ECONOMIC RESEARCH-EKONOMSKA ISTRAŽIVANJA
https://doi.org/10.1080/1331677X.2022.2080745

The impact of the quality of corporate governance on sustainable development: an analysis based on development level

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ABSTRACT

Sustainable development has gained the attention of researchers worldwide and is becoming an important topic, especially in relation to corporate governance principles. This study investigates the influence of corporate governance on sustainable development in a sample of 185 countries over 2005–2020 using a panel linear regression model. Separate analyses are also conducted on subsamples of high- and low-income countries. Our findings highlight the positive influence of corporate governance, as measured by board efficacy, the strength of audits and reports, and digitalisation, on sustainable development, as measured by the Human Development Index, Human Capital Index, and Environmental Performance Index. Moreover, we find a higher positive and marginal effect of the influence of corporate governance on sustainable development for low-income countries than for high-income countries. The robustness checks performed using variables related to the happiness index, women in top management positions, and technology adoption verify our results. Our findings are important for managers and policymakers to consolidate sustainable development through the incentive brought about by high-quality corporate governance.

ARTICLE HISTORY
Received 9 February 2022
Accepted 16 May 2022

KEYWORDS
Corporate governance; sustainable development; corporate social responsibility

JEL CODES
G38; Q56; O15

1. Introduction

The well-being of a company should be a common interest of all engaged parties. Although researchers have long emphasised the importance of corporate governance principles (Nedelchev, 2013), Howell and Sorour (2016) raised the importance of implementing good practices to ensure organizational well-being. Hashanah and Mazlina (2005) also underlined the corporate governance elements that directly hamper the healthy development of society. Thus, implementing good corporate

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governance principles ensures the positive and therefore sustainable development of the business.

Various studies have analyzed the relationships between corporate governance and corporate social responsibility (CSR) (Achim et al., 2017; Crane & Matten, 2007; Kolk & Pinkse, 2010) as well as between CSR and sustainable development (Kahraman Akdogu, 2017; Truant et al., 2017). However, few studies (e.g., De Luca, 2020; Dienes et al., 2016) have investigated the direct relationship between corporate governance and sustainable development. To bridge this gap in the literature, we analyze the impact of corporate governance on social and environmental performance as well as compare the influence of corporate governance in high- and low-income countries. We use a sample of 185 countries over 2005–2020 and panel linear regressions. To validate our main results, we also check their robustness using variables such as the happiness index, women in top management positions, and technology adoption. The results show that the level of sustainable development increases when the use of corporate governance best practices increases. Moreover, we find that corporate governance has a higher impact on the low-income countries than in the high-income countries than

The novelty of this study brought to the literature consists in the fact that it covers a gap in literature and it comes with important evidences of the role of corporate governance on boosting the sustainable development of the society. The increase of the quality of corporate governance realised through the increase in *efficiency of board, audit quality, participating* female in ownership and top management and the increase of digitalisation, are important channels for improving the performances of the companies and for creating sustainable development for the society. These findings have many policy implications for all the participant at the business environment.

The structure of the reminder of this paper is as follows. In Section 2, we review the literature on the relationships between corporate governance and CSR as well as between CSR and sustainable development. Section 3 presents the methodology and describes the data. Section 4 summarises our results from the empirical tests. Section 5 discusses the findings in relation to the literature. The last section concludes, including limitations, policy implications, and avenues for future research.

2. Literature review

2.1. Corporate governance and CSR

Sustainable development is a matter of great importance for modern society and is gaining increasing research attention. In the wake of major accounting scandals such as Enron, Tyco, and Worldcom, corporate governance is promoting CSR to restore investor confidence in the financial system through the transparent presentation of financial statements and deployment of corporate governance practices. Thus, starting to this point, the well-being of a company has became an important objective of stakeholders through the adoption of corporate governance principles. At the same time, the issues of a sustainable economy and social responsibility have cleared the path for a new role for companies in society. More specifically, strategic choices and performance have had to be reconsidered (Salvioni & Gennari, 2019). In this view,

Mirza et al. (2020) also underlined the importance of business achievements in a pandemic context, finding that a hybrid approach can help companies adapt to ever-changing times. Regarding the concept of corporate governance, the study of Waddock and Graves (1997) argued that corporate governance aims to balance economic and social goals as well as individual and community goals. The same idea is supported by Kendall (1999), who argued that good corporate governance supports the interests of those engaged with CSR policy. Aguilera et al. (2007) argued that companies that have implemented good governance procedures (transparency and social responsibility) have a greater inclination to implement CSR practices. Jamali et al. (2008) found that most managers see corporate governance as a necessary pillar of CSR. In addition, Kong (2013) showed that companies' CSR activities significantly affect corporate governance and may, to some extent, replace the governance role of minority shareholders.

Clearly, corporate governance and CSR are related concepts (Achim et al., 2017; Crane & Matten, 2007; Kolk & Pinkse, 2010). However, Flammer (2015) stated that their relationship is extremely complex. Zingales et al. (2016) showed that management practices and CSR strategies depend on corporate governance factors, with the board of directors and shareholding structure heavily influencing strategic decision-making and risk-taking in CSR activities, which may affect CSR policies to cover unethical behaviour and misconduct. As CSR is a suitable indicator of the implementation of a business's sustainable behaviour, companies might apply CSR policies because they think it is the responsible thing to do or to raise performance (Ullah et al., 2019).

In the same vein, various studies (e.g., Crane & Matten, 2007; Spitzeck, 2009; Welford, 2007) have demonstrated a close link between corporate governance and the business ethics adopted by a company. Promoting both managers and their subordinates to behave ethically has a decisive impact on the end results of the entire organisation. To understand what is right and wrong in business behaviour, Crane and Matten (2007) referred to morality, which is reflected by individual and social values and community beliefs.

Regarding drivers of CSR behaviour, Fahad and Mubarak (2020) found that CSR disclosure can be improved by board independence and CEO duality. Habbash (2016) underlined that firm size, family ownership, government ownership, and firm age affect the quality of CSR reporting. Coffie et al. (2018) demonstrated that using larger/smaller boards and establishing CSR committees improve CSR disclosure. Similarly, Welford (2007) and Spitzeck (2009) showed that good CSR policies are related to qualitative corporate governance reporting. In other words, if CSR is integrated into the corporate governance structure, companies have an incentive to act responsibly. After investigating various definitions of corporate governance, Kolk and Pinkse (2010) concluded that this concept is largely related to the concepts of CSR. They found that more than half of the 250 companies in their sample allocate a dedicated section to corporate governance in their CSR reports. Similarly, Chan et al. (2014) concluded that businesses that present a CSR policy provide qualitative corporate governance reporting.

2.2. CSR and sustainable development

The topic of sustainable development arose in 1970 with the publication of the first report of the Club of Rome entitled 'The Limits of Growth.' The best-known definition of this concept is mentioned in the report of the World Commission on Environment and Development (United Nations, 1987), which defines sustainable development as 'development that meets the needs of the present generation, without compromising the ability of future generations to meet their own needs.' In the context of sustainable development (Achim et al., 2017), CSR refers to the orientation and attitude of an organization to voluntarily integrate into its strategy and social and environmental concerns while ensuring the economic success of the business. At the macroeconomic level, sustainable development includes economic, social, and environmental pillars, which should be equally integrated into the process of enhancing development. Hence, applying CSR principles positively impacts sustainable development (Kahraman Akdogu, 2017).

