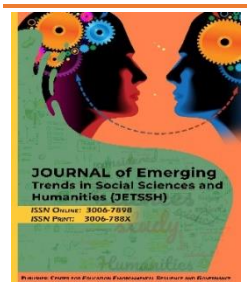
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Institutions and Well-Being: A Dynamic Common Correlated Estimation Analysis Across HDI Levels

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ABSTRACT

Institutional quality plays an important role in the well-being of the people. This study explores the relationship between institutional quality and well-being. It will focus on the key institutional aspects, such as rules and regulations, government effectiveness, and corruption. The study will examine how these institutional aspects affect people's well-being. A panel of 50 nations was selected. The time period of the study is 1996 to 2024. The nations were divided into two groups: very high and high human development index (HDI) nations. This categorization was based on their respective HDI scores. The dynamic common correlated effect (DCCE) technique was used to capture the issues of cross sectional dependence and slope heterogeneity. The empirical results reveal that institutions and well-being are positively and significantly related in very high HDI nations. However, there exists a negative relationship in the case of high HDI nations. Per capita income and well-being are positively related in both groups, whereas trade openness is positive and significant in case of group one and insignificant in group two. The empirical results identify two key findings: first, institutions are vital for prosperity, and second, the quality of institutions also matters, as in nations where institutions are stronger and operate with sovereignty, the standard of living is higher. This research paper is an important contribution to the literature. It uncovers the role of vital institutional aspects and their relationship with the well-being of the people, with such a large panel dataset.

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1. Introduction

The role of institutions is vital for the prosperity and well-being of the people. Institutions provide rules and regulations within the legal framework to run the social and economic systems efficiently. (North, 1990) was the first researcher to discuss this role of institutions and explain how they integrate with the economic system to ensure prosperity. Institutions are developed by humans to create incorporation among cultural norms, administrative bodies, legal frameworks, and social infrastructure of any respective nation (Currie, Campenni, Flitton, Njagi, Ontiri, Perret, and Walker, 2021). Efficient and high quality institutions help reduce transaction costs in the economy by eliminating market failures and ensuring the equitable distribution of resources. Institutions are important because they not only contribute to the process of making regulations, but also ensure their smooth implementation with the help of governing bodies. The previous literature explains that the well-being of the people is a multidimensional phenomenon; it is not only about income (Yang, 2018). Equal opportunities to grow with better health and education facilities are also a significant part of well-being. Thus, well-being means that income is not the only concern; improvements in the abilities of the people are also vital. Institutions are imperative because they provide a stable environment to ensure the equitable distribution of resources, which guarantees the well-being of the people.

The institutional framework has evolved over time. Traditionally, the institution means one big authoritarian regime, controlling all the affairs of the state at large. The overtime development in the institutional framework has determined that institutional procedure is a systematic managerial framework that works as per the given mandate. It is a complex set of bodies, where every domain plays its role as per the design (Hoefer, 2022). The successful implementation of policies can only be done by making proper rules in accordance with the law through a legislative framework. The well-being of the people is linked with the laws and policies. Institutional support is a key in this regard, as policy formulation is also linked with the institutional structure. It is important for the government to act independently, reduce the level of corruption, and ensure that resources are distributed equally. Institutional reform is also vital; here, it means the lowest level of corruption. In those nations where the rule of law is being followed in its full spirit, the result is a decreased level of corruption and a higher level of growth.

Institutions that are poor in quality become a prime reason for corruption, which results in a lower level of well-being and growth; this issue is persistent in developing and emerging economies (Bilal and Ahmad, 2024). Formal and well-regulated institutions promote inclusivity, provide equal opportunities to individuals to grow, and also help in the equitable distribution of resources. Thus, institutional effect is not only about an increase or decrease in income levels, but goes beyond it, where focus should be on the functioning of the institutions, with an appropriate implementation mechanism, so that on the one side the policies can be implemented successfully and on the other side the issues like corruption can be dealt with (El Maachi, Saadane and Chehri, 2025).

Another important aspect is the role of economic growth or development in promoting well-being. The level of human development is much better in nations where the overall national income level is high. This argument has been supported by several research studies (Li and Pilz, 2023; Pata and Samour, 2022; Dada and Abanikanda, 2022).

In light of these arguments, an empirical investigation is conducted to check the relationship between institutions and well-being. The institutions are not merely regulatory bodies. They have become a fundamental resource for policymaking. This research study will explore this role of institutions on a panel of fifty nations. This deeper dive to explore the role of institutions in the promotion of well-being has been done with the modern econometric technique Dynamic Common Correlate Effects (DCCE) because in panel data sets the cross-sectional dependence and slope heterogeneity are important and must be addressed to obtain unbiased, perfect empirical results (Chudik and Pesaran, 2015). The paper is divided into different sections. In these sections, the previous literature, data and methodology and results with the conclusion has been discussed.

