



# Converting a resource curse into a resource blessing: The function of institutional quality with different dimensions

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## ABSTRACT

There are a number of reasons suggesting that improving institutional quality is the most vital role for nations that are experiencing or are expected to face a natural resource curse to overcome these challenges. Based on this debate, this study seeks to examine the relative impacts of different dimensions of such qualities – institutional quality (that is, index of rule of law, control of corruption, regulatory quality, political instability, voice accountability, and government effectiveness) – in MENA countries using a cross-sectional and time series data from period of 1996–2019. In the light of this, the main variable considered is effects of natural resource rents and other factors, such as human factor and financial developments on real GDP per capita. To achieve the desired result, panel model techniques was employed to estimate the results, which revealed that natural resource rents and human capital have positive and significant relationship with real GDP per capita while financial development have negative impacts, hence diminishes the economic growth of the country. Also, voice accountability and government effectiveness have negative effects on the real GDP, while the other institutional quality, except regulatory quality, have significant contribution in increasing the real GDP. The interacting effects of natural resource and voice accountability foster the economic development, and it also have impact in increasing the size of natural resources, and human capital on the economic development of MENA while at the same time vanishes the initial negative effects of financial development of the economic growth. Moreover, interaction of natural resource rent on political instability, government effectiveness, rule of law, and control of corruption have all significantly contributed to increase the economic growth of MENA while regulatory law is of no significant. Based on this, ideal policy directions were highlighted.

## 1. Introduction

In recent years, findings proving the reverse of the mainstream economic view that natural resource wealth is one of the most fundamental criteria for economic growth and that countries deficient in natural resources should struggle more to grow than other countries have begun to be discussed. Following the pioneering work of Sachs and Warner (1995, 1999, 2001) suggesting the negative relationship between natural resource abundance and economic growth, research is accelerating to identify the routes via which this possible negative relationship occurs (Apergis and Payne, 2014).

The “Resource Curse” hypothesis proposes that the first likely cause

of this unfavourable condition is the rise in real exchange rates brought on by the discovery and abundance of resources and the associated decline in exports (Corden, 1984; Krugman, 1987). Second, resource discovery, according to Gylfason (2001), causes resources to be diverted away from investments that boost human capital, slowing the growth process. Depending on the financial sector, one of the potential negative effects of resource discoveries may materialize. The prices of global resources (oil, natural gas, etc.) has a huge impact on the economies of nations that depend more and more on resource rent (Destek, 2015). The economic activity and capital investments of resource-rich countries may become unstable due to the significant volatility of resource prices (James, 2015). The depth and development of the financial sector are

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key factors for nations that depend heavily on natural resources for their economic operations in order to maintain investments that support economic growth, particularly when global resource prices are falling. Because of this, many scholars who study the causes of resource curse take financial development into account (Bist, 2018; Guru and Yadav, 2019; Raheem et al., 2020). The deficiencies in institutional quality of countries have been seen in recent years to be one of the most significant determinants in the emergence of the resource curse (Berhane, 2018; Nguyen et al. 2018; Salman et al. 2019; Alexiou et al., 2020). It is well recognized that in nations with poor institutional quality, rent-seeking public officials can use bribery to divert resource income from profitable investment areas to less productive sectors, where they can be used for less productive purposes. The arrest of public officials implicated in such corruption highlights the significance of these variables in terms of deterrence because there are numerous consequences in this regard in nations with high levels of democracy and accountability (Mehlum et al., 2006). Accordingly, Robinson et al. (2006), Brunnschweiler (2008), de Medeiros Costa and dos Santos (2013), and others contend that resource abundance is directed to profitable investment areas and positively affects economic growth in nations where corruption is low, private property rights are strongly protected, the rule of law is upheld, and bureaucracy is used effectively.

It is well recognized that studies looking at how improving institutional quality can lessen the resource curse tend to concentrate on the direct impacts of institutions on economic activity, ignoring the interaction between institutions and resource availability. The few studies that take into account institutional quality's mediating function in the resource curse appear to concentrate on the total institutional quality score (Entele, 2021). On the other hand, analysing the direct impact of institutional quality on economic growth, which has been demonstrated by numerous studies to have positive effects on the economic growth performance of countries, does not offer accurate information on the role of institutional quality in reducing the resource curse. Similar to the previous point, the suggestion to raise all institutional quality indicators (rule of law, control of corruption, voice accountability, political stability, government effectiveness, and regulatory quality) in terms of policy suggestions for nations with low institutional quality is not a sensible one in terms of the limitations on policy. It will be more sensible to decide which institutional quality indicator is more helpful in reducing or eliminating the resource curse and to base recommendations on this finding in order to make these suggestions in a sound manner. Even if the institutional quality does not completely eliminate the impact of the resource curse, it still crucial to identify the mitigating role of institutional quality because Destek et al. (2022) determined the optimal rates of resource dependence for countries and demonstrated that resource dependence to a certain extent is beneficial for national economies.

In light of the preceding information, the goal of this study is to assess the mediating roles of several institutional quality indicators in mitigating the resource curse in resource-rich Middle East and North Africa (MENA) nations for the period from 1996 to 2019. Consequently, the interaction effects of various institutional quality indicators with resource rent for 14 MENA nations are explored (Algeria, Bahrain, Egypt, Iran, Jordan, Kuwait, Morocco, Pakistan, Qatar, Saudi Arabia, Sudan, Tunisia, United Arab Emirates, Yemen). In addition, empirical study takes into account the consequences of elements including human capital and financial development. The potential contributions of this study to the literature are threefold: i) to our knowledge, this is the first study to evaluate the usefulness of multiple sub-dimensions of institutional quality in mitigating the risk of resource curse. ii) The study also investigates the effect of human capital accumulation and financial growth on economic activity. iii) In empirical analysis, the consistency of the results produced using various panel data estimators is also examined.

## 2. Literature review

One of the most extensively studied topics in recent years has been the significance of natural resource rents for economic growth. It is interesting to note that there are two patterns when looking at the literature on how natural resource rents affect growth. While the first of these trends focuses on examining the beneficial effects of resource rents on economic growth in resource-rich nations, the second trend that has recently been noticed is connected to how natural resource abundance can turn into dependence, particularly in resource-rich nations, and what tools can be used to avoid this curse. In this regard, empirical studies looking at how the aforementioned elements, which are thought to reduce the likelihood of a natural resource curse, directly affect economic growth are provided in Table 1 in the first stage of the literature section. Increases in financial development may contribute to economic growth, according to the overall conclusion drawn from research analyzing the link between financial development and economic growth (Zhang et al., 2012; Balach and Law, 2015; Muhammad et al., 2016; Berhane, 2018; Guru and Yadav, 2019; Ahmed et al., 2022). However, other research indicates that there is a conflict between financial development and economic expansion (Gazdar and Cherif, 2015; Raheem et al., 2020). However, human capital, which is a component of production at the national level alongside physical capital, promotes both personal income growth and national economic expansion. Furthermore, Becker (2009) and Lucas (1988) hypothesized that it is difficult to distinguish between physical and financial assets and human capital, and that regardless of the degree of development now attained, human capital and physical capital will provide a constant growth rate in stock. The research in Table 1 that examine the economic impacts of the human capital stock show that this widely held belief has been validated. Finally, recent studies on the impact of institutional quality on growth (Berhane, 2018; Nguyen et al., 2018; Salman et al., 2019; Zallé, 2019; Sani et al., 2019; Alexiou et al., 2020; Duodu and Baidoo, 2020; Nouira and Saafi, 2021; Ahmed et al. (2022); Nair et al., (2021); Tiwari and Bharadwaj (2021); Conteh et al., (2021) show that strong institutions play an important role in achieving sustainable development and economic growth.