Husser et al. (2012) concluded that majorities of French companies excepting the companies that have to deal with the pollution aspects are concerned on CSR disclosure rather than sustainable development. Thus, the study reveals a short- term orientation of the French companies rather than a long-term one. Kahraman Akdogu (2017) stated that CSR appeared as a 'reaction for sustainable development', therefore businesses can contribute to sustainable development by promoting CSR activities. Environmental, social, and governance (ESG) performance, as provided in a sustainability report, measures a firm's accountability to both external and internal stakeholders (Calabrese et al., 2017). Truant et al. (2017) tested the complex relationship between sustainability reporting and the disclosure of ethical, social, and environmental risk, finding a negative relationship between sustainability reporting and environmental risk and that social risk can damage a company's reputation. Fatemi et al. (2018) demonstrated that the association between a company's ESG activities and its evaluation is moderated by its disclosures of those activities. Therefore, CSR reporting contributes to ESG disclosures, creating benefits for information users. Adams (2017) and Gardberg and Fombrun (2006) argued that CSR reports lead to greater transparency by outlining the links between financial performance and ESG. At the same time, high ESG performance creates competitive advantage for a firm.

The reporting of non-financial data consists of descriptions, opinions, and facts that cannot be expressed in monetary units (Gernon and Gary, Gernon & Gary, 2000) and may be prospective or retrospective in nature. With the implementation of the 2014/95 Directive, listed EU companies are now obliged to provide non-financial reporting (Salvioni & Bosetti, 2014). However, the European Union wants to implement these reports for non-listed companies as well because all companies should be socially responsible regardless of their size. However, despite being an important tool in CSR management, non-financial reporting requirements for small and medium-sized businesses have not yet been developed (Baumann-Pauly et al., Baumann-Pauly et al., 2013).

Few studies have investigated the relationship between corporate governance and sustainable development. Dienes et al. (2016) identified that the structure of property, size of the company, and visibility of the media are the most important factors in the

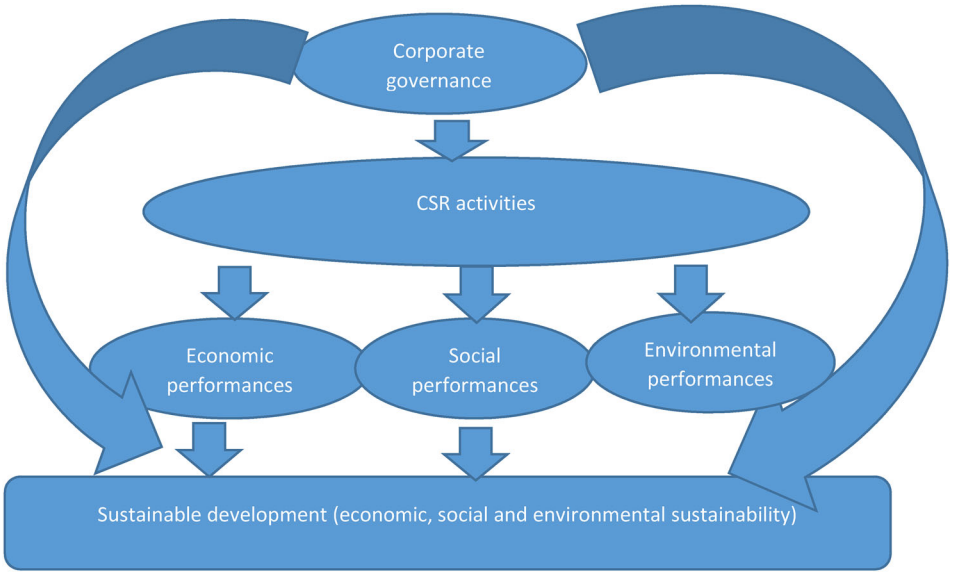

Figure 1. The causal relationships between corporate governance and sustainable development.
Source: own projection

disclosure of sustainability reports. Similarly, De Luca (2020) found that several factors represent the basis of sustainable development, namely, the structure and size of corporate governance, institutional factors, the objective of companies' activities, and their profitability (De Luca, 2020).

Based on the foregoing, we investigate whether a high level of corporate governance in a firm increases its level of sustainable development. We also examine the extent to which the corporate governance–sustainable development relationship depends on a country's development level. In other words, does it differ between high- and low-income countries? Figure 1 presents the research framework.

3. Methodology and data

3.1. Measuring the variables

3.1.1. Dependent variable: Sustainable development

Sustainable development, the dependent variable, is measured using the following three indicators.

a. The Human Development Index (HDI) is a composite index for evaluating the development of a country, not just its economic growth. It is a summary measure of the average achievement in three key dimensions of human development: life expectancy, education, and per capita income (UNDP (2022)/Human Development Reports, 2022). Other studies have used the HDI as a proxy indicator of sustainable development (Absalyamova et al., 2016; Murshed & Mredula, 2018).

b. The Human Capital Index (HCI) measures human capital using three pillars: survival, as measured by under-5 mortality rates; expected years of quality-adjusted schooling, which combines information on the quantity and quality of education; and the health environment. Human capital is an important determinant of environmental performance (Kim & Go, 2020).
c. The Environmental Performance Index (EPI) describes how close countries are to meeting their environmental policy goals. The EPI offers a scorecard that highlights leaders and laggards in environmental performance, provides insights into best practices, and guides countries that aspire to be leaders in sustainability (Yale University, 2022). It is used in many studies as a proxy for environmental performance (Emerson et al., 2012; Esty et al., 2008; Gallego-Alvarez et al., 2014; Kim & Go, 2020).

3.1.2. Independent variable: corporate governance

We use two important variables to measure corporate governance (Achim & Borlea, 2020): *Efficacy of corporate board* (*BE*) and *Strength of audits and reports* (*SAR*). Both indicators are calculated and reported in the Global Competitiveness Report (2021), which is a tool for measuring national competitiveness for economies globally provided annually by the World Economic Forum. They are scored between 1 (the weakest) and 7 (the strongest), thus reflecting the efficiency of corporate governance in national economies.

In addition, in the era of the digital economy, high-quality corporate governance requires a high level of digitisation. The digitisation of the activities of companies above the traditional methods of operations and organizational bureaucracy is a key factor to their success. According to Fréminville (2020), digitalisation affects interested parties through 'e-reputation, price volatility, dematerialisation of operations, protection of board information, disintermediation, and emergence of new players.' Digital corporate governance empowers company boards to make better strategic decisions (Tricor Group, 2020). Thus, a high level of digitisation can be considered as a good proxy for corporate governance. Following Achim et al. (2021), we measure the level of digitisation as the number of individuals using the Internet (*Internet*) as a percentage of the total population.

3.1.3. Control variables

In the literature, the following factors are found to be determinants of sustainable development: public governance, urbanisation, unemployment, and culture. First, the efficiency of a country's public governance influences its level of development (Absalyamova et al., 2016; Forson et al., 2017; Hoinaru et al., 2020). More precisely, a higher level of corruption in public institutions erodes the development of the economy. Hoinaru et al. (2020) highlighted the destructive role of corruption on the economic and sustainable development of states. Similarly, Forson et al. (2017) found that corruption poses a long-term threat to the sustainable development of economies in sub-Saharan Africa. Absalyamova et al. (2016) found a negative effect of corruption on sustainable development, with a 1% increase in corruption in the socioeconomic systems of a state leading to a decrease of more than 1% in the value of the

human capital sustainable development index of that state. According to the World Governance Indicators provided by the World Bank (2021), the quality of governance can be expressed using six dimensions: voice and accountability (VA), political stability and absence of violence (PS), government effectiveness (GE), regulatory quality (RQ), rule of law (RL), and control of corruption (CC).

Second, studies (e.g., Rogers et al., 2012; Satterthwaite, 2008; Zeng et al., 2016) find that urbanisation is crucial to regional and global sustainability and that all the richest nations are highly urbanised, while all the poorest nations are predominantly rural. In addition, the level of urbanisation provides strong developmental advantages such as lowering the unit costs of providing piped water, drains, health care, and education, but also some strong environmental advantages, including reducing energy use, cutting waste, controlling pollution, and lowering greenhouse gas emissions (Satterthwaite, 2008).

