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Article

Democracy, governance, and environmental policy effectiveness: a cross-country analysis with Sustainable Governance Indicators

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Abstract. The effectiveness of environmental policies has been extensively studied, often focusing solely on environmental degradation indicators. However, successful environmental policies have broader societal impacts. This study addresses this limitation by utilizing the Sustainable Governance Indicators (SGIs) for a more comprehensive measurement of environmental policy effectiveness. Analyzing 41 countries with data from 2014-2021, a fixed-effects model was employed to assess the impact of democratic and good governance practices on environmental policy success. The findings reveal that democracy and government quality are crucial determinants of effective environmental policies, highlighting the need for improved institutional structures. The robustness of these results is confirmed using alternative democracy and governance indicators. Additionally, the study identifies education, urbanization, and population density as significant factors influencing environmental policy performance.

Keywords: environmental policy effectiveness; democracy; Sustainable Governance Indicators; education; urbanization.
JEL classification: O13; Q58; P18; I29; D73

1. Introduction

Production, employment, food security, and environmental sustainability are at risk due to degraded ecosystems, rising biodiversity losses, and climate catastrophe. These consequences were intensified even further by the Covid-19 outbreak (FAO, 2022a). The efficiency of production factors decreases as a result of climate change, which also limits access to factor utilization. It has a major negative economic impact, particularly in climate-sensitive industries, including forestry, agriculture, tourism, and fisheries (UNCTAD, 2021). Given that the tourism industry contributes 6.1% of the global GDP and the agricultural sector 4% (WTCC, 2022; FAO, 2022b), it is crucial to preserve these industries from environmental deterioration. If adequate policy measures are not put in place, the economic and social costs of environmental deterioration may become much worse than COVID-19 in the future. In addition, environmental problems that feed off one another, such as climate change, biodiversity loss, air pollution, and water pollution, may render people more susceptible to

epidemics in the future (OECD, 2020). However, even legally binding policy targets set out in the Convention on Biological Diversity and the Paris Agreement, which include temperature limits and greenhouse gas emission reductions, have still not been achieved (Ekardt, Bärenwaldt & Heyl, 2022; Ekardt et al. 2023).

Although the Environmental Kuznets Curve characterizes the relationship between aggregate income and environmental degradation by the level of welfare, increased welfare may also lead to further degradation due to the rebound effect (Stern, 2020). To manage environmental quality, governments can use a variety of policy measures, including taxes, subsidies, rationing, prohibition, technical standards, public production, and moral persuasion (Oates & Baumol, 1975). Performance on behalf of institutions and governments determines how effective these policy instruments are. In the presence of institutional and political flaws, both a government failure and a market failure may occur (Hepburn, 2010). However, political, institutional, and demographic variables do influence the nature and course of this connection. For instance, according to Deacon and Norman (2006), the link between pollution and income varies by nation. The effects of environmental deterioration brought on by economic growth will lessen as environmental regulations and institutions become more effective. Effective measures, according to Panayotou (1997), make the Environmental Kuznets Curve flatter and lower the environmental costs of growth. A positive linear link between environmental degradation and economic growth is predicted in the absence of appropriate policies (Nicolli et al. 2012). Additionally, some elements, such as climate conditions that have an impact on environmental quality and natural resources, are out of the political process's control (Pellegrini & Gerlagh, 2006). Therefore, it is important to be interested in how well government programs are working.

In this paper, we show how democracy and the quality of governments affect the success of environmental policies. The study's use of distinctive environmental performance indicators sets it apart from previous research in the field. Environmental Policy Stringency Index and Environmental Performance Index have been employed as performance indicators of environmental policies in several research works (Damania, Fredriksson & List, 2003; Pellegrini & Gerlagh, 2009; Mavragani, Nikolaou & Tsagarakis, 2016). Studies have also linked environmental outcomes, such as greenhouse gas emissions or ecological footprint, to the success of policies (Panayotou, 1997; Torras & Boyce, 1998; Easty & Porter, 2005; Ward, 2008). Instead, we make use of the Bertelsmann Stiftung's Sustainable Governance Indicators. The data set already covers widely referenced global environmental agreements like Kyoto as well as policy targets like CO2 emissions, waste generation, footprints, etc. We might say that the index is more thorough than others in this regard. The remainder of the essay is structured as follows: The literature on environmental policy effectiveness and its institutional determinants is reviewed in Section 2. The model, data, and approach are described in Section 3. The empirical findings and discussion in Section 4 are followed by the conclusion in Section 5.

