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Well governance, economic growth and wellbeing. A case study from 11 Balkan countries.

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ABSTRACT— The governance is considered to be a very important component for good economic growth and wellbeing. Several econometric studies which have tested the relationship between good governance in the sense of market-enhancing governance, show a positive interrelationship between good governance economic growth and wellbeing. The main objective of this study is to determine the interrelationship between more significant governance indicators, the economic growth, and wellbeing. GDP per capita in constant prices and Human Development Index of 11 Balkan countries during the period 1996-2019 are taken as proxy variables for economic growth and wellbeing followed by six indicators developed by World Bank to measure the governance named: Political Stability (PS), Voice and Accountability (VA), Regulatory Quality (RQ), Government Effectiveness (GE), Rule of Law (RL) and Control of Corruption (CC). Multiple Regression and Robust Regression technics are used to carry out the objective. The quality of governance and human development are mutually reinforcing in the sense that the quality of governance has a significant impact on human development and vice versa. This implies that the quality of governance and human development are both important areas for improving the well-being of the residents of EU member countries. The quality of governance has a positive impact on economic growth and vice versa. The quality of governance has a more positive impact on economic growth and Human Development Index in Balkan's EU Candidate Countries rather than EU member's Balkan's countries.

KEYWORDS: governance, Human Development Index, relationship, economic growth, regression.

1. INTRODUCTION

1.1 Economic growth is the process by which a nation's wealth increases over time. Although the term is often used in discussions of short-term economic performance, in the context of economic theory it generally refers to an increase in wealth over an extended period. Economic historians have attempted to develop a theory of stages through which each economy must pass as it grows. Economic growth is usually distinguished from economic development, the latter term being restricted to economies that are close to the subsistence level. The term economic growth is applied to economies already experiencing rising per capita incomes.

1.2 Govern mentality is an approach to the study of power that emphasizes the governing of people's conduct through positive means rather than the sovereign power to formulate the law. The concept of govern mentality takes the definition of government as the exercise of organized political power by a nation or state and expands it to include the active consent and willingness of individuals to participate in their own governance. Rationality, as a form of thinking that strives to be systematic and clear about how things are or ought to be, suggests that before people or things can be controlled or managed, they must first be defined. According to the World Bank, good governance is evaluated by the implementation capacity of governance principles of a country, providing a framework for market development and economic growth.

1.3 Indicators of National Well-Being

Famously, what counts for economists is whatever one can measure quantitatively, and especially monetarily. Historically, per-capita Gross Domestic Product was the dominant measure of national well-being and vitality used, not only by economists, but by international security, development, and political institutions and experts. However, critiques of the limitations of GDP as a measure even of sustainable economic development began decades ago. More importantly, non-economic indicators of well-being on a national scale were needed. Various alternative concepts and measures have been proposed, many focusing on broader conceptions of human and community [3], [2].

1.4 Human Development Index

Human Development Index was created by the United Nations Development Program to measure human development, wellness, and quality of life in a society across multiple dimensions. Thus, HDI measures development along two social dimensions and one economic dimension with the goal of providing a slightly broader indicator based on widely available population measures. A study from [5] compared HDI with other variables of well-being and found it to be a strong indicator of human development [5]. HDI has also been critiqued for its limitations as a comprehensive measure of population well-being and the many other dimensions it ignores [28]. However, HDI has become the most widely used and accepted international measure of development and due to the alternatives lacking complete data, we use the HDI.

