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Enhancing institutional quality to boost economic development in developing nations: New insights from CS-ARDL approach

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ABSTRACT

Institutional quality (IQ) plays a crucial role in achieving the Sustainable Development Goals. IQ is fundamental to SDG's 16, which promotes peaceful and inclusive societies, provides access to justice, and builds effective, accountable, and transparent institutions. Countries with strong institutions that uphold the rule of law, protect human rights, and combat corruption are more likely to achieve this goal and promote economic development. Therefore, this study examines the relationship between IQ and economic development, as measured by the human development index (HDI), in 70 developing countries between 2002 and 2018. To achieve the above mention objective, various econometric techniques were employed, including CIPS unit root, Westerlund (2007) co-integration, and Cross-sectional Augmented Autoregressive Distributed Lag, and robustness analysis conducted using Fully Modified Ordinary Least Square, Dynamic Ordinary Least Square, Augmented Mean Grouped, Impulse Response Function, and Variance Decomposition Analysis panel estimators. The study found that IQ and globalization have a positive, while inflation, unemployment, and corruption have a negative impact on HDI. The estimates from the Impulse Response Function show that IQ positively influences HDI from 2019 to 2028. Additionally, the Variance Decomposition Analysis reported that around 38% of the variations in HDI can be attributed to changes in IQ. To improve IQ, transparency must be prioritized as it is the foundation of IQ enhancement. Similarly, measures must be taken to combat corruption, and strong administrative intervention is required to advance economic development. These findings suggest that policymakers must prioritize improving institutional quality and fighting corruption to promote economic development in developing countries.

1. Introduction

Institutional quality is one of the most important factors in enhancing the economic development of a country. All over the world, the most crucial goal of any government to enhance economic growth is to endorse people's living standards (Ngo & Nguyen, 2020). The differences in institutions worldwide produce significant variances in productivity growth, capital accumulation, education attainment, and so account for wealth disparities. Rodrik, Subramanian, and Trebbi

(2004) discovered that the rule of law influenced economic growth (EG) favorably. Similarly, found that private property rights institutions primarily drive long-run EG, investment, and financial development. These studies proposed that institutions primarily predict long-run EG across countries. The existing literature largely points to a favorable relationship between institutions and economic growth. However, institutions do not have the same influence on economic growth across various countries. The beneficial impact of institutions is determined by several elements, such as the individual's perception of the institutions and the

Abbreviations: HDI, Human Development Index; CS-ARDL, Cross-sectional Augmented Autoregressive Distributed Lag; FMOLS, Fully Modified Ordinary Least Square; DOLS, Dynamic Ordinary Least Square; AMG, Augmented Mean Grouped; IQ, Institutional Quality; SDG's, Sustainable Development Goals; EG, Economic Growth; PLS, Partial Least Squares; COR, Corruption; INF, Inflation; UET, Unemployment; GLO, Globalization; PCA, Principle Component Analysis; CS, Cross-sectional Dependency; IRF, Impulse Response Function; VDA, Variance Decomposition Analysis.

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social norms and community rules of a certain group of persons. Institutions with comparable traits can have wildly disparate outcomes among groups, regions, and countries. [Bernabe \(2017\)](#) examined Asian countries for sustainable economic development goals, and they revealed economic development concerns through the legal and IQ. In contrast, [North \(2000\)](#) showed that growing human investment, rising markets, and improving technology add to productivity. A social institution creates incentives that affect political and economic activities and grounds for economic development.

Since IQ plays a vital role in any country's economic development, it is a crucial factor in the country's wealth, besides other factors like socio-political stability, reducing political risk, and innovation. This wealth and rationalization of its management also led to increasing economic development ([Moudine, El Khattab, & Bettah, 2019](#)). In order to foster economic growth and incentivize productivity, it is essential for institutions to promote wealth-generating actions such as education acquisition, innovation, while discouraging wealth-destructive behaviors such as rent-seeking, theft, and corruption. Additionally, it is crucial for institutions to prevent predatory practices and ensure the protection of property rights. By doing so, they can create an environment that encourages individuals and businesses to thrive and contribute to overall prosperity. The role of IQ has the most important component of economic growth, mainly the features related to the independence of judicial institutions, regulation structure, and property rights. In all these aspects, we assume that implicit and explicit behavior standards of a country circumstance patently its economic performance ([North, 1990, 1994](#)).

Institutions in developing economies mostly develop redistribution happenings as an alternative to production activities, making monopolies in their place of competitive circumstances, confining opportunities in their place of developing them. These institutions hardly lead to investments that will surge productivity ([Yıldırım & Gökalp, 2016](#)). Since institutions' quality plays a crucial role in endorsing economic development and growth, investment protection, political stability, and the rule of law can affect the country's economic development. Institutional quality matters for the improvement of institutions. The Vietnam Ministry of Finance often concentrates and the sequence of actions for institutional advancement, which definitely, gains the economic development goals in 2016–2020 ([Ngo & Nguyen, 2020](#)). Knowing the national economic development goals and the significant role of the institution concerning economic growth. In recent years many researchers worked on the nexus between economic growth and institution, but their findings are diverse from each other. According to [Alexiou, Tsaliki, and Osman \(2014\)](#), [Ha \(2016\)](#), [Vianna and Mollick \(2018\)](#), [Salman, Long, Dauda, and Mensah \(2019\)](#), and [Ngo and Nguyen \(2020\)](#) reported that institutions have positive effects on EG. In contrast, [Dias and Tebaldi \(2012\)](#) and [Boldeanu and Constantinescu \(2015\)](#) showed that there is no nexus between the institution and EG. [Barro \(1996\)](#) revealed that democracy and economic growth have non-linear nexus, if democracy crosses a certain threshold, it negatively affects EG. Another study was done by [Marakbi and Turcu \(2016\)](#) and [Ouoba and Sawadogo \(2019\)](#) to examine the role of institutions in economic growth, and the results showed that there exists a threshold of institutions affecting EG. One of the latest studies done by [Chong \(2020\)](#) found a non-linear connection between institutional quality and EG.

Although many studies investigated IQ's role in EG, few studies deal with institutions in explaining economic development. Only two pieces of literature are available on this issue ([Moudine et al. 2019](#); [Tran, Le, & Nguyen, 2021](#)). However, [Moudine et al. \(2019\)](#) examined Moroccans' IQ and economic development. The author found that for economic performance the institutional variable matters. [Tran et al. \(2021\)](#) investigated the impact of IQ on EG by taking 48 countries in Asia from 2005 to 2018. They discovered that institutions of greater quality support growth more successfully in lower-income Asian nations than higher-income ones. The findings also demonstrated that the maximum level of institutional expansion is required for EG. If the institution

indicator rises above the threshold, the growth is affected contrarily.

