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ECO WARRIORS AND OIL BARONS: DO AUTOCRACIES AND DEMOCRACIES DIFFER IN THE PURSUIT OF ENVIRONMENTAL POLICY? A CROSS-COUNTRY EMPIRICAL ANALYSIS EXAMINING THE EFFECT OF REGIME TYPE ON ENVIRONMENTAL POLICY PERFORMANCE

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ECO WARRIORS AND OIL BARONS: DO AUTOCRACIES AND DEMOCRACIES DIFFER IN THE PURSUIT OF ENVIRONMENTAL POLICY?

A CROSS-COUNTRY EMPIRICAL ANALYSIS EXAMINING THE EFFECT OF REGIME TYPE ON ENVIRONMENTAL POLICY PERFORMANCE

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Abstract

What determines how a country performs on their domestic and international environmental policy targets? Does the performance on environmental policies depend on political regime type or are there other factors that matter? This research aims to identify the factors which may either enhance or constrain a given countries likelihood of achieving their environmental policy targets. In this research an analysis is conducted that measures the impact of regime types on environmental policy performance, while controlling for other effects through a quantitative linear regression analysis. A positive statistically significant correlation is found between democracy and the performance on environmental policy targets. This means that the more democratic a government is perceived, an improved performance on the environmental policy objectives within a country is expected compared to autocratic regimes. The results are supported with a time series analysis in which the progression on the dependent variable from 2010 to 2019 also shows a significant positive correlation between democratic score and environmental policy performance. These findings indicate that environmental performance within a country is explained by a fundamentally political factor, regime type, rather than on economic grounds.

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1. Introduction

Plastic pollution is a growing problem around the world. For this specific issue, governments could put in place regulations to minimize or abolish single-use plastic bags, which would contribute to battling environmental issues. However, as seen in Europe, the plastic debate stirred up a counterargument from the plastic manufacturing industry, arguing that plastic bags are sustainable and reusable. The European Union (EU) took this into account and agreed on a binding reduction target for plastic bags, but was not able to abolish the production of single-use plastic until July 2021. On the other hand, Rwanda, as an authoritarian regime, was able to prohibit the use of plastic bags since 2008. Another example can be found in Myanmar, where the government was already in 2011 more effective compared to the EU in banning plastic bags in its capital city. The puzzle here is why Rwanda and Myanmar were more effective in implementing environmental protection policy, whilst the EU was not? The general belief around policymaking is that democracies are better at formulating and implementing their environmental protection policy compared to autocracies (Fredriksson & Wollscheid, 2006; Pellegrini & Gerlagh, 2006). However, the examples of Rwanda and Myanmar indicate that sometimes an authoritarian regime is far more effective in the implementation of environmental policies. Broadly, the varying levels of success, across a wide range of international actors, at ending the production of non-degradable waste, highlights an interesting difference in the effective implementation of environmental policy across regime types. Are democratic states in fact more effective in the implementation of environmental policy, or should this title be ascribed to authoritarian regime types?

The puzzle here is what affects environmental policy performance within a country. Does the political regime type make a difference in how countries implement their policy, or do other factors matter? Are the industries, for instance the plastic manufacturers, responsible for the outcome of environmental policy? What this research aims to find out is what the impact is of political regime type on environmental performance within a country. Does the type of regime matter for how environmental policies are pursued? Or is there another domestic factor that plays an even bigger role in how the policies regarding the environment are implemented?

Environmental policy concerns several aspects, of which the majority can be seen as a long-term environmental policy problems, such as climate change, increasing soil degradation, loss in biodiversity, air pollution, a decline in coastal and high sea fisheries and so on (Sprinz, 2009). Examples of environmental issues that concern a more short-term approach are, among others, water sanitation and the extinction of species (Sprinz, 2009). Within the definition of

this paper, both short- and long-term environmental policies will be considered. It is interesting to see what impacts both aspects of environmental policies in a global perspective as it has not specifically been focused on in the literature as a whole.

This paper addresses a broader debate: whether environmental performance depends on political grounds or economic grounds. Often, industrial producers and consumers are held accountable for the environmental outcome within a country (Congleton, 2003). Although industrial producers and consumers, in the end, pollute the environment, regulatory targets and the enforcement of environmental regulations can frame the decisions of the industries. Are, in this sense, environmental problems rather than consequences of economic activities, generated by ongoing political activities? The underlying question addressed is if regime type can *cause* an improved performance on environmental policies?

The purpose of this research is thus to find what causes environmental policy to perform better, or worse, from a global perspective. In order to make the argument, the theory on what impacts environmental policy performance is examined first. Second, the argument relating to which, if any, regime type plays a role in how a country performs in the pursuit of their environmental policy targets is presented. Then, a quantitative cross-country linear analysis is conducted, controlling for several variables. Besides that, an analysis on the progression of environmental performance will be conducted to examine the effect of regime type on the change over time in the dependent variable. Finally, the paper concludes on these findings and closes with some final remarks on the research.

2. Theory

Various empirical studies have already attempted to identify the determinants of state-level environmental policy. Within state variables that might affect environmental performance are, among others, legislative competitiveness (Lester, 1980), the strength of certain interest groups (Hoagland & Farrow, 1995; Cheon & Urpelainen, 2013), mass urbanization (Agthe, Billings & Marchand, 1996), the rate of corruption (Damania, Fredriksson & List, 2003; Pellegrini & Gerlagh, 2006) and how environmental organizations might use focusing events, such as environmental challenges, to enhance environmental policies (Bose & Brower, 2017). According to empirical studies, variables on the global level that might affect domestic environmental performance are the convergence of national policies due to globalisation and interlinkage (Holzinger, Knill & Arts, 2011), compliance to international norms and agreements (Cortell & Davis, 2000) and competition among states (Kenyon & Kincaid, 1991).

However, these analyses miss one crucial linkage that determines the effectiveness of environmental policy. Ultimately, the government in place has the final say on how environmental policy is determined, what instruments will be used to implement it, and how it is regulated within the state. Therefore, this paper specifically looks into the effects of regime type on the environmental policy outcome. A number of the variables that have been found to empirically affect environmental performance will nevertheless be taken into account as control variables in the analysis. In short, several determinants of environmental policy performance received much attention in the wider literature. However, regime type has been unduly ignored to this point. Therefore, political regime type will be the main variable taken into consideration in the research.