Third, regarding culture as a determinant of sustainable development, cultural heritage, cultural and creative industries, sustainable cultural tourism, and cultural infrastructure can serve as strategic tools for creating benefits, especially in developing countries, given their often rich cultural heritages and substantial labour forces. Since January 2012, culture has been included in 70% of the United Nations Development Assistance Frameworks (UNESCO, 2012). The role of culture in achieving sustainable development is also included in the UN 2030 Agenda for Sustainable Development (United Nations, 2015). Related to this, the Committee on Culture of UCLG (2018) document highlights the relevance of culture, emphasising that cultural services are basic services and that equal access to them should be guaranteed for all, including the poor and vulnerable. In addition, cultural expressions, services, goods, and heritage sites can contribute to inclusive and sustainable economic development. In the same view, the study of Gallego-Álvarez and Pucheta-Martínez (2021) started their research from the institutional theory whereby firms domiciled in the same institutional context will behave in a similar manner related to innovation practices and ways of creating benefits. They find the cultural dimensions of power distance, masculinity, uncertainty avoidance, and long-term orientation are positively associated with innovation, while individualism has a negative effect, and indulgence has no effect whatsoever.

In our paper, culture relies on the multidimensional cultural model of Hofstede (Hofstede Centre, 2022) summing up the following: Power distance (PD), Individualism versus collectivism (IDV), Masculinity versus Femininity (MAS), Uncertainty avoidance (UAI), Long-term orientation (LTO) and the latest added dimension, Indulgence versus restraint (IND).

Finally, high rates of unemployment and underemployment, particularly among young men in small island developing states, are often associated with anti-social behaviour, including crime and drug use, which threatens political stability and sustainable development (United Nations, 2014). In addition, reducing youth unemployment rates and empowering vulnerable groups such as women, young people, and people with disabilities are stated as major targets in the 2030 Agenda. Picatoste and Rodriguez-Crespo (2020) underlined decreasing youth unemployment as a way to achieve sustainable development, as the probability of youth unemployment is three times greater than that of adults. Table A in Appendix A summarises these variables.

3.2. Model

Our data cover a sample of 185 countries over 2005–2020. Despite striving to maximise the number of observations, they still comprise an unbalanced panel structure. We estimate panel linear regression models in which sustainable development is determined as a function of the corporate governance proxies and control variables. We use the pooled OLS method for the panel data and the forward estimation technique to build from a simple linear regression model to multiple regressions (see Equation (1)). The resulting models are estimated as fixed effects models (FEMs) and random effects models (REMs). The Hausman test probability indicates the optimal technique (bolded and included in the results tables).

The general form of our model is

$$\textbf{\textit{Sustainable development}} = \boldsymbol{\beta 0} + \boldsymbol{\beta 1}\ \textbf{\textit{Corporate governance}}_{it} + \boldsymbol{\beta}_2(j)\ \textbf{\textit{Controls}}(j)_{it} + \varepsilon_{it} \quad (1)$$

where

Sustainable development$_{it}$ is the dependent variable for country i in year t;

Corporate governance$_{it}$ is the independent variable for country i in year t;

Controls(j)$_{it}$ represents the jth control variable for country i in year t;

β0 is the intercept;

β1 is the regression coefficient that indicates the extent to which the independent variable (*Corporate governance*) is associated with the dependent variable (*Sustainable development*) if β1 is found to be statistically significant;

β2(j) is the regression coefficient for the jth variable in the vector of control variables;j denotes the ranges of the vector of control variables (*public governance*, *urbanisation*, *unemployment*, and *culture*);

ε_{it} is the residual or prediction error for country i in year t.

Table 1 presents the descriptive statistics. Further, we classify the 185 sample countries by their level of economic development into high- and low-income countries. This classification is based on data provided by the World Bank (2020), which classifies countries as high-income, upper-middle-income, lower-middle-income, and low-income countries. We thus divide our sample into 128 low-income countries (comprising low- and middle-income economies) and 57 high-income countries. Table B in Appendix B lists the two subsamples.

Table 1 that shows the average HDI for high-income countries is higher than that of low-income countries by 0.20 units, or about 33%. For the HCI and EPI, the relative changes are even higher, at about 47% and 54%, respectively, for high-income countries compared with low-income countries. Similarly, corporate governance quality in high-income countries is significantly higher than that in low-income countries. Specifically, the indexes of *BE* and *SAR* are 14% and 30% higher, respectively, for developed countries than for developing ones. The difference for digitalisation is even larger. More precisely, about 70.4% of the population in high-income countries use the Internet on average compared with about 24.2% in low-income countries (2.9 times higher).

Table 1. Summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
HDI_all	2584	0.6967	0.1591	0.294	0.957
HDI_HI	780	0.8496	0.0976	0.327	0.957
HDI_LI	1804	0.6306	0.133	0.294	0.929
HCI_all	580	0.5715	0.1472	0.286	0.887
HCI_HI	209	0.7190	0.0799	0.5016	0.887
HCI_LI	371	0.4884	0.1054	0.286	0.777
EPI_all	2801	52.8818	16.6427	14.68	90.68
EPI_HI	864	69.7005	10.7907	37.1	90.68
EPI_LI	1937	45.3798	12.8895	14.68	83.78
CB_all	1525	4.6035	0.7825	0	6.34
CB_HI	588	4.9689	0.8315	0	6.34
CB_LI	937	4.3742	0.6534	0	6.27
SAR_all	1528	4.6175	1.0079	0	6.73
SAR_HI	580	5.3901	0.6187	3.57	6.58
SAR_LI	948	4.1449	0.9028	0	6.73
Internet_all	2626	39.3632	30.466	0	100
Internet_HI	863	70.3937	19.8303	6.6835	100
Internet_LI	1763	24.1736	22.0893	0	89.555
CC_all	2955	−0.0826	1.0036	−1.9051	2.4699
CC_HI	912	1.0479	0.7704	−0.5822	2.4699
CC_LI	2043	−0.5874	0.6055	−1.9051	1.6484
GE_all	2953	−0.0548	0.995	−2.4751	2.4369
GE_HI	912	1.1056	0.6101	−0.3747	2.4369
GE_LI	2041	−0.5734	0.6287	−2.4751	1.26711
PS_all	2950	−0.1247	0.9739	−3.3149	1.6393
PS_HI	912	0.7124	0.5244	−1.6262	1.6393
PS_LI	2038	−0.4994	0.8921	−3.3149	1.4227
RL_all	2954	−0.0948	0.9963	−2.6064	2.1296
RL_HI	912	1.07	0.6154	−0.2161	2.1296
RL_LI	2042	−0.615	0.6245	−2.6064	1.0792
RQ_all	2952	−0.0501	0.9996	−2.645	2.26054
RQ_HI	912	1.1009	0.5573	−0.8547	2.2605
RQ_LI	2040	−0.5648	0.6707	−2.645	1.2408
VA_all	2954	−0.1047	0.9931	−2.3134	1.7396
VA_HI	912	0.7663	0.8031	−1.9072	1.7396
VA_LI	2042	−0.4937	0.8054	−2.3134	1.222
PD_all	1584	63.9191	20.7871	11	100
PD_HI	704	53.5909	23.2341	11	100
PD_LI	880	72.1818	13.8801	35	100
IDV_all	1584	39.4747	21.9072	6	91
IDV_HI	704	52.0909	23.1993	11	91
IDV_LI	880	29.3818	14.2967	6	80
MAS_all	1584	47.6666	18.6519	5	100
MAS_HI	704	47.2954	23.3371	5	100
MAS_LI	880	47.9636	13.8116	10	80
UAI_all	1584	64.0202	21.3637	8	100
UAI_HI	704	65.3181	23.1325	8	100
UAI_LI	880	62.9818	19.7877	13	99
LTO_all	1360	41.7529	22.7705	4	100
LTO_HI	656	52.6829	22.3071	12	100
LTO_LI	704	31.5681	17.9816	4	81
IND_all	1248	48.2179	22.7691	4	100
IND_HI	640	47.75	20.2219	13	83
IND_LI	608	48.7105	25.1811	4	100
Urban_all	2737	57.3495	22.9757	9.375	100
Urban_HI	840	77.1422	15.7747	31.147	100
Urban_LI	1897	48.5853	20.0307	9.375	91.991
Unempl_all	2864	7.7405	5.73	0.11	37.25
Unempl_HI	880	6.8839	4.0775	0.11	27.47
Unempl_LI	1984	8.1204	6.29	0.13	37.25

Source: own prelucrations.

