

Article

Human Development and Its Institutional Drivers—A Panel Impact Assessment for EU-27 Member States

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Abstract

Institutions are one of the most important factors that support economic and human development. In this respect, this paper analyses the relationship between selected institutional dimensions and human development in the European Union over the period 2011–2022. More specifically, the analysis focuses on the Control of Corruption Index, Regulatory Quality Index and Rule of Law Index as proxies for institutional quality. Therefore, we applied the Panel EGLS method to assess the relationship between these institutional dimensions and the Human Development Index. According to the results, the Control of Corruption Index has the strongest positive association with human development among the analysed institutional dimensions. Moreover, we also found a positive relationship between the Rule of Law Index/Regulatory Quality Index and the Human Development Index, highlighting the important role of institutional quality in supporting human development. These findings provide additional empirical evidence regarding the relationship between institutional specificities and human development and increase the awareness on setting national priorities aimed at improving institutional quality as a way to support sustainable human development.

Keywords: institutions; human development; rules; panel; corruption; rule of law; regulatory quality; governance

1. Introduction

Institutions play an important role in society, since these reflect the formal and informal rules that govern the behaviour of economic agents within a society [1]. Institutions create the incentive framework that guides economic and social interactions, influencing the allocation of resources and the effectiveness of public policies [2]. As institutional quality evolves, it shapes the trajectory of economic development, affecting growth, social inclusion, and human development outcomes. The more efficient institutions/rules are, the more these contribute to the level of development improvement [3]. Along with institutions, human development is a key pillar of a society's sustainable development, supported by individuals with a high level of education and good health.

Our paper aims to add value to the existing economic literature in the field of institutions through studying the relationship between the institutional specificities and human development at the level of EU Member States. The motivation for choosing this theme



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lies in the relevance of this topic, with the role of institutions being strongly emphasised in the agendas of international organisations and in the economic literature regarding their impact on human development.

Although the economic literature widely acknowledges the importance of institutional quality for human development, the available empirical evidence does not provide a clear picture regarding the relative association of the main institutional dimensions with the Human Development Index. Existing studies mainly focus on particular institutional indicators, different country samples or different empirical approaches, making the comparison of findings difficult. Therefore, further empirical evidence is needed to better understand the relationship between the main institutional dimensions and human development within a consistent analytical framework. To address this research gap, this paper analyses the relationship between control of corruption, regulatory quality, rule of law and the Human Development Index for the EU-27 Member States over the period 2011–2022.

The focus on the EU-27 Member States is justified by the common institutional and regulatory framework provided by the European Union, while differences in institutional quality and human development continue to persist across Member States. This provides an appropriate setting for analysing the relationship between institutional specificities and human development.

The main objective of this paper consists in determining the implications of institutional specificities on human development. In this respect, the research problem addressed by the paper is to assess the relationship between selected institutional dimensions and the Human Development Index at the level of the EU-27 Member States.

To address the research objective, we tried to answer to the following research question: To what extent are the institutional factors (control of corruption, regulatory quality, rule of law) associated with human development across the EU-27 Member States during the period 2011–2022?

Reaching the above-mentioned objective has been supported by setting the following hypotheses:

H1: *The increase in the control of corruption is associated with the growth of the Human Development Index.*

H2: *The increase in regulatory quality is positively associated with the Human Development Index.*

H3: *Improving the rule of law favours human development increase.*

Our work contributes to the existing economic literature by providing additional empirical evidence regarding the relationship between selected institutional dimensions and human development in the EU-27 Member States over the period 2011–2022. By focusing on the Control of Corruption Index, Regulatory Quality Index and Rule of Law Index as complementary dimensions of institutional quality, while considering the early leavers from education and training rate as a proxy for the institutional effectiveness of the education system, the paper provides a consistent empirical assessment of their relationship with the Human Development Index.

This paper is structured as follows: (i) the main results from the scientific literature published in this field; (ii) the methodology used to achieve the main objective of the paper; (iii) results and interpretations; (iv) conclusions and recommendations.

2. Literature Review

Human development is an important form of development that is based on education, health, and income, the most used index for measuring its level being the Human Development

opment Index (HDI), which provides a composite measure of human development as an expression of life expectancy, mean years of schooling, and gross national income (GNI) per capita. It provides crucial information to policymakers, enabling them to formulate evidence-based policies aimed at improving citizens' well-being and advancing sustainable economic growth.

The concept of human development started to evolve after 1970, when many authors focused their studies on development indicators, such as the poverty rate, income inequality and other forms of inequality, unemployment, and other indicators detrimental to the population living standard [4–6]. Further, the Millennium Development Goals (MDGs) were formalised in 2001, these being aimed at reducing poverty and infant mortality, while in 2015, these objectives were reformulated into the Sustainable Development Goals, which introduced other relevant dimensions such as gender equality, environmental sustainability, social inclusion, human rights, and society participation.