The efficacy of these factors in reducing the danger of resource curse is tied to the main goal of our study rather than the direct effects of these factors on economic growth. Since conventional growth theories, it has been widely believed that nations with a wealth of natural resources have a higher chance of developing than nations with comparatively little resources. Researchers who support the validity of "Resource Curse" hypothesis, which contends that when natural resource abundance evolves into reliance, it will not boost economic growth but rather hinder it, have rejected this approach (Shahbaz et al., 2019). The "Resource Curse," proposed by (Auty, 1993), links the availability of natural resources with low economic performance (Sachs and Warner, 1995). As shown in Table 2, following that seminal work, the concept of the resource curse has been validated by numerous researchers (Papyrakis and Gerlagh, 2004; Costantini and Monni, 2008; Arezki and Nabli, 2012; Abou-Ali and Abdelfattah, 2013; Apergis and Payne, 2014; Kim and Lin, 2017; Su et al., 2016; Badeeb and Lean, 2017). Additionally, it is clear from recent studies (Larsen, 2006; Iimi, 2007; Holden, 2013; Parlee, 2015; Dwumfour and Ntow-Gyamfi, 2018; Shahbaz et al., 2019; Adams et al., 2019; Asif et al., 2020; Bergougui and Murshed, 2021; Ali and Ramakrishnan, 2022) that researchers are more interested in the policies that should be put in place to lessen the risk of resource curse. It is widely contended that a lack of investment in human capital, inadequate institutional design, or low levels of financial development are the primary indicators of the resource curse (Tiba, 2019). Furthermore, one of the keys to maximizing the benefits of resource rents and boosting sustainable economic growth is accepted as the developments in the financial sector (Zaidi et al., 2019). Therefore, according to some recent studies, to support economic growth and to successfully implement natural resource management, a strong and efficient finance system is

**Table 1**  
Summarized literature on moderating factors and economic growth.

Author (s)	Period	Countries	Methodologies	Dependent variable	Independent variable	Conclusion
Law and Habibullah (2006)	1980–2001	East Asian Economies	OLS	GDP	IQ	IQ increases GDP
Zhang et al. (2012)	2001–2006	China	GMM	GDP	FD	FD increases GDP
Lau et al. (2014)	1984–2008	Malaysia	ARDL	GDP	IQ, CO <sub>2</sub> , EXP	IQ increases GDP
Balach and Law (2015)	1984–2008	SAARC	PMG	GDP	IQ, HC, FD	IQ, HC, FD increase GDP
Effiong (2015)	1960–2010	21 South Sahara Economies	OLS-GMM	GDP	IQ, FD	IQ increases GDP
Gazdar and Cherif (2015)	1984–2007	MENA	GMM	GDP	FD, IQ	IQ increases GDP FD reduces GDP
Abuzayed and Al-Fayoumi (2016)	1996–2010	MENA	GMM	GDP	IQ, CONC	IQ increases GDP
Muhammad et al. (2016)	1975–2012	GCC	GMM	GDP	FDI, INF,	FDI increases GDP
Kacho and Dahmardeh (2017)	2002–2014	OECD	GMM	GDP	IQ, FD	IQ, FD increase GDP
Bhattacharya et al. (2017)	1991–2012	85 Countries	GMM	GDP	IQ, K, REC, NREC	IQ increases GDP
Kutan et al. (2017)	1980–2012	MENA	PMG	GDP	IQ, FDI, TO	IQ increases GDP
Berhane (2018)	1980–2014	40 Africa Countries	PMG	GDP	IQ, FD	IQ, FD increase GDP
Bist (2018)	1995–2014	African Countries	FMOLS-DOLS	GDP	FD, TO, INF	FD increases GDP
Ibrahim and Alagidede (2018)	1980–2014	29 SSA	GMM	GDP	FD, INF, TO	FD increases GDP
Nguyen et al. (2018)	2002–2015	29 Emerging Economies	GMM	GDP	IQ, TO, FDI	IQ increases GDP
Salman et al. (2019)	1990–2016	Indonesia- Thailand-South Korea	FMOLS-DOLS	GDP	EC, TO, IQ, CO <sub>2</sub>	IQ increases GDP
Sepehrdoust and Ghorbanseresht (2019)	2002–2015	OPEC	GMM	GDP	ICT, FDI, GOV, TO, INF	FDI increases GDP
Zallé (2019)	2000–2015	29 Countries	PMG- MG	GDP	NRA, IQ, HC	IQ, HC increases GDP
Hayat (2019)	1996–2015	104 Countries	GMM	GDP	IQ, FDI, POP, INF, T	IQ increases GDP
Sani et al. (2019)	2000–2014	46 SSA	GMM	GDP	IQ, DEB, POP, T, GCF	IQ increases GDP
Guru and Yadav (2019)	1993–2014	BRICS	GMM	GDP	FD	FD increases GDP
El Hamma (2019)	1982–2016	MENA	OLS	GDP	FD	FD increases GDP
Yahyaoui and Al Saggaf (2019)	1995–2012	Arabian Gulf States	FMOLS	GDP	IQ, FD	IQ increases GDP
Raheem et al. (2020)	1990–2014	G-7	PMG	GDP	FD, ICT, CO <sub>2</sub>	FD reduces GDP
Alexiou et al. (2020)	1996–2016	27 Postsocialist Countries	PMG	GDP	IQ, TO, INF	IQ increases GDP
Duodu and Baidoo (2020)	1984–2018	Ghana	ARDL	GDP	TO, IQ, FD, INF	IQ increases GDP
Nouira and Saafi (2021)	1995–2015	56 Countries	GMM	GDP	IQ, TO, HC, INV	IQ increases GDP
Ahmed et al. (2022)	2000–2018	South Asian Economies	FMOLS-DOLS	GG	IQ, FD	IQ, FD increase GG
Nair et al. (2021)	2005–2018	67 Countries	FMOLS	GDP	IQ, CO <sub>2</sub> ,	IQ increases GDP
Shittu et al. (2021)	1990–2017	MENA	ARDL	GDP	IQ, GI, FDI, HC, NRA	IQ increases GDP
Alabed et al. (2021)	1996–2017	Jordan	ARDL	GDP	GCF, INF, TO, IQ	IQ increases GDP
Ponce et al. (2021)	1988–2018	Latin America	FMOLS	GDP	FD, HC, REC, NREC	FD increases GDP HC increases GDP
Abdoulil and Omri (2021)	1990–2013	Mediterranean Region	FMOLS	GDP	HC, TO, POP	HC increases GDP
Tiwari and Bharadwaj (2021)	2002–2019	BRICS	OLS	GDP	HC, IQ, K, GOVEX, INF	IQ increases GDP HC increases GDP
Conteh et al. (2021)	1996–2016	27 SSA	GMM	GDP	IQ, K, L, TO	IQ increases GDP
Ashraf et al. (2022)	1984–2019	South Asian	ARDL	GDP	CO <sub>2</sub> , EC, TO, IQ	IQ increases GDP

**Note:** SAARC: South Asian Association for Regional Cooperation; IQ: Institutional Quality; HC: Human Capital; FD: Financial Development; GG: Green Growth; TO: Trade Openness; INV: Investment; FDI: Financial Development Index; CONC: three banking market concentration; FDI: foreign direct investment; POP: Population; INF: Inflation; T: Trade; DEB: public debt-to-GDP; GCF: fixed capital formation, NRA; natural resources abundance, GI: KOF Globalization Index; GOV: Government Expenditures; REC: Renewable energy consumption; NREC: Non-renewable energy consumption; K: Physical capital; GOVEX: Government expenditure; EXP: Export; L: Labour; GLOB: globalization index; URB: urbanization; GCC: Gulf Cooperation Council; OPEC: Organization of the Petroleum Exporting Countries; GFLS: feasible generalized regression equations; SSA: Sub-Saharan Countries; PLS: Partial Least Square.

essential (Pradhan et al., 2016). In addition, a recent study by Destek et al. (2022), validated that there is inverted U-shaped relationship between natural resource rents and economic growth.

As vital as financial development in avoiding the resource curse, human capital, which is defined as the knowledge and skills that people acquire, preserve, and use, plays a crucial role in reducing the danger of the curse or avoiding its negative impacts because many researchers think that low human capital accumulation is one of the main factors contributing to resource curse, particularly in developing nations with an abundance of natural resources. Since human capital development will promote economic growth, the risk of resource curse can be mitigated by making human capital investments, according to Balach and Law (2015); Zallé (2019); Nouira and Saafi (2021); Ponce et al., (2021); Abdoulil and Omri (2021); Tiwari and Bharadwaj (2021); Sun and Wang, 2021.

When the literature on the resource curse theory is examined, it is interesting to note that while many studies have looked at the connections between financial development and resource abundance or human capital and resource abundance, there are not sufficient studies looking

at the connection between resource abundance and institutional quality. The degree of institutional quality is crucial for natural resource management, according to proponents of the institutional perspective of economic growth, because institutions determine factors like physical and human capital (Glawe and Wagner, 2020). Many of the natural resource companies are often owned by the government in resource-rich nations, which might encourage unforeseen public official abuse of power, degrade the standards of political institutions, and slow down economic progress (Sala-i-Martin and Subramanian, 2013). Since excellent institutional quality is a requirement for economic progress, the natural resource industries are greatly impacted (Boschini et al., 2013). Natural resources are also considered to be a significant barrier to the improvement of institutional quality. In other words, governments in resource-rich nations utilize the money they make from those resources to quell unrest, alter public accountability, and lessen demand for institutional reform. The nations with the lowest institutional quality, according to Sachs and Warner (1997) and Karl (1997), are those with the richest natural resources.

