Vol. 58, p. 193-211, jul./dez. 2021. DOI: 10.5380/dma.v58i0.73189 e-ISSN 2176-9109

UFPR

DMA DESENVOLVIMENTO E MEIO AMBIENTE

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Equality, freedom and democracy: how important are they for environmental performance?

Igualdade, liberdade e democracia: qual a importância para a performance ambiental?

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Article received on April 26, 2020, final version accepted on December 14, 2020, published on September 20, 2021.

ABSTRACT: The complexity of the relationship between society and the environment is recognized by researchers and practitioners as a major challenge. This article examines how the type of political regime, the degree of political freedom and civil rights, and the level of income concentration relates to environmental performance as measured by the Environmental Performance Index (EPI). The analysis is based on a sample of 161 countries and covers the period 2007-2016, using a fixed effects panel data model. Our findings suggest that democracy as a political regime does not necessarily induce greater commitment to environmental issues. Lower income inequality offers the same results. However, a positive association was found between the expansion of rights and freedoms and the EPI, suggesting that freer countries tend to have better environmental performance. Given the multiplicity of profiles in terms of the nature and depth of democracy and inequality, our study suggest parsimony with more generalist analyses.

Keywords: democracy; freedom; civil rights; inequality; environmental performance.

RESUMO: A complexidade das relações entre sociedade e meio ambiente é reconhecida por pesquisadores e técnicos como um grande desafio. Este artigo examina como o tipo de regime político, o grau de liberdade políticas e direitos civis e o nível de concentração de renda se relaciona com a performance ambiental medida pelo Environmental Performance Index (EPI). A análise é baseada em uma amostra de 161 países e cobre o período de 2007-2016, utilizando um modelo de dados em painel de efeitos fixos. Nossos achados sugerem que democracia como um regime político não necessariamente induz maior comprometimento com questões ambientais. Menor desigualdade de renda oferece os mesmos resultados. Entretanto, foi encontrada uma relação positiva entre a expansão dos direitos e liberdades e o EPI, sugerindo que países mais livres tendem a

ter melhor performance ambiental. Dada a multiplicidade de perfis em termos da natureza e profundidade da democracia e desigualdade, nosso estudo também sugere parcimônia com análises mais generalistas.

Palavras-chave: democracia; liberdade; direitos civis; desigualdade; performance ambiental.

1. Introduction

In recent decades, the social and natural sciences have developed a wide range of perspectives on the effects of anthropic activity on the environment. In addition to widely investigated economic aspects such as income, economic activity (Grossman & Krueger, 1991; 1995; Shafik & Bandyopadhyay, 1992; Panayotou, 1993; 2016) and inequality (Borguesi, 2006; Jorgueson, *et al*., 2016), different domestic and international political arrangements seem to be related to a variety of levels and types of engagement with environmental protection (Dryzek, 1987; Congleton, 1992; Downey & Strife, 2010).

Environmental problems, which governments generally assign low priority, require plural and multifaceted solutions that often take longer to take effect than actions on other dimensions (Povitkina, 2018a; 2018b). Thus, given their complexity for decision makers, there has been growing interest in analyzing the role of democracy and political institutions in maintaining the public goods associated with natural environments (Midlarsky, 1997; 1998; Li & Reuveny, 2006; Buitenzorgy & Mol, 2011).

This study examines the empirical relationship between income inequality, features of democracy, and environmental performance in a set of countries around the world. It assesses the effects that the type of political regime, the degree of political freedom and civil rights, and the level of income concentration have on the performance of established environmental policies in the countries. In this context, the central question to be investigated here is whether it is reasonable to say that democratic, free, and egalitarian societies are more committed to the environment.

Due to the nature of the approach, the theoretical scope, and the variables used, this study contributes to three aspects. Regarding the environmental dimension, it innovates by using a multidimensional environmental performance variable that aggregates elements related to both human health and the vitality of ecosystems, the Environmental Performance Index (EPI). From a theoretical perspective, it provides an advance by jointly analyzing the role of income inequality and democracy in the context of environmental quality. It also contributes by considering democracy jointly from two perspectives: as an institutionalized political regime, and the degree of civil liberties and rights - which is done using two composite indices.

The following section presents the theoretical arguments and empirical evidence found in the literature that discusses the relationship between inequality, democracy, and the environment. The next section describes the methodological approach adopted, detailing the statistical method and the databases. After that, the next section discusses the results found in relation to those reported in the literature. Finally, the last section presents the main conclusions regarding the proposed relationship, as well as the limitations of the study and future propositions.

2. Inequality, democracy and the environment

Since the 1990s, the body of literature on the interconnections between development and the environment has grown considerably. Research into the relationship between income and environmental degradation is one of the most classic strands of this debate. Among the most important contributions are the preliminary studies by Grossman & Krueger (1991; 1993; 1995; 1996), who, borrowing from Kuznets (1955) research on the relationship between economic growth and income distribution (known as Kuznets Curve) expanded the initial proposal by considering environmental issues. In doing so, they sought to understand if economic growth is always harmful to the environment or if the increasing wealth and income eventually results in a mitigation of environmental problems.