Regime type is empirically proven to affect various other governmental issues, such as the formulation, implementation and regulation of policies and international behaviour (Leeds & Davis, 1999). Foreign aid policies are such an example that can be considered as affected by regime type. Nondemocratic regimes, in this case, tend to use the reciprocity effect foreign aid has on political elites to demand a return in support to the nondemocratic leaders (Lai & Morey, 2006). Another type of policy affected by regime type is foreign economic policy, as autocracies are found to be more likely to adopt interventionist and protectionist economic policies, in order to control the state income (Steinberg & Malhotra, 2014). Moreover, redistributive policies are empirically proven to vary between different types of regimes, resulting in improved healthcare, higher education levels, welfare transfers and a fair distribution of food in democratic regimes (Wigley & Akkoyunl-Wigley, 2011). However, there is relatively little literature that has specifically looked into the effect of regime type on the performance of environmental policies. One paper that closely aligns with this paper's aims comes from Fredriksson and Wollscheid (2006). They compared various types of democracies to autocracies and related this to the stringency of the formulation of environmental policies. This paper differs in that it will not look at the stringency, but at the outcome of environmental policy making. As the performance of countries within the field of environmental policy says more about the implementation and eventual outcome compared to the stringency of environmental policies. This paper also differs in the operationalization of regime type, by employing a variable that measures different levels of democratic governance on a scale of 0 to 10, compared to the categorical definition of varying types of democracies used by Fredriksson and Wollscheid (2006). Finally, what this paper aims to address is what affects environmental policy performance compared to the environmental targets set, for which the argument is that political regime type matters.

A question that might arise here is how regime type and environmental policy performance interact? Why might democracies perform better at environmental policy performance compared to nondemocracies? First, most democracies' key objectives include the promotion of economic and environmental welfare. A just formulation, implementation and regulation of environmental policies can encourage the achievement of these ideals (McCloskey, 1983; Payne, 1995). Also, through the objective of economic welfare, the state's capacities and instruments to preserve the environment increase. Second, democracies rather than nondemocracies, are connected to citizen freedoms such as the availability of information on environmental degradation and the ability to protest against environmental policy (Pelligrini & Gerlagh, 2006). As the public is able to check the government on their environmental policy, it should be carried out correctly. Thirdly, and perhaps most importantly, is the responsiveness of the government towards the citizen's and international demands in democracies, such as the engagement in international activities, including international agreements. This was empirically measured as the probability of signing a global environmental treaty to which democracies tend to comply, which was also positively linked to the formulation of domestic environmental policies (Congleton, 1992; Neumayer, 2002). A final point that supports the argument that democracies tend to perform better on environmental policies, refers to how environmental protection in the late 20th century literature was described as a public good within policy making. The provision of public goods has been found to positively correlate with the size of the ruling elite (Deacon, 1999). This means that democracies, with a larger ruling class in comparison to nondemocracies, provided more efficient solutions with higher levels of public goods. One of the public goods taken into consideration was environmental protection, which was positively related to democratic regime type and supported the hypothesis (McGuire & Olson, 1996; Deacon, 1999).

A counter argument was made by Dryzak (1987), who argued that market-oriented democracies cannot solve environmental issues, and autocratic regimes in general perform better on environmental issues. As democracies revolve around elections every few years, democracies tend to have a short-term vision, rather than a long-term vision. Environmental policies, however, are largely seen as a long-term goal that does not provide immediate result. Besides that, the electorate does not have the environment as a top-priority, neither do political candidates see it as priority as the results are not visible in the short term. Stepping and Banholzer (2017) argue in line with Dryzak (1987) that democratic governments need broad support to survive in the political field. Therefore, democratic governments are more likely to invest in public goods that benefit the majority of the population in the short term, a category

to which environmental policies do not comply. Autocracies on the other hand, only need the support from the ruling elite, a relatively small segment of the population. This makes it easier for autocratic regimes to implement environmental policies even though such policies can be unpopular with the masses, compared to democracies that depend on majority preferences and support from interest groups (Cheon & Urpelainen, 2013). Fredriksson & Wollsheid (2006) also concluded that there was no significant difference between autocracies and democracies, when looking at the stringency of environmental policies across different regime types.

However, this paper argues that democracies tend to do better on environmental performance compared to nondemocracies. Authoritarian regimes rest as much as democracies on a short term vision, but authoritarian leaders generally act according to their own will instead of the publics. This is evident as authoritarian leaders are in a position where they can ignore environmental concerns if it is in conflict with their politics, as they lack the need for broad support (McGuire & Olson, 1996; Deacon, 1999). Moreover, democracies established a more supportive setting for the development and implementation of environmental policies. Through the free flow of information and exchange of ideas and knowledge on environmental issues (Pellegrini & Gerlagh, 2006), through the objective of economic and environmental welfare that enhance the capacity and instruments of the government to act (McCloskey, 1983; Payne, 1995), through the responsiveness of the government to domestic and international actors (Congleton, 1992; Neumayer, 2002) and through the efficiency in the provision of public goods within a larger ruling elite (McGuire & Olson, 1996; Deacon, 1999). Therefore, the hypothesis is formulated as follows: *Democracies perform better on their environmental policy implementation compared to autocracies.*

3. Methodological framework

3.1 Methods of data analysis

To test this hypothesis, the paper regresses environmental performance against regime type in a quantitative regression analysis. The different models also provide an insights in other explanatory factors that might help explain environmental performance. The analyses will be performed across a cross-country research design. The broad dataset includes 200 political communities, with observations of the year 2010 and 2019. However, they do not all provide sufficient data on each variable and over time. Therefore, 145 countries are taken into account in the regression of the dependent on the independent variable, whereas with the control

variables added, 129 countries are observed through the analysis. The quantitative nature of the research also contributes to the field of literature as it analyses several determinants of environmental policy, and tries to find the main explanatory factor. As the dependent variable is a scale variable, an ordinary least square (OLS) regression analysis on two points in time on a cross-section of countries will be performed to measure the impact of regime type on the environmental policy implementation.

3.2 Measurement

First, the dependent variable, environmental performance, which includes the tackling of various domestic and transnational environmental issues. Among these are the battle against climate change, the loss of biodiversity, the extraction of natural resources, air pollution, water resources et cetera. To measure the implementation of environmental policy, an index has been developed by the Yale University Centre for Environmental Law & Policy: The Environmental Performance Index (EPI). The EPI measures environmental health and ecosystem vitality per country, in order to gauge how close countries are to their established environmental policy targets. The EPI is measured every two years, starting with a pilot in 2006. However, the indexes from 2006 and 2008 use different indicators than the following years. Therefore, in this paper the EPI of 2010 will be used as benchmark, to which the 2020 EPI will be compared. This hands a perspective of almost ten years of potential change in environmental performance.

