Research article

Natural resource dependency, institutional quality and human capital development in Gulf Countries

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ABSTRACT

This study analyses the social aspects of the natural resource dependency and institutional quality in the Gulf Countries by taking human capital as the dependent variable. The cointegration and error correction model has been applied based on the autoregressive distributed lag (ARDL) approach by using the time-series data from 1984 to 2014. The study uses the natural resource rents as a percentage of GDP as a proxy of natural resource dependency and corruption as a proxy of institutional quality. The results of the co-integration show that the natural resource dependency dampens human capital in Kuwait, UAE and the Kingdom of Saudi Arabia, and that corruption shows a significant negative impact on human capital in Kuwait and the Kingdom of Saudi Arabia in the long-term.

1. Introduction

Over time, natural resources have been measured as either an obstacle to growth or as an engine of growth in different contexts [1]. The later idea has been termed as the “resource curse” and is used as a subject in a substantial number of researches [2, 3, 4]. Much work has been devoted to the understanding of the underlying factors that are responsible for the varied experiences of resource-rich countries, and the mechanisms through which resource endowments can either enhance or impede economic growth [5, 6, 7].

However, there is no theory of the resource curse which is universally accepted. [8] simplified the resource curse theory based on a crowding-out logic by stating that certain growth-enhancing activities are crowded-out due to the natural resources. Past studies have emphasized that the distortions caused by the existence of natural resources act as transmission mechanisms, which do not prompt economic stagnation but instead perturb the economic growth [9, 10, 11, 12, 13]. The majority of studies in this area have concentrated on the monetary impacts of the resource curse, in terms of the rate of economic growth and the level of per capita GDP [14, 15, 16, 17]. However, recent interest has been focused on its non-monetary impacts; mainly, the human capital [18, 19, 20, 21, 22, 23].

The skills, education, working experience, and knowledge that individuals practice, maintain, and build is represented through the Human capital [24, 25, 26]. Human capital is considered as an important component for the development of a swift economic growth across the globe, which improves the living standards by enhancing the workforce productivity and, hence, wages, which foster democracy, creates good governance, and improves equality [27, 28, 29, 30, 31, 32, 33].

A huge increase of interest has abruptly regarding the relation between the human capital and the natural resources; especially in tracing the adverse link between the deterioration of human capital, economic growth, and resource wealth in the resource-rich countries [18, 19, 34]. The main argument explains that the reduction of human capital is due to the rents of natural resources being measured by income of minerals, gas, and oil. This argument relates to the brashness and the false sense of security that natural resource rents bestow on the governments and societies [23, 35], which discourage the need to invest in the human capital and causes individuals to get stuck in low skilled jobs, resulting in lower growth. [36] states that countries that tend to pay little attention and fewer financial resources on their human capital is because they consider their natural resources are more relevant as an asset rather than the development of their human capital.

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However, a higher level of human capital is found in resource-rich countries that have succeeded in escaping the resource curse [1] because the encouragement of productive economic sectors is due to a higher educational level that helps in the efficient allocation of resources by managing and supporting technology absorption [12, 21]. Therefore, the dependence on natural resources counterbalances the undesirable effects of a higher level of human capital [1, 23, 37]. According to [10], a higher level of human capital plays an important role in diminishing the effects of a higher level of human capital [1, 23, 37]. According to [1], a higher educational level that helps in the efficient allocation of resources but negatively affected by the need to rely on resources.

Besides these conclusions, which have specifically considered the influence of the natural resources on the human capital, the literature has paid relatively little attention to whether other important factors, such as the per capita GDP and the institutional quality, could also have any impact on the human capital in a resource-rich economy. For example, in Norway, with its natural resources and highest level of the human capital in the world [41], one could question the institutional role in the expansion of its human capital.

Considering this argument, this research seeks to understand if there is any link between human capital and institutional quality by explaining and clarifying the full picture of the relationship if it exists. The observation shows how human capital development is dependent on the support of good institutional quality [27], because if a weak institutional quality exists, then the improvements in growth are not specifically linked to the enhancement in the human capital [42]. Though the literature lacks studies that inspect the relationship between the institutional quality and the human capital, especially in resource-rich economies; a few researches have scrutinized this situation by analyzing the connection between the human development and the natural resources by, directly or indirectly, considering institutional quality [43, 44, 45, 46, 47].