Examining earlier research on the link between institutional quality

**Table 2**  
Summarized literature on natural resources and economic growth.

Author (s)	Period	Countries	Methodologies	Dependent variable	Independent variable	Conclusion
Wu et al. (2018)	1997–2015	China	OLS	GDP	NRA, HC, INOV, GOV	NRA increases GDP
Erum and Hussain (2019)	1984–2016	OIC	CS-ARDL	GDP	COR, NRA	NRA increases GDP
Nawaz et al. (2019)	1972–2017	Pakistan	ARDL	GDP	NRA, FDI, K, L	NRA increases GDP
Hassan et al. (2019)	1970–2014	Pakistan	ARDL	GDP	NRA, GLOB, URB	NRA increases GDP
Topcu et al. (2020)	1980–2018	124 Countries	PVAR	GDP	NRA, K, EC, POP	NRA increases GDP
Redmond and Nasir (2020)	1990–2016	30 Countries	FMOLS-DOLS	GDP	IQ, FD, NRA, TO	NRA and IQ increase GDP
Haseeb et al. (2021)	1970–2018	Asian Economies	Quantile on Quantile Regression	GDP	NRA	NRA increases GDP
Hayat and Tahir (2021)	1970–2016	UAE	ARDL	GDP	NRA	NRA increases GDP
Aslan and Altinoz (2021)	1980–2018	European, Asian, African, and American Continents	VAR	GDP	NRA	NRA increases GDP
Ridzuan et al. (2021)	2000–2016	ASEAN	Panel Regression	GDP	NRA, FD, TO, GOV	NRA increases GDP
Saadaoui and Jbir (2021)	2002–2018	95 Countries	GLS	GDP	NRA, IQ	NRA increases GDP IQ reduces GDP
Zeeshan et al. (2021)	1990–2018	Latin American Countries	GMM-OLS	GDP	NRA, EC, FDI	NRA increases GDP
Moshiri and Hayati (2017)	1996–2016	149 Countries	OLS	GDP	NRA, NRA, K, L	NRA reduces GDP
Kim and Lin (2017)	1990–2012	40 Developing Countries	CCE	GDP	NRA	NRA reduces GDP
Tiba and Frikha (2019)	1990–2016	26 African Countries	FMOLS-DOLS	GDP	NRA, IQ, MHDI, TO, K, FDI	NRA reduces GDP
Wang et al. (2019)	1993–2017	China	GMM	GDP	NRA, K, EDU, TO, R&D	NRA reduces GDP
Majumder et al. (2020)	1980–2017	95 Countries	OLS	GDP	NRA, FDI, TO	NRA reduces GDP
Sweidan and Elbargathi (2021)	1995–2016	GCC	ARDL	GDP	NRA	NRA reduces GDP
Inuwa et al. (2021)	2008–2018	OPEC	GMM	GDP	NRA, IQ, FD	NRA reduces GDP IQ and FD increase GDP
Sun and Wang (2021)	2000–2019	China	GMM	GDP	NRA, K, L, HC	NRA reduces GDP HC increases GDP
Khan et al. (2021)	1970–2016	The top ten manufacturing countries	GFLS	GDP	NRA, URB	NRA reduces GDP
Destek et al. (2022)	1990–2017	28 countries with the curse risk	CUP-FM	GDP	NRA, NRA <sup>2</sup> IQ, HC	Inverted U-shaped nexus exists between NRA and GDP IQ does not significantly affect GDP HC increases GDP

**Note:** SAARC: South Asian Association for Regional Cooperation; IQ: Institutional Quality; HC: Human Capital; FD: Financial Development; GG: Green Growth; TO: Trade Openness; INV: Investment; FDI: Financial Development Index; CONC: three banking market concentration; FDI: foreign direct investment; POP: Population; INF: Inflation; T: Trade; DEB: public debt-to-GDP; GCF: fixed capital formation, NRA; natural resources abundance, GI: KOF Globalization Index; GOV: Government Expenditures; REC: Renewable energy consumption; NREC: Non-renewable energy consumption; K: Physical capital; GOVEX: Government expenditure; EXP: Export; L: Labour; GLOB: globalization index; URB: urbanization; GCC: Gulf Cooperation Council; OPEC: Organization of the Petroleum Exporting Countries; GFLS: feasible generalized regression equations; SSA; Sub-Saharan Countries; PLS; Partial Least Square.

and the resource curse reveals that institutional quality is boiled down to a single indicator by averaging six different factors (rule of law, control of corruption, regulatory quality, political instability, voice accountability, and government effectiveness). It is remarkable that so few research (Hayat, 2019; Alexiou et al., 2020; Shittu et al., 2021) have looked at the impact of the index’s constituent components on economic growth. In this study, the effects of rule of law, control of corruption, regulatory quality, political stability, voice accountability, and government effectiveness on economic growth and natural resource abundance are examined one at a time while examining the role of institutional quality in escaping the curse of natural resources in MENA countries. With more consistent and trustworthy estimating findings, it is feasible to examine the degree of institutional quality needed for natural resources to have a beneficial impact on economic growth or to reduce the negative consequences of the resource curse. The Middle East and North Africa (MENA) countries are the inspiration for the MENA group to be the subject of research due to the fact that around 50% of the world’s oil reserves and approximately 40% of the natural gas reserves are situated in these nations (BP Energy Outlook, 2020).

Previous research on the resource curse has mostly concentrated on

the direct correlation between economic growth and factors that might lessen the impact of the curse, such as human capital, institutional quality, and financial development. To reduce the danger of the resource curse, it may be possible to acquire more consistent and dependable results by examining the interactions between these regulatory factors and resource reliance as opposed to their direct impacts. When the recent studies presented in Table 3 are looked at in this way, it can be observed that some of them find that, in nations with excellent institutional quality, a rise in natural resource rent has a beneficial impact on economic growth (Entele, 2021; Nzié and Pepeah, 2022). There are, however, counterarguments that contend that institutional quality enhancement does not lessen the threat of resource curse (Fagbemi and Kotey, 2022). On the other hand, Rahim et al. (2021) demonstrated that the interaction variable between human capital and resource rent has a beneficial impact on real income despite the negative impacts of resource rent on economic development. Last but not least, Alenoghena et al. (2022) evaluated the impact of resource rent on economic activities and financial development in Nigeria and said that as the financial system becomes more advanced, the beneficial impacts of resource rent on economic growth rise.



**Table 3**  
Summarized literature on the role of moderating factors in resource curse.

Author (s)	Period	Countries	Methodologies	Dependent variable	Independent variable	Conclusion
Entele (2021)	1995–2019	9 Countries	GMM	GDP	NRA, IQ, NRA*IQ, K, HC	NRA*IQ increases GDP while NRA reduces GDP
Rahim et al. (2021)	1990–2019	Next-11	AMG	GDP	NRA, NRA*HC, FD, TO	NRA*HC increases GDP while NRA reduces GDP
Nzié and Pepeah (2022)	1996–2019	37 African Countries	ARDL	GDP	NRA, K, L, TO, IQ, NRA*IQ	NRA*IQ increases GDP while NRA does not significantly affect GDP
Alenoghena et al. (2022)	1981–2019	Nigeria	FMOLS	GDP	NRA, FD, NRA*FD	NRA*FD and NRA increases GDP
Fagbemi and Kotey (2022)	1996–2019	Nigeria	ARDL	GDP	NRA, IQ, NRA*IQ, INF	NRA*IQ reduces GDP while NRA increases GDP
Zakari and Khan (2022)	2002–2019	21 sub-Saharan Countries	ARDL	GDP	NRA, IQ, FDI, NRA*IQ	IQ reduces GDP NRA*IQ increases GDP

**Note:** SAARC: South Asian Association for Regional Cooperation; IQ: Institutional Quality; HC: Human Capital; FD: Financial Development; GG: Green Growth; TO: Trade Openness; INV: Investment; FDI: Financial Development Index; CONC: three banking market concentration; FDI: foreign direct investment; POP: Population; INF: Inflation; T: Trade; DEB: public debt-to-GDP; GCF: fixed capital formation, NRA; natural resources abundance, GI: KOF Globalization Index; GOV: Government Expenditures; REC: Renewable energy consumption; NREC: Non-renewable energy consumption; K: Physical capital; GOVEX: Government expenditure; EXP: Export; L: Laboure; GLOB: globalization index; URB: urbanization; GCC: Gulf Cooperation Council; OPEC: Organization of the Petroleum Exporting Countries; GFLS: feasible generalized regression equations; SSA; Sub-Saharan Countries; PLS; Partial Least Square.