2. Literature review

The economic analysis of environmental policies is based on the idea that economic activities create externalities by damaging the environment. The market mechanism fails to internalize such externalities because of the free-rider problem and transaction costs, therefore public intervention is required (Pigou, 1932; Coase, 1960). For a long time, the effectiveness of environmental policies has been discussed using a Pigouvian framework. According to Pigou (1932), the government should impose taxes on economic activities to equal the marginal damage of pollution. However, the Pigouvian tax is not sufficient for environmental quality and is usually not implemented correctly (Fullerton, Hong and Metcalf, 2000). In addition to the Pigouvian approach, socio-economic, political, and institutional factors have recently been widely discussed among economists (Carraro & Metcalf, 2000; Esty & Porter, 2005).

Environmental protection is considered as a public good (Kirchgässner & Schneider, 2003). The provision of public goods is closely related to the level of democracy. In autocracies, the state budget is allocated through transfers to politically influential groups. However, in democratic regimes, a wide range of people need to be satisfied. Therefore, governments spend on public goods where economies of scale occur. According to Deacon (2009), in democracies, the level of public policies on environmental protection (e.g. clean water, sanitation, pollution control) is greater than in non-democratic ones. In democratic systems, voters who want to protect the environment and are against the waste of natural resources, pressure the government to be more accountable. Freedom of expression further increases this pressure. Democracy has often been associated with the free flow of information about environmental degradation and the ability of citizens to resist it (Pellegrini and Gerlagh, 2006). Governments in democratic states participate more in international collaborations and agreements on environmental protection than non-democratic states (Congleton, 1992). As the level of democracy increases, people are more concerned with the burden on future generations (Fiorino, 2011).

Quality of governance improves the performance of governments and makes policy outcomes effective. Good governance better responds to voter demands (Fiorino, 2011). In the political economy framework, environmental policies are important in that they could represent many government decision-making processes. Because environmental policies are usually determined by economic and political self-interest rather than public interest (Aidt, 1998; Fredriksson & Svensson, 2002). Corruption causes environmental policies to differ in their legal form and practice. When bureaucrats are corrupt, non-compliance with policy rules is not punished. Thus, the stringency of government policies is reduced (Damania, 2002). However, public support for environmental policies increases when the citizens believe that government is effective and fair (Huber, Wicki & Bernauer, 2020). Thus, voluntary compliance with environmental policies increases. Harring (2014) concluded that corruption reduces the effectiveness of environmental policies because of the unwillingness to comply with policy decisions. In addition, the effect of a rise in the demand for environmental policy also depends on corruption (Damania, Fredriksson & List, 2003). According to Damania (2002), environmental regulations can lead to more corruption in countries that already have corruption problems due to environmental taxation. Governments differ from each other in the effectiveness of public policies (Tanzi, 1998; Afonso, Shuknecht & Tanzi, 2005; Afonso,

Shuknecht & Tanzi, 2010; Adam, Delis & Kammas, 2014). According to Afonso, Shuknecht & Tanzi (2005), Rajkumar & Swaroop (2008), Hwang & Akdede (2011), as well as traditional indicators (such as GDP growth, inflation, unemployment, etc.) education, rule of law, bureaucracy, corruption and demography are important determinants on the overall performance of the public sector.

It has been discussed for a long time which of the policy instruments for environmental protection is effective. However, a consensus has not been reached on the factors that determine the effectiveness of environmental policies (Steinebach, 2022). Most of the studies focus on certain policy tools or environmental outcomes, while several others emphasize environmental policy performance. Morley (2012) examined policy performance through the effectiveness of environmental taxes using a dynamic panel for the EU countries. Nerudova and Solilova (2016) compared the relative effectiveness of environmental taxes and public expenditure on environmental protection using the Vector Error Correction Model.