In recent years, human development has become a central topic in economic dialogues, attracting the particular focus of economic policies and strategies on it, while the economic literature started to advocate, to a greater extent, the important role of education, healthcare, and social protection [7,8] in improving human development. In this respect, government policies have increasingly started to focus on the well-being of individuals, promoting high employment rates, reducing school dropout rates, and ensuring equitable access to healthcare services.

Well-being is closely related to the HDI. The economic literature [9] showed that newspapers often associate the term 'well-being' with the HDI, and that the association appears to be stronger for countries towards the top end of the rankings (i.e., those with a higher human development level) compared to those at the bottom end of the rankings. On the other hand, the HDI was found to be more closely related to cognitive than affective measures of subjective well-being [10–13].

Many studies supported the importance of institutions in driving economic and social development [14–18]. In this respect, taking into account that human development is an important component of socioeconomic development, the economic literature acknowledges a positive relationship between institutions and human development [19,20]. Supporting this hypothesis, Van (2022) demonstrated that institutions play an essential role in improving human development by safeguarding individual rights [21]. Moreover, according to the United Nations (2021), institutional quality is particularly important for middle-income countries in relation to both human and economic development [22,23].

Other studies [24] argue that the institutional framework, alongside governance quality at both central and local levels, plays an important role in supporting the human, economic, and social development of residents, which contributes to removing the significant disparities between more developed and less developed regions.

In this paper, institutional quality is approached through three complementary dimensions, namely control of corruption, regulatory quality and rule of law, as defined by the Worldwide Governance Indicators developed by the World Bank. These dimensions capture different aspects of institutional performance and are used throughout the paper as proxies for institutional quality. Therefore, the discussion in the following sections is structured around these institutional dimensions and their relationship with human development.

Among the institutional dimensions considered in this study, control of corruption has received considerable attention in the economic literature due to its implications for economic and human development. Corruption is considered as a way to break the rules and provide advantages only to some individuals, affecting the opportunities of other individuals [25,26]. Corruption can also cause high levels of poverty, social inequality, and difficulty in accessing education and health systems, and the higher it is, the more

difficult it is to reduce it. In this regard, several authors [25–32] demonstrated the existence of a negative relationship between the level of corruption and the human development index. Another study [33] compared the perceived level of corruption in 170 countries and concluded that corruption significantly and inversely influences human development, especially in developing countries. In addition, corruption causes inefficient allocation of resources and budgets, undermines transparency of work, and reduces employability and opportunities in the labour market [34]. It is worth mentioning that a corrupt environment affects public trust in legal and political systems, hindering human development [35], but also the attractiveness of the economy. At the same time, corruption is considered a cause of institutional weakness that reduces economic growth [36–39] and efficiency in the allocation of public resources [40,41].

Another important dimension of institutional quality is regulatory quality. The economic literature emphasises that effective regulatory frameworks support the implementation of sound public policies and contribute to improving economic and social outcomes. A strong institutional framework ensures good governance, capable of developing and implementing policies and programs to improve living standards, control corruption, and promote good regulation and the rule of law [42], which subsequently improve human development. According to a study [19] focusing on corruption, the regulatory quality, and the rule of law, conducted for 186 countries using data specific to the period 1995–2011, the quality of governance and regulation have been found to exert a significant impact on human development and vice versa, with other important factors contributing to human development being related to education and health systems. Moreover, Ahmad and Saleem (2014) [27] found that government effectiveness, political stability, control of corruption, and the quality of regulation have a significant effect on the HDI, stating that countries focusing on these indicators will be more efficient in ensuring the well-being of their citizens.

The rule of law represents another key dimension of institutional quality. Previous studies also indicate that institutional quality promotes long-term human development [43], while strengthening the rule of law represents one of the key institutional mechanisms supporting this process. Institutions may also act as a mediating variable, influencing the relationship between social and economic indicators, including the relationship between human development and financial development [44]. In this regard, another study found that income inequality negatively influences economic growth in developing EU Member States due to the low quality of institutions, whereas in developed EU Member States the effect was found to be positive [45].

Besides institutional quality, the institutional performance of education systems also plays an important role in explaining differences in human development. In this respect, early school leaving continues to represent a major global challenge. Governments across the world are implementing measures to reduce dropout rates by promoting equitable educational opportunities for all children, aligned between education systems and labour market demands. To this end, the economic literature identifies an inverse relationship between early leavers rate and the HDI [30,46–48], suggesting that improvements in human development are associated with lower levels of school dropout. This evidence underscores the role of education not only as a determinant of individual well-being but also as a fundamental pillar of inclusive and sustainable socioeconomic development.