The objectives of this study are based on several factors. First, it considers the fact that for growth human capital is essential, as agreed by several studies [26, 48, 49]. Second, the amount of research in this area is limited. Finally, according to national circumstances the resource curse has diverse ‘strains’. Therefore, this research aims to show the contribution to the development theory by testing if there is any evidence of the resource curse for human capital, along with institutional quality and per capita GDP as control variables, in a number of the major petroleum-exporting countries: Kuwait (KWT), the Kingdom of Saudi Arabia (KSA), and the United Arab Emirates (UAE), which, till now, major attention has not been paid to in the literature.

This is the first research according to our knowledge that has attempted to analyze the natural consequences of the resource curse in the Gulf Countries (GCCs). It would also be interesting for an international audience as the GCCs depend mostly on their natural resources; thereby, making the GCCs main contenders for the adverse effects of the resource curse. Moreover, the GCCs have a strong influence in the Organization of the Petroleum Exporting Countries (OPEC), hence such a study provides useful results for policymakers.

The study is organized as follows: Section 2 provides the methodology and empirical procedure. The empirical results and discussion are given in Section 3. Finally, we conclude in Section 4 and the policy implications are provided in Section 5.

2. Research methodology and data

2.1. Theoretical model

Rapid and sustained growth is unquestionably crucial for the social development, but to attain sustainability in the long term, and to be distributed among all the sectors in the economy, the growth should be inclusive [50]. Accordingly, to disclose if resource rents growth is inclusive or exclusive, this research examines the impact of resource rents on the human capital, along with other independent variables. Eq. (1) indicates that the human capital (HC) is a function of resource rents (RR), corruption (CRP), law and order (LO), and per capita GDP (PGDP):

\[ HC = f(\text{RR}, \text{CRP}, \text{LO}, \text{PGDP}) \]  

(1)

2.2. Estimation procedure and empirical model

In order to investigate empirically the impact of resource rents, institutional quality, and per capita GDP on human capital, Eq. (2) is written as follows,

\[ HC_t = \alpha_0 + \theta_1 \text{RR}_t + \theta_2 \text{CRP}_t + \theta_3 \text{LO}_t + \theta_4 \text{PGDP}_t + \mu_t, \]  

(2)

where \( \alpha_0 \) is the intercept, \( \mu_t \) is the error term, and the subscript \( t \) is used to indicate that the data is a time series.

2.3. Autoregressive distributed lag model

To achieve the short and long-term results, this research applies an Autoregressive Distributed Lag (ARDL) model. The ARDL model is appropriate when there are various stages of integration between the variables. The General form of the ARDL model of Eq. (3) is as given below,

\[ \Delta HC_t = \alpha_0 + \sum_{i=1}^{4} \delta_i \Delta HC_{t-i} + \sum_{i=1}^{5} \rho_i \Delta \text{RR}_{t-i} + \sum_{i=1}^{5} \omega_i \Delta \text{CRP}_{t-i} + \sum_{i=1}^{4} \phi_i \Delta \text{LO}_{t-i} + \sum_{i=1}^{5} \Theta_i \Delta \text{PGDP}_{t-i} + \lambda_1 HC_{t-1} + \lambda_2 \text{RR}_{t-1} + \lambda_3 \text{CRP}_{t-1} + \lambda_4 \text{LO}_{t-1} + \lambda_5 \text{PGDP}_{t-1} + \mu_t, \]  

(3)

where \( \alpha_0 \) is a constant and the terms \( \delta_i, \rho_i, \Theta_i, \omega_i, \) and \( \phi_i \) are parameters used for short-term analysis, while \( \lambda_1, \lambda_2, \lambda_3, \lambda_4, \) and \( \lambda_5 \) are given for estimating the long-term parameters. Then, to judge the co-integration or the long-term relationship between the independent and the dependent variables, the Wald restriction test is used. The value of the F-test is taken by applying the coefficient diagnostic Wald restriction test on the long-term variable parameters. The hypotheses for the co-integration test are:

\[ H_0: \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = 0 \]  

(indicating no co-integration), and

\[ H_1: \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq 0 \]  

(indicating co-integration).

The F-test is based on the number of regressors in the model. If the F-stat value is greater than the value of the upper bound, then the null hypothesis will be rejected, concluding that there is co-integration, which means that the long-term relationship exists between the independent and dependent variables. When the value of the F-stat is lower than the value of the lower bound, then the null hypothesis is not rejected, indicating that the dependent and independent variables have no long-term relationship because it shows no co-integration. Finally, the result would be considered as inconclusive if the F-stat is between the lower and upper bounds.

