = \frac{\lambda_2}{\lambda_1}\text{RR}_{t-1} + \frac{\lambda_3}{\lambda_1}\text{CRP}_{t-1} + \frac{\lambda_4}{\lambda_1}\text{LO}_{t-1} + \frac{\lambda_5}{\lambda_1}\text{PGDP}_{t-1}, \tag{25}$$

$$\frac{\lambda_1}{\lambda_1}\text{IQ}_t = \frac{\lambda_2}{\lambda_1}\text{RR}_{t-1} + \frac{\lambda_3}{\lambda_1}\text{Edu}_{t-1} + \frac{\lambda_4}{\lambda_1}\text{PGDP}_{t-1}. \tag{26}$$

Now, by reparameterizing, we obtain

$$\begin{aligned}\text{PGDP}_t = \psi_0 + \psi_1 k_{t-1} + \psi_2\text{RR}_{t-1} + \psi_3\text{Edu}_{t-1}\\ + \psi_4\text{CRP}_{t-1} + \psi_5\text{LO}_{t-1},\end{aligned} \tag{27}$$

$$\text{TFP}_t = \psi_0 + \psi_1\text{RR}_{t-1} + \psi_2\text{CRP}_{t-1} + \psi_3\text{LO}_{t-1} + \psi_4\text{Edu}_{t-1}, \tag{28}$$

$$\text{Edu}_t = \psi_0 + \psi_1\text{RR}_{t-1} + \psi_2\text{CRP}_{t-1} + \psi_3\text{LO}_{t-1} + \psi_4\text{PGDP}_{t-1}, \tag{29}$$

$$\text{IQ}_t = \psi_o + \psi_1\text{RR}_{t-1} + \psi_2\text{Edu}_{t-1} + \psi_3\text{PGDP}_{t-1}. \tag{30}$$

Here, ψ_1, ψ_2, ψ_3, ψ_4, and ψ_5 are the long-run parameters. Their values and signs determine the long-run relationships between the dependent and independent variables in the model. For the short-run analysis, the error correction model is used.

Error Correction Model

When a long-run relationship exists between variables, then there is an error correction representative model, so the following error correction models are estimated in the third step:

$$\begin{aligned}\Delta\text{PGDP}_i = \alpha_0 + \sum_{i=1}^{t}\delta_i\Delta\text{PGDP}_{t-i} + \sum_{i=1}^{t}\vartheta_i\Delta k_{t-ii}\\ + \sum_{i=1}^{t}\rho_i\Delta\text{RR}_{t-1} + \sum_{i=1}^{t}\varnothing_i\Delta\text{Edu}_{t-i}\\ + \sum_{i=1}^{t}\omega_i\Delta\text{Crp}_{t-i} + \sum_{i=1}^{t}\varphi_i\Delta\text{LO}_{t-1} + \gamma\text{ECM}_{t-1},\end{aligned} \tag{31}$$

$$\begin{aligned}\Delta\text{TFP}_i = \alpha_0 + \sum_{i=1}^{t}\delta_i\Delta\text{TFP}_{t-i} + \sum_{i=1}^{t}\rho_i\Delta\text{RR}_{t-1} + \sum_{i=1}^{t}\varnothing_i\Delta\text{Edu}_{t-i}\\ + \sum_{i=1}^{t}\omega_i\Delta\text{Crp}_{t-i} + \sum_{i=1}^{t}\varphi_i\Delta\text{LO}_{t-1} + \gamma\text{ECM}_{t-1},\end{aligned} \tag{32}$$

$$\begin{aligned}\Delta\text{Edu}_i = \alpha_0 + \sum_{i=1}^{t}\delta_i\Delta\text{Edu}_{t-i} + \sum_{i=1}^{t}\rho_i\Delta\text{RR}_{t-1} + \sum_{i=1}^{t}\varnothing_i\Delta\text{PGDP}_{t-i}\\ + \sum_{i=1}^{t}\omega_i\Delta\text{Crp}_{t-i} + \sum_{i=1}^{t}\varphi_i\Delta\text{LO}_{t-1} + \gamma ECM_{t-1},\end{aligned} \tag{33}$$

$$\Delta \text{IQ}_i = \alpha_0 + \sum_{i=1}^{t} \delta_i \Delta \text{IQ}_{t-i} + \sum_{i=1}^{t} \rho_i \Delta \text{RR}_{t-1} + \sum_{i=1}^{t} \varnothing_i \Delta \text{PGDP}_{t-i} + \sum_{i=1}^{t} \varnothing_i \Delta \text{Edu}_{t-i} + \gamma \text{ECM}_{t-1}. \tag{34}$$

The coefficient of ECM_{t-1} determines the speed of adjustment of the short-run shocks toward the long-run equilibrium in the case of any disturbance.

Description of Variables

The variables included in the model and the rationale for their inclusion are presented below.

1. Per capita GDP (PGDP; constant US$2,010) is the dependent variable, as used in previous studies that considered PGDP as a proxy for the degree of development in a country (Akpan & Chuku, 2014; Arezki & Van der Ploeg, 2011; Busse & Groening, 2013; Kakanov et al., 2018; Kalyuzhnova et al., 2009; Olayungbo & Adediran, 2017). PGDP is measured by dividing the GDP by the midyear population. Data on PGDP are from the World Development Indicators (WDI) provided by the World Bank (2017) for the period of 1984 to 2014, and the natural logarithm was taken for this variable.
2. Real capital stock per worker is denoted by *K*. Capital stock includes infrastructure such as the ports and roads, buildings, machines, and vehicles that are used in the process of producing goods and services. It is required in this model because it is the model formation, so capital stock per worker is an independent variable in the model; however, the data were absent. Therefore, a base period capital stock was estimated by following a method called the perpetual inventory method (Berlemann & Wesselhoft, 2016) as follows:

$$K_0 = \frac{\text{GFK}_0}{\delta + g_{\text{GFK}}}, \tag{35}$$

where K_0 is the capital stock, GFK_0 is the level of gross fixed capital formation, and δ is the rate of depreciation, which is assumed to be 5% per year because it is the standard percentage (Berlemann & Wesselhoft, 2016; Cole & Neumayer, 2006). To calculate the data for the targeted years, we used the procedure given by the following equation:

$$K_t = K_{t-1} - \delta K_{t-1} + \text{GFK}_t = (1-\delta) K_{t-1} + \text{GFK}_t, \tag{36}$$

where K_t is the capital stock in the current year, K_{t-1} is the capital stock in the previous year, GFK_t is the gross fixed capital formation, and δ is the rate of depreciation, as indicated above. The data on gross fixed capital formation (constant US$2,010) are from the World Bank (2017), and the natural logarithm was taken for this variable.

