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The Moderating Effect of Financial Development and Institutions

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Natural Resource Volatility and Inclusive Growth in MENA: The Moderating Effect of Financial Development and Institutions

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Abstract

This study investigates the nexus between natural resource volatility and inclusive growth while examining the moderating impact of financial development and institutional quality across 18 Middle East and North African (MENA) countries from 2002 to 2021. The empirical results based on the two-step system GMM estimation reveal that natural resource volatility positively affects inclusive growth after controlling for moderation effects, implying that natural resources are a blessing in MENA. The results also indicate that the proposed moderators play a pivotal role in shaping the impact of volatility on inclusive growth. Institutions and volatility exhibit a synergistic relationship in promoting inclusivity in the MENA region. Nonetheless, volatility and financial development are substitutive in promoting inclusive growth since financial development (natural resource volatility) weakens the positive impact of volatility (financial development). Overall, institutional quality and financial development have a net positive impact on inclusive growth. However, the positive effect of financial development is entirely negated at a volatility threshold of 34%, whereas institutional quality has a net positive effect beyond a volatility threshold of 17%. Additionally, the net positive impact of volatility on inclusive growth is nullified at a financial development threshold of 80%. Policymakers in MENA are recommended to be prudent with these thresholds while pursuing shared prosperity from their abundant natural resources.

Keywords: Inclusive growth, Natural resource volatility, Financial Development, Governance, Institutional Quality, MENA

JEL classification: P48, E02, I24

Abbreviations

Natural resource volatility	NRV	**Inclusive growth**	IG
Institutional Quality	IQ	**Financial Development**	FD

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1. Introduction

Natural resources are the world's major traded commodities (Cao & Xiang, 2023; Ma et al., 2023). In 2021, oil, coal, and natural gas accounted for 82% of primary energy consumption (BP, 2022). Approximately 33% of the world's energy consumption is derived from crude oil, and its raw materials are used in practically every sector of the economy (Eyden et al., 2019; Wachtmeister et al., 2018). However, natural resource prices, particularly oil, are exceedingly volatile and bounce higher than other mineral resources (Zhang et al., 2024). Such volatility has always been a source of apprehension for governments in oil-producing and oil-consuming countries (Yating et al., 2022). The escalating geopolitical fragmentation and climate change imperatives have compounded these concerns (IMF, 2023a; Li, 2023). For instance, the oil price surge following the Ukrainian-Russian conflict and the relaxation of COVID-19 restrictions culminated in a record high of $120 per barrel in June 2022 after a substantial drop to $16.70 per barrel in April 2020 (World Bank, 2023; Zhang et al., 2024). However, the price plunged significantly again, eventually settling at $81.08 per barrel in November 2023 (OPEC, 2023). This is primarily due to concerns over reduced demand in the global economy, further deteriorating by the current Middle East tension, with additional downturns expected in the future (IMF, 2023a).

Accordingly, natural resource volatility (NRV) and its impact on economic performance have piqued scholars' and policymakers' attention (Bakhsh & Zhang, 2023), particularly with a continuing stream of research empirically verifying the volatility-triggering and long-lasting impact of the current crises (Zhang et al., 2024; Cao & Xiang, 2023; Thi et al., 2023; Sha, 2022; Su et al., 2021; Guan et al., 2021), along with the deleterious impact of geopolitical risks on natural resources' returns and volatility (Zheng et al., 2023; Dogan et al., 2021). Literature has extensively evolved, therefore, to explore NRV's multifaceted effects, especially oil prices effects on economic growth and has provided contradictory results (Guo et al., 2022; Wang et al., 2022; Liu et al., 2022; Yu et al., 2022).

NRV cannot only affect growth prospects but also can impact the likelihood of its inclusiveness, discerning a shift from focusing on the income level or growth rate to how this income is shared (i.e., inclusive growth). In addition to its effects on growth, the amplification of NRV inevitably contributes to higher inflation, which could push millions into food insecurity and poverty, especially in developing countries (IMF, 2023b). A staggering 345 million people worldwide are expected to suffer from severe food insecurity this year, nearly doubling the number in 2020 (WFP, 2023). In addition, between 75 and 95 million more people lived in extreme poverty in 2022 than in the pre-pandemic era (IMF, 2023c). The current brewing conflict in the Middle East further exacerbates these concerns due to its impact on oil prices. Since the beginning of the conflict, oil prices have risen by roughly 6%. A sustained rise in oil prices will further push inflation (World Bank, 2023b), which can aggravate living standards and poverty. However, as will be discussed, some scholars argue in favor of the beneficial impact of NRV on economic growth and, hence, its inclusivity, leaving ambiguity as to how precisely volatility affects inclusive growth (IG).

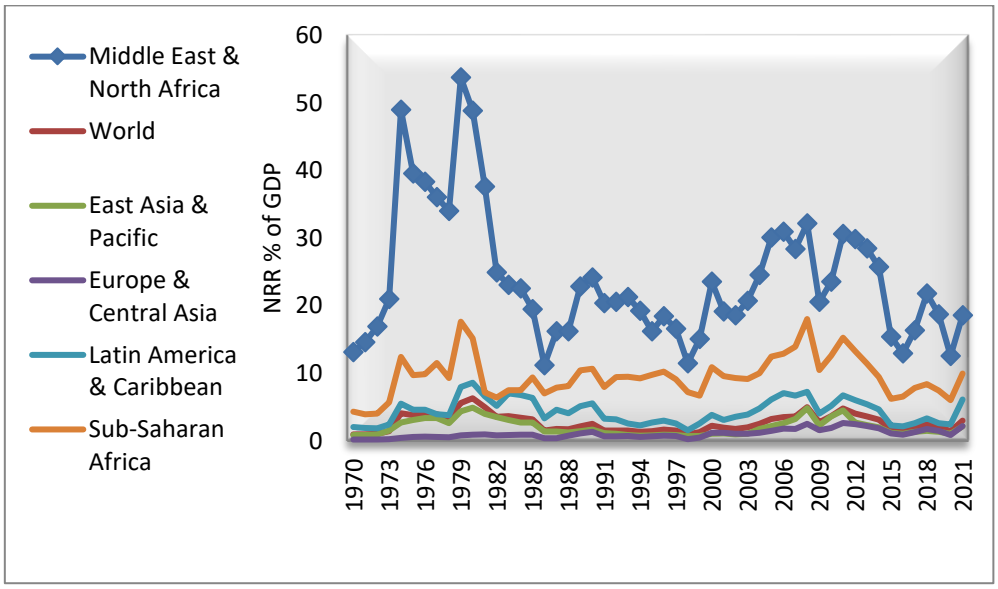
Additionally, natural resource management is considered indispensable for long-term shared prosperity, as the potential positive attributes of natural resources are heavily dependent on how they are used and managed (Cheng et al., 2023). Recent propositions have indicated that poorly functioning institutions and financially underdeveloped economies are more prone to volatility and external shock risk. On the one side, according to Ploeg and Poelhekke (2009), NRV has a disruptive indirect effect on economic growth, suggesting that a well-functioning financial sector lessens the volatility curse. On the other side, weak institutional fabrics are considered a significant impediment to the government's ability to decouple its spending priorities from fluctuations in resource revenue, thereby hindering IG (Raheem et al., 2018). Therefore, this paper argues that financial development (FD) and institutional quality (IQ) could moderate the relation between natural resource volatility and IG.