Initiated in developing nations, structural reforms failed to address the problems with development. The question now is: Can social and economic marginalization, illiteracy, war, corruption, and combative politics in developing nations be solved by the market alone? In view of the above, the current study examines the impact of IQ on economic development in developing countries. This study contributes to the existing literature in three ways; first, this study is the only study that examined economic development along with some important variables, such as corruption, inflation, unemployment, and globalization for the selected 70 developing countries. Second, unlike the previous researcher, who employed conventional econometrics techniques, this empirical study uses advanced techniques, such as second-generation techniques, to overcome the problem of heterogeneity and cross-sectional dependency. Third, this empirical study estimates the forecasting framework, such as impulse response function and variance decomposition analysis, over the next 10 years from 2019 to 2028.

The rest of the study is organized in this sequence; the first section includes a literature review, the second section consists of methodology and data, the fourth section includes results and discussion, and finally, the study's conclusion.

2. Literature review

2.1. Measurement of economic development

According to the classical approach proposed by Adam Smith described in his book "The Wealth of Nations" and then supported by David Ricardo. This theory's major idea was that money is necessary for human well-being. Individual minds are satisfied by utility, according to Neo-classical philosophy. They also stressed resource allocation, new technologies, and preferences ([Mill, 2017](#)). Finally, classical and neo-classical economists concluded that income, revenue, and capital are the primary components required for a society's development. A basic needs (BN) approach to development prioritizes satisfying the basic needs of all people. The actual substance of BN has been defined in numerous ways. Still, it always includes the fulfillment of specific nutrition criteria (water and food) and the universal supply of health and education services. They may also encompass other basic requirements like shelter and clothes and non-material needs like political freedoms, work, and participation ([Stewart, 1985](#)).

The human development index (HDI) was developed by [Haq \(1990\)](#), who emphasized the combination of health, education, and a higher standard of life. This index incorporates all fundamental human requirements and includes three income, health, and education indices to comprehensively view a country's progress. The HDI serves two important functions in welfare and development economics. First, it indicates popularizing human well-being as a perfect and fresh concept of progress. Second, it is an alternative to standard development assessment that uses GDP to compare various degrees of human development across nations. One of the fundamental elements of HDI is that it has switched policymakers' focus from economic growth to development ([Ravallion, 2011](#)). The beauty of this HDI is that it encompasses a country's economic progress and other social dimensions of human development ([Klugman, Rodriguez, & Choi, 2011](#)).

The HDI evaluates education, income, and life expectancy, which reflect how healthy and wealthy a country is, but it also reveals how well-educated a society is. This is why the HDI is a geometric mean of these three indices of health, income, and education ([Ravallion, 2011](#)). Economic development is not the same as economic growth. EG is defined as a rise in the value of goods and services generated by a country over time, and economists quantify it by an increase in the country's GDP. Thus, EG without economic development is feasible in the short or medium term ([Hadjimichael, Kemeny, & Lanahan, 2014](#)).

In other words, a rise in GDP may occur without an increase in a state's people's quality of life. Environmental circumstances that

promote economic growth must be developed by investing national money in infrastructure development, which will lead to an improvement in a country's population's standard of living (Wilkins & Zarawski, 2014). Some study highlighted the need for a new measure of progress in people's well-being, stating that GDP is insufficient because economic development is not synonymous with better well-being. The literature proposed that indices encouraging sustainable development be utilized in place of GDP. According to Tejvan (2015), HDI is one of the various economic development indicators. According to Diffen (2015), HDI is a measuring indicator that takes into account literacy rates and life expectancy, which impact productivity and may drive economic development, whereas economic growth does not take into account unrecorded economic activity.

2.2. Theoretical review

Institutions are the boundaries that humans have created to control social, political, and economic interaction (North, 1990a). They are comprised of both unofficial (constitutions, laws, and property rights) and formal norms (sanctions, taboos, customs, and standards of behavior). Throughout history, people have developed institutions to encourage order and remove uncertainty in commerce. In association with the typical constraints of economics, they define the choice set and hence determine transaction and production costs, as well as the profitability and viability of engaging in economic activity.

According to Fukuyama (2013), each one will not be sufficient to measure government quality since governance quality is ultimately a product of the mix of capacity and autonomy. Without insufficient institutional quality, a lax application of the law, and uncertain property rights, even a good policy prescription may fail to achieve its goals (Knack & Keefer, 1995). According to Rodrik (1999), domestic social conflicts are critical in understanding economic performance disparities between war and peaceful nations. Gradstein (2004) discovered a positive relationship between IQ and economic development. Similarly, Rivera-Batiz (2002) found that democratic institutions increase governance and growth. Gough et al. (2004) state that the lack of effective and efficient governance in many developing economies impedes national advancement. The foundational study by Williamson and Tadelis (1989) and North (1990) revealed that IQ is one of the most important factors influencing GDP growth, which institutional economics research has accepted. Additionally, Gagliardi (2008) hypothesized that a higher IQ might deter abuse, foster better agent-agent collaboration, and encourage agents to consider externalities. Therefore, the increased IQ may provide comprehensive methods for boosting Economic growth (EG) (Subramanian, 2007). Economic institutions are associated with higher earnings, human development, revenue growth, and decreased unemployment (Leite, Lucio, & Ferreira, 2019). Financial institutions are therefore designed to aid EG through better corporate governance oversight and influence, capital allocation, savings pooling, and targeted marketing (Levine, 2005, Levine, 1997). Acemoglu and Zilibotti (1997) state that better variety enables progressive money allocation for most productive uses and lowers growth variability through more productive specialization. Finally, various types of institutions impact societal and economic outcomes. As a result, while developing policies, the unique institutional situation should be considered. The benefit streams of economic agents must also be preserved and guaranteed for a better economic outcome. Singh and Pradhan (2022) reported that governance is a set of institutions and procedures that affect economic outcomes.

2.3. Empirical review

Boujelbene (2021) examined the connection between IQ, and economic growth (EG) in the case of North African countries from 1980 to 2016 using the GMM methods. The finding revealed that there is the existence of a non-linear nexus amongst the selected variables and also revealed that above a threshold level of inflation hurts EG. In contrast,

Tran et al. (2021) claimed that there is a non-linear connection between economic growth and institutions in Asian countries. They used the Non-linear ARDL approach. Furthermore, presented that the institutional vector tops the threshold, reducing economic growth. Finally, Asian economic growth has been affected due to infrastructure, labor force, inflation, and trade openness. By using the time series data and OLS technique, from 1979 to 2018, Abubakar (2020) and Yuldashev et al. (2023) claimed that IQ responds positively to EG. While FDI and domestic investment have a negative effect on EG. (Ngo and Nguyen, 2020) worked in Asian Low - Middle-income Countries from 2000 to 2018. The paper examines institution quality, total productivity, and EG by using the Quintile regression. The findings showed that interactive variables and TFP positively affect EG, whereas institutional determinants have a negative effect because low-middle-income countries have weak institutions. Ouoba and Sawadogo (2019) showed that African countries have no proper management of their resources because of a lack of solid and reasonable institutions. Thus African countries should decrease their dependency on economic diversification and enhance institutional quality. Hayat (2019) worked in 104 countries and found that FDI delayed EG in high-income countries by using the GMM methods. Moudine et al. (2019) examined Moroccans' IQ and economic development by using graphical and correlation analysis and found that the institutional variable matters for economic performance. In their research of SAARC nations, (Devarajan & Nabi, 2006) discovered that external money, particularly remittances and institutions, are important drivers of improved economic performance. Ghani and Ahmed (2009) observed that regional public goods, inclusive growth, infrastructure market integration and institutions are the five primary drivers of EG in South Asia. While, (Ravallion, 2011) argued that greater levels of education should be prioritized in the South Asian area for improved economic outcomes.