3. Total factor productivity (TFP) is the portion of output that is not explained by the volume of inputs used in production (Comin, 2017). The source of TFP data is the Penn World Table (PWT) v9.0 (Feenstra et al., 2015), which provides the TFP data for 182 countries.
4. Education (Edu) is another variable explained by human capital theory as a significant source of human capital, which, in time, is an important component of the economic growth of any country (Acevedo, 2008). Earlier studies have highlighted that economic growth and productivity are noticeably influenced by educational attainment (Ciccone & Papaioannou, 2009; Gennaioli et al., 2013) and that a well-educated workforce increases TFP and thus economic growth (Nachega & Fontaine, 2006). Thus, this study included the human capital index, following Kim and Lin (2017), to test the impact of human capital on TFP and PGDP. The data source is the PWT (The PRS Group; Feenstra et al., 2015), in which it is referred to as the human capital index. PWT v9.0 introduced the human capital index based on the average years of schooling (Barro & Lee, 2013) and weighted by the respective return on schooling in each year (Psacharopoulos, 1994).
5. Institutional quality (IQ) is included using corruption (CRP) and law and order (LO) as a proxy of IQ (Herzfeld & Weiss, 2003). Corruption was defined by Aidt (2003) as the use of public power for individual interest, so it negatively affects the economy (Aidt et al., 2008; Lambsdorff, 2007; Meon & Sekkat, 2005; Mo, 2001). Corruption in the political system is defined by the International Country Risk Guide (ICRG) as "a threat to foreign investment by distorting the economic and financial environment, reducing the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability, and introducing inherent instability into the political process" (ICRG, 2017). High scores indicate that "high government officials are likely to demand special payments" and "illegal payments are generally expected throughout lower levels of government" in the form of "bribes connected with import and export licenses, exchange controls, tax assessment, policy protection, or loans" (Knack & Keefer, 1995). Corruption is presented in the ICRG as the "control of corruption," which is measured using a scale from 0 to 6. The measure of corruption is inverted to "corruption" in this study, which is a similar approach to that used by Okada and Samreth (2017).

Table 1. Results of Unit Root Test.

	Tests			
	Augmented Dickey–Fuller test		Phillips–Perron test	
Variables	Level	First difference	Level	First difference
Per capita GDP	−2.131	−4.714***	−2.192	−4.810***
	(.234)	(.000)	(.212)	(.000)
Education	−2.418	−3.027**	−1.362	−2.946***
	(.145)	(.045)	(.587)	(.004)
Resource rents	−3.223**		−3.181**	
	(.028)		(.031)	
TFP	−2.256	−4.786***	−1.851	−4.769***
	(.191)	(.000)	(.349)	(.000)
Law and order	−5.990***		−1.732	−3.649**
	(.000)		(.405)	(.010)
Corruption	−2.352	−5.430***	−2.426	−5.435***
	(.163)	(.000)	(.143)	(.000)
Capital stock	−3.451**		−3.253**	
	(.016)		(.026)	

Note. The values in parentheses represent the *p* values. GDP = gross domestic product; TFP = total factor productivity.
** and *** represent 10%, 5%, and 1% significance levels, respectively.

As stated in Knack and Keefer (1995), LO reflects "the degree to which the citizens of a country are willing to accept the established institutions to make and implement laws and adjudicate disputes." The data were obtained from the ICRG by the PRS Group for the period between 1984 and 2014. This is a similar approach used by a range of studies, such as those by Busse and Groening (2013), Tebaldi and Elmslie (2013), and Knack and Keefer (1995). Furthermore, "law and order" is measured on a scale of 0 to 6. The ICRG explained that LO represents two measures with each constituting one risk component. Each subcomponent equals half of the total (thus a scale of 0–3 is used for each). The "law" subcomponent reflects the impartiality and the strength of the legal system, whereas the "order" subcomponent assesses the popular observance of the law (ICRG, 2017). Higher scores indicate "sound political institutions, a strong court system, and provisions for an orderly succession of power." Lower scores indicate "a tradition of depending on physical force or illegal means to settle claims" (Knack & Keefer, 1995). Good institutional quality enhances productivity, economic growth, and development in the country (Acemoglu & Robinson, 2010; Haapanen & Tapio, 2016; Olayungbo & Adediran, 2017; Perera & Lee, 2013).

6. The resource rents (RR) is the variable of interest and it is defined as the sum of oil, natural gas, coal, mineral, and forest rents (World Bank, 2017). It was used as an independent variable in this study to evaluate the impact of non-renewable natural resources on PGDP and TFP. The total natural resource rent (percentage of GDP) data were taken from the WDI provided by the World Bank following the approach used by Okada and Samreth (2017), Elbadawi and Soto (2015), Farhadi et al. (2015), Bhattacharyya and Hodler (2014), and Anthonsen et al. (2012). Hereinafter, resource rents refer to the resource rents as a proportion of GDP, and the natural logarithm was taken for this variable.

Results and Discussion

Checking the order of integration of variables is a precondition for any cointegration technique. For this purpose, the augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) unit root tests were applied. The probability values are given in parentheses, and the results of the unit root tests are reported in Table 1. The results from both tests are consistent, except for the variable LO. For PGDP, HC, TFP, and CRP, the null hypotheses of a unit root could not be rejected at the 5% level of significance. All these variables are integrated of order one, I(1). The other variables under consideration, such as RR, are stationary at levels, I(0). For LO, the reported results of the ADF test indicate the rejection of the null hypothesis at level, whereas those of the PP test indicate nonstationarity at level, when the series is stationary with first difference transformation.