Environmental performance is measured in air quality, sanitation and drinking water, heavy metals, waste management, biodiversity and habitat, ecosystem services, fisheries, climate change, pollution emissions, agriculture and water resources. With the first four indicators belonging to the policy objective of environmental health and the latter seven to the policy objective of ecosystem vitality. The dataset is based on 32 performance indicators across 11 categories, concerning 180 countries around the world. The dataset is comprised from various other datasets. On each of the 32 indicators, a scale identifies the worst performance as a score of 0 and the best performance as a score of 100, relative to the targets set by the individual countries. The benefits of an aggregated index can be seen as more reliable, according to Saisana & Saltelli (2012). The EPI is also a good quantitative representation as it is focused on environmental issues for which governments can be held accountable, instead of focusing on natural disasters which also affect the environment, but are not anticipated on in environmental policy. Finally, it covers a wide range of countries, only excluding a set of small

countries for which there was not enough data to say something meaningful. Further details on the indicators and how they are measured can be found in the appendix.

The main independent variable, political regime type, is provided by The Economist Intelligence Unit (EIU). The EIU dataset entails a research with the latest data on the extent of democracies worldwide on a scale of 0 to 10. The categorization of political regime type is as following: full democracies (>8), flawed democracies (>6 and <8), hybrid regimes (>4 and <6) and authoritarian regimes (<4). However, this research uses the continuous variable with a scale from 0 to 10 as the main independent variable. The score is based on five categories: electoral process and pluralism, civil liberties, the functioning of the government, political participation, and political culture. Both a dichotomous and three-point scoring system are introduced for the 60 indicators. Further details on the independent variable and how it is measured can also be found in the appendix.

3.3 Control Variables

While the theory focuses on political regime type, it is important to account for alternative factors typically included in models predicting environmental policy. The first of these is wealth, or more specifically income. Wealth should be controlled for as a bidirectional relationship has earlier been found between renewable energy solutions and wealth (Aspergis & Payne, 2010; Aspergis et al., 2010). The generation of renewable energy solutions requires other, more expensive instruments, therefore a positive correlation between wealth and environmental performance, measured in renewable energy solutions, was found. Wealth can also cause an increased focus on environmental policy fronts as it decreases on other policy fronts (McCloskey, 1983; Payne, 1995). However, a higher income per capita is also known for its strong positive relation with democracy (Lipset, 1959). Therefore, the analysis takes income, measured as GDP per capita, into account as a control variable.

Another factor that might affect environmental policy performance is the amount of natural resources within a country. Within the natural resource curse literature, various scholars argue that natural resource abundance has a negative effect on democratic institutions (Sachs & Warner, 1995; Ross, 2001). The underlying assumption is that resource abundance makes institutions corrupt, discourages governments to initiate a diversified economy, and the export of the country becomes uncompetitive. The expectation is that countries that enjoy higher amounts of natural resource revenues are reluctant in their environmental performance as the government is discouraged by the income that the natural resources generate. Also, the

extraction of natural resources such as fossil fuels, have a harmful effect on the environment. The expectation is that the income generated by natural resources is considered to be more important to the government than the protection and perseverance of the environment. The amount of resource revenues will be measured as the contribution of natural resources to the economic output of a country in percentage of GDP.

Trade liberalization as a potential explanatory factor of a country's environmental performance is in line with the previous two control variables. Trade liberalization mainly refers to the decline in trade costs, which can also lead to lower environmental taxes (Li, Xing & Yu, 2018). Rauscher (1994) linked trade liberalization to 'ecological dumping', defined as governments attempting to subsidize manufacturers by implementing loose environmental policies, in order to sell products to foreign markets at lower prices. Another form of 'ecological dumping' through trade liberalization is the exchange of profits between exporting countries through sacrificing the environment collectively. On the other hand, Copeland and Taylor (2003) empirically conclude that free trade will shift pollution-intensive goods production from poor countries with neglecting environment regulation to rich countries with stringent regulation, thereby lowering worldwide environmental damaging. Trade liberalization is potentially able to affect the country's performance on environmental policy and is therefore interesting to take into account. The variable will be measured as the amount of trade as percentage of GDP within a country, to see how open a country is to international trade. For this the value of total imports and exports is divided over the GDP within a country.

Urbanization of the country is another factor that contributes to the commitment of states to environmental programs as Agthe, Billings and Marchand (1996) argue. A positive correlation was found earlier between urbanization, energy consumption and carbon emission (Wang, Chen & Kubota, 2016). Bai, et al. (2017) further looked into the implications for environmental policy performance of increasing urban areas. The conclusion was that there indeed is a link between high population densities and environmental impact in the form of local mismanagement of environmental problems (Bai, McPhearson, Cleugh, Nagendra, Tong, Zhu & Zhu, 2017). Therefore, urbanization will be used as variable within the analysis as the percentage of the total population that lives in urban areas.

The fifth factor that is taken into account controls for the level of corruption in the country. Corruption plays an important role in the formulation and implementation of various policy fronts, as it determines where the government will focus on (Damania, Fredriksson & List, 2003; Pellegrini & Gerlagh, 2006). The expectation here is that corruption will reduce environmental performance. Damania, Fredriksson and List (2003) argue that less corruption

would imply a greater focus on social welfare and public goods such as the environment. Also, in highly corrupt political communities, policy is shaped through bribery, and unorganized groups have little influence on the formulation and output of environmental policies. An empirical relationship was indeed found in which lower levels of corruption were associated with stricter environmental regulation policies (Damania, Fredriksson & List, 2003). Pellegrini and Gerlagh (2006) found that the variable corruption also plays into the main independent variable regime type, as countries with a history of democratic rule tend to be less corrupt. Therefore, the rate of corruption will be taken into account in the analysis, measured with the Corruption Perceptions Index (CPI).

The final factor that potentially affects the outcome of the environmental policy is the commitment to international agreements from states (Cortell & Davis, 2000). As environmental issues are often transnational problems that reach beyond the borders of a country, the international community will have an influence on the domestic policy towards these issues (Mbatu, 2014). The Kyoto Protocol from 1997 is such a multilateral environmental agreement. The initiative from the United Nations gave developed countries the so-called ‘flexibility’ to invest in green development projects in developing countries in order to meet their own emission targets (Mbatu, 2014). With quantifying the individual ratification to the Kyoto Protocol the analysis aims to control for the impact of international environmental agreements towards domestic performance on the environment.