For the control variables, we note significantly higher values for high-income countries than for low-income ones. The average level of public governance in high-income countries is above 1 unit, while the values are negative for all six dimensions for low-income countries. The values of the cultural components are significantly different for the two groups of countries. In addition, the percentage of urbanisation in high-income countries is 60% higher than that in low-income countries, while the level of unemployment is about 14% lower.

4. Results

4.1. Baseline results

Table 2 presents the estimation of the impact of the various corporate governance proxies on sustainable development, proxied by *HDI*. Models (1)–(5) determine the impact exerted by *BE* on *HDI*, models (6)–(9) determine the impact of *SAR* on *HDI*, and models (10)–(14) determine the impact exerted by *Internet* on *HDI*. All the signs of the corporate governance proxies are positive, indicating a direct relationship; the values of these coefficients indicate the change in the dependent value caused by a one-unit change in the independent variables.

First, according to the estimated coefficient of model (1), for a one-unit increase in *BE*, *HDI* is higher on average by 0.0634. The predictive accuracy of this model is given by a coefficient of determination (R^2) of 0.0962, representing the amount of variance in *HDI* explained by *BE*. The significance of the overall model increases as more variables are added: *PS* as a governance indicator (in model (2)); *PD*, *IDV*, *UAI*, and *LTO* as cultural dimensions (in model (3), with a negative impact for *PD* and a positive impact for *IDV*, *UAI*, and *LTO*); and *unemployment* in model (4) (the OLS model). Model (5) estimates the FEM, as pointed out by the Hausman test, but the cultural variables are omitted owing to multicollinearity. The positive and significant coefficients are maintained for *BE* and *PS*; therefore, the higher corporate governance and political stability, the higher is *HDI*. The negative relationship between *HDI* and *unemployment* is also revalidated in model (5).

Model (6) shows that when *SAR* increases by one unit, *HDI* is higher on average by 0.0769, significant at the 1% level. This positive impact is maintained in models (7) and (8), which include the positive influence of *RQ* on *HDI* (models (7) and (8), also kept in model (9)) and the direct impact of *urbanisation* on *HDI* (the cultural dimensions are not significant in model (8)).

Digitalisation, measured by *Internet*, as a novel corporate governance proxy, exerts a positive impact on *HDI* in models (10)–(14), and its coefficients are significant at the 1% level, although more variables are added (multiple regression modelling in models (11)–(13) for the OLS regression and model (14) for the FEM). In model (10), for a one-unit increase in *Internet*, *HDI* is higher on average by 0.004. *GE* exerts a positive impact (models (11)–(14)), while *IDV* and *UAI* have a positive impact on *HDI* (models (12) and (13)). *Urbanisation*, as previously proven, has a direct impact on *HDI* (models (13) and (14)).

Table 3 presents the estimations of the impact exerted by the various corporate governance proxies on *HCI* as a sustainable development indicator. When significant,

Table 2. Regression results for sustainable development measured by *HDI* as a function of corporate governance measured by *CB, SAR, Internet* and other control variables.

HDI	Model 1 (OLS)	Model 2 (OLS)	Model 3 (OLS)	Model 4 (OLS)	Model 5 FEM (p = 0.0437 Hausman)	Model 6 (OLS)	Model 7 (OLS)	Model 8 (OLS)	Model 9 **FEM** (p = 0.0000 Hausman)	Model 10 (OLS)	Model 11 (OLS)	Model 12 (OLS)	Model 13 (OLS)	Model 14 **FEM** (p = 0.0000)
Constant	0.4349***	0.6366***	0.5115***	0.524***	0.7353***	0.372***	0.6282***	0.4838***	0.2081***	0.5437***	0.5886***	0.451***	0.4018***	0.3652***
CB	0.0634***	0.0206***	0.0182***	0.0155**	0.0079***									
SAR						0.0769***	0.0178***	0.0077**	0.0011					
Internet										0.004***	0.0029***	0.0025***	0.0019***	0.0007***
GE											0.0448***	0.0284***	0.0236***	0.0241***
PS		0.0851***	0.0428***	0.044***	0.0077***									
RQ							0.0889***	0.0545***	0.0278***					
PD			−0.001***	−0.0009***										
IDV			0.0022***	0.0023***								0.0017***	0.0017***	
MAS														
UAI			0.0017***	0.0018***								0.0014***	0.0012***	
LTO			0.0005***	0.0005***										
Urbanisation								0.0032***	0.0083***				0.0014***	0.0052***
Unempl				−0.0018**	−0.0005*									
R^2	0.0962	0.2975	0.5052	0.5086	within = 0.0548	0.2530	0.3971	0.5419	within = 0.4946	0.5867	0.6157	0.6609	0.6806	within = 0.6423
Adj R^2	0.0955	0.2965	0.5018	0.5047	between = 0.2251	0.2525	0.3963	0.5410	between = 0.4943	0.5866	0.6154	0.6600	0.6794	between = 0.5190
Obs	1452	1452	885	885	overall = 0.2287	1459	1459	1459	overall = 0.4897	2417	2417	1398	1398	overall = 0.5348

Source: Authors' processings.

Table 3. Regression results for sustainable development measured by *HCI* as a function of corporate governance measured by *CB, SAR, Internet* and other control variables.

HCI	Model 1 (OLS)	Model 2 (OLS)	Model 3 (OLS)	Model 4 (OLS)	Model 5 (OLS)	Model 6 **FEM** (p = 0.0000 Hausman)	Model 7 (OLS)	Model 8 (OLS)	Model 9 (OLS) MAS Obs la jum	Model 10 (OLS)	Model 11 **FEM** (p = 0.0000 Hausman)	Model 12 (OLS)	Model 13 (OLS)	Model 14 (OLS)	Model 15 (OLS)	Model 16 **FEM** (p = 0.0000)
Constant	0.2003***	0.4056***	0.278***	0.2765***	0.3354***	0.3221***	0.2158***	0.4065***	0.3345***	0.3329***	0.2746***	0.3512***	0.4501***	0.4327***	0.445***	0.6073***
CB	0.0815***	0.0391***	0.0564***	0.0337***	0.0264**	0.0116**										
SAR							0.0805***	0.0401***	0.0461***	0.0239**	−0.0041					
Internet											0.0139	0.0042***	0.0021***	0.0016***	0.0016***	0.0007***
GE													0.0814***	0.0979***	0.0975***	0.0281***
PS		0.0914***	0.066***	0.058***	0.0594***	0.0105		0.0797***	0.0641***	0.0584***						
PD			−0.001***	−0.0008***	−0.0008***				−0.001***	−0.0008***						
UAI			0.0011***	0.0007**	0.0008***				0.001***	0.0006**				0.0007***	0.0008***	
LTO			0.0014***	0.0014***	0.0014***				0.0015***	0.0014***				0.0005***	0.0005**	
IND														−0.0006***	−0.0006***	
Urbanisation				0.0018***	0.002***	0.0042***				0.0018***	0.0057***					
Unemployment					−0.0048***	−0.0038***									−0.0016**	−0.0023***
R^2	0.2078	0.4554	0.6142	0.6645	0.6921	within = 0.433	0.3185	0.4719	0.6128	0.66	within = 0.2129	0.6887	0.8115	0.8453	0.8482	within = 0.3666
Adj R^2	0.2055	0.4523	0.6050	0.6548	0.6817	between = 0.4796	0.3166	0.4689	0.6035	0.6502	between = 0.4241	0.6879	0.8106	0.8420	0.8443	between = 0.826
Obs	355	355	215	215	215	overall = 0.4613	356	356	215	215	overall = 0.3996	431	431	240	240	overall = 0.7557

