7. ARE RICH COUNTRIES' DEMOCRATIC INSTITUTIONS KEY TO FAVOURABLE ENVIRONMENTAL POLICIES TOWARD DEVELOPING COUNTRIES?

7.1 INTRODUCTION

Rich countries affect the development perspectives of poor countries through many policies. Some of these policies have an articulated goal of supporting these countries, the most notable example being foreign aid. However, other policies also affect developing countries either positively or negatively. The Commitment to Development Index (CDI) has been constructed to measure the wide range of these policies and rank a group of rich countries from this perspective.

This chapter focuses on a specific subset of these policies that affect the environment in developing countries. It builds on a prior research by Faust (2008) in which the author hypothesized that "higher rates of democratic voice and accountability in rich countries should provoke more development-oriented foreign policies" (p. 384) and supports the hypothesis empirically, using the CDI as a dependent variable. We narrow the research question down and ask whether more democratic countries tend to have higher scores in the environmental component of the CDI controlling for other factors. Compared to the original research, we extend the time period up to 2009. Having panel data for a nine-year period (2001–2009) and 21 countries, we obtained 189 observations.[1] In contrast to the classical linear regression model applied in the previous work (Faust, 2008), we have run a fixed effects model (Hill et al., 2008) in order to account for heterogeneity of the analysed countries.

[1] CDI results have been published since 2003. For each CDI year most of the underlying data go two years back (e.g., data for CDI 2011 mainly come from 2009). In our research we used the same procedure for independent variables.

The chapter is organized as follows. After an introduction of the CDI and its environmental component (Section 1), we present a theoretical background on the relation between democracy and environmental protection (Section 2). What follows is a description of independent variables (Section 3) and an econometric estimation (Section 4).

7.2 COMMITMENT TO DEVELOPMENT INDEX AND ITS ENVIRONMENTAL COMPONENT

The Commitment to Development Index is an aggregate indicator that attempts to measure policies of rich countries that support or hinder the development of poor countries. The index was constructed in 2003 by the Center for Global Development (Birdsall and Roodman, 2003) and has been published annually since then. Over time, the methodology of the index has been revised several times; see Roodman (2011) for the most recent methodology.

The CDI is composed of seven components: aid, trade, investment, migration, environment, security, and technology. Each of the seven components consists of several sub-indicators. Rather than a complete description of each component, we provide a brief snapshot of three of them. The aid component assesses both quantity and quality of aid (e.g. aid given to poorest countries is considered more beneficial than aid given to relatively less poor countries) and computes its share in the donor's GNI; the trade component measures the level of trade openness/protectionism toward developing countries' export; and the migration component evaluates policies toward immigration from developing countries. It should be noted that though the stated aim of the CDI is to measure *policies*, it sometimes goes beyond to measure *outcomes* (i.e., outcomes of both policies and other factors that affect the outcomes). For example, the indicator of immigrant inflow as a percentage of a country's population (security component) is clearly not a policy but an outcome of many factors, one of them – likely the most important – being an immigration policy. The seven components are weighted equally in the final index. The value of each component is scaled to a 0–10 range with an average of 5 for the CDI base year 2008. Currently the index is calculated for 22 countries – all members of the OECD Development Assistance Committee (DAC) except Luxembourg.

The environmental component of the CDI was constructed in 2003 (see Roodman, 2003) along with the whole CDI and has gone through several methodological revisions since then. One of these revisions has been made based on a proposal of Cassara and Prager (2005) of the World Resources Institute. The current structure of the environmental component is summarized in Table 7.1.

Table 7.1: Environmental component of the CDI

Area	Indicator
Global climate (60%)	Greenhouse gas emissions plus carbon equivalent of fossil fuel production per capita (10%)
	Average annual change in greenhouse gas emissions per unit of GDP, last 10 years (15%)
	Gasoline taxes in PPP dollars per litre (15%)
	Consumption of ozone-depleting substances per capita (10%)
	Ratification of the Kyoto Protocol (10%)
Fisheries (10%)	Fishing subsidies per capita (5%)
	Ratification of the UN fisheries agreement (5%) *
Biodiversity and global ecosystems (30%)	Reporting to multilateral treaties relating to biodiversity (15%)
	Value of tropical timber imports per capita (15%)

Note: * United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks.