Table 1. Descriptive statistics of all variables

Variable	N	Minimu m	Maximum	Mean	SD
Environmental Performance Index (EPI)	311	22.60	82.50	49.30	13.72
Democracy score (EIU)	333	1.08	9.87	5.46	2.23
Regime type	333	1.00	4.00	2.28	1.07
GDP per capita (current US\$)	365	261.25	114707.59	13885.43	19048.53
Total Natural Resource Rents (% of GDP)	369	.000	54.92	7.72	11.28
Trade (% of GDP)	352	17.93	404.77	91.74	55.36
Urban population (% of total population)	391	10.64	100.00	58.27	23.66
Corruption perceptions Index	355	9.00	93.00	41.68	20.02
Kyoto Protocol Ratification	374	.00	1.00	.99	0.05
Progression on EPI	129	-27.75	22.19	-2.78	11.84
N	258				

3.4 Regression Models

The first five models regress environmental performance against regime type and produce the findings with clustered standard errors, controlled for country, region and time fixed effects. Models five through ten are the same with control variables added to the analysis. For each country, two observations almost a decade apart, are included in the dataset. Therefore, all models, except for the ones including country fixed effects, include the clustered standard errors (CSE). Through CSE the standard errors of the effect on environmental policy performance are measured more precisely, as the two observations are clustered within each country.

The purpose of fixed effects is picking up a correlation that is specific for a certain country, region or year. With these effects there can be controlled for omitted variables that might be influencing the model (Beck & Katz, 2001). Through adding fixed effects to the analysis, the possibility that the model contains omitted variable biases is reduced. However, omitted variables can also influence a model in different ways depending on which variable is included in the analysis. As the dataset includes variables that change rapidly over time and variables that hardly or do not change over time, it is justified to use several fixed effects as not every effect can say something meaningful about each variable (Beck & Katz, 2001).

Country fixed effects are able to control for large shifts in variables, which happens a lot within the timeframe of ten years for rapidly changing variables such as GDP, trade or urban population. However, with controlling for these constantly shifting variables it will probably destroy the effect on variables that hardly change. Thus, by controlling for largely shifting variables with a country fixed effects model, the time invariant variables will not perform well. Therefore, a time fixed effects model will also be included to cover all bases. The variables that should be focused on when including the time fixed effects, which behaviour hardly changes over time, are democracy, regime type, natural resources as percentage of GDP and the ratification to the Kyoto protocol. When a time invariant variable does change, there is more to it, which will be controlled for with the time fixed effects. Region fixed effects are able to help control for discrepancies between regions, or the volatility of certain variables within regions. For example, democracy or urban population is probably much more likely to shift in sub-Saharan Africa than in Western Europe. To summarize, to interpret the effect of the different variables, the focus should shift to the appropriate model that fits the specific dynamic of the variable, rather than analysing all variables in each model. In order to cover each variable according to the suitable level of analysis, ten analyses are conducted as presented in table two.

In the final two models presented in table two, the dependent variable changes to the country’s progression on environmental performance between the two observations from the year 2010 to 2019. The descriptives for this constructed variable can also be found in table one. The two points in time are almost a decade apart and will show insights if democracy also had an impact in the development of environmental performance over time. The focus in model 12 is on the categorical variable regime type to gain insight in which regime, if any, had a significant impact in the development of the dependent variable. If democracy has besides a significant effect on environmental performance, also a significant effect in how the variable developed over time, the hypothesis is strongly supported. The final two models do not include fixed effects as only the time-invariant variable democracy will be taken into consideration here. Besides, the clustered standard errors account for the two observations per country in the dataset.

Table 2. OLS regression models for environmental performance

Model	Variables			
Model 1	Dependent Variable		Independent Variable	
Model 2	Dependent	Independent	Country FE	
Model 3	Dependent	Independent	Region FE	
Model 4	Dependent	Independent	Time FE	
Model 5	Dependent	Independent	Country FE	Time FE
Model 6	Dependent	Independent	Control variables	
Model 7	Dependent	Independent	Control Variables	Country FE
Model 8	Dependent	Independent	Control Variables	Region FE
Model 9	Dependent	Independent	Control Variables	Time FE
Model 10	Dependent	Independent	Control Variables	Country FE Time FE
Model 11	Change in dependent over time		Independent	
Model 12	Change in dependent over time		Categorical indepenent	

4. Empirical Findings

4.1 Regression Analysis

Table 3. OLS linear regression models for environmental policy performance on cross-country data

	Model 1	Model 2	Model 3	Model 4	Model 5
(Constant)	25.824*** (1.622)	27.125* (9.687)	26.355** (1.815)	28.872*** (1.792)	30.580** (9.548)
Democracy	4.219*** (.286)	-.570 (1.532)	2.626*** (.335)	4.151*** (.284)	-.789 (1.498)
Country FE	No	Yes	No	No	Yes
Region FE	No	No	Yes	No	No
Time FE	No	No	No	Yes	Yes
CSE	Yes	No	Yes	Yes	No
R ²	.444	.832	.606	.474	.871
Adjusted R ²		.613			.631
N	291	291	291	291	291