These authors, as well as Panayotou (1993), and more recently Andreaoni & Levinson (2001), Dinda (2004), Carson (2009) and Panayotou (2016), found that the relationship between some pollutants and income growth was represented by an inverted U-shaped curve known as the Environmental Kuznets Curve (EKC). According to the arguments presented in their studies, the curved shape arises because in the early stages of development, when economic activity is most intense, the pressure on the environment inevitably grows sharply, then slows down, and later reaches a tipping point. From this stage on, as *per capita* income grows, there are incentives to reduce the impact on the environment. This trend is said to occur because the relationship between income and degradation is linked to a more significant demand for stricter environmental policies and standards, so that higher income levels are positively associated with better environmental outcomes.

The main suggestion of the EKC hypothesis is that the natural course of economic growth would eventually induce environmental improvements and therefore can be considered a solution to environmental degradation. However, as pointed out by Grossman and Kruger (1995), the proposed relationship cannot be understood as automatic or deterministic.

With a similar aim, to investigate the socioeconomic factors that affect environmental degradation, Boyce (1994) questioned whether greater vigilance with environmental issues is directly associated with income level, as the EKC hypothesis suggests, or if there is also a relationship with the political process. His contributions are central to this debate, especially because they suggest, based on microeconomic theory, that the optimal social decision between demand and environmental quality is weighted by the power of certain social groups, what he calls the "Power--Weighted Social Decision Rule".

For Boyce (1994), the inequality of power and income existing between different groups in society is the key to understanding this relationship. According to his proposed theoretical model, the social ideal would be reached at the point where the level of degradation maximizes the net social benefit. However, when inequality is taken into account, i.e. when the maximization of benefits and their distribution is weighted by the power of individuals (in terms of wealth and political power), this balance tends to benefit the "winners". They obtain greater levels of net benefits by not bearing the costs of degradation if they are producers, or by having access to low-priced goods and services if they are consumers (Boyce 1994; Torras & Boyce 1998).

In this sense, when the beneficiary group has more power than the others, who suffer the environmental costs, the social ideal is inefficient from the point of view of reducing degradation. This is because a positive correlation is found between benefit and power, suggesting that the "winners" are less vigilant when it comes to reducing environmental damage. Consequently, greater inequality is associated with greater degradation (Boyce, 1994; 2003; 2007; Boyce, *et al*., 1999).

These hypotheses were empirically tested in the study by Torras & Boyce (1998), which investigated the relationship between changes in income distribution and changes in pollution levels in several countries in the early 1990s. For these authors, the distribution of power between social groups was key to understanding this association. The results suggest that the unequal distribution of power, represented by a higher concentration of income, lower levels of education, political freedom and civil rights, would tend to increase the environmental damage generated by economic activities. This is because those individuals considered "winners" would have greater access to the surplus that would be generated by not incorporating the cost of environmental degradation into the final price of goods and services.

Baek & Gweisah (2013), Jorgenson, *et al*. (2016; 2017), Kasuga (2017), Knight, *et al*. (2017) and Kashwan (2017), despite employing different statistical methods, found similar results. On the other hand, Ravallion, *et al*. (2000), Borghesi (2006) and Grunewald, *et al*. (2017) found evidence to confirm and refute Boyce's hypotheses. In general, the latter authors emphasized that the relationship between inequality and environmental quality depended on both the variables analyzed and the scale of the analysis.

The relationship between sustainability and inequality was also investigated by Scruggs (1998), who pointed out some problems with the premises adopted in the studies by Boyce and his colleagues. According to Scruggs (1998), Boyce's hypothesis on equality fails in two respects: in considering that *per capita* income is linearly related to environmental degradation, and in assuming that collective and democratic social decision-making provides the best solutions to environmental problems.

For Scruggs (1998), richer and more powerful individuals would not necessarily prefer greater degradation, thus assuming that a positive correlation between income and degradation would be misleading. According to his findings, the impact of income inequality varied according to the environmental indicator used, so he was unable to confirm the hypothesis of equality in any general sense. In general, the results of his research indicated that global environmental performance was more closely associated with income level, as in the classical economic approaches, than with the effects of inequality advocated by Boyce.

The findings of Holts-Eakin & Selden (1995) and Heerink, *et al*. (2001) are in line with Scruggs' arguments. For example, the previous authors provided evidence that degradation varied with income level and could even decrease at higher income levels when richer individuals allocated less of their income to consumption. On the other hand, Heerink, *et al*. (2001) argued that in the short to medium term, income redistribution could contribute to a reduction in environmental protection because the propensity to consume degrading intensive goods and services would tend to increase, increasing the propensity to degrade.

The ensuing debate on power and income inequality opened the door for further discussions that included issues related to the institutional and political system of societies. As a result, interest emerged in assessing how decision-making on environmental issues could be related to the type of political regime. Researchers sought to understand, for example, whether democracy was beneficial or harmful to the environment and in what contexts this association took place (Farzin & Bond, 2006; Scruggs, 2009; Downey, 2015; and Povitkina 2015, 2018a, 2018b).

In Schumpeter's (2010) conceptions of classical theory, democracy is understood as a system in which an institutional arrangement is used "*for arriving at political decisions in which individuals acquire the power to decide by means of a competitive struggle for the people's vote.*" (Schumpeter, 2010, p. 269). Thus, as a political regime, democracy is understood as a system of selecting politicians or, as Mill (1861) suggests, as a form of government whose social rules and decisions are conducted by an authorized representative, according to the principle of "*representative democracy*". Moreover, it is associated with the level of political power distributed in a given society, that is, "*the ability of individuals and groups to influence the decision of the society*" (Bollen & Paxton, 1997, p.15).