There is extensive literature on which the environmental policy goal is to reduce greenhouse gas emissions and energy use (Panayotou, 1997; Torras & Boyce, 1998; Easty & Porter, 2005; Wawrzyniak & Doryń, 2020; Acheampong, Dzator & Savage, 2021). Ward (2008) also revealed the effect of democracy based on ecological footprint as a measure of policy success. Nicolli, Mazzanti, and Iafolla (2012) analyzed the socio-economic and political factors that determine the effectiveness of environmental policies through waste dynamics for the EU15 in the SURE model. According to the study, population density has a positive impact on waste generation and a negative impact on landfilled waste, depending on whether economies of scale arise. On the other hand, Neumayer, Gates and Gleditsch (2002) argued that environmental outcomes such as the amount of emission and soil erosion may occur depending on the type of energy used and climate conditions. Both are hard for institutional and political actors to control. This is why, in many studies, the effect of institutional factors such as democracy on emissions is not robust. Instead of environmental outcomes, Neumayer, Gates and Gleditsch (2002) used environmental commitments, including international environmental agreements, memberships in environmental organizations, the number of protected area statuses, etc. According to the study, the impact of democracy on environmental commitments is positive, significant, and robust. Bättig and Bernauer (2009) discussed policy effectiveness by using an index consisting of climate change policy and emissions in a cross-section of data from 185 countries. While the impact of democracy on climate change policy is positive, its impact on environmental outcomes is uncertain.

Damania, Fredriksson and List (2003) examined the effectiveness of policies in the context of environmental policy stringency using panel data for developed and developing countries by developing a political economy model. The study indicates that corruption reduces the stringency of policies. Pellegrini and Gerlagh (2006) also used the environmental policy stringency index to point out the effects of socio-economic and institutional factors. The stringency increases at high levels of democracy and decreases at high levels of corruption.

Kelleher, Kim and Chang (2009), Mukherjee and Chakraborty (2013), Mavragani, Nikolaou and Tsagarakis (2016), Chang and Hao (2017) used the Environmental Performance Index (EPI) developed by Yale University to examine the effects of institutions and government quality. Control of corruption improves the environmental performance in Kelleher, Kim, and Chang (2009); democracy, control of corruption and education are positively related to the EPI in Mukherjee and

Chakraborty (2013); quality of government and control of corruption have a positive effect on the EPI in Mavragani, Nikolaou and Tsagarakis (2016); government quality causes better environmental performance in Chang and Hao (2017).

Adam and Tsarsitalidou (2019) evaluated the environmental policy effectiveness of 39 countries with the DEA method. The study indicates that the effectiveness of environmental policies is affected by economic, demographic, and political factors. According to the regression results, population density and corruption have no effect on policy effectiveness, while urbanization has a positive effect. The effect of democracy varies depending on the income level.

The first gap identified in the literature is that there is no consensus on the effects of democracy and governance indicators on the effectiveness of environmental policies. While some studies have revealed a strong positive relationship, some have concluded that this relationship is not certain, while others have concluded that it differs depending on the income level of the countries. It is seen that the main difference in the empirical literature is among the methods of measuring effectiveness, which means the degree of achieving certain policy goals (Ekardt, 2022). In many studies, the effectiveness of environmental policies has been directly measured by indicators of environmental degradation. However, it is debatable whether CO2 emission or ecological footprint alone can be an indicator of environmental policy success. Reducing CO2 emissions is part of environmental policy objectives, but broader indicators should be used to measure this success. For this purpose, some studies have used the Environmental Policy Stringency Index published by OECD as an indicator of environmental policy effectiveness. This index considers the strength of market-based, non-market instruments and government support when measuring how strictly environmental policy instruments are implemented. However, strict implementation of environmental policies does not guarantee that these policies will be effective in reducing environmental degradation. There is also no indication of the outputs of environmental policies in the calculation of the index. In several studies, the Environmental Performance Index published by Yale University and developed by Wolf et al. (2022) is used as an indicator of environmental policy effectiveness. Although the sub-components of this index are published in the form of time series, it is not appropriate to assemble them in the form of time series or panel data. This is because the dataset and methodology vary between different versions of EPI (Wolf et al., 2022). Sustainable Governance Indicators offer a broader measure than indicators of environmental degradation such as CO2 emissions. They are also appropriate for comparison across countries in the context of environmental policy effectiveness. In addition to the empirical studies in the literature, this study investigates the role of democracy and government quality in the performance of environmental policies utilizing the Sustainable Governance Indicators dataset published by Bertelsmann Stiftung (2023).