Source: Authors' processings.

all three corporate governance proxies (*BE* in models (1)–(6), *SAR* in models (7)–(11), and *Internet* in models (12)–(16)) have a direct relationship with *HCI*, boosting its level. The interpretations of the simple linear regressions in models (1), (7), and (12) are as follows: for a one-unit increase in *BE*, *HCI* is higher on average by 0.0815 (model (1)); for a one-unit increase in *SAR*, *HCI* is higher on average by 0.0805 (model (7)); and for a one-unit increase in *Internet*, *HCI* is higher on average by 0.0042 (model (12)); moreover, all the coefficients are significant at the 1% level. *PS* (as an indicator of public governance) has a positive impact on *HCI* (models (2)–(5) and models (8)–(10)). Similarly, *GE* (another proxy for public governance) positively influences *HCI* (models (13)–(16)), while no other government proxy is validated for a multiple regression model of *HCI* when *Internet* is considered to be the main exogenous variable. Of the cultural dimensions, *PD* exerts a negative impact on *HCI* (models (3)–(5) and models (9) and (10)), while *UAI* and *LTO* have a positive impact on *HCI* (models (3)–(5) and models (9) and (10)). *IND* has a negative impact on *HCI* (models (14) and (15)). *Urbanisation* has a direct influence on *HCI* (models (4)–(6) and models (10) and (11)), while *unemployment* has an indirect relationship with *HCI* (models (5) and (6) as well as models (15) and (16)).

Table 4 presents the estimation of the impact of the various corporate governance proxies on environmental sustainability (*EPI*). Models (1)–(4) determine the impact exerted by *BE* on *EPI*, models (5)–(9) determine the impact of *SAR* on *EPI*, and models (10)–(13) determine the impact of *Internet* on *EPI*. All the signs of the coefficients of these three corporate governance proxies are positive when significant, indicating a direct relationship: the better corporate governance, the higher is environmental performance through various mechanisms.

Starting with model (1), when *BE* increases by one unit, *EPI* is higher on average by 9.3194 units. The adjusted R^2 of 0.1866 proves the significance of the overall model, which increases to 0.5159 in model (3) as *VA* and all the cultural dimensions are added into the multiple regression model. The positive and significant coefficients of *BE* and *VA* are maintained in model (4) as well; when the estimation technique is changed to the FEM, the cultural influences are omitted because of multicollinearity.

Model (5) shows that when *SAR* increases by one unit, *EPI* is higher on average by 9.2235 units. This positive impact of *SAR* on *EPI* is maintained in models (6)–(8), which include the positive influence of *RQ* on *EPI* and the impact of *urbanisation* on *EPI* (positive in models (7)–(9)) and that of *unemployment* (positive in model (8) and negative in model (9)).

Internet exerts a direct influence on *EPI*. Throughout models (10)–(13), its coefficients are positive and significant at the 1% level, although more variables are added (multiple regression modelling in models (11)–(13) with *GE* and the cultural indicators). In model (10), for a one-unit increase in *Internet*, *EPI* is higher on average by 0.4267. *GE* exerts a positive and significant impact (models (11) and (12)). Moreover, *IDV*, *MAS*, and *UAI* have a positive impact on *EPI*, while *LTO* and *IND* have a negative impact (model (12)), all significant at the 1% level.

For the subsample estimations, we consider the same three proxies of corporate governance (*BE*, *SAR*, and *Internet*), but reduce the number of estimated models for each proxy to three: a simple regression model (models (1), (4), and (7); see Tables 2a–4a

Table 4. Regression results for sustainable development measured by *EPI* as a function of corporate governance measured by *CB, SAR, Internet* and other control variables.

EPI	Model 1 (OLS)	Model 2 (OLS)	Model 3 (OLS)	Model 4 **FEM** (p = 0.0454 Hausman)	Model 5 (OLS)	Model 6 (OLS)	Model 7 (OLS)	Model 8 (OLS)	Model 9 **FEM** (p = 0.0000 Hausman)	Model 10 (OLS)	Model 11 (OLS)	Model 12 (OLS)	Model 13 **FEM** (p = 0.0000 Hausman)
Constant	14.3057***	34.2407***	20.8103***	46.7666***	14.7043***	47.6779***	34.2976***	33.1974***	−81.8284***	36.814***	42.9086***	40.3325***	54.0435***
CB	9.3194***	4.8813***	6.6893***	2.9565***									
SAR					9.2235***	1.5829***	1.0286***	1.1287***	−0.083				
Internet										0.4267***	0.2736***	0.2481***	0.1452***
GE											6.0216***	8.59***	−1.072
RQ						11.5407***	8.1602***	8.1218***	−3.0605**				
VA		8.5832***	6.586***	5.3598**									
PD			−0.0569*										
IDV			0.0758***									0.0429***	
MAS			0.0363*									0.0872***	
UAI			0.099***									0.0745***	
LTO			0.0594**									−0.0617***	
IND			−0.0582**									−0.1005***	
Urbanisation							0.2764***	0.2739***	2.3707***				
Unemployment								0.0981**	−0.3009***				
R^2	0.1872	0.3794	0.5207	within = 0.0316	0.3194	0.5093	0.6019	0.6040	within = 0.2471	0.6024	0.6489	0.7385	within = 0.1133
Adj R^2	0.1866	0.3786	0.5159	between = 0.5511	0.3189	0.5086	0.6011	0.6030	between = 0.4715	0.6022	0.6486	0.7369	between = 0.8023
Obs	1491	1491	803	overall = 0.4665	1497	1497	1486	1481	overall = 0.4099	2510	2510	1159	overall = 0.5725

Source: Authors' processings.

and Tables 2b–4b), a multiple regression model built on the forward estimation technique to generate the complex model (models (2), (5), and (8); see Tables 2a–4a and Tables 2b–4b), and finally the FEM/REM estimation of that complex model (models (3), (6), and (9); see Tables 2a–4a and Tables 2b–4b).

Tables 2a, 3a, and 4a include the estimation of the sustainable development indicators as a function of corporate governance proxies plus the supplementary explanatory variables of public governance, culture, urbanisation, and unemployment. As shown in Table 2a, *BE*, *SAR*, and *Internet* exert a positive impact on *HDI* in high-income countries. These coefficients are lower than those for the similar regression for the full sample (see Table 2), suggesting that the impact of *BE* is lower for high-income countries than for the full sample. Thus, corporate governance seems to be a better tool for boosting social performance in low-income countries.

Table 2a shows the estimated impact of *BE* (models (1)–(3)), *SAR* (models (4)–(6)), and *Internet* (models (7)–(9)) on *HDI* as proxies of social development. In addition to their positive impact, these models validate *PS*, *VA*, and *GE* as *HDI* determinants, with a direct impact when significant. Of the cultural variables, *PD* exerts a negative impact on *HDI* (models (2) and (3) as well as models (8) and (9)), as does *LTO* and *IND* (model (8)). On the contrary, some cultural variables exert a positive impact on *HDI*: *IND* (models (8) and (9)) as well as *MAS* and *UAI* (model (8)). *Urbanisation* and *unemployment* are not significant in the multiple regression models.