Over the centuries, democracy has been widely associated with ideas and principles, such as civil rights and political and social freedoms - which are some of the basic principles attributed to liberal democracy. However, as Cunningham (2009) points out, Political Science presents different liberal-democratic theories that are guided by different conceptions about the value of democracy, about how democratic societies should function, and even about the semantics of the meaning of the word itself. Therefore, understanding democracy as a political regime and what it represents as an idea is increasingly complex.

According to Midlarsky (1997; 1998), despite the complexities of the concepts of inequality and democracy, several fields of science have investigated the relationship between these two aspects. In the environmental sphere, the level of participation of political institutions and the performance of governments has become points of debate associated with some observed environmental outcomes, fueling the discussion about what policies should be adopted in relation to the environment.

According to Congleton (1992), political institutions influence degradation (positively or negatively) according to the extent to which they direct environmental policy and economic growth. Thus, the measures adopted by the political regime have a direct relationship with environmental performance.

The studies conducted by Smith (2003), Bättig & Bernauer (2009), Bernauer & Koubi (2009), Buitenzorgy & Mol (2011), Povitkina, *et al*. (2015) highlighted the existence of a positive association between political regime (as a proxy for "power") and the environment, based strictly on the concept of democracy. As argued by Povitkina (2015; 2018a; 2018b) and Congleton (1992), this association would tend to occur mainly because a democratic system, where politicians are elected in free and competitive elections, would seek to get as close as possible to the aggregate preferences and interests of the average citizen. Therefore, policies would tend to meet the demand of the majority, as opposed to decision-making in an autocratic regime, where the interests of a non-representative elected group are prioritized.

On the other hand, according to Olson (1993) and McGuire & Olson (1996), non-democratic socie-

ties are governed by a small portion of the so-called "elite" population, whose primary concern is to increase its personal wealth and serve its individual interests. Thus, if the opportunity cost associated with providing of the public good is under the control of the "elite", environmental quality would tend to enjoy less prestige.

Furthermore, in autocratic regimes the flow of information is more limited, given the greater control exercised over the media. Thus, decision making is less participatory and more autonomous (Li & Reuveny, 2006). On the other hand, democratic societies have greater respect for freedom of expression and encourage the dissemination of information, leading to greater awareness of environmental problems and encouraging greater scrutiny of environmental legislation (Schultz & Crocket, 1990; Payne, 1995).

However, Midlarsky (1998) points out that most of the above arguments are based on an idealization of democracy. That is, they ignore the fact decision making can be conducted within a scenario of competition between different social groups that fighting each other at the legislative and executive levels of government power. An example of this is the antagonisms presented between corporations and environmental groups. Given this context, a democratic regime may be far from ideal in terms of its role in carrying out pro-environmental public policies, since environmental problems affect different social groups in different ways. Thus, democracy may not be efficient for the purposes environmental protection.

A similar argument is supported by the perspective highlighted in the "*Tragedy of the Commons*", where Hardin (1968) emphasized that the excess of freedom and individualism, generally observed in democratic societies, would result in further environmental degradation. According to him, only a collective effort would lead to an improvement in the quality of the environment. Thus, he argues that in undemocratic regimes coercive power could induce a reduction in degradation by diminishing individual freedoms and controlling access to public goods.

Research such as that by Dryzek (1987) and Midlarsky (1998) is in line with these arguments, suggesting that capitalist democracies tend to prioritize the market economy and the performance of corporations whose economic interests prevail, reducing the scope for action on environmental issues. This is because the interest of such groups is mainly based on maximizing profit and their individual gains.

The debate presented here stands out due to the heterogeneity of the arguments and approaches adopted when exploring the influence of power and income on anthropogenic environmental pressure. While the discussion of the impact of these two dimensions is important, it is necessary *a priori,* to define power, democracy and equality. This study seeks to understand the temporal dynamics of this relationship from two complementary views on democracy and a broader framework of environmental indicators.

3. Method and data

This paper investigates the association between political regime, degree of political freedom and civil rights, and level of income inequality with the performance of environmental policies established worldwide. For this purpose, information was collected from 161 countries in a 10-year period, covering the period 2007-2016. After that, the database consisted of 1,930 observations and included 8 variables.

Countries for which information on the key variables was not available were excluded from the database.

The Environmental Performance Index (EPI), prepared by the universities of Yale and Columbia, was adopted as the environmental variable. This same variable has been used in similar studies, such as Nekooei, *et al*. (2015) and Telle (2015). The EPI was chosen because it provides a means of more fully analyzing a country's environmental performance based on a set of environmental indicators, rather than focusing the analysis on outcome variables, such as greenhouse gas emissions, for example. Therefore, EPI as an indicator of environmental quality and performance can offer a greater relationship between spending capacity and the efforts made by countries to improve environmental sustainability, in various spheres.

The EPI ranks the performance of countries on environmental issues related to protecting human health and protecting of ecosystems. Structurally, it has two distinct objectives, environmental health and ecosystem vitality, which are comprised of more than 20 indicators. The environmental health information measures the protection of human health against environmental damage, while the ecosystem vitality data measures ecosystem protection and natural resource management. The scores range from 0 to 100, and the closer to 100, the better the countries perform against the targets for each indicator (Wendling *et al.* 2019; Hsu and Zomer, 2016). The final EPI score was used as the dependent variable for the proposed econometric model.