2. Literature Review

The traditional growth models and development frameworks focused more on infrastructural development and skill development in human capital. Institutions are vital for the prosperity and well-being of the people. (Nkurunziza and Bates, 2003) have augmented the Solow growth model by adding political and institutional factors. The empirical investigation has been done on the selected countries of the African region with the help of the system Generalized Method of Moments (GMM) technique. It has been concluded that political and institutional factors affect economic progress. Institutions usually provide a set of rules and regulations that help in enhancing the governance mechanisms. (Norton, 2003) has explored the connection between institutions and economic well-being. (Coatsworth, 2008) has discussed this scenario in his descriptive essay in light of the Latin American nations. It has been concluded that many of these nations are struggling to achieve the desired target of economic growth due to liberal policies, and institutions within these nations are failing to address this problem. The below power performance of the institutions is not due to colonization but due to the weak institutional structure in these developing nations. (Demetriades and Law, 2006) have discussed the integration of financial development and institutional performance in connection with economic development on a panel of seventy-two nations. The mean group econometric estimation technique has been used. It has been concluded that financial development and economic development are strongly linked in nations where strong institutional mechanisms exist. (Zhuang, de Dios and Martin, 2010) have focused on this area and tried to examine the quality of governance and institutional framework in developing Asia. In their working paper, it has been concluded that good governance is essential for economic well-being and it must be followed in all dimensions. (Bennett, Nikolaev, and Aidt, 2016) have explored the literature on institutions figured out that, new areas of research with respect to economic well-being and institutions. It has been concluded that future research can be done with respect to the type of institutions and their inherent capability to counter economic issues. The role of legislative size is important in improvising the socioeconomic policies effectively, and also studied its impact on the welfare of the people (Mignozzetti, Cepaluni and Freire, 2022). This survey research study has been done in Brazil. It has been concluded that legislators prefer to work to provide public and private goods to the people, as it is easiest to claim credit for these types of goods at the time of voting. (Acquah, Carbonari, Farcomeni and Trovato, 2023) have investigated the role of institutions with the help of a new multidimensional institutional index, Fraser Institute (2018). The generalized propensity score mechanism has been used to explore the causality between institutions and GDP growth. It has been concluded that all institutions are not vital for economic development, and different institutions have different impacts on economic development. (Inanc and Kalleberg, 2022) have explored this role of institutions in providing an efficient working environment to the labor force. In this descriptive study, a significant nationwide variation has been found with respect to labor market policies. Furthermore, it has also been concluded that the impact of employment protection legislation depends on the time period, in case these legislations are temporary, the impact will also be temporary. (Tashtamirov, 2023) has studied the role of institutions in six developed nations. It's a panel data study, in which it has been concluded that different institutional variables like rule of law, regulatory quality, and control of corruption act differently in different nations. It has also been concluded that, on one side, these variables do affect the economic conditions of the country, but, contrary to it has a very little effect on trade openness and human capital. (Shiroka-Pula, Bartlett and Krasniqi, 2023) have studied the role of institutions in subjective well-being in European nations. In this survey based study, it has been concluded that institutional quality is relevant and does make a sound impact on the well-being of the people in these selected European nations. (Omri and Kahia, 2024) have studied the integration between institutional quality and natural resources and their impact on well-being in the Kingdom of Saudi Arabia. They have used the capabilities approach by Amartya Sen and focused on the quality of life and standard of living. The Johansen cointegration approach has been used for the empirical investigation, and it has been concluded that quality of life and standard of living do

