EXPLAINING VARIATIONS IN ENVIRONMENTAL PERFORMANCE ACROSS 17 INDUSTRIAL DEMOCRACIES

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ABSTRACT

Leslie Ann Beasley: Explaining Variations in Environmental Performance across 17 Industrial Democracies

(Under the direction of John D. Stephens)

This thesis aims to make a contribution to the economic and political literature on (solutions to) environmental pollution issues by indentifying the variables which significantly affect environmental performance. This thesis revisits the socioeconomic, political, and institutional variables that studies of the period in which environmental mobilization was first gaining momentum (1970-1990) report significant for affecting outcomes in environmental performance. It finds that the independent variables corporatism, geographic advantage, and income are significant in explaining variations in environmental performance across the 17 industrial democracies covered in this thesis.

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Introduction

International policy efforts such as the Kyoto protocol and the World Summit on Sustainable Development reflect how environmental issues such as air pollution and even access to fresh water require the attention and cooperation of the entire global community. They also reflect the vital role of developed industrialized democracies in influencing the amount and type of attention given to environmental issues worldwide. And yet, as evidenced by the poorer environmental performance of influential leaders such as the United States, policy efforts, even at a global level, and rhetorical commitments to leadership in areas such as climate change and pollution, do not necessarily dictate improvements in environmental performance. As important at it is for leaders in industrialized countries such as the United States and across Europe to take a strong, leading position on climate change, energy security, and other environmental issues, it is equally as important for these leaders to be aware of what factors cause cross-sectional differences in environmental performance.

This thesis aims to make a contribution to the economic and political literature on (solutions to) environmental pollution issues by identifying the variables which significantly affect environmental performance. This thesis revisits the socioeconomic, political, and institutional variables that studies of the period in which environmental mobilization was first gaining momentum (1970-1990) report significant for affecting outcomes in environmental performance. It assesses whether these factors have remained significant over time or have lessened or shifted in significance due to certain social, economic, and political structural changes on the national and supranational levels.

The thesis is divided up into two main sections. The first section deals mainly with the construction of the dependent variable, environmental performance and testing for convergence in environmental performance among the countries in the study. The section discusses the operationalization of the dependent variable and the overall environmental performance of countries from 1970 to 2005. It then retests the following hypothesis, purported by Scruggs: "environmental performance is converging among advanced industrial countries as environmental attitudes and policies have diffused, and as countries have adopted similar standards and regulations" (2003: 23). Based on the above assumptions, one would expect to find convergence not only among industrialized countries in the last 10 to 15 years, but especially among countries of the European Union, due to growing harmonization of EU environmental policy.

The second part of the thesis is then devoted to (re)answering the question of what variables affect environmental performance, or reduction in environmental pollution, among the developed countries of the world. The section looks in particular at seven different economic, institutional, and political variables that other studies of comparative environmental performance have found useful for explaining variation in environmental performance such as income, land size, and corporatism. It contains explanations of the construction of the independent variables in the study and the results of the regression analysis. It discusses the way the regression results may influence how we understand and explain the relationship between economic, institutional, and political variables and variations in environmental performance among industrialized countries.

1. Measuring Environmental Performance

The environmental performance indicators used in this study are based directly on the indicators developed and used by Lyle Scruggs (2003) in *Sustaining Abundance: Environmental performance in industrial democracies*. This section of the thesis recaps why these particular indicators are relevant for creating the study's dependent variable, environmental performance, as well as investigates whether or not there has been the expected convergence among the 17 countries since 1995, especially among the member countries of the European Union.

In order to more succinctly study environmental performance among 17 industrialized democracies, and to create a broad aggregate dependent variable (environmental performance), Scruggs identifies six pollution indicators "that have been identified as important across all industrial countries, thus making them candidates for remedial action by business, government, and the public" (2003: 21). They are: sulfur oxide emissions, nitrogen oxide emissions, creation and disposal of municipal waste, recycling rates, water pollution (measured by the percentage of the population served by wastewater treatment), and fertilizer usage.

Each of the indicators included in this study and discussed below are derived from a set of key environmental indicators established by the OECD (Organization for Economic Co-Operation and Development), and are meant to reflect environmental progress among the OECD member countries. The data for each environmental performance indicator is taken from the *OECD Environmental Data Compendium* (2005, 2007, and 2008) and the *OECD Key Environmental Indicators 2008*, with the exception of fertilizer usage which comes from the Food and Agriculture

Organization (FAO) and is based on calculations of commercial fertilizer usage per 10,000 hectare of arable land (Food and Agriculture Organization of the United Nations 2006).

Sulfur oxides are green house gases which are particularly harmful to human health and to the environment, in human beings they have been associated with lung, heart, and other respiratory disease (U.S. EPA 2008: "Sulfur Dioxide"). They have also been linked to acid rain and therefore vast ecosystem damage (U.S. EPA 2008: "Sulfer Dioxide"). The data for the SOx indicator is based on the change in the level of total SOx emissions from 1970 to 2005, taken directly from the *OECD Environmental Data Compendium* (2005, 2007). Nitrogen oxide emissions come primarily from on-road vehicles and from fertilizer usage. They are also the result of electricity generation, fossil fuel combustion, industrial processes, and waste disposal (U.S. EPA 2008: "Nitrogen Oxides"). Nitrogen Oxides have considerable human health effects due primarily to ground-level Ozone (smog) and they contribute to "acid rain" and the green house effect, which is the leading cause of climate change (U.S. EPA 2008: "Nitrogen Oxides"). Furthermore, because they are emitted from fertilizer, they also cause ground water contamination and affect eco systems, "upsetting the chemical balance of nutrients used by aquatic plants and animals" (U.S. EPA 2008: "Nitrogen Oxides"). The NOx indicator is based on the percent change in total NOx emissions levels from 1980 to 2005 (OECD 2005, 2007).

Generation of municipal waste is environmentally costly on several levels. First of all, there is the initial cost of the creation of the waste, followed by the cost of the transportation of the waste, and in the end the costs of waste disposal. Of course waste disposal is the most problematic aspect, as the general means of waste disposal are landfills and burning of waste, both of which lead to the leakage of harmful chemicals and gases into soil, air, and water. National governments may take a number of different actions in attempting to decrease per capita municipal waste generation.

These include promoting recycling of products, especially paper and glass, and using economic tools, such as "internalizing the costs of waste management into prices of consumer goods and of waste management services" to reduce overall consumption and waste generation (OECD 2008: 18). The indicator for municipal waste generation is the change in percentage of municipal waste generation per capita from 1975 to 2005 (OECD 2005, 2007).

Aside from indicating a level of individual commitment to environmental improvement, recycling is generally important as an indicator because the overall environmental effects of waste generation are reduced when recycling practices are used. Because most municipal waste ends up in landfills, recycling can reduce the amount of waste that goes into landfills, thereby reducing gaseous emissions and chemical pollution of soil and ground water, and the need to find alternative burial sites. Furthermore, most recycling processes, while not free from energy costs, use significantly less energy than non-recycling waste disposal processes, as well as generation of new products rather then recycled products. For example, it takes significantly less energy to recycle paper than it does to create new paper from wood. This study combines the recycling rates per capita for paper and glass in order to measure the change in recycling from 1980 to 2000, or the most recent year with data available (OECD 2005, 2007).