2. Literature Review

Empirical results of the work of the World Bank [19] developed a set of six composite indicators covering nearly 190 measures for the perception of governance and agglomerate the collection of data from 17 institutions. Kaufmann's studies correlate the quality of governance with the per capita income in all the countries studied. The econometric studies by [20] showed that the variables of good governance, such as control of corruption, stability of property rights or democracy are closely correlated with variables, such as GDP growth rate per capita, investment or human capital development. [27] investigated the relationship between economic growth, democracy, and economic freedom by including indicators of public governance in a panel regression for 24 transition economies during the 1994-2007 period and found a positive relationship between economic growth and the quality of economic institutions. Investigated the impact of governance (proxies by WGI) on economic growth in Pakistan during the 2002-2011 period using correlation and regression analysis and found a highly negative correlation between political instability and economic growth, a moderate negative correlation between control of corruption, rule of law and economic growth. [6] examined the impact of governance on economic growth in Romania during the 1996-2013 period by using correlation analysis and found a highly positive correlation both between rule of law and economic growth and between regulatory quality and economic growth. With the aim of providing a better measure of the economic and social development of a country, the UNDP developed the HDI as a composite index in the 1990s. The HDI has not been free of criticism, several modifications and alternative approaches to measure human development have been proposed [30], [4], [29]. In their work, [9] suggest that improving governance leads to improved human development. They argue that there is still only limited agreement on how improvements in governance improve human development, but argue that there needs to be a more systematic approach to measuring the outcomes of governance inputs. Their methodology, combining both qualitative and quantitative approaches, is supported by [26] who finds a strong relationship between good governance and human development.

3. Description of Governance Indicators, Economic Growth Indicator, and Human Development Index

According to the World Bank, [21] some dimensions of governance are defined as follows: a) The process by which governments are selected, monitored, and replaced: 1-Voice and Accountability (VA). VA measures

the extent to which a country's citizens are able to participate in electing their government, as well as freedom of expression and association and free media. It contains number a number of indicators measuring different features of civil liberties, political process, and political rights. 2-Political Stability (PS). This indicator measures the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism. b) The capacity of the government to effectively formulate and implement sound policies: 3- Government Effectiveness (GE). GE measures the quality of the civil services, the quality of public services, the quality of policy formulation, implementation, and the degree of its independence from political pressures and the credibility of the government's commitment to such policies. 4-Regulatory Quality (RQ). Measures the capacity of the government to formulate and execute sound policies and regulations that permit and promote private sector development c) The respect of citizens and the state for the institutions that govern economic and social interactions among them: 5-Rule of Law (RL). RL measures the extent to which agents have confidence in, accept and act according to the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. 6- Control of Corruption (CC). Human development Index consists of the mean of three components: (1) per capita GNI (as a proxy for material or economic well-being), (2) population life expectancy (as a crude proxy for general health and bodily wellness), and (3) an education index based on averaging the mean years of schooling for adults over 24 years old and expected years of schooling for school-aged children (as a crude proxy for mental development or human capabilities). There are two steps to calculating HDI values. Minimum and maximum values are set in order to transform the indicators expressed in different units into indices between 0 and 1. They are set at the following values:

Dimension Indicator	Indicator	Minimum	Maximum
Health	Life expectancy (years)	20	80
Education	Expected years of schooling (years)	0	18
	Mean years of schooling (years)	0	15
Standard of living	GNI per capita (2017 PPP$)	100	75000

The justification for placing the natural zero for life expectancy at 20 years is based on historical evidence that no country in the 20th century had a life expectancy of less than 20 years [15]. Maximum life expectancy is set at 85, a realistic aspirational target for many countries over the last 30 years. Societies can subsist without formal education, justifying the education minimum of 0 years. The maximum for expected years of schooling, 18, is equivalent to achieving a master’s degree in most countries. The maximum for mean years of schooling, 15, is the projected maximum of this indicator for 2025. The low minimum value for gross national income (GNI) per capita, $100 is justified by the considerable amount of unmeasured subsistence and nonmarket production in economies close to the minimum, which is not captured in the official data. The maximum is set at $75,000 per capita. [16] have shown that there is virtually no gain in human development and wellbeing from annual income above $75,000 per capita. Having defined the minimum and maximum values, the dimension indices are calculated as:

$$\text{Dimension index} = \frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}}$$

For the education dimension, equation is first applied to each of the two indicators, and then the arithmetic mean of the two resulting indices is taken. Using the arithmetic mean of the two education indices allows perfect substitutability between expected years of schooling and mean years of schooling, which seems to be right given that many developing countries have low school attainment among adults but are very eager to achieve universal primary and secondary school enrollment among school-age children. Because each

dimension index is a proxy for capabilities in the corresponding dimension, the transformation function from income to capabilities is likely to be concave [3] that is, each additional dollar of income has a smaller effect on expanding capabilities. Thus for income the natural logarithm of the actual, minimum and maximum values are used.