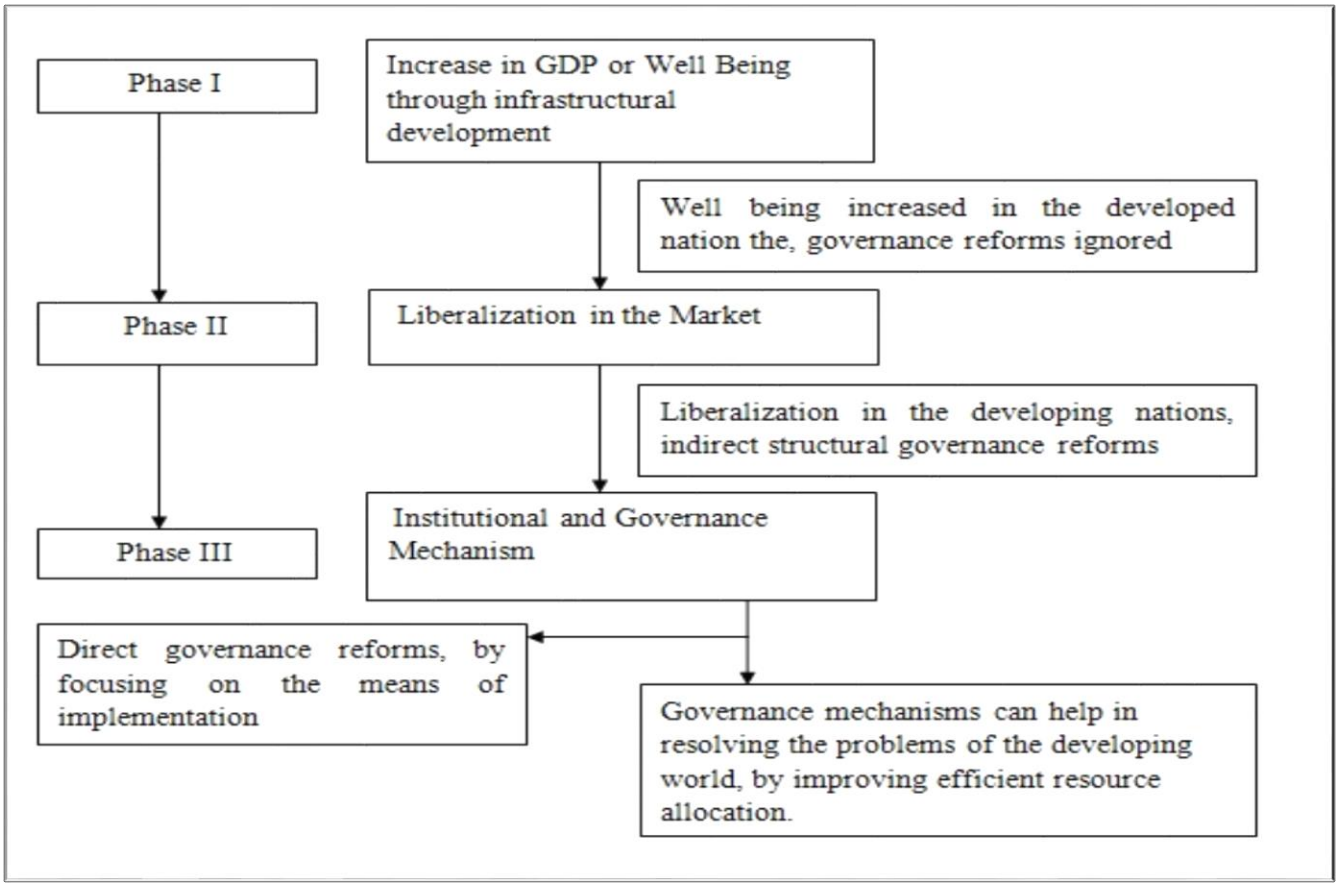
improve when the government works efficiently under a rule of law and controls issues like corruption. In this way, the people can get maximum benefit from the natural resources, and their quality of life and standard of living also improve. (Maddah and Arab, 2022) have studied the resource curse hypothesis in eleven resource-rich nations. Their major focus was to study the impact of natural resource rent on human well-being. They have also studied the role of institutions on well-being. It has been concluded that institutions positively impact human well-being, and on the other hand, natural resource rent negatively affects human well-being, but this negative effect can be controlled with the help of improved quality of institutions. (Le and Ozturk, 2020) have studied the Environmental Kuznets Curve in forty-seven emerging developing economies. It's a panel data study. The empirical investigations have been done with the help of Common Correlated Effects Mean Group (CCEMG), Dynamic Common Correlated Effects (DCCE), and Augmented Mean Group (AMG) econometric techniques. It has been found that the government must work to improve the institutional and financial frameworks to overcome the impacts of environmental degradation and promote sustainable growth. The literature on institutions and well-being helps us to understand the fact that this domain has been discussed in various aspects, where institution related themes and their impact have been discussed together. This research study will focus on the prime institutional quality aspects, like rule of law, government effectiveness, and corruption. More importantly, the modern econometric technique DCCE will be used to evaluate the long-run association between institutional quality and well-being. Furthermore, this study will not only theoretically contribute to the evaluation of institutional quality but also empirically estimate the relationship with an error free econometric mechanism.

3. Institutionalism: The Theoretical Framework

The institutional economics has deep roots in the human history. The Greek and Roman relied on the institutions and rule the world for a longer period of time. The socioeconomic development of that era was much dependent upon the institutions. The division between public and private goods and development of legislative houses was some important steps of that era Adamson, (2020). The role of State has been redefined with the help of institutions. The social choice of institutions has been made in light of the demand and supply factors, in other words the role of state is to act as a market enabling rather than a controlling authority Arruñada, (2020). North changed the traditional approach towards the institutions, according to him institutions are the humanly made constraints, which devise certain rules and regulations, and as a result of these certain rules and regulations the working of the market becomes efficient, Dugger (1995). One of the key roles of the institutions is to enhance the contract enforcement, as certain transaction costs are related with the market clearing mechanisms, North (1993).

Hence the debate of economic growth moved forward from the traditional side to the modern side and changes are being observed. The increase in the national income or the gross domestic product is not only linked with factors like technology, labor or capital, the role of other factors like institution is very important. The important thing in this regard is the working of the institutions Fraumeni and Okubo, (2005). Here comes the good governance agenda and the role of the government as a regulator.

The most important thing with respect to the institutional framework is the ability of the institutions to cater the modern day issues of the public welfare. In this regard it is pertinent to mention that institutions traditionally belonged to the colonial era and most of these institutions have this tendency to operate in light of the colonial structure. The modern day institutional growth paradigm has also addressed this issue and stressed on the process of institutional development with least impact of the colonial centralized working mechanism (Acemoglu, Johnson and Robinson, 2012).



Schematic Framework of Economic Growth/ Well Being Paradigm with reference to Governance

Source: *Authors Own Idea*

The schematic framework provides the idea about the evolving process of the growth paradigm in light of the governance mechanisms. This brief analysis of the economic growth or well-being strategy provides complete evidence that process of economic growth or well-being happens in three phases. The phase one focused on industrial and infrastructural development and the priority of the policy makers was to enhance the production and increase the gross domestic product, so that overall income levels of the respective nation can be achieved. Furthermore, in this phase one the democracy was struggling in most of the nations and authoritarian regimes focused less on the institution building and respective rules and regulations.

The second phase was all about liberalism. The markets were given desired economic freedom and it was thought that liberalism would enhance the productivity and not only developed but the developing and low income nations would also be able to grow. The institutional building was yet again under played and the role of the state was only to enhance the structural mechanism by introducing effective mechanisms to control the issues of corruption or rent seeking.