Waste water treatment is the OECD measurement of overall freshwater quality and level of pollution of aquatic ecosystems. The OECD measures access to waste water treatment in terms of access to primary, secondary, and tertiary treatments. I used the overall combined percentage of population with access to water treatment, which provides the highest amount of population with access to some sort of water treatment. It is important to note that water treatment causes its own forms of pollution in terms of "concentrated pollutants like nitrates, phosphates, or heavy metals" and, as Scruggs notes, is not a long-term solution to the problem of water pollution (2003: 42). It is

an important measure of environmental performance, however, because it reflects overall efforts to decrease negative effects on human beings related to environmental pollution problems. Overall, the data show improvement in both the access to water treatment and overall quality of water, meaning that efforts to abate external causes of water pollution such as agricultural run off from animal waste and fertilizer, as well as from industrial chemicals have increased over time.

Finally, fertilizer usage is used as a measure of land, water, and air pollution. While fertilizer usage has some crop benefits, such as resistance to spoiling and greater crop production, excessive fertilizer usage causes the run off of damaging chemicals, such as nitrogen into water sources, as well as the evaporation of these chemicals into the air. These chemicals have serious effects on human health as well as the health of land and aquatic ecosystems. Fertilizer usage is measured as the usage of commercial fertilizer per 10,000 hectare of arable land (FAO 2006). The indicator is the change in fertilizer usage from 1970 to the most recent year with available data, 2000-2005.

For the purpose of a comparative study of scale such as this, it follows logically that one should focus more on change in pollution levels, rather than the levels themselves. Comparing change over time helps point to overall trends in environmental performance and responsiveness of countries to environmental pressures, despite the fact that countries may start out or end up with very different levels of pollution. For each of the above indicators, I have calculated the percent change from 1970 (or the earliest year with most complete data) and 2005. The percent change was then calculated into an equation which takes into account the score of the highest and lowest performer for each of the variables:

$$Env_n = \sum_p [(\%reduction_{np} - lowest\%reduction_p)/(highest\%reduction_p - lowest\%reduction_p)*100]$$ [1]

[1] Scruggs (2003): 49.

This equation is then used to calculate a score from 0 to 100 for each country for each individual pollutant, with the lowest performer scoring a 0 and the highest performer scoring 100. The total overall possible score for each country is between 0 and 600 (Scruggs 2003: 49). To further level the playing field, per Scruggs, I combine the variables for paper recycling and glass recycling into one variable and calculate the percent change based on his formula [([ending%]-[beginning%])*100]/(100-[beginning%]). This equation compensates for countries that would be "punished" by starting out with higher recycling rates based on a basic percent change calculation, and is also used to calculate the scores for waste water treatment.

Summary of Performance

Table 1.1 Environmental Performance Scores 1970-2005*

Country	Sox	NOx	Waste	Recycling	Water Treatment	Fertilizer	Total
Austria	97	55	36	89	77	94	448
Belgium	78	87	80	79	3	99**	327
Canada	43	34	100	27	0	0	204
Denmark	100	81	66	57	93	96	493
Finland	80	88	93	100	31	89	481
France	75	90	66	34	26	83	347
Germany	76	92	72	94	45	94	473
Ireland	16	18	0	9	57	49	149
Italy	80	81	64	0	48	39	312
Japan	77	37	94	54	35	84	381
Netherlands	92	89	84	50	100	100	515
Norway	78	49	73	92	54	83	429
Spain	0	0	40	9	33	10	92
Sweden	99	100	76	96	3	94	468
Switzerland	77	96	73	87	89	95	517
United Kingdom	86	82	73	16	69	69	395
United States	10	75	84	13	40**	62	244

Source: Own calculations based on Scruggs' aggregate environmental performance equations (2003: 49), data from OECD 2005, 2007 and FAO 2008.

*Environmental performance scores are calculated as change from 1970 to 2005, or from the year at the outset of the period with the most complete data: Sox is calculated from 1970 to 2005, NOx is calculated from 1980 to 2005, Waste from 1975 to 2005, recycling from 1980 to 2000 (paper) and 2005 (glass), water treatment from 1980 to 2005, and fertilizer usage from 1970 to 2002.

**Data for access to waste water treatment for the United States was not available after 1995, the score for the United States is based on the period 1970 to 1995 and taken from Scruggs 2003: 51; data for fertilizer usage for Belgium was not available after 1995, the score for Belgium is based on the period 1970 to 1995 and taken from Scruggs 2003: 51.

In general, most of the countries in the study experienced some progress and improvement in each of the six areas. In terms of reduction of SOx emissions, countries experienced significant improvement over time, with countries such as the Netherlands, Austria, Sweden, and Denmark experiencing change in emissions outputs of between 90 and 95% from 1970.[2] Furthermore, no country experienced an increase in emissions or a significant downturn in performance. As opposed to SOx, progress in NOx emissions was mixed, with several countries actually experiencing an increase in emissions as recently as 2005 Austria and Spain, and Norway in 2000. In Spain and Ireland an increase in NOx emissions might be due to an increase in industrial growth in a period where industrial growth was declining in some of the more developed countries of the study. It may also reflect an increase in the number of the population able to afford vehicles, and an increase in the transport of goods due to higher demand, greater wealth, and diminished borders between EU member states.

As expected there is not a clear indication of better performance overall among the countries in this study in terms of waste generation. As population increases and as wealth increases in certain countries consumption levels are bound to rise. However, controlled growth of waste generation is more evident across countries in this study, with very few countries (Spain, Ireland, and Denmark the exceptions) experiencing dramatic surges in waste generation. Furthermore, there was a significant increase in recycling from 1980 to 1995 and 1980 to 2000. There was more of a plateau or less distinctive recycling increase between 1995 and 2000; this may be primarily due to smaller amount of years considered, as well as the difficulty in attracting new members to recycling practices.

[2] The data is based on my own calculations of the percent change in pollution levels from 1970 to 2005 for SOx emissions. The exact numbers are Netherlands, 92.11%; Austria, 94.63%; Denmark, 96.17%; and Sweden, 95.86%. The percentage change scores for each individual indicator were then used to calculate the environmental performance scores shown above in Table 1.1. The data for pollution levels in 1970 and 2005 comes from the *OECD Environmental Data Compendium* (2005, 2007).

More population dense countries such as the Netherlands and Denmark scored highest in terms of access to waste water treatment, where as less population dense countries, or countries that are likely to have higher numbers of rural population such as Canada, Sweden, and the United States scored lowest. Most countries, Sweden as the exception, experienced an increase over time in access to waste water treatment facilities, which is evidence of improvement in the water pollution area of environmental performance.

In terms of reduction of fertilizer usage, the countries with the most reduction and therefore best performance were the Netherlands, Denmark, Sweden, and Switzerland. The Netherlands, Denmark, and Switzerland are all countries with considerably less land area than the worst performers, Canada and Spain, and significantly smaller agricultural sectors. Countries with larger agricultures such as France, Germany, and Ireland scored in the middle, with relative improvement over time, suggesting that there is overall evidence of success in reducing fertilizer usage, and not simply a correlation between less fertilizer usage among countries with smaller land area and agricultural sectors.