The Gini Index extracted from the Standardized World Income Inequality Database (SWIID)[1], in its latest update (Solt, 2017), was chosen as the variable to represent inequality. This variable is widely used in the literature due to the lack of comparable data over time for a large set of countries (Knight, *et al*. 2017; Grunewald, *et al*. 2017). The Gini was calculated based on disposable income (after taxes and/or transfers). The index ranges from 0 to 100, with 0 representing total equality and 100 representing absolute inequality. Although currently Gini may be questionable as the best measure of inequality, we chose to use it so that we could compare the results generated (at a certain level) with studies that debate the same topic, in order to allow for a closer dialogue.

Two variables, the Polity IV index and the Freedom House Index were chosen for the dimension of democracy. This allowed us to evaluate the role of democracy in the environmental context from two perspectives: considering democracy as an institutionalized political regime and considering democracy as a level of freedom and political and civil rights within a society.

The main reason for adopting this bi-variable composition was the understanding, previously discussed above in the theoretical framework, that the concept of democracy is broad and complex. The use of two variables, with different focuses, seems to provide a more reasonable chance of capturing the realities of countries with diverse profiles. While some may be democratic and have higher levels of freedom, others may be considered democratic but do not enjoy the same level of freedom. The central hypothesis regarding this issue is that the various patterns expressed by the combination of the two variables are associated with different environmental performances.

[1] Those data can be accessed at http://fsolt.org/swiid/

Polity IV captures information about the quality of government institutions, considering a "governmental spectrum" ranging from fully institutionalized democratic regimes to mixed or anocratic[2] regimes and fully institutionalized autocracies. The final result takes the form of a score on a 20-point scale, ranging from -10 (for cases of hereditary monarchy) to +10 (for cases of a fully consolidated democracy). The Polity IV score can also be analyzed in terms of regime categories: autocracies (from -10 to -6), anocracies (from -5 to +5) and democracies (from +6 to +10) (Marshall et al. 2002, pp. 1-16). For the present study, the scale was changed to 0 to 20, so that the higher the score, the greater the degree of institutionalized democracy.

The Freedom House Index (FHI) differs from Polity IV in that it is used to the political freedoms and civil rights of individuals within each nation. Thus, while Polity IV characterizes the country according to the type of political regime, the FHI indicates the aggregate degree of freedoms and rights within the country[3]. Structurally, the index includes 25 indicators, 10 corresponding to the "political rights" category and 15 corresponding to "civil liberties". The country status is determined based on the aggregated scores: from 1 to 2.5 is "Free", from 3.0 to 5.0 is "Partly Free" and from 5.5 to 7.0 is "Not Free" (Freedom House, 2018).

In addition to the two explanatory variables listed; some control variables commonly used in similar studies to minimize endogeneity issues were included: i) percentage of rural population; ii) population density (in km²); iii) *per capita* GDP based on purchasing power parity; iv) industry value added (as % of GDP), iv) Human Development Index (HDI) and v) tax revenue (as % of GDP) as a proxy for state size, to capture some effect of state capacity on environmental issues. Scruggs (2009), Jorgenson, *et al*. (2017) and Povitkina (2018) also used some of these variables because they consider multidimensionality a strong factor in the relationship between inequality, democracy, and the environment.

Control variables i, iii and iv were collected directly from the World Bank Open Data repository. Variable ii was calculated based on the total number of inhabitants of each country in relation to its area (in km²), which were also collected from the World Bank. Finally, variables v and vi were respectively extracted from the databases of the United Nations Development Program and the International Monetary Fund.

3.1. Econometric model

To analyze the proposed relationship, a fixed effects panel data econometric model was designed. Prior to applying the model, a Hausman test was conducted to determine if the fixed effects model was the most suitable for the purposes of this research. The rejection of the null hypothesis indicated its suitability.

Since each country has individual time-invariant characteristics, this effect needs to be removed, which panel models can do. According to Cameron & Trivedi (2010), fixed effect models aim to control

[2] A democratic political regime that has features of a dictatorship or when there is intense political instability that makes the regime neither democratic nor autocratic (Vreeland, 2008).

[3] For further understanding of how "freedom" and "right' are being addressed here, visit https://freedomhouse.org/report/methodology-freedom-world-2019

for effects associated with omitted variables among individuals, but invariant in time. Thus, the intercept is supposed to be variant according to the individual but over time. In contrast, the coefficients of the explanatory variables are constant across individual scope and time.

The estimated fixed effects model is represented in Equation 1.

$$Y_{it} = \alpha_i + \beta_{0i} + \beta_1\gamma_{it} + \beta_2\delta_{it} + \beta 2\sigma_{it} + \beta_3 Z'_{it} + \varphi_2 T_2 + \ldots + \varphi_t T_t + e_{it} \quad (1)$$

Where $i = 1 \ldots n$ countries and t = year. The dependent variable Y is the EPI and the independent variables γ , δ and σ are, respectively, the Gini Index, Freedom House Index and Polity IV. There is also the set of control variables, called Z'. The e_{it} is the error term for each country at each point in time and the term α_i is the fixed effect of the cross-sectional unit (country).

The effect of time was also considered, as it is believed that the proposed relationship changes over the years. Thus, time *dummies* variables were introduced for each year from 2008 to 2016, with 2007 being the reference category. In equation (1), φ_t is the coefficient of the binary time variable and is the year as a binary variable. The *t-1* periods were considered.