The HDI is the geometric mean of the three dimensional indices:

$$HDI = (I_{Health} * I_{education} * I_{income})^{1/3}$$

Suppose we have for one country:

Indicator	Value
Life expectancy at birth (years)	66.3
Expected years of schooling (years)	7.8
Mean years of schooling (years)	3.9
Gross national income per capita (2017 PPP $)	3900

$$\text{Expected years of schooling index} = \frac{7.8 - 0}{18 - 0} = 0.4333$$

$$\text{Mean years of schooling index} = \frac{3.9 - 0}{15 - 0} = 0.26$$

$$\text{Education index} = (0.4333 + 0.26)/2 = 0.3467$$

$$\text{Income index} = \frac{\ln(3900) - \ln(100)}{\ln(75000) - \ln(100)} = (8.2687-4.6051)/(11.2252-4.6051)=0.5534$$

$$\text{Human Development Index} = (0.7076 \,.\, 0.3467 \,.\, 0.5534)^{1/3} = 0.5139$$

For more details see the technical note of calculating the human development indices. The World Bank's Development Indicators database contains estimates of GNI per capita in constant purchasing power parity (PPP) terms for countries.

4. Data Source, Analysis Techniques, and Objectives of Study

4.1 Data source

In this article, we provide the results of our empirical work which aims to offer answers to the questions of the interrelationship between economic performance and quality of institutions (WGI) in 11 Balkan countries. Several models are estimated, first a panel with fixed effects on GDP per capita growth in constant prices and Human Development Index and quality of governance over the period 1996-2019 is presented. The model chosen for the study combines the determinants of economic performance: GDP per capita in constant prices and wellbeing with proxy variable Human Development Index and good governance. We also compare results between Balkan countries actual members of European Union and Potential Candidate Countries. The data on governance indicators are taken from the World Bank's project of Worldwide Governance Indicators (WGI), [22]. A country-year panel of six governance indicators is taken from the Worldwide Governance Indicators and a country-year panel data on economic growth is taken from World Bank Indicators. A country-year panel data on Human Development Index is taken from the United Nations Development Program. We focus on the transitional economies of the 11 Balkans countries, including Albania, Bulgaria, Croatia, Romania, Slovenia,

Serbia, Bosnia and Herzegovina, Greece, Montenegro, North Macedonia, and Turkey. Some of the countries like Romania, Slovenia, Croatia and Bulgaria made the required reforms to meet the membership criteria during the EU integration process. Consequently, the transitional economies of the EU have come a long way in terms of good governance. The indexes of each governance indicator vary between -2.5 (weak) and 2.5 (strong) governance performance [18]. Principal Component Analysis, a dimensionality-reduction method, is used to reduce the dimension of large data sets of WGI, by transforming the large set of variables into a smaller one that still contains most of the information in the large set, [29]. We use this method to reduce the World Government Indicators from 6 into 3 (GE, RL, CC) which together explain 94.3% of all the variation of WGI into depended variable. The variables used in the econometric analysis, their symbols, and data sources are briefly presented in Tab. 1:

Table 1: Variables used in the analysis

Variables	Symbol	Source
Human Development Index	HDI	United Nations Development Programmer, Human Development Reports
Real GDP per capita in 2015 year constant price	GDP	World Bank Indicators 2020
Voice and accountability	VA	World Bank Indicators 2019
Political stability and absence of violence/terrorism	PS	World Bank Indicators 2019
Government effectiveness	GE	World Bank Indicators 2019
Regulatory quality	RQ	World Bank Indicators 2019
Rule of law	RL	World Bank Indicators 2019
Control of corruption	CC	World Bank Indicators 2019

4.2 Regression analysis and Robust Estimation Method

By combining the time series and cross-country evidence for multiple countries across a reasonable number of years, we have identified a relationship between changes in the quality of governance and changes in well-being and economic growth. We explain differences in well-being and economic growth across countries and over time. A regression model is generally defined as the dependent variable vector *Y* and the design n x p matrix *X* and the vector of true residuals ε of dimensions n_x1: $Y=X\beta+\varepsilon$ where $\hat{\beta}$ is an estimate of β and for the corresponding fitted residuals, $e = Y - x\hat{\beta}$.