Based on the overall comparative performance score, the countries that performed the very best between 1970 and 2005 were Switzerland, the Netherlands, Denmark, Sweden, Germany, and Finland. The countries that scored the highest in the sub-period between 1995 and 2005 were Switzerland, Denmark, Netherlands, Germany, and the UK. This is consistent with Scruggs' 2003 study, which found that the countries with the best aggregate environmental performance between 1970 and 1995 were Germany, Sweden, the Netherlands, Denmark, and Austria. Similarly, in his 1998 study based on a separate, but similar environmental performance aggregate, Jahn found that of the OECD countries in his study, the Netherlands, Germany, Austria, Sweden, Switzerland, and Switzerland had the "more positive environmental performance" (Jahn 1998: 113). On the other

hand, the countries that had comparatively low environmental performance include the United States, Ireland, Canada, and Spain. This remains consistent with Scruggs (2003), and Jahn (1998), who both place the USA, Canada, and Ireland at the bottom of their lists.[3]

The overall highest score in environmental performance from 1970 to 2005 was 518 (Switzerland), the overall lowest score was 92 (Spain) and the mean score was 371, with countries like Belgium, Japan, France, and the United Kingdom scoring nearest the middle (mean). Overall, countries that score well in one area tended to score well in others and vice versa, with the exception of countries such as Belgium and Sweden that scored high in most areas, but low in terms of percentage of population with access to waste water treatment. In Sweden this might be due to a higher number of people living in rural areas. For example, the country that scored the best for waste water treatment, the Netherlands, has the highest population density of any of the countries in the study, where as Sweden, has much lower population density. Furthermore, Ireland and Spain scored extremely low in many areas, as did the United States and Canada. Ireland and Spain's low comparative score between 1970 and 2005, however, is probably due to underdevelopment and later economic growth versus the low scores of the United States and Canada which are probably due to large industrial development and large land size.

Convergence

Changes in policy internationally as well as changes in EU policy create the expectation that convergence in performance should be occurring among advanced industrial democracies, as well as countries of the European Union. However, the above scores for environmental performance suggest that there are significant differences between countries in terms of where they fall along

[3] Jahn does not include Spain in his 1998 study, however, Spain would be likely to have similar performance to Ireland due to the categorization of "less developed…but with very substantial rates of pollution increase" (113).

the environmental performance scale. This is somewhat counter productive to the assumption and argument that industrialized countries, as their policies become more harmonized, should be moving towards similar levels of environmental performance.

In order to test for overall convergence among the countries, rather than convergence among the individual indicators, I calculated both an overall score of change in pollution levels from 1970 to 2005 as well as a total score for the levels of pollution at the outset of the period. The first score, total change from 1970 to 2005, is based on the sum of the country scores for each of the six individual indicators, and the results can be found above in Table 1.1. For the first score a high score indicates better environmental performance whereas a low score indicates poorer environmental performance. The second score is calculated individually for each of the six indicators based on their pollution level at the outset of the period. For nitrogen oxide and sulfur oxide emissions, the level of pollution at the beginning of the period is standardized by the population in the same year, to account for different levels of emissions due to different country sizes. Similarly, the data for percentage of the population with access to waste water treatment and percentage of population with recycling are reversed so that the numbers represent the percentage of the population that *does not* have access to waste water treatment, and likewise the percentage of the population that *does not* recycle. The data for each indicator is then scaled to 100, so that the country with the most pollution scores a maximum of 100 points, and the country with the least amount of pollution in a given indicator scores the lowest amount of points, theoretically 0. For the second score a low score indicates better performance. Therefore, a positive correlation between overall performance over time and performance at the outset of the period would indicate convergence among the countries, where as negative correlation would indicate divergence. Below is the table of country scores for levels of pollution at the outset of the period, 1970, or the year closest to 1970 with the most available data.

Table 1.2 Scaled Country Scores for Pollution Levels at the Outset of the Period

Country	SOx	NOx	Waste	Recycling	Water Treatment	Fertilizer	Total
Austria	22	31	34	83	73	32	276
Belgium	35	46	56	84	88	68	377
Canada	100	82	88	92	47	3	411
Denmark	39	55	69	91		29	283
Finland	38	63	80	86	46	24	336
France	20	40	50	83	49	32	273
Germany	16	34	61	80	31	47	269
Ireland	17	25	32	100	100	41	316
Italy	19	30	48	81	81	12	271
Japan	16	14	70	67	81	45	293
Netherlands	20	42	82	77	38	100	359
Norway	15	47	79	97	77	32	347
Spain	24	26	42	85	93	8	277
Sweden	41	55	54	87	29	21	287
Switzerland	6	28	68	73	38	51	263
United Kingdom	41	45	60	90	29	35	300
United States	45	100	100	95	41	11	291

Source: Data from OECD 2005, 2007; FAO 2008; and own calculations

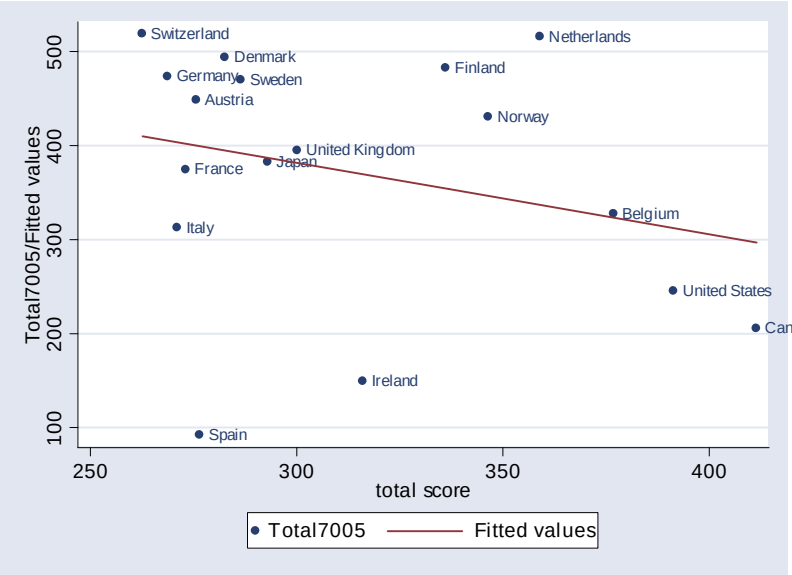
Countries like Switzerland and the Netherlands who had the best performance in terms of change over time (scoring a 517 and 515 out of a possible 600 total score on environmental performance from 1970 to 2005), had moderate pollution levels at the outset of the period, shown above in Table 1.2.[4] Italy also had low pollution levels, probably due to being less developed at this point and time than other countries such as the United States and Canada. Canada, notably, scores the worst (highest) at the outset of the period, and as one of the worst (lowest) in change in environmental performance over time, suggesting that it is not only plagued by high levels to begin with, but failure to make significant improvements over time.[5]

In terms of convergence, the graph below is a twoway scatter plot of the total score for pollution level at the outset of the period and the total score for changes in the level of pollution

[4] See Table 1.1, p. 6-7

[5] *ibid*

over time. The results do not indicate that there has been convergence among the countries during this period. Actually the negative correlation (-.28) and the graph suggest that there has been divergence among the countries. Even when the obvious outliers (Ireland and Spain) are removed, the graph continues to reflect divergence with a negative correlation (-.41).



*total7005 is the aggregate score calculated based on percent change in pollution levels from 1970 to 2005; total score is the aggregate score calculate based on levels of pollution at the outset of the period, 1970.

Figure 1.1 Total scores for pollution levels at the outset of the period and total scores for changes in pollution levels from 1970 to 2005.

Convergence among EU member states

While Scruggs and Jahn do not consider the impact of the European Union on environmental performance, for reasons which are particularly relevant to their studies, namely the time period in review, changes in European environmental policy 1995 onward, as well as evidence from studies by Armingeon (2008) and Knill and Lenschow (2005) suggest that there is significant merit to reviewing the influence of the European Union on the environmental performance of member states.