4. Results and discussion

To better understand the relationship between inequality, democracy and environmental performance, the analysis starts with reduced models. Model (1) included only the Gini Index, while model (2) also included the control variables and the effect of time. The results are shown in Table 1. While the first model showed a negative association between income concentration and environmental performance, the second model showed the opposite – both coefficients are statistically significant.

The use of fixed effects models assumes time invariant characteristics that can create a bias in the explanatory variable and therefore, there is a need to control for such effects. Therefore, by incorporating the time effect and socioeconomic and demographic variables into model (2), a coefficient closer to that considered as the net effect of Gini Index on EPI was obtained. The coefficient indicates that the higher the inequality, the better would be environmental performance.

The evidence revealed in model (2) refutes, at least in part, the equality hypothesis proposed by Boyce (1994). Contrary to the arguments proposed in Torras and Boyce's study (1998), the results suggest that a better redistribution of income from rich to poor individuals worsens the performance of environmental indicators. In this sense, the results were closer to those found by Scruggs (1998).

The results discussed so far show that when inequality is analyzed in the environmental context, the evidence converges with the conclusions reported by Scruggs (1998). However, when only the effects of *per capita* income are observed, as in the approach adopted in the EKC literature, the results are similar to those reported by Boyce (1994) and Torras & Boyce (1998). That is, even though income redistribution was not positively associated with high scores in the EPI suggesting that egalitarian societies are not necessarily more environmentally

sustainable, high income levels were related to worse performance regarding pro-environmental action, suggesting that wealth is a driver of degradation[4]. However, this result also adds to the discussion that greater environmental performance is associated with countries' capacity to spend on technologies, systems and policies for mitigate and/or control environmental degradation. Possibly countries with greater capacity to invest in environmental control measures are also those with the best performance on the EPI indicators.

When considering the effect of time on model (2), we assume that environmental performance is modified over the years due to various factors, such as technological changes, changes in consumption patterns, changes in environmental and economic policies, which may or may not be pro-environmental. Since the results indicate highly significant coefficients for the time variables from 2010, the presence of a time effect is confirmed.

Based on this positive association, it is suggested that during the period 2010-2015 the quality of the economy-environment relationship was gradually improving on a global scale. The two years that were not statistically significant (2008 and 2009) represent a period of crisis and post-crisis in the world economy, when the priorities in political agendas in several countries changed. In this period, it may be that environmental issues were neglected, given the degree of economic adversity.

Figure 1 shows the evolution of the mean EPI scores and of the two objectives over the period under review. As also indicated by the 2016 EPI Report, countries have made progress in some dimensions, with an emphasis on water quality and basic sanitation. Although some indicators are declining, particularly in relation to air quality, marine stocks, and CO_2 emissions, which have slowed progress, the overall environmental performance score has been improving since 2007.

TABLE 1 – Reduced models, including only inequality and control variables.
Dependent variable: Environmental Performance Index (EPI), fixed-effects models.

Variables	**Model (1)**	**Model (2)**
Intercept	74.555*** (1.939)	53.865*** (4.870)
Gini	-0.150*** (0.051)	0.268*** (0.041)
per capita GDP (ppp)		-0.000** (0.000)
Total Population		-1.68e^{-08} † (8.66e^{-09})
Rural Population		-0.032 (0.038)
Demographic Density		-0.004*** (0.000)
Industry (% GDP)		0.013 (0.015)
HDI		16.2454** (5.354)
Taxes (% GDP)		-0.022 † (0.012)
2008		0.032 (0.113)
2009		0.047 (0.124)
2010		1.005*** (0.140)
2011		1.147*** (0.158)
2012		1.449*** (0.179)
2013		1.073*** (0.206)

[4] Iterations between GDP *per capita* and Gini were tested and it turned out not statistically significant.

2014		1.952*** (0.228)
2015		2.135*** (0.249)
Observations	1.187	804
Number of countries	162	105
R^2 within	0.008	0.539
R^2 between	0.098	0.118

Robust standard errors in parentheses, *** p <0.001, ** p <0.01, * p <0.05, † p <0.1.

SOURCE: prepared by the authors.

Global environmental improvement is being driven by annual increments in the human health objective, which, according to Wendling *et al* (2019), is positively correlated with income and prosperity. On the other hand, ecosystem vitality, which is negatively associated with industrialization and urbanization, presents greater stability and less progress.

When considering the variables of political regime (Polity IV) and level of freedom and individual rights (FHI), without the other controls, the relationship between the EPI and income concen-