When analysing the HDI in the European Union in comparison with its neighbourhood, southern surrounding countries have lower values and northern slightly higher. Djordjević et al. (2022) concluded that all EU Member States have a better HDI than non-member states from the Balkans [49]. However, academics recommended different measures in order to enhance human development levels in the EU countries or regions they analysed [50,51].

3. Materials and Methods

In this section, we presented the methods used to assess the relationship between institutions and human development in the period 2011–2022, this period being selected in order to ensure the availability of a consistent and comparable data series for all analysed variables. In this respect, we extracted the following indicators from the Eurostat, United Nations and World Bank databases [52–54]: (i) Human Development Index—United Nations; (ii) Control of Corruption Index, Regulatory Quality Index and Rule of Law Index—World Bank; (iii) early leavers from education and training—Eurostat. The analysis covers the EU-27 Member States over the period 2011–2022. Based on these data, the next step consisted of selecting the explanatory variables included in the model, according to the research objective and the formulated hypotheses.

The explanatory variables included in the empirical model were selected taking into account the main objective of the study, namely, to assess the relationship between selected institutional dimensions and human development. Consequently, the model focuses on institutional indicators and one complementary educational variable rather than on a broader set of macroeconomic control variables. Although additional factors such as GDP per capita, public expenditure or labour market indicators may also be associated with human development, they fall outside the scope of the current analysis, which specifically aims to examine the relationship between the selected institutional dimensions and the Human Development Index.

Prior to estimating the empirical model, the stationarity of the analysed variables was assessed using the Levin, Lin and Chu t^* panel unit root test, with the lag length selected according to the Schwarz Information Criterion. The results confirmed that all variables are stationary, supporting the application of the selected panel estimation methodology.

The Redundant Fixed Effects ($p = 0.00\%$) and Hausman ($p = 0.00\%$) tests were performed as part of the model specification procedure. Although the results supported the Fixed Effects specification, the empirical model was estimated using the Panel EGLS method (without effects) weighted by Period SUR. This estimation strategy was considered more appropriate for the analysed dataset because it accounts for heteroscedasticity and contemporaneous correlation across cross-sections, which were expected given the strong economic and institutional linkages among the EU-27 Member States.

Further, we applied the Panel EGLS (using a total of 324 observations) weighted by Period SUR option to ex ante address the heteroscedasticity issues that may appear on the following equation:

$$HDI_{it} = \alpha_0 + \beta_0 corruption_{it} + \beta_1 regulatory_{it} + \beta_2 ruleoflaw_{it} + \beta_3 early_leavers_{it} + \epsilon t, \quad (1)$$

where i reflects the country name; t represents the year; α_0 is the constant term; ϵt catches the error term; HDI is the Human Development Index reflecting the level of human development, through three fundamental dimensions, namely health, education and standard of living; corruption is the Control of Corruption Index; regulatory reflects the Regulatory Quality Index; ruleoflaw represents the Rule of Law Index; while β_{0-3} are the estimated coefficients of the independent variables.

Although the Human Development Index incorporates an education dimension, the early leavers from education and training indicator is included in the model as a proxy for the effectiveness of the educational institutional framework. High rates of early school leaving may reflect weaknesses in the capacity of education systems to retain students and ensure equitable access to education. Therefore, this variable complements the institutional dimensions analysed in the study rather than measuring the same concept as the dependent variable.

The Control of Corruption Index, Regulatory Quality Index and Rule of Law Index were selected as proxies for institutional quality, taking into account their relevance in the economic literature and their availability for all EU-27 Member States over the analysed period.

The estimated coefficients indicate the direction and strength of the relationship between the analysed variables. Therefore, the results are interpreted as statistical associations between institutional specificities and human development and should not be regarded as evidence of causal relationships.

Following the estimation, we analysed the following tests to verify if the model is adequately specified and if the obtained results are feasible: (i) R-squared, which can confirm the good choice of the independent variables; (ii) Fisher test for confirming the statistical validity of the model; (iii) Breusch–Pagan LM and Pesaran scaled LM tests for confirming the absence of cross-section dependence; (iv) Jarque–Bera test, with Kurtosis and Skewness statistics for confirming the normal distribution of residuals; (v) Durbin–Watson test for confirming the absence of the autocorrelation between residuals; (vi) Variance Inflation Factors test for confirming the absence of multicollinearity.

Prior to the estimation, we also analysed the relationship between the examined institutional factors and human development through scatter plot graphs to find additional evidence supporting the linkages. In addition, we also calculated the correlation between the EU Member States' positioning from the perspective of the HDI and country ranks from the perspective of the institutional indicators.