One of the most recent and notable EU environmental policy developments has been the EU Sustainable Development Strategy, which is the application of the open method of coordination, used by the EU in policy areas such as social inclusion and employment, to environmental areas. Using the open method of coordination, the sustainable development strategy aims to reach certain environmental goals by implementing the best practices of individual member states across the EU. However, within the sustainable development strategy there are policies which employ the usage of "hard law instruments" such as directives and penalties, which make countries responsible under EU law. Overall, however, the SDS is based upon "soft modes of governance (SMGs), such as the use of soft instruments for policy-goal setting, voluntary national action plans, non-binding measures, market-oriented instruments, stakeholder participation and network-led initiatives" (Usui 2007: 620). For example, the EU supports using tax incentives to achieve positive sustainable outcomes and also to have an effect on the public's behavior and response to environmental problems. The Swedish governments' 2001 decision to "increase taxes on diesel, heating oil, and electricity and lower income taxes on social security contributions" is used by the EU as successful example for the type of effective environmental efforts member countries can (should) make (European Commission 2007: 10). SDS, however, might be too recent to have a measureable effect on the data in this study having really only begun in 2001.

The graph in Figure 1.2 below is a twoway scatter plot of the total scores for pollution levels at the outset of the period and the total scores for changes in pollution levels over time for EU member states only. The results do not indicate that there has been the expected convergence among the member states of the European Union during this period. Although the relationship is positive, the data suggests that there really is no correlation (.0914). Again, when the most obvious outliers (Spain and Ireland) are dropped from the data, the correlation becomes even less (.02) and the line becomes almost flat. Although there is not enough room in this thesis, it should be noted

that based on the qualitative evidence of harmonization of European environmental policy, there may be significant cause to investigate a smaller subset of the data, the more recent period 1995 to 2005. This data may offer a stronger indication of convergence and actual changes that are happening over time, and may more strongly represent the influence of EU environmental policy, rather than the broader period 1970 to 2005 discussed here.

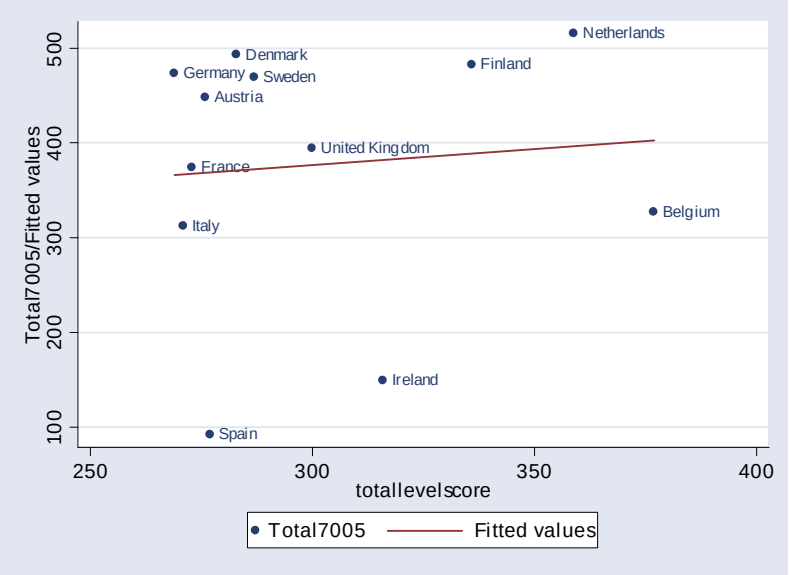


Figure 1.2 Total scores for pollution levels at the outset of the period and total scores for changes in pollution levels from 1970 to 2005, EU member states only

Developments in EU policy, as well as overall global developments, such as the ratification of the Kyoto protocol are legitimate reasons that one would expect convergence among EU member states and industrial democracies in general in terms of environmental performance. As for EU members, all countries agree to the same directives and are threatened by the same legal sanctions, and blaming and shaming. In spite of this, as the above graphs reflect, harmonized policy does not particular dictate harmonized outcomes. Due to the subsidiary principle, and the new Sustainable Development Strategy, many of the EU implementation strategies are based on uptake by national governments in ways that do not alter the current structure of their individual bureaucratic

institutions, so that each individual member state is typically responsible for interpreting and implementing EU environmental directives in whatever way they deem most appropriate, “national bureaucracies remain widely autonomous in finding appropriate ways towards policy compliance” (Knill and Lenschow 2005: 586). This then would be one reason not to expect convergence, even in light of strengthened EU policy, but rather a reason to look toward the independent variables in this study, such as corporatism and structure of political institutions to better understand the elements which facilitate better performance.

While the EU may have geared up its policy making, the way in which its policies are put into place depends more on the institutional structure of the particular nation state, “in line with institutional arguments, we expect the strongest convergence between countries characterized by similar state, legal, and administrative traditions and possibly the emergence of several functionally equivalent models to which groups of countries converge” (Knill and Lenschow 2005: 588). For example, each of the Scandinavian countries might share similar methods of EU policy implementation, and perhaps have a better record of policy implementation because their economic and political structural systems (corporatist/ social democratic parties) are more conducive to better environmental performance. These assumptions are tested and revisited in the second section of the thesis.

2. Determinants of Environmental Performance

The remaining section of this thesis is devoted to construction and analysis of the several independent variables that for both qualitative and quantitative purposes likely affect environmental performance variations among industrialized countries. The first section states the expected relationships between the independent variables and environmental performance, the second section explains the operationalization of the independent variables, the third section presents the regression models and results, and the fourth section provides analysis of the variables and the regression results, followed by a summary and conclusions.

Hypothesis

The following section develops and tests the relationship between a number of independent variables and the dependent variable, environmental performance. Based on previous studies of environmental performance, I have developed five basic hypotheses:

-Environmental performance (change in pollution levels over time) is determined by the wealth, in this case income as real GDP per capita, and/or economic growth of a given nation. One can reasonably assume that as wealth and growth increases environmental performance increases. Alternatively, however, economic growth may be due to an increase in industrial output and/or an increase in consumption, which may actually lead to poorer environmental performance. Based on previous studies, however, we would expect to find a positive relationship between income and environmental performance as well as economic growth and environmental performance for the 17 industrialized countries considered in this study.

-Geographic and physical variables such as population density and land area affect not only starting pollution levels, but also reduction of pollution levels over time. Greater population density may lead to improvement in environmental performance because more people are noticeably affected by pollution levels and other environmental problems. Oppositely, countries with a large land area may be able to distribute pollution so that it is less concentrated and therefore less noticeable and seem less problematic to large amounts of the population. It is expected that countries with large land area and small population density, such as Canada, would have comparatively poorer environmental performance than countries with small land area and large population density, such as the Netherlands.

-Institutional arrangements may impact environmental performance due to the fact that they determine who has access to and influence over both policy creation and policy implementation. Specifically it has been found in environmental performance studies by Jahn (1998) and Scruggs (1999, 2001, 2003) that neocorporatism has a significant positive effect on environmental performance. Based on previous studies, as well as the fact that countries such as Switzerland, Sweden, and Germany have very high aggregate environmental performance in this study, we would expect that corporatist institutional structures contribute to better environmental performance.

-Percentage of left parties in government, including social democrats and any other part to the left of the spectrum, such as green parties, influences environmental performance. One would expect that countries with a larger average of left parties in government during the period from 1970 to 2005 would have better environmental performance. However, many studies have made the argument that social democratic ideology may resist environmental ideology. Studies by Neumayer (2003) and Jahn (1998) found that where green parties have access to the legislative

process environmental performance definitely improves, whereas the relationship is less clear with social democratic parties, or left parties in general, which is the measure used in this study.