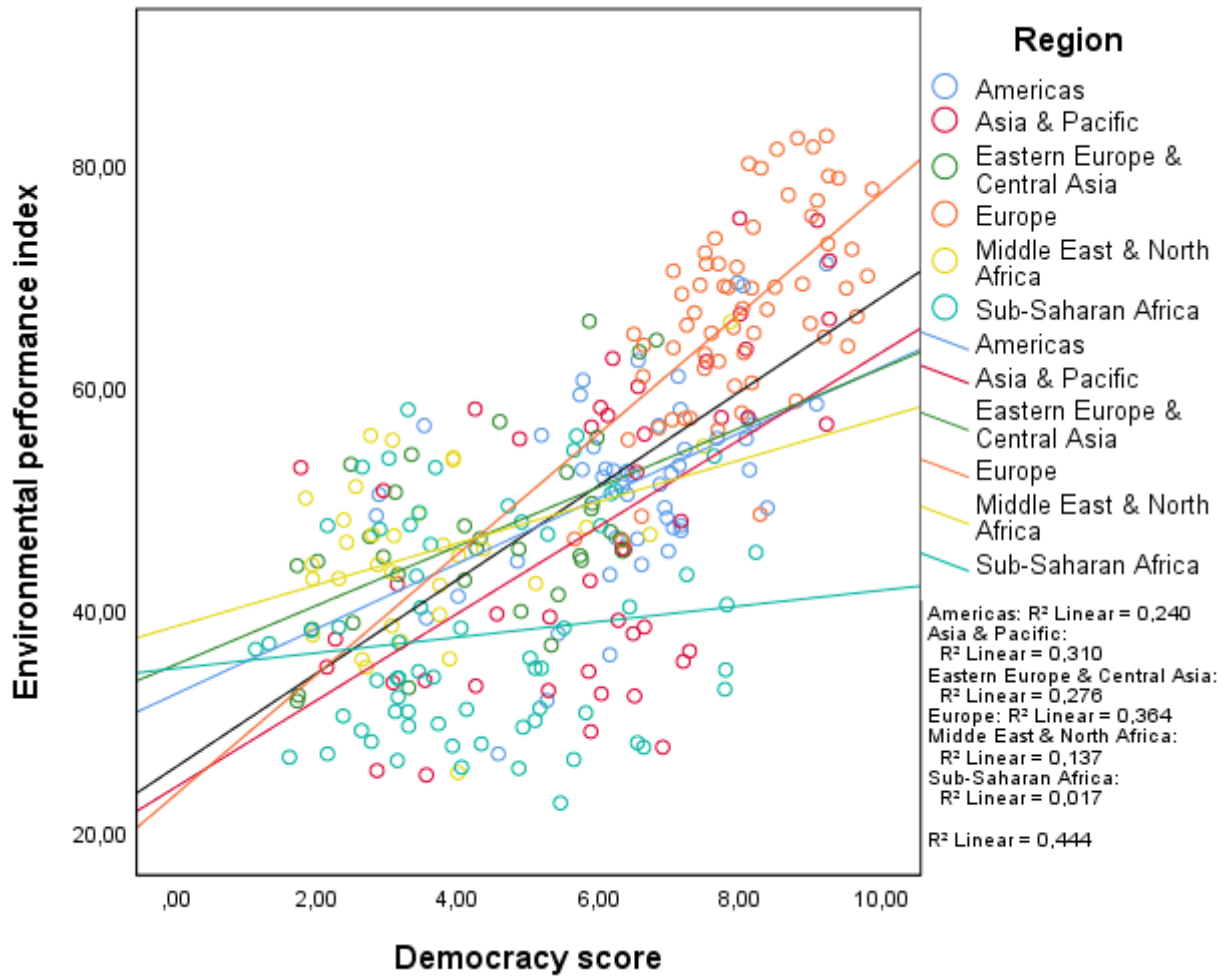
*Note: Linear regression coefficients with standard errors in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$*

Table 4. OLS linear regression models for environmental policy performance on cross-country data including control variables

	Model 6	Model 7	Model 8	Model 9	Model 10
(Constant)	32.895*** (2.870)	155.145*** (38.897)	45.089*** (3.341)	39.367*** (3.163)	203.741*** (50.235)
Democracy	2.169*** (.457)	-.130 (1.346)	1.299** (.452)	1.846*** (.454)	.046 (1.333)
GDP per capita (current US\$/100)	.030*** (.006)	.079 (.330)	.020*** (.005)	.029*** (.006)	.013 (.020)
Natural resource rents (% of GDP)	-.195** (.060)	.079 (.060)	-.107 (.059)	-.222*** (.053)	.279 (.343)
Trade (% of GDP)	-.001 (.015)	.159** (.046)	-.012 (.010)	-.001 (.015)	.134** (.048)
Urban population (% of total population)	.116*** (.031)	-1.123*** (.285)	.083* (.038)	.111*** (.030)	-1.572*** (.368)
CPI	-.059 (.051)	-.484** (.139)	-.016 (.040)	-.024 (.048)	-.571*** (.145)
Ratification Kyoto Protocol	-2.871* (1.261)	-6.871 (10.076)	-8.512 (1.694)	-5.454*** (1.080)	-2.774 (10.188)
Country FE	No	Yes	No	No	Yes
Region FE	No	No	Yes	No	No
Time FE	No	No	No	Yes	Yes
CSE	Yes	No	Yes	Yes	No
R ²	.605	.898	.680	.638	.902
Adjusted R ²		.753			.759
N	258	258	258	258	258

Note: Linear regression coefficients with standard errors in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Figure 1. Scatterplot of Environmental Performance Index against Democracy Score per Region



4.2 Empirical Findings

The results of the linear regression analysis are listed in table three and table four. In this section, each model will be shortly reflected on. Starting with the standard models without any fixed effects, only the clustered standard errors: model one and model six. The correlation in model one closely corresponds with the theory. When the level of democracy presents the value of zero, thus a full autocratic regime, the environmental performance will be on average 25.83, which is quite low on the scale of 0 to 100. The correlation between the level of democracy and environmental policy performance within a country is found to be statistically significant at the 99.9% threshold ($p < .001$). As the effect is positive, the more democratic a country is perceived by the Economist Intelligence Unit, the better it performs on the environmental policy implementation, according to the Environmental Policy Index. If the score on democracy increases one unit on a ten-point scale, the performance on environmental

policy as measured by the EPI, increases with 4.22 units on a 100 point scale. The R^2 value shows that 44.4% of the environmental policy performance can be explained through the independent variable, democracy. As the R^2 value is not that high, several control variables will be added from model six onwards to seek for a higher explanatory value. The R^2 value could further be explained through a weak correlation or many independent errors, but as the assumptions have been checked, this is unlikely to be the case.

With the inclusion of several control variables in model six, table four, the democracy variable remains statistically significant ($p < .001$). However, the effect decreases. As the score on democracy increases with one unit, the score on environmental performance now increases with only 2.17 units. The explanatory value of the model, on the other hand, increases from 44.4% without the control variables, to 60.5% including the control variables. This indicates that not only democracy has a significant influence on environmental performance. However, not all the effects produced by the control variables in model six confirm the theory and literature as discussed. Trade liberalization and corruption rate do not have a significant effect on the environmental policy performance ($p > .05$). Nevertheless, four other control variables have a significant effect on environmental policy performance.