The Akaike information criteria (AIC) has been used to select the orders, of the lag length in the ARDL model. Considering this, if the co-integration is statistically significant, then by normalizing the long-term equation, the values of the long-run parameters are found while the estimation of the error correction model is used for the short-term analysis. If the assumption of the steady-state condition is considered then, the long-term Equation is \( \Delta HC_t = 0 \), which indicates that:
$\Delta HC = HC_t - HC_{t-1} = 0 \Rightarrow HC_t = HC_{t-1}$. So, by applying the above assumption and dividing by $\lambda_1$, Eq. (4) could be written in the long-term form as given below:

$$\frac{1}{\lambda_1} HC_i = HC_{t-1} = \frac{1}{\lambda_1} \Delta HC_{t-1} = \frac{1}{\lambda_1} \left[ \frac{\lambda_2}{\lambda_1} RR_t, \frac{\lambda_3}{\lambda_1} CRP_t, \frac{\lambda_4}{\lambda_1} LO_t, \frac{\lambda_5}{\lambda_1} PGDP_t \right].$$

Now, by re-parameterizing it:

$$HC_i = \psi_0 + \psi_1 RR_{t-1} + \psi_2 CRP_{t-1} + \psi_3 LO_{t-1} + \psi_4 PGDP_{t-1},$$

where $\psi_1, \psi_2, \psi_3, \text{ and } \psi_4$ are the long-term parameters in the model, their signs and values determine the long-term relationship between the independent and dependent variables. An error correction model is used for the short-term analysis.

2.4. Error correction model

There is an error correction representative model when the variables have a long-term relationship between them, so the error correction model as given below is run in the third step:

$$\Delta HC_i = \alpha_0 + \sum_{j=1}^{i-1} \rho_j \Delta HC_{t-j} + \sum_{j=1}^{i-1} \rho_j \Delta RR_{t-j} + \sum_{j=1}^{i-1} \rho_j \Delta CRP_{t-j} + \sum_{j=1}^{i-1} \rho_j \Delta LO_{t-j} + \gamma \Phi_X C_{0} + \gamma ECM_{t-1}.$$ 

The error correction model amends the speed of the adjustment of the short-term shocks back to a long-term equilibrium. The coefficient of the $ECM_{t-1}$ determines the speed of adjustment towards the equilibrium in the case of any commotion.

2.5. Data and variables description

This research uses the human capital as the dependent variable, and institutional quality, per capita GDP, resource rents, and institutional quality are used as the independent variables.

Figure 1 clarifies the dependent (DV) and independent variables (IV) in the model, where (IV3) is the variable of interest.

A description of the variables and the rationale for their inclusion in the model are presented below:

The buildup of education in a country is usually measured by the Human Capital (HC) even though it is a challenge to measure [24, 51]. An important component of the economic growth is the human capital and according to the human capital theory it is dependent on education [52]. The present study takes the human capital index, based on the average years of schooling and an assumed rate of return, in terms of education, as the measure of the human capital [53, 54]. The data was sourced from the Penn World Tables v9.0 [55], as used in [39].

Figure 2 shows that, in 2014, the highest human capital index was in the UAE and the lowest was in KWT.

Several studies have considered per capital GDP (PGDP) as a proxy for the degree of the development in a country, so PGDP was used as an indicator [16,56-58]. A strong bond between the human capital and PGDP is shown by enhancing the schooling and learning abilities to support the institutional environment through allocating more resources by using a higher level of national income to improve the human capital [59, 60]. The data derived from the World Development Indicators regarding the PGDP [61] between 1984–2014, and the natural logarithm was used for this variable. To gain per capita GDP, the data taken as the GDP (constant 2010 USD) was divided by the population data from [62], between all the countries in the given time frame. PGDP is shown in Figure 3. As KWT is a small country with a small population, it was expected to show the highest level of PGDP. However, UAE started to reach a higher level in 2013. KSA shows the lowest level of PGDP, with a very small fluctuation when compared to the other two countries.