The regression analysis commonly makes use of the least squares (LS) method for estimation of model parameters under some assumptions to be satisfied, such as the normality of errors with zero mean and constant variance, i.e., $\varepsilon \sim N(0, \sigma^2)$. Thus, the LS method uses a function which is extremely sensitive to outliers, particularly those occurring on high leverage cases. The least square method gives misleading results when the assumption of normality is dissatisfied or outliers happen in the data as outliers drag the least square fit towards itself. A robust regression is an iterative procedure that is designed to overcome the problem of outliers and influential observations in the data and minimize their impact over the regression coefficients, [25]. The robust procedure replaces the sum of squared residuals of the OLS with some other function that is being less influenced by the unusual observations [11], [12]. There are various robust regression techniques.

We use the least absolute deviation (LAD) by minimizing the sum of absolute residuals instead of minimizing the sum of squared residuals proposed by [8]. LAD is preferable over OLS in providing protection against vertical outliers. The underlying data and models along with a full range of results, are reported in our estimation appendix. We used Gretl program, a cross-platform software package for econometric analysis.

4.3 Objective of study

The data for the desired variables are available for 11 countries. In addition to the whole set of countries, the results are also reported for two sub-groups of countries defined as the EU member 5 countries and 6 countries potentially candidate for membership as EU countries. The relationship between the quality of governance (QG) and Human Development Index is analyzed in terms of the following hypotheses: The quality of governance has a positive impact on Human Development Index; the quality of governance has a positive impact on economic growth; economic growth has a positive impact on the Human Development Index. The quality of governance has a more positive impact on economic growth and on Human Development Index in Balkan's EU Candidate Countries than Balkan's EU member countries. These hypotheses can be empirically tested using the following models: $HDI = \alpha + \beta\ QG + \varepsilon$ (1) $GDP = \alpha + \beta\ QG + \varepsilon$ (2) $HDI= \alpha+\beta GDP+ \varepsilon$ (3) $GDP= \alpha+\beta HDI+ \varepsilon$ (4) $QG=\alpha+\beta HDI +\varepsilon$ (5) where HDI, GDP and QG indicate measures of human development index, economic growth and quality of governance. α, β, are regression parameters, and ε are corresponding error terms.

We use 3 different measures of the quality of governance (or WGIs) which explain 94.3% of all variation (out of six) for the models. The resulting equations are estimated at the beginning using the standard ordinary least squares (OLS) regression. However, it is important to note that the measures of quality of governance are not fully independent of each other as some of the factors used in the development of quality of governance measures are expected to overlap [17]. In the light of such interrelationships, it is not very surprising that our three principal components (out of six) are strongly positively correlated across countries. This is also supported by the highly positive correlation values between WGIs. Consequently, standard OLS estimates are expected to generate highly correlated errors. The econometrics literature argues that under conditions of correlated errors, no normality of residuals and presence of outliers and autocorrelation more efficient estimates can be produced by using the robust regression.

5. Summary and conclusions

This study examined the impact of the quality of governance on human development (and vice versa), on economic growth (and vice versa) by analyzing data covering 24 years (1996-2019) for 11 Balkan's countries. WGIs, developed by the World Bank are used as a proxy for different aspects of governance. The HDI, developed by the UNDP is used to measure human development and real GDP per capita in the 2015 year constant price as a proxy for economic growth. To ensure the robustness of the findings, the results have been estimated at the beginning with OLS panel fixed effect and after that with LAD for all 11 countries and separated for two sets of countries; namely, 5 EU member countries and 6 EU potential candidate countries. We compare the results between the two groups of countries. Several conclusions emerge from the study. Up to the median value of 0.77 of HDI the quality of governance has no impact on HDI. The factor that most affect HDI in 11 countries is Rule of Law. When the Rule of Law increases with one unit, the median of HDI increases with 0.09 units, provided that the other factors remain unchanged. When the Government Effectiveness increases with one unit, the median of HDI increases with 0.05 units provided that other factors remain unchanged. When the Control of Corruption increases with one unit, the median of HDI decreases with 0.05 units provided that other factors remain unchanged. Up to the median value of 8476 USD of GDP, the quality of governance has no impact on economic growth. The factor that affected the GDP in 11 countries is Rule of Law. When the Rule of Law increases with one unit, the median of GDP increases with 4573 USD

