STUDIA UNIVERSITATIS BABEȘ-BOLYAI OECONOMICA
VOLUME 68, ISSUE 2, 2023, pp. 73-86
DOI: 10.2478/subboec-2023-0010

THE IMPACT OF GOVERNANCE UPON SUSTAINABLE DEVELOPMENT. EMPIRICAL EVIDENCE

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Abstract: This study assesses the effect of governance upon sustainable development. The trends of the Worldwide Governance Indicators (WGI) and the Sustainable Development Index (SDI) are analysed for the 2005 - 2021 period for 161 countries by using Pooled Ordinary Least Squares (OLS) estimations for panel data, the multiple regression modelling. The results emphasize the significant effect of regulatory quality, government effectiveness, political stability, rule of law, control of corruption and voice and accountability on SDI. The results of the research show that governance is a variable that should be taken into consideration for explaining sustainable development level each country may achieve.

JEL Classification: C23, Q1

Keywords: sustainable development, Governance, the Sustainable Development Index, World Governance Indicators

1. Introduction

Sustainable development (SD) is at the core of all concerns in this century. Assessing it, monitoring its progress, finding links that connect it with other fields and major themes of interest, have become a usual thing among scholars in the attempt of better understanding its complexity.

Sustainable development, as defined by the World Commission of Environment and Development (1987) represents the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Also called sustainable lifestyle, SD attempts to achieve the ideals of humanism and harmony between Men and Nature with the goal of finding the balance between people's rights and obligations towards Nature (Vavrousek, 2000).

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The present study contributes to the literature with findings which relate governance to sustainable development. The purpose of this research is to fill the research gap in studies that use governance in establishing the type of relationship with sustainable development. Kwatra et al. (2020) have showed the existence of various indices that are available at the global scale to assess sustainable development. Most studies (Maccari, 2014; Mombeuil and Diunugala, 2021; Gellers, 2016; Khalifa and Connelly, 2009) use the Human Development Index (HDI) for this matter. Our study tries to connect governance (measured by The World Governance Indicators (WGI)) with sustainable development (measured by the Sustainable Development Index (SDI)). Until present, no studies have been identified to focus strictly on this aspect. Moreover, there are very few studies (Bell et al., 2023; Nchofoung and Simplice, 2021; Neagu, 2020) that use the SDI (Hickel, 2020), since it is a relatively newly created index.

After the introduction, the "Literature Review" section discusses the literature review focusing on the relationship between governance and sustainable development and methodological approaches to SD measurement. The data used for the present study are presented in the section "Data and data sources". In the fourth section, the "Research methodology" section, tests are applied to determine the presence of associations between the studied variables. The results are presented in the fifth section. The last section "Conclusion" presents the importance of the study and future research directions.

2. Literature Review

The relationship between governance and sustainable development

The multitude of literature that connects governance to sustainable development, shows its great importance in this field. There are numerous studies that approach governance under different aspects such as: its interaction with natural resources (Nchofoung and Ojong,, 2023), its effect on the quality of life (Sarpong and Bein, 2022), the measure sustainable development goals are reached (Mombeuil and Diunugala, 2021), its role in the connection between sustainable development and financial development (Dutta and Saha, 2023) and many more.

Governance is defined as "the manner in which power is exercised in the management of a country's economic and social resources for development" (World Bank, 1992). Kaufmann et al. (2011) define governance in their study as "the traditions and institutions by which authority in a country is exercised."

In relation to SD the term "good governance" is being used. Good governance is represented by "a set of qualitative characteristics relating to processes of rulemaking and their institutional foundations. It encapsulates values such as enhanced participation, transparency, accountability, and public access to information. Also, it also helps to combat corruption and secures both basic human rights and the rule of law" (UNU-IAS, 2015). A good governance is vital to improving environmental and socio-economic aspects of a country (Asongu and Odhiambo, 2019) and it represents the foundation of sustainable development measures (Leal Filho et al., 2021).

In the present paper good governance is represented using Worldwide Governance Indicators (WGI).

Methodological approaches to SD measurement

To measure the progress of SD over the time, different set of indicators have been developed by various organizations: The Commission of Sustainable Development (2001), World Bank (2000), United Nations Development Programme (1990), The World Resource Institute (2000), World Health Organization, OECD. There is the need of measurements and indicators capable of assessing changes that might not be compatible with the ecological limits of the planet. (Moran et al., 2008). Developing integrated sustainable development indicators seemed to be the challenge that measuring SD has faced.