Table 1 reports two very important features regarding the univariate characteristics of variables used in this study. First, all variables follow different orders of integration: I(1) and I(0). Second, all proposed dependent variables are integrated of order one (stationary at level). These two characteristics of variables allowed for the application of ARDL because they are also important prerequisites. The other prerequisite for ARDL is the existence of cointegration between

Table 2. Cointegration Bound Test Results.

Dependent variable	*F* statistics	*K*
Per capita GDP	4.43	5
TFP	5.37	4
Education	4.70	3
Institutional quality	3.88	3

Note. GDP = gross domestic product; TFP = total factor productivity.

Table 3. The Short- and Long-Run Results of Resource Rents on PGDP.

Variable	Coefficient	*t* statistics
Short-run results		
Resource rents	0.218***	4.309
Resource rents (−1)	0.009	1.230
Resource rents (−2)	0.038	0.925
Corruption	−0.006	−0.152
Corruption (−1)	0.057	1.059
Law and order	0.212***	7.650
Education	0.738***	6.611
Education (−1)	0.101**	2.348
Capital stock	0.116*	1.796
CointEq (−1)	−0.711***	−6.280
Long-run results		
Resource rents	0.098	0.056
Corruption	−0.100**	−2.521
Law and order	0.181***	11.048
Education	0.630***	4.632
Capital stock	0.058	0.925
C	10.847***	19.676

Note. PGDP = Per capita gross domestic product.
***, **, and * denote the significance at the 99%, 95%, and 90% confidence intervals, respectively.

I(0) and I(1) variables. This is done by a cointegration bound test (Pesaran et al., 2001), and the bound testing procedure is based on the Wald test (*F* test). Two critical values are given by Pesaran et al. (2001) for the cointegration test (see Table B1 in Appendix B). The lower critical bound assumes that all the variables are I(0), which means that there is no cointegration relationship between the examined variables. The upper bound assumes that all the variables are I(1), which means that there is cointegration among the variables. If the computed *F* statistic is greater than the upper bound critical value, then the null hypothesis that the variables are not cointegrated is rejected. If the *F* statistic is below the lower bound critical value, then the null hypothesis cannot be rejected.

The bound test results in Table 2 show that the values of the *F* statistics are higher than the upper bound at the 95% confidence interval. The values are (4.43) for PGDP and (5.37) for TFP. With these results, it can be assumed that, for all equations, there is at least one short-or long-run cointegrating relationship between I(0) and I(1) variables. All preconditions to apply ARDL are fulfilled for Kuwait. In the table, *K* is the degree of freedom, and it shows the independent variables in the selected model.

The Impact of Resource Rents on Per Capita GDP

The first regression equation (Equation 15) captures the impact of resource rents (RR) on per capita GDP (PGDP) while controlling for corruption (CRP), law and order (LO), human capital (HC), and capital stock (K). The appropriate lag length of ARDL was selected using the AIC (Table 3).

The upper part of Table 3 shows the short-run estimates from the error correction model, whereas the bottom part presents the long-run estimates. The error correction term highlights the short-run dynamics of the model. In Kuwait, the error correction term is negative with a value of 0.71, which means that 71% of the error is corrected every year successively. The negative sign represents the stability of the model. The simultaneous significance of the long-and short-run estimates indicates the strong and persistent causal relationships between variables.

Resource rents have a short-run positive effect on PGDP of 0.2% per 1% increase in the proportion of resource rents in Kuwait GDP. This is significant at the 1% level, whereas all lags for resource rents are statistically insignificant. This result suggests that resource rents have a one-time effect on PGDP.

Institutional quality measured as corruption reduces PGDP by 0.10% in the long-run per 1 unit increase in corruption, whereas short-run estimates for both level and first lag are not statistically significant for PGDP. Results show that the law and order situation and human capital measured as education are useful predictors of PGDP in both the long- and the short-run. Improvement in law and order, as the other measure of institutional quality, increases PGDP by 0.21% and 0.18% in the short- and the long-run, respectively, relative to a 1 unit increase in law and order. The effect of human capital is even more pronounced: A 1% increase in human capital increases the PGDP significantly by 0.73% in the short-run and 0.63% in the long-run. In addition, a 1% increase in the 1-year lag of human capital has a positive effect on PGDP by 0.1%. Capital stock is marginally significant in the short-run, but long-run estimates of capital stock for PGDP are insignificant.

Furthermore, to evaluate the stability of the model, the cumulative sum control chart (CUSUM) and CUSUM of squares tests were applied, and the results of both tests indicate that the model is stable (Figures A1 and A2 in Appendix A).

The positive relationship between natural resource rents (percentage of GDP) and PGDP in the short-run is an indication that natural resource abundance contributes significantly to the standard of living, as well as the development, because PGDP is seen as a proxy for development (Akpan & Chuku, 2014; Olayungbo & Adediran, 2017). The results

Table 4. The Short- and Long-Run Results of Resource Rents on TFP.

Variable	Coefficient	*t* statistics
Short-run results		
Resource rents	0.102*	1.812
Resource rents (−1)	0.046	0.978
Corruption	−0.069	−1.306
Corruption (−1)	0.075	1.156
Law and order	0.048**	2.730
Education	0.367*	1.846
Education (−1)	0.138**	2.341
CointEq (−1)	−0.646***	−3.353
Long-run results		
Resource rents	−0.327**	2.074
Corruption	−0.244***	−3.043
Law and order	0.075**	2.173
Education	0.568**	2.663
C	0.075	0.078

Note. TFP = total factor productivity.
***,**, and * denote the significance at the 99%, 95%, and 90% confidence intervals, respectively.

could possibly be related to the fact that the government is distributing these revenues to the citizens in the form of pensions, cash payments, high wages, and a reduction in costs for households and local businesses through government subsidies, such as subsidized fuel and subsidized water prices and electricity, as discussed by Hvidt (2013). These results contradict the resource curse theory (Arezki & Van der Ploeg, 2011; Sala-i-Martin et al., 2004), but confirm the results of Smith (2015) and Alexeev and Conrad (2009).