Table 3a presents the estimated impact of *BE* (models (1)–(3)), *SAR* (models (4)–(6)), and *Internet* (models (7)–(9)) on *HCI* for the subsample of high-income countries. Besides the positive impact of corporate governance proxies (with the exception of model (6)), these models also validate *GE* and *PS* as *HCI* determinants, with a positive impact when significant (models (2), (3), and (5) for *PS* and model (8) for *GE*). Of the cultural variables, *PD* exerts a negative impact on *HCI* (models (2) and (3)), *IDV* exerts a positive impact on *HCI* (model (5)), and *LTO* has a positive influence on *HCI* (model (2)). *Urbanisation* is validated as an explanatory variable of *HCI* in model (8), with an indirect influence, while the estimated sign of the coefficient of *unemployment* is positive in the OLS multiple regression in model (8) and negative in the FEM (model (9)).

Table 4a estimates *BE* (models (1)–(3)), *SAR* (models (4)–(6)), and *Internet* (models (7)–(9)) as the determinants of *EPI* for the subsample of high-income countries. Their impact is positive and usually robust to the estimation technique (OLS versus FEM/REM). Of the public governance proxies, *GE* (models (8) and (9)) and *VA* (models (2) and (5)) are validated. The cultural variables that remain significant are *PD* with a negative impact (model (2)); *IDV* with a positive impact in models (5) and (8); *MAS* with a positive impact in models (2), (5), and (8); *UAI* with a negative impact in model (5); *LTO* with a positive impact in models (2) and (5), but a negative impact in model (8); and *IND* with a negative impact in model (8). *Unemployment* has a positive impact on *EPI* (models (2) and (5)), which becomes negative when the FEM technique is used to estimate the complex model (model (6)).

Tables 2b, 3b, and 4b show the regression results for sustainable development measured by *HDI*, *HCI*, and *EPI* as a function of corporate governance measured by

Table 2a. Regression results for sustainable development measured by *HDI* as a function of corporate governance measured by *CB, SAR, Internet* and other control variables, for high income countries (HI).

HDI	Model 1 (OLS)	Model 2 (OLS)	Model 3 **REM** (p = 0.7738 Hausman)	Model 4 (OLS)	Model 5 (OLS)	Model 6 **REM** (p = 0.8327 Hausman)	Model 7 (OLS)	Model 8 (OLS)	Model 9 **REM** (p = 0.6799 Hausman)
Constant	0.7422***	0.781***	0.8215***	0.7181***	0.5987***	0.8843***	0.7095***	0.6588***	0.701***
CB	0.0226***	0.0186**	0.0165***						
SAR				0.0256***	0.0358***	−0.0025			
Internet							0.0020***	0.0016***	0.0012***
GE								0.0217**	−0.0044
PS		0.0242***	0.0044						
VA					0.0207***	−0.011			
PD		−0.0021***	−0.0022***					−0.0011***	−0.0013
IDV								0.0014***	0.0015*
MAS								0.0002*	0.0001
UAI		0.0012***	0.0011*		0.0007***	0.00002		0.0012***	0.001
LTO								−0.0004*	−0.0001
IND								−0.0006**	−0.0001
R^2	0.0327	0.2909	within = 0.1487	0.0275	0.0693	within = 0.0119	0.1778	0.4004	within = 0.7265
Adj R^2	0.0309	0.2849	between = 0.2834	0.0257	0.0633	between = 0.0364	0.1767	0.3920	between = 0.3886
Obs	555	473	overall = 0.2813	550	473	overall = 0.0347	767	577	overall = 0.3842

Source: Authors' processings.

Table 3a. Regression results for sustainable development measured by *HCI* as a function of corporate governance measured by *CB, SAR, Internet* and other control variables, for high income countries.

HCI	Model 1 (OLS)	Model 2 (OLS)	Model 3 **REM** (p = 0.3172 Hausman)	Model 4 (OLS)	Model 5 (OLS)	Model 6 **FEM** (p = 0.0010 Hausman)	Model 7 (OLS)	Model 8 (OLS)	Model 9 **FEM** (p = 0.0000 Hausman)
Constant	0.4789***	0.519***	0.5534	0.466***	0.4941***	0.7664***	0.5333***	0.545***	0.6653***
CB	0.0459***	0.038***	0.0345***						
SAR				0.0469***	0.0264***	−0.0066			
Internet							0.0023***	0.0015***	0.0011***
GE								0.0917***	−0.0055
PS		0.0327***	0.0153*		0.0484***	−0.0021			
PD		−0.0006**	−0.0007*						
IDV					0.0011***				
LTO		0.0005**	0.0005						
Urbanisation								−0.0008***	−0.0001
Unemployment								0.003***	−0.0026***
R^2	0.1953	0.4153	within = 0.3475	0.1612	0.4063	within = 0.0082	0.1865	0.6592	within = 0.5860
Adj R^2	0.1898	0.3949	between = 0.4025	0.1554	0.3921	between = 0.2934	0.1821	0.6498	between = 0.0365
Obs	149	120	overall = 0.3987	148	129	overall = 0.2549	189	149	overall = 0.0624

Source: Authors' processings.

Table 4a. Regression results for sustainable development measured by *EPI* as a function of corporate governance measured by *CB, SAR, Internet* and other control variables, for high income countries.

EPI	Model 1 (OLS)	Model 2 (OLS)	Model 3 **REM** (p = 0.3368 Hausman)	Model 4 (OLS)	Model 5 (OLS)	Model 6 **FEM** (p = 0.0132 Hausman)	Model 7 (OLS)	Model 8 (OLS)	Model 9 **FEM** (p = 0.0002 Hausman)
Constant	49.4848***	41.606***	50.3443***	50.0232***	49.5994***	78.9976***	52.166***	55.2102***	69.0642***
CB	4.4452***	5.2495***	3.802***						
SAR				4.0402***	3.0508***	−1.1176			
Internet							0.2532***	0.1049***	0.109***
GE								6.8908***	−2.9467*
VA		2.7839***	3.4562**		3.4552***	3.6123			
PD		−0.0626***	−0.0557						
IDV					0.0564***			0.0633***	
MAS		0.0427***	0.0367		0.0314*			0.0619***	
UAI					−0.0445**				
LTO		0.037**	0.0418		0.0322*			−0.0378*	
IND								−0.0482*	
Unemployment		0.3325***	0.0314		0.2059**	−0.2666**			
R^2	0.1103	0.2891	within = 0.0419	0.0594	0.2585	within = 0.0155	0.2203	0.402	within = 0.0625
Adj R^2	0.1087	0.2790	between = 0.4094	0.0577	0.2462	between = 0.1257	0.2193	0.396	between = 0.1576
Obs	566	429	overall = 0.2722	561	429	overall = 0.0845	818	604	overall = 0.0062

Source: Authors' processings.

Table 2b. Regression results for sustainable development measured by *HDI* as a function of corporate governance measured by *CB, SAR, Internet* and other controls variables, for low income countries.

HDI	Model 1 (OLS)	Model 2 (OLS)	Model 3 **REM** (p = 0.8787 Hausman)	Model 4 (OLS)	Model 5 (OLS)	Model 6 **FEM** (p = 0.0000 Hausman)	Model 7 (OLS)	Model 8 (OLS)	Model 9 **FEM** (p = 0.0043 Hausman)
Constant	0.624***	0.3862***	0.4435***	0.5275***	0.4067***	0.2185***	0.5378***	0.417***	0.313***
CB	0.0056	0.0153*	0.0049**						
SAR				0.0291***	0.0124***	0.0023***			
Internet							0.0039***	0.0017***	0.0004***
GE								0.0399***	0.0371***
RQ					0.0187***	0.0347***			
VA		−0.0151*	−0.0038						
IDV		0.002***	0.0022*					0.0014***	
UAI		0.0021***	0.0021**					0.0005***	
LTO		0.0005*	0.0002						
Urbanisation					0.0038***	0.0085***		0.0027***	0.0064***
Unemployment								−0.0024***	−0.0005
R^2	0.0008	0.1661	within = 0.0121	0.0425	0.399	within = 0.5640	0.3896	0.5429	within = 0.6531
Adj R^2	0.0003	0.1566	between = 0.1585	0.0414	0.397	between = 0.3909	0.3893	0.5393	between = 0.4295
Obs	897	445	overall = 0.1595	909	909	overall = 0.3917	1650	761	overall = 0.4506

Source: Authors' processings.