3. Model, data, and methodology

As a measure of the effectiveness of environmental policies, the Environmental Policy Performance Index of the Sustainable Governance Indicators published by Bertelsmann Stiftung (Schiller, Hellmann & Paulini, 2022) was used. This indicator is more comprehensive than environmental

degradation measures such as CO2 emission and ecological footprint, which are frequently used in the literature. The indicator has two main sub-components. These are environmental policy and global environmental protection. 50% of the environmental policy sub-component includes expert assessments of environmental policy effectiveness. The remaining 50% covers energy productivity, CO2 emission, particulate matter, biocapacity, waste generation, material recycling, biodiversity, renewable energy, and material footprint indicators. 50% of the Global Environmental Protection subcomponent also includes expert assessments. 25% includes participation in multilateral environmental agreements and 25% success in meeting the Kyoto targets.

In the study, SGI robust democracy and good governance indicators published by Bertelsmann Stiftung were used as proxies of democracy and government quality (*dem* and *gov* in equations). The composition of the robust democracy indicator consists of electoral processes, access to information, civil rights and political liberties, and the rule of law sub-components. Good governance indicator considers government quality in the context of accountability and executive capacity (Schiller, Hellmann & Paulini, 2022).

Real GDP per capita and its square, global energy price index, education, urbanization, and population density variables were used as control variables. In the literature, these variables have been associated with the success of environmental policies. There is extensive literature that focuses on the relationship between national income and environmental quality based on the Environmental Kuznets Curve (Grossman and Krueger, 1995; Holtz-Eakin and Selden, 1995; Cole, Rayner, and Bates, 2001; Stern and Common, 2001). According to the hypothesis, environmental degradation is temporary, and the problem can be solved with sufficient growth rate and technological progress, although the threshold level of national income that improves environmental conditions is not fully clear (Bimonte, 2002). The energy price index is also used as a control variable. It is expected that as non-renewable energy prices increase, the tendency towards alternative energy sources will increase. In this respect, high energy prices can contribute to the reduction of CO2 emissions. (Li, Fang & He, 2020).

There are important demographic factors that affect the success of environmental policies. The first is education. Educated people have a high perception of environmental problems. They demand policies that increase environmental quality and are more participatory and organized. Rivera-Batiz (2002) empirically confirmed that as the level of education increases, democratic participation will increase, and individuals will be more demanding of effective policies. In addition, since the compliance of educated people with environmental regulations is high, the effectiveness of the policies increases (Bimonte, 2002; Farzin & Bond, 2006). On the other hand, having a majority of educated people may not always guarantee a smaller ecological footprint since it is highly correlated with economic development (Heyl & Ekardt, 2022). An increase in urban population may lead to higher levels of energy consumption and, therefore, higher emissions. However, a few studies addressed the possible positive effects on environmental policy effectiveness. Urbanization reduces the cost of transportation and transactions required for people to come together and organize. This may lead to an increase in environmental activism. Rising activism increases politicians' awareness of environmental degradation (Farzin & Bond, 2006). Urbanization also creates economies of scale, for example in the provision of sanitation facilities to reduce environmental pollution (Torras & Boyce, 1998). Population density is also associated with economies of scale. As population density

increases, economies of scale can occur through urbanization (Mazzanti & Zoboli, 2009). Economies of scale offset the pollution-increasing effect of population density. The social costs of environmental degradation are high in densely populated areas (Nicolli, Mazzanti & Iafolla, 2012). Therefore, the government is more sensitive to environmental problems in such areas.
The models established following the related literature are as follows.

$$epp_{it}=\beta_0+\beta_1 gdp_{it}+\beta_2 gdp_{it}^2+\beta_3 ep_{it}+\beta_4 edu_{it}+\beta_5 urb_{it}+\beta_6 pd_{it}+\beta_7 dem_{it}+\mu_{it} \quad [1]$$

$$epp_{it}=\theta_0+\theta_1 gdp_{it}+\theta_2 gdp_{it}^2+\theta_3 ep_{it}+\theta_4 edu_{it}+\theta_5 urb_{it}+\theta_6 pd_{it}+\theta_7 gov_{it}+\varepsilon_{it} \quad [2]$$

In equations 1 and 2, *epp* refers to the environmental policy performance index. Democracy and good governance indicators are *dem* and *gov* respectively. Since these variables are highly correlated, models were set up separately. *gdp* is real GDP per capita, *ep* is energy prices, *edu* is expected years of schooling as a proxy of education, *urb* is urban population, and *pd* is population density. Variable definitions and sources are presented in Table 1.