-Constitution of political institutions may affect environmental outcomes. This paper in particular looks at constitutional structure or veto structure, which is a measure of dispersion of political power combining political institutional elements such as federalism, presidentialism, bicameralism, and popular referenda (Huber and Stephens 2001: 55-56). Because a greater number of veto points would likely make the passage of environmental policy legislation more difficult, one would expect that that countries with a high constitutional structure score would have poorer environmental performance. Similarly, one would also expect to find better environmental performance among countries with lower electoral thresholds, allowing for easier access to policy making by a number of different parties, and countries with frequent coalition governments.

Operationalization

The data for the dependent variable, environmental performance, is an aggregate environmental score for the years 1970 to 2005 for each individual country in the study and is based on the formulas in Scruggs (2003) *Sustaining Abundance* and is discussed in the first section of this paper. The data for the independent variable, income, comes from the Penn World Table 6.2 and is the real GDP per capita (rgdpch) for each country at the outset of the period (1970), calculated in thousands of dollars (Heston, Summers, and Aten 2006).The data for the independent variable economic growth comes from the Penn World Table 6.2 and is calculated based on the change in real GDP per capita over the thirty-five year period 1970 to 2004 (Heston, et al. 2006).

The data for the independent variable population density comes from the United Nations (2006) publication *Population, Resources, Environment and Development: The 2005 revision.* I created an average population density variable based on the average of population density between

1970 and 2005. The data for the independent variable of land area is taken directly from Scruggs *Sustaining Abundance: Environmental Performance in Industrialized Democracies* (2003: 74). Scruggs data is based on a 1991 Penn World Table publication in the *Quarterly Journal of Economics*. To account for the extreme comparative size of Canada and the United States to the other countries in the study, Scruggs computes a natural log of land area ($lnkm^2$) to create the variable. Geographic advantage is calculated based on the combination of the standardized average population density variable, which comes from the average population density calculated for 1970, 1980, 1990, 2000 and 2005, and the inverse log of land area (km^2) (United Nations 2006, Scruggs 2003: 74). The variable is meant to indicate the combined effects of population size and land area, since both arguably contribute to environmental performance.

The variable for corporatism is based on Siaroff's "integration" value. It comes from the Armingeon, Gerber, Leimgruber, and Beyeler (2008) *Comparative Political Data Set 1960-2006* and is an average of the integration (corporatism scores) for the years 1980, 1990, and 2000. According to Scruggs, "Siaroffs' [variable] attempts to rectify several problems that exist in categorizations used in the corporatist literature…his categorization focuses more on the general functional and behavioral elements of corporatism…[and] takes into account changes in corporatism after the mid-1980s" (2003: 155). Furthermore, I do not use the other measures of corporatism included in Scruggs' 2003 study on environmental performance because Lembruch's (1980) measure of corportist concertation is dated for my purposes and Lijphart's (1999) indicator does not show change over time.

The variable for percentage of left parties in cabinet comes from the *Comparative Political Data Set 1960-2006* and is the average from 1970 to 2005 of "cabinet composition—social democratic and other left parties in percentage of total cabinet posts weighted by days"

(Armingeon, et al. 2008: 3). The variable for veto structure comes directly from Scruggs *Sustaining Abundance* and is calculated based on a combination of variables that influence constitutional arrangements and veto points, such as federalism, bicamericalism, and executive dominance (2003: 166). It is based on Huber and Stephens measure of constitutional structure (Huber and Stephens 2001: 55-56). The variable for multiparty politics comes directly from Scruggs *Sustaining Abundance* as well and is the combined scores for frequency of coalition government and proportional representation (measured by electoral threshold) (2003: 166). According to Scruggs, "…both of these variables affect the likelihood of having environmental issues prominently represented within the chambers of political power" (2003: 183).

Regression results

Table 2 below displays the results of the regressions based on my five hypotheses. Model 1 includes the variables for economic and geographic determinants of environmental performance, Model 2 includes the variables for labor market institutions as determinants of environmental performance, Model 3 includes the political parties variable, and Model 3 the political institutions variables. Models 5 and 6 represent the regression equations in which all variables in the previous regressions found to be statistically significant are included. The variables corporatism and left government are not included in the same regression models because they are too highly correlated. In Model 6 the left cabinet variable is statistically significant at a .1 level. It was included in a further regression model, not shown below, with the other significant variables income and geographic advantage. In this model it was statistically significant at a .01 level. However, in all the models, a high R^2 indicates that the fit is good. The adjusted R^2 is higher for the model including corporatism rather than left government. Model 7 is therefore seen as the best regression model for explaining variations in environmental performance. Overall the regression results show that income,

geographic advantage, and corporatism best describe variations in environmental performance (R^2: 70).

Table 2.1 Regression Results: Economic, Institutional, and Political variables and Environmental Performance.

Independent Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Economic and Geographic Variables							
Income	36.48*				26.08**	34.61**	25.77**
Economic Growth	0.47						
Geographic Advantage	46.32**				28.89*	35.96*	23.84*
Labor Market Institutions							
Corporatism		92.49***			85.56**		72.9***
Political Parties							
Left cabinet percentage			2.29ª			1.83	
Political Institutions							
Veto Structure				-14.8			
Multiparty Politics				-42.93*	14.83	-11.87	
Constant	-14.15	62.18	293.6	371.02	-173.48	-34.1	-128.03
Adjusted R^2	.33	.58	.10	.20	.70	.46	.70
Number of Cases	17	17	17	17	17	17	17

ªSignificant at p<.10 and retained in Model 6

* p<.05 ** p<.01 ***p<.001

Discussion of Variables and Results

Economic and Geographic Variables

Economic and structural explanations associated with environmental performance include, but are not exclusive to income level, economic growth, population density and land area. The majority of the literature structured around environmental performance views the relationship between income and environmental performance as a U-shaped curve, or what has come to be known as the environmental Kuznets curve (EKC). The curve is based on the idea that as countries'

income per capita increases, they are likely to increase their levels of pollution to a certain point due, for example, to growth in heavy industry and/or to greater consumption. However, the curve reflects that as industrial growth levels off, or income levels reach a certain point, pollution actually decreases. The relationship assumes a number of previous or causal relationships are all reflected by the "per capita income" variable. For example, the relationship assumes that per capita income growth is based on a shift towards industrialization, and that certain political structures, as well as environmental and consumer values, are also in place during the shift. Similarly, the decline in pollution levels as income levels reach a certain point is often attributed to the post-industrial shift and to an emergence of values or greater interest in environmental issues.[6]

Beyond its theoretic assumptions, the income variable causes a number of problems in the explanatory literature related to environmental performance. Scruggs and Neumeyer note that the real relationship between income and environmental performance may not be well explained by an aggregate dependent variable of environment performance, rather the relationship between income and environmental outcome may depend on the individual pollutant in question. For example, in 2003 Neumayer finds a linear income environmental performance relationship and that "a higher per capita economic output and greater per capita use of vehicles increase per capita pollution levels" (218).

In the case of this particular study, the regression results from Table 2.1 suggest that there is a strong, statistically significant relationship between income and environmental performance. When combined with other significant variables in models 5, 6, and 7, income remains statistically significant at the .01 level. In this case we can say with much certainty that there is a strong positive relationship between income and environmental performance. Canada and the United States

[6] Scruggs tests for the effects of environmental values and environmental mobilization among populations in the countries of this study, but finds no significant relationship between values and mobilization and environmental performance (2003: 78-121).

remain the interesting outliers, whose higher GDPs clearly do not correlate to better environmental performance. In the case of Canada and the United States, other political and geographic factors may be better indicators of environmental performance than income. In fact, if Canada and the United States are dropped, the data shows an even stronger linear relationship between income and positive environmental performance outcomes: in a first order correlation between income and the aggregate environmental performance score, the correlation coefficient is .81.