Weak institutional quality in the form of high corruption and weak law and order situations hampers the human capital development [63, 64, 65]. The research has used corruption (CRP) as a proxy for Institutional Quality (IQ) according to past studies [58, 66, 67, 68, 69, 70]. This study also investigates the situation of law and order (LO) as an independent variable. The data for the two variables was provided by the International Country Risk Guide (ICRG) by the PRS Group, from 1984–2014. The assessment of the level of corruption is taken into consideration through the CRP variable, where it indicates how corruption that includes financial matters such as bribes related to import and export licences, tax assessments, secret party fundings, excessive patronage, and nepotism that are used within a political system [58, 71]. According to [70], LO reflects “the level to arbitrate disagreements and to
make or implement laws depends on the willingness of a country’s citizens and their acceptance the decisions of the institutions already established”.

The literature has presented two different views of the implications of how resource rents affect the human capital. One view is that resource rents discourage investment in education and the obtainment of higher skills, as people may in the resource-based sectors get jobs with less skills [13, 72]. The other view is that the resource-rich countries have more capacity to spend and make more investments in education to increase the human capital. To evaluate this phenomenon, this research considers the independent variable to be the resource rents (RR), and the natural logarithm was taken for this variable. The World Development Indicators (WDI) that have been provided by the World Bank present the total natural resource rents as the total percentage of GDP linked with the sales of natural resources [61]. RR is the value of interest in this study, and it is selected from the following [66, 73, 74, 75, 76, 77]. Hereafter, when the resource rents (RR) is mentioned, it refers to the resource rents as a proportion of the GDP. As Kuwait had the highest percentage of RR between the countries compared in Figure 4 below, this indicates that Kuwait had the highest degree of dependency on natural wealth.

3. Empirical results and discussion

3.1. Unit root test

When evaluating any co-integration technique, it is a pre-condition to check the order of integration of the variables. The augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests are applied for this purpose. Table 1 reports these unit root test of (ADF) results. In KWT, for per capita GDP, corruption, and human capital, the null hypotheses of the unit root could not be rejected at the 5% level of significance. Thus, these variables are integrated of order 1 (i.e., I(1)). The other variable under consideration, resource rents, is stationary at level (i.e., I(0)).

The results were found to be similar for the KSA and the UAE, as given in Table 1. It was found that the null hypotheses of the unit root at level could not be rejected at a 10% level of significance for law and order, PGDP, corruption, and human capital, but these variables were stationary in the first difference. Nevertheless, resource rents were stationary at level (i.e., I(0)).

3.2. The ARDL and bound test

Table 1 shown above, discusses two very significant features regarding the variables and their characteristics used in the case of the three countries. First, all of the variables followed different orders of integration (i.e., I(1) and I(0)). Secondly, all the given dependent variables were integrated of order one. The characteristics of the variables granted the application of ARDL as they are considered important prerequisites characteristics. The existence of the co-integration between the I(0) and I(1) variables is another prerequisite for ARDL. This was based on the bound-testing procedure of the Wald-test (F-test) as a co-integration bound test [78]. This specified two critical values for the co-integration test. All variables are I(0), if assumed by the lower critical bound, resulting in a no co-integration relationship between the analyzed...
variables, while all variables are I(1), according to the upper bound, meaning that there is co-integration between the variables. The null hypothesis that the variables are co-integrated is rejected, when the computed F-statistic is greater than the upper bound critical value. When the F-statistic is below the lower bound critical value, then the null hypothesis cannot be rejected. The results in Table 2, clarify that the values of the F-statistics were higher than the upper bound in a 95% confidence interval for the three countries. The value was (4.70) for the human capital in KWT, (4.63) in KSA, and (33.62) in the UAE.

For all equations, these results confirm that at least one short or long-term co-integrating relationship exists among the I(0) and I(1) variables, according to the upper bound, first difference (LO), and PGDP. The verification of the stability of the model was approved every year successfully. The CUSUM and CUSUM of Squares tests were applied and both tests approved the stability of the models (Appendix A, Figures A3 and A4).

3.3. The short-term and the long-term results of the impacts of the natural resources

The results are given in Table 3, by estimating the human capital (HC) and resource rents (RR) while controlling corruption (CRP), law and order (LO), and PGDP. The verification of the stability of the model was done through the error correction term, which shows that the error of 49% in the case of KWT, 11% in KSA, and 10% in the UAE has been corrected every year successfully.