Khan and Hanif (2020) examined the nexus between Institutional quality, inflation and economic growth by using the GMM approaches for a large panel of 113 economies over the period 1981–2015. They showed that IQ positively affects EG, while the inflation and growth relationship is negative. Jude and Leveuge (2015) examined the role of IQ in the Growth effect of FDI in developing countries and claimed that at a certain threshold level of IQ, the FDI positively affects growth. Bhattacharjee and Haldar (2015) examined growth determinants with special reference to the institution. They revealed that two institutional indicators, accountability and government effectiveness, positively affect growth in South Asia. By using the fixed and random effect Azam and Emirullah (2014) worked on the association between corruption and EG from 1985 to 2012 in the case of nine Asia-Pacific economies. Authors found that inflation and corruption harm economic growth. Sachs (2009) highlights the necessity of regional integration in South Asian economies, whereas Volcker (2009) emphasizes the relevance of governance capacities in maintaining prosperity. Using property rights as a metric of governance, Gradstein (2004) discovered a positive relationship between IQ and economic development. Similarly, Rivera-Batiz (2002) discovered that democratic institutions increase governance and EG. Gough et al. (2004) state that the lack of effective and efficient governance in many developing economies impedes national advancement. Dima, Dima, and Lobont (2013) discovered that the quality of friendly governance positively influenced economic performance in 27 European Union member nations. Sarwar, Afzal, Shafiq, and Rehman (2013) and Bhattacharjee (2017) conducted similar research on the influence of IQ on the economic performance of South Asian nations. Both studies indicated that governance quality has a favorable and significant influence on a country's economic success.

Nawaz, Iqbal, and Khan (2014) analyzed the Asian economies and showed that developed Asia institutions are more effective than developing Asia. Moreover, institutions in shaping the long-term economic growth of Asian economies. Nevertheless, the influence of institutions on economic growth varies among these economies and is contingent upon their level of development. The results indicate that institutions

have a greater impact in developed Asian countries compared to developing ones. This suggests that diverse countries necessitate distinct sets of institutions to foster sustainable economic growth in the long run.

Law, Lim, and Ismail (2013) worked on the nexus between economic development and institutional quality in the case of 60 economies from 1990 to 2008. The authors used the Granger causality test. The result shows a two-way connection between the institution and economic development. Moreover, the relationship between institutions and economic performance varies depending on a country's income level. In higher-income countries, improved institutional quality promotes economic development, whereas in lower-income countries, economic development tends to enhance institutional quality. This suggests a dynamic interplay between institutions and economic progress, where the direction of causality differs across income levels. Venard (2013) worked on association amongst economic development, institutional and economic growth for 120 economies and used five indicators of IQ by using the Partial Least Squares (PLS) method. The finding reveals that low institutional quality and high corruption are worse for economic development. Zhuang, de Dios, and Martin (2010) worked on Asian developing economies from 1998 to 2008 and revealed that good governance must be a followed development goal in Asian economies.

Bisht and Pattanaik (2022) examined the importance of youth in a country's economic development and, the role of economic change. The results pointed to specific enigmatic changes in the labor market that, despite reasonable EG, pose a serious obstacle to a successful School-to-Work transition for the nation's younger population. These obstacles include declining labor force participation, rising unemployment across gender and sector and declining employment. Using the Tobit regression, Giri and Arora (2023) analyzed the nexus between energy Poverty and human development in Rural Rajasthan, India. The results support that energy poverty has a negative impact on the region's level of human development. Additionally, it helps the other side of the relationship, which holds that, via various connections, raising human development lowers energy poverty.

3. Methodology and data

3.1. Model specification

This study analyzes institutional quality's impact on economic development from the above theoretical background. We followed the model used by Ahmad et al., (2023), Nawaz et al. (2014), Moudine et al. (2019), Saad and Uddin (2021), Abubakar (2020), Tran et al. (2021), Uddin and Rahman (2022) and Gu et al. (2023a,2023b).

$$HDI_{i,t} = \beta_0 + \beta_1 IQI_{i,t} + \beta_2 COR_{i,t} + \beta_3 INF_{i,t} + \beta_4 UET_{i,t} + \beta_5 GLO_{i,t} + \mu_{i,t} \quad (1)$$

In Eq. (1), *HDI*, *IQI*, *COR*, *INF*, *UET*, and *GLO* stands for Human development index, institutional quality index, corruption, inflation, unemployment, and globalization. The *IQI* emerged from six governance indicators by using the principle components analysis. Whereas $\mu_{i,t}$ = Error term, the subscript (i = 1..... n) shows the country, and subscript (t = 1..... t) indicates the period. Moreover β_0 is intercept and $\beta_1, \beta_2, \beta_3, \beta_4$ and β_5 , are slope coefficients of the respective variables. To avoid data sharpness and Heteroscedasticity, we transformed all the variables into natural log form (Uddin et al., 2023), except the index of institutional quality, inflation, and unemployment, because *IQI* includes negative values, while *INF* and *UET* already in percentage form.

3.2. Measurement of institutional quality index

The Institutional Quality Index (IQI) emerged from six governance indicators suggested by (Nawaz et al., 2014; Epo & Nochi Faha, 2020; Tran et al., 2021). The governance indicators include (1) Voice and Accountability (2) Political Stability and Absence of Violence/Terrorism (3) Government Effectiveness (4) Regulatory Quality (5) Rule of Law

and (5) Control of Corruption. The indicators range from -2.5 to +2.5. The low value indicates the bad quality of the institution, while the high value indicates the good quality of the institution. It is expected that these indicators are likely to be corrected, therefore, we construct the IQI, using principle component analysis (PCA). Because these indicators are assumed to be corrected, we create the IQI using the principal component analysis (PCA). The PCA shows how much of a variable's variation is explained by a given component. The eigenvalues of the sample covariance matrix are used to calculate the primary component. The variances of the variables are represented by these eigenvalues (institutional indicators in this case). As a result, the number of principal components equals the number of variables. Because the first principle component often explains most of the variation, its value is utilized to compute the index. The main benefit of PCA is that the weights assigned to variables are decided by the data itself (Nawaz et al., 2014).