Table 3b. Regression results for sustainable development measured by *HCI* as a function of corporate governance measured by *CB, SAR, Internet* and other control variables, for low income countries.

HCI	Model 1 (OLS)	Model 2 (OLS)	Model 3 **REM** (p = 0.5422 Hausman)	Model 4 (OLS)	Model 5 (OLS) Fara GOV!	Model 6 **FEM** (p = 0.0005 Hausman)	Model 7 (OLS)	Model 8 (OLS)	Model 9 **REM** (p = 0.0500 Hausman)
Constant	0.4214***	0.0752	0.1424	0.4162***	0.0139	0.6582***	0.3655***	0.3941***	0.427***
CB	0.0177*	0.0375**	0.0245**						
SAR				0.0205**	0.0451***	−0.0115			
Internet							0.0033***	0.0029***	0.001***
PS		0.0338**	0.0272**					0.0278**	0.0202*
PD		0.0015*	0.0015		0.0016**				
UAI		0.0026***	0.0024***		0.0025***			0.0012***	0.0017**
LTO		0.0013***	0.0013		0.0017***				
IND								−0.0006**	−0.0008
Unemployment		−0.0039**	−0.0048***		−0.004**	−0.0102***		−0.0046***	−0.003*
R^2	0.0132	0.3941	within = 0.2915	0.0292	0.3783	within = 0.2577	0.5601	0.6105	within = 0.3359
Adj R^2	0.0084	0.3528	between = 0.3436	0.0245	0.3434	between = 0.0051	0.5583	0.5889	between = 0.537
Obs	206	95	overall = 0.3834	208	95	overall = 0.0200	242	96	overall = 0.4978

Source: Authors' processings.

Table 4b. Regression results for sustainable development measured by *EPI* as a function of corporate governance measured by *CB, SAR, Internet* and other control variables, for the low income countries.

EPI	Model 1 (OLS)	Model 2 (OLS)	Model 3 **FEM** (p = 0.0221 Hausman)	Model 4 (OLS)	Model 5 (OLS)	Model 6 **FEM** (p = 0.0000 Hausman)	Model 7 (OLS)	Model 8 (OLS)	Model 9 **FEM** (p = 0.0000 Hausman)
Constant	31.5072***	0.3006	32.6751***	32.1625***	7.7723	47.9937***	37.1023***	30.5622***	42.059***
CB	3.8678***	4.5432***	2.6051***						
SAR				3.9231***	2.5888***	−0.5298			
Internet							0.3533***	0.2962***	0.1663***
PS								1.4781***	−1.2621
RQ		2.9604**	−6.3849**		2.659**	−9.1829***			
PD		0.1482***			0.2029***				
MAS		0.1422***			0.1329***			0.1379***	
UAI		0.1736***			0.1005***			0.0892***	
IND		−0.0527**						−0.0732***	
Unemployment		0.5803***	0.5854*		0.6298***	0.2316			
R^2	0.0397	0.2863	within = 0.0476	0.0772	0.2264	within = 0.0389	0.3624	0.4434	within = 0.1595
Adj R^2	0.0397	0.2730	between = 0.0107	0.0762	0.2179	between = 0.0553	0.3620	0.4383	between = 0.5555
Obs	925	385	overall = 0.0156	936	550	overall = 0.024	1692	555	overall = 0.3650

Source: Authors' processings.

BE, *SAR*, *Internet*, and the other control variables for the group of low-income countries. Table 2b shows the estimated impact of *BE* (models (1)–(3)), *SAR* (models (4)–(6)), and *Internet* (models (7)–(9)) on *HDI*; Table 3b estimates their impact on *HCI*; and Table 4b evaluates the corporate governance determinants of *EPI* for the subsample of 128 low-income countries.

In Table 2b, when significant, *BE*, *SAR*, and *Internet* are positively correlated with *HDI*. Of the public governance quality indicators, *VA* (model (2)), *RQ* (models (5) and (6)), and *GE* (models (8) and (9)) are found to be determinants of *HDI*. Of the cultural variables, in contrast to high-income countries, *IDV* exerts a positive impact on *HDI* (models (2), (3), and (8)); *UAI* also has a positive influence on *HDI* (models (2), (3), and (8)), as does *LTO* (model (2)). *Urbanisation* is directly related to *HDI* (models (5) and (6) as well as models (8) and (9)), while the coefficient of *unemployment* is negative and significant in model (8).

Table 3b shows the estimated impact of *BE*, *SAR*, and *Internet* on *HCI* for the subsample of low-income countries. The corporate governance proxies have a positive impact on *HCI*. These models also validate *PS* as an *HCI* determinant, with a positive impact (models (2) and (3) as well as models (8) and (9)), while none of the six governance proxies are validated in models (5) and (6). Of the cultural variables, *PD* exerts a positive impact on *HCI* (models (2) and (5)), as do *UAI* (models (2), (3), (5), (8), and (9)) and *LTO* (models (2) and (5)). *IND* has a negative impact in model (8). *Urbanisation* is not validated as an explanatory variable of *HCI*, while *unemployment* has a negative impact on *HCI* (models (2) and (3), (5) and (6), and (8) and (9)).

Table 4b estimates the impact of *BE* (models (1)–(3)), *SAR* (models (4)–(6)), and *Internet* (models (7)–(9)) on *EPI* for the subsample of low-income countries. Their impact is positive, and most of the coefficients are significant at the 1% level. Of the governance proxies, *RQ* (models (2) and (3) as well as models (5) and (6)) and *PS* (models (8) and (9)) provide the highest explanatory power, whereas the positive impact of *RQ* is not robust to the estimation technique. The positive impact of *PD*, as opposed to in high-income countries, is present in models (2) and (5). *MAS* and *UAI* both have a positive impact in models (2), (5), and (8), while the impact of *IND* is negative (models (2) and (8)). *Unemployment* has a positive impact on *EPI* (models (2), (3), and (5)).

4.2. Robustness checks

To check the robustness of our main results, we perform a battery of robustness tests. First, we use another proxy for our dependent variable of sustainable development, namely, the happiness index (*Happy*); the results are in Table 5. Second, we use three other proxies for our main independent variable of corporate governance, namely, women in top management positions (*FM*) and female ownership (*FO*), and measure digitalisation by technology adoption (*TA*), with the results shown in Table 6. Table A in Appendix A describes the variables. Our robustness checks mostly support the strength of our main results. Specifically, we find that an improved level of corporate governance, expressed as greater gender diversity, leads to a higher level of

Table 5. Regression results for sustainable development measured by *Happy* as a function of corporate governance measured by *CB, SAR, Internet* and other control variables.

Happy	Model 1 (OLS)	Model 2 (OLS)	Model 3 **FEM** (p = 0.0000 Hausman)	Model 4 (OLS)	Model 5 (OLS)	Model 6 **REM** (p = 0.0709 Hausman)	Model 7 (OLS)	Model 8 (OLS)	Model 9 **FEM** (p = 0.0000)
Constant	2.0553***	2.514***	6.4698***	2.6637***	3.8068***	3.9741***	4.398***	4.1092***	6.0405***
CB	0.7459***	0.4019***	−0.0285						
SAR				0.6176 ***	0.0735*	0.0464			
Internet							0.0245***	0.0115***	0.0017**
GE								0.4824***	0.3318***
PS		0.3894***	0.1709**						
RQ					0.3337***	0.275***			
PD									
IDV		0.0098***			0.0057***	0.0089***		0.0042***	
UAI		0.0037***						0.0028***	
LTO		0.0037**							
IND		0.0129***						0.0118***	
Urbanisation					0.0246***	0.0231***			
Unemployment		−0.0172***	−0.0691***		−0.0501***	−0.0567***		−0.0155***	−0.065***
R^2	0.2279	0.5504	within = 0.1392	0.3089	0.6393	within = 0.0951	0.4416	0.6547	within = 0.175
Adj R^2	0.2273	0.5461	between = 0.1060	0.3084	0.6373	between = 0.6847	0.4413	0.6526	between = 0.4082
Obs	1271	743	overall = 0.1094	1280	920	overall = 0.6347	1755	981	overall = 0.3896

Source: Authors' processings.