In a nut, this inquiry draws the attention of scholars and practitioners to an emerging issue, accentuating *the quality of growth rather than the quantity* (Raheem et al., 2018). We, specifically,

scrutinize whether and how NRV affects IG while considering the moderating role of FD and IQ in the Middle East and North Africa (MENA), which is exceptionally pertinent for various reasons.

MENA is one of the world's leading energy-producing regions, boasting approximately 60% of global oil and 45% of global gas reserves (Suad et al., 2023). MENA's economic performance is linked to its natural wealth, as shown in Figure (1). Moreover, oil exports weigh over 85% of the region's overall exports (Liu et al., 2022), rendering it dramatically prone to NRV (Chengyonghui et al., 2023). Natural resource-driven revenues allow the region's countries to achieve high growth rates, yet countries grapple with ensuring that development perks are shared equally. Poverty and inequality in the region are remarkably high, ranking it the most unequal region globally (OXFAM, 2023). Poverty rates in MENA have almost doubled since 2010 compared to other regions, with around 192 million people living in extreme poverty in 2021[3] (World Bank, 2022). In total, a mere 11% of the total income reaches the bottom half, whereas half goes to the top 10% (OXFAM, 2023), fueling economic exclusiveness, which is a crucial driver of the region's social instability (Lui et al., 2022). Cascading and multidimensional crises also hinder the MENA's prospects for IG. These include atypical soaring food and energy prices, climate-related risks, the ongoing Russian-Ukrainian conflict, IMF-imposed austerity measures in certain countries, public debt surges, currency depreciation, interest rate increases (OXFAM, 2023; World Bank Group, 2023), and most importantly, natural resource price oscillations (Liu et al., 2022). Hence, NVR, IG, and their relation are highly relevant for the region.

Figure (1) Trends in Natural Resources Rent Shares in MENA vs. Other Regions



Source: WDI (2022)

As mentioned, no study has investigated the effect of natural resource volatility on inclusive growth. Thus, our investigation provides a unique contribution to the extant field of knowledge in several empirical novelties: (1) To the best of the authors' knowledge, this is one of the first studies that empirically investigate the impact of NRV on IG, which refines the existing literature on the NRV-economic performance nexus. Arezki and Nabil's (2012) highlighted the potential impact of NRV on IG, albeit without empirical validation. (2) The dataset spans from 2002 to 2021, covering the COVID-19 pandemic, a significant source of global uncertainty, especially in natural resources. (3) This study examines the dynamics among the selected variables, emphasizing the MENA region, where NRV and IG are relatively crucial, particularly in current crises. (4) This study investigates how internal financial

[3] less than $5.50/day

development and institutional quality (governance) can moderate the impact of exogenous natural resources volatility on IG, which is a novel perspective in policy-based analysis.

Using two-step System-Generalized Methods of Moments (SYS-GMM), this paper finds a positive relationship between resource volatility and inclusive growth after controlling for the two proposed modulating variables. Unconditionally, financial development positively affects inclusive growth, whereas institutions have a negative effect. Regarding interactive terms, the findings demonstrate that the NRV-IG link is moderated by institutional quality and financial development. On the one hand, institutional quality and resource volatility are particularly complementary in promoting inclusive growth in MENA. In contrast, financial development and resource volatility are substitutes for improving inclusive growth. Overall, both modulators generate positive net effects in the MENA region. However, the positive effect of financial development is completely negated at a volatility threshold of 34%, whereas institutional quality starts to have a net positive effect after a volatility threshold of 17%. In addition, the net positive impact of volatility on inclusive growth is nullified at a financial development threshold of 80%.

The paper structure is configured into five sections. Section 2 surveys the existing literature. Next, Section 3 introduces the model specification and the estimation strategy. The empirical results are then reported and discussed in Section 4. Finally, Section 5 concludes and provides policy implications.

2. Literature Survey and Hypotheses Development

2.1. Natural Resource Volatility and Inclusive Growth

Plentiful natural resources were considered a "boon " for economic growth and development for millennia. However, since the 1980s, economists have voiced doubts regarding this, arguing that natural resource abundance can adversely affect growth and development (Lotfalipour et al., 2022). Eventually, Corden and Neary (1982) and Bruno and Sachs (1982) coined the term "Dutch disease," which was empirically supported later by Sachs and Warner (1995), stating that resource-rich economies tend to grow more slowly than resource-poor economies (Lotfalipour et al., 2022). Sachs and Warner (1995) finding sparked a surge of academic investigations into the so-called "resource curse," yielding two seemingly divergent findings: some asserting that natural resources are a curse (Rahim et al., 2021) and others advocating that they are a blessing (Hayat & Taher, 2021). A parallel strand, nonetheless, maintains that natural resources do not inhibit development on their own but rather induce aberrations that act as transmission channels to stymie development (Yang et al., 2021; Aljarallah & Angus, 2020; Haouas & Soto, 2012), ranging from human capital, environmental quality, institutional settings, and others (Dialga & Ouoba, 2022; Destek et al., 2023; Elmassah & Hassanein, 2022). However, these studies substantially overlooked the volatility channel of effect (Su et al., 2021).

A strand of research has highlighted the volatility channel as the primary channel of the resource curse, positing that the adverse indirect effects of volatility may trump the positive impact of natural resources abundance on economic performance (Joya, 2015; Eyden et al., 2019), and the current severe fluctuations prove to fuel this claim (Sun et al., 2022). This notion was initially supported by Ramey and Ramey (1995), who demonstrated that natural resource volatility negatively affects economic growth. Specifically, countries with higher levels of volatility tend to have lower average growth rates even after controlling for other factors influencing growth. Ploeg and Poelhekke (2009) also observe that the disruptive indirect impact of natural resources on economic growth through volatility obscures any favorable direct impact. In a similar vein, Cavalcanti et al. (2015) deduce that volatility's harmful effects on growth dwarf the positive impact of commodity booms, implying that volatility rather than plenty causes the 'resource curse' paradox. Similarly, Benramdane (2017) found that oil price volatility, rather than abundance, dictates Algeria's "resource curse" dichotomy. In addition, Hayat and Tahir

(2021) analyzed NRV and economic growth in resource-rich economies and concluded that while natural resources can promote economic growth, their volatility harms it. Guan et al. (2021) and Jaya (2015) also provided similar results using a sample of top oil-producing nations and a global sample of 187 countries.