3.3. Estimation strategy

3.3.1. Cross-sectional dependence tests and slope homogeneity tests

We employed CD tests, and the Lagrange multiplier (LM) to investigate cross-sectional dependence (CSD) test. Eqs. (2) and (3) provide the formulas, respectively.

$$LM = J \sum_{i=1}^{K-1} \sum_{j=i+1}^K \hat{\varrho}_{ij}^2 \quad (2)$$

$$CD = \sqrt{\frac{2K}{N(N-1)}} \left[\sum_{i=1}^{K-1} \sum_{j=i+1}^K \hat{\varrho}_{ij}^2 \right] \quad (3)$$

where *K*, *T*, and $\hat{\varrho}_{ij}^2$ represent sample size, time period, and correlation of residuals between nation *i* and nation *j*, respectively. The slope heterogeneity (S-H) is the puzzle of CS-dependency because of the wrong estimation. (Pesaran, 2007) developed the S-H to evaluate the slope homogeneity coefficient. To determine the homogeneity and heterogeneity slope coefficient the $\hat{\Delta}$ statistic as follows:

$$\hat{\Delta} = \sqrt{K} \left[\frac{K^{-1} S^{-N}}{\sqrt{2N}} \right] \quad (4)$$

For the small sample size, $\hat{\Delta}_{Adj}$ can be stated as in equation-5.

$$\hat{\Delta}_{Adj} = \sqrt{K} \left[\frac{K^{-1} S^{-N}}{\sqrt{Var[\hat{T}_{it}]}} \right] \quad (5)$$

3.3.2. Panel unit root

In the existence of CS-dependency, and to avoid biased estimates, to capture the stationarity characteristics of the variables, this study uses second-generation unit root tests, such as the CADF and CIPS tests developed by Pesaran (2007). Using Eq. (6), the CADF statistic was calculated.

$$\Delta Z_{it} = \omega_i + \omega_i Z_{it-1} + \omega_i \bar{Y}_{t-1} + \sum_{i=0}^p \omega_{it} \Delta \bar{Z}_{t-1} + \sum_{i=1}^p \omega_{it} \Delta Z_{it-1} + e_{it} \quad (6)$$

In Eq. (6), \bar{Y}_{t-1} and $\Delta \bar{Z}_{t-1}$ link to the cross-sectional average. The CIPS statistic as expressed in Eq. (7) was utilized to calculate individual CADF (Pesaran, 2007). The *Ho* of the CADF and CIPS tests reported that data are non-stationary.

$$\widehat{CIPS} = \frac{1}{K} \sum_{i=1}^n CADF_i \quad (7)$$

3.3.3. Co-integration test

Cross-section correlation is ignored by the Co-integration analyses suggested by earlier researchers, hence, to solve this issue, we use the

Wasterlund (2007) co-integration analysis. The Westerlund’s suggested formula (2007), as signified in Eqs. (8)–(11).

$$G_t = \frac{1}{K} \sum_{i=1}^K \frac{b_i}{SE(b_i)} \tag{8}$$

$$G_\alpha = \frac{1}{K} \sum_{i=1}^K \frac{Tb_i}{b_i(1)} \tag{9}$$

$$P_T = \frac{b_i}{SE(b_i)} \tag{10}$$

$$P_\alpha = Tb_i \tag{11}$$

3.3.4. Cross sectionals auto regressive distributive lags (CS-ARDL) model

Given the presence of cross-sectional dependency (CD), the first-generation panel ARDL does not give the best estimates. CS-ARDL has been used in this empirical study to avoid the problem of cross-sectional dependency. Chudik and Pesaran (2015) reported that to overcome this issue must take cross-section averages of each regressor, which will sweep the unfitting inference considered in Eq. (3).

$$HDI_{i,t} = \sum_{j=1}^p \delta_{ij} HDI_{i,t-j} + \sum_{j=0}^q \Omega_{ij} X_{i,t-j} + \omega_i + \mu_{it} \tag{2.a}$$

$$HDI_{i,t} = \sum_{j=1}^p \delta_{ij} HDI_{i,t-j} + \sum_{j=0}^q \Omega_{ij} X_{i,t-j} + \sum_{j=0}^r \beta_{ij} \bar{I}Z_{t-1} + \omega_i + \mu_{it} \tag{2.b}$$

where $\bar{Z}_{t-1} = (\overline{HDI}_{i,t-j}, \overline{X}_{i,t-j})$ are the averages of regressand and regressor, p, q, r indicate lags for each variable. Further \bar{Z} represents cross-section averages to evade cross-section dependence (Azam, Uddin, Khan, & Tariq, 2022).

$$HDI_{i,t} = \sum_{j=1}^p \delta_{ij} HDI_{i,t-j} + \sum_{j=0}^q \Omega_{ij} X_{i,t-j} + \sum_{j=0}^r \beta_{ij} \bar{I}Z_{t-1} + \omega_i + \mu_{it} \tag{2.c}$$

The CS-ARDL estimates the long-run coefficients from short-run coefficients are given as.

$$\widehat{\lambda}_{CS-ARDL,ij} = \frac{\sum_{j=0}^q \widehat{\Omega}_{ij}}{1 - \sum_{j=1}^p \widehat{\delta}_{ij}} \tag{2.d}$$

The mean group is given as follows:

$$\widehat{\lambda}_{MG} = \sum_{j=1}^N \widehat{\lambda}_{i,j} \tag{2.e}$$

Short- run Coefficient is estimated as:

$$\Delta HDI_{i,t} = \vartheta_i [HDI_{i,t-j} - \lambda_{ij} X_{i,t-j}] - \sum_{j=1}^{p-1} \delta_{ij} \Delta HDI_{i,t-j} + \sum_{j=0}^q \Omega_{ij} \Delta X_{i,t-j} + \sum_{j=0}^r \beta_{ij} \bar{I}Z_{t-1} + \omega_i + \mu_{it} \tag{2.f}$$

$$\Delta_t = t - (t - 1)$$

$$\widehat{\tau}_{ij} = - \left[1 - \sum_{j=1}^p \widehat{\delta}_{ij} \right] \tag{2.g}$$

$$\widehat{\lambda}_{ij} = \frac{\sum_{j=0}^q \widehat{\Omega}_{ij}}{\widehat{\tau}_{ij}} \tag{2.h}$$

3.3.5. Robustness analysis

The long-run co-integration test was established using FMOLS developed by (McCoskey & Kao, 1998; Phillips & Moon, 1999), and the Panel Dynamic Ordinary Least Squares (DOLS) by (Kao & Chiang, 2001)

methods were used. The Monte Carlo simulations found that The DOLS estimation of co-integration is less biased and has better sample properties than the FMOLS estimators in small samples. The panel FMOLS estimator is performing under the following equation:

$$\widehat{\beta}_{FMOLS} = \left\{ \sum_{i=1}^N \sum_{t=1}^T (X_{it} - \bar{X}_i)(X_{it} - \bar{X}_i) \right\}^{-1} \left\{ \sum_{i=1}^N \left[\sum_{t=1}^T (X_{it} - \bar{X}_i) \left(\widetilde{Y}_{it} - T\Delta_{\epsilon\mu} \right) \right] \right\} \tag{12}$$

where \widetilde{Y}_{it} is the endogeneity correlation term, and $T\Delta_{\epsilon\mu}$ is the serial correlation correction term. While the dynamic ordinary least square (DOLS) estimator is obtained as follows:

$$\widehat{\beta}_{DOLS} = \theta_i + \beta_i X_{it-1} + \sum_{j=p_1}^{p_2} Z_{ij} \Delta X_{it+j} + U_{it} \tag{13}$$

where p_2 is the maximum lead length, and p_1 is the maximum lag length ΔX_{it+j} eliminates the effect of endogeneity of X_{it} and U_{it} .