Gross Domestic Product (GDP)

The most used measure for wealth is GDP. According to Daly and Cobb (1989), GDP reflects services, industrial production, the capital the resources and agricultural product. Even if it is a very popular indicator, there are also criticisms of GDP such as the fact that wealth distribution, the household value and environmental issues are not properly taken into consideration (Mederly et al., 2003).

The Human Development Index (HDI)

Since GDP was not able to adequately reflect the human and social dimension of development (Anand and Sen, 1994), The Human Development Index (HDI) was developed in 1990. HDI is supposed to express the national and individual level of growth and development that is why it is often used to measure the progress in attaining the Millennium Development goals. HDI is often used to help GDP to better represent the human development and it comprises four sub-indicators: GDP per capita, life expectancy at birth, gross school enrolment ratio, and adult literacy rate (UNDP, 2004). The problem with the HDI is that all the top performers register unsustainable and high levels of ecological impact (Hickel, 2000) meaning that even though HDI is one of the most used measures of well-being it does not take into consideration sustainability since environmental aspects are missing (Maccari, 2014).

Sustainable Development Index (SDI)

Since HDI is difficult to universalize and has encountered problems in measuring empirically ecological stability, Hickel (2020) has proposed an alternative index: the Sustainable Development Index (SDI). “The SDI is an indicator of strong sustainability that measures nations’ ecological efficiency in delivering human development” (Hickel, 2000). In contrast to HDI, SDI comprises elements belonging to all three pillars (Basiago, 1999; Gibson 2006; Boyer et al., 2016) specific to SD (Hacking and Guthrie, 2008) because the domains are interrelated requiring thus a simultaneous and integrated consideration (e.g., Costanza et al., 2016).

In the attempt of finding the perfect indicator to best represent the meaning of SD other indicators have been developed, each of them trying to best fit the requirements. The Hong Kong Sustainable Development Index (HKSDI) for example is used as a tracking mechanism on the state of affairs (TSO, 2011). The roots index developed by Hoffman (2000) is used to measure sustainable development in New

York City. Herrera-Ulloa et al. (2003) have developed a regional-scale SDI for Baja California Sur of Mexico, considering four aspects: the environmental one, the economic one, the social one, and the institutional one. Another SD index proposed by Tarabusi and Palazzi (2004) is used to analyse and compare the level of SD in 126 countries based on the principal component analysis. The Multilevel Sustainable Development Index (MLSDI) was applied to 62 industries from Germany (Lemke and Bastini, 2020). Some SD indicators adopted by European Commission are presented in the work of Ledoux et al. (2005).

3. Data and data sources

This study explores the trends of the Worldwide Governance Indicators (WGI) and SDI from 2005 to 2021 for 161 countries based on the availability of the data at the time of this study. Data about unemployment and urbanization rates provided by World Bank (2023) are also taken into consideration for the same period of analysis.

The Sustainable Development Index (SDI)

The Sustainable Development Index developed by Hickel (2000), comprises five indicators: life expectancy, income, education, material footprint and CO_2 emissions.

Life expectancy

Life expectancy at birth reflects the quality of life for a country's people. The impact of health quality and efficiency is often evaluated through a patient's "quality of life" (Carr, 2001). In addition, the quality of life might also be determined by the subjective perception of the life conditions, relationships and social life, apart from education and wealth (Maccari, 2014)

Education

In the education index, the Mean Years of Schooling Index (MYSI) and The Expected Years of Schooling Index (EYSI) were taken into consideration. It seems that for higher education is easier to emphasize the importance of SD in the context of the global sustainability agenda (Cicmil et al., 2017) influence. Since education for sustainable development has started to gain increased attention in tertiary education Gatti et al., 2019), models for education that allows students to gain sustainability competencies should be developed Faham et al., 2017).

Income

Gross national income (GNI) is used in studies to measure national wealth and reflects all income earned in a country, even if it was earned outside the country. According to Hickel (2000), The Income Index used in SDI differs from that used in HDI in that it incorporates a sufficiency threshold below the HDI's maximum value incompatible with planetary boundaries (www.sustainabledevelopmentindex.org).

CO_2 emissions

CO_2 emissions per capita (tonnes) are important in the context of the Kyoto protocol (Unfccc, 1998) where targets for greenhouse gas emission reduction were established for 192 countries. CO_2 emissions and material footprint account for international trade (see more at https://www.sustainabledevelopmentindex.org/methods).