### 3. Data and methodology

#### 3.1. Description of variables

The study engages a panel data on MENA countries from 1996 to 2019 is to investigate the relative impacts of different dimensions of institutional quality on reducing possible negative effects of natural resource curse. The variables used are real gross domestic product per capita (constant 2010 US\$) (*GDPPC*); natural resource rent (*nrd*) percentage of GDP; human capital (*hc*); financial developments (*fd*); and institutional qualities index as control variables.

### 4. Materials and methods

The models were captured using four different techniques: the first is the pooled regression techniques (known as pooled OLS) that estimates intercept and slopes of regressors without the individual entities, and/or time effects. Its basic scheme is to test the effects of natural resource rent, human capital, financial development, and institutional quality on real GDP capita. The second one is fixed effects techniques which examined the entity differences in the intercept. It does not take into account the error component across the entity (country). The third one is random effects technique which examines how entity and/or time influences the error variances. The fourth one is system generating method of moment (system GMM) which check for and remove autocorrelation problem, it also allow for inclusion of endogeneity of independent variables. The general model of the study is given below

$$gdpper_{it} = a_0 + a_1nrd_{it} + z_{it} + x_{it} + u_{it} \tag{1}$$

$$gdpper_{it} = a_0 + a_1nrd_{it} + z_{it} + x_{it} * nrd_{it} + u_{it} \tag{2}$$

Where *gdpper* is the real gdp per capita, *nrd* is natural resource rent, *z* is vector of financial developments and human capita, *x* is vector of institutional quality, *x<sub>it</sub> \* nrd<sub>it</sub>* is the interacting variable between each institutional quality and natural resource rent and *u* is the error term.

#### 4.1. Diagnostic measures

To capture and control for endogeneity, we test between the fixed and random effects model using Hausmann test random effect in the null hypothesis. the p-value of the test is less than 1% level of significance meaning that random model is rejected in favour of fixed effect model. Finally, this model also used dynamic model for robustness check to account for endogeneity of the error term and autocorrelation problem.

### 5. Estimation and discussion

Just as discussed in the methodology section, this section talks about the estimation of the model and discussion of results. It starts off from the exploratory data analysis, which seeks to have overviews about the summary statistics and distribution of the intending variables as well as the initial correlations between the dependent and the vector of independent variables. After that, the we delve into the panel data analysis of the main model using range of panel data techniques available.

#### 5.1. Summary statistics

Revealing in Table 4 is summary statistics of the dependent and independent variables at level (upper panel) and at natural logarithm transformation (lower panel). At level, the mean of gdp per capita is \$15190.65, with standard deviation of \$19670.6 indicating that there is very wide disparity among the data relative to their mean, it also has minimum and maximum value of \$632.91 and \$69679.4. On average, natural resource rents has mean of 17.04% of GDP, deviation of 15.41% of GDP with minimum and maximum and minimum value of 0.03% and 58.98%. As for human capital and financial development, their respective average is 2.11 and 0.31 respectively; dispersion of 0.44 and 0.15 which means the amount of disparity between their mean and standard deviation is low.

Comparing the summary statistics of the natural logarithms of the variables to the levels, the mean of GDP per capita has been reduced to

**Table 4**  
Summary statistics.

At level					
Variable	Obs	Mean	Std. Dev.	Min	Max
gdpper	336	15190.65	19670.6	632.9087	69679.4
nrd	336	17.05394	15.41004	0.034886	58.98281
hc	336	2.108525	0.447014	1.107328	3.259456
fd	336	0.30772	0.145475	0.047754	0.578378
voiceaccou ~ y	336	-0.99133	0.454602	-1.9072	0.304584
politicals ~ e	336	-0.62015	1.039181	-2.99331	1.223623
government ~ s	336	-0.16605	0.671511	-2.27942	1.509608
regulatory ~ y	336	-0.27074	0.713056	-1.72011	1.120548
ruleoflaw	336	-0.22636	0.697929	-1.78989	0.958524
controlofc ~ n	336	-0.24048	0.681763	-1.68146	1.567186
Natural Log					
lgdpper	336	8.725336	1.385935	6.450326	11.15166
lnrd	336	2.086507	1.584381	-3.35566	4.077246
lhc	336	0.722066	0.223461	0.10195	1.18156
lfd	336	-1.32767	0.595659	-3.04169	-0.54753

\$8.72 with a very low standard deviation of \$1.39 indicating the disparity is better with range of \$4.7, that is the difference minimum value and maximum value. The same trend was observed from log of natural resource rents which has mean of 2.08% and deviation of 1.58% in comparison to higher standard deviation at levels. It should be noted that, even though log of variables will be deployed in the model, it may not give accurate results, but it does avoid spurious regression results in the model.

5.2. Correlation matrix and bin scatter plot

Both correlation matrix scatter plots of the variables give an insight about the extent of the association between the dependent and independent variables, but while the correlation matrix allow the use of correlation coefficient and significancy of the relationship, scatter plot visualize the relationship in graphical form. Therefore, as revealed in Table 5, all the independent variables have positive and direct relationship with the dependent variable although with varies degree of correlation coefficient as shown by the movement of data points around the fitted line on the bin scatter plot in Fig. 1. For instance, natural resource rent, human capital, and financial development has a correlation coefficient of 0.513, 0.675, and 0.645 respectively all at 0.1 significant level. Also, all the government index variables – rule of law, control of corruption, voice accountability, political stability, government effectiveness, and regulatory quality have positive and significant association with the real gdp per capita.

5.3. Estimation of main model

After exploring the variables, these sections present the panel techniques (pooled-OLS, FE, RE, and one-step sys GMM) of the dependent variables with natural resource rent; human capital, and financial development; institutional qualities, and interaction variables.

In Table 6, the panel result of the relationship between GDP per capita, and all the variables is presented, the result revealed that natural resource has positive and significant relationship with GDP per capita under pooled-OLS with coefficient of 0.039 and RE model with coefficient of 0.015 indicating that a percent increase in natural resource rents will increase the GDP per capita by 0.039% and 0.05% at 0.01 level of significance under each model. The variable is not significant under FE and one-step sys-GMM. Across all the models except sys-GMM, human capital has positive and significant relationship with GDP per capita with regression coefficient ranging from 1.087 to 2.348. This also means a 1.09%–2.35% increase in real GDP per capita when human capital

increase by a unit percent. The finding that human capital accumulation contributes to real GDP is also validated by Zallé (2019); Ponce et al. (2021); Shittu et al. (2021). On the contrary, financial development has negative relationship with real GDP per capita throughout the model, although it is only significant under pooled-OLS with coefficient of –0.181 which means a reduction in real GDP per capita by 0.18% resulting from a cent increase in financial development. This finding is consistent with the study of Raheem et al. (2020).

Regarding the institutional quality variables, voice accountability and government effectiveness is negatively related with real GDP per capita each with coefficient of –0.454 and –0.251 – 0.272 respectively. With these, we could say that both variables have contributed in drawing back the economic growth of MENA by 0.45% and 0.25%–0.27% respectively. However, the other three institutional qualities – political instability, rule of law, and control of corruption variables - have contribution in moving the economic growth of MENA countries forward as they all have positive and significant relationship with the real GDP though under different model. Furthermore, the r-squared of the model is 0.862 explaining that 86.2% variability in real GDP can be explained or accounted for by the vector of independent variables in this study. Although, the significant value of Hausman test (p < 0.05) denotes that RE is the static model suitable for this analysis.

5.4. Interaction model

To examine to what extent the institutional qualities have effects on the main independent variable, natural resource rent, and GDP per capita, we interact each of the variable in institutional qualities with natural resource rents and we re-run the model again. The effects were checked based on the changing in size and significant of the variables compared to the initial model in Table 6.

5.4.1. Interaction of natural resource rents and voice accountability

The interaction of natural resource rents and voice accountability have positive and significant relationship with the real GDP cross all the model except sys-GMM. An increase in the interacting variables has 0.01%–0.025% increase in the GDP of MENA at 1% and 5% significant level. Moreover, the effects change the size of the significant variables in Table 6. The detailed report of this, as revealed in Table 7, is given below.