3.3.6. Panel Granger causality test

The above CS-ARDL, AMG, FMOLS, and DOLS do not explain the causal link. The Panel causality, the commonly used by Dumitrescu and Hurlin (2012). To examine the causal association between the variables.

$$\Delta HDI_{it} = \varnothing_{1j} + \sum_k \varnothing_{11ik} \Delta HDI_{it-k} + \sum_k \varnothing_{12ik} \Delta IQI_{it-k} + U_{1it} \tag{14}$$

$$\Delta IQI_{it} = \varnothing_{2j} + \sum_k \varnothing_{21ik} \Delta HDI_{it-k} + \sum_k \varnothing_{22ik} \Delta IQI_{it-k} + U_{2it} \tag{14.1}$$

$$\Delta HDI_{it} = \varnothing_{1j} + \sum_k \varnothing_{11ik} \Delta HDI_{it-k} + \sum_k \varnothing_{12ik} \Delta COR_{it-k} + U_{1it} \tag{14.2}$$

$$\Delta COR_{it} = \varnothing_{2j} + \sum_k \varnothing_{21ik} \Delta HDI_{it-k} + \sum_k \varnothing_{22ik} \Delta COR_{it-k} + U_{2it} \tag{14.3}$$

$$\Delta HDI_{it} = \varnothing_{1j} + \sum_k \varnothing_{11ik} \Delta HDI_{it-k} + \sum_k \varnothing_{12ik} \Delta INF_{it-k} + U_{1it} \tag{14.4}$$

$$\Delta INF_{it} = \varnothing_{2j} + \sum_k \varnothing_{21ik} \Delta HDI_{it-k} + \sum_k \varnothing_{22ik} \Delta INF_{it-k} + U_{2it} \tag{14.5}$$

$$\Delta HDI_{it} = \varnothing_{1j} + \sum_k \varnothing_{11ik} \Delta HDI_{it-k} + \sum_k \varnothing_{12ik} \Delta UET_{it-k} + U_{1it} \tag{14.6}$$

$$\Delta UET_{it} = \varnothing_{2j} + \sum_k \varnothing_{21ik} \Delta HDI_{it-k} + \sum_k \varnothing_{22ik} \Delta UET_{it-k} + U_{2it} \tag{14.7}$$

$$\Delta HDI_{it} = \varnothing_{1j} + \sum_k \varnothing_{11ik} \Delta HDI_{it-k} + \sum_k \varnothing_{12ik} \Delta GLO_{it-k} + U_{1it} \tag{14.8}$$

$$\Delta GLO_{it} = \varnothing_{2j} + \sum_k \varnothing_{21ik} \Delta HDI_{it-k} + \sum_k \varnothing_{22ik} \Delta GLO_{it-k} + U_{2it} \tag{14.9}$$

The null hypothesis of the Granger causality test is that the lag of the explanatory variable does not justify the variation in the regressand. Therefore, $H_0 : \varnothing_{12ik} = 0$ or $H_0 : \varnothing_{21ik} = 0$. If the null hypothesis is rejected IQI, COR, INF, UET, and GLO cause HDI.

3.4. Data

This empirical study analyzed the connection between institutional quality and economic development. This study includes 70 developing countries, the list of countries in Appendix A, from 1990 to 2018. The record of selected variables is given in Table 1.

Table 1
Variables description and data sources.

Variables	Description	Unit of measurement	Data sources
HDI	Human Development Index	Index	(WDI, 2022)
IQI	Institutional Quality Index	Index emerged from six Governance indicators.	(WGI, 2022)
COR	Corruption	Index	CPI (2022)
INF	Inflation	Inflation, Consumer Prices (annual %)	(WDI, 2022)
UET	Unemployment	Unemployment, total (% of total labor force)	(WDI, 2022)
GLO	Globalization	Index	(WDI, 2022)

4. Results and discussion

4.1. Descriptive statistic

Table 2, shows the descriptive statistics of selected variables. HDI, IQI, COR, INF, UET, and GLO mean values are 0.111652, 0.886549, -0.400804, 6.457083, 7.516614, and 4.026202, respectively. Whereas the standard deviation of HDI, IQI, COR, INF, UET, and GLO are 0.082783, 0.656894, 7.450016, 5.869235, and 0.212679, correspondently. Moreover, the Jarque-Bera statistic shows that all variables' coefficients are statistically significant and reject the null hypothesis of normal distribution except IQI. Table-2 also shows the correlation matrix for selected variables. The range of correlation coefficients is from -1 to + 1.

4.2. Cross-sectional dependence test result

CD denotes the effects of a shock spreading from one nation to another. If we ignore the CD, it will lead to biased estimates (Pesaran, 2015). The results are stated in Table 3. The null hypothesis of no CD is rejected at 1%. Therefore, we determine that there is CD across all the variables in developing countries.

4.3. Unit root and endogeneity tests results

The first-generation panel unit root tests (such as LLC, IPS, and Fisher ADF test) may produce incorrect findings in the presence of CD. As a result, this research uses the CIPS unit root test by, a second-generation panel unit root test (Pesaran, 2007). The CIPS unit root test results are shown in Table 4. IQI, RL, and GLO coefficients are stationary at the

Table 2
Descriptive statistics.

	HDI	IQI	COR	INF	UET	GLO
Mean	0.111652	0.886549	-0.400804	6.457083	7.516614	4.026202
Median	0.142607	0.234566	-0.521628	4.876533	5.725000	4.056982
Maximum	0.81345	0.893423	1.724580	108.8974	33.29000	4.446888
Minimum	0.21092	-0.00451	-1.722250	-18.10863	0.130000	3.220417
Std. Dev.	0.082783	0.46563	0.656894	7.450016	5.869235	0.212679
Skewness	-0.242326	1.775501	0.773397	5.190866	1.311912	-0.666719
Kortosis	1.245174	0.628280	3.458859	2.715684	4.575129	3.447074
Jarque-Bera	39.89724***	3.628280	129.0716***	151572.4***	519.7844***	98.07241***
<i>Correlation Matrix</i>						
HDI	1	0.12	0.53	0.47	0.56	0.73
IQI	0.65	1	0.54	0.65	0.35	0.56
COR	0.53	0.46	1	0.64	0.90	0.44
INF	0.58	0.61	0.45	1	0.55	0.24
UET	0.57	0.33	0.56	0.56	1	0.35
GLO	0.73	0.54	0.44	0.36	0.55	1

Note: *** represents a significance level at 1%,

Table 3
Cross-sectional Dependence Tests Result.

	Breusch-Pagan LM	Pesaran scaled LM	Pesaran CD
HDI = f (IQI, COR, INF, UET, GLO)	[883.1372] {0.0000}***	[120.3461] {0.0000}***	[19.4572] {0.0000}***

Note: [.] indicates t-statistics, {.} denotes p-values, *** represents significance at 1%, respectively.

Table 4
CIPS unit root test result.