Table 1. Variable definitions and sources

Variable	Definition	Source
epp	Environmental Policy Performance Index	Bertelsmann Stiftung (2023)
gdp	Real GDP per capita (Constant 2015, US $)	World Bank (2023a)
ep	Energy price index (2016=100). It is the average of global oil, coal, and natural gas price indices.	IMF (2023)
edu	Expected years of schooling for children.	UNDP (2023)
urb	Urban population (% of the total population)	World Bank (2023a)
pd	Population density (people per sq. km of land area)	World Bank (2023a)
dem	Quality of democracy	Bertelsmann Stiftung (2023)
gov	Good governance	Bertelsmann Stiftung (2023)

The data set includes data from 41 countries. The availability of data sets was considered as the selection criteria. Table 2 presents a list of the countries.

Table 2. Countries included in the sample

Australia	Czechia	Iceland	Malta	Slovakia	United States
Austria	Denmark	Ireland	Mexico	Slovenia	
Belgium	Estonia	Israil	Netherlands	South Korea	
Bulgaria	Finland	Italy	New Zealand	Spain	
Canada	France	Japan	Norway	Sweden	
Chile	Germany	Latvia	Poland	Switzerland	
Croatia	Greece	Lithuania	Portugal	Türkiye	
Cyprus	Hungary	Luxemburg	Romania	United Kingdom	

Table 3. Descriptive statistics

	epp	gdp	ep	edu	urb	pd	dem	gov
Mean	5.958	35278.66	133.16	16.860	76.878	168.06	7.131	6.589
Median	5.894	31372.5	123.30	16.418	79.577	104.74	7.30	6.592
Max	8.796	108351	212.32	23.089	98.079	1610.4	9.292	8.925
Min	3.091	6796.69	91.70	13.897	53.557	3.056	2.692	3.607
SD	1.086	22195.13	37.757	1.767	12.150	245.74	1.355	1.112
Skewness	0.290	1.071	1.059	0.732	-0.340	3.864	-0.731	0.050
Kurtosis	2.970	4.049	3.099	3.413	2.143	20.55	3.436	2.715
N	287	287	287	287	287	287	287	287

The time dimension of the panel covers the period 2014-2020. Descriptive statistics for the data set are presented in Table 3. All variables are turned into logarithmic form. Since the data set has a low time dimension, a choice was made between fixed effects and random effects estimators. According to the Hausman test results, the null of random effects was rejected in all estimations. In addition, to see the sensitivity of the results, estimates were made for the two sub-components of the environmental policy performance index. This is also important in terms of determining whether the effects on environmental policy performance occur on energy and environmental indicators or the adaptation process to global environmental policies.

4. Empirical results

The fixed effects estimation results for models 1 and 2 are presented in Table 4. According to the results, the effects of democracy and governance are positive and significant at 1%. A 1% improvement in democracy leads to a 0.38% increase in environmental policy performance. The effect of a 1% improvement in good governance is 0.47%. There is an inverted U relationship between GDP per capita and environmental policy performance. This result is the opposite of that predicted by the Environmental Kuznets Curve hypothesis. For this hypothesis to be valid, the opposite of the relationship (U-shaped) between GDP and environmental degradation would have to be seen in environmental policy performance.

Estimation results show that demographic variables such as education, urbanization, and population density have a positive effect on environmental policy. In model 1, a 1% increase in expected years of schooling leads to a 0.51% increase in policy performance, while in model 2, this effect is 0.34%. The effects of urbanization and population density are also positive and statistically significant for both models. In model 1, the effect of a 1% increase in urban population is 1.49%, while it is 1.14% in model 2. A 1% increase in population density leads to about 0.50% increase in environmental policy performance. The effect of the energy price index is insignificant in both models.

Table 4. Fixed Effects Estimation Results

		EPP
gdp	2.6737***	1.6384*
	(2.79)	(1.77)
gdp^2	-0.1402***	-0.0939**
	(-2.96)	(-2.04)
ep	0.0004	0.0002
	(0.03)	(0.02)
edu	0.5109***	0.3458*
	(2.89)	(1.93)
urb	1.4919***	1.1396**
	(2.64)	(2.01)
pd	0.5554***	0.5040***
	(3.35)	(3.03)
dem	0.3806***	
	(7.06)	
gov		0.4709***
		(6.70)
constant	-21.934***	-14.121***
	(-4.03)	(-2.75)
F	12.30***	11.50
R^2_{adj}	0.933	0.932
Hausman	36.21***	32.51***
NxT	287	287

***, **, and * indicate the rejection of null hypothesis at 1%, 5%, and 10% respectively. t statistics are given in parentheses.