The link between NRV and economic growth has recently emerged as a prominent theme in resource research, particularly following the COVID-19 outbreak, triggering a growing body of research with heterogeneous findings in various contexts. Most studies, however, concur that NRV impairs economic growth. For example, Zhang et al. (2023) utilized the Bootstrap Autoregressive Distributed Lagged (BARDL) estimation method to examine economic performance and uncertainties in natural resource prices from 1996 to 2021. The long- and short-run results indicate that NRV impedes China's growth. In a similar vein, Deng (2022), Hsu et al. (2023), Wen et al. (2022), and Etokakpan et al. (2020) empirically analyzed the previous relationship in China, 11 emerging countries, BRICS, and the G7 economies, respectively, and provided similar findings. In addition, Aloui et al. (2018) found that the volatile oil market hindered Saudi Arabia's economic growth from 1969 to 2014. Over 144 data points, Eyden et al. (2019) blended several panel data estimations in OECD countries and reported that oil price volatility significantly affected their economic growth. Adeosun et al. (2022), Sha (2022), Guan et al. (2018) and, Zhou et al. (2022); (Ma et al., 2022) also reported similar results across different time series and panel data. However, Rosnawintang et al. (2021) and Charfeddine and Barkat (2020) observed that inverse swings in oil prices harm GDP growth only in the short run. In contrast, Guan et al. (2021) revealed that NRV severely impacted economic growth in the long run.

Scholars have challenged this seemingly obvious consensus by noting that volatility may benefit growth. For example, Nusair (2015) analyzed the influence of oil price fluctuations on the real GDP of the GCC region, and the results show a positive correlation with positive fluctuations having a significantly greater impact on real GDP. Similarly, Nasir et al. (2019) show that oil price shocks have a statistically favorable, though variant, effect on GCC countries' growth, a finding refuted by Erdogan et al. (2020) in the same context. In an analysis of Brazil, Russia, India, China, and South Africa between 1990 and 2020, Wu et al. (2023) found that natural gas and coal volatility positively correlated with economic performance, whereas oil volatility was insignificant. According to the results of Arif et al. (2022), NRV are crucial in bolstering China's economic performance. Li (2023) also reports a positive link between coal commodity prices, crude oil commodity prices, and economic expansion.

Although empirical examination of the effect of NRV on IG is understudied, the few attempts to study this link are typically devoted to a single aspect of IG (i.e., inequality) and are severely limited in number and scope with inconsistent outcomes. A shred of evidence demonstrates that natural resource supply chains, from discovery to sale, are considered a source of elitism and exclusivity (Shah et al., 2023; Raheem et al., 2018). For instance, Kim et al. (2020) found that oil abundance mitigates income inequality while its volatility inhibits it through institutional channels. They claim that resource abundance may lead to institutional decay, political corruption, and rent-seeking, distorting public expenditures from productive activities and thereby exacerbating income disparities. According to Aizenman and Pinto (2005), high NRV adversely affects social welfare, poverty, and income inequality. In addition, Baba (2017) showed that household welfare, economic growth, and poverty in Nigeria have declined substantially due to oil price volatility from 1997 to 2017. High NRV can be a crucial avenue for inducing inequality in resource-rich nations, according to Chekouri (2023). Conversely, using household-level data, Howie and Atakhanova (2014) examined how a resource boom affects income inequality in Kazakhstan's regions and found that booms reduce income inequality.

As noted, the vast results on the effect of NRV on economic growth and the few ones on IG show that they are related but with inconclusive directions. Thus, based on the preceding discussion, the first hypothesis of this study posits that NRV affects IG. However, the specific direction of this influence

cannot be priory ascertained as the available literature presents conflicting evidence. Thus, the first hypothesis is as follows:

H1: Natural resources volatility has an effect on IG in MENA

2.2. Institutions, Financial Development, Volatility and Inclusivity

2.2.1. Empirical literature on Institutions and Volatility

Since Ross (2001)[4] groundbreaking study, research on the resource curse has repeatedly demonstrated that natural resource-dependent countries tend to have poor institutional structures and weak revenue management, potentially turning natural resources into a curse by triggering rent-seeking behavior (Ding, 2023; Pata et al., 2021; Aljarallah & Angus, 2020). This has led to voluminous studies suggesting that well-functioning institutions are crucial to natural resource management. Contrarily, studies on the significance of institutions in the context of volatility are sparse (Hsu et al., 2023).

Among the few attempts, Leong and Mohaddes (2011) examined a panel of 112 economies from 1970 to 2005 and unearthed that NRV has a hazardous impact on output. Nevertheless, they reckon that a well-established institutional structure can negate these adverse effects. El-Anshasy et al. (2015) also verified these findings by examining 17 major oil producers over 1961–2013, showing that volatility in oil revenues coupled with weak government responses drives the resource curse paradox. Even so, robust institutions can mitigate some of the negative impacts of oil revenue volatility. Arezki and Gylfason (2011) reiterated this point, stating that volatility spurs non-resource GDP growth in democracies but not autocracies. Thus, they suggest that curbing natural resource infringement and propagating good governance may moderate the negative impact of volatility on the economic performance of resource-based countries. Moreover, Henri (2019) examined Africa's institutional and economic indicators most adversely affected by natural resource rents from 1992 to 2016. The results indicated that countries with poor governance exhibited higher volatility.

2.2.2. Empirical literature on Financial Development and Volatility

Since Poelhekke and van der Ploeg (2007) proposed robust financial sector to mitigate the volatility curse on growth, financial development has been noted as a potent instrument for transforming the resource curse into a blessing in subsequent academic studies. However, a handful of empirical studies have discussed the impact of FD on NRV, reporting contradictory results. On the one hand, Liu et al. (2023) used second-generation methods to examine the long-run impacts of several macroeconomic variables on NRV in MENA. They empirically prove that globalization and governance increase NRV, whereas FD reduces it by promoting responsible and sustainable business practices. Easterly et al. (2001) also revealed that a robust financial system can reduce macroeconomic volatility. Regarding its moderating effect, Gazdar et al. (2019) find that the development of the Islamic financial system reinforced the growth-promoting effect of oil volatility in the GCC context. Additionally, in a sample of 63 oil-producing countries, Moradbeigi and Law (2016) demonstrated that FD dampens the negative effect of oil volatility on growth. Erdogan et al. (2020) found that an increase in oil exports had no statistically significant effect on economic growth when the FD rate was less than 45%. However, when the rate was greater than 45%, one unit of oil exports increased economic growth by 7%. These results indicate that FD can enhance (mitigate) volatility's positive (adverse) effects on growth. However, few scholars have mentioned crowding out between natural resources and FD (Yuxiang & Chen, 2011; Moradbeigi and Law, 2016). It is argued that high reliance on natural resources negatively affects the development of the financial sector and, hence, growth (Gylfason, 2004). This is because heavy reliance on natural resources diverts financial resources away from other uses and directs them to exploit natural resources (Yuxiang & Chen, 2011). Thus, an increasing FD might weaken (enhance)

[4] A study of 113 countries confirmed that oil exports and other kinds of mineral exports are strongly associated with authoritarian rule.

the positive (negative) effect of natural resources on growth and vice versa. These arguments indicate that both natural resource dependence and FD may crowd out each other 's effects on growth.