The next relationship investigated in this study is the effect of economic growth on environmental performance. While the literature discussed thus far has paid attention predominantly to the effect of certain structural variables on environmental performance, it is often suggested in both scholarly literature and in political debate that environmental policy negatively affects environmental growth. The idea behind the negative relationship is that certain environmental policies and practices would naturally predicate a reduction in certain manufacturing and industrial practices that have high pollution rates. The relationship thus suggests that in order to ensure better environmental outcomes there must be a trade off in economic growth. If this is indeed the case then the interests of participants in institutional arrangements such as corporatist systems, and some political parties such as social democratic, might view themselves as negatively affected by environmental policy, and therefore they might be less inclined to be responsive to environmentalist concerns, "some observers of this development have concluded that this creates a new social cleavage between productionism and environmentalism" (Jahn 1998: 108).

Does environmental policy slow economic growth which in turn produces better environmental performance? In fact, the data in this study shows that there is no clear relationship between economic growth and environmental performance. In the regression model 1 economic growth is not statistically significant, and in a simple correlation equation the correlation coefficient

between economic growth and environmental performance is extremely small (-.12). It is fair to mention that the correlation is negative, which may lend a small amount of support to the argument that economic growth negatively affects environmental performance. However, again when the two outliers, the United States and Canada are dropped from the dataset, the correlation becomes even smaller (-.0629) suggesting that there really is no relationship between economic growth and environmental performance among industrialized democracies.

The lack of relationship produced by the results is in fact extremely significant for the environmental movement and proponents of environmental policy. If there is, indeed, no relationship between growth and performance, then it is not a clear disincentive for governments, businesses, or trade unions to support and implement environmental policy. It should also be noted that this lack of relationship has been supported by other studies. Neilson, Pedersen, and Sorensen indicate that while there may be slowed economic growth due to a "shift toward greener preferences," this shift has a positive effect on levels of unemployment (1995: 186).

Population density and land size reflect more static variables that have a likely impact on environmental performance but are not easily altered by public motivation or governmental policy. Population density and land size affects environmental performance in two ways. First, pollution problems are likely to be more obvious to the public and to governments of densely populated regions, for example people living in the UK might be more aware of levels of green house gases or more susceptible to water contamination by fertilizer usage, than people living in the United States. And second, government action to solve pollution problems is more likely due to the pressure from the public, as well as the difficultly in finding alternative options. For example, in the United States or Canada, waste generation may be less problematic as there is more space for landfills, versus countries such as the UK and the Netherlands that have very small land mass and may be required

to make more drastic efforts to reduce consumption and promote consumer recycling. However, where land size and population sufficiently explain the weaker performance of Canada and the US, geographic advantage does not so clearly explain the better performance of the larger Scandinavian countries such as Sweden and Norway.

In this study, land size and population density are combined into one variable, geographic advantage. The regression results show a strong positive relationship between geographic advantage and environmental performance. In general, large land size and low population density should predict poorer environmental performance, while small land size and high population density should predict better environmental performance. This is because greater land area has a negative impact on environmental performance, where as higher population density is positively associated with environmental performance. The graph below does a lot to describe the relationship between geographic advantage and environmental performance. The United States and Canada all have larger land area and are less densely populated, and they all have lower overall environmental performance scores. On the other hand, the Netherlands is very densely populated, 300 people per km^2 versus Canada's 3 people per km^2, and has very high environmental performance. In the middle however, you find a mixture of countries, where geographic advantage may not best explain environmental performance. For example, Sweden is relatively large and relatively sparsely populated, and yet has very high environmental performance. In this case the Swedish corporatist structure, discussed below, probably does more to predict Sweden's environmental performance than its geographic advantage (or lack thereof).

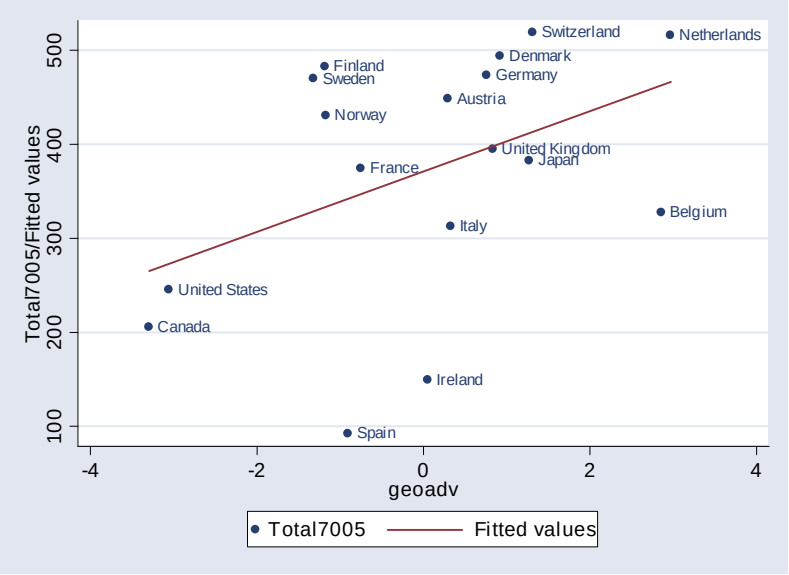


Fig 2.1 Twoway scatter plot of environmental performance from 1970 to 2005 and individual country scores for geographic advantage

As mentioned above, the relationship between income and structure of economy and environmental performance assumes that the income variable represents a number of relationships that have already combined together, such as social institutions and government policy to affect income growth. If this is the case, however, "if social institutions and policy play a role in the determination of economic development, it seems logical to expect that they will play a role in determining environmental outcomes" (Scruggs 2001: 64). Thus, the next two sections of this thesis are devoted to the institutional and political variables that are potential determinants of variations in environmental performance.

Labor Market Institutions and Environmental Performance

Corporatism and pluralism reflect two distinctly different types of arrangements between economic and policy actors which could potentially determine effectiveness of environmental performance. Historically, however, cross national studies comparing and contrasting corporatist

and pluralist systems have often, in regards to environmental performance, noted that while policy outputs and implementation methods may differ between the two institutional structures, the environmental performance outcomes, for example reduction of air pollutant emission, have often been similar. That is, both have tended to see results from the production and implementation of environmental policy, regardless of whether the policy was created in a more antagonistic pluralist fashion, or a more consensual or cooperative corporatist fashion (Scruggs 2003: 127). More recently, however, comparative literature has strongly suggested the corporatist arrangements may be more likely to result in positive environmental performance (Crepaz 1995, Scruggs 1999, 2001, 2003, Jahn 1998), while other studies (Armingeon 2008, Neumayer 2003) find corporatism to have a statistically insignificant effect on environmental performance. With so much controversy, it seems relevant to investigate once more not only whether corporatism does indeed indicate better environmental performance (the second segment of this portion), but also why it is an important and relevant indicator of environmental performance in general.