4. Results and Discussions

In this section, we presented the main results obtained regarding the relationship between institutions and the HDI. Table 1 reports the descriptive statistics of the variables included in the empirical analysis. The reported statistics indicate sufficient variation across the EU-27 Member States, supporting the suitability of the selected indicators for the subsequent empirical analysis.

Table 1. Descriptive statistics.

Variables	Mean	Median	Maximum	Minimum	Standard Deviation
HDI	88.96	89.10	95.20	79.40	3.82
corruption	77.15	76.72	100.00	44.29	16.07
regulatory	82.94	82.86	99.53	60.00	10.52
ruleoflaw	80.72	82.77	100.00	49.05	13.78
early_leavers	9.43	8.60	26.30	2.10	4.26

Source: Calculations of the authors using Eurostat, United Nations and World Bank data in the Eviews 13 software package.

Next, we examined the evolution of the Human Development Index and the selected institutional indicators across the EU Member States over the period 2011–2022. Subsequently, scatter plots based on the average values for the analysed period were used to provide descriptive evidence regarding the relationship between institutional quality and human development. In the last part of the analysis, we estimated the relationship between institutional indicators and the Human Development Index.

According to Figure 1, human development increased in all EU Member States in the period 2011–2022; the highest improvements were found in Latvia, Croatia and Malta, while the lowest increases being reported for Bulgaria, Slovakia and Luxembourg.

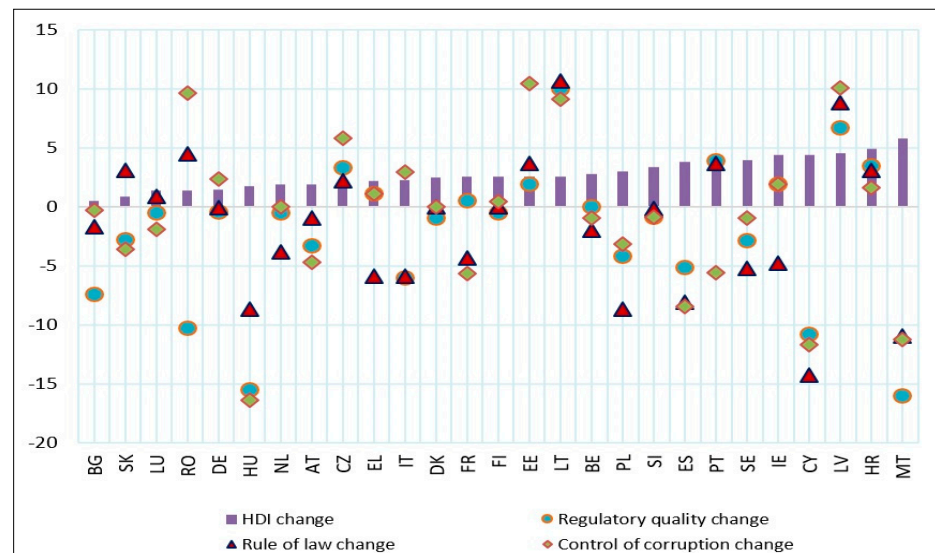


Figure 1. HDI and institutional index changes over the period 2011–2022 (points). Source: Authors processing in Microsoft Office Excel using UN and World Bank data.

However, this development is not generally in line with the evolution found at the level of the analysed institutional indexes, since in many countries we identified a downward trend at the level of the examined institutional indicators. Nevertheless, the situation differs at country level, with some Member States reporting increases, while others experienced negative institutional developments.

Further, we identified six countries (HU, DK, SI, SE, CY and MT) that did not register an improvement in at least one of the analysed indicators (among rule of law, regulatory quality and control of corruption) in the period 2011–2022 and experienced an improvement in human development. Among these, the Denmark and Sweden situation is not relevant, since these countries rank as top-performing countries in terms of institutional indicators, and a small decline in institutional quality is not able to produce significant effects on human development, while the human development trend found in Cyprus or Malta is more influenced by other external factors (taking into account their high openness) such as investments and tourist activities. Moreover, if the trend of two indicators is not positively correlated, it does not support the evidence to confirm a negative impact, since there may exist other relevant factors that influenced the evolution of the dependent variable. In this respect, in Slovenia the educational system is performing well (with an early leavers rate of 4% in 2022) and generates a high standard of living even if the institutions experienced a decline in 2011–2022, while Hungary attracted a high amount of European funding in that period, which determined a high economic growth rate. It is worth mentioning that nine EU Member States (RO, CZ, EL, EE, LT, PT, IE, LV, HR) experienced improvements in the case of at least two of the three examined institutional indicators in the analysed period. These developments show that national governments' engagement in improving the quality of institutions alone cannot solve all challenges related to human development and should complement other reforms essential to address these challenges, depending on the country specificities and on the interaction between institutions and other relevant factors for development.