3.3.1. Results in Kuwait

The results show that the human capital was mainly determined by its own lag. A 1% growth in a one-year lag for the human capital boosts the present human capital up to 0.60%. Resource rents (% of GDP) had an instant adverse effect on the human capital: A 1% upsurge in the Resource rents declined the human capital by 0.07% and showed the significance level at 10%. Nevertheless, the long-term result was far greater than the short-term result, where the human capital was reduced by 0.49% when the proportion of resource rents increase by 1% in the KWT GDP.

The human capital was affected by corruption in the long-term, where the human capital was reduced significantly by 0.09%, relatively to a 1% surge in corruption; though, it was insignificant in the short-term. In the long-term, a positive effect of law and order was shown on the human capital, the human capital was increased by 0.069%, due to a 1% increase in law and order.

The cumulative sum control chart (CUSUM) and CUSUM of Squares tests were applied to check the stability of the model; both tests indicated that the model is stable (Appendix A, Figures A1 and A2).

3.3.2. Results in the Kingdom of Saudi Arabia

In case of KSA, the resource rents had an insignificant impact on human capital in the short-term; nevertheless, the human capital deteriorated in the long-term by 0.59%, relative to a 1% upsurge in the proportion of the resource rents in the KSA GDP. PGDP was significant in both terms, but with different effects. It was found that high PGDP weakened the human capital in the short-term by 0.31% per 1% increase in PGDP, but enhanced the human capital in the long-term up to 0.57%, as per 1% increase in PGDP. Corruption was only significant in the short-term at the 10% level, where a 1% increase in corruption deteriorates the human capital by 0.08%. However, the variable of the law and order was statistically insignificant, showing no effect on the human capital in both the short and long-term.

The CUSUM and CUSUM of Squares tests were applied and both tests approved the stability of the models (Appendix A, Figures A3 and A4).

3.3.3. Results in the United Arab Emirates

In case of the UAE, the one-year lag of the resource rents affected negatively the human capital in the short-term, and a similar effect appeared in the long-term. A 1% surge in the proportion of the resource rents in the UAE GDP, decreased the human capital by 0.16%. Corruption showed a negative relationship to the human capital, in both the short and long-term, in 90% confidence interval. The human capital deteriorated by 0.001% in the short-term and 0.14% in the long-term, as per 1% increase in corruption.

In 95% confidence interval, the variable of the law and order affected positively the human capital in both the short and long-term, by 0.02% and 0.27% as per 1% upsurge in the law and order, respectively. Regarding PGDP, the one-year lag of PGDP showed a noteworthy positive relationship with the human capital only in the short-term. The CUSUM and CUSUM of Squares tests were applied and both tests approved on the stability of the model (Appendix A, Figures A5 and A6).

3.3.4. Discussion

This study presented the results for each country, where each displayed different outcomes, depending on their own experience, condition, and characteristics. However, there were some similarities.

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**Table 1. Results of the augmented Dickey-Fuller unit root tests.**

| Variable          | Country                  | The Kingdom of Saudi Arabia | The United Arab Emirates |
|-------------------|--------------------------|-----------------------------|-------------------------|
| Per capita GDP    | Level                    | 1st Difference              | Level                   | 1st Difference              | Level                   | 1st Difference              |
|                   | -2.131 (0.234)           | -4.714*** (0.000)           | -1.866 (0.342)          | -8.618*** (0.000)          | -1.684 (0.428)          | -3.845*** (0.006)          |
| Human Capital     | -2.418 (0.145)           | -3.027*** (0.045)           | 0.833 (0.993)           | -4.037*** (0.004)          | -0.318 (0.910)          | -3.546*** (0.013)          |
| Resource Rents    | -3.223** (0.028)         | 3.577** (0.049)             | -2.888** (0.058)        |                          |                        |                          |
| TP                | -2.256 (0.191)           | -4.796*** (0.000)           | -1.247 (0.640)          | -7.219*** (0.000)          | -2.150 (0.227)          | -4.052*** (0.004)          |
| Law and Order     | -5.990*** (0.000)        | -1.656 (0.440)              | -3.721*** (0.000)       | -2.392 (0.152)             | -5.661*** (0.000)       |                          |
| Corruption        | -2.352 (0.163)           | -5.430*** (0.000)           | -2.581 (0.290)          | -5.257*** (0.000)          | -0.631 (0.290)          | -4.025*** (0.004)          |

The values in the parentheses represent the P-value. * is 10% significance; ** is 5% significance; and *** is 1% significance.