The third and final phase is about institutions and governance which has become vital in the past two to three decades. It evolves from the institutional building to setting up the rules and regulations and also introducing effective bureaucratic mechanisms. The vital thing in this regard is the issue of least development in the developing nations. The most of the developing nations are struggling even after following the liberal agenda to run the markets efficiently. The growth enhancing governance strategies are vital as they not only promote economic well-being but also helps the nations to deal with the problems like property right enforcement, rent seeking and effective bureaucratic management. The model also implies that institutional improvements will differ in Phase II countries (high HDI) compared to Phase III countries. Institutional reforms are often driven by external countries and consist of a good governance agenda that has been overlaid onto pre-existing colonial institutions (Acemoglu, Johnson and Robinson, 2012). If there is no

capacity to implement introduced regulations, this can lead to institutions becoming void. This means that whilst there may be adherence to regulation and anti-corruption, there will still be informal practices that cause increased costs of compliance, inefficient resource allocation, and no change in opportunity distribution (Tridico, 2007). Therefore, improved institutional quality may not lead to improvements in health, education and income. Instead, there may be negative effects if institutional reforms create disruption to current institutions of production and employment quicker than inclusive institutions can be developed. The model therefore suggests that a positive relationship will exist between institutional improvements and well-being if institutional improvements are part of the stock of state capacity (Phase III - very high HDI). However, if institutional improvements occur before state capacity exists (Phase II - high HDI) then there will be an unclear relationship between institutions and well-being (it can be negative). This is the key hypothesis of the analysis and will be tested.

4. Data and Methodology

This study was designed to determine the relationship between institutions and the well-being of the people. A panel of fifty nations was created. Thirty-six nations with very high HDI and fourteen nations with high HDI scores were selected. Two other explanatory variables, per capita income and trade, were also used. The proposed model to see the relationship is as under:

HDI=f (INST Index, GDPCU, TO)

(Equation i)

In equation (i), the Human Development Index (HDI) is used as a proxy for well-being. Institutions are represented using an institutional index. All variables are in natural logaritham form to avoid data sharpness. The converted model will be

$$\ln HDI_{it} = \beta_0 + \beta_1 lnINST\ Index_{it} + \beta_2 \ln GDPCU_{it} + \beta_3 lnTO_{it} + \epsilon_{it}$$

(Equation ii)

In equation (ii), β_1, β_2, β_3 are the elasticities of well-being to the institutional quality, per capita income, and trade openness respectively. Institutional quality index was calculated by principal components analysis (PCA) of rule of law, government effectiveness and control of corruption from the three Worldwide Governance Indicators (WGI), (Khan, Weili and Khan, 2022). The KMO test for sampling adequacy is 0.783, therefore there are sufficient correlations between the three variables to create an index using PCA. However, the principal component one (PC1) can be negative. Therefore, we calculate INST by taking the minimum of PC1 and adding one to make it strictly positive. After applying the natural logarithm to INST, the index can be calculated by INST = PC1 – min (PC1) + 1. Previous studies have used similar methods for the calculation of institutional measure (Siddiqui and Ahmed, 2013; Epo and Faho, 2020). Importantly, the PCA and the subsequent min-shift transformation were applied to the pooled sample of all 50 nations to ensure that the resulting institutional index is comparable across the two HDI groups. There are two limitations regarding the institutional index, which deserve explanation. First, the three WGI dimensions capture formal, market-enabling governance rather than distributive or welfare oriented institutions. Second, the WGI are perception based and measured with error (Kaufmann, Kraay and Mastruzzi, 2010). The attenuation bias cannot be ruled out. These limitations do not overturn the main findings but qualify the interpretation of the institutional elasticity. Future work using alternative institutional measures (i.e. V-Dem, ICRG) and instrumental variable strategies would strengthen the causal interpretation. In the log-linear econometric model, the coefficient on the logarithmic institutional index will represent the elasticity when the dependent variable is also reported in logarithms. Data on the Human Development Index were obtained from the United Nations Development Programme, while the figures for per capita income and trade openness were taken from the World Development Indicators. Cross-sections are indexed by i and time by t; the sample covers 1996 to 2024 and comprises 50 nations of which 36 are in the very high HDI group and 14 in the high HDI group; the full list is given in the appendices, and the variable definitions and sources are reported in Table 1.

Table 1: *Variables & Sources*

Abbreviations	Variables	Measurement Units	Sources
HDI	Human Development Index	Index, range is from 0 to 1.	United Nation Development Program (UNDP)
INST Index	Institutional Index	Principal Component Analysis (PCA)	World Governance Indicators (WGI)
GDPCU	GDP per Capita	GDP per Capita (Constant 2015 US dollars)	World Development Indicator (WDI)
TO	Trade Openness	Percentage Form	World Development Indicator (WDI)

Source: *Author Made*

4.1 Econometric Modeling

Most panel data studies, where large panel data sets are involved, often suffer from two data issues at large. The issues of slope heterogeneity and cross-sectional dependence are always present, which affects the authenticity of the results. Therefore, in this research study, the econometric modeling began with the cross-sectional dependence test and slope heterogeneity.