Material footprint

The material footprint indicator reflects the total weight of a nation's material extraction and consumption, including biomass, minerals, fossil fuels and construction materials (Hickel, 2000). The problem with our society is that the planet converts much slower waste into resources than we are transforming resources into waste. Moran et.al. (2008) talk about the regenerative capacity of the planet that influence the development and use of resources.

Overall, the SDI is based on a "development index" calculated as the geometric mean of the education index, the life expectancy index, and the modified income index; and an "ecological impact index" calculated as the average overshoot of CO_2 emissions and material footprint vis-à-vis their per capita planetary (Hickel, 2020). More insights on SDI are available at https://www.sustainabledevelopmentindex.org/about.

Studies (Bell et al., 2023) have shown that success in terms of SDI imply efforts both for the poor and rich nations. The poor nations must attend a higher degree of growth and development at the same time with maintaining ecological boundaries while more developed countries need to improve their growth and development reducing at the same time the ecological problems.

The Worldwide Governance Indicators (WGI)

WGI is composed of aggregate and individual governance indicators that measure a country's level of governance for six key variables: regulatory quality, government effectiveness, political stability and absence of violence, rule of law, voice and accountability and control of corruption. The scale of measurement ranges from -2.5 (highly underperformed governance to +2.5 (excellent governance) (Mombeuil and Diunugala, 2021).

4. Research Methodology

Using multivariate research approach, we propose that SDI is influenced by the levels of government effectiveness, regulatory quality, rule of law, political stability and absence of violence, control of corruption, and voice and accountability, controlling for unemployment and urbanisation. Once our data have been examined and the basic assumptions checked, we use simple and multiple regression modelling of our unbalanced panel data set, to evaluate the impact of governance upon sustainable development. Unemployment and urbanisation rates are used as control variables.

Table no.1: Variables used and their descriptive statistics

Variable	Explanations	Obs.	Mean	Std. dev.[$]	Min	Max
CC	**Control of corruption** captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	2729	-0.0927	0.9913	-1.7819	2.45911
GE	**Government effectiveness** captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	2729	-0.0428	0.9564	-2.3485	2.42602
PS	**Political Stability** and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism.	2728	-0.1561	0.9520	-3.0059	1.6393
RQ	**Regulatory quality** captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	2729	-0.0397	0.9543	-2.3660	2.2553
RL	**Rule of law** captures perceptions of the extent to which agents have confidence in and abide by 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.	2729	-0.1035	0.9690	-2.3315	2.1247
VA	**Voice and accountability** captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	2729	-0.1193	0.9719	-2.2591	1.7517
Unempl	Unemployment refers to the share of the labor force that is without work but available for and seeking employment.	2718	7.6432	5.6027	0.1	37.32

Variable	Explanations	Obs.	Mean	Std. dev.$	Min	Max
Urban	Urban population ((% of total population) refers to people living in urban areas as defined by national statistical offices.	2737	58.2340	22.175	9.375	100
SDI	The Sustainable Development Index (SDI) measures the ecological efficiency of human development, recognizing that development must be achieved within planetary boundaries. Lower SDI stands for a higher sustainable development.	2371	0.5711	0.1740	0.085	0.85
Footprint	Material footprint pcap. (tones) represents the total weight of material extraction and consumption, including biomass, minerals, fossil fuels and construction materials.	2385	12.8327	12.125	0.29	78.19
CarbonD	CO_2 emissions per capita (tonnes)	2377	5.2701	6.1707	0.02	52.71

For a closer look on the evolution of worldwide sustainable development, the average SDI within the period was 0.5711 and it ranged from 0.085 to 0.85. At the beginning of the analysed period (see Figure no.1), SDI has recorded increasing trends especially in the period of the economic crisis in 2008. In the 2010-2014 period SDI remained relatively constant then it registered a decreasing trend until 2019. An upward trend began to appear again in the last two years of the analysed period.