2.2.3. Institutions, Financial Development, and Inclusivity

A similar pattern emerges in the literature, demonstrating that institutions and financial development have discernible effects on inclusive growth. Regarding institutions, Lotfalipour et al. (2022) conducted a panel quantile regression analysis using 14 data points to determine how natural resource dependence and IQ affect social welfare in developing fuel-exporting countries. The findings show that natural resource dependence harms social welfare in the sampled countries, validating the welfare curse; institutional quality, however, benefits it. A competent strategy for utilizing resource rents, combined with solid governance, can promote shared growth in countries endowed with natural resources, according to the results of Chen et al. (2023). Ofori and Asongu (2022) applied the GMM estimator to examine how Sub-Saharan African (SSA) institutional fabrics moderate FDI's influence on IG in SSA from 1990 to 2020. They observed that the region's fragile governance settings negated the weak FDI-induced IG effects. In their study, Amponsaha et al. (2021) highlighted that a solid governance structure promotes inclusiveness: a 1% increment in governance ensues in a 0.3-0.5% increase in IG. Solid institutions that ensure accountability and fair redistribution are indispensable to achieving IG (Ofori et al., 2022).

However, the research findings regarding FD's impact on IG were inconclusive. For instance, Oyinlola and Adedeji (2019) investigated the role of FD in the human capital-IG link and generally reported a direct positive impact of FD on IG. Nevertheless, in certain specifications, the authors indicated that FD had either no significant impact or a negative impact on IG due to the crowding out of domestic investment or, broadly, the ineffectiveness of the financial system. Iddrisu et al. (2023) examined how FD shapes the relationship between foreign bank presence and IG using a two-stage GMM in 28 African countries and found that FD magnifies the beneficial impact of foreign bank presence on IG. Gyamfi et al. (2010) researched the relationship between FD and IG while examining how institutions moderate this relationship. They found that the IG and FD variables are non-linearly related, indicating that weak institutions inhibit the favorable impact of FD on IG. Ofori et al. (2022) also show that FD has a positive impact on IG and enhances the positive effect of ICT on IG. By contrast, Rumbogo et al. (2021) examined the relationship between financial sector development, financial inclusion, and economic growth in 33 Indonesian provinces. They demonstrate that FD might disproportionately satisfy the wealthy and exclude the poor in the absence of financial inclusion, triggering income inequality and poverty, a finding previously reached by Demirgu et al. (2016) and Levine (2005). Relatedly, Ofori et al. (2023) found that Africa's weakened financial sector impeded the beneficial effect of remittances on IG; a minimum FD threshold of 14.5% is required for FD to boost IG.

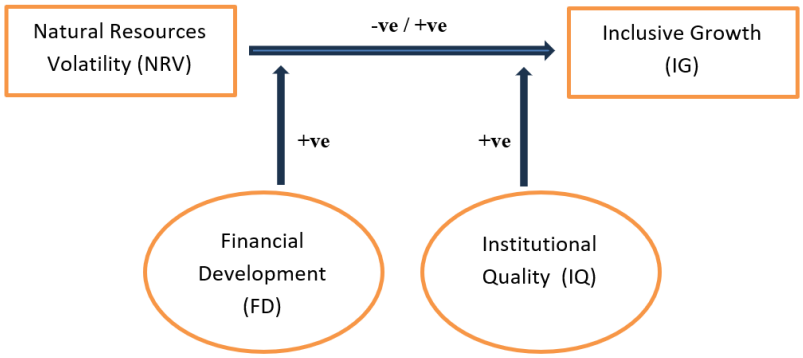
According to the previous literature, institutional quality and financial development are proven to impact volatility. In addition, it is shown that both variables can moderate the effect of volatility on economic growth as well as the effect of other macroeconomic variables on IG. Thus, it may moderate the volatility effect on IG, acting as a damper on the curse or an enhancer for the blessing. However, no previous study investigated whether these variables can moderate the relationship between NVR and IG. Hence, based on the majority of findings, this paper proposes that IQ and FD in the MENA region can moderate the relationship between NRV and IG in the sense that those countries with higher institutional quality/ financial development have less (more) detrimental (positive) effect of NRV on IG.

Thus, the second hypothesis of this paper is as follows:

H2: Financial development and institutional quality act as moderators, enhancing (mitigating) the positive (negative) relationship between NVR and IG in MENA

Figure (2) recapitulates the two hypotheses of the paper.

Figure (2) Study Design



3. Data and Methodology

3.1. Sample and variables

This study examines the impact of NRV on IG in 18 MENA countries between 2002 and 2021. Data availability guides the sample selection and time frame. We follow the World Bank's classification of MENA countries. This analysis considers two policy variables that can moderate the effect of natural resources on IG in MENA: financial development and institutional quality. The primary research question is how FD and IQ can moderate the relationship between inclusiveness and NRV.

The dependent variable is IG and is calculated by the authors using PCA, as explained below in detail, as there is no direct measurement of IG. The primary explanatory variable is NRV, measured as total natural resources rent as % of GDP (Wen et al., 2022; Khan, 2022). Regarding the moderators, IQ is also constructed as a PCA composite index using the six worldwide governance indicators as illustrated below. Domestic credit to the private sector is used as a proxy for FD since it is the most commonly used indicator in the literature for FD (Cao et al., 2022). Finally, control variables are added following the literature, including internet access, trade openness, and vulnerable employment (e.g., Bello et al., 2023; Kouladoum, 2023).

Internet access is an indicator for Information and communication technologies (ICT). ICT or digital infrastructure is argued to enhance IG by creating more jobs, enhancing learning and education, and supporting connection and networking through social media. Nevertheless, ICT can also be detrimental to IG by decreasing job availability due to automation and increasing the information gap between the rich and the poor (Ejemeyovwi & Osabuohien, 2018; Adeleye et al., 2023). Vulnerable employment is included to capture the informality in our sample. On the one hand, the informal sector may increase economic growth and reduce poverty, which could enhance IG; however, rising vulnerability may also harm IG as vulnerability's effect is more pronounced on the income of poor individuals than the rich ones (Ofori et al., 2023a; Ofori et al., 2023b). Likewise, trade openness may favorably impact IG through job creation and decreasing inequality. However, some argue that trade could harm income distribution and IG as it threatens domestic employment (Agyei1 and Idan, 2022).

Most data on these variables were derived from the World Bank data. Table (A1) in the Appendix provides additional information regarding the data sources and measurements.