The issue of cross-sectional dependence has also been investigated in the study. This investigation has been done with the help of the (Pesaran, 2006) cross-sectional dependence test. The slope heterogeneity has been tested with the help of of test statistics by (Pesaran and Yamagata, 2008). Cross-sectional dependence is also helpful in the selection of the stationarity tests, which are useful for confirming the order of integration, as in the case of cross-sectional dependence, the first-generation stationarity tests often do not give reliable results. The second-generation stationarity tests (Im- Pesaran-Shin (CIPS) and cross-sectional augmented Dickey-Fuller (CADF)) are more reliable in the case of cross-sectional dependence. These two tests assume that there is no stationarity between the variables in the presence of cross-sectional dependence and slope heterogeneity. Panel co-integration has also been examined using the Westerlund (2007) test. This cointegration test has been done to ensure the presence of a long-run relationship among the variables. The Westerlund test is more reliable in the presence of cross-sectional dependence and slope heterogeneity compared with the Kao and Pedroni cointegration tests. The Westerlund test uses four statistics to measure the level of co-integration. These test statistics are:

$$G_T = \frac{1}{N}\sum_{i=1}^{N}\frac{\epsilon_i}{Se(\widehat{\epsilon})_\iota} \qquad Test\ 1$$

$$G_\alpha = \frac{1}{N}\sum_{i=1}^{N}\frac{T\epsilon_i}{\acute{\epsilon}_i(1)} \qquad Test\ 2$$

$$P_T = \frac{\hat{\epsilon}_i}{Se(\widehat{\epsilon_\iota})} \qquad Test\ 3$$

$$P_\alpha = T\hat{\epsilon} \qquad Test\ 4$$

The first two test statistics are group mean tests (G_T , G_α). These tests are used to confirm the co-integration in at least one cross-section. The second two tests are panel tests (P_T , P_α). These tests are employed to confirm the co-integration in the whole panel. In these Westerlund test statistic ϵ_i represents the speed of conversion towards the equilibrium level, the Se is there as a least square estimator, and T has been used for the time dimension.

For the econometric estimations, in light of the pre-estimation tests, the Dynamic Common Correlated Effects (DCCE) by (Chudik and Pesaran, 2015) has been used. The DCCE is based on the mean group (MG), pooled mean group (PMG), and common correlated effects (CCE) by (Pesaran and Smith, 1995) and (Pesaran, 2006). DCCE is a reliable econometric technique in the presence of cross-sectional dependence and slope heterogeneity. It deals with the issue of cross-sectional dependence by combining the average values and lags of cross-sectional factors;

furthermore, it deals with structural breaks and small sample sizes (Ditzen, 2018). The following formal equation is to be estimated.

$$lnHDI_{it} = \alpha_i lnHDI_{it-1} + \delta_i X_{it} + \sum_{p=0}^{pT} \gamma_{xip} \bar{X}_{t-p} + \sum_{p=0}^{pT} \gamma_{yip} \bar{Y}_{t-p} + \mu_{it}$$

(Equation iii)

In equation (iii), lnHDI is the natural log of the human development indicator, which is used as the dependent variable. The set of independent variables is presented with X_{it} , the independent variables are the ln INST Index, lnGDPCU and lnTO. The common unobserved factors have been presented with γ_{xip} , pT shows the cross sectional averages. The error term is μ_{it}.

5. Results and Discussion

The descriptive statistics for both the groups have been given in Tables 2 and 3.

Table 2: *Descriptive Statistics (Very High HDI Nations)*

	ln HDI	ln INST Index	ln GDPCU	ln TO
Mean	-0.1464	1.6555	26.7649	4.3076
Maximum	-0.0335	2.0896	31.0046	6.0806
Minimum	-0.4620	0	22.7282	2.8973
S.D	0.0754	0.3792	1.4510	0.5314
Observations	1044	1044	1044	1044

Source: *Authors own calculations*

Table 3: *Descriptive Statistics (High HDI Nations)*

	ln HDI	ln INST Index	ln GDPCU	ln TO
Mean	-0.3601	1.5660	26.0051	4.0372
Maximum	-0.2194	2.2279	30.5618	4.9898
Minimum	-0.7072	0	22.6587	2.7495
S.D	0.0861	0.3628	1.6554	0.4272
Observations	406	406	406	406

Source: *Authors own calculations*

Empirical investigations have been started by focusing on the problem of cross-sectional dependence. The Pesaran (2004) test was conducted for both groups. The results of the cross-sectional dependence are presented in Table 4. The results indicate that cross-sectional dependence exists in both groups.

Table 4: *Cross Sectional Dependence Test*

	Very High HDI Nations		High HDI Nations	
Variable	**CD-test**	**p-value**	**CD- test**	**p-value**
ln HDI	130.240	0.000	49.12	0.000
ln INST Index	6.11	0.000	4.53	0.000
ln GDPCU	116.30	0.000	48.27	0.000
ln TO	45.230	0.000	9.25	0.000

Notes: Under the null hypothesis of cross-sectional independence

Source: *Authors own calculations*

The slope heterogeneity test was also conducted to check for slope heterogeneity. The results are

presented in Table 5.

Table 5: *Slope Heterogeneity Test*

	Very High HDI Nations		**High HDI Nations**	
	Delta	**p-value**	**Delta**	**p-value**
	23.508	0.000	17.727	0.000
adj	25.841	0.000	19.486	0.000

Notes: Pesaran & Yamagata delta test, under the null hypothesis that slope coefficients are homogeneous

Source: *Authors own calculations*

Tables 4 and 5 indicate that the data suffer from both issues: cross-sectional dependence and slope heterogeneity. This conclusion takes us to the second phase of the empirical investigation, where second-generation stationarity tests CIPS and CADF have been conducted. The second-generation stationarity tests have been preferred over the first-generation tests because of the issues of cross-sectional dependence and slope heterogeneity, as the first-generation stationarity tests often become less reliable in case of these problems.

The stationarity tests, CIPS, and CADF tests for both groups are shown in Tables 6, 7, 8, and 9. The comparative results for both groups are presented in Tables 10 and 11.