Starting with GDP per capita as statistically significant on environmental policy performance ($p < .001$), confirming the theory that country wealth strengthens its focus on environmental policy objectives and implementation. One unit increase in GDP per capita in US\$ affects the environmental performance on average with an increase of .03 units. Secondly, the percentage of natural resource rents on the country's GDP also has a significant effect on environmental policy performance ($p = .003$), however negative. As predicted by the theory, the more dependent the country is on natural resource rents as part of the GDP, the more likely the government is to be reluctant in their environmental policy performance. The effect in table four presents one unit increase in percentage of GDP in natural resource rents, results on average in a decrease of .20 units on the environmental performance scale. Thirdly, urbanization also has a significant positive effect on the environmental performance ($p = .001$). Urbanization would cause more environmental problems due to the link between high population densities, energy consumption and carbon emission. However, the correlation is weakly positive and significant. One unit increase in the percentage of the population living in urban areas results in 0.12 units increase in the environmental performance index, both on a scale from 0 to 100. Also, the ratification with the Kyoto Protocol has a significant effect on the environmental performance index, however negative ($p = 0.022$). As the variable for ratification is binary, a change from 0 to 1 results on average in a decrease of 2.87 on the 100-

point environmental performance scale, contrary to the theory. However, as the cross-country dataset also includes a time series, the cases are not independently selected and a correction for several variables should be made.

In models two and seven the countries are treated as independent variables in the analysis to control for country fixed effects, , the latter also including control variables. This takes away everything that is common between the observations over the years for one single country. Through adding country fixed effects the possibility that the model contains omitted variable bias is reduced. In the second and seventh model of the regression analysis, the effect of democracy on environmental performance is no longer statistically significant ($p = .710$; $p = .924$) at the 95% threshold. Country fixed effects largely take away the variation of rapidly moving variables and do not take the slowly moving variables into account with this, therefore destroying any effect on the democracy variable. The insignificance is thus largely explained by democracy as a slowly moving variable within the timeframe, whereas these models control for the variance in constantly shifting variables.

Models three and eight perform the same analysis as the previous models, but now including each region as an independent variable in the model instead of each country. The coefficients of the regions differ majorly as visualized in figure 1. Europe's coefficient is quite steep, while the coefficient for sub-Saharan Africa shows a weak correlation between democracy score and environmental performance. The variation between the general regression line and the region specific regression lines can be caused by various outliers resulting in a mean that does not completely reflect the global dataset, which can also be seen in figure 1. Both model three and model eight correct for these broad differences between the regions, in which the effect of democracy on environmental policy reduces compared to the standard model, but remains significant at the 99.9% threshold in model three ($p < .001$) and at the 99% threshold in model eight ($p = .005$).

The fourth and ninth model correct for the time order that is found in the dataset, as the cases are not randomly selected across time. Adding time fixed effects controls for the possibility of rare events in time that affect time invariant variables. The data points in time concern the year 2010 and 2019, almost a decade apart. When controlling for time-fixed effects, the coefficient of the score on democracy lowers but remains statistically significant in both models without and with control variables ($p < .001$; $p < .001$). With the inclusion of the control variables the explanatory value of the model rises from 47.4% to 63.8%. Model nine hands the most interesting results for this research, as democracy hardly changes over time and is hereby corrected for while remaining its significant effect on the environmental policy performance.

The final models in each table, respectively models five and ten, include both the country and the time fixed effects, assuming that country-specific variables grow or decrease over time. Including both country and time fixed effects accounts for the fact that each country has a different democratic trajectory. The country specific time trends show no significant result for environmental policy performance at the 95% threshold in model five ($p = .599$). Also in model ten, democracy has no significant effect on the dependent variable at the 95% threshold ($p = .972$). This is again due to democracy being a time-invariant variable, whereas country fixed effects takes away the variation that remains somewhat constant. Hence the effect of democracy on environmental performance is no longer significant.

Of the ten models as presented in table three and four, which one explains the environmental performance of a country best? Models two, five, seven and ten, including country fixed effects, present the highest explanatory value. However, as the score on democracy varies little over time it cannot be used as an explanatory variable within a country fixed effects model, since the effect of democracy is then 'controlled' for with the fixed effects. As this paper aims to estimate the effect of democracy on environmental performance, the focus will be on the model that captures the effect of democracy best. A model without country fixed effects is then far superior for assessing the impact of democracy on environmental performance, despite the high explanatory value of the models with country fixed effects. Model nine, on the other hand, including both time fixed effects and clustered standard errors gives the better insight in the significant effect of democracy on environmental performance. Clustered standard errors control for the two observations that are added for each country in the dataset, whereas the time fixed effects control for the rare events, such as a revolution, that might affect the time-invariant independent variable. In this model the environmental performance increases on average with a 1.85 unit on the hundred-point scale as the democracy scores increases 1 unit on a ten-point scale ($p < .001$). Furthermore, the explanatory value of the model is 63.8%. Based on model nine, the conclusion is that democracy score has a significant positive effect on environmental performance. However, time fixed effects are still not the optimal way for assessing the impact of democracy on environmental performance. Time fixed effects clearly provide more insight in the dynamics of the variable compared to country fixed effects, but should still be interpreted together with the standard model, model six, to provide support to the hypothesis.

4.3 Time Series Analysis

Table 5. OLS linear regression models for the progression on environmental policy performance (EPI2019-EPI2010) against the 2010 democracy score

	Model 11	Model 12
(Constant)	-17.049*** (3.108)	-6.299** (2.001)
Democracy 2010	2.416*** (.461)	
Regime type 2010 (ref. autocratic regime)		
Hybrid regime		3.229 (2.876)
Flawed democracy		2.845 (2.477)
Full democracy		15.882*** (2.531)
R ²	.191	.301
Adjusted R ²	.185	.284
N	127	127

Figure 2. Scatterplot of the regression in model 1 of environmental performance index against democracy score per year