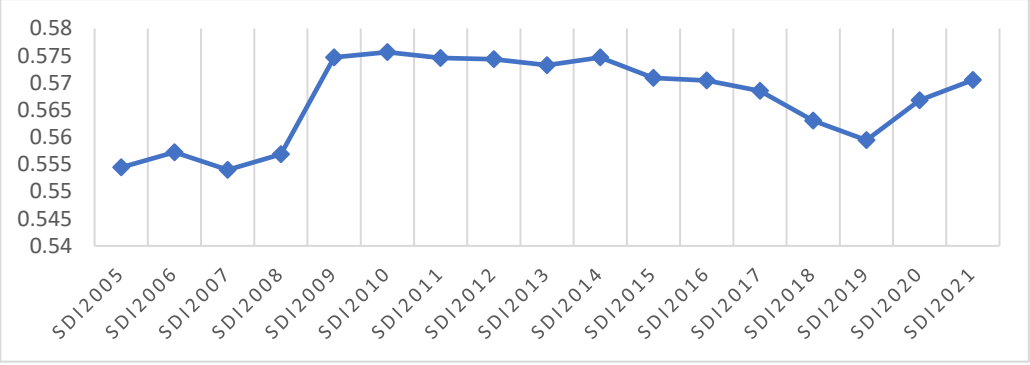

Figure no.1: The evolution of SDI in the analysed period

Furthermore, Table no.2 contains the correlation matrix between SD and its explanatory variables, for n=2365 perfectly matching observations. We thus expect governance proxies to have a direct impact upon sustainable development: the better the governance is, thus higher governance proxies, the lower the SDI is, thus improved SD.

Table no. 2: Correlation matrix

	SDI	CC	GE	PS	RQ	RL	VA
SDI	1						
CC	-0.4551	1					
GE	-0.3806	0.9278	1				
PS	-0.2947	0.7431	0.7137	1			
RQ	-0.3637	0.8643	0.9203	0.6628	1		
RL	-0.433	0.9491	0.9489	0.7567	0.9195	1	
VA	-0.1863	0.756	0.7402	0.6117	0.7909	0.7876	1

The present study uses a baseline regression model as follows:

$$SDI_{it} = a_1 + b_1CC_{it} + c_1Unempl_{it} + d_1Urban_{it} + \varepsilon_{it} \quad \text{Equation (1)}$$

$$SDI_{it} = a_2 + b_2GE_{it} + c_2Unempl_{it} + d_2Urban_{it} + \varepsilon_{it} \quad \text{Equation (2)}$$

$$SDI_{it} = a_3 + b_3PS_{it} + c_3Unempl_{it} + d_3Urban_{it} + \varepsilon_{it} \quad \text{Equation (3)}$$

$$SDI_{it} = a_4 + b_4RQ_{it} + c_4Unempl_{it} + d_4Urban_{it} + \varepsilon_{it} \quad \text{Equation (4)}$$

$$SDI_{it} = a_5 + b_5RL_{it} + c_5Unempl_{it} + d_5Urban_{it} + \varepsilon_{it} \quad \text{Equation (5)}$$

$$SDI_{it} = a_6 + b_6VA_{it} + c_6Unempl_{it} + d_6Urban_{it} + \varepsilon_{it} \quad \text{Equation (6)}$$

Equation (1) estimates the effects of control of corruption as a governance proxy, and that of unemployment rates and urbanization rates as control variables upon the SDI of worldwide countries. Furthermore, Equation (2) uses Government Effectiveness as a governance proxy, Equation (3) uses Political Stability as a governance proxy, Equation (4) uses Regulatory Quality as a governance proxy, Equation (5) uses Rule of Law as a governance proxy and Equation (6) uses Voice and Accountability as a governance proxy, respectively, controlling for unemployment and urbanisation as well. The notations used are presented below:

SDI_{it} – sustainable development index of country i in year t;
$a_{1,2,3,4,5,6}$ – constants;
$b_{1,2,3,4,5,6}$ – linear effects' parameters;
CC_{it} – control of corruption of country i, year t;
GE_{it} – government effectiveness of country i, year t;
PS_{it} – political stability of country i, year t;
RQ_{it} – regulatory quality of country i, year t;
RL_{it} – rule of law of country i, year t;
VA_{it} – voice and accountability of country i, year t;
ε_{it} – the residual.

5. Results and Discussions

The methodology employed is that of Pooled Ordinary Least Squares (OLS) estimations for panel data, the multiple regression modelling, a combinatorial approach. As such, Table no. 3 contains the coefficients of multiple OLS regressions, considering the six World Governance Indicators, on turn, as explanatory variables, and controlling for unemployment and urbanisation. Our data are structured as unbalanced panel data for 161 countries, covering the 2005-2021 period (17 years), the most recent data available at the time of constructing our database.