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**Table 2. Co-integration bound test results.**

| Dependent Variable | Country                  | The Kingdom of Saudi Arabia | The United Arab Emirates |
|-------------------|--------------------------|-----------------------------|-------------------------|
|                   | F. Statistic K            | F. Statistic K              | F. Statistic K          |
| Human Capital     | 4.70                     | 3                           | 4.63                    | 4                         | 33.62                    | 4                          |
An increase of the natural resources’ proportion in the KWT GDP seemed to deteriorated the human capital in the short-term. Similarly, in the long-term the resource rents deteriorated the human capital in all three countries.

There are a few possibilities that could be the cause for the undesirable effect of the resource rents on the human capital. Natural resource richness triggers countries to allocate inadequate attention and minimum expenditures in the education sector [23]. The other possibility could be that the resource-rich countries neglect the development of the human capital because they consider the huge natural resource windfalls as a significant asset for their countries as it prompts a false sense of security and overconfidence [35]. This would be reflected, on a country-wide level, in preventing investment in the human capital by paying less attention and low budgets for education [35]. Additionally, at the individual level, this wealth would diminish the need to educate children, hence causing the quality of education to get less priority [72]. Thus, the change in economy is resulted due to the major role that the resource richness provide, as people obtain more jobs in the energy sector which requires little skills and pays high wages [72]. The findings of this research support what is known as the “social resource curse” [1, 10, 13, 23, 79, 80].

In the UAE and the KSA, corruption deteriorated the human capital in the short-term and the similar effects are observed in KWT and the UAE in the long-term. [63] also found that the educational system in the resource-rich countries is harmed due to the corruption by plummeting funds for health and education, influencing the outcomes of the education, and wasting good opportunities. [57] and [64] found the same results.

Additionally, the findings of [42] support the findings that law and order affected the human capital in the UAE in the short-term, and in the UAE and KWT in the long-term. However, in the KSA, this study found the effect of law and order on the human capital to be insignificant, both in the short and long-term. Our research findings on the impact of institutional quality on human capital seem to support the fact that an enhancement in the institutional environment increases incentives to learn and encourages education expenditure, with subsequent improvement of the human capital [27, 81].

The possibilities of the undesirable effects of PGDP on the human capital in the KSA and the insignificant results in KWT, can probably be related to the same possibilities that caused the resource rents to affect negatively the human capital, as high income countries may have a false sense of security and become overconfident about their income, which drives these countries to neglect their human resources by giving less consideration to the quality of their human capital; in particular, with respect to both education and health [35, 72, 82].

However, the results depict that, in the long-term, this negative effect in the KSA has turned to positive. Moreover, this positive effect appeared in the UAE from the one-year lag of PGDP in the short-run. The logic behind this is that income illustrates the well-being of individuals and, so, a growth in income drives schooling and better education [60]. This is likely to happen when the high national income is used appropriately by allocating more resources for education, increasing access to higher levels of education and better dissemination of knowledge, supporting a better institutional environment that is favourable to education and offers better opportunities to the educated worker and dispense more support for the expences of education [59].

The insignificant results in KWT are similar with the observation of some researches that the association between PGDP and the human capital is insignificant [83, 84].

4. Conclusion

The current research investigated the link amongst the natural resource dependency (which is measured as resource rents as a proportion of GDP) and the human capital, in order to analyse the social aspects of the resource curse in the Gulf Countries. The research is based on a time-series data between the period of 1984–2014, deriving evidence by applying the ARDL model and the co-integration of the deponent variable of the human capital.

The natural resource rents appeared to crowd-out the need for education in the long-term, in the case of the three countries. This crowding-out effect of the resource rents on education operated in the short-term in

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Table 3. Impact of resource rents and institutional quality on human capital in Kuwait, Kingdom of Saudi Arabia, and United Arab Emirates.