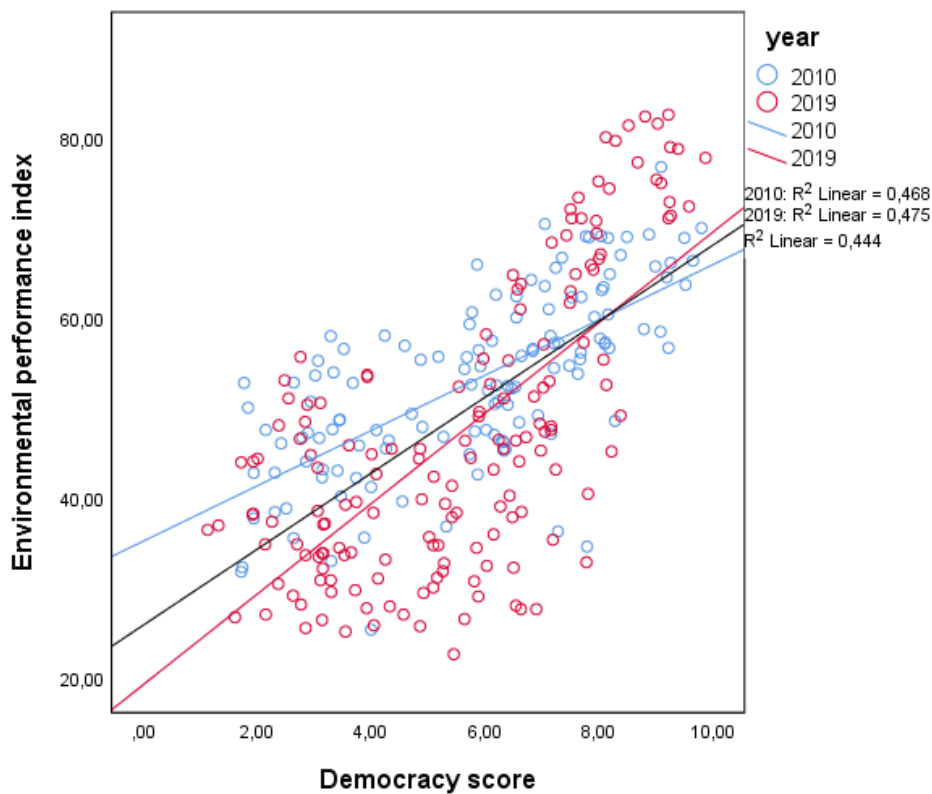
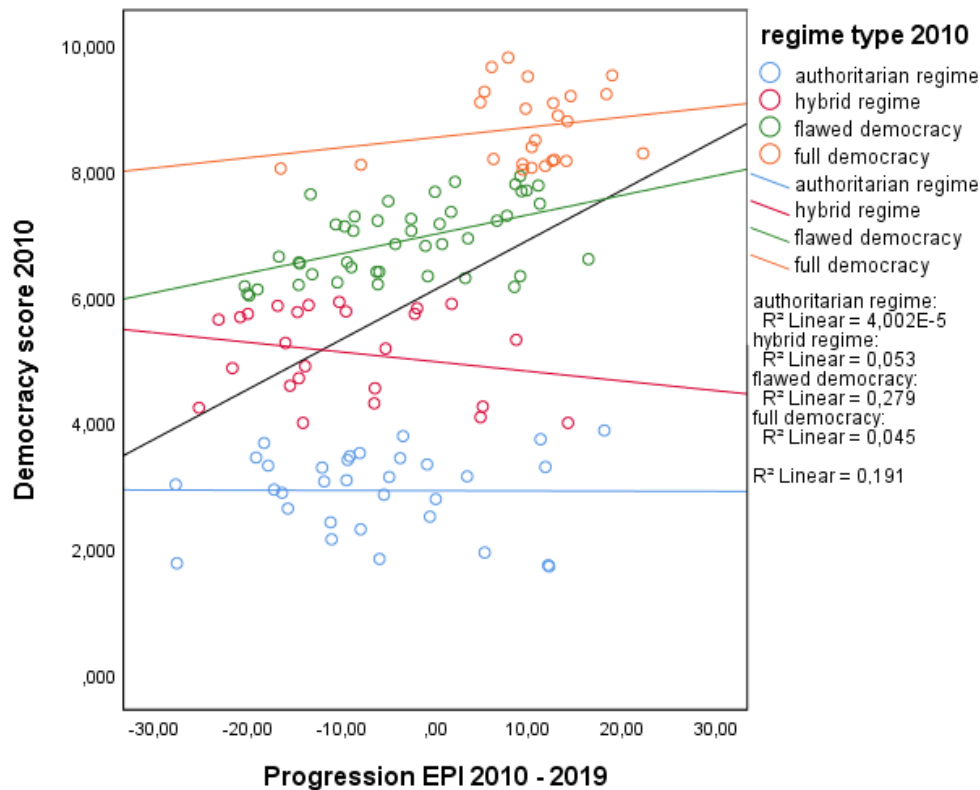


Figure 3. Scatterplot of 2010 democracy score against the progression on environmental performance between 2010 and 2019 per regime type



4.4 Time Series Findings

When the dependent and independent variables are analysed against different points in time the regressions does not differ tremendously. The regression lines in figure 2 present the variation between the years 2010 and 2019 of the regression in model one, table three. The change over the years between the different regression lines is what will be further looked into. As shown in figure 2, the results of almost a decade earlier already show a positive significant relationship between environmental performance and level of democracy. To see if there is more to the correlation between democracy and environmental performance, a new variable is created that measures the change in environmental performance over the years. If democracy remains its significant effect on the progression in environmental performance, the hypothesis stating the impact of regime type is strongly supported.

In model 11 and 12 the progression in environmental policy performance between 2010 and 2019 is measured and analysed against the score of democracy in 2010. In model 11 when the value of democracy is zero, meaning a full autocratic regime, the environmental performance scores on average a decrease with 17.05 units over the period from 2010 to 2019,

statistically significant at the 99.9% threshold. One unit increase in the democracy variable on a scale from 0 to 100 changes the environmental policy index on average with an increase of 2.42 units over time, also statistically significant at the 99.9% threshold. In model 12 dummy variables of the democracy score of 2010 are added in which the different regime types become clear, which is visualized in figure 3. A significant decrease of 6.299 units reflects the average of autocratic regime types at the 99% threshold from 2010 to 2019 in environmental performance, as this is the reference category. The only significant result at the 99.9% threshold is the effect of full democracies compared to autocracies, with an increase of 15.882 units in environmental performance over time. From the statistically significant strong result can be concluded that democracies indeed perform better on the implementation of environmental policies over time compared to autocracies. However, no conclusion can be drawn on the impact of hybrid regimes and flawed democracies, as they are both found to be insignificant on the progression in environmental performance.

Despite the low explanatory values of both models 11 and 12, respectively 18.5% and 28.4%, the progression and decline of the different regime types over time support the general hypothesis. Not only perform democracies significantly better on environmental policies at two different points in time, they also progress significantly better *over* time. Both these models thus increase the support for the hypothesis of this paper, in which democracies affect environmental performance significantly. This is empirically proven at two points in time, 2010 and 2019, as well as over a period of time. The time series findings support the hypothesis in which the more democratic a government is, the closer the country is to their established environmental policy targets.