provided that other factors remain unchanged. When Control of Corruption increases with one unit, the median of GDP increases with 3566 USD provided that other factors remain unchanged. When Government Effectiveness increases with one unit, the median of GDP increases with 2333 USD provided that other factors remain unchanged. Government Effectiveness in the 5 EU member countries has an impact 5 times higher on economic growth compared to the EU potential candidate countries. Up to the median value of 6484 USD in both groups of countries, economic growth is not indicated by the quality of governance. Up to the median value of 0.66 of HDI the economic growth has no impact on HDI. The HDI tends to increase steadily over time on average 0.004 every year. In both 5 EU member countries and 6 EU potential candidate countries the factor that most affect HDI is the Rule of Law. In 5 EU member countries HDI has more impact on CC, RL and less on GE. The Economic growth tends to decrease steadily over time. In the 6 EU potential candidate countries Control of Corruption remains an important factor of economic growth. When Control of Corruption increases with one unit, the median of GDP increases with 2189 USD provided that other factors remain unchanged. The negative role of Control Corruption on economic growth in 5 EU member countries is unclear. When Control of Corruption in those countries increases with one unit, the median of GDP decreases with 5870 USD provided that other factors remain unchanged. More studies are needed in the future to explain the negative role of Control Corruption on HDI in 6 EU potential candidate countries. The quality of governance and economic growth are mutually reinforcing in the sense that the quality of governance has a significant impact on economic growth and vice versa.

The magnitude of the impact of human development on the economic growth is about 5.2 times higher on EU member countries compared to the EU candidate countries The quality of governance and human development are mutually reinforcing in the sense that the quality of governance has a significant impact on human development and vice versa. This implies that the quality of governance and human development are both important areas for improving the well-being of the residents of EU member countries. The magnitude of the impact of human development on the quality of governance is much larger than the impact of governance on human development of EU member countries compared to the EU candidate countries. As such, human development focused policies can be expected to deliver better outcomes than governance focused policies in those countries. The magnitude of the impact of the quality of governance on human development has been falling over time. This may suggest that over time the ability of governments to influence human development will be limited. In contrast to this conclusion, the impact of human development on the quality of governance has been relatively stable. Human development benefits of policies focused on education, health, and increasing income remain as powerful as in the past in EU member countries.

Overall, our results suggest that spends on human development in EU member countries offer much more value to communities than spends on improving the quality of governance. Considering the presence of high corruption on the 6 candidate countries, there is a huge scope for savings and channeling those resources towards desired areas of human development. Thus, some reprioritizing by governments in low HDI countries, particularly, EU potential candidate countries, can make a huge difference to improving human wellbeing.

6. Appendix of calculation results

Table 2: Principal Components Analysis n = 254 (dropped 10 incomplete observations)

Eigen analysis of the Correlation Matrix

Component	Eigen value	Proportion	Cumulative
1	4.8869	0.8145	0.8145
2	0.5043	0.0841	0.8985
3	0.2678	0.0446	0.9432
4	0.1637	0.0273	0.9705

5 0.1100 0.0183 0.9888
6 0.0672 0.0112 1.0000

Table 3 Model 1: Fixed-effects, using 246 observations
Included 11 cross-sectional units
Time-series length: minimum 14, maximum 24
Dependent variable: HDI
Robust (HAC) standard errors

	Coefficient	*Std. Error*	*z*	*p-value*	
const	0.759702	0.00553891	137.2	<0.0001	***
GE	0.148097	0.0432297	3.426	0.0006	***
RL	−0.00762331	0.0509134	−0.1497	0.8810	
CC	−0.0493627	0.0224722	−2.197	0.0280	**