Corruption appears to have a negative impact on PGDP in the long-run. The causes of the negative relationship have been explained at length in the literature (Gyimah-Brempong, 2002). This finding is consistent with many studies that have confirmed a strong statistically significant negative impact of corruption on PGDP (Aidt, 2009; Gyimah-Brempong, 2002; Hassaballa, 2017; Kalyuzhnova et al., 2009; Mauro, 1995, 1997; Mustapha, 2014; Ugur, 2014).

Law and order's positive effect on PGDP in the short and the long-run has been highlighted by many studies that have concluded that good institutions improve PGDP (Butkiewicz & Yanikkaya, 2006; Dollar & Kraay, 2000; Knack & Keefer, 1995). The reason has been clarified by different studies: When a country adheres to law and order—which is demonstrated by the maintenance of property rights, a stronger court system, and the absence of corruption—people start to understand and respect the legal system and follow the rules, resulting in higher PGDP (Knack & Keefer, 1995; Mauro, 1995; Sala-i-Martin, 1997). These results agree with the findings of Butkiewicz and Yanikkaya (2006) and Dollar and Kraay (2000).

The importance of education to growth and productivity reported in the literature is confirmed by the results of our model. Starting with the short-run, education shows a positive impact on PGDP, and the 1-year lag of education is positive as well, indicating that the knowledge and skills acquired through education are essential for enhancing human capital and good standards of living, thus promoting PGDP (Aghion et al., 2009; Ali & Jabeen, 2015; Appiah, 2017; Delalibera & Ferreira, 2019; Hanushek & Woessmann, 2010; Ozturk, 2001). When it comes to the long-run, education is also important. One possible reason that drives the positive relationship between education and PGDP is that knowledge and skills attained through education are conducive to the improvement in workers' productivity and facilitate the absorption of superior technologies from other leading countries, which is essential for enhancing human capital and ensuring good standards of living, thus promoting PGDP (Aghion et al., 2009; Ali & Jabeen, 2015; Hanushek & Woessmann, 2010; Ozturk, 2001). Our findings agree with the findings of several studies, such as those by Delalibera and Ferreira (2019), Appiah, (2017), Faruq and Taylor (2011), Keller (2006), Bauer et al. (2006), Bensi et al. (2004), Petrakis and Stamatakis (2002), and Krueger and Lindahl (2001).

Finally, capital stock shows an important short-run effect and the possible reasons for the positive relationship are related to the fact that capital stock improves investments, production, and employment, as well as raises the purchasing power and national income and hence PGDP. This finding has been proved in previous studies (Alvi & Ahmed, 2014; Cole & Neumayer, 2006; King & Levine, 1994; Nawaz & Alvi, 2017).

The Impact of Resource Rents on TFP

Table 4 shows the impact of resource rents (RR) on TFP while controlling for education (Edu), law and order (LO), and corruption (CRP). The orders of lag lengths in the ARDL were selected using the AIC. The error correction term is negative and significant, indicating the stability of the three models. The rate at which the variables readjust to equilibrium once they deviate from equilibrium in the face of any shock is 65%.

Similar to the PGDP results, in the short-run, a 1% increase in the percentage of resource rents of Kuwait GDP increases TFP significantly by 0.10% (at the 5% level of significance). However, in the long-run, a 1% increase in resource rents (as a proportion of GDP) reduces TFP by 0.33% at the 5% level of significance.

Corruption has no statistically significant effect on TFP in the short-run. However, in the long-run, a 1 unit increase in corruption reduces TFP by 0.24%. Law and order increase TFP by 0.04% in the short-run and 0.07% in the long-run. It is observed that education in both its level and lag form is positively significant, and its long-run effect is remarkably high: With a 1% increase in human capital, TFP increases by 0.36%, 0.13%, and 0.56%, respectively.

Table 5. Impact of Resource Rents on Human Capital.

Variable	Coefficient	*t* statistics
Short-run results		
Education (−1)	0.606***	3.979
Resource rents	−0.074*	−1.847
Resource rents (−1)	0.071	1.576
Corruption	−0.002	−0.076
Law and order	0.0056	0.226
CointEq (−1)	−0.491***	−3.753
Long-run results		
Resource rents	−0.495*	−2.015
Corruption	−0.099**	−2.127
Law and order	0.069**	2.554
C	0.930*	1.995

***, **, and * denote the significance at the 99%, 95%, and 90% confidence intervals, respectively.

For the purpose of checking the stability of the model, the CUSUM and CUSUM of squares tests were applied, and the results of both tests indicate that the model is stable (Figures A3 and A4 in Appendix A).

The positive relationship between resource rents and productivity in the short-run contradicts the resource curse theory (Corden & Neary, 1982). This is an evidence that resource revenues in Kuwait are advantageous to the country. The possible explanations are related to the huge resource windfalls that encourage productive projects and investments, together with the resource sector that adds well-paying jobs, and contribute little to technology transfer and productivity. This finding aligns with that of Brunnschweiler (2008) and is clarified in the traditional economic theory. However, this positive relationship becomes negative in the long-run. This suggests a phenomenon that is similar to the resource curse theory of a negative relationship between resource rents and TFP (Corden & Neary, 1982); hence, it is alarming for Kuwait.

Corruption, as a proxy of institutional quality, is harmful to productivity in the long-run, which supports an important principle that corruption renders governments capability of achieving efficiency and harms public welfare (Lambsdorff, 2002). Moreover, corruption causes wasteful rent-seeking activities, distorted public decisions, neglect of contracts' quality checks on governments' projects, and low-quality investments, consequently lowering productivity (Acemoglu & Robinson, 2010; Haapanen & Tapio, 2016; Perera & Lee, 2013). The same results were reported by Rose-Ackerman and Palifka (2016), Lambsdorff (2002), and Bardhan (1997).