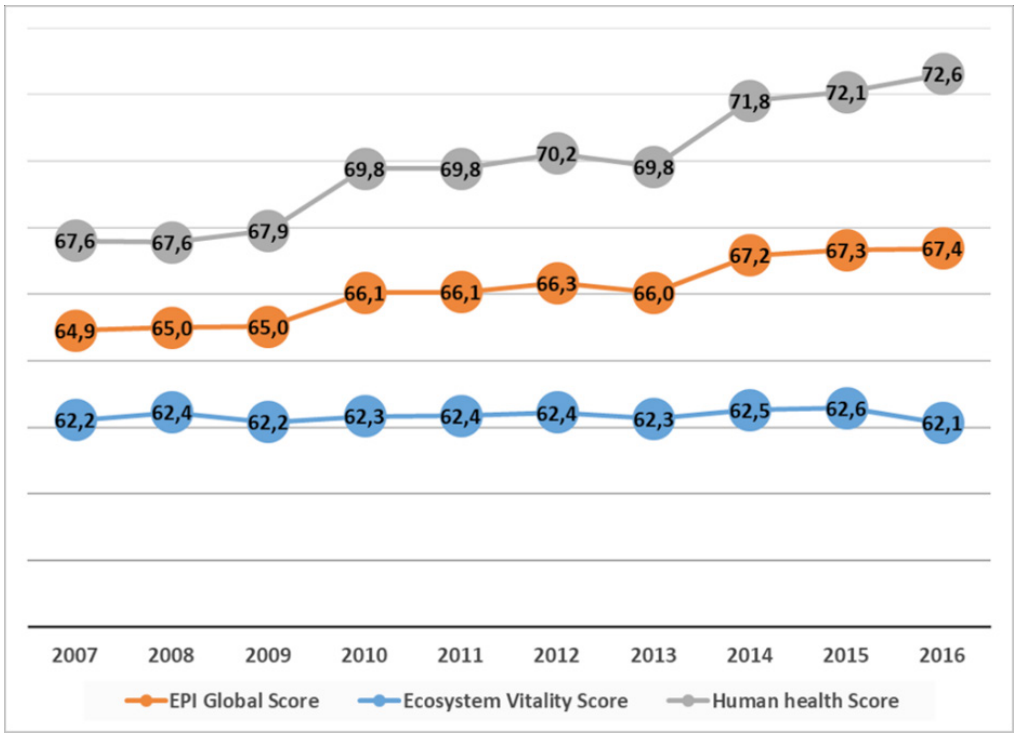

FIGURE 1 – Average Environmental Performance Index Score and its objectives, 2007-2016.

SOURCE: prepared by the authors.

tration was negative, as illustrated in model (3) of Table 2. However, when control and time variables are included, models (4) and (5), the relationship becomes positive and the magnitude of the coefficients becomes comparatively larger. In other words, a less unequal society does not necessarily have a better society-nature relationship, as suggested in the research of Jorgenson, *et al*. (2016; 2017), Kasuga (2017) and Knight, *et al*. (2017), who point to the current and potential consumption pattern as the main factor behind environmental degradation.

When separately analyzing the association of the political regime variable (Polity IV) with the EPI, the three estimated models show that, on average, higher levels of democracy are related to lower environmental performance scores. That is, there is a negative association between democratic political regime and environmental performance.

According to Congleton (1992), one of the factors that explains the negative association found in these models is the long-term horizon of environmental policies. In the political sphere, the time horizon directly influences the behavior of political leaders, as well as their plans and proposals. Thus, politicians with short-term views tend to prioritize actions that are perceived as produce results quickly, while rulers with long-term perspectives tend to prioritize policies that yield results over a longer period.

The studies of Povitkina (2018a; 2018b) are in line with Congleton (1992): given the brevity of electoral cycles in democratic regimes, leaders tend to prioritize short-term policies in order to deliver faster results within their mandate, thus favoring their chances of being reelected to power. Thus, pro-environmental policies, which require longer time horizons in terms of planning, action, and outcome, are constantly neglected.

TABLE 2 – Complete models, including control variables.

Dependent variable: Environmental Performance Index (EPI), fixed-effects models

Variables	**Model (3)**	**Model (4)**	**Model (5)**
Intercept	74.346*** (2.038)	54.558*** (4.947)	55.893*** (4.876)
Gini	-0.140** (0.052)	0.286*** (0.040)	0.284*** (0.040)
Polity IV	-0.017 (0.038)	-0.094*** (0.029)	-0.095*** (0.029)
FHI "Partially free"	0.952† (0.353)	0.452 (0.292)	
"Not free"	0.070 (0.510)	-0.817† (0.427)	
FHI "Not free"			-1.275*** (0.309)
per capita GDP (ppp)		-0.000*** (0.000)	-0.000*** (0.000)
Total Population		$-1.52e^{-08}$ † ($8.53e^{-09}$)	$-1.47e^{-08}$ † ($8.53e^{-09}$)
Rural Population		-0.034 0.038	-0.043 (0.038)
Demographic Density		-0.004*** (0.000)	-0.004*** (0.000)
Industry (% GDP)		0.028 † (0.015)	0.026† (0.015)
HDI		15.578** (5.433)	14.628** (5.404)
Taxes (% GDP)		-0.0243† (0.129)	-0.0235† (0.129)
2008		0.058 (0.113)	0.060 (0.113)
2009		0.108 (0.125)	0.117 (0.125)
2010		1.086 *** (0.141)	1.096*** (0.141)
2011		1.243*** (0.160)	1.251*** (0.160)
2012		1.564*** (0.181)	1.576*** (0.181)
2013		1.199*** (0.208)	1.218*** (0.208)

2014		2.060*** (0.230)	2.086*** (0.230)
2015		2.254*** (0.251)	2.281*** (0.250)
Observations	1.097	779	779
Number of countries	145	103	103
R^2 within	0.021	0.562	0.560
R^2 between	0.018	0.070	0.089
R^2 total	0.025	0.037	0.051

Robust standard errors in parentheses, *** p <0.001, ** p <0.01, * p <0.05, † p <0.1.

SOURCE: prepared by the authors.

That is, the effectiveness and efficiency of democracy as a political regime are also important elements in this debate. Although the liberal-democratic regime expresses plurality by allowing the participation of various social groups in the governmental dimension (Povitkina, 2018a), the degree of their effectiveness differs between societies. A democratic government, however corrupt or dominated by a particular social group, may not guarantee good environmental performance. If influential corporations lead the decision-making process, individual or smaller-scale interests may be put before social interests in greater environmental protection and quality (Dryzek, 1992; Povitkina; 2018b).