The natural resource rents have positive and significant relationship with GDP per capita under pooled-OLS with coefficient of 0.610 at 1% level, FE with coefficient of 0.0189 at 5% level, and RE model with coefficient of 0.0371 at 1% level indicating that a percent increase in

Table 5  
Correlation matrix.

Variables	(lgdpper)	(lnrd)	(lhc)	(lfd)	va	polins	govteff	regp	(rol)	coc
lgdpper	1.000									
lnrd	0.513*	1.000								
	(0.000)									
lhc	0.675*	0.098	1.000							
	(0.000)	(0.072)								
lfd	0.645*	0.016	0.732*	1.000						
	(0.000)	(0.768)	(0.000)							
va	0.120*	–0.271*	0.144*	0.288*	1.000					
	(0.028)	(0.000)	(0.008)	(0.000)						
polins	0.765*	0.192*	0.578*	0.681*	0.410*	1.000				
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)					
govteff	0.731*	0.077	0.669*	0.728*	0.380*	0.864*	1.000			
	(0.000)	(0.161)	(0.000)	(0.000)	(0.000)	(0.000)				
regp	0.650*	–0.029	0.561*	0.666*	0.410*	0.754*	0.864*	1.000		
	(0.000)	(0.596)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
ruleoflaw	0.765*	0.037	0.737*	0.814*	0.444*	0.861*	0.883*	0.885*	1.000	
	(0.000)	(0.496)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
coc	0.805*	0.150*	0.697*	0.725*	0.385*	0.866*	0.907*	0.833*	0.899*	1.000
	(0.000)	(0.006)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

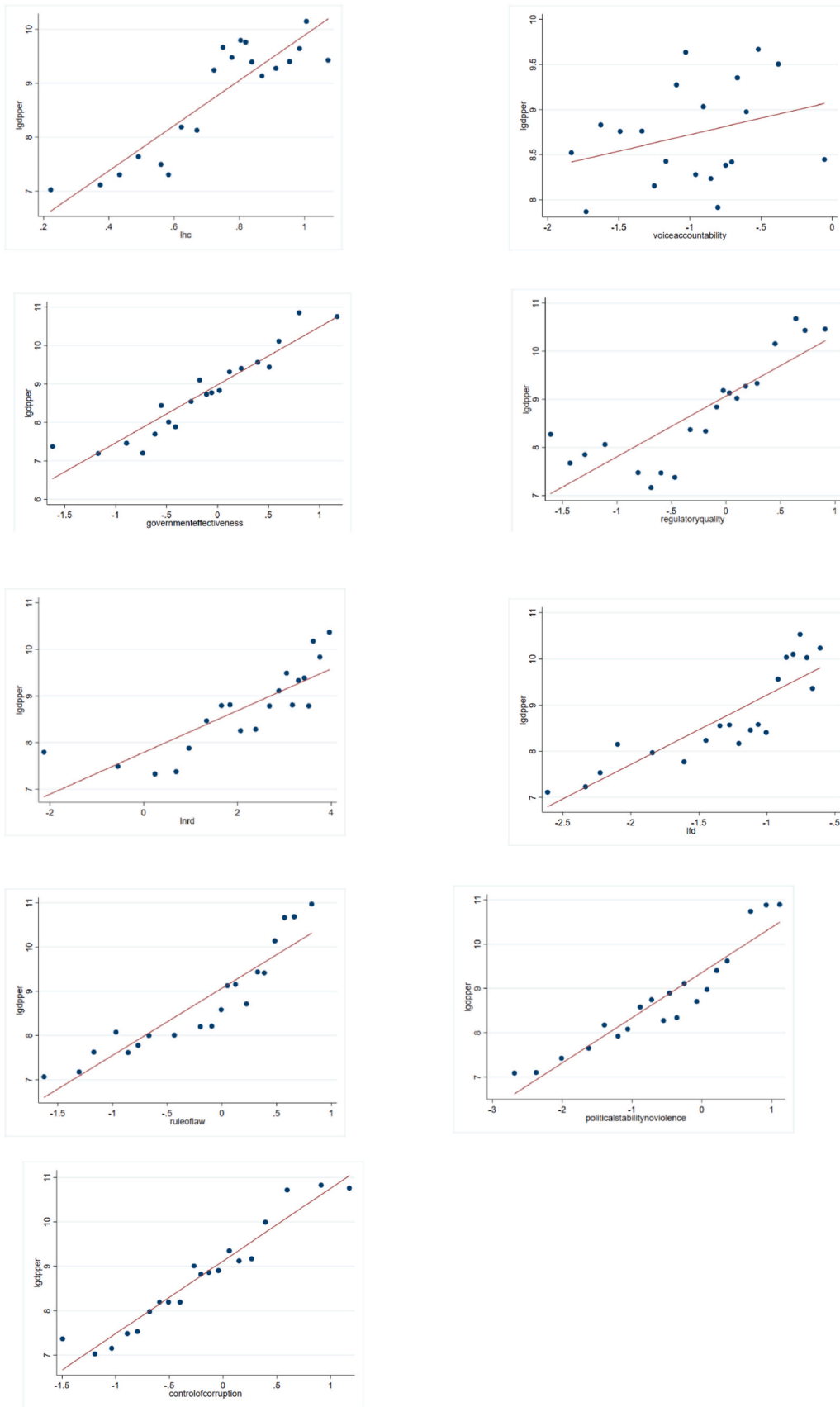


Fig. 1. Bin scatter plot.

**Table 6**  
Results of model across several techniques compared with One-Step System GMM (Dep. Variable: GDPPC, log).

VARIABLES	Pooled OLS	Fixed Effects	Random Effects	One-Step System GMM
nrd	0.0385*** (0.00260)	0.00587 (0.00553)	0.0150*** (0.00418)	-0.000217 (0.00199)
lhc	1.087*** (0.280)	1.531*** (0.347)	2.348*** (0.550)	0.0837 (0.140)
lfd	-0.181* (0.0919)	-0.161 (0.156)	-0.0571 (0.175)	0.0150 (0.0283)
voiceaccountability	-0.454*** (0.0673)	0.0171 (0.0681)	-0.0837 (0.0687)	-0.0320 (0.0223)
politicalstabilitynoviolence	0.0438 (0.0921)	0.148* (0.0763)	0.180** (0.0790)	0.0539 (0.0520)
governmenteffectiveness	0.290 (0.223)	-0.251* (0.120)	-0.272** (0.124)	-0.163 (0.162)
regulatoryquality	0.0126 (0.127)	0.0477 (0.0691)	0.0726 (0.113)	0.0491 (0.0608)
ruleoflaw	0.647*** (0.202)	0.293 (0.180)	0.424** (0.170)	-0.0605 (0.102)
controlofcorruption	0.493*** (0.155)	-0.0176 (0.133)	0.0448 (0.151)	0.0847 (0.0660)
L.lgdpper				1.100*** (0.155)
L2.lgdpper				-0.127 (0.137)
Constant	7.044*** (0.274)	7.414*** (0.408)	6.949*** (0.573)	0.191 (0.205)
Observations	336	336	336	308
R-squared	0.862	0.376		
Instrumental/Groups				252/14
AR (2) pvalue				0.222
Hausman pvalue		0.0000		
Number of countryid		14	14	14

Robust standard errors in parentheses \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

**Table 7**  
Model result of interacting natural resource rents with voice accountability (Dep. Variable: GDPPC, log).

VARIABLES	Pooled OLS	Fixed Effects	Random Effects	One-Step System GMM
Nrd	0.0610*** (0.00315)	0.0189** (0.00851)	0.0371*** (0.00672)	0.00251 (0.00233)
Lhc	1.416*** (0.272)	1.709*** (0.376)	2.624*** (0.538)	0.128 (0.161)
Lfd	-0.114 (0.0920)	-0.126 (0.150)	-0.0147 (0.165)	0.0199 (0.0310)
Voiceaccountability	-0.876*** (0.0968)	-0.0875 (0.0746)	-0.277*** (0.0758)	-0.0776 (0.0462)
Politicalstabilitynoviolence	0.0374 (0.0840)	0.146* (0.0710)	0.174** (0.0709)	0.0515 (0.0491)
Governmenteffectiveness	0.335 (0.207)	-0.291** (0.115)	-0.328*** (0.112)	-0.151 (0.153)
Regulatoryquality	0.0525 (0.123)	0.110 (0.0745)	0.164 (0.120)	0.0533 (0.0610)
Ruleoflaw	0.564*** (0.190)	0.298 (0.169)	0.430*** (0.149)	-0.0626 (0.100)
Controlofcorruption	0.403*** (0.149)	-0.0274 (0.131)	0.0364 (0.156)	0.0823 (0.0656)
nrd_va	0.0247***	0.0103**	0.0168***	0.00239
L.lgdpper				1.092*** (0.161)
L2.lgdpper				-0.130 (0.144)
Constant	6.523*** (0.274)	7.199*** (0.425)	6.557*** (0.565)	0.220 (0.211)
Observations	336	336	336	308
R-squared	0.879	0.396		
Instrumental/Groups				253/14
AR (2) pvalue				0.227
Hausman pvalue		0.0000		
Number of countryid		14	14	14

Robust standard errors in parentheses \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.



natural resource rents will increase the GDP per capita by 0.06%, 0.02%, and at 0.04% under each model. The variable is not significant only under one-step sys-GMM. Across all the models except sys-GMM, human capital has positive and significant relationship with GDP per capita with regression coefficient ranging from 1.416 to 2.624. This also means a 1.42%–2.62% increase in real GDP per capita when human capital increase by a unit percent. On the contrary, financial development has negative relationship with real GDP per capita throughout the model, although it is nonsignificant relationship.