5. Conclusion

The empirical analysis, in line with the theory, shows statistically significant and positive coefficients when democracy is considered as an explanatory variable for environmental performance (model 1). The explanatory value increases even more when several control variables are added to the model (model 6). However, the inclusion of additional control variables decreases the magnitude of the democracy coefficient (table 3). Moreover, controlling for country fixed effects renders the democracy variable statistically insignificant (models 2, 5, 7 and 10). However, the issue of insignificance of the democracy variable can be explained through the time-varying variables that are controlled for, destroying the effect of the slowly moving democracy variable. Although country fixed effects can control for omitted

variables that may influence the model, it is not the best way to analyse an independent variable that does not vary temporally. The time fixed effects analyses, which include clustered standard errors, compensate for this effect and remain a significant coefficient on the democracy variable (model 4 and 9). However, as time fixed effects are still not the most optimal way to analyse the regression of democracy against environmental performance, model six should be taken into account as well. Both models confirm the theory that democracy has a significant positive effect on environmental performance within a country.

Supporting the theory even more, the time series analysis also showed that the independent variable has a significant effect on the change in the dependent variable over time. Model 12 in table 5 shows that democracies significantly progress more on the environmental performance index compared to autocracies. However, the explanatory value of the final two models (11 and 12) is low, meaning that control variables should be added in order to make separate conclusions on these models. Based on the given significant findings, the preliminary conclusion can be made that regime type, and especially democracy, affects both the outcome of environmental performance within a given year, as well as the progression of a country on environmental performance over a decade of time.

There are several aspects of democracies that jointly explain the causal relationship between democracy and environmental performance: democratic objectives, the democratic rights and freedoms, the responsiveness of the government and the environment perceived as a public good. First, the democratic ideals and objectives to which governments tend to hold on to. The first of these aims for environmental welfare, making the achievement of environmental targets a priority in policymaking and implementation (McCloskey, 1983; Payne, 1995). In combination with the objective of economic welfare, the instruments to carry out the environmental policy are more likely to be available in democracies. Secondly, the free flow of information in democracies enables the exchange of ideas and knowledge. The more knowledge on a complex subject such as environmental policy, the more potential the government has to address the issue best (Pelligrini & Gerlagh, 2006). This adds to the third mechanism, the responsiveness of the government. With citizen freedoms such as the freedom of the media and the availability to information also comes the ability to engage with governmental issues and check the government on their environmental policy. Perhaps more importantly, democracies also have more responsiveness towards the international community and will thus comply more easily to international agreements, concerning transnational issues such as the environment (Congleton, 1992; Neumayer, 2002). Finally, the environment is perceived as a public good. Democracies are found to provide more efficient solutions to the provision of public goods,

such as environmental issues. As democracies need broader support from the population compared to autocracies, which can potentially be achieved through serving the population in the provision of public goods (McGuire & Olson, 1996; Deacon, 1999). These theoretical mechanisms are in line with the findings of this research and support the argument in which the more democratic a government is perceived to be, the closer the country will be to their established environmental policy targets.

What this research mostly contributes to the literature is the empirical evidence of the impact of ‘politics’ rather than ‘economics’ on the environmental performance of countries. Environmental problems are often considered to be economic in origin, as industrial producers are on numerous occasions blamed for the impact on climate change or the increasing soil degradation, the loss in biodiversity, the increased air pollution, a decline in coastal and high sea fisheries and so on (Congleton, 2003). This research empirically analysed another explanatory factor that is ultimately responsible for the environmental situation, politics. This is explained as governments and their policies that frame the decisions of firms and consumers that generate environmental pollution, such as the ban on single-use plastic bags. Regime type, and especially democracy, has a significant positive effect on environmental performance within a country, therefore it is part of the explanatory mechanism on how well environmental policy is carried out.

6. Discussion

Despite the effort to include several possible scenarios in the research, there is room for improvement. To start with the mechanisms that add to the enabled environment for democratic governments to carry out their environmental policies: the responsiveness to the international community and wealth. Responsiveness to the international community was included in the analysis as ratification to the Kyoto Protocol, as the most prominent international agreement between international actors on environmental policy. The variable ratification to the Kyoto Protocol showed a significant result for time fixed effects and clustered standard errors as a slowly moving variable. However, there was not much focus on while interpreting the results. The same applies to the mechanism that mentions wealth as boosting the ability to focus on policy fronts such as the environment and handing the required instruments to implement environmental policy. As a rapidly changing variable it did not remain significant when country fixed effects were added, while it was significant with the region and time fixed effects

including standard errors. This is something that should be looked further into in future research.

Further, the research shows a significant effect of democracy on environmental performance which could be supported with more robust findings. As indexes are used to determine the proxies for the dependent and independent variables, they are replaceable with other variables. As there will not be major differences expected between different measurements of the same variable, it could strengthen the outcome or falsify the significance presented in this research. There are many variables that look at the score of democracy in countries worldwide that could be included in the research, or different measures for environmental policy implementation. Through adding more proxies to the research, the robustness of the conclusions is strengthened. Also, through adding more or other control variables the explanatory value of the model could increase and add to the understanding of the outcome of environmental policies. However, the control variables cited in this study are theorized as the most important ones yet. The control variables that showed a statistically significant result for environmental performance are democracy, natural resource rents, trade liberalization, urban population, corruption and the ratification to the Kyoto Protocol. Although these variables already add to the explanatory value of environmental performance, there is more to it that should be researched.

Finally, it is rather difficult to determine whether or not to include fixed effects (Beck & Katz, 2001). Therefore, this research also somewhat engaged with the discussion when to analyse fixed effects and what influence they have on the models. As democracy is the most important independent variable in this research, the country or region fixed effects do not add to the explanation of the effect of democracy. If anything it destroyed the significance on environmental performance. Although fixed effects can reduce the omitted variable bias that influence the model, they also might influence the model by itself. Fixed effects need a case by case determination if it adds to the explanatory value of the model or not. That is also why time fixed effects were more highly valued for the time-invariant variables such as democracy. Fixed effects are still a highly debated topic, but this paper argued in line with Beck and Katz (2001) that country fixed effects are not always the right choice for time-series cross-section data with a continuous dependent variable. This is supported by the conclusion arguing that models six and nine capture the effect of democracy on environmental performance best, without the country fixed effects.

To conclude, the result suggests a preliminary positive significant effect of democracy on environmental performance compared to the policy objective within a country. Democracies

are also found to be statistically significant in the change of environmental performance over time. Therefore, democracy has a serious impact on a country's performance relating to the environmental policy implementation, which should be taken into account in future studies.

7. References

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