Institutional arrangements reflect the interplay between those who are most likely to be negatively affected by environmental legislation (large/ heavy industry and businesses) and environmental interest groups, government, and the general public. In both corporatist and pluralist institutional structures, there are reasons to expect that businesses, trade unions, and industry may be wary of environmental policy implementation. The most obvious reasons being that environmental regulation has often been associated with job loss and slowed economic growth, and also because environmental regulations mean incorporating changes into the already extant structures and systems. Alternatively, this paper finds that there is no clear relationship between economic growth and environmental performance. And Scruggs points out that the “myth” of a trade off between environmental improvement and economic growth and job creation has actually

remained more strongly emphasized in countries with pluralistic arrangements, such as the United Kingdom and the United States, rather than countries with more corporatist type structures.

While, as stated, there are reasons to theoretically think that corporatism would not be compatible with environmental regulation, there are a number of logical and practical reasons that corporatism might facilitate more environmental regulations and therefore better environmental performance, which are exemplified by the real-life examples of countries such as Sweden, Denmark, and Germany. Proponents of corporatism suggest that the system is more able to deal with problems of collective action and free-riding. In a more corporatist style system there is typically some compensation for losers during adjustments that are the result of (environmental) regulations; as well as incentive to share information, which arguably makes business more accepting of policy and regulation, and incentive for technological innovations that would allow businesses to seek out ways in which to benefit from regulations, rather than to avoid them. Scruggs argues that while corporatism is interested in economic benefits, it is strictly because these economic benefits are often seen as the root of other social benefits. Therefore, while the economy remains a top priority, corporatist institutions have always had high incentive to incorporate demands for the public good such as "health, safety, and environmental reforms" (Scruggs 2003: 138). Where job loss in relationship to environmental regulations is concerned, Scruggs notes that environmentalism was used to create jobs as well as to encourage technological innovations, while Nielsen, et al (1995) find that environmental regulations are associated with reduction not inflation of voluntary unemployment.

The results of this study show that strong corporatist systems are highly positive related to better environmental performance, with statistical significance at the .001 level (Model 7). This is consistent with Scruggs (1999, 2001, 2003) and Jahn (1998) who find corporatism also to be

statistically significant. The relationship between corporatism and environmental performance may explain why a country such as Switzerland, which has the same veto structure as the United States (discussed below), has comparatively better environmental performance. The divergence among countries, especially EU countries, in overall performance, could likely be attributed to differences in corporatist structures as well. EU countries with more corporatist structures such as Germany, Sweden, and Switzerland scored high on overall environmental performance, whereas countries with weak corporatism such as the UK and France score more moderately.

Left Government, Veto Structure, and Multiparty Politics

Political structures are, of course, likely to affect both environmental policy outputs and environmental performance outcomes. Political structures determine who has access to policy making and therefore what interests are articulated at legislative levels. They also determine the ease or difficulty in passing environmental legislature. The political segment of this study is divided into looking first at whether the ideological orientation of a given cabinet in a political system affects environmental outcomes, and then at looking at the political structure itself, in terms of whether structural issues such as veto points and electoral threshold, federalism and bicameralism, determine better (or poorer) environmental performance.

Typically parties associated with more environmentally friendly behavior are parties on the left of the spectrum. Logically, of course, green parties are the parties with ecological values at the very top of their platforms which would most support positive environmental performance. Green parties are typically based on principles of environmentalism, as well as social justice and pacifism. They have typically been anti-nuclear power, a stance most clearly evidenced by the German green party and the fact that Germany energy policy has remained staunchly anti-nuclear since. Often where electoral threshold is high or larger parties dominate green party votes shift to left parties

such as social democrats. Thus it would seem that left parties, such as social-democratic parties, tend also to be more environmentally friendly. However the quantitative data to support this claim is somewhat mixed, and of course (theoretically) there are reasons to think that social democratic type parties might not be consistently supportive of environmental policy, despite evidence that "more successful political mobilization of environmental demands has usually been part of a wider left-wing political agenda" (Neumayer 2003: 205).

The reasons that social democratic and left parties do not typify parties that would support environmental policy and environmental movements has to do with the perceived threat of environmental policy legislation on economic growth and especially employment, which is at the center of the left party agenda. As discussed earlier, academic studies and political literature have suggested that adoption of best environmental practices can potentially cause a decline in economic growth, due to the regulations placed on the industrial manufacturing sector, although this argument is not supported by evidence in this study.

On the other hand, there are many reasons to think that social democratic parties would be aligning themselves with environmental policy issues. The first and most obvious would be in order to gain electoral support, which would otherwise go to challenging green parties. Furthermore, Neumeyer remarks that "as left-wing parties tend to be more interventionist in their economic policy making they might find it easier to accept that governments need to install environmental protection instruments such as command-and-control, environmental taxes or tradable pollution permits, in order to correct market failures" (2003: 204). In a similar respect, Scruggs notes that left parties, despite having concern for employment and growth, which could be counter productive to environmental performance, have always put social welfare concerns and quality of life at the top of their priorities, two important variables which are directly influenced by environmental outcomes.

Interestingly enough, several studies find that when social democrats are in opposition, they tend to mobilize more for environmental policy rather than when they are the majority government. This has to do with the fact that while environmental issues have gained attention from social democratic parties, other party priorities may remain higher, "social democratic parties are traditionally oriented toward questions of redistribution, state intervention, and welfare states;" and that it may be easier to push unfavorable legislation when in opposition and at less of a threat of losing face, than while in the majority (Armingeon 2008: 18).

The results in Model 3 show that the percentage of left seats in government over the period 1970 to 2007 has a positive influence on better environmental performance. Sweden who had almost 100 percent left government in cabinet over the period, also experienced very high environmental performance, where again the two low performers, the US and Canada had no left governments in cabinet during the same time period. The relatively low adjusted R^2 in both Model 3, Model 6 and a non-include regression Model 8, suggest that while left government may be a significant variable, it does not sufficiently explain environmental performance. Left government is also very highly correlated with corporatism, exemplified by countries such as Sweden, and in the case of this study, the models indicate the relationship between corporatism and environmental performance actually explains more than the relationship between left government and variations in environmental performance. The first order correlation between left government and performance is .40, the first order between corporatism and performance is a much more convincing .78.

It is important, however, to consider not only the effect of left governments on environmental performance, but the political structure factors that might also determine the types of political parties that have access to policy making as well as the ease of creating and passing

environmental legislation. For example, constitutional structures such as bicameralism, federalism, executive dominance, electoral threshold, and frequency of coalition governments may all influence the way in which legislation is created and implemented and therefore may positively or negatively affect environmental outcomes.

The variable for multiparty politics is the combination of the frequency of coalition government and electoral threshold. Neumayer's 2003 study confirms consistently that the presence of green parties influences positive environmental performance. This is significant in so far as a green party has access to the legislative process. Clearly, having a green party in legislation would increase chances of bringing environmental policy to the forefront of the political agenda, as the environment is the main concern of green parties. However, in many systems smaller political parties do not have access to the legislative process due to electoral threshold, the number of votes a new party is required to achieve in order to enter into the political arena, or dominance of legislature by a single party. Where green parties may enter into the political arena easily, there may be a faster response to environmental demands, where as "where laws favor big parties—such as the United States—the process of responding to new environmental demands [can be] subsequently delayed" (Neumayer 2003: 204). In this case the measure for electoral threshold, or for proportionality, comes from Lijphart 1994 and is the "effective percentage of the vote a party needs for representation" (Scruggs 2003: 177). A country with a high electoral threshold, would have a smaller degree of proportional representation, and therefore increase not only the difficulty of new parties entering into politics, but the difficulty of representing diffuse interests such as environmental issues. This variable is logically linked together with the frequency of single party versus coalition systems. Obviously, a lower electoral threshold would lead toward multiparty politics and therefore greater frequency of coalitions.