Source: Roodman (2011)

The sub-indicators of the environmental component are scaled to a 0–10 range with an average of 5 for the base year of CDI 2008.[2] Interestingly, weighting of sub-indicators within the environmental component (as well as

[2] This is actually true only for seven out of the nine indicators. For the two other indicators of ratification, a value of 10 is given for ratification and 0 for non-ratification, so the average in each year depends on the policies of all countries. Since most of the countries have ratified these agreements, the average value of the environmental component in CDI 2008 is 5.68 instead of 5.00.

within other components) is different from the weighting of the other seven components of the CDI. While equal weights have been applied in the final weighting of components, sub-indicators within each component have different weights. The weights given to sub-indicators of the environmental component (and to each of the three areas) were allocated by David Roodman based on his expert judgment.

7.3 DEMOCRACY AND THE ENVIRONMENT

The potential effects of democracy on the environment have been discussed by researchers and politicians since the 1960s. Early findings were rather sceptical about the link between democracy and environmental protection. The shift emerged in the 1990s in both the political arena and theoretical research. Payne (1995) presented a set of arguments why democracy is beneficial for the environment. To sum the most important ones, in democracies freedom of information (freedom of speech and free press) leads to the establishment of environmental interest groups and increased public awareness about environmental issues. Since democratic governments are accountable to their citizens, they are more likely to respond to the environmental concerns of their people and act accordingly. This theory is sometimes explained jointly with the Environmental Kuznets Curve (EKC) hypothesis (see Barrett and Graddy, 2000). According to the hypothesis, as income per capita rises, people are willing to substitute part of material goods for non-material aspects of their lives, including environmental quality. Demands for higher environmental quality are realized through the political system.

In recent literature, most of the theoretical studies on the relation between democracy and the environment have presented arguments that relate mainly to the **domestic environment**. There is a significant amount of empirical research in this area, usually testing the role of democracy (and income) on a few environmental variables. Such research, however, shows mixed results; there is evidence that democracy leads to improved environmental variables, that it worsens them (see Li and Reuveny, 2006, for a list of arguments on both sides) or that there is no significant relationship. For certain types of environmental variables, such as sulphur dioxide, nitrogen oxides, and heavy particles, the analyses usually lead to a conclusion that higher levels

of democracy improve environmental quality.[3] A strong positive impact of freedom and democracy is usually found for those environmental variables that relate directly to human health (Barrett and Graddy, 2000).

Midlarsky (1998) claims that results may vary depending on how one defines democracy, arguing that levels of democracy vary across countries; no positive relationships were found if defined in a broad sense, while the analysis shows a positive effect on environmental protection if defined from the "Western" point of view. Pellegrini and Gerlagh (2006) arrive at a similar conclusion that environmental policies tend to be stricter in high-income well-established democracies. Most authors conclude that economic development is highly significant for environmental protection.

The second strand of research concerns the role of democracy in the **global environment**. This is more relevant to the CDI concept since its environmental component aims to assess countries' behaviour that affects the environment in developing countries. This is related to the degradation of global common resources such as climate stability or stratospheric ozone. These resources are difficult to regulate since they are outside national jurisdictions and may therefore suffer from "the tragedy of the commons" as Hardin (1968) envisaged for unregulated resources. Though nation states usually do not have the will to regulate the use of these resources within their jurisdictions unilaterally, they may agree to multilateral (or rather global) regulation. Democratic countries tend to cooperate more than those less democratic, which is true generally as well as in particular types of cooperation, such as on international environmental issues.

Empirical research on environmental policies with transboundary impacts covers mainly ratification of and reporting under multilateral environmental agreements and participation in environmental international organizations. These studies support the hypothesis that more democratic countries tend to make stronger international environmental commitments.[4] There is much less consensus on the relationship between democracy and external environmental outcomes. Empirical analyses for carbon dioxide emissions (the most important greenhouse gas and therefore the most researched) do not provide clear results concerning the relationship.[5]

[3] See, for example, Barrett and Graddy (2000), who found that for a number of pollution variables (sulphur dioxide emissions, smoke, particulates, arsenic, and lead), an increase in civil and political freedoms improves environmental quality. Torras and Boyce (1998) identified statistically significant effects of democracy on levels of sulphur dioxide, smoke, heavy particles, water pollution, and the percentage of the population with access to safe drinking water for the majority of low income countries. Farzin and Bond (2006) found an association between democracy and lower levels of carbon dioxide, nitrogen oxides, sulphur dioxide and volatile organic compounds. Harbaugh et al. (2002) found statistically significant effects of democracy on levels of sulphur dioxide, smoke, and particulates.