Mean dependent var	0.775732	S.D. dependent var	0.062789
Sum squared resid	0.244164	S.E. of regression	0.032441
LSDV R-squared	0.747214	Within R-squared	0.384490
Log-likelihood	501.5163	Akaike criterion	−975.0326
Schwarz criterion	−925.9580	Hannan-Quinn	−955.2726
rho	0.821515	Durbin-Watson	0.268190

Table 4 Model 2: Fixed-effects, using 255 observations
Included 11 cross-sectional units
Time-series length: minimum 15, maximum 24
Dependent variable: GDPpercapitaconstant2015U
Robust (HAC) standard errors

	Coefficient	*Std. Error*	*z*	*p-value*	
const	8070.39	257.378	31.36	<0.0001	***
GE	4359.61	1686.60	2.585	0.0097	***
RL	1376.80	1603.53	0.8586	0.3906	
CC	−2447.78	1355.37	−1.806	0.0709	*

Table 5 Model3: LAD, using 246 observations
Dependent variable: HDI (All 11 Balkan countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.777465	0.00352190	220.8	<0.0001	***
GE	0.0588852	0.0121027	4.865	<0.0001	***
RL	0.0915930	0.0143761	6.371	<0.0001	***
CC	−0.0589817	0.0166951	−3.533	0.0005	***

Table 6 Model 4: LAD, using 255 observations
Dependent variable: GDPpercapitaconstant2015U (All 11 Balkan countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	8476.19	258.936	32.73	<0.0001	***
GE	2333.67	686.508	3.399	0.0008	***
RL	4573.42	975.405	4.689	<0.0001	***
CC	3566.85	1125.46	3.169	0.0017	***

Table 7 Model 5: LAD, using 246 observations

Dependent variable: HD I(all 11 Balkan Countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.664382	0.00630913	105.3	<0.0001	***
GDPpercapitaconstant 2015U	7.06620e-06	4.75845e-07	14.85	<0.0001	***
Years	0.00410319	0.000305461	13.43	<0.0001	***

Table 8 Model 6: LAD, using 120 observations

Dependent variable: HDI (EU 5 member countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.768323	0.00927163	82.87	<0.0001	***
GE	0.0594222	0.0257102	2.311	0.0226	**
RL	0.107451	0.0167633	6.410	<0.0001	***
CC	−0.0627248	0.0225610	−2.780	0.0063	***

Table 9 Mode l7: LAD, using 120 observations

Dependent variable: GDPpercapitaconstant2015U (EU 5 member countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	6484.91	673.449	9.629	<0.0001	***
GE	7275.64	2167.98	3.356	0.0011	***
RL	11971.9	1854.58	6.455	<0.0001	***
CC	−5870.99	3254.67	−1.804	0.0738	*

Table 10 Model 8: LAD, using 120 observations

Dependent variable: HDI (EU 5 member countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.683537	0.00289256	236.3	<0.0001	***
GDPpercapitaconstant 2015U	5.84879e-06	3.23184e-07	18.10	<0.0001	***
Years	0.00420973	0.000264617	15.91	<0.0001	***

Table 11 Model 9: LAD, using 120 observations

Dependent variable: GDPpercapitaconstant2015U (EU 5 member countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−93859.3	7546.32	−12.44	<0.0001	***
Years	−485.929	87.9128	−5.527	<0.0001	***
HDI	138399	10753.1	12.87	<0.0001	***

Table 12 Model 10: LAD, using 126 observations

Dependent variable: HDI (6 EU potential candidate countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.768325	0.0108979	70.50	<0.0001	***
GE	0.0633334	0.0200825	3.154	0.0020	***
RL	0.0817263	0.0500251	1.634	0.1049	
CC	−0.0838699	0.0427000	−1.964	0.0518	*

Table 13 Model 11: LAD, using 135 observations

Dependent variable: GDPpercapitaconstant2015U (6 EU potential candidate countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	6494.39	226.182	28.71	<0.0001	***
GE	2281.69	484.405	4.710	<0.0001	***

RL	1049.42	988.179	1.062	0.2902	
CC	2189.28	847.775	2.582	0.0109	**

Table 14 Model12 : LAD, using 126 observations
Dependent variable: HDI (6 EU potential candidate countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.633245	0.00271149	233.5	<0.0001	***
Years	0.00665182	0.000545038	12.20	<0.0001	***
GDPpercapitaconstant 2015U	2.56265e-06	1.42844e-06	1.794	0.0753	*