Variables	I (0)	I (1)
HDI	-1.108	-2.268*
IQI	-3.156***	-3.764***
COR	-1.659	-2.270*
INF	-3.735***	4.568***
UET	-3.579**	-4.468***
GLO	-2.248*	-2.691***

*, **, *** shows 10%, 5%, 1%, -2.22-2.36 and -2.65 level of significance.

level, while HDI, COR, and PS have non-stationary at the level but stationary after the 1st difference. Moreover, We test for endogeneity of the indicators of IQ considering the Durbin-Wu-Hausman test. Table 5, presents the endogeneity test for the six IQ variables. Table 5, reported that IQ indicators are exogenous because we reject the alternative hypothesis of endogeneity. (Epo and Nochi Faha, 2020) also used the same indicators for the nexus between IQ and EG.

4.4. Co-integration test:

The Westerlund (2007) co-integration test has been employed in the presence of CD. The results of the Westerlund co-integration test are shown in Table 6. The null hypothesis of no-co-integration has been rejected. For that reason, there exists a long-run nexus among the selected variables.

Table 5
Test for institutional quality endogeneity.

Variable	Durbin scores test	Hausman
Voice and Accountability	0.816 (p = 0.448)	0.716 (p = 0.448)
Political Stability	0.517 (p = 0.418)	0.496 (p = 0.610)
Government Effectiveness	1.5321 (p = 0.219)	2.010 (p = 0.244)
Regulatory Quality	3.562 (p = 0.2313)	3.490 (p = 0.246)
Rule of Law	0.081 (p = 0.8427)	0.094 (p = 0.849)
Control of Corruption	1.871 (p = 0.163)	2.178 (p = 0.133)

Table 6
Westerlund (2007) co-integration test result.

Statistic	Value	Z value	P value
G _t	-4.891	-4.560	0.000***
G _a	-3.943	-3.360	0.000***
P _t	-0.468	-1.190	0.201
P _a	-4.193	-4.097	0.000***

*, **, *** shows 1%, level of significance.

4.5. CS-ARDL estimates:

The estimates of CS-ARDL are presented in Table 7. In the long run, the institutional quality indicator positively affects HDI. More specifically, the coefficient of IQI, is positive, indicating that a 1 unit rise in the IQI, will lead to a surge in the HDI by 0.88120%. The reason of the positive sign of IQI, when the institution is strong may raise investment, grow human investment, raise markets, and improve technology, all of these adding to productivity and creates incentives, which turn an effect on political and economic activities and grounds for economic development (North, 2000). Since IQ plays a vital role in any country’s economic devolvement, it is a crucial factor in the country’s wealth, besides other factors like sociopolitical stability, reducing political risk, and innovation. This wealth and rationalization of its management also increased economic development (Moudine et al., 2019). The finding is consistent with the finding of Tran et al. (2021), Abubakar (2020) and Ngo (2020). Tran et al. (2021) reported that there is a non-linear connection between EG and institutions. Moreover, when the institutional vector tops the threshold, EG is reduced in 48 Asian countries. Abubakar (2020) claimed that institutional quality responds positively to economic growth. While FDI and domestic investment harm economic growth. Moreover, Ngo (2020) showed that interactive variables and TFP positively affect EG. In contrast, institutional determinants have a negative impact because low-middle-income countries have weak institutions (Ngo, 2020).

The coefficient of corruption is a negative sign, which shows that a 1 percent rise the corruption will lead to reducing HDI by 0.34125%. It discourages investments, diverts public funds from social expenditures, and raises income equality, affecting developing countries’ economic development. Therefore, it is hypothesized that countries with lower levels of corruption have higher degrees of institutional transparency and more economic advancement than nations with higher levels of corruption (Mo, 2001). The outcomes are consistent with the outcomes of Kirchler (2007), Achim and Borlea (2020), Schneider and Buehn (2018), and Hoinaru, Buda, Borlea, Văidean, and Achim (2020). Similar critical results on corruption, money laundering, and the shadow

Table 7
Cross-Sectional ARDL Results.

Long run		
Variables	Coefficient	Standard deviation
IQI	0.88120***	0.05789
COR	-0.34125***	0.05468
INF	-0.98457*	0.56779
UET	-0.35668***	0.05677
GLO	2.45679***	0.04567
Short run		
ECM	-0.13567***	0.04567
IQI	0.56799***	0.04568
COR	-0.45670***	0.05789
INF	-0.56770***	0.05668
UET	-0.66880***	0.04679
GLO	0.56780***	0.02457

Note: selected model: CS-ARDL (1, 1, 1, 1, 1). ECM error correction coefficient. ***, **, * represents 1%, 5%, and 10% level of significance. Dependent variable. HDI.

economy are provided by Achim and Borlea (2020), Kirchler (2007), Schneider and Buehn (2018), and Uddin and Rahman (2022). Hoinaru et al. (2020) examine how the shadow economy and corruption impact economic and sustainable development. The authors give actual evidence of the negative impact of corruption on the shadow economy and economic development in nations worldwide, corroborating the “sand the wheels” approach using a sizable database (185 countries) between 2005 and 2015.

The coefficient of INF is a negative sign, revealing that a 1% rise in the INF causes HDI to be reduced by 0.98457%. The finding is consistent with the findings of Azam and Khan (2022), and Saad and Uddin (2021), while in contrast with the result of Ijaz (2020) and Ijaz (2021). The coefficient of UET is also a negative sign, indicating that a 1% rise the unemployment will cause to reduction HDI by 0.35668%. The coefficient GLO is also a positive sign, which reveals 1% rise in the GLO will also surge HDI by 2.45679% for developing countries. The reason for the positive sign of GLO, is globalization benefits access to global finance, national income, loans and investments, technology transfer, the establishment of new businesses, communication infrastructure, energy development, human rights dissemination, labor quality, and working conditions and enhancing the economic development of developing countries (Swadźba, 2020).

The short-run estimation of CS-ARDL is shown in Table 6, the variables IQI, and globalization have positive effects on HDI, while COR, INF and UET have adverse impact on HDI. At the 5% significance level, the ECM coefficient is -0.13567, which is negative and statistically significant. These results demonstrate that the model’s annual adjustment to long-run equilibrium is around 13.5%. Results of the ECM are negative and statistically significant and supported by theoretical expectations.

4.6. Robustness analysis

We use FMOLS, DOLS, AMG, Impulse response function (IRF), and variance decomposition Analysis (VDA) for robustness analysis. The results of FMOLS, DOLS, and AMG reported in Table 8, the direction of coefficient of these estimators, have been the same, but their significance levels are different. The FMOLS; DOLS; and AMG estimates show that IQI, and GLO positively affect HDI while COR, INF and UET negatively affect HDI. Finally, the adjusted R² of the FMOLS, DOLS and AMG estimates are 0.97, 0.995 and 0.96, indicating that 97%, 99% and 96% variation occurs in HDI due to IQI, COR, INF, UET and GLO, respectively (see Table 9).