However, when testing the second proxy of institutional quality—law and order—it shows a positive impact on TFP in both the long and the short-run. The higher the quality of institutions, the higher the TFP, as proved in different studies (Boschini et al., 2007, 2013; Mehlum et al., 2006).

Education affects TFP positively in the short and the long-run, and the 1-year lag of education. This supports an important principle that states that education, knowledge, and skills are essential for technology and innovation, which improve productivity, and that educated workers are more capable of carrying out jobs that need critical thinking, skills, and literacy, all of which lead to higher productivity (Ciccone & Papaioannou, 2009; Gennaioli et al., 2013). Several papers have revealed the same results, including Kumar and Chen (2013), Liberto et al. (2011), Nachega and Fontaine (2006), Bauer et al. (2006), Bensi et al. (2004), and Aiyar and Feyrer (2002).

The Impact of Resource Rents on Human Capital

Human capital measured by education is also potentially related to resource rents.

We estimated the model for education (Edu) and resource rents (RR) while controlling for corruption (CRP), law and order (LO), and PGDP; the results are shown in Table 5. The stability of the model was verified by the error correction term, which depicts that 49% of the error was corrected every year successfully.

The results show that education was largely determined by its own lag. A 1% increase in 1-year lag for education enhanced the current education by 0.60%. Resource rents had an immediate negative effect on education: A 1% increase in resource rents reduced education by 0.07%, at a 10% level of significance. However, the long-run effect was far larger than the short-run effect, where a 1% increase in the proportion of resource rents in the GDP reduced education by 0.49%.

The effect of corruption on education occurred in the long-run, where it reduced education significantly by 0.09% relative to a 1 unit increase in corruption; however, it was insignificant in the short-run. The positive effect of law and order on education was also manifested in the long-run, where a 1 unit increase in law and order increased education by 0.069%.

The CUSUM and CUSUM of squares tests were applied to check the stability of the model; both tests indicated that the model was stable (Figures A5 and A6 in Appendix A).

A percentage increase of natural resources in the Kuwait GDP appeared to reduce human capital in the short and the long-run. There are few possibilities for the negative effect of resource rents on human capital (education). Natural resource richness causes countries to assign inadequate attention and expenditures to education (Behbudi et al., 2010). Another possibility is that resource-rich countries consider the huge revenues from mineral production and exportation as secured income and, hence, they are prone to neglect the development of human capital (Gylfason, 2001); furthermore, huge natural resource windfalls trigger a false sense of security and overconfidence about natural resource wealth, causing authorities and individuals to consider it to be the most important asset of their country (Sachs & Warner, 1999). This would be reflected, on a country-wide level, in neglecting the importance of human resources by allocating less budget and attention to education. In addition, at the individual level, this wealth would diminish the need to educate children, which would cause the quality of education to have less priority (Gylfason et al., 1999). Furthermore, resource richness plays a major part in changing the economy, as people start getting jobs in the energy sector which pay high wages and require less skills (Gylfason et al., 1999). Our findings support what is known as the "social resource curse" (Behbudi et al., 2010; Bravo-Ortega & De Gregorio, 2005; Carmignani, 2013; Gylfason, 2001; Sarr & Wick, 2010; Shao & Yang, 2014).

Corruption deteriorated education in the long-run. These findings are consistent with Chimezie and Prince (2016) who found that corruption harms the educational system in resource-rich countries by reducing funding for health and education, wasting good opportunities, and influencing education outcomes. Similar results were found by Akpan and Chuku (2014) and Azfar and Gurgur (2008).

Moreover, law and order positively affected education in the long-run, which supports the findings of Faruq and Taylor (2011). The findings on the impact of institutional quality on education appear to support the fact that an enhancement in the institutional environment encourages educational expenditure and increases incentives to learn, with a subsequent improvement in human capital (Glaeser et al., 2004; Hanushek & Woessmann, 2007).

The Impact of Resource Rents on Institutional Quality

As the study aimed to examine the effect of resource rents as a proportion of GDP (RR) on institutional quality as proxied by corruption (CRP), the model was estimated by selecting corruption (CRP) as the dependent variable and resource rents (RR) as the independent variable. Education (Edu), law and order (LO), and per capita GDP (PGDP) were taken as the control variables along with resource rents. This was a necessary step to avoid the problem of omitted variables, which occurs when important variables are excluded from the model, hence avoiding biases and achieving robust results (Leightner & Inoue, 2012). The results of the short- and long-run analyses based on ARDL are given in Table 6, and the lag lengths of the dependent and independent variables were selected on the basis of the AIC.

It appears that resource rents (as a proportion of GDP) could induce corruption and cause a deterioration in the institutional quality in both the short and the long-run. With a 1% increase in the proportion of resource rents in the GDP of Kuwait, corruption increased by 0.42 and 0.43 units in the short and the long-run, respectively, which was significant at the 10% level. Education also had a noticeable impact on institutional quality as it reduced corruption by 0.66 in the short-run and 0.68 in the long-run per a 1% increase in education. However, there was no statistically significant link between PGDP and institutional quality in the short and the long-run.

Table 6. Impact of Resource Rents on Institutional Quality.

Variable	Coefficient	*t* statistics
Short-run results		
Resource rents	0.428*	1.874
Education	−0.655*	−1.871
Per capita GDP	0.100	0.297
CointEq (−1)	−0.266*	−2.011
Long-run results		
Resource rents	0.430*	1.968
Education	−0.675***	−3.150
Per capita GDP	0.648	0.466
C	12.999***	5.404

Note. GDP = gross domestic product.
*** and * denote the significance at the 99%, 95%, and 90% confidence intervals, respectively.

The model was judged to be stable with a 0.26 error correction term. Next, the CUSUM and CUSUM of squares tests were applied to check the stability of the model, where both tests indicated that the model was stable (Figures A7 and A8 in Appendix A).