3.2. Principal Component Analysis

3.2.1. Inclusive Growth Index

The inclusive growth index is constructed following Anand et al. (2013), which quantifies IG depending on income growth and income distribution. Following Ofori and Asongu (2021) and Kouladoum (2023), GDP per capita is used as a proxy for income growth, and the Gini index is used for income distribution. IG is then calculated as a component score using PCA. Before conducting

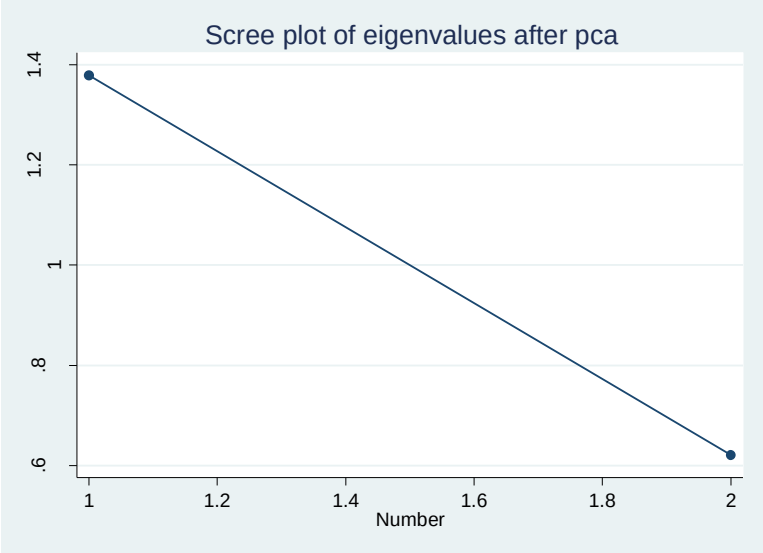
PCA, an adequate sample from the two indicators covariates, the correlations' strength between these covariates, and the partial and overall intercorrelations' strength between these indicators are tested (Bello et al., 2023). The correlation matrix and the Bartlett test with a p-value of 0.0000 (found in *Appendix A2*) show significant correlations supporting these indicators' selection. The Kaiser-Meyer-Olkin (KMO) statistics (found in *Appendix: A2*) is 0.5, which supports that the sample is adequate for computing a composite index for IG. In order to compose the index, the two indicators are standardized to have a mean of 0 and a standard deviation of 1. Table (1) provides components' differences, proportion, cumulative, and eigenvalues. Consistent with kaiser's eigenvalue rule (Tchamyou, 2020), the index is constructed using only the first component as the eigenvalue of only the first component is larger than one. Figure (3) depicts the scree plot of the components of the IG index, which provides consistent results with Table (1). The first component explains 69% of the variation in the data.

Table (1) Principal Components and Eigenvalues (IG)

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	1.379	0.758	0.690	0.690
Comp2	0.621	.	0.311	1.000

Variable	Comp1	Comp2	Unexplained
GINI	0.707	0.707	0
GDP	0.707	-0.707	0

Figure (3) Scree Plot of Principal Components of IG Index



Source: Generated by the authors using STATA

3.2.2. Institutional quality index

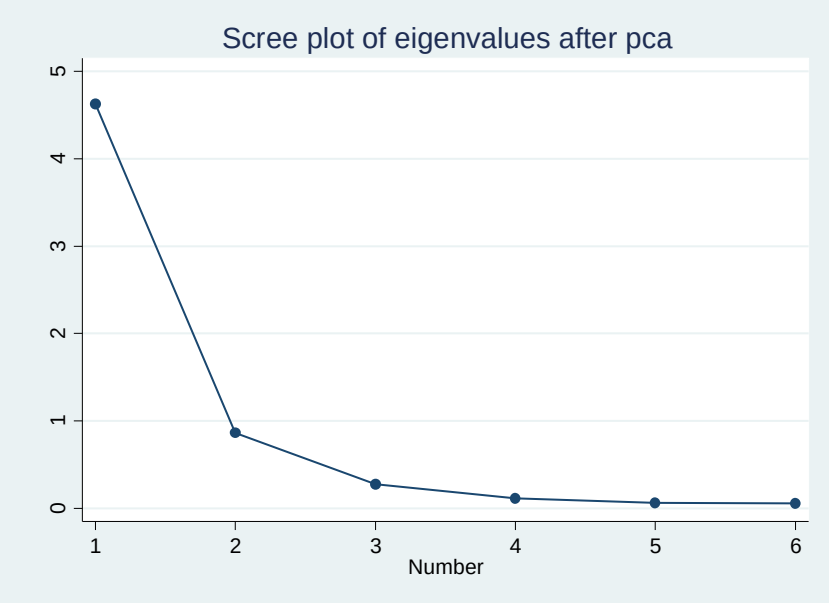
Following Bekana (2023), IQ index is constructed using PCA based on the six Worldwide Governance Indicators,: Control of Corruption, Government Effectiveness, Political Stability and Absence of Violence, Regulatory Quality, Rule of Law, and Voice and Accountability. The correlation matrix and the Bartlett test with a p-value of 0.0000 (found in *Appendix: A2*) support the selection of these indicators and Kaiser-Meyer-Olkin (KMO) statistics (found in *Appendix: A2*) of 0.8907 support that the sample is adequate for computing a composite index for IG. As shown in Table (2), only the first component is larger than one, so the index is constructed using this component. Figure (4) provides the scree plot for the eigenvalues of the different components. The first component explains about 77% of the variation in the data.

Table (2) Principal Components and Eigenvalues (Institutional Quality)

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	4.629	3.766	0.771	0.771
Comp2	0.863	0.589	0.144	0.915
Comp3	0.274	0.160	0.046	0.961
Comp4	0.114	0.053	0.019	0.980
Comp5	0.061	0.002	0.010	0.990
Comp6	0.059	.	0.010	1.000

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Unexplained
CC	0.449	-0.114	-0.006	-0.384	0.154	-0.783	0
GE	0.445	-0.045	-0.267	-0.585	0.199	0.589	0
PS	0.402	-0.265	0.814	0.206	0.162	0.194	0
RQ	0.437	0.018	-0.457	0.670	0.389	-0.001	0
RL	0.452	-0.065	-0.113	0.136	-0.872	0.031	0
VA	0.209	0.954	0.213	-0.020	0.006	-0.010	0

Figure (4) Scree Plot of Principal Components of IQ Index



Source: Generated by the authors using STATA

3.3 Model Specification and Estimation Strategy

Our model takes the following specification :

$$IG_{it} = \alpha_0 + \alpha_1 NRV_{it} + \alpha_2 FD_{it} + \alpha_3 IQ_{it} + \alpha_4 INT_{it} + \alpha_5 TO_{it} + \alpha_6 VE + \varepsilon_{it} \quad \text{(Eq.1)}$$

Where IG is inclusive growth, NRV is natural resources volatility, IQ is institutional Quality, FD is financial development, INT is internet access, TO is trade openness, and VE is vulnerable employment.