Table 15 Model 13: LAD, using 126 observations
Dependent variable: GDPpercapitaconstant2015U (EU potential candidate countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−15279.1	1166.29	−13.10	<0.0001	***
Years	10.5610	12.9557	0.8152	0.4166	
HDI	26304.7	1725.51	15.24	<0.0001	***

Table 16 Model14: LAD, using 246 observations
Dependent variable: GE

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−6.38504	0.284444	−22.45	<0.0001	***
HDI	8.87038	0.392139	22.62	<0.0001	***
Years	−0.0338118	0.00370692	−9.121	<0.0001	***

Table 17 Model 15: LAD, using 246 observations
Dependent variable: RL

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−2.11172	0.825948	−2.557	0.0112	**
HDI	2.17667	1.20810	1.802	0.0728	*
Years	−0.00677108	0.00433310	−1.563	0.1194	
GDPpercapitaconstant 2015U	5.92550e-05	9.56386e-06	6.196	<0.0001	***

Table 18 Model 16: LAD, using 246 observations
Dependent variable: CC

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−5.67975	0.713864	−7.956	<0.0001	***
Years	−0.0328709	0.00582648	−5.642	<0.0001	***
HDI	7.64677	0.991046	7.716	<0.0001	***

Table 19 Model 17: LAD, using 246 observations
Dependent variable: GE

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−6.38504	0.311976	−20.47	<0.0001	***
Years	−0.0338118	0.00338966	−9.975	<0.0001	***
HDI	8.87038	0.414921	21.38	<0.0001	***

Table 20 Model 18: LAD, using 126 observations
Dependent variable: GE (6 candidate countries)

Coefficient	*Std. Error*	*t-ratio*	*p-value*

const	−2.35945	1.01770	−2.318	0.0221	**
Years	0.0216878	0.0116891	1.855	0.0659	*
HDI	2.46813	1.54935	1.593	0.1137	

Table 21 Model 19: LAD, using 126 observations
Dependent variable: RL (6 candidate countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0.497285	1.47488	−0.3372	0.7366	
Years	0.0269444	0.0161791	1.665	0.0984	*
HDI	−0.365547	2.29924	−0.1590	0.8739	

Table 22 Model20: LAD, using 126 observations
Dependent variable: CC (6 candidate countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−1.65099	0.746295	−2.212	0.0288	**
Years	0.00893168	0.00861216	1.037	0.3017	
HDI	1.54791	1.09144	1.418	0.1587	

Table 23 Model 21: LAD, using 126 observations
Dependent variable: HDI (6 candidate countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.633245	0.00213708	296.3	<0.0001	***
Years	0.00665182	0.000497434	13.37	<0.0001	***
GDPpercapitaconstant 2015U	2.56265e-06	1.30167e-06	1.969	0.0512	*

Table 24 Model 22: LAD, using 120 observations
Dependent variable: GE (5 EU Member Countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−6.81129	0.535808	−12.71	<0.0001	***
HDI	9.48214	0.691787	13.71	<0.0001	***
Years	−0.0394733	0.00547487	−7.210	<0.0001	***

Table 25 Model 23: LAD, using 120 observations
Dependent variable: RL (5 EU Member Countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−7.47918	0.349625	−21.39	<0.0001	***
HDI	10.3579	0.447495	23.15	<0.0001	***
Years	−0.0480413	0.00586953	−8.185	<0.0001	***

Table 26 Model 24: LAD, using 120 observations
Dependent variable: CC (5 EU Member Countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−8.16939	0.397946	−20.53	<0.0001	***
HDI	11.0396	0.559106	19.75	<0.0001	***
Years	−0.0484476	0.00482427	−10.04	<0.0001	***

Table 27 Model25: LAD, using 120 observations
Dependent variable: GDPpercapitaconstant2015U (5 EU Member Countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−93859.3	7556.79	−12.42	<0.0001	***

HDI	138399	10748.9	12.88	<0.0001	***
Years	−485.929	86.6506	−5.608	<0.0001	***

Table 28 Model 26: LAD, using 120 observations
Dependent variable: GE (5 EU Member Countries)