There was a negative association between resource rents and institutional quality, which is known as the "political resource curse," where resource-rich countries are more prone to inadequate governance, corruption, and rent-seeking behavior, thus causing a distortion in the allocation of resources and a decrease in economic efficiency (Akpan & Chuku, 2014; Gylfason, 2001; Mehlum et al., 2006; Murshed, 2007; Okada & Samreth, 2017; Olayungbo & Adediran, 2017; Oskenbayev et al., 2013; Ross, 2015; Torvik, 2002; Williams, 2011).

One possible clarification for the negative association is that the huge windfalls from natural resources encourage politicians to use these windfalls for their own personal benefit as long as they remain in their positions, which is similar to the findings of Ahmadov et al. (2013), Busse and Groening (2013), and Kolstad and Soreide (2009).

In addition, the positive relationship between resource rents and corruption persisted in the long-run. Possibilities of this finding, particularly in the case of Kuwait, can be related to the findings of Montinola and Jackman (2002), who found that the semi-democratic political system paved the way for corruption and poor checks and balances (Collier & Hoeffler, 2009). Another possibility is that when the political system is divided between an appointed government and elected parliament, the country becomes less accountable and less representative, providing more loopholes for rent-seeking activities and the misallocation of natural resources (Andersen & Aslaksen, 2008).

Our findings were consistent with several studies such as Antonakakis et al. (2017), Olayungbo and Adediran (2017), Okada and Samreth (2017), Apergis and Payne (2014), Dias and Tebaldi (2012), Anthonsen et al. (2012), and Easterly and Levine (2003).

The result of the negative effect of human capital on corruption showed, on a balance of probability, that education encourages anticorruption awareness, behaviors, and information, and increases the tendency of people participating in good citizenship, as found by Faria et al. (2016), Tebaldi and Elmslie (2013), Dias and Tebaldi (2012), Coe et al. (2009), Oreopoulos and Salvanes (2009), Cheung and Chan (2008), Lederman et al. (2005), Beets (2005), and Glaeser et al. (2004).

One possible cause for the lack of a relationship between PGDP and corruption is that although citizens are enjoying higher incomes from the huge revenues due to natural resource abundance (Driouchi, 2014), the governments are lagging behind due to corruption practices. Accordingly, these revenues were not found to be related to how good the quality of the institutions was, concluding that Kuwait lagged behind in the efficient transfer of revenue into development and growth (Banafea & Ibnrubbian, 2018; El-Katiri et al., 2011). Another possible cause is that if a country is blessed with huge resource revenues, the impression of a false sense of security exists, leading governments to pay little attention to the necessity of delivering good institutional quality. However, this can be detected in any resource-rich country because it is a common condition under the phenomenon of the resource curse (Busse & Groening, 2013; Gylfason, 2001; Sachs & Warner, 1999). Another possibility is that when the citizens do not pay taxes, as in the case of Kuwait, they do not see themselves as entitled to supervise how these revenues are allocated or used by the government. Moreover, the governments themselves are not held accountable in how they allocate these revenues efficiently in front of its citizens, or how good the quality of institutions is in these countries (Besley & Persson, 2014; Moss, 2010; Sandbu, 2006).

Conclusion

The occurrence of the resource curse is related to the deteriorating development measures from the existence of natural resource abundance and especially the overreliance on the revenues gained from the exportation and production of natural resources.

Thus, this study is presented as an initial attempt to clarify the resource curse dilemma and identify the transmission channels that drive the resource curse, so this study has focused on the economic drivers, which highlight the negative relationship between natural resources and economic growth. Nevertheless, some scholars have debated whether the resource curse even exists or whether the economic outcomes are the result of other factors, such as poor institutional quality or neglected human capital.

To provide a precise answer to this debate, it was necessary to conduct this study that examined the existence of the resource curse in Kuwait by studying the impact of natural resource rents on per capita GDP and TFP and taking the institutional quality and human capital as covariates.

The study has applied the ARDL model and cointegration and derived evidence based on time-series data collected from 1984 to 2014. The results of the first aspect of the resource curse indicate that, in the long-run, the natural resource rents (percentage of GDP) have a significant negative effect on TFP. These findings indicate that huge windfalls from resources are not contributing to increases in productivity or growth. Thus, high dependency on rents from natural resources could be harmful to Kuwait in the long-run. Moreover, the results suggest that an increase in education increases productivity and PGDP. Furthermore, corruption, as a measure of institutional quality, decreases productivity in the long-run and decreases PGDP. Law and order increase productivity and PGDP. Since institutions and human capital are proved to be crucial to growth, the government in Kuwait has to tailor these two factors to the country's goals and circumstances.

The findings are of particular importance for governments in resource-rich countries who aim to manage the huge revenues generated from natural resources in a sustainable manner. This study supports the fact that TFP and PGDP can be increased by properly managing these revenues, investing in human capital, and maintaining a good institutional environment, as supported in previous studies, as well.

However, future analysis is needed to determine the different necessary policies and their impact on productivity and growth and, most importantly, to find the most optimal approach to manage natural resource rents and utilize these rents between sectors. If a resource-rich country perfects this activity, other advantageous outcomes will follow, and high productivity and growth can be realized.

The political aspect of the resource curse was examined in Kuwait by taking institutional quality as the dependent variable. The results revealed that, in the long-run, resource rents had a detrimental effect on the ratings of institutional quality due to its greater dependency on resource rents.

Human capital in the form of education can mitigate the resource curse as it increases the level of institutional quality (low corruption) in the short-and the long-run because education could encourage anticorruption awareness and information, hence improving the institutional quality. Accordingly, there is a need to enhance the level of education, but the optimal level of education to attain was out of the scope of this study.

Currently, rents from natural resource are beneficial for Gulf Countries because these rents boost investments, employment, and capital accumulation as well as increase the PGDP (Driouchi, 2014). Nevertheless, poor institutional quality could turn this blessing into a curse. Thus, it is recommended that if Kuwait desires the full benefits from oil rents, serious effort and decisiveness should be devoted to reform and revamp the institutions along with democratic reforms. Moreover, there is a need to ensure an optimal management of natural resources through strong institutions to achieve long-term growth and sustainable development. The ideal institutions and policies required to guarantee the optimal management of natural resources in a way that fits the country's goals are the scope for further research.