In the case of single party versus coalition systems, where single party systems tend to limit the number of interests that are encompassed and reflected by their ideological platform, a coalition government, which is composed of a number of different parties, tends to be representative of a number of different ideologies and interests. Therefore, in theory, smaller parties such as environmental parties would have a much greater chance at affecting environmental legislation in a coalition government than in a single party dominated government. This has been the case in Germany, where "the necessity of a coalition government has provided the Green Party with extensive access to and influence over environmental policy among the German Lander" (Scruggs 2003: 164). While Germany remains a case in which a coalition government has clearly aided in the uptake of environmental issues, other countries such as Sweden and Norway, which have comparatively high environmental performance, are "run by single parties more than two thirds of the time" (Scruggs 2003: 166-167). The United States, however, reflects a case in which green parties have little or no access to policy making and the dominant parties clearly have little incentive for allowing the articulation of their interests through their party platforms. The result has been weaker comparative environmental performance.

In the regression Model 4, multiparty politics is shown to be statistically significant at the .05 level, although the low R^2 suggest that neither multiparty politics nor veto structure does much to explain environmental performance. Nevertheless, there is the expected negative relationship between the multiparty politics variable and environmental performance, which suggest that perhaps higher frequency of coalition government and lower electoral threshold are somewhat more conducive to better environmental policy. When multiparty politics is entered into regression Model 5 and 6, however, it loses statistical significance, suggesting that issues such as income, geographic advantage, corporatism, and frequency of left party government do much more to

describe variations in environmental performance, than institutional factors such as electoral threshold and single party versus coalition governments.

The final variable in this study, veto structure, brings together three different elements of the structure of political institution: bicameralism, federalism, and executive dominance. Each contributes to how unified or separated a country's government is. In the case of bicamerialism, the existence of a (strong) second chamber would suggest more dispersed political power, where as a weak or non-existent second chamber (unicamerial system) would imply more unified government. Similarly, the presence of a strong and independent executive would also suggest more dispersion of powers, whereas a weaker executive would suggest that they power rested more solely or heavily in the legislature. Finally, federalism measures the dispersion of powers between the central government and sub-governments. In this case "the critical issue is whether it is better to have multiple avenues of possible representation for environmental interests or centralized channels" (Scruggs 2003: 172). Countries with strong federalist systems have a large geographic dispersion of powers to sub-governments, countries such as the United Kingdom who have unified governments have little or no dispersion of powers.

On the one hand a less unified or more dispersed political system may provide a number of avenues in which to put forth policy and legislation, as well as the guarantee that once this legislation is passed it cannot be easily overturned. This type of situation typifies a government with a strong veto structure, or more dispersed political power, such as the United States and Switzerland. On the other hand, a more unified system may be more effective at integrating, adopting, passing, and implementing environmental issues because of a lack of veto points (dispersion) and therefore a smaller change of encountering "political deadlock" (Scruggs 2003: 168). Scruggs finds some evidence to support the claim that unified governments have better

environmental performance than countries with separation of powers such as the United States, France, and Switzerland when looking at each of the components of veto structure individually. This is not surprising as, in general, "political scientists have suggested that the concentration of power better enables democratic regimes to regulate powerful interests in the public interests than does and arrangement providing for more balance between branches or levels of government" (Scruggs 2001: 189). In this case, unified government may be more apt at representing diffuse interests (interests where individual costs and benefits are seen as very low) than more dispersed governments.

However, like Scruggs, my data suggests that there is no relationship between veto structure and environmental performance (in a first order correlation between veto structure and the aggregate environmental performance score the correlation coefficient is -.06). This evidence may suggest that both systems have their own pros and cons in terms of interest articulation and legislative policy making. Smaller comparative country studies, such as one noted by Scruggs between the United States and the Sweden, show differences in the process of creating and implementing environmental legislation during the 1980s, but similar outcomes in terms of pollution reduction (2003: 127). In section one, when discussing convergence, I suggested that the divergence among the countries of the European Union and in general all of the countries in this study, could possibly be described by differences in political institutions. However, as shown by the lack of significance of the veto structure variable, it is unlikely that the composition of political institutions, or the dispersion of political power, affects outcomes in environmental performance. In this case, then, we would not expect differences in political structure to be standing in the way of EU harmonization policy or to be causing divergence among the EU member states. It is possible then to consider that the evidence presented shows an absence of convergence due to time frame—not enough years of tough EU environmental policy have passed to indicate convergence—and that the

study could be revisited and conducted in another five years, to include data up to 2010, which might yield different results.

Conclusion

The results of the regression models above find income, geographic advantage, and corporatism to be the variables which best explain variation in environmental performance. The study has attempted to account for variations in environmental performance by investigating a number of possible casual effects such as percentage of left parties in government, economic growth, and political structures such as veto points and electoral threshold. Furthermore, it has also attempted to account for variation by using the most recently available data in both the dependent and independent variables.

Income and geographic advantage are not variables which are likely to change over time, making it difficult to approach them as elements which help countries develop better environmental performance. While it can be pointed out to Canada and the United States that their large land areas increase emissions due to greater transportation lengths, and increase waste generation and decrease likelihood of recycling measures due to availability of landfills for waste disposal, the proposed solution cannot be to decrease their land size or increase their population density. However, it can be understood from the relationship that some countries are at a geographic advantage or likewise disadvantage from the beginning of the period, while other elements such as corporatism and frequency of left government may explain why over time some countries improve upon their environmental performance and others do not. For example, large land area and therefore relatively longer transportation routes are a likely cause of higher SOx emissions and NOx emissions in the United States and Canada. Pluralist institutional structures and lack of left

government influence may explain why over time emissions levels have not decreased as drastically as in countries such as Sweden, that have large land size as well.

Neo-corporatism as it is defined today is a flexible model used to explain the involvement of different interest group actors in government policy making. As Molina and Rhodes explain, since the 1970s, understandings and definitions of corporatism have shifted slightly from "analysis [of] tripartite relations between labor, business, and the state…" to "…the emergence of new forms of neo-corporatist decision making in the postindustrial policy arenas of education, health care, welfare and environmentalism" (2002: 309). As evidenced by this study, as well as by Scruggs (1999, 2001, 2003) and Jahn (1998), the neo-corporatist style of consensual policy making has clearly had a positive influence in the area of environmental performance. If we understand neo-corporatism in a more broad form, rather than its early solely economic form, we can see that "consensus seeking, extensive involvement of major groups at the policy making stages, and shared responsibility by associations of regulated actors in the outcomes of government policy may be conducive to effective environmental policies independent of economic policy" (Scruggs 2003: 211). Therefore, governments with more pluralist or less corporatist structures can seek to solve environmental problems through more corporatist-like arrangements, without suggesting that these countries overhaul their economic arrangements and institutional structures and adopt neocorporatist models.

This thesis provided a broad view of the relationship of a number of different economic, political, and institutional variables to environmental performance. Ideally a future study would look at the subset of data from 1995 to 2005 to more accurately describe the relationship of the EU to environmental performance, as well as point out more recent changes to overall trends in environmental performance. In a study of the subset of data I would hope to find greater

convergence in environmental performance among EU member states. I would expect many of the relationships between environmental performance to remain the same, especially those which are static such as population density, land area, and even income. While others may decrease in influence, such as political structures that are seemingly inimical to environmental improvement due to the influence of European Union environmental policy as well as deepening of global environmental policy.

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