Furthermore, according to Midlarsky (1998), if the most powerful groups in government are not interested in environmental legislation and in guaranteeing the protection of natural environments, democracy as a political regime is failing for this purpose. Ehrhard-Martinez *et al*. (2002), for example, found that countries with a democratic regime improved their environmental indicators only when they displayed what the authors referred to as a "strong state capacity". That is, when the government had considerable ability to articulate actions with the various entities within society.

Another argument for the non-deterministic association between democracy as a political regime is the fragility of democracy itself – even as an ideal. However democratic a country may appear by virtue of its electoral procedures, many authoritarian movements that prioritize the particular interests of a specific power group and lean toward corruption are camouflaged by democratically elected leaders, "weakening the buffers of democracy" (Levitsky & Ziblatt, 2018, p. 2).

While Polity IV indicates the degree of institutionalized democracy in the country, the inclusion of the individual liberty indicator (FHI) sheds light on how some of the liberal principles and democratic practices, such as political rights and civil liberties (Cunningham, 2009) are also related to environmental performance.

Models (3) and (4) in Table 2 incorporated the Freedom House Index with its three response statuses, with "free" as the reference category. However, model (3) showed a statistically non-significant "not free" category; and for model (4), where the control variables were inserted, the "partially free" status coefficient was not statistically significant. Therefore, it was decided to consider "free" and "partially free" as a single category, which is the reference category compared to the "not free" status in model (5).

The results suggest that when disregarding other influencing factors, in model (3), being less 'free' induces better environmental performance. However, when socioeconomic variables and the effect of time were introduced, in model (4), the association is reversed: countries with higher levels

of freedom and rights are positively associated with better performance regarding human protection and ecosystem issues as a whole.

These results seem to corroborate Povitkina's (2018a) suggestion that the relationship between freedom and environmental quality is multidimensional. The basic argument is that greater freedom of expression and the press favors greater access to information about current and potential environmental problems, as well as governmental failures and inefficient solutions. In addition, greater freedom allows for broader debates, favoring feedback between society and organizations, corporations and parties on necessary decision-making.

Similarly, freedom of association allows environmental interest groups to organize themselves. Together, greater freedom of expression and association enable pro-environmental groups to protest and articulate in favor of reducing negative externalities, both locally and globally (Povitkina, 2015; 2018a; 2018b).

With wider dissemination of information, individual pro-environmental decisions can bring about changes not only in everyday life and in the pattern of consumption, but also in the sphere of electoral voting, inducing preferences for "green" political parties that propose actions focusing on the environment. Recently, the number of parties linked to environmental issue has grown in several countries, and their influence is reflected in the voting behavior of their populations.

When analyzing the evidence found in model (5), which has a highly significant coefficient for the bi-categorical FHI, some interesting finding become even more apparent. Democracy as an institutionalized political regime and democracy as defined by the extent of political rights and civil liberties have inverse relations with environmental performance. That is, while higher levels of institutionalized democracy do not necessarily suggest higher environmental quality, higher levels of freedom suggest. This paradox may have been produced by the Polity IV indicator, which ranks only regimes based on electoral political game, although it does not reveal whether democracy is subverted by elected leaders.

The conclusion is that since each nation has its own socioeconomic and cultural particularities, consequently these differences are also expressed in the performance of the political system as a whole. Given the complexity and particularities associated with each government, it is unrealistic to suggest the existence of a unique relationship between democracy and global environmental performance.

The tree map in Figure 2 reveals the diversity of political profiles found in the sample for 2016. Sixty countries (the largest blue box), including Canada, Argentina and Brazil, were classified as democratic and free. Only 19 were classified as autocratic and not free, examples being China, Cuba and Iran. The number of anocratic countries, in turn, totaled 46, indicating many cases of mixed regimes. Of this total, 24 were categorized as non-free, such as Venezuela, 21 as partially free, such as Morocco, and only Suriname was categorized as free.

When dividing countries into "free and democratic" and "not free and autocratic" profiles, different profiles were found regarding environmental performance. In 2016, in the former group, 52 countries had high EPI scores (70-100), e.g. Finland, while 6 countries had medium scores (50-69), e.g. India, and only 2 had scores below 50, namely Benin and the Salomon Islands. In the latter group of autocratic and non-free countries, 6 had high EPI scores, e.g. Cuba, 12 had medium scores, e.g.

China, and only one country had a score below 50, namely Eritrea. Therefore, the results suggested that free and democratic, as well as autocratic and non-free countries, may have both high and low environmental performances[5].

Considering the Gini index of the series, it was found that most of the free and democratic nations had high EPI scores and low levels of inequality[6], e.g. Germany. Brazil and Mexico, on the other hand, are examples of democratic and free countries with high EPI scores, but with high levels of income concentration. In contrast, most "non-free and autocratic" nations have medium EPI scores, and similarly, most countries in this group present low levels of inequality, examples being Azerbaijan (high EPI and low inequality) and Vietnam (medium EPI and low inequality).