[4] For an analysis of the role of democracy in international environmental commitments (that demonstrate a significant positive impact of democracy) see, for example, Neumayer (2002). Bernauer et al. (2010) provide a summary of other studies in this area and examine a range of factors that affect ratification of international environmental treaties. They conclude that domestic factors such as democracy and income do have a positive impact on ratification behaviour, but international factors (such as involvement in international organizations) have a stronger and more positive impact.

[5] For example, Midlarsky (1998) argues that democracies tend to have higher emissions of carbon dioxide per capita. Carlsson and Lundström (2003) found that the effect of political freedom on carbon dioxide emissions is insignificant. Farzin and Bond (2006) and Li and Reuveny (2006) found that higher levels of democracy are associated (among other indicators of environmental degradation) with lower levels of carbon dioxide emissions. According to Gallagher and Strom (2008), it is the democracy stock (duration and history of democracy) that has a significant effect on the levels of carbon dioxide (and sulphur dioxide) emissions, while the effect of the contemporaneous level of democracy is weak and inconsistent.

7.4 INDEPENDENT VARIABLES

Democracy can be defined and measured in a variety of ways, which is reflected in a number of proxies that can be applied. However, not all of them are appropriate for our type of analysis. One of the most widely-used indicators of freedom (to be loosely interpreted as a level of democracy) is the **Freedom House Index** published annually in the Freedom in the World survey. Freedom is measured in two broad categories: political rights and civil liberties, both discretely scaled from 1 to 7. Most of the rich countries in our sample regularly receive the best possible rating of 1, with only a few exceptions such as Italy and Greece (rated 2 in the field of civil rights in recent years). Moreover, all of these countries are assessed by Freedom House (2011) to be electoral democracies. We therefore do not consider the index to be an appropriate measure as it fails to show the variance among the levels of democracies of the sample countries. Accordingly, we have not used the Freedom House Index as an independent variable and instead we have decided to use other – more continuous – measures of democracy.

Transparency International's **Corruption Perceptions Index** (CPI) measures the degree to which public sector corruption is perceived to exist in countries around the world. The index is based on businesspeople opinion

surveys and assessments from a group of analysts carried out by 10 independent institutions such as the African Development Bank and the World Economic Forum. Countries are ranked on a scale from 10 (very clean) to 0 (highly corrupt) on a more continuous basis. The CPI should not be understood as an indicator of democracy but rather as one of its dimensions. Given its methodology, the CPI is criticized for not being suitable for cross-country and year-to-year analyses and comparisons, which is admitted by Transparency International. Changes in a country's score can result from a change in the perceptions of a country's performance, a change in the ranking provided by original sources or from methodological revisions of the index (Transparency International, 2011). Since this is the only available indicator of corruption, we decided to include it in the regression in spite of this methodological shortcoming.

The **Democracy Index** constructed by the Economist Intelligence Unit (EIU, 2010) provides a better composite measure of democracy. Although the index is a good proxy for measuring democracy, it was produced only recently (in 2006) and therefore we have not used it in our regression.

The quality of democratic institutions may also be proxied by the **Worldwide Governance Indicators** (WGI) constructed under the auspices of the World Bank (see Kaufmann et al., 2009, for the latest results and Kaufmann et al., 2010, for the methodology). The WGI consist of six independent dimensions of governance (voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption). Values of the indices range from –2.5 to +2.5 and higher values indicate higher levels of the specific dimension of governance. In line with Faust (2008), we test our hypothesis on two indices: the voice and accountability index (VA) and the composite index of governance (WGI), which is a simple average of the six indices. The voice and accountability index appears to be a very good proxy for measuring democracy because it captures perceptions of the extent to which citizens are able to participate in selecting government, freedom of expression, freedom of association, and a free media (Kaufmann et al., 2010). Unlike the other dimensions of the WGI that focus on the roles of governments, regulations and laws in the concept of governance, the voice and accountability index measures citizens' possibilities of influencing the political processes and the extent of freedoms they may benefit from.