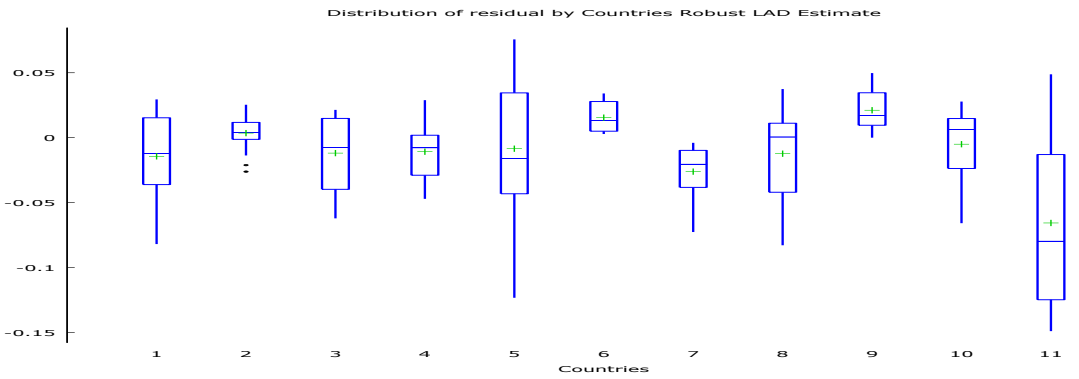
	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0.318731	0.0944835	−3.373	0.0010	***
Years	−0.00383349	0.00467887	−0.8193	0.4143	
GDPpercapitaconstant 2015U	6.52479e-05	5.09645e-06	12.80	<0.0001	***

Table 29 Model 27: LAD, using 120 observations
Dependent variable: RL (5 EU Member Countries)

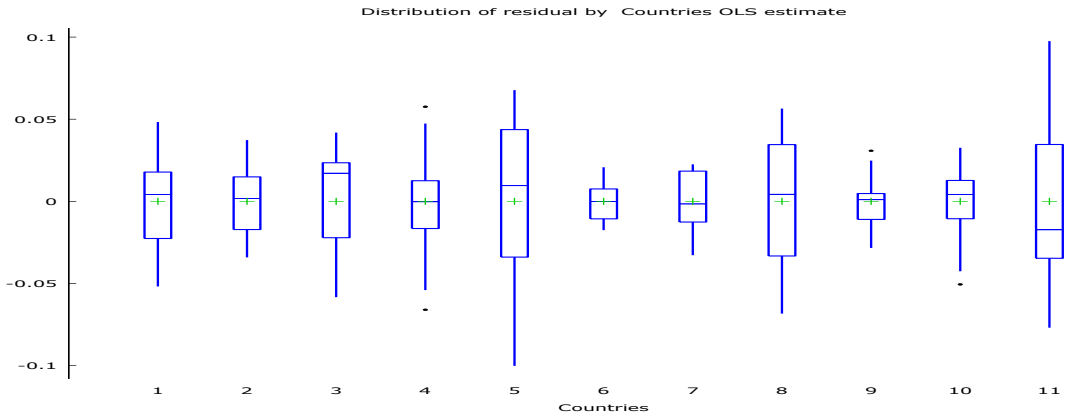
	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0.439589	0.0647584	−6.788	<0.0001	***
Years	−0.00626875	0.00382297	−1.640	0.1037	
GDPpercapitaconstant 2015U	6.99868e-05	3.64656e-06	19.19	<0.0001	***

Table 30 Model 28: LAD, using 120 observations
Dependent variable: CC (5 EU Member Countries)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0.601377	0.105397	−5.706	<0.0001	***
Years	−0.00925497	0.00561686	−1.648	0.1021	
GDPpercapitaconstant 2015U	7.17960e-05	9.76094e-06	7.355	<0.0001	***



Graph nr.1: Distribution of residual by Countries Robust LAD Estimate



Graph nr.2: Distribution of residual by Countries OLS Estimate

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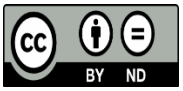

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