Table no. 3: Main results of SDI as a function of various WGI determinants

OLS regression modelling of SDI_{it}						
	Eq(1)	Eq(2)	Eq(3)	Eq(4)	Eq(5)	Eq(6)
CC	-0.0841***					
GE		-0.0688***				
PS			-0.0461***			
RQ				-0.0653***		
RL					-0.0788***	
VA						-0.0269***
Unempl	0.0067***	0.0066***	0.0074***	0.0071***	0.0068***	0.0079***
Urban	0.0003*	-0.00002	-0.0009***	-0.0002	0.00003	-0.0012***
const	0.4958***	0.5218***	0.5619	0.5298***	0.5119***	0.5842***
R^2	0.2583	0.1898	0.1472	0.1843	0.2366	0.1141
Adj R^2	0.2574	0.1888	0.1461	0.1832	0.2356	0.113
No obs	2350	2350	2350	2350	2350	2350

Note: *,**,*** Statistically significant at 10%, 5% and 1% levels.
Source: Author's processings

The interpretations of the estimated coefficients from Table no 3, through equation (1) show that one quarter of the variation in SDI is captured by CC as a governance proxy and the two control variables (its Adjusted R^2 is of 25.74%). The interpretation of the estimated coefficient for CC is the folllowing: at a one unit increase in CC, the SDI decreases on average with 0.0841 units, everything else unchanged.

Then, Equation (2) has an explanatory power, given by its Adjusted R^2, of 18.88%, so one fifth of the variation in SDI is captured by GE as a governance proxy and the two control variables. The interpretation of the estimated coefficient for GE is that at a one unit increase in GE, the SDI decreases on average with 0.0688 units, ceteris paribus.

Moreover, Equation (3) has an explanatory power, given by its Adjusted R^2, of 14.61%, while the interpretation of the estimated coefficient for PS is that at a one unit increase in PS, the SDI decreases on average with 0.0461 units, everything else unchanged.

Furthermore, Equation (4) has an explanatory power, given by its Adjusted R^2, of 18.32 %, so almost a fifth of the variation in SDI is captured by RQ as a governance proxy and the two control variables. The interpretation of the estimated coefficient for RQ is the following: at a one unit increase in RQ, the SDI decreases on average with 0.0653 units, everything else unchanged.

To continue, the interpretation of the estimated coefficient for RL from Equation (5) is the following: at a one unit increase in RL, the SDI decreases on average with 0.0788 units, ceteris paribus. This model has an Adjusted R^2 of 23.56%.

Nonetheless, Equation (6) has the smallest explanatory power of all models, revealing the variation in SDI captured by VA as a governance proxy and the two control variables. The interpretation of the estimated coefficient for VA is that at a one unit increase in VA, the SDI decreases on average with 0.0269 units, ceteris paribus.

The results of present study have revealed that the higher the WGI the better the governance and as a result SDI decreases leading thus to a greater sustainable development. This is in accordance with De Jesus (2012) which states that improvement in country's governance is associated with sustainable development.

In the SDI corruption has a strong impact especially on the income indicator. So, the higher the CC is in a country the lower the corruption phenomena is, meaning that governance is effective, which leads to a greater SD. Moreover, some authors (Hope, 2017a, 2017b; Rose-Ackerman and Palifka, 2016) believe that SD is constrained by corruption. Therefore, sustainable development will be elusive (Labelle, 2009) if corruption prevails. At the same time, the likelihood of achieving SD for the analysed countries increases if GE and PS are improved. This has also been confirmed in the study of Mombeuil and Diunugala (2021). The state is considered a failure (Akiwumi, 2014) if the government is ineffective, there is a poor regulatory quality and it lacks a strong and independent judicial system (Mombeuil and Diunugala, 2021). Being able to participate in selecting the government together with the freedom of expression and association also leads to better governance and thus to a higher SD.

Therefore, the higher each component of the WGI the better the governance and there are more chances to an improved sustainable development. Worldwide countries should design their national policies to attain better governance, with a direct relationship upon sustainable development.

6. Conclusions

In this study the relation between governance and sustainable development has been analysed. Based on the estimated on the linear regression modelling of panel data, the results have shown that higher levels of governance are associated with a higher sustainable development. This is also confirmed by the results of other studies (Dhaoui, 2022) that used different measures instead of SDI. These findings are important in the context that a good governance may contribute in attaining the 2030 Sustainable Development Goals (SDGs) set by the United Nations (Glass and Newig, 2019).

Our approach contributes to identifying and focusing on improving the required conditions to build effective governance systems, in order to obtain a greater sustainable development and thus it builds up to the literature on the determinants of sustainable development.

Future directions of research might focus on adding the concepts of peace and conflict to sustainable development, that have not been taken into consideration (Fisher and Rucki, 2017). Another future research area might focus on replicating this study by using the newer versions of SDI (according to its creator (Hickel, 2020) the SDI "understates the overshoot of richer nations and overstates the overshoot of poorer nations"). Subsampling of nations and cluster analysis might also be helpful in proving new insights on this subject.

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