To probe the moderating effects, we incorporate interaction terms between NRV, FD and IQ (Eq. 2).

$$IG_{it} = \alpha_0 + \alpha_1 NRV_{it} + \alpha_2 FD_{it} + \alpha_3 IQ_{it} + \alpha_4 INT_{it} + \alpha_5 TO_{it} + \alpha_6 VE_{it} + \alpha_7 NVR * IQ + \alpha_8 NRV * FD + \varepsilon_{it} \quad \text{(Eq.2)}$$

In order to mitigate the common econometric issues related to the typical panel data estimation methods (Pooled OLS, Fixed Effects, and Random Effects), such as omitted variable bias, endogeneity, and heterogeneity, the GMM method is utilized; however, the typical difference GMM may suffer from lack of precision and weak instruments in finite samples (Teixeira & Queirós, 2016). To mitigate this problem, the standard two-step system GMM procedure is employed. Weindmeijers (2005) correction is also applied to resolve the downward bias in standard errors. We use the lag of IG as an endogenous variable. To test the validity of the instruments, the AR (2) test for serial correlation and Hansen test for overidentification restriction are implemented (Teixeira and Queirós, 2016; Kouki, 2021). Hence, Equation 1 and 2 takes the following forms in level:

$$IG_{it} = \gamma_0 + \gamma_1 IG_{i(t-\tau)} + \gamma_2 NRV_{it} + \sum_{h=1}^{k} \lambda_h \boldsymbol{X}_{h,i(t-\tau)} + \varepsilon_{it} \quad \text{(Eq.3)}$$

$$IG_{it} = \gamma_0 + \gamma_1 IG_{i(t-\tau)} + \gamma_2 NRV_{it} + \gamma_3 FD + \gamma_4 IQ + \gamma_5 NVR * IQ + \gamma_6 NRV * FD + \sum_{h=1}^{k} \lambda_h \boldsymbol{X}_{h,i(t-\tau)} + \varepsilon_{it} \quad \text{(Eq.4)}$$

4. Empirical Results and Discussion

Table (3) displays descriptive statistics for all the variables, while Table (A3) in the Appendix shows the correlation among the critical variables employed in the empirical investigation. As noted, the range of economic dependence on natural resources rents in our sample varies between 0.001 % and 66.06%. Likewise, GDP per capita is dispersed mainly, with a minimum value of 726.7 $ and a maximum value of 73493.2 $. In addition, institutional quality is low in the region, given the negative mean values for all governance indicators. The correlation matrix shows that there is a significant positive correlation between NRV, institutional quality, financial development, internet usage, and trade openness on the one hand and IG on the other hand, while vulnerable employment shows a significant negative correlation with IG.

Table (3) Descriptive statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
IG	348	0	1.174	-2.236	3.064
NRV	355	20.733	17.865	.001	66.06
FD	321	44.36	26.849	1.266	138.42
IQ	360	0	2.151	-4.709	3.942
INT	348	40.212	31.438	.487	100
TO	329	90.895	44.973	29.857	347.997
VE	360	22.105	17.685	.05	58.106
GINI	360	.617	.05	.488	.694
GDP per capita	348	14369.384	17075.163	726.739	73493.27
CC	360	-.347	.75	-1.798	1.559
GE	360	-.315	.759	-2.362	1.501
PS	360	-.654	1.074	-3.18	1.224
RQ	360	-.382	.805	-2.302	1.097
RL	360	-.352	.773	-2.096	.978
VA	360	-1.078	.466	-2.05	.304

In order to test our hypotheses, Model (1) without interaction terms and Model (2) with interaction terms in Table (4) are estimated using two-step system GMM. As Table (4) indicates, the test of

second-order serial correlation AR(2) for both models is not rejected, which means there is no second-order serial correlation problem. In addition, the Hansen test for over-identification for both models does not reject the hypothesis of exogenous instruments. These results validate our models.

In Model (1), natural resources volatility is found to have a significant negative correlation with IG. This gives initial evidence that natural resource volatility might be a curse to IG in the region. In addition, IQ is found to have a significant adverse effect on IG. FD is also found to have a significant negative impact on IG. This result is consistent with the literature strand arguing that FD might decrease IG since people experiencing poverty cannot access these new financial opportunities, negatively affecting income distribution (Rumbogo et al., 2021; Demirgu et al., 2016; Levine, 2005). Similarly, vulnerable employment is found to decrease IG in consistent with the earlier argument that vulnerability is detrimental to the poor's income and thus widens the inequality gap. Moreover, trade openness and internet access show no significant impact on IG.

However, when interaction terms are added in Model (2), natural resource volatility is found to have a significant positive correlation with IG. This means that the higher the natural resources rent share in GDP, the higher the IG in the MENA region, which validates our first hypothesis (H1) that there is a correlation between natural resources volatility and IG in the MENA region. Regarding the direction of this relationship, this result is consistent with the discussed strand in the literature that views natural resources as a blessing to the economy and found natural resource rent to have a positive effect on economic growth (e.g., Nusair, 2015; Nasir et al., 2019; Arif et al., 2022). The effect of FD on IG is also reversed to be positive. However, IQ still affects IG negatively.

Table (4) Impact of NRV on IG and the Moderating Effect of IQ and FD

VARIABLES	(1) IG	(2) IG	(3) Ln GDP per capita
$IG_{(t-1)}$	1.062***	0.726***	
	(0.029)	(0.101)	
NRV	-0.010***	0.080***	0.014***
	(0.004)	(0.024)	(0.004)
FD	-0.003***	0.034***	0.004***
	(0.001)	(0.009)	(0.001)
IQ	-0.045**	-0.272**	0.003
	(0.022)	(0.116)	(0.018)
FD_NRV		-0.001***	-0.000***
		(0.000)	(0.000)
IQ_NRV		0.016***	0.002**
		(0.005)	(0.001)
Int	-0.001	0.006**	0.001***
	(0.001)	(0.003)	(0.001)
TO	-0.000	0.002**	0.000*
	(0.000)	(0.001)	(0.000)
VE	-0.007**	0.016	0.001
	(0.003)	(0.010)	(0.002)
Ln GDP per $capita_{(t-1)}$			0.853***
			(0.030)
Constant	0.576***	-3.047***	0.885***
	(0.206)	(0.878)	(0.198)
Observations	273	273	273
Number of Countries	18	18	18
AR(2) p-value	0.851	0.608	0.562
Hansen p-value	0.735	0.697	0.363

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Regarding the interaction terms, both are found to be significant, meaning that the positive effect of NRV on IG depends on the level of financial development and institutional quality. The significantly positive interaction effect between natural resources rent and IQ indicates that IQ intensifies the positive impact of NRV on IG. The higher the quality of institutions in the region, the more blessing the natural resources rents for inclusiveness in the MENA region. This positive interaction term between NRV and IQ, and the negative effect of IQ, also implies that as the natural resources rent share in GDP increase, the detrimental effect of IQ on IG decreases. Since IQ has a negative effect and its interaction with natural resources volatility has a positive effect, the net effect of IQ on IG can be calculated as follows:

$$\text{Net effect (IQ)} = \gamma_4 + (\gamma_5 * \overline{NRV})$$

Where γ_4 is the unconditional (direct) impact of institutional quality, γ_5 is the conditional (indirect) impact of IQ, and $\overline{NRV}$ is the mean value of natural resources rent share in GDP. The net effect of IQ on IG is calculated to be [-0.272 + (0.016*20.733)]= 0.06. This positive net effect of IQ implies that economies with robust institutions experience more IG after a specific critical value of natural resources rent share. The threshold of natural resources rent share in GDP at which the negative effect of IQ is nullified and hence, beyond which increasing IQ has a net positive impact on IG is calculated by taking the absolute value of the ratio of the unconditional and conditional effects of IQ as follows:

$$\text{Threshold (NRV)} = \left|\frac{\gamma_4}{\gamma_5}\right|$$

This threshold is calculated to be 17%, well within the sample range. Below a natural resources rent share in GDP of 17% , the direct negative effect outweighs the positive indirect effect, and thus, the net effect of IQ is negative, which means that IQ is detrimental to IG below this threshold. At this threshold of 17%, this negative effect is nullified. However, beyond this volatility threshold of 17%, the positive indirect effect outweighs the negative direct effect and hence, the net harmful impact of IQ is reversed and IQ has a net positive effect on IG.