This study investigated the nexus between natural resource dependence (measured as resource rents as a proportion of GDP) and human capital development (education) to cover the social aspects of the resource curse in Kuwait.

Natural resource rents appeared to crowd out education in the short-and the long-run. In fact, this could slow down the pace of the progress of economic development, as the endogenous growth theory highlights the role of human capital in guaranteeing long-term economic growth. The crowding-out effect on education, due to natural resource rents, predictably leads to low economic growth and development in the long-run, resulting in the resource curse phenomenon, as this crowding-out effect is one of the transmission channels by which the resource curse impacts economies. The results confirm the social resource curse in Kuwait and raise questions concerning the appropriate tools to implement to avoid or control the crowding-out effect on education, which is out of the scope of this study and needs to be further considered.

Corruption deteriorated education, whereas law and order enhanced it, only in the long-run. According to the results, to improve human capital, there is an instant need to ensure better law and order conditions, control corruption, and enhance the overall institutional environment, which must go hand in hand with any plans to enhance human capital. However, more work needs to be done to recognize efficient methods to improve institutional quality at the country level to guarantee human capital development, as this is beyond the scope of this study.

Policy Implications

Presently, natural resource rents are believed to be a blessing for Kuwait, as these huge windfalls boost investments, employment, and PGDP. Accordingly, they are expected to improve human capital; yet, resource rents cause a deterioration in human capital. As a result, these deterioration effects cause an overreliance on non-renewable resources. As there is a global shift toward renewable energy, and these revenues are volatile and uncertain, this blessing could turn into a curse by slowing the pace of economic development.

Therefore, Kuwait should be able to develop its citizens' education, due to their mass wealth and abilities, to utilize the revenues from natural resources to enhance and develop the quality of human capital and, consequently, utilize the knowledge and skills attained by their citizens effectively in wealth creation and, hence, development. The idea emphasizes on the fact that human capital is considered to be one of the greatest resources and wealth of nations, which manages other resources to achieve long-term growth (Harbison, 1971).

Governments in resource-rich Gulf Countries should, first, realize the necessity of being aware of the existence of the resource curse in their economies, that is, the issues and complications in relation to natural resource wealth and their serious effects on their long-term growth and development, which cause Kuwait to be the scope of this study.

If governments realized and appreciated the relevance and necessity of human capital in both tackling the crowding-out effects of natural resources and as a means for placing their countries on the long-term growth and sustainable development path, then governments would alter their budgets, decisions, and policies toward this direction.

As there is no universal theory of the resource curse and the literature is rich in different case studies and approaches to tackle the existence of the resource curse, this article has added to this body of work by examining the particular circumstances and conditions of Kuwait and the challenges it faces of being a resource-rich country.

Appendix A

CUSUM and CUSUM of Squares Stability Tests

Model 1: Impact of Resource Rents on PGDP

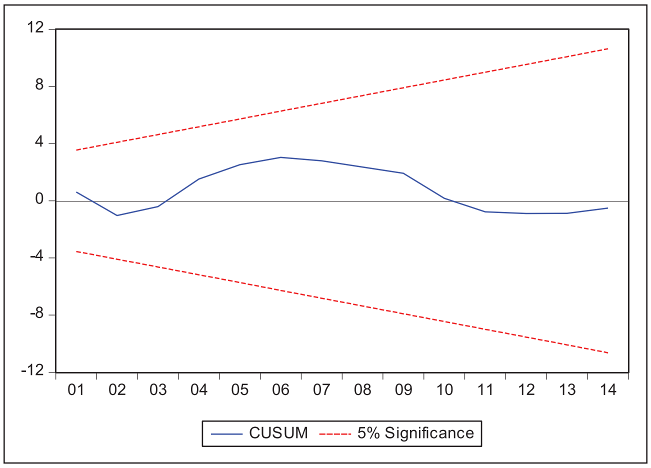

Figure A1. *Note.* CUSUM = cumulative sum control chart.

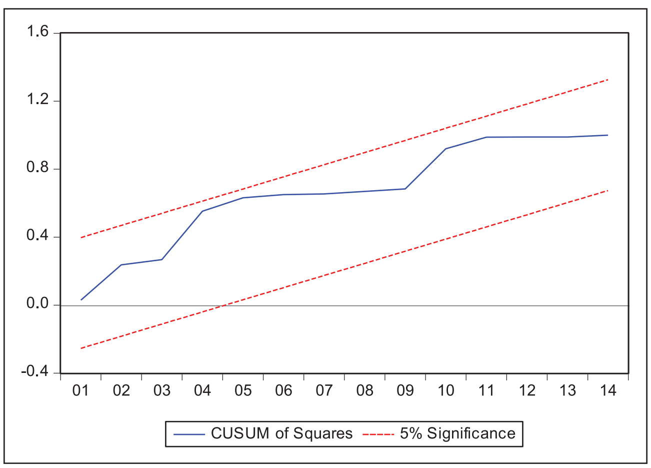

Figure A2. *Note.* CUSUM = cumulative sum control chart.

Model 2: Impact of Resource Rents on TFP

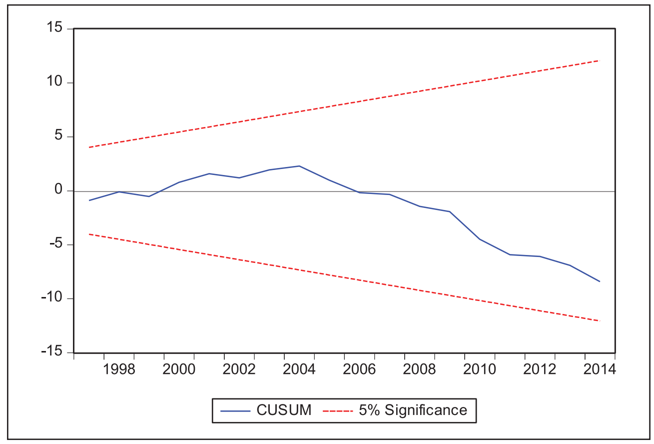

Figure A3. *Note.* CUSUM = cumulative sum control chart.