Table 5 presents the estimation results obtained for the environmental sub-component of environmental policy performance. The effects of democracy and good governance variables are positive for both models and are significant at 1%. A 1% improvement in democratic institutions leads to an increase of 0.32% in the environment sub-component. The effect of a 1% increase in good governance is 0.33%. When the control variables are examined, it is seen that the Kuznets curve hypothesis is still invalid. While the effect of the increase in real GDP is positive, this effect turns negative after the threshold value. On the other hand, the signs of demographic factors are positive and statistically significant. Education, urbanization, and population density have positive effects on the environmental sub-component of the environmental policy performance index. Energy prices do not have a statistically significant effect in this model either.

The results regarding the impact of democracy and good governance in achieving global environmental policy goals are shown in Table 6. According to the results, the effect of democracy is positive and significant at the 1% level. A 1% increase in the democracy index improves compliance with global environmental policy targets by 0.46%. The effect of governance quality is similarly positive and significant at the 1% level. A 1% increase in this indicator creates a 0.66% increase in the dependent variable. The effect of GDP again shows that the EKC hypothesis is invalid. Considering the impact of demographic indicators, it is seen that the effects of education, urbanization and population density indicators are positive and significant. While education and urbanization are positive and significant at the 1% level, population density is significant at the level of 5% in the first model and 10% in the second model. The impact of the energy price index is insignificant.

Table 5. Fixed Effects Estimation Results for $EPP_{environment}$

		$\boldsymbol{EPP_{environment}}$
gdp	2.4790***	1.4008*
	(2.66)	(1.80)
$\boldsymbol{gdp^2}$	-0.1266***	-0.0775**
	(-2.75)	(-2.02)
ep	-0.0170	-0.0174
	(-1.45)	(-1.41)
edu	0.6332***	0.5088***
	(3.68)	(3.23)
urb	2.1832***	1.8721***
	(3.97)	(2.78)
pd	0.3924**	0.3266*
	(2.43)	(1.72)
dem	0.3244***	
	(6.48)	
gov		0.3319***
		(3.53)
constant	-23.816***	-15.943***
	(-4.49)	(-3.60)
F	13.19***	11.95***
$\boldsymbol{R^2_{adj}}$	0.92	0.92
Hausman	48.42***	43.29***
NxT	287	287

***, **, and * indicate the rejection of null hypothesis at 1%, 5%, and 10% respectively. t statistics are given in parentheses.

Table 6. Fixed Effects Estimation Results for EPP_{global}

		$\boldsymbol{EPP_{global}}$
gdp	3.4852***	2.5083*
	(2.49)	(1.82)
$\boldsymbol{gdp^2}$	-0.1840***	-0.1417**
	(-2.62)	(-2.04)
ep	0.1645	0.0162
	(0.94)	(0.95)
edu	0.4907**	0.2714
	(2.32)	(1.16)
urb	0.7149	0.3076
	(1.10)	(0.43)
pd	0.7413***	0.7092***
	(3.21)	(2.98)
dem	0.4553***	
	(4.48)	
gov		0.6563***
		(4.32)
constant	-23.219***	-15.498**
	(-3.16)	(-2.24)
F	7.57***	9.37***
$\boldsymbol{R^2_{adj}}$	0.90	0.90
Hausman	18.71***	17.69**
NxT	287	287

***, **, and * indicate the rejection of null hypothesis at 1%, 5%, and 10% respectively. t statistics are given in parentheses.