While the institutional trend may be different at EU level compared to the HDI developments, the data shows that institutional performances are associated with the human development level in terms of EU Member States' rankings. Figure 2 reflects a positive relationship between the average Human Development Index and the average Regulatory Quality Index across the EU Member States over the period 2011–2022. In

particular, it can be observed that Member States registering the lowest HDI values (BG, RO, HU) are also the worst three performers in terms of regulatory quality, while the best performers at the level of both indicators are the northern EU Member States. The positive association is also reflected in the high correlation between the analysed data, these statistics indicating that 81.09% of the Member States registering high values of one of the two indicators also perform in terms of the other indicator.

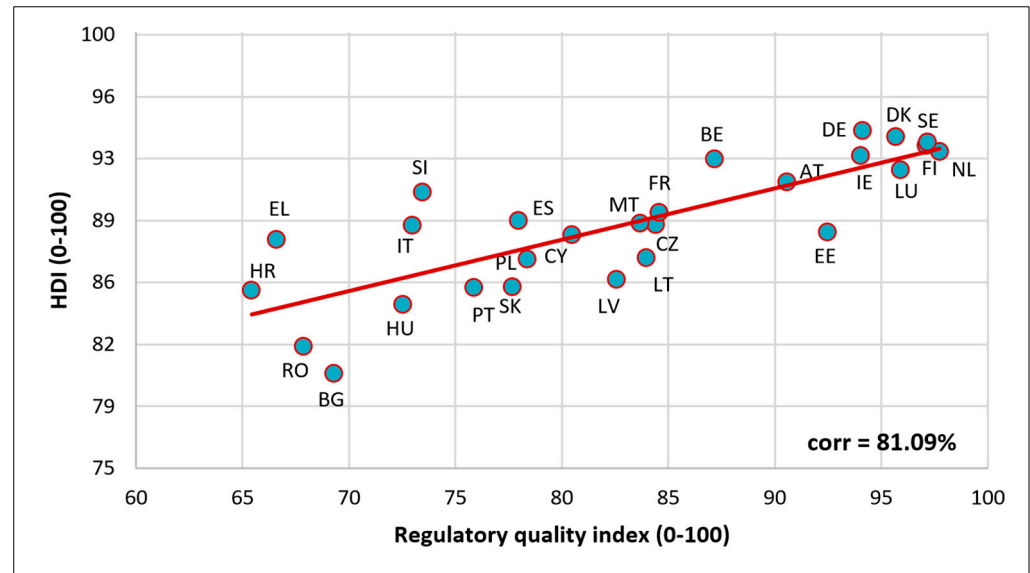


Figure 2. The relationship between regulatory quality and human development (average 2011–2022). Source: Authors processing in Microsoft Office Excel using UN and World Bank data.

Even if, in the last ten years, the European Union has made several efforts to increase social and economic convergence between Member States, the divergence from the perspective of EU Member States' human development level increased in the period 2011–2022, taking into account the increase in standard deviation from 3.79289 units in 2011 to 3.96649 units in 2022, which also reflects the increase in Member States' divergence from the perspective of the analysed institutional indicators. To this end, it is worth mentioning the increase in standard deviation found at the level of Regulatory Quality Index from 10.41272 units in 2011 to 11.94530 units in 2022, but also that found when examining the Rule of Law Index (increase from 14.41210 units in 2011 to 14.52163 units in 2022) and the Control of Corruption Index data (increase from 15.94580 units in 2011 to 16.02257 units in 2022).

Regarding the relationship between the rule of law and human development, we identified a positive association based on the average values recorded by the EU Member States over the period 2011–2022 taking into account the positive slope reflected in Figure 3. According to the data, we also found that 85.48% of Member States that showed good (poor) performance in terms of rule of law also registered favourable (unfavourable) outcomes regarding human development. Compared to the previous graph, the worst performers category is exposed to a small change; in the case of the Rule of Law Index, the lowest values were registered in BG, IT and EL, while the best performers remained the northern countries (FI, DK). The data suggest a possible positive association between rule of law and human development, which will be further examined in the estimation process.