Regarding the institutional quality variables, voice accountability and government effectiveness is still negatively related with real GDP per capita each with coefficient of  $-0.277$  to  $-0.876$  and  $-0.291$  to  $-0.328$  respectively. With these, we could say that both variables have contributed in drawing back the economic growth of MENA by 0.28%–0.88% and 0.29%–0.33% respectively. However, the other four institutional qualities – political instability, regulatory quality, rule of law, and control of corruption variables - have contribution in moving the economic growth of MENA countries forward as they all have positive and significant relationship with the real GDP though under different model. Furthermore, the r-squared of the model is 0.879 explaining that 87.9% variability in real GDP can be explained or accounted for by the vector of independent variables in this study. Although, the significant value of Hausman test ( $p < 0.05$ ) denotes that RE is the static model suitable for this analysis. What was deduced here is that the interacting natural resource rents with voice accountability plays a good role in increasing the economic growth of MENA and also neutralized the negative coefficient of financial development on GDP of MENA.

5.4.2. Interaction of natural resource rents and political instability

The interaction of natural resource rents and political instability have positive and significant relationship with the real GDP under only pooled OLS with coefficient of 0.114 at 1% level. An increase in this

interacting variable has increased the GDP of MENA at 1% by 0.11%. Moreover, the effects change the size and significant of variables (Table 8).

The natural resource rents have positive and significant relationship with GDP per capita under pooled-OLS with coefficient of 0.0428 at 1% level, and RE model with coefficient of 0.0158 at 1% level indicating that a percent increase in natural resource rents will increase the GDP per capita by 0.04% and at 0.02% under each model. The variable is not significant under FE model and one-step sys-GMM. Across all the models except sys-GMM, human capital has positive and significant relationship with GDP per capita with regression coefficient ranging from 1.212 to 2.228. This also means a 1.21%–2.23% increase in real GDP per capita when human capital increase by a unit percent. On the contrary, financial development has negative relationship with real GDP per capita throughout the model, although it is only significant under the pooled-OLS model.

Regarding the institutional quality variables, voice accountability has negative relationship with real GDP with coefficient of  $-0.455$  indicating 0.46% decrease in economic growth of MENA. As for government effectiveness, it has positive and significant effects with 0.452 at 5% level under pooled-OLS model which means 0.45% increase in GDP, but under FE and RE, the effect is negative and also significant at 10% level while it is nonsignificant under sys-GMM. However, the other institutional qualities, political instability itself, have contributing in moving the economic growth of MENA countries forward as they all have positive and significant relationship with the real GDP though under different model. Furthermore, the r-squared of the model is 0.872 explaining that 87.2% variability in real GDP can be explained or accounted for by the vector of independent variables in this study. Although, the significant value of Hausman test ( $p < 0.05$ ) denotes that RE is the static model suitable for this analysis. What was deduced here is that the interacting natural resource rents with political plays a good

**Table 8**  
Model result of interacting natural resource rents with political instability (Dep. Variable: GDPPC, log).

VARIABLES	Pooled OLS	Fixed Effects	Random Effects	One-Step System GMM
nrd	0.0428*** (0.00239)	0.00640 (0.00515)	0.0158*** (0.00434)	0.000894 (0.00204)
lhc	1.212*** (0.264)	1.537*** (0.344)	2.228*** (0.510)	0.113 (0.128)
lfd	-0.261*** (0.0928)	-0.159 (0.159)	-0.0714 (0.168)	-0.00130 (0.0287)
voiceaccountability	-0.455*** (0.0633)	0.0183 (0.0662)	-0.0590 (0.0646)	-0.0389 (0.0236)
politicalstabilitynoviolence	-0.113 (0.0856)	0.138 (0.0877)	0.122 (0.0869)	0.0286 (0.0491)
governmenteffectiveness	0.452** (0.208)	-0.239** (0.108)	-0.211* (0.116)	-0.126 (0.151)
regulatoryquality	0.00867 (0.125)	0.0533 (0.0713)	0.0904 (0.105)	0.0460 (0.0643)
ruleoflaw	0.600*** (0.193)	0.296 (0.188)	0.411** (0.173)	-0.0568 (0.102)
controlofcorruption	0.355** (0.151)	-0.0241 (0.128)	-0.000251 (0.145)	0.0622 (0.0628)
nrd_pins	0.0114*** (0.00200)	0.000718 (0.00328)	0.00354 (0.00292)	0.00180 (0.00106)
L.lgdpper				1.075*** (0.172)
L2.lgdpper				-0.113 (0.153)
Constant	6.720*** (0.276)	7.405*** (0.404)	6.984*** (0.538)	0.214 (0.201)
Observations	336	336	336	308
R-squared	0.872	0.376		
Instrumental/Groups				253/14
AR (2) pvalue				0.223
Hausman pvalue		0.0000		
Number of countryid		14	14	14

Robust standard errors in parentheses \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

role, on some variables, in increasing the economic growth of MENA.

5.4.3. Interaction of natural resource rents and government effectiveness

The interaction of natural resource rents and government effectiveness have positive and significant relationship with the real GDP under only pooled OLS with coefficient of 0.114 at 1% level and under sys-GMM with coefficient of 0.00357 at 10% level. An increase in this interacting variable has increased the GDP of MENA at 1% by 0.02% and at 10% by 0.003% increase. Moreover, the effects also change the size and significant of variables (Table 9).

The natural resource rents have positive and significant relationship with GDP per capita under pooled-OLS with coefficient of 0.0417 at 1% level, and RE model with coefficient of 0.0141 at 1% level indicating that a percent increase in natural resource rents will increase the GDP per capita by 0.04% and at 0.01% under each model. The variable is not significant under FE model and one-step sys-GMM. Across all the models except sys-GMM, human capital has positive and significant relationship with GDP per capita with regression coefficient ranging from 1.141 to 2.236. This also means a 1.41%–2.24% increase in real GDP per capita when human capital increase by a unit percent. On the contrary, financial development has negative relationship, with coefficient of –0.222 at 5% level, with real GDP per capita throughout the model, although it is only significant under the pooled-OLS model.

Regarding the institutional quality variables, voice accountability and government effectiveness is still negatively related with real GDP per capita each with coefficient of –0.410 and –0.241 to –0.277 respectively. With these, we could say that both variables have contributed in drawing back the economic growth of MENA by 0.41% and 0.24%–0.28% respectively. However, the other four institutional qualities, except regulatory quality have contribution in moving the

**Table 9**  
Model result of interacting natural resource rents with government effectiveness (Dep. Variable: GDPPC, log).