Moreover, we employed the impulse response function (IRF) used for long-run shocks between the variables in a forecasting framework. The study used 10 years of forecasting the relationship between HDI and IQI, COR, INF, UET, and GLO to observe the positive and negative shocks between the variables over the next ten years, from 2019 to 2028. The estimates of IRF show that from 2019 till 2028, are presented in Table 10, the IQI has positive shocks to HDI. The adverse shocks of COR to HDI will be 2019–2023 and 2026–2028. The negative shocks of PS to

Table 8
Robustness Analysis Results.

Variables	FMOLS	DOLS	AMG
IQI	0.683456*** (0.05672)	0.403567*** (0.04571)	0.432456*** (0.014578)
COR	-0.094572* (0.014932)	-0.037912** (0.062379)	-0.072031*** (0.0024561)
INF	-0.145678*** (0.024812)	-0.124745*** (0.023456)	-0.593467** (0.023567)
UET	-0.804321 (0.013832)	-0.456212 (0.103510)	-0.953567 (0.023034)
GLO	0.934245*** (0.010721)	0.904571*** (0.014263)	0.762637*** (0.034892)
R ²	0.98	0.99	0.97
Adj. R ²	0.97	0.99	0.96

Note: ***, **, * represents 1%, 5%, and 10% level of significance.

Table 9
Impulse response function of HDI.

Period	HDI	IQI	COR	INF	UET	GLO
2019	0.085901 (0.00176)	0.234560 (0.04564)	-0.063342 (0.45134)	-0.003451 (0.00032)	-0.023411 (0.00039)	0.001293 (0.00017)
2020	0.081086 (0.00301)	0.001719 (0.00250)	-0.002077 (0.00250)	-0.002779 (0.00250)	-0.002086 (0.00249)	0.000593 (0.00250)
2021	0.073567 (0.00306)	0.002874 (0.00268)	-0.003348 (0.00253)	-0.002289 (0.00265)	-0.001869 (0.00264)	0.003295 (0.00274)
2022	0.066564 (0.00327)	0.003678 (0.00305)	-0.004373 (0.00282)	-0.001796 (0.00288)	-0.001837 (0.00314)	-0.005392 (0.00307)
2023	0.060133 (0.00359)	0.004279 (0.00350)	-0.005199 (0.00320)	0.001281 (0.00321)	0.001774 (0.00363)	-0.006978 (0.00349)
2024	0.054244 (0.00391)	0.004709 (0.00389)	0.005860 (0.00356)	-0.000780 (0.00354)	-0.001696 (0.00402)	-0.008132 (0.00386)
2025	0.048868 (0.00419)	0.004997 (0.00420)	0.006373 (0.00387)	-0.000303 (0.00382)	-0.001608 (0.00430)	-0.008934 (0.00415)
2026	0.043970 (0.00440)	0.005169 (0.00441)	-0.006757 (0.00412)	-0.000143 (0.00405)	-0.001512 (0.00447)	-0.009449 (0.00435)
2027	0.039520 (0.00454)	0.005247 (0.00455)	-0.007029 (0.00431)	-0.000552 (0.00422)	-0.001412 (0.00456)	-0.009732 (0.00447)
2028	0.035483 (0.00463)	0.005249 (0.00462)	-0.007204 (0.00444)	-0.000922 (0.00434)	-0.001311 (0.00457)	-0.009829 (0.00452)

(.) Represent Standard Error.

Table 10
Variance decomposition analysis of HDI.

Period	HDI	IQI	COR	INF	UET	GLO
2019	1.96656	0.98344	0.54555	0.65650	0.09930	0.97620
2020	0.85906	0.02114	0.03087	0.05527	0.03114	0.00251
2021	0.89752	0.05773	0.07993	0.06673	0.04039	0.05771
2022	0.96883	0.10341	0.14482	0.06766	0.04689	0.16840
2023	0.91827	0.15576	0.22316	0.06451	0.05197	0.32192
2024	0.85363	0.21240	0.31267	0.06004	0.05615	0.50511
2025	1.49568	0.27129	0.41098	0.05574	0.05964	0.70667
2026	0.82102	0.33078	0.51579	0.05249	0.06257	0.91735
2027	0.93984	0.38954	0.62491	0.05085	0.06502	0.12984
2028	1.93604	0.44655	0.73635	0.05116	0.06705	0.51242

HDI will be 2019–2022 and 2024–2028. The adverse shocks of UET to HDI will be from 2019 to 2022, and 2024–2028. The positive shocks of GLO to HDI will be 2019–2021, while this result would be negative in the preceding forecasted values during 2022–2028.

Furthermore, we perform the variance decomposition analysis to measure the relative strength of IQI, COR, INF, UET and GLO on HDI. The variance decompositions (up to 10 years) are presented in Table 10. Generally, we find that on average of the ten years horizon, nearly 0.19.22% of the variations in the forecast error variance for HDI are explained by its shocks. While on average, a shock in IQI explains about 38.02% of the variations in the forecast error variance in HDI. On average, a shock in COR, INF, UET and GLO explains about 20.42%, 10.76%, 1.27% and 29.37% of the variations in the forecast error variance in HDI. In summary, the results of VDA reveal that IQI is relatively more important than GLO, COR, INF and UET in explaining the variation of HDI, particularly in the long-run. Therefore, our empirical results confirm that IQI is a long-term economic development catalyst for the developing economy.

4.7. Panel causality estimation result

The (D–H; 2012) is employed for the panel Granger causality. The D–H panel causality outcomes are given in Table 11 and Fig. 1. The finding reveals a bi-directional causal linkage between HDI and IQI, GLO and IQI, COR and UET, UET and HDI, INF and COR, GLO and COR, and GLO and INF. While the unidirectional causal link exists between HDI and INF, GLO and HDI, UET and COR, INF and UET, INF and IQI, GLO and UET.

5. Conclusion

The core goal of this study is to analyze the impact of institutional quality on economic development in the case study of 70 developing countries from 2002 to 2018. The dependent variable is HDI which is used as a proxy for (economic development), while independent variables include; institutional quality index, corruption, inflation, unemployment, and globalization. This study firstly checked the cross-sectional dependency and used the second-generation panel unit root test (SGPUT). The SGPUT reports the mixed order of integration amongst the variables. Secondly, this study used the second-generation panel co-integration test (SGPCT). The SGPUT report that there exists the co-integration among the variables. Thirdly, this study employs CS-ARDL estimators to generate long- and short-run estimates. Fourthly, this study used the FMOLS, DOLS, and AMG estimators for robustness analysis to create long variables estimates. The Empirical results of the panel CS-ARDL, FMOLS, DOLS, and AMG estimates showed that in the long run IQI, and, GLO have a positive effect on HDI, while COR, INF and UET have a negative effect on HDI. Moreover, we employed the Impulse response function (IRF) for long-run shocks between the variables in a forecasting framework. The estimates of IRF show that till 2019 to 2028,

Table 11
Dumitrescu Hurlin Panel Causality Tests Result.