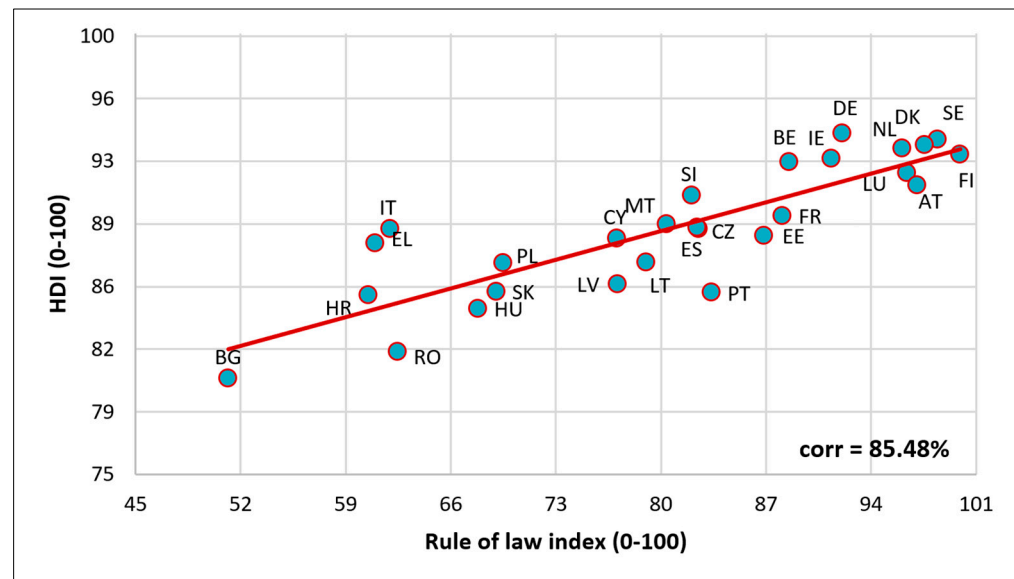


Figure 3. The relationship between the rule of law and human development (average 2011–2022). Source: Authors processing in Microsoft Office Excel using UN and World Bank data.

Further, we found a positive link between the positioning of EU Member States in terms of control of corruption and their ranking based on the HDI (Figure 4), with a positive correlation of 89.24% between the two. The correlation between control of corruption and the HDI, which is higher than the previously calculated correlations, suggests that control of corruption may exhibit a stronger relationship with human development than the other analysed institutional dimensions. The worst performers regarding the control of corruption are BG, HU and RO (similar to the regulatory quality case), while the best performers category group remains occupied by the northern countries.

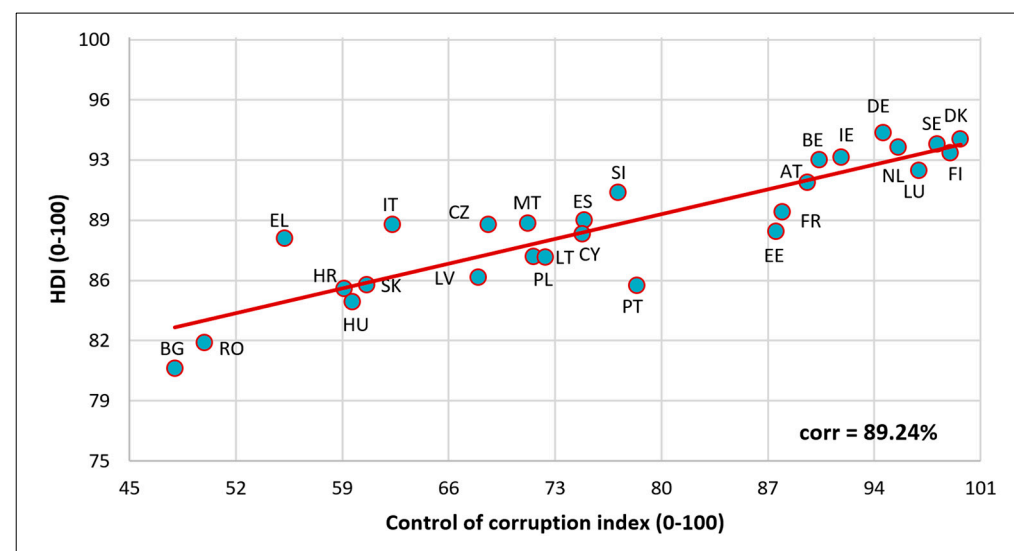


Figure 4. The relationship between the control of corruption and human development (average 2011–2022). Source: Authors processing in Microsoft Office Excel using UN and World Bank data.

The explored data highlight the important role of institutional convergence for improving the human development convergence but also a possible significant relationship between institutions and human development (including a strong positive relationship between control of corruption and human development), which will be carefully assessed through the methodology applied.