Different indices are estimated to test whether the results on democracy and governance quality are robust. The political rights index published by Freedom House is used as an indicator of the quality of democracy. The political rights index measures the quality of the electoral process, political pluralism and participation, and the functioning of the government (Freedom House, 2023). Another index used as an indicator of democracy is the Voice and Accountability Index of Worldwide Governance Indicators published by the World Bank. This index measures the extent to which citizens can participate in elections, freedom of association, freedom of expression and freedom of the media (World Bank, 2023b). Higher levels of indexes indicate higher levels of democracy. Two different indicators were used as measures of governance quality. The first is the arithmetic average of Government Effectiveness, Rule of Law, and Control of Corruption indices of the World Bank's World Governance Indicators. These indices, which took values between -2.5 and +2.5, were normalized between 0-1 and their natural logarithms were taken. The second governance indicator is the arithmetic average of the Corruption, Bureaucracy Quality, and Law and Order indices obtained from the International Country Risk Guide database published by The PRS Group (2023). The index value was normalized between 0-1 and used in logarithmic form.

Robustness check results are shown in Table 7. The effect of democracy indicators is positive and significant at the 1% level. Similar results were obtained for the governance quality indices. The effect of the ICRG index is significant at the 5% level, while the WGI index is significant at the 1% level. As a result, it is seen that the quality of democracy and governance is strictly robust in terms of environmental policy success. While the effect of GDP per capita confirms the results in the opposite direction of the EKC hypothesis in the estimations made with democracy indices, it becomes insignificant in estimations made with governance quality indices. Therefore, it is seen that the inverted-U-shaped relationship between income level and the effectiveness of environmental policies is not robust.

Estimates of control variables show that the positive effect of education on the effectiveness of environmental policies is robust. The coefficient of education for all models is positive and significant at the 1% level. The effect of population density is also seen to be positive and significant in all models. This result indicates that economies of scale are strongly effective in the success of environmental policies. While the effect of urbanization is positive and significant in the estimations made with the democracy indices and the WGI governance index, it is statistically insignificant in the estimation made only with the ICRG index. There is no significant relationship between energy prices and the success of environmental policies in all models estimated.

Table 7. Robustness check

			EPP	
gdp	1.9733**	1.9288*	0.6350	0.6884
	(2.06)	(1.95)	(0.64)	(0.70)
gdp^2	-0.1090**	-0.1053**	-0.0444	-0.0459
	(-2.30)	(-2.16)	(-0.90)	(-0.94)
ep	0.1033	0.0057	0.0042	-0.0033
	(0.83)	(0.45)	(0.31)	(-0.26)
edu	0.5247***	0.4821***	0.5637***	0.5716***
	(2.90)	(2.61)	(2.83)	(2.91)
urb	1.8338***	1.3299**	0.7834	1.0350*
	(3.13)	(2.26)	(1.25)	(1.70)
pd	0.6952***	0.5976***	0.4802**	0.5488***
	(3.96)	(3.38)	(2.56)	(2.87)
dem_{fh}	0.4555***			
	(6.14)			
dem_{wgi}		0.7414***		
		(5.17)		
gov_{icrg}			0.3259**	
			(2.12)	
gov_{wgi}				0.4550***
				(2.69)
constant	-21.1146***	-16.3993***	-7.0672	-8.7751
	(-3.75)	(-2.96)	(-1.30)	(-1.61)
F	10.36***	8.58***	5.01***	5.45***
R^2_{adj}	0.93	0.93	0.92	0.92

***, **, and * indicate the rejection of null hypothesis at 1%, 5%, and 10% respectively. t statistics are given in parentheses.

5. Discussion

The study demonstrates that democracy and government quality indicators have a positive effect on environmental policy performance. Besides, the findings are not sensitive to alternative measures and, therefore, are robust. The study has results similar to those of other studies in the existing literature in many respects. To summarize, democracy improves environmental policy effectiveness as in Neumayer, Gates and Gleditsch (2002), Pellegrini and Gerlagh (2006), Deacon (2009), Bättig and Bernauer (2009), Mukherjee and Chakraborty (2013). Democracy is often associated with sustainable development, public accountability and participation opportunities (Baker & Jehlička, 1998; Scholte, 2002). In democracies, the standards for environmental protection are quite high. Environmental law is effectively enforced with the rule of law based on democracy (Bosselmann, 2009). Democracy also enables civil society on environmental issues. As the level of democracy increases, governments care about citizens' environmental concerns more and allow them to act together. (Dalton and Rohrschneider, 2002). Participation and empowerment of civil society are essential for sustainability (Munslow and Ekoko, 1995). As public pressures increase, governments follow policies more effectively in more democratic regimes. The findings regarding democracy differ from the findings of Adam and Tsarsitalidou (2019). The authors concluded that democracy negatively affects the effectiveness of environmental policies. They explained these findings, which