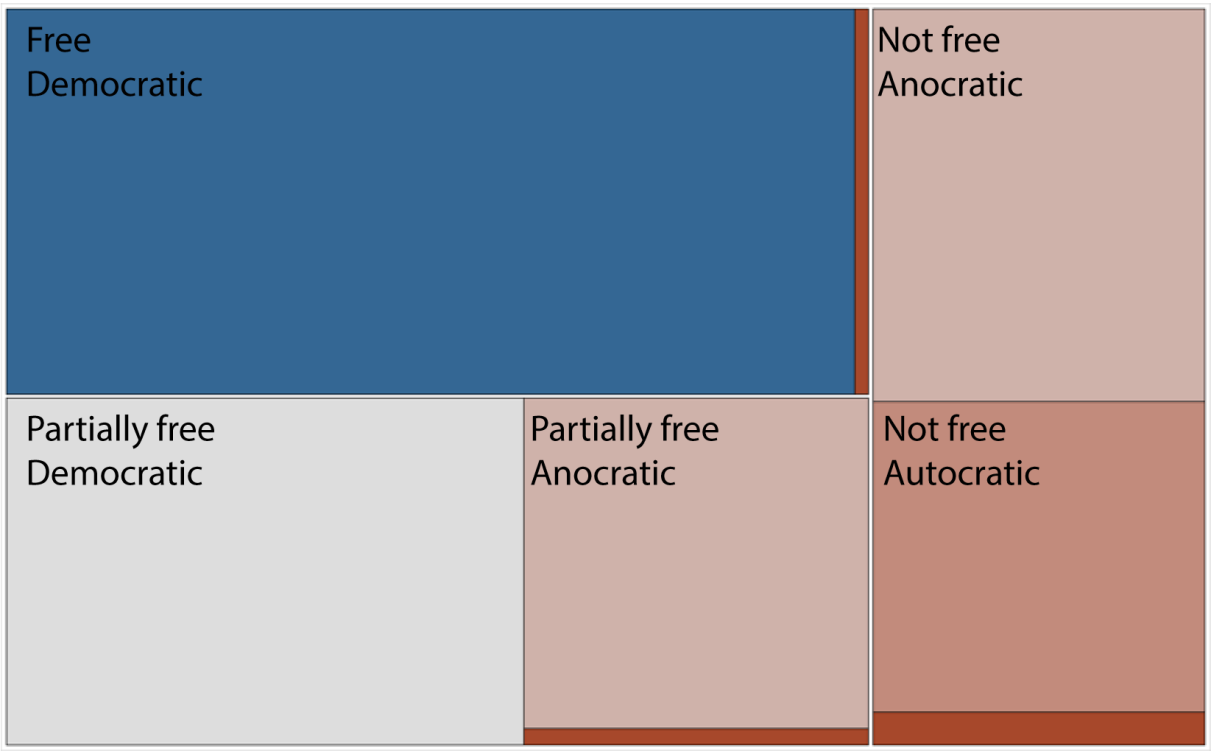

FIGURE 2 – Combination of political regime (Polity IV) and level of freedom (Freedom House Index) – size of boxes representing the number of countries.
Note: the brown boxes with no label accounts for: anocratic and free (1 country), autocratic and partially free (1 country), and democratic and not free (2 countries).
SOURCE: prepared by the authors.

[5] In this analysis, 32 countries were not analyzed due to insufficient information.

[6] A GINI below 40.0 was considered low.

This exploratory analysis, therefore, illustrates the paradox revealed by the estimated models: higher levels of democracy do not necessarily correlate with better environmental performance and more egalitarian income distribution. This may occur due to the presence of more conservative and even autocratic features masked within democracy – a conclusion that is reinforced by the fact that only the iterations between Gini and the FHI or Polity IV in the model have not been statically significant. Similarly, in autocratic societies, there may not necessarily be a disharmonious relationship between individuals and the environment, as exemplified by Cuba's efforts in recent years.

Given the diversity of country profiles, which include distinct features in terms of the degree of freedom, the type of political regime, and the level of inequality, the pattern of environmental performance is variable. That said, it is argued that the performance of the indicators may be more closely related to the structuring and articulation between the different institutions within each nation - which largely reflects the priorities of political agendas and varies according to the socioeconomic, political and cultural profile and interests of individual citizens - than to the type of political regime *per se*.

5. Conclusions

In order to associate economic and political factors in the environmental context, this research investigated the influence of political regime, the level of political freedoms and civil rights, and the degree of income concentration on environmental performance on a global scale. The results showed a negative relation between democracy and economic inequality with environmental performance scores. Thus, democracy as a political regime does not necessarily induce a greater commitment of nations to environmental issues. Similarly, reducing income inequality does not ensure that the relations between society and nature will be more harmonious.

On the other hand, the FHI showed a positive association with the EPI: higher levels of political freedom and civil rights were linked, on average, to better environmental performance. In other words, freer countries tend to make stronger commitments to the environment.

However, care should be taken when considering any generalized interpretations regarding the investigated relationships. One country may be democratic and free, egalitarian, have a high EPI score and culturally sustainable habits, such as Denmark, but a country may have a similar political and social status and still have a history of development based on environmental pressure for emissions, such as Norway.

Thus, it is argued that the relationships established between individuals and the environment are highly heterogeneous and based on elements beyond the limits of the political regime and purely macroeconomic issues. That is, it is necessary to direct our gaze to even more complex aspects within societies, such as their traditions, habits, patterns of consumption, and priorities.

These considerations point to the challenges of future research in this area. A more detailed look at the quality of democracy and its association with the levels of individual and collective freedoms is required. Similarly, interdisciplinary approaches have much to contribute in this area.

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