Table 6. Regression results for sustainable development measured by *HDI, HCI and EPI* as a function of corporate governance measured by *FO, FM* and *TA* and other control variables.

	Regression results for sustainable development measured by *HDI* as a function of corporate governance measured by *FM and TA* and other controls variables				Regression results for sustainable development measured by *HCI* as a function of corporate governance measured by *FO and TA* and other controls variables				Regression results for sustainable development measured by *EPI* as a function of corporate governance measured by *FM and TA* and other controls variables			
	Model 1 (OLS)	Model 2 (OLS)	Model 3 (OLS)	Model 4 (OLS)	Model 5 (OLS)	Model 6 (OLS)	Model 7 (OLS)	Model 8 (OLS)	Model 9 (OLS)	Model 10 (OLS)	Model 11 (OLS)	Model 12 (OLS)
Constant	0.6223***	0.3694***	0.1528***	0.4163***	0.4128***	0.1205	−0.0506	0.1038	45.5404***	41.0383***	−1.7706	18.7092***
FM /FO	0.0034***	0.0029***			0.0029**	0.0014*			0.2828***	0.2831**		
TA			0.1228***	0.0225**			0.1398***	0.0699***			12.8357***	4.7089***
PS						0.0697***		0.0568***				
RQ		0.0515***		0.0584***								
VA										9.2532***		5.8327***
IDV		0.0018***		0.0024***								0.0423*
MAS						0.0043***						
UAI		0.0016***		0 .0017***		0.0023***		0.0011***		0.123**		0.0471**
LTO								0.0013***				
IND												−0.1157***
Urbanisation		0.002***						0.0014***				0.3089***
Unemployment								−0.0048***				
R^2	0.0503	0.6141	0.3432	0.5444	0.1811	0.713	0.5036	0.7435	0.0374	0.3866	0.3399	0.6005
Adj R^2	0.0459	0.5976	0.3426	0.5419	0.1562	0.6556	0.5017	0.7331	0.0333	0.3719	0.3393	0.5964
Obs	220	123	1092	742	35	25	263	156	235	129	1123	592

Source: Authors' processings.

sustainable development. In addition, as the level of technology adoption increases, the level of sustainable development rises.

5. Discussions

Our research examines whether higher corporate governance increases sustainable development using a variety of proxy indicators. For the full sample, about 9.6% of the variation in *HDI* is explained by board efficacy, whereas 25.3% is explained by the quality of audits and reports. By contrast, board efficacy and the quality of audits and reports explain relatively more of the variation in *HCI* (20.6% and 31.7%, respectively). *EPI* is also positively and significantly impacted by board efficacy and the quality of audits and reports (18.66% and 31.89%, respectively). Among the three main proxies of corporate governance (*BE*, *SAR*, and *Internet*), *Internet* has the largest impact on sustainable development, in line with the results of Dienes et al. (2016) and De Luca (2020), who found a positive impact of corporate governance on sustainable development. More precisely, they show that some elements of corporate governance quality, such as the structure of property and structure and size of corporate governance, along with other economic and institutional factors, represent the foundation for sustainable development.

The results differ when analyzing the two subgroups of countries classified according to their level of development,. We estimate higher regression coefficients of *BE*, *SAR*, and *Internet* for the regressions of sustainable development conducted in low-income countries than in high-income countries. Thus, the intensity of the way in which high-quality corporate governance impacts sustainable development is higher in low-income countries than in high-income countries. A one-unit increase in corporate governance determines higher increases in the level of sustainable development in low-income countries than in high-income countries. In other words, the marginal effects of corporate governance on sustainable development are higher in low-income countries.

Regarding the control variables, public governance exerts a significant positive influence on sustainable development in all countries irrespective of their development level, meaning that increasing the quality of public governance provides higher-quality public services in the form of health care, education, and security services. These results are in line with those of Hoinaru et al. (2020), Absalyamova et al. (2016), and Forson et al. (2017), who also found that high-quality public governance influences societal development, in terms of both the economic and the sustainable dimensions.

Our findings also indicate that culture influences sustainable development, in line with earlier studies (UNESCO, 2012). We find that lower power distance, higher individualism, higher masculinity, higher uncertainty avoidance, higher long-term orientation, and lower restraint increase sustainable development. The estimated coefficients of Hofstede's cultural dimensions are typically higher in low-income countries than in high-income countries, suggesting that culture exerts a greater influence on sustainable development in low-income countries. In addition, the influence of power distance on sustainable development differs between the two groups of

countries, with positive (negative) coefficients for low-income (high-income) countries. High power distance, which generally characterises low-income countries (see Table 1), means that there is greater acceptance that the less powerful members of society must accept and expect power to be distributed unequally. This high degree of accepting inequality could be a channel for obtaining high short-term benefits in the form of bribes for contracting or avoiding paying taxes. Thus, higher power distance increases sustainable development in low-income countries. Indeed, previous studies support the 'grease the wheels' theory by documenting a positive effect of corruption and the shadow economy on the economic and sustainable development of countries (Hoinaru et al., 2020; Zaman & Goschin, 2015), especially low-income countries.

Urbanisation has a positive influence on sustainable development. This result is in line with the studies of Satterthwaite (2008), Rogers et al. (2012), and Zeng et al. (2016), who found that urbanisation is crucial to regional and global sustainability. Indeed, our results also concur with those of the United Nations (2014) and Picatoste and Rodriguez-Crespo (2020), who showed that unemployment, especially among young men, is a major threat to sustainable development. Similarly, we find that higher unemployment decreases sustainable development in the low-income subsample, while mixed results are obtained for the full sample.

6. Conclusions

This study investigated the influence of corporate governance on sustainable development using a panel linear regression model applied to a sample of 185 countries over 2005–2020. Separate analyses were also conducted for high- and low-income countries. Our findings highlight the positive influence of corporate governance on sustainable development measured by the HDI, HCI, and EPI. In addition, we find a higher positive and marginal effect of the influence of corporate governance on sustainable development for low-income countries than for high-income countries.

Further, we find that high-quality public governance, a high level of urbanisation, and low unemployment increase sustainable development. Culture impacts the sustainable development of a society markedly for both high- and low-income countries, but this effect is particularly high in the latter. The robustness checks performed using the supplementary variables of the happiness index, women in top management positions, and technology adoption verify our results.

Our results have both theoretical and practical implications. Theoretically, our finding of a direct relationship between corporate governance and sustainable development may create new research directions. The practical implications of the findings include showing that the quality of corporate governance directly affects sustainable development, which could help policymakers better manage this relationship. Thus, adopting more best practices in corporate governance raises the sustainable development in a society. Managers and policymakers should be interested in the continuous supervision and boosting of this relationship. Corporate governance practices may therefore be used as leverage to boost sustainable development, which is desirable. The continuous development of corporate governance proxies such as those tested in

our large sample increases human development and raises environmental performance.

The limitations of this study may include the ways of measuring the level of corporate governance using macroeconomic proxies. Future studies should adopt a microeconomic view by analyzing this relationship in a sample of companies from different countries. Furthermore, a multivariate data analysis approach could be adopted, including using lagged variables and interaction terms.

Funding

This work was supported by a grant of the Romanian Ministry of Education and Research, CNCS - UEFISCDI, project number PN-III-P4-ID-PCE-2020-2174, within PNCDI III.

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