Table 6: *CIPS Stationarity Test (Very High HDI Nations)*

Variable	**Level (Constant)**	**Level (Trend)**	**First Difference (Constant)**	**First Difference (Trend)**	**Decision (Order of Integration)**
ln HDI	-2.380***	-2.410	-4.461***	-4.511***	I(1)
ln INST Index	-2.079	-3.029***	-5.437***	-5.500***	I(1)
ln GDPCU	-2.250**	-2.355	-4.525***	-4.521***	I(1)
ln TO	-2.128*	-2.464	-4.263***	-4.403***	I(1)

Notes: (Pesaran CIPS Stationarity test, under the null hypothesis that series is non stationary. ***, **, * shows level of significance at 1, 5 and 10 percent respectively

Source: *Authors own calculations*

Table 7: *CIPS Stationarity Test Group 2 (High HDI Nations)*

Variable	**Level (Constant)**	**Level (Trend)**	**First Difference (Constant)**	**First Difference (Trend)**	**Decision (Order of Integration)**
ln HDI	-2.618***	-2.410	-4.461***	-4.511***	I(1)
ln INST Index	-3.430***	-3.992***	-	-	I(0)
ln GDPCU	-3.442***	-3.492***	-	-	I(0)
ln TO	-2.068	-3.252***	-5.071***	-5.113***	I(1)

Notes: (Pesaran CIPS Stationarity test, under the null hypothesis that series is non stationary. ***, **, * shows level of significance at 1, 5 and 10 percent respectively

Source: *Authors own calculations*

Table 8: *CADF Stationarity Test Group (Very High HDI Nations)*

Variable	Level (Constant)	Level (Trend)	First Difference (Constant)	First Difference (Trend)	Decision (Order of Integration)
ln HDI	-2.366***	-2.454	-3.379***	-3.476***	I(1)
ln INST Index	-1.805	-2.569**	-3.844***	-3.833***	I(1)
ln GDPCU	-2.285***	-2.512*	-3.569***	-3.584***	I(1)
ln TO	-2.216***	-2.743***	-3.507***	-3.567***	I(1)

Notes: Pesaran CADF test with lags (1). t-bar statistics reported. ***, **, * indicate rejection of H_0 (homogeneous non-stationarity) at 1, 5, and 10 percent respectively

Source: *Authors own calculations*

Table 9: *CADF Stationarity Test Group (High HDI Nations)*

Variable	Level (Constant)	Level (Trend)	First Difference (Constant)	First Difference (Trend)	Decision (Order of Integration)
ln HDI	-2.620***	-2.202	-3.191***	-3.263***	I(1)
ln INST Index	-2.687***	-3.247***	-	-	I(0)
ln GDPCU	-3.465***	-3.487***	-	-	I(0)
ln TO	-1.893	-3.506***	-3.507***	-3.567***	I(1)

Notes: Pesaran CADF test with lags (1). t-bar statistics reported. ***, **, * indicate rejection of H_0 (homogeneous non-stationarity) at 1, 5, and 10 percent respectively

Source: *Authors own calculations*

Table 10: *CIPS vs. CADF Comparison Group (Very High HDI Nations)*

Variable	CIPS (Constant)	CIPS (Trend)	CADF (Constant)	CADF (Trend)	Final Order
ln HDI	I(1)	I(1)	I(1)	I(1)	I(1)
ln INST Index	I(1)	I(1)	I(1)	I(1)	I(1)
ln GDPCU	I(1)	I(1)	I(1)	I(1)	I(1)
ln TO	I(1)	I(1)	I(1)	I(1)	I(1)

Source: *Authors own calculations*

Table 11: *CIPS vs. CADF Comparison Group (High HDI Nations)*

Variable	CIPS (Constant)	CIPS (Trend)	CADF (Constant)	CADF (Trend)	Final Order
ln HDI	I(1)	I(1)	I(1)	I(1)	I(1)
ln INST Index	I(0)	I(0)	I(0)	I(0)	I(0)
ln GDPCU	I(0)	I(0)	I(0)	I(0)	I(0)
ln TO	I(1)	I(1)	I(1)	I(1)	I(1)

Source: *Authors own calculations*

The results of the Westerlund (2007) test indicate a mixed result. The bootstrap p-values suggest there is evidence to reject the null hypothesis of no-cointegration for the group mean statistics Gt and panel statistics Pt and Pa (all p = 0.000) within both groups. However, we cannot reject the null for the group mean statistic Ga (note very high HDI p = 0.300; high HDI p = 1.000). This result should be expected due to the fact that the Ga test allows for full heterogeneity and tests if there is at least one cross-section for which there is cointegration. The panel statistics test whether there is cointegration in the panel as a whole. The panel statistics Pt and Pa show strong evidence to reject the null in both groups. (Westerlund, 2007) and (Persyn and Westerlund, 2008) advise giving more weight to the panel statistics if the interest is in common long-run relationships. Therefore, we can conclude there is evidence of cointegration at the panel level. This conclusion is confirmed by the negative and significant error correction terms in the DCCE estimates (Table 14).