VARIABLES	Pooled OLS	Fixed Effects	Random Effects	One-Step System GMM
nrd	0.0417*** (0.00252)	0.00511 (0.00481)	0.0141*** (0.00444)	0.000919 (0.00191)
lhc	1.141*** (0.268)	1.534*** (0.353)	2.236*** (0.525)	0.103 (0.130)
lfd	–0.222** (0.0907)	–0.153 (0.150)	–0.0760 (0.164)	0.00291 (0.0287)
voiceaccountability	–0.410*** (0.0664)	0.0136 (0.0657)	–0.0619 (0.0669)	–0.0266 (0.0217)
politicalstabilitynoviolence	–0.00111 (0.0866)	0.149* (0.0770)	0.174** (0.0777)	0.0433 (0.0492)
governmenteffectiveness	0.212 (0.220)	–0.241* (0.133)	–0.277** (0.134)	–0.169 (0.150)
regulatoryquality	0.0124 (0.124)	0.0422 (0.0678)	0.0742 (0.103)	0.0472 (0.0627)
ruleoflaw	0.661*** (0.195)	0.294 (0.180)	0.405** (0.171)	–0.0451 (0.101)
controlofcorruption	0.364** (0.155)	–0.00889 (0.123)	0.0239 (0.140)	0.0501 (0.0576)
nrd_gve	0.0159*** (0.00454)	–0.00166 (0.00391)	0.00171 (0.00363)	0.00357* (0.00186)
L.lgdpper				1.080*** (0.168)
L2.lgdpper				–0.116 (0.152)
Constant	6.883*** (0.281)	7.435*** (0.389)	7.002*** (0.532)	0.223 (0.201)
Observations	336	336	336	308
R-squared	0.868	0.377		
Instrumental/Groups				253/14
AR (2) pvalue				0.206
Hausman pvalue		0.0000		
Number of countryid		14	14	14

Robust standard errors in parentheses \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

economic growth of MENA countries forward as they all have positive and significant relationship with the real GDP though under different model. Furthermore, the r-squared of the model is 0.868 explaining that 86.8% variability in real GDP can be explained or accounted for by the vector of independent variables in this study. Although, the significant value of Hausman test (p < 0.05) denotes that RE is the static model suitable for this analysis. Furthermore, the nonsignificant value of AR(2) test, p > 0.05 indicate that the GMM dynamic model is free from serial correlation and endogenous instrumental variables.

5.4.4. Interaction of natural resource rents and regulatory quality

The interaction of natural resource rents and regulatory law have no positive and significant relationship with the real GDP across all the models. Although, there is little shifts in the size and significant effects of other variables on the real GDP, the result is presented in Table 10.

The natural resource rents have positive and significant relationship with GDP per capita under pooled-OLS with coefficient of 0.0393 at 1% level, and RE model with coefficient of 0.0151 at 1% level indicating that a percent increase in natural resource rents will increase the GDP per capita by 0.04% and at 0.01% under each model. The variable is not significant under FE model and one-step sys-GMM. Across all the models except sys-GMM, human capital has positive and significant relationship with GDP per capita with regression coefficient ranging from 1.099 to 2.246. This also means a 1.10%–2.25% increase in real GDP per capita when human capital increase by a unit percent. On the contrary, financial development has negative relationship, with coefficient of –0.179 at 5% level, with real GDP per capita throughout the model, although it is only significant under the pooled-OLS model.

Regarding the institutional quality variables, voice accountability and government effectiveness is still negatively related with real GDP

**Table 10**  
Model result of interacting natural resource rents with regulatory quality (Dep. Variable: GDPPC, log).

VARIABLES	Pooled OLS	Fixed Effects	Random Effects	One-Step System GMM
nrd	0.0393*** (0.00262)	0.00667 (0.00566)	0.0151*** (0.00480)	6.03e-05 (0.00189)
lhc	1.099*** (0.277)	1.518*** (0.346)	2.246*** (0.518)	0.0873 (0.135)
lfd	–0.179* (0.0916)	–0.167 (0.153)	–0.0755 (0.166)	0.0152 (0.0280)
voiceaccountability	–0.443*** (0.0669)	0.0208 (0.0664)	–0.0622 (0.0677)	–0.0297 (0.0225)
politicalstabilitynoviolence	0.0289 (0.0891)	0.146* (0.0752)	0.173** (0.0765)	0.0490 (0.0501)
governmenteffectiveness	0.351 (0.219)	–0.235** (0.108)	–0.237** (0.107)	–0.143 (0.153)
regulatoryquality	–0.0938 (0.148)	0.0149 (0.0857)	0.00808 (0.125)	0.0178 (0.0675)
ruleoflaw	0.647*** (0.200)	0.298 (0.183)	0.420** (0.171)	–0.0586 (0.103)
controlofcorruption	0.469*** (0.157)	–0.0267 (0.129)	0.0185 (0.146)	0.0762 (0.0628)
nrd_requa	0.00512 (0.00358)	0.00186 (0.00302)	0.00346 (0.00329)	0.00145 (0.00117)
L.lgdpper				1.093*** (0.155)
L2.lgdpper				–0.121 (0.138)
Constant	7.022*** (0.276)	7.401*** (0.400)	6.982*** (0.541)	0.192 (0.198)
Observations	336	336	336	308
R-squared	0.863	0.377		
Instrumental/Groups				253/14
AR (2) pvalue				0.209
Hausman pvalue		0.0000		
Number of countryid		14	14	14

Robust standard errors in parentheses \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

per capita each with coefficient of  $-0.443$  and  $-0.235$  to  $-0.237$  respectively. With these, we could say that both variables have contributed in drawing back the economic growth of MENA by  $0.31\%$  and  $0.24\%$  respectively. However, the other four institutional qualities, except regulatory quality have contribution in moving the economic growth of MENA countries forward as they all have positive and significant relationship with the real GDP though under different model. Furthermore, the r-squared of the model is  $0.868$  explaining that  $86.8\%$  variability in real GDP can be explained or accounted for by the vector of independent variables in this study. Although, the significant value of Hausman test ( $p < 0.05$ ) denotes that RE is the static model suitable for this analysis. Furthermore, the nonsignificant value of AR(2) test,  $p > 0.05$  indicate that the GMM dynamic model is free from serial correlation and endogenous instrumental variables. The result denoted that interacting regulatory quality and natural resource rents play no important roles in increasing the economic growth of MENA countries.

5.4.5. Interaction of natural resource rents and rule of law

Interacting natural resource rents and rule of law have positive and significant relationship with the real GDP under the pooled OLS model with coefficient of  $0.0133$  at  $1\%$  level. There is also little shifts in the size and significant effects of other variables on the real GDP, the result is presented in Table 11.

The natural resource rents have positive and significant relationship with GDP per capita under pooled-OLS with coefficient of  $0.0397$  at  $1\%$  level, and RE model with coefficient of  $0.0151$  at  $1\%$  level indicating that a percent increase in natural resource rents will increase the GDP per capita by  $0.04\%$  and at  $0.01\%$  under each model. The variable is not significant under FE model and one-step sys-GMM. Across all the models except sys-GMM, human capital has positive and significant relationship

**Table 11**  
Model result of interacting natural resource rents with rule of law (Dep. Variable: GDPPC, log).

VARIABLES	Pooled OLS	Fixed Effects	Random Effects	One-Step System GMM
nrd	0.0397*** (0.00238)	0.00636 (0.00527)	0.0151*** (0.00490)	0.000272 (0.00177)
lhc	1.185*** (0.270)	1.513*** (0.361)	2.203*** (0.539)	0.110 (0.133)
lfd	-0.203** (0.0922)	-0.163 (0.157)	-0.0745 (0.171)	0.00821 (0.0283)
voiceaccountability	-0.411*** (0.0670)	0.0234 (0.0669)	-0.0464 (0.0703)	-0.0296 (0.0219)
politicalstabilitynoviolence	0.0390 (0.0916)	0.148* (0.0763)	0.177** (0.0778)	0.0519 (0.0515)
governmenteffectiveness	0.423** (0.208)	-0.243** (0.109)	-0.239** (0.109)	-0.132 (0.143)
regulatoryquality	0.0358 (0.125)	0.0516 (0.0721)	0.0818 (0.107)	0.0512 (0.0664)
ruleoflaw	0.330 (0.226)	0.276* (0.147)	0.347** (0.158)	-0.106 (0.116)
controlofcorruption	0.412*** (0.153)	-0.0229 (0.129)	0.0162 (0.145)	0.0699 (0.0607)
nrd_rol	0.0133*** (0.00294)	0.000997 (0.00512)	0.00341 (0.00474)	0.00224 (0.00131)
L.lgdpper				1.088*** (0.159)
L2.lgdpper				-0.122 (0.145)
Constant	6.916*** (0.266)	7.417*** (0.411)	7.019*** (0.556)	0.229 (0.216)
Observations	336	336	336	308
R-squared	0.870	0.376		
Instrumental/Groups				253/14
AR (2) pvalue				0.223
Hausman pvalue		0.0000		
Number of countryid		14	14	14

Robust standard errors in parentheses \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

with GDP per capita with regression coefficient ranging from  $1.185$  to  $2.200$ . This also means a  $1.185\%$ – $2.200\%$  increase in real GDP per capita when human capital increase by a unit percent. On the contrary, financial development has negative relationship, with coefficient of  $-0.203$  at  $5\%$  level, with real GDP per capita throughout the model, although it is only significant under the pooled-OLS model.