Descriptive statistics of the overall CDI and its environmental component (Environment) as dependent variables in the regression analysis are presented in Table 7.2. Furthermore, we introduce descriptive statistics of independent variables, both the democracy indices and economic variables such as gross domestic product (GDP), population (POP), and gross domestic product per capita (GDP_CAP).[6]

Table 7.2: Descriptive statistics, N=189

Variable	Mean	Std. Dev.	Min	Max
CDI	5.31	0.97	2.63	7.86
Environment	5.62	1.44	0.96	8.41
VA	1.38	0.22	0.87	1.83
WGI	1.43	0.33	0.50	1.90
Checks	4.07	1.02	2.00	7.00
CPI	7.84	1.41	3.80	9.90
GE	44.49	6.65	32.00	61.20
GDP_CAP	32,175	5,742	21,026	48,800
log_GDP_CAP	10.36	0.18	9.95	10.80
POP	41,800,000	65,300,000	3,835,025	307,000,000

7.5 ECONOMETRIC ESTIMATION

The research by Faust (2008) explained the differences in developed countries' policies that affect developing countries mainly by the level of democracy. The analysis was mainly focused on explaining the overall CDI (i.e., all policies affecting developing countries) rather than its individual components. Although he did run regressions for each of the seven CDI components, he did not go further to present a theory, modify the model and explain the results for each component. With a high correlation of CDI at different points in time and having just four consecutive years of CDI values (2003–2006), Faust applied a classical linear regression model and estimated regression parameters using the ordinary least square method. Thus, he did not take into

[6] GDP is expressed in 2005 USD at purchasing power parity.

account differences among countries, and moreover, he used only average values of the examined variables, thus the time variability was suppressed.[7]

Our paper extends this analysis by focusing on the impact of democracy (and other factors) in order to explain the environmental component of the CDI. More specifically, with nine years of CDI values (2003–2011, i.e., data for 2001–2009) and other explanatory variables for 21 OECD countries, we have created a panel data set consisting of 189 observations.

At the first stage, we supposed that the regression parameters are fixed for all the time periods and are identical for all the OECD countries. We constructed a pooled regression model as follows:

$$CDI_{it} = \beta_1 + \beta_2 D_{it} + \beta_3 E_{it} + e_{it} \qquad i = 1, ..., 21; t = 1, ... 9 \qquad (7.1)$$

where i indicates the OECD country and t indicates the time period, D_{it} is a vector of democracy indices and E_{it} is a vector of economic variables. This model assumes that the errors in all the countries' regression functions (i) have a zero mean, (ii) are homoskedastic, and (iii) are not correlated over time. The ordinary least squares (OLS) estimates of the pooled model (PM) are reported in Table 7.3.

Table 7.3: Ordinary least squares estimates of the pooled model

Variable	CDI - overall		CDI - Environment	
	Coefficient	***P-value***	***Coefficient***	***P-value***
VA	1.295	0.000	1.928	0.010
CPI	0.150	0.006	-0.122	0.287
Checks	0.227	0.000	-0.026	0.820
GE	0.059	0.000	0.104	0.000
log_GDP_CAP	0.568	0.058	-0.134	0.832
constant	-7.066	0.021	0.788	0.902
N	187		187	
Adj. R-squared	0.653		0.290	

[7] The regression parameters were estimated using only 21 observations.

The pooled model explaining the variability in the overall CDI is preferred to the model estimating only the variability in the environmental component (Adjusted R^2 is 0.65 for the overall CDI and 0.29 for its environmental component). As expected, government expenditures are significant at the 1% level in both the models. However, gross domestic product per capita in the log form does not seem to be related to the CDI and the environmental component of the CDI performance. Also, the VA indicator is positive in both the models as expected, at the 5% level. The CPI and Checks are positive and significant at the 1% level only in the first model explaining the overall CDI.