Table 12: *Westerlund Panel Cointegration Test Results (Very High HDI Nations)*

Statistic	Value	Z-value	Asymptotic p-value	Bootstrap p-value
Gt	-1.640	0.404	0.657	0.000
Ga	-3.564	4.079	1.000	0.300
Pt	-8.319	0.318	0.375	0.000
Pa	-2.601	1.585	0.944	0.000

Source: *Authors own calculations*

Table 13: *Westerlund Panel Cointegration Test Results Group (High HDI Nations)*

Statistic	Value	Z-value	Asymptotic p-value	Bootstrap p-value
Gt	-0.766	3.447	1.000	0.000
Ga	-1.527	3.764	1.000	1.000
Pt	-2.884	1.559	0.941	0.000

Statistic	Value	Z-value	Asymptotic p-value	Bootstrap p-value
Pa	-1.135	1.858	0.968	0.000

Source: *Authors own calculations*

The short-run and long-run empirical estimations are done with the DCCE estimation technique. The results are given in Table 14, 15 and 16.

Table 14: *Short-Run Dynamics, Dependent Variables: ln HDI*

	Very High HDI Nations	Hi High HDI Nations
Variables	**Coefficients**	**Coefficients**
ln INST Index	0.0132*	-0.0061*
	(0.0069)	(0.0034)
ln GDPCU	0.0096***	0.0118*
	(0.0039)	(0.0069)
ln TO	0.0104*	-0.0013
	(0.0055)	(0.0075)
L. ln HDI (EC Term)	-0.3308***	-0.5099***
	(0.0411)	(0.0815)

Notes: ***, **, * shows 1, 5 and 10 percent level of significance. Standard errors are in parenthesis.

Source: *Authors own calculations*

Table 15: *Long-Run Dynamics, Dependent Variable: ln HDI*

	Very High HDI Nations	High HDI Nations
Variables	**Coefficients**	**Coefficients**
ln INST Index	0.0398*	-0.0121*
	(0.0223)	(0.0066)
ln GDPCU	0.0292**	0.0232**
	(0.0124)	(0.0115)
ln TO	0.0317*	-0.0026
	(0.0165)	(0.0150)

Notes: ***, **, * shows 1, 5 and 10 percent level of significance. Standard errors are in parenthesis.

Source: *Authors own calculations*

Table 16: *Diagnostic Tests*

Tests	Very High HDI Nations	High HDI Nations
CD Statistics	1.30 (p-value = 0.1931)	1.45 (p-value = 0.1474)
R- Squared	0.67	0.53
R-Squared (MG)	0.58	0.49

Source: *Authors own calculations*

The short-run results for both groups are presented in Table 14. The short-run results in Table 14 indicate a significant relationship between well-being and institutional quality. The relationship between institutional quality and HDI is positive in the case of very high HDI nations, whereas it is negative in the case of high HDI nations. Per capita income is positively related with the well-being in both groups. Trade openness is positively related with well-being in very high HDI nations and is negative and insignificant in high HDI nations. The long-run results are presented in Table 15. The long-run results are similar to the short-run dynamics. The institutional quality is positive and significant in the case of very high HDI nations and negative in high HDI nations. The relationship between well-being and per capita income is positive in both groups. The third explanatory variable is significant in the long run for very high HDI nations and insignificant in high HDI nations. The long-run relationship is confirmed in both cases with negative error correction values. In very high HDI nations, it is -0.3308, and in high HDI nations, it is -0.5099. The results of the diagnostic tests are presented in Table 16. The diagnostic test indicates that the model successfully deals with the issue of cross-sectional dependence, which is shown by the insignificant CD statistic. The R-squared MG is more reliable because it allows every country to have its own slope. This deals with the problem of slope heterogeneity (Pesaran and Smith, 1995).

The quality of institutions is not the same across the world. There are nations in which institutions do not work independently and efficiently, which affects overall decision-making, including economic policymaking (Tridico, 2007). The weak performance of institutions affects the process of human development in emerging and underdeveloped economies. The inefficiencies of the system, weak implementation of law, and an increase in the level of corruption are evidence of weak institutional mechanisms in these nations, which often results in a lower level of human development (Uddin, Ahmad, Ismailov, Balbaa, Akhmedov, Khasanov and Haq, 2023). The poor institutions affect the well-being of the people, which often results in poor distribution of resources and an increased level of inequality in the nation (Nor and Raheem, 2025). The significantly negative coefficient of institutional quality in high-HDI countries (-0.0121) seems contradictory. However, there are three explanations that make sense of this result. Firstly, institutional reforms in middle income countries often lead to a more externally driven notion of good governance being implemented with weak implementation capacities meaning institutional quality increases do not translate into actual benefits in the real world. This leads to higher costs for firms and households as institutional quality does not increase public goods (Acemoglu, Johnson and Robinson, 2012; Tridico, 2007). Secondly, improvements in institutional quality can reduce informal strategies used by low and middle income households. This means that whilst we see an increase in rule of law, or fighting corruption we can see a reduction in the effective social safety nets for the poor (Uddin et al., 2023). Finally, the WGI index only captures the formal aspects of institutional quality, therefore in high HDI countries that have resource intensive or export led economic growth it is likely that the institutions are increasing due to their beneficial effects to capital and traded industries. This will increase well-being but not necessarily that of health and education as those are captured in HDI (Nor and Raheem, 2025). As this is negative in the long run, the impact cannot be purely attributed to transition costs. A more likely explanation for this would be that institutional quality has increased beyond institutional quantity. It is important to note that this does not mean that institutions are not important in high HDI nations, as we can see from the per capita income results that economic growth does increase well-being. However, it does show that the quality of implementation can affect the impact of institutional reforms.