Regarding the institutional quality variables, voice accountability has negative relationship with real GDP with coefficient of  $-0.411$  indicating  $0.41\%$  decrease in economic growth of MENA. As for government effectiveness, it has positive and significant effects with  $0.423$  at  $5\%$  level under pooled-OLS model which means  $0.42\%$  increase in GDP, but under FE and RE, the effect is negative and also significant at  $10\%$  and  $5\%$  level respectively while it is nonsignificant under sys-GMM. However, the other institutional qualities, except regulatory quality, have contributed in moving the economic growth of MENA countries forward as they all have positive and significant relationship with the real GDP though under different model. Furthermore, the r-squared of the model is  $0.870$  explaining that  $87.0\%$  variability in real GDP can be explained or accounted for by the vector of independent variables in this study. Although, the significant value of Hausman test ( $p < 0.05$ ) denotes that RE is the static model suitable for this analysis. What was deduced here is that the interacting natural resource rents with rule of law plays a good role, on some variables, in increasing the economic growth of MENA.

5.4.6. Interaction of natural resource rents and control of corruption

Just like the result in Table 8, the interaction of natural resource rents and control of corruption have positive and significant relationship with the real GDP under the pooled OLS and sys-GMM model with coefficient of  $0.114$  at  $1\%$  level and  $0.00239$  at  $10\%$  level respectively.

**Table 12**  
Model result of interacting natural resource rents with control of corruption (Dep. Variable: GDPPC, log).

VARIABLES	Pooled OLS	Fixed Effects	Random Effects	One-Step System GMM
nrd	0.0408*** (0.00248)	0.00676 (0.00518)	0.0148*** (0.00452)	0.000510 (0.00184)
lhc	1.221*** (0.279)	1.521*** (0.350)	2.235*** (0.518)	0.118 (0.135)
lfd	-0.205** (0.0925)	-0.167 (0.154)	-0.0775 (0.165)	0.00782 (0.0275)
voiceaccountability	-0.424*** (0.0657)	0.0284 (0.0617)	-0.0475 (0.0637)	-0.0285 (0.0205)
politicalstabilitynoviolence	0.0306 (0.0908)	0.145* (0.0750)	0.171** (0.0764)	0.0512 (0.0511)
governmenteffectiveness	0.410* (0.210)	-0.228* (0.107)	-0.230** (0.107)	-0.130 (0.146)
regulatoryquality	0.0365 (0.127)	0.0548 (0.0698)	0.0805 (0.104)	0.0536 (0.0645)
ruleoflaw	0.593*** (0.199)	0.286 (0.170)	0.394** (0.164)	-0.0651 (0.104)
controlofcorruption	0.195 (0.181)	-0.0663 (0.146)	-0.0481 (0.160)	0.0180 (0.0561)
nrd_coc	0.0114*** (0.00340)	0.00184 (0.00432)	0.00307 (0.00415)	0.00239* (0.00121)
L.lgdpper				1.088*** (0.161)
L2.lgdpper				-0.121 (0.145)
Constant	6.848*** (0.286)	7.395*** (0.398)	6.985*** (0.535)	0.191 (0.191)
Observations	336	336	336	308
R-squared	0.867	0.377		
Instrumental/Groups				253/14
AR (2) pvalue				0.213
Hausman pvalue		0.0000		
Number of countryid		14	14	14

Robust standard errors in parentheses \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

Although, there is also little shifts in the size and significant effects of other variables on the real GDP, the result is presented in Table 12.

The natural resource rents have positive and significant relationship with GDP per capita under pooled-OLS with coefficient of 0.0408 at 1% level, and RE model with coefficient of 0.0148 at 1% level indicating that a percent increase in natural resource rents will increase the GDP per capita by 0.04% and at 0.01% under each model. The variable is not significant under FE model and one-step sys-GMM. Across all the models except sys-GMM, human capital has positive and significant relationship with GDP per capita with regression coefficient ranging from 1.221 to 2.235. This also means a 1.22%–2.24% increase in real GDP per capita when human capital increase by a unit percent. On the contrary, financial development has negative relationship, with coefficient of  $-0.205$  at 5% level, with real GDP per capita throughout the model, although it is only significant under the pooled-OLS model.

Regarding the institutional quality variables, voice accountability has negative relationship with real GDP with coefficient of  $-0.424$  indicating 0.42% decrease in economic growth of MENA. As for government effectiveness, it has positive and significant effects with 0.410 at 5% level under pooled-OLS model which means 0.41% increase in GDP, but under FE and RE, the effect is negative and also significant at 10% and 5% level respectively while it is nonsignificant under sys-GMM. However, the other institutional qualities, except regulatory quality and control of corruption, have contributing in moving the economic growth of MENA countries forward as they all have positive and significant relationship with the real GDP though under different model. Furthermore, the r-squared of the model is 0.867 explaining that 86.7% variability in real GDP can be explained or accounted for by the vector of independent variables in this study. Although, the significant value of Hausman test ( $p < 0.05$ ) denotes that RE is the static model suitable for this analysis. What was deduced here is that the interacting natural resource rents with control of corruption plays a good role, on some variables, in increasing the economic growth of MENA.

## 6. Conclusions and policy implications

Having an increased economic growth is the global concern of all the countries in the world. As such, different countries have certain qualities and policies that could foster her financial increment in order to have good standard of living for her citizens. This study seeks to examine the relative impacts of different dimensions of such qualities – institutional quality (that is, index of rule of law, control of corruption, regulatory quality, political instability, voice accountability, and government effectiveness) – in MENA countries using a cross-sectional and time series data from period of 1996–2019. In the light of this, the main variable considered is effects of natural resource rents and other factors, such as human factor and financial developments on real GDP per capita which measures the economic growth of MENA countries. Then, we interact each of institutional quality indices with natural resource rents to check if there would be decrease in negative curse of natural resource, if exist, on the MENA economic growth. To achieve this, four different panel techniques ranging from pooled-OLS to fixed effect model, random effect model, and one-step system GMM that control for serial correlation and heteroscedasticity of the error term.

The initial result of the model revealed that natural resource rents have positive and significant relationship with real GDP per capita indicating that the natural resource foster the economic growth of the MENA countries. Also, human capital also plays a very important role in fostering the economic growth, however, financial development was examined to have negative impacts on real GDP per capita, hence diminishes the financial growth of the country. Voice accountability and government effectiveness have negative effects on the real GDP, while the other institutional quality, except regulatory quality, have significant contribution in increasing the real GDP.

The interacting effects of natural resource and voice accountability foster the economic development, and it also have impact in increasing

the size of natural resources, and human capital on the economic development of MENA while at the same time vanishes the initial negative effects of financial development of the economic growth. Moreover, interaction of natural resource rent on political instability, government effectiveness, rule of law, and control of corruption have all significantly contributed to increase the economic growth of MENA while regulatory law is of no significant. Based on this, it should be of concerned to policy to check what factors induces the diminish effect of financial development on the economic growth and synergizing ways to curb the recurring effects of such factors. Also, policy should keep on making advance the directions towards improving the natural resource rents and human capital of the MENA countries as this have in all ways contributed positively in upsurging the economic growth. Finally, the policy should also make an ideal development towards improving the MENA institutional quality, especially regulatory quality as its interaction effects has no impacts in fostering the economic development.

Although this study fills a significant gap in the literature by investigating the role that potential enhancements in the institutional quality sub-dimensions may play in lessening the resource curse, it centers on the supposition that the adverse effects of the resource curse only affect real income. On the other hand, comprehensive development processes could not be adequately served by policies that reduce the detrimental consequences on economic growth. A major limitation of the research is the lack of a more comprehensive examination of the process directed toward sustainable development. Future research will thus lay the foundation for more in-depth policy suggestions by looking at other indicators (such as the sustainable development index) that point to sustainable development rather than real national income as the dependent variable.

## Author statement

**Mehmet Akif Destek:** Original Idea, Writing, Conceptualization, Supervision, **Festus Adedoyin:** Empirical Analysis, Software, Manuscript Review, Writing, **Festus Victor Bekun:** Original Draft, Draft Reviewing, Methodology, Manuscript Review, **Sercan Aydın:** Data Curation, Visualization, Writing – Review & Editing.

## Data availability

Data will be made available on request.

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