| Variable            | Country                        | Coefficient | t-Statistics | Coefficient | t-Statistics | Coefficient | t-Statistics |
|---------------------|--------------------------------|-------------|--------------|-------------|--------------|-------------|--------------|
| Short-run results   |                                |             |              |             |              |             |              |
| Human Capital (-1)  | Kuwait                         | 0.606***    | 3.979        |             |              |             |              |
|                     | The Kingdom of Saudi Arabia    | -0.074*     | -1.847       | -0.012      | -0.456       | -0.001      | -0.102       |
|                     | The United Arab Emirates       | 0.071       | 1.576        | -0.312***   | -3.044       | 0.000       | 0.015        |
| Per capita GDP      | Kuwait                         | -0.002      | -0.076       | -0.089*     | -1.689       | -0.001*     | -1.689       |
|                     | The Kingdom of Saudi Arabia    | 0.0056      | 0.226        | 0.004       | 0.294        | 0.029**     | 2.302        |
|                     | The United Arab Emirates       | -0.491***   | -3.753       | -0.110***   | -2.365       | -0.107***   | -8.404       |
| Long-run results    |                                |             |              |             |              |             |              |
| Resource Rents      | Kuwait                         | -0.495*     | -2.015       | -0.596**    | -2.695       | -0.169*     | -1.790       |
|                     | The Kingdom of Saudi Arabia    | -0.099**    | -2.127       | 0.812       | 1.094        | -0.140*     | -1.801       |
|                     | The United Arab Emirates       | 0.069**     | 2.554        | -0.040      | -0.319       | 0.276**     | 2.465        |
| Corruption          | Kuwait                         | -0.930*     | 1.995        | -25.814     | -1.502       | 5.234       | 1.382        |

Note: ***, **, and * denote the significance at the 99%, 95%, and 90% confidence interval respectively.

Note: In this study, the variable of PGDP in the case of KWT was excluded due to the problem of multicollinearity between PGDP and resource rents. We apply the Variance Inflation Factor (VIF) and the value of VIF is greater than 10. So, we dropped the less significant variable, Per Capital GDP. The results are robust. The detail results of VIF test and robustness of variable are available on request.
KWT and in the UAE with the one-year lag. In fact, this could slow down the pace of the progress of economic development, since the endogenous growth theory highlights the role of the human capital in guaranteeing long-term economic growth.

The crowding-out effect of resource rents on the human capital in the three countries is one of the main transmission channels by which the resource curse affects economies, which would predict a low economic growth and low development in the long-term, due to over reliance on natural resource rents.

Other sources have suggested that the reason behind the crowding-out effect is that governments and individual households are not inclined to promote education due to the false sense of security, resulting in the reduction of incentives to give priority to educate their people. The results confirm the need to raise the question of appropriate tools that could be implemented to avoid the seen results of the social resource curse in the GCs, as it is essential to control the effect of resource rents on human capital. This aspect has not been included in this research and can be considered as a future aspect of research.

In the case of KWT, corruption deteriorated the human capital, although law and order enhanced it, only in the long-term. In the case of the KSA, corruption worsened the human capital immediately. The same results appeared in the UAE, but they were consistent in both the short and long-term. High PGDP in KSA deteriorated the human capital in the short-term but enhanced the human capital in the long-term. However, in the case of the UAE, the one-year lag of PGDP improved the human capital in the short-term.

Presently, the GCs believe that rents from natural resources to be a blessing, as these huge windfalls boost investments, PGDP, and employment, accordingly, the human capital improves; yet, the resource rents cause a deterioration in the human capital, which cause an over-dependence on these non-renewable resources. This blessing could turn into a curse by slowing the pace of economic development, especially that there is a global shift towards renewable energy.

Moreover, if education and skill development do not receive proper support mechanisms and adequate institutions, then, this will result in limited access to institutions for learning and training.

Governments in resource-rich Gulf Countries need to realize the serious effects of natural resource wealth on their long-term growth and development and lessen their dependency on their natural resource windfalls. There is also a need to raise the financial revenues from non-natural resources and reduce the non-development expenditures. There is also an instant need to curb the corruption in the education sector and enhance the general institutional environment to improve the human capital.

Declarations

Author contribution statement

R. Aljarallah: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Additional information

No additional information is available for this paper.

Appendix A. CUSUM and CUSUM of Squares stability test

1. Impact of resource rents on the human capital in Kuwait

![CUSUM and CUSUM of Squares stability test](image-url)
2. Impact of resource rents on the human capital in the Kingdom of Saudi Arabia

Figure A2. CUSUM of Squares stability test.

Figure A3. CUSUM stability test.
3. Impact of resource rents on the human capital in the United Arab Emirates

Figure A4. CUSUM of Squares stability test.

Figure A5. CUSUM stability test.
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