The situation is totally different in nations with very high HDI indices. In these nations, institutions are playing a very pivotal role in building up the capacity of human capital through the human development process. The institutional framework plays a key role in these developed nations. The rules and regulations are followed to control the level of corruption in the country, which eventually makes things smooth, and economic activities produce positive outcomes (Abdillah and Handoyo, 2020; Holubec and Tomka, 2023). In other words, it can be said that institutions promote the process of well-being of

the people by creating proper growth opportunities and making markets fundamentally correct (Gomado, 2025). Collectively, it is affirmed that institutional quality is very relevant and positively impacts the well-being of the people in these high-income, developed nations and becomes an important source of growth and sovereignty.

The per capita income is also contributing positively towards human development. The coefficient of per capita income is positive and significant in both groups. It validates the theoretical fact that an increase in national income makes a positive impact on the well-being of the people, as the theory often correlates higher national income with an improved standard of living (Sinaga, 2020). The HDI integrates health and education with income in a much better way, and in most of the high- and middle-income nations, its relation with per capita income is positive (Puttitanun and Lerskullawat, 2025). It is quite understandable that if a nation is earning more and growing positively, it usually does have the capacity to improve the life standard of its people as compared with other low-income nations. The relationship between trade openness and well-being is significant in group one, but in high HDI nations it's not significant. On the other hand, trade often doesn't show a relationship with non-income factors like health and education (Hamid, 2013), and in this research study, the HDI index has been used, which is based on health and education.

6. Conclusion and Recommendations

This research analysis has been done to examine the relationship between institutions and well-being with the help of a relatively new econometric technique. Dynamic common correlated effects have been used to control for data issues such as cross-sectional dependence and slope heterogeneity. It has been concluded that in very high HDI nations, institutions positively and significantly related with well-being, whereas in high HDI nations, this relationship is negative. This study helps us conclude that the institutional structure is a key for the well-being of the people. The good quality of regulatory institutions not only helps in improving the regulatory quality but also decreases the financial and socioeconomic uncertainty, which results in an improved standard of living of the people. The relationship of per capita income with well-being is significant and positive in both groups. The lesson is very clear: the very high HDI nations have been successfully transforming their growth trajectories into the well-being of the people, and this is merely happening due to the strong institutional structures in these nations. An issue when interpreting the results is the possibility of endogeneity. Institutional quality and human development may well be simultaneously determined, as wealthier and healthier countries will have more capacity to provide good institutions, and may even require them. However, two aspects of the model reduce this concern. Firstly, the institutional quality index is constructed from Worldwide Governance Indicators, which are slow moving and based on perception measures. As such there is limited reverse feedback over the short run from HDI to institutional quality. Additionally, the dynamic model means that persistent country specific trends have been accounted for by use of the lagged dependent variable (Chudik and Pesaran, 2015). Secondly, the DCCE methodology treats the regressors as weakly exogenous. Unobserved common factors have been removed by taking averages of the cross-section over time and including lagged terms. This removes a large source of omitted variable bias in macro panel data. Therefore, it is best to interpret these estimates as representing long run relationships rather than identifying causal effects. Future research using plausibly exogenous instruments for institutional quality would be a useful extension.

In addition to their direct contribution to well-being, institutions have an indirect but equally important influence on well-being in other ways. Institutions preserve the rule of law, improve regulatory quality, and decrease criminal activity. In the long run, robust institutions lead to healthy and resilient communities, which ultimately serve to reinforce institutions. It is not a coincidence that institutions have a positive effect on well-being. It is a conscious effort that results from continuous investment in institutional frameworks. Therefore, focusing on institutions' robustness by combating corruption, equitable resource distribution, and good governance is one of the best ways to improve the well-being of the people.

The good effects that institutions have had on well-being in high HDI nations are not due to geographical or cultural location. They are accomplishments that can be reached by any country committed to honesty, capability, and the powerful principle that public institutions are there to make people thrive. And this is the lesson for the other nations: they must invest in institutional quality.

Declaration of Conflicting Interests

The authors declare that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data Availability Statement

The data that support the findings of this study are openly available in

World Development Indicators at https://databank.worldbank.org/source/world-development-indicators

World Governance Indicators at https://www.worldbank.org/en/publication/worldwide-governance-indicators

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Authors' Contributions

Author A: Conceptualization, Methodology, Writing – original draft.

Author B: Data curation, Formal analysis, Writing – review & editing.

Ethics Statement

Ethical approval and participant consent were not required for this study as it relied entirely on publicly available, aggregated secondary data and did not involve direct interaction with human subjects.

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Appendices

List of Nations (Group 1)

Sr. No	Nations	Sr. No	Nations
1	Australia	19	UK
2	Austria	20	USA
3	Belgium	21	Singapore
4	Canada	22	Qatar
5	Denmark	23	Saudi Arabia
6	Finland	24	UAE
7	France	25	Portugal
8	Germany	26	Poland
9	Iceland	27	Hungary
10	Italy	28	Chilie
11	Japan	29	Kuwait
12	Netherland	30	Romania
13	New Zealand	31	Argentine
14	Norway	32	Greece
15	South Korea	33	Russia
16	Spain	34	Uruguay
17	Sweden	35	Turkey
18	Switzerland	36	Malaysia

N= 36

List of Nations with High HDI (Group 2)

Sr. No	Nations
1	Brazil
2	China
3	Mexico
4	Colombia

5	Ecuador
6	Algeria
7	Jordan
8	Sri Lanka
9	Indonesia
10	Thailand
11	Egypt
12	Morocco
13	South Africa
14	Paraguay
N= 14	