were incompatible with the literature, with differences in income levels between countries and showed that an interaction term consisting of per capita income level and democracy variables turned the relationship positive. Our findings suggest that democracy has a robust positive effect. Although the non-robust results of Adam and Tsarsitalidou (2019) that higher corruption is associated with higher policy effectiveness, our study confirms that the quality of government increases the success of environmental policies similar to Kelleher, Ki and Chang (2009), Harring (2014), Mavragani, Nikolaou and Tsagarakis (2016), and Chang and Hao (2017). Government quality ensures political freedom and effective provision of public goods such as environmental protection (La Porta et al., 1999). Government quality prevents environmental intervention caused by market failure from turning into government failure, such as regulatory capture (Becker, 1983; Helm, 2010). Policy performance also suffers as unaccountable governments lack public support (Anderson and Tverdova, 2003). Therefore, environmental policies cannot be expected to be effective if compliance with environmental measures is low.

The finding on the positive effect of education on the effectiveness of environmental policies is in line with Bimonte (2002), Farzin and Bond (2006), and Kelleher, Kim and Chang (2009). Accordingly, we can claim that education is related to compliance with environmental rules, more participation in the policy-making process and more environmental awareness. Furthermore, education enables environmental activist groups to have more supporters, so it is easier to create public pressure to influence the government to protect the environment (Dalton & Rohrschneider, 2002). In the study, urbanization increases policy effectiveness, confirming the economies of scale in line with Mazzanti and Zoboli (2009), Adam and Tsarsitalidou (2019). The proposition that population density creates economies of scale, which means more recycling through urbanization, is also supported empirically (Mazzanti & Zoboli, 2009). In addition, urbanization makes it easier for individuals with common environmental concerns to come together and take action (Dalton & Rohrschneider, 2002).

Limitations

An important limitation of the study is related to the data structure. Although Sustainable Governance Indicators provide multidimensional measurement, the time dimension of the data set is relatively short. Democracy and government quality, which are the main elements of the analysis, change in the relatively longer term. This leads to a methodological limitation. According to Hill et al. (2020), the basis of the fixed effects model is changing data characteristics over time. Since the time dimension of our study is relatively short in the context of institutional change, the information it provides for analysis is limited. These constraints may be reviewed in future studies utilizing panels with longer time periods.

6. Conclusions

The factors affecting the success of environmental policies are a frequently discussed topic in the literature. At this point, the number of studies investigating the role of democracy and government effectiveness is limited. In addition, studies investigating the effectiveness of environmental policies

in the literature mostly focused on a single environmental degradation indicator. However, the effectiveness of environmental policies is a broader issue. A successfully implemented environmental policy is expected to lead to improvements in many indicators of environmental degradation. Therefore, more comprehensive measurements are needed. In this study, the role of democracy and government quality in environmental policy performance was investigated with the Sustainable Governance Indicators dataset. Empirical results show that both democracy and good governance are positively associated with environmental policy performance, and the relationship is robust under alternative measurements.

According to the empirical results, democracy and the quality of the government have a significant role in the success of environmental policy. Implementing and enforcing environmental policies and ensuring that they are based on community needs and objectives require democratic governance systems and effective government institutions. A more effective democracy will enable individuals and organizations with high environmental awareness in society to express their demands to the government effectively. They can also create political pressure to use public resources to solve environmental problems. Based on the findings, strengthening democratic institutions is recommended. Key stakeholders in the development of democracy are parliaments and governments. Parliaments can contribute to the more effective implementation of environmental policies by creating an institutional structure that will ensure better representation of citizens and promote transparency and accountability. Governments should respond to the democratic demands of voters regarding environmental concerns. They should also improve the quality of governance. Thus, more effective use of public resources in the fight against environmental degradation and climate change can be achieved. Moreover, the rule of law should be established, bureaucratic efficiency should be increased, and corruption should be reduced. These measures reduce the private interest-based actions of politicians and bureaucrats and enable public interest policies, such as reducing environmental degradation, to come to the fore more. Environmental policies combined with good governance can also be implemented more restrictively. In this context, country-specific studies can be conducted to make more specific policy recommendations. Future studies can examine individual environmental policies of countries and conduct comparative analysis following improvements in measurement methods.

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