Additionally, the interaction term between NRV and FD is negative. With positive effect of natural resources volatility, this negative interaction term indicates that the higher the financial development, the less the positive effect of natural resources rents share on IG. Likewise, with a positive direct effect of FD and a negative interaction term between natural resources volatility and financial development, natural resource rents are detrimental to the positive relationship between FD and IG. The higher the natural resources rent share, the lower the positive effect of FD on IG. These results support the minor literature on crowding out between the effects of natural resource volatility and financial development. This could be explained, as mentioned earlier, by the argument that the more natural resources abundance and dependence, the less the pace of financial development as production factors are diverted away from manufacturing and private sectors that represent the largest demanders of financial services (Yuxiang & Chen, 2011). Thus, at high levels of natural resources rent share, the dependence on financial development to increase growth and reduce poverty is low since production factors are devoted more to using natural resources. However, as natural resources rent share decreases, there becomes a rising dependence on financial development to increase growth and equality and enhance inclusive growth. Similarly, as the level of financial development increases, the reliance on natural resources decreases since individuals have access to other financial services that can increase their well-being. In other words, at low levels of financial development, the dependence on natural resources rent to increase growth and reduce poverty is high. However, as financial development increases, this dependence on natural resources rents decreases as more resources are devoted to the private sector and more financial opportunities are provided to the poor which enhances inclusive growth. These results indicate that natural resources rent share and financial development can be considered as substitutes with regard to enhancing inclusive growth in MENA region. The higher the level of one of them, the lower the positive effect of the other on inclusive growth. Since NRV and FD have positive coefficients and their interaction term is negative, net effect of FD could be calculated as follows:

$$\text{Net effect (FD)} = \gamma_3 + (\gamma_6 * \overline{NRV})$$

The net effect of FD on IG is found to be positive and equals to [0.034 + (-0.001*20.733)]=0.013. The threshold of natural resources rent share in GDP beyond which increasing FD has a negative net impact on IG is calculated by taking the absolute value of the ratio of the unconditional and conditional effects of FD as follows:

$$\text{Threshold (NRV)} = \left|\frac{\gamma_3}{\gamma_6}\right|$$

This threshold is calculated to be 34%, which is well within the sample range. Below this threshold, the positive direct effect of FD outweighs the negative indirect effect. At this critical mass, this positive effect is neutralized. After this threshold, the negative indirect effect outweighs the positive direct effect, and the net effect of FD on IG becomes negative. This implies that for FD to be IG enhancer with a net positive effect, natural resources rent share in GDP should be below 34%.

In addition, the net effect of natural resources rent share could be calculated as follows:

$$\text{Net effect (NRV)} = \gamma_2 + (\gamma_6 * \overline{FD})$$

The net effect of natural resources rent share in GDP on IG is found to be positive as well and equals [0.080 + (-0.001*44.36)]=0.036. The threshold of FD beyond which increasing natural resources rent share in GDP has a negative impact on IG is calculated by taking the absolute value of the ratio of the unconditional and conditional effects of natural resources rent share as follows:

$$\text{Threshold (FD)} = \left|\frac{\gamma_2}{\gamma_6}\right|$$

This threshold is calculated to be 80%, which is well within the sample range. Below this critical value, the positive direct effect of natural resources rent share on IG outweighs the negative indirect effect. Reaching the critical value of 80% nullifies this positive effect. However, when FD level goes beyond this threshold, the negative indirect effect outweighs the positive direct effect of NRV and the net effect on IG becomes negative. This threshold indicates that FD should be below 80% for natural resources rent share in GDP to have a positive net effect and enhance IG.

These results on the net effects and thresholds of FD and NRV means that when NRV and FD are simultaneously below their thresholds of 34% and 80% respectively, there will be a positive net effect for both FD and NRV on IG. However, when NRV and FD are simultaneously beyond their thresholds of 34% and 80% respectively, there will be a negative net effect for both FD and NRV on IG. Yet, when FD is below (beyond) 80% and NRV is beyond (below) 34%, there will be opposing net effects for FD and NRV on IG. This indicates that when FD and NRV are simultaneously either below or beyond their calculated critical values, they are enhancing each other effects whether positive or negative which means that they are complements in their net effects on IG in these cases. Only when one of them is beyond its critical value and the other is below its own threshold, their net effects conflict and they become substitutes in their net effects on IG.

Based on the calculations and discussion above, it can be concluded that when natural resources rent share in GDP is below 17%, IQ has a negative net effect and is detrimental to IG while increasing FD (until FD reaches the threshold of 80 %) has a net positive effect and enhances IG. For natural resources rent share in GDP between 17 % and 34%, increasing both IQ and FD (until 80%) have a positive net effect and increase IG. However, when natural resources rent share in GDP exceeds 34%, FD has a net negative effect and decrease IG whereas IQ has a net positive effect and increases IG.

Finally, regarding the control variables, both internet access and trade openness are found to have a positive effect on IG. These results are in line with most previous empirical results (see e.g., Bello et

al., 2023; Ofori et al., 2021; Kouladoum, 2023 for ICT, Kouladoum, 2023; Kamah et al., 2021; Adeleye et al., 2023 for trade). In addition, vulnerable employment has insignificant impact on IG.

Since GDP per capita is employed in literature as the absolute indicator of IG (Ofori et al., 2023b)**,** Model (2) is re-estimated using GDP per capita as a robustness check. Model (3) in Table (4) provides the results when GDP per capita is used and the results are consistent with the previously discussed results of Model (2) to a great extent. Natural resources rent is confirmed to be a blessing in the MENA region. FD has a positive impact on IG. However, IQ has no significant effect. Yet, the two interaction terms hold the same signs as in Model (2) but with smaller magnitude. Finally, internet access and trade openness have positive effect on IG but again the effects are lower in their magnitude compared to Model (2). Finally, vulnerable employment still shows no significant effect.