Variables	HDI	IQI	COR	INF	UET	GLO
HDI		(3.56789)*** { 3.19465}	(3.86837)*** { 3.54721}	(4.94417)*** { 5.13582}	(4.93501)*** { 5.15627}	(2.80174) { 0.78220}
IQI	(4.43882)*** {5.00239}		(1.84394) {0.98321}	(5.23401)*** {5.32184}	(1.14736) {1.48269}	(5.34562)*** {5.32678}
COR	(4.91950)*** {6.27206}	(1.35567) {1.43545}		(5.94562)*** {7.36104}	(2.74726) { 0.63403}	(3.82494)*** {3.43465}
INF	(1.35461) {1.00314}	(1.24013) {1.03692}	(2.93415)*** {0.83466}		(3.30525)* {1.37924}	(3.93461)*** {3.46916}
UET	(3.13935)** {3.18479}	(1.10468) {0.26164}	(3.18457)* {1.39368}	(2.84501) {1.23156}		(2.34179) {1.36013}
GLO	(3.65506)*** {2.99427}	(4.24456)*** {6.65767}	(4.25704)*** {4.55476}	(5.27924)*** {8.40274}	(4.83515)*** {4.13993}	

Note: ***, **, * represents 1%, 5%, and 10% level of significance. () w states, {} Zbar-Stat,

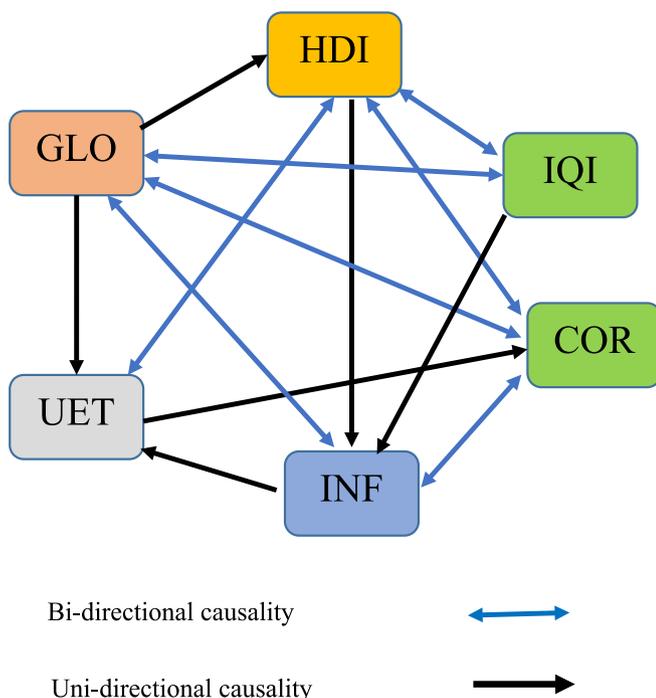


Fig. 1. Causality relationship diagram.

IQI has positive shocks to HDI. Furthermore, we perform the variance decomposition (VDA) analysis to measure the relative strength of IQI, COR, INF, UET and GLO on HDI. The estimates of VDA reported that on average of the 10 years horizon; nearly 0.19.22% of the variations in the forecast error variance for HDI are explained by its own shocks. While on average, a shock in IQI explains about 38.02% of the variations in the forecast error variance in HDI. Finally, From the D-H panel causality test results shows that bi-directional causal linkage exists between HDI and IQI, GLO and IQI, UET and HDI. In contrast, the unidirectional causal link exists between HDI and INF, GLO and HDI.

Based on the finding, this empirical study suggested some important policies for developing countries to surge their economic development: first, Policymakers should pay attention to the individual and whole impacts of the IQ on economic development, which is important for economic performance, so that appropriate improvements on institutional aspects, volumes, and goals are given to promote the country optimal economic development. Second, governments can establish and enforce a strong rule of law that protects property rights and ensures contracts are enforced fairly. This provides certainty to investors and entrepreneurs and encourages them to invest in the country, leading to

increased productivity growth and development. Third, governments can create a transparent and predictable regulatory environment that reduces corruption and bureaucratic hurdles to doing business. This can help businesses operate more efficiently and encourage investment, growth, and development. Fourth, the government should strengthen its institutional quality, it attracts foreign investment because of the certainty and stability of strong institutions. This investment can create jobs, boost economic activity, and promote growth and development. Fifth, Institutional quality must be enhanced, which is attainable through transparency, the foundation of institutional quality enhancement, and the combat against corruption. Six, a strong administrative intervention is required to eradicate corruption and advance economic development. Seven, the government should encourage globalization, enhance market interconnection globally, and boost communication and understanding of the economic potential in other countries. Eight, the government should maintain price stability through a variety of policies, including monetary, fiscal policy, exchange rate policy, supply-side policies, and wage and price controls. If prices are stable, businesses and consumers can plan and make decisions more confidently. Finally, the government should increase its spending on infrastructure projects or other programs that create jobs. Governments can create employment opportunities and stimulate economic growth and development by investing in public works.

Finally, this study has several limitations that will give us future research directions. We select only developing countries and ignore the developed countries, and the future study will use these variables to examine developed countries. In this study, we used only three indicators of institutional quality, and others were ignored. We used only a few determinants of Economic Development, where many macroeconomic variables affect economic development, such as; interest rate, geopolitical risk, exchange rate volatility, etc. We used CS-ARDL, FMOLS, DOLS, and AMG, but ignored the asymmetric analysis. The asymmetric analysis is best suited for non-normally distributed variables.

CRedit authorship contribution statement

Ijaz Uddin: Conceptualization, Writing – original draft. **Maaz Ahmad:** Methodology, Writing – review & editing. **Dilshod Ismailov:** Supervision. **Muhammad Eid Balbaa:** Visualization, Investigation. **Akbarali Akhmedov:** Software, Validation. **Sarvar Khasanov:** Resources, Supervision. **Manzoor Ul Haq:** Data curation, Formal analysis.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A: List of developing countries

1	Albania	25	Costa Rica	49	Mauritius
2	Algeria	26	Croatia	50	Mexico
3	Angola	27	Dominican Rep	51	Moldova
4	Armenia	28	Ecuador	52	Mongolia
5	Azerbaijan	29	El Salvador	53	Morocco
6	Bahrain	30	Gabon	54	Mozambique
7	Bangladesh	31	Georgia	55	Myanmar
8	Barbados	32	Ghana	56	Namibia
9	Belarus	33	Guatemala	57	Nepal
10	Benin	34	Guinea	58	Nicaragua
11	Bhutan	35	Guyana	59	Niger
12	Bolivia	36	Haiti	60	Nigeria
13	Bosnia/Herzegovina	37	Honduras	61	Oman
14	Botswana	38	Hungary	62	Pakistan
15	Brazil	39	India	63	Papua New Guinea
16	Bulgaria	40	Indonesia	64	Paraguay
17	Burkina Faso	41	Iran	65	Peru
18	Burundi	42	Jamaica	66	Poland
19	Cambodia	43	Jordan	67	Rwanda
20	Cameroon	44	Kenya	68	Saudi Arabia
21	Chad	45	Libya	69	South Africa
22	Chile	46	Malawi	70	Sri Lanka
23	China	47	Malaysia		
24	Colombia	48	Mali		

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