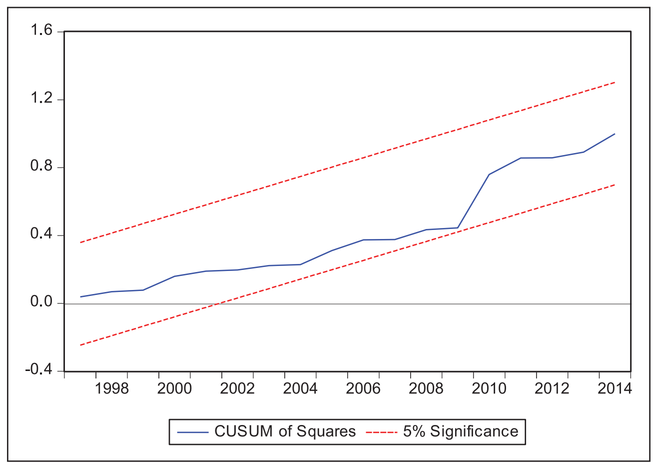

Figure A4. *Note.* CUSUM = cumulative sum control chart.

Model 3: Impact of Resource Rents on Human Capital

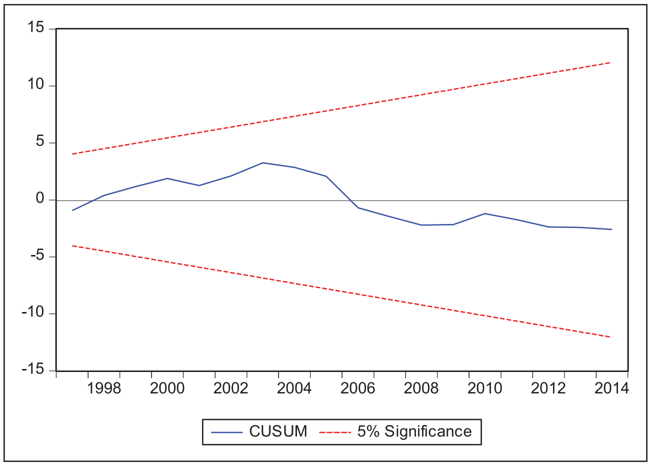

Figure A5. *Note.* CUSUM = cumulative sum control chart.

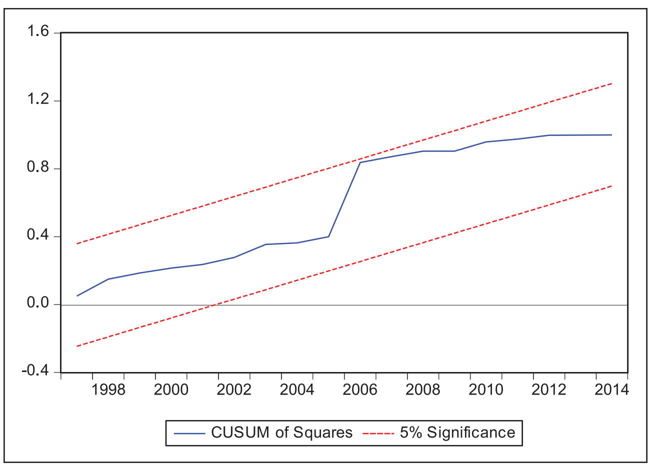

Figure A6. *Note.* CUSUM = cumulative sum control chart.

Model 4: Impact of Resource Rents on Institutional Quality

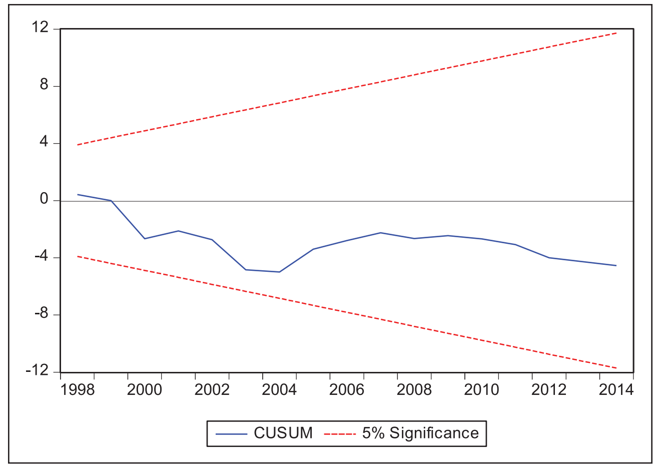

Figure A7. *Note.* CUSUM = cumulative sum control chart.

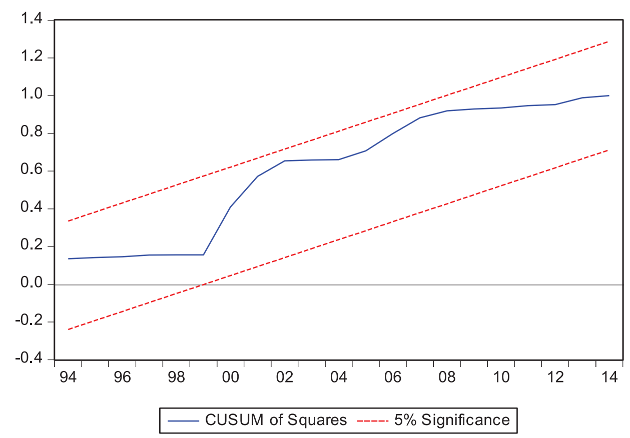

Figure A8. *Note.* CUSUM = cumulative sum control chart.

Appendix B

Table B1. Critical Value Bounds.

Number of independent variables (*K*)	Significance (%)	Lower bounds	Upper bounds
3	10	2.72	3.77
	5	3.23	4.35
	2.5	3.69	4.89
	1	4.29	5.61
4	10	2.45	3.52
	5	2.86	4.01
	2.5	3.25	4.49
	1	3.74	5.06
5	10	2.26	3.35
	5	2.62	3.79
	2.5	2.96	4.18
	1	3.41	4.68

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