5. Concluding Remarks and Policy Propositions

This study investigates the link between natural resources volatility and inclusive growth, while exploring the potential moderating effects of financial development and institutional quality in the MENA region. Two hypotheses are proposed: the first posits that natural resources volatility influences inclusive growth; however, due to inconclusive results regarding the volatility-economic growth relationship, the specific direction of this influence cannot be determined priorly. The second hypothesis proposes that financial development and institutional quality moderate the relationship between natural resources volatility and inclusive growth by enhancing (mitigating) the positive (negative) impact of volatility on growth.

Using a sample of 18 countries from the MENA region between 2002 and 2021 and employing a two-step system GMM approach, our findings validate the first hypothesis that natural resources volatility has a positive impact on inclusive growth, lending support to the argument that natural resources are a blessing for the region. Furthermore, the results reveal a direct positive effect of FD and a negative effect of institutional quality on inclusive growth. Concerning the interaction between variables, a positive interaction between volatility and institutional quality is observed, suggesting that improving institutional quality can amplify the positive influence of natural resources volatility on inclusive growth. Conversely, a negative interaction between volatility and financial development is found, indicating that financial development (natural resources volatility) weakens the positive effect of volatility (financial development) on inclusive growth.

When overall effects are calculated, both institutional quality and financial development are found to have net positive effect on inclusive growth in MENA region. Based on the calculated net effects and thresholds, the following findings are reported. When natural resources rent share in GDP is below 17%, institutional quality has a negative net effect and is detrimental to inclusive growth while increasing financial development (till a threshold of 80 %) has a net positive effect and enhances IG. For natural resources rent share in GDP between 17 % and 34%, increasing both institutional quality and financial development (until 80%) have a positive net effect and increase inclusive growth. However, when natural resources rent share in GDP exceeds 34%, financial development has a net negative effect and decrease inclusive growth whereas institutional quality has a net positive effect and increases inclusive growth. These thresholds are policy-relevant since they are within the range of our sample disclosed in summary statistics. It follows that, countries with natural resources rent (% GDP) lower than 17% is suggested to increase its financial development (domestic credit to private sector as % GDP) up to 80% to enjoy the net positive effect of financial development on inclusive growth. Countries with natural resources rent share between 17% and 34% is suggested to start working on enhancing their institutional quality along with their financial development (till 80%) to experience the compounded net positive impact of both institutional quality and financial development on inclusive growth G. Finally, countries with natural resource rent share exceeding 34% is recommended to focus more on improving their institutional quality to attain the net positive effect of institutional quality on inclusive growth.

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Appendix

A1- Variables and Data Sources

Table (A1): Variables and Data Sources

Variable	Abbreviation	Definition	Source	Position
Inclusive Growth	IG	Integrating income growth and distribution in a unified manner using the absolute definition (i.e., GDP per capita) and relative definition (Gini index) of inclusive growth	Computed by the authors using PCA	Dependent
Gini Index		A measure of inequality ranging from 1 (perfect equality) to 100 (one person controls all the resources in the economy).	WID	Indicator in PCA of IG
GDP per capita		GDP per capita is gross domestic product divided by population.	WDI	Indicator in PCA of IG
Natural Resource Volatility	NRV	The sum of oil, natural gas, coal (hard and soft), mineral rents, and forest rents equals total natural resource rents and measured as % of GDP	WDI	Independent
Institutional Quality	IQ	PCA of 6 World Governance Indicators	WGI	Moderator
Rule of Law	RL	A measure of public perceptions of the quality of contract enforcement, property rights, police and courts, as well as the likelihood of crime and violence in society.	WGI	Indicator in PCA of IQ
Control of Corruption	CC	A measure of public perceptions about whether public authority is exercised for private gain as well as "capture" by elites and private interests of the state.	WGI	Indicator in PCA of IQ
Government Effectiveness	GE	A measure of perceptions about the effectiveness of government growth policies	WGI	Indicator in PCA of IQ
Regulatory Quality	RG	A measure of public perceptions of the government's ability to develop and implement sound policies and regulations	WGI	Indicator in PCA of IQ
Political Stability	PS	A measure of perceptions of political instability, violence, including terrorism	WGI	Indicator in PCA of IQ
Voice and Accountability	VA	A measure of citizen perceptions in government selection, expression, association, and free media.	WGI	Indicator in PCA of IQ
Financial Development	FD	Domestic credit to private sector (% of GDP)	WDI	Moderator
Trade Openness	TO	Exports plus imports (% of GDP)	WDI	Control
Vulnerable Employment	VE	Contributing family workers and own-account workers as a percentage of total employment.	WDI	Control
Internet access	INT	Internet users (% of population)	WDI	Control

*Note: WDI is World Development Indicators, WGI is World Governance Indicators, WID is World Inequality Database

A2- Principle Component Analysis

A2.1- Correlation matrix for IG index indicators and Bartlett Test

Variables	(1)	(2)	Bartlett Test
(1) Equality index	1.000		
(2) GDP per capita	0.379***	1.000	
Chi (X^2) statistic			53.567***
Chi (X^2) p-value			0.0000

*** p<0.01, ** p<0.05, * p<0.1

A2.2- Kaiser-Meyer-Olkin measure of sampling adequacy for IG indicators

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Kaiser-Meyer-Olkin measure of sampling adequacy
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Variable	kmo
gini	**0.5000**
GDP	**0.5000**
Overall	**0.5000**

A2.3- Correlation matrix for IQ index indicators and Bartlett Test

Variables	(1)	(2)	(3)	(4)	(5)	(6)	Bartlett Test
(1) cc	1.000						
(2) ge	0.931***	1.000					
(3) ps	0.845***	0.775***	1.000				
(4) rq	0.881***	0.892***	0.727***	1.000			
(5) rl	0.930***	0.923***	0.826***	0.915***	1.000		
(6) VA	0.341***	0.378***	0.218***	0.408***	0.376***	1.000	
Chi (X^2) statistic							2745.410
Chi (X^2) p-value							0.000

*** p<0.01, ** p<0.05, * p<0.1

A2.4- Kaiser-Meyer-Olkin measure of sampling adequacy for IQ indicators

Kaiser-Meyer-Olkin measure of sampling adequacy

Variable	kmo
cc	**0.8750**
ge	**0.8987**
ps	**0.8885**
rq	**0.9050**
rl	**0.8805**
va	**0.9317**
Overall	**0.8907**

A3- Correlation Matrix

Table (A3) Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) IG	1.000						
(2) NRV	0.292	1.000					
	(0.000)						
(3) FD	0.308	-0.342	1.000				
	(0.000)	(0.000)					
(4) IQ	0.533	-0.016	0.633	1.000			
	(0.000)	(0.768)	(0.000)				
(5) INT	0.352	-0.124	0.653	0.448	1.000		
	(0.000)	(0.021)	(0.000)	(0.000)			
(6) TO	0.235	-0.035	0.168	0.360	0.202	1.000	
	(0.000)	(0.521)	(0.004)	(0.000)	(0.000)		
(7) VE	-0.568	-0.388	-0.424	-0.689	-0.470	-0.238	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	