In order to take into account the countries' heterogeneity, we have applied the fixed effects model, where we allowed the intercept for each OECD country to vary, but restricted the slope parameters of democracy and economic variables to be constant across all the countries and time periods. Country intercepts are included to control for the countries' specific differences. The resulting econometric model is:

$$CDI_{it} = \beta_{1i} + \beta_2 D_{it} + \beta_3 E_{it} + e_{it} \qquad (7.2)$$

where β_{1i} represents the intercept for each OECD country, for i = 1, … 21. This specification is also called the least squares dummy variable (or the fixed effects, FE) model. The results are presented in Table 7.4.

Table 7.4: Dummy variable estimation of the fixed effects models

Variable	CDI - overall		CDI - Environment	
	Coefficient	***P-value***	***Coefficient***	***P-value***
VA	-0.632	0.024	0.113	0.834
CPI	-0.172	0.071	-0.478	0.011
Checks	0.091	0.067	0.095	0.326
GE	0.073	0.000	0.104	0.000
log_GDP_CAP	3.692	0.000	10.316	0.000
Australia	-33.509	0.000	-103.948	0.000
Austria	-34.613	0.000	-103.694	0.000
Belgium	-35.145	0.000	-102.686	0.000

Table 7.4: Continued ...

Variable	CDI - overall		CDI - Environment	
	Coefficient	***P-value***	***Coefficient***	***P-value***
Canada	-34.272	0.000	-105.190	0.000
Denmark	-33.235	0.000	-102.979	0.000
Finland	-34.032	0.000	-100.924	0.000
France	-35.034	0.000	-102.387	0.000
Germany	-34.646	0.000	-102.103	0.000
Greece	-35.174	0.000	-102.215	0.000
Ireland	-34.499	0.000	-102.717	0.000
Italy	-35.984	0.000	-102.840	0.000
Japan	-35.862	0.000	-102.876	0.000
Netherlands	-33.641	0.000	-102.877	0.000
New Zealand	-32.366	0.000	-98.598	0.000
Norway	-34.133	0.000	-106.409	0.000
Portugal	-33.636	0.000	-99.001	0.000
Spain	-34.097	0.000	-101.963	0.000
Sweden	-33.156	0.000	-101.988	0.000
Switzerland	-34.162	0.000	-102.353	0.000
United Kingdom	-33.811	0.000	-100.982	0.000
United States	-36.026	0.000	-107.872	0.000
N	187		187	
Adj. R-squared	0.997		0.991	

Compared to the PM, the FE procedure explains more variability in terms of adjusted R^2 in both the regressions. Adjusted R^2 is 0.997 for the regression explaining the overall CDI, and 0.991 for the one explaining the environmental component of the CDI. The influence of both the economic variables has been proven, government expenditures and now also gross

domestic product per capita are positive and significant at the 1% level in both the models compared to the pooled regression. However, the democracy hypothesis has not been proven in terms of the significance of the estimated parameters as in the pooled regression. The estimated VA parameter in the overall model is significant at the 5% level, but shows the negative influence of the Voice and Accountability indicator on the CDI. In the second model, explaining the variability in the environmental component of the CDI, only the CPI was significant at the 5% level, but the effect on CDI environment is also negative.

7.6 CONCLUSION

We can conclude that the fixed effects models examining the countries' heterogeneity explain more variability in the CDI but show a poor and even negative influence of democracy indices. While all the democracy proxies tend to have the expected positive effects on the CDI in the pooled model and are significant even at the 1% level, they fall insignificant or even negative when accounting for unobserved heterogeneity within countries using the fixed effects estimation. As for the environmental component of the CDI, the only democracy variable which appeared significant and positive in the pooled model was the voice and accountability index. However, in the final model all the democracy variables but the CPI are insignificant and the CPI is negatively related to the CDI environment performance at the 5% significance level. The analysis proved both the economic variables (government expenditures and log of GDP per capita) to be significant after accounting for country-specific heterogeneity using the fixed effects estimation. This supports previous findings that economic development is significant for environmental protection.

Although we have not found a strong positive impact of democracy on the environmental component of the CDI, democracy may impact differently on its individual elements. Further research might analyse the impact of democracy on individual indicators or groups of indicators according to the type of environmental degradation or the nature of the indicator (policies versus outcomes). It should also be noted that all the countries in our sample were not selected randomly, and are generally the richest, most democratic and least corrupt countries in the world. Therefore, our conclusions may not be applicable to other – more diverse – countries in the world.

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