To this respect, we used the Panel EGLS (weighted by Period SUR option) method to analyse the relationship between the selected indicators as proxy for institutions and the Human Development Index over the period 2011–2022. The results of the model presented in Table 2 confirmed a positive relationship between the Control of Corruption Index and the HDI (H1).

Table 2. Results of the estimation—method applied: Panel EGLS (without effects), weighted by Period SUR.

Variables (Dependent HDI)/Test Performed	Coefficient/Std. Error/ Test Result	Interpretation/ Hypothesis Found
corruption	0.090803 *** (0.009428)	Positive association with HDI
regulatory	0.017245 ** (0.008215)	Positive association with HDI
ruleoflaw	0.038851 *** (0.009355)	Positive association with HDI
early_leavers	−0.110228 *** (0.014849)	Negative association with HDI
Constant	78.56960 *** (0.872174)	-
R-squared	0.495670	-
F-statistic/ Prob F-statistic	78.38056 0.000000	Model is statistically valid
Observations	324	-
Cross-section Dependence tests		
Breusch–Pagan LM (prob.)	0.8585	No cross-section dependence
Pesaran scaled LM (prob.)	0.2852	
Distribution of residuals test		
Jarque–Bera/ Prob. Jarque–Bera	1.710694 0.425136	Normal distribution of residuals
Skewness	−0.000916	
Kurtosis	3.355970	
Mean	0.079777	
Autocorrelation of residuals test		
Durbin–Watson	1.843128	No autocorrelation
Variance Inflation Factors test (centered VIF coefficient)		
corruption	1.207430	Centred VIF values < 4 => no multicollinearity
regulatory	1.318877	
ruleoflaw	1.418050	
early_leavers	1.002805	

Note: *** significant at 1%; ** significant at 5%; standard errors in parentheses. Source: Calculations of the authors using Eurostat, United Nations and World Bank data in the Eviews 13 software package.

In this respect, the results obtained support H1. In particular, we found that an increase by one point in the Control of Corruption Index is associated with a rise of 0.0908 points in the HDI value. This is explained by the fact that low levels of corruption (reflected in the high level of the index) increase the confidence in the economy and make

the economy more attractive, promoting investments and new economic opportunities, but also raises the efficiency of public investments oriented around health and education sectors, which interacts with the human development-relevant factors. These findings are consistent with the existing economic literature, which emphasises that better control of corruption contributes to improving human development by increasing institutional efficiency, transparency and the effective allocation of public resources.

The results also support H2. To this end, we found that an increase in the Regulatory Quality Index by 1 point is associated with a hike in the Human Development Index of 0.0172 points, which confirms the positive relationship between the two variables. Improving regulatory quality has positive effects on protecting human rights and preventing discrimination by ensuring fair conditions for all individuals. It also ensures fair access to public health or education services, but also to social protection systems, which promotes improving the human development level across the nations. The identified positive association is also in line with previous empirical evidence highlighting the contribution of regulatory quality to human development through the implementation of effective public policies and the improvement in institutional performance.

As regards the relationship between the rule of law and the HDI, we also identified a positive association, which confirms H3. According to the results of the model, we found that HDI increases by 0.0388 points when the Rule of Law Index improves its position by 1 point. The rule of law plays a fundamental role in society by ensuring the proper enforcement of legislation and guaranteeing equal access to justice. In this respect, it contributes to social prosperity by promoting an independent judicial system based on fair and balanced rules, and enhanced mechanisms for combating corruption. This result supports the literature findings showing that stronger rule of law contributes to human development by protecting individual rights, improving governance and strengthening institutional effectiveness. Therefore, institutional quality—expressed through control of corruption, regulatory quality and rule of law—plays a critical role in driving the human development level, countries with strong and efficient institutions being better positioned to achieve their inclusive development goals.

Finally, we found that an increase in the early leavers rate by one percentage point is associated with a decrease of 0.1102 points in the HDI. As already indicated in the literature, education represents a fundamental pillar of human development, and increased school dropout rates affect the HDI, taking into account the effect of school dropouts on reducing individual opportunities, which hampers economic productivity and reduces GDP per capita—another key component of the HDI. In addition, individuals with a lower education level are also less informed on health-related issues and are more likely to be exposed to severe illnesses, endangering the individual's progress.

The results indicate that all estimated coefficients are statistically significant at the 5% level, with relatively low standard errors, supporting the robustness of the estimated relationships. Moreover, the Fisher test (Prob. < 0.05) supports the overall statistical validity of the model, while the R-squared value indicates that approximately 49.6% of the variation in the Human Development Index is explained by the selected explanatory variables. At the same time, the remaining variation suggests that other determinants of human development, not included in the present specification, may also influence the dependent variable. Table 2 also confirms the absence of cross-section dependence taking into account the probabilities of the Breusch–Pagan LM and Pesaran scaled LM tests, which are higher than 5%, thus reducing the risk of biased coefficients. Next, we checked the distribution of the residuals (presented in Table 2 and in Figure 5) and we found that these are normally distributed, since the Jarque–Bera specific probability (42.51%) is higher than 5%, while the Skewness (−0.000916) and Kurtosis statistics (3.355970) are close to their

reference values (0 and 3). In addition, the mean of the residuals is close to 0, all of these supporting the evidence of normally distributed residuals.

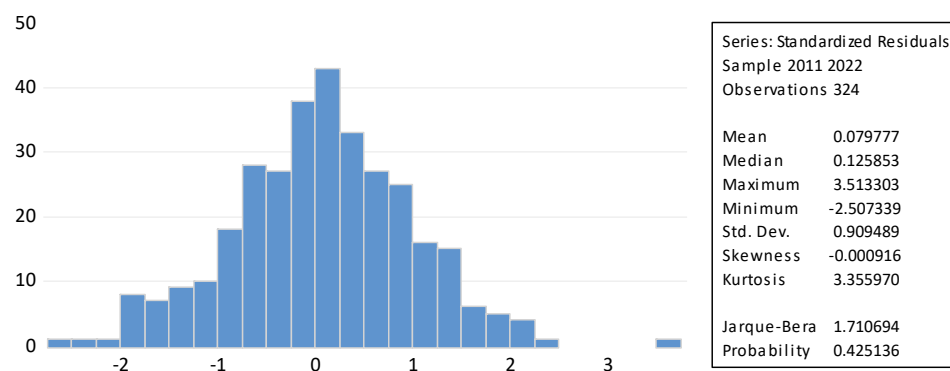


Figure 5. Distribution of residuals. Source: calculations of the authors using Eurostat, United Nations and World Bank data in the Eviews 13 software package.

In addition, the Durbin–Watson result confirmed the absence of autocorrelation between residuals, while there was no need to test for heteroscedasticity, taking into account that we applied a method to ex ante avoid this issue.

Finally, to check the existence of multicollinearity within the model, we applied the Variance Inflation Factors test and obtained centred coefficients lower than 4 for each independent variable, which confirmed its absence. Taking into account all performed tests, the calculated coefficients can be considered feasible and reliable.

5. Conclusions

The empirical analysis confirmed all three research hypotheses (H1–H3), indicating that control of corruption, regulatory quality and rule of law were positively associated with the Human Development Index in the European Union in the analysed period. In this respect, the Control of Corruption Index shows the strongest positive association with the Human Development Index among the relationships between other institutional indicators (Regulatory Quality Index and Rule of Law Index) and human development. However, all institutional indicators are positively associated with the Human Development Index, which highlights the important role of institutions in determining the human development level and increase the awareness on setting national priorities having the objective to improve the quality of institutions as a way to facilitate economic and human development.

Moreover, we also confirmed a negative relationship between early leavers from education and training rate and human development, which increases the need to take into account educational challenges in further policy responses. Even if the tests performed confirmed the feasibility of the results, the R-squared value suggests that only 49.56% of the Human Development Index evolution is explained by the dynamics of the selected independent variables, which indicates that there are also other factors that may influence its change. Nevertheless, we used a prudent approach (with a small number of variables) to avoid multicollinearity, which would endanger the feasibility of the estimators, taking into account that lower R-squared values do not interfere with the adequacy of the estimators if all feasibility tests are confirmed.

From a policy perspective, the obtained results suggest that public authorities should continue to strengthen institutional quality by promoting transparent public administration, improving regulatory frameworks and reinforcing the rule of law. At the same time, reducing early school leaving should remain a priority, given its negative association with human development. These measures may contribute to supporting sustainable human development across the EU Member States.

The current paper is subject to several limitations. Although the Human Development Index provides a comprehensive measure of human development, it remains a composite indicator that aggregates multiple dimensions into a single measure. Moreover, while the Panel EGLS methodology provides robust estimates of the relationships between the analysed variables, the observational nature of the data does not allow for causal relationships to be inferred. Finally, the empirical analysis is constrained by the availability of comparable data for the EU-27 Member States over the analysed period and by the selected institutional dimensions included in the model. In addition, as in most macroeconomic panel studies, the possibility of endogeneity cannot be fully excluded.

As a further work, when more data is available, we will try to focus our efforts on calculating the impact of institutions on human development at country level, since, in our case, panel assessment provides a general impact estimated for the European Union as a whole, the impact not being relevant for the effects of institutions on human development at country level. Future research may further investigate the relationship between institutional quality and human development by including additional institutional dimensions and extending the analysis to longer periods.

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