Early Participants of Multilateral Environmental Agreements and Their Effect on Later Membership

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Abstract

This paper studies the causes of success in the signing and ratification of Multilateral Environmental Agreements (MEAs). Following previous studies, the paper examines the domestic factors contributing to whether or not a country has signed or ratified a particular environmental treaty at a particular time. However, the paper also attempts to isolate the effect of the characteristics of the first countries to participate in an MEA by adding variables which measure the relative influence of early signatories and parties. The study finds that the early participation of United Nations Security Council members encourages latter participants to join an agreement.

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1 Introduction

Over the past few decades, awareness of environmental protection has skyrocketed. Transnational bodies have labored to regulate activities affecting the environment through Multilateral Environmental Agreements (MEA). Better understanding of the support an environmental treaty requires can lead to better construction and promotion of treaties, and regulations helping the environment can be more quickly enacted.

This thesis discusses the determinants of a country's participation in an MEA. It examines the factors contributing to whether a country has signed or ratified an agreement, particularly the effects of other countries joining the MEA. Does the early support of high-GDP countries guarantee that others will follow? Do countries with a higher percentage of industry sway others to sign more quickly? Are United Nations Security Council members influential upon the decisions of others? This paper serves as a direct examination of how the relative "size" of the first participants increases the chance of an individual nation signing an MEA. We compare the explanatory power of factors internal to each country – the main focus of previous literature – and of external relations.

In the provision of a clean environment, countries must deal with externalities caused by activities such as pollution and overuse of resources. Countries try to limit these externalities by committing to environmental protection through multilateral agreements. The major difficulty regarding MEAs is in the voluntary nature of ratification and adherence to them. A country individually decides whether it is in its best interest to sign an agreement, taking into account domestic variables as well as foreign relationships. A country which has signed then decides whether to bind itself legally to the agreement and become a party through ratification. A country which did not originally sign the agreement can still become a party through acceptance

of the agreement. However, even once a treaty is ratified, there still may be little to no control over its implementation, and parties can choose to depart from the agreement. Without enforcement mechanisms within the treaty, fellow signers must resort to indirect moral pressure upon the delinquent.

This paper rests on the idea that since the influence of other countries is already present in treaty enforcement, it may prove important in the actual decision to sign or ratify the treaty. The hypothesis that early participation, in the form of signature or ratification, from wealthy and politically powerful countries serves as a "carrot" and causes a larger amount of countries to sign afterward is confirmed. The early participation of Security Council members does indeed increase the probability that other countries will join. The effect of the total wealth of the leader countries determined significant but so miniscule as to be negligible.

The paper is divided as follows: Section 2 discusses the relevant literature and how this paper departs from it, Section 3 introduces the theoretical model, Section 4 details the data sources used, Section 5 presents the empirical model, Section 6 summarizes the results of the paper's regressions, Section 7 checks the model's robustness, Section 8 offers conclusions, and Section 9 elaborates possible extensions of the research.

2 Literature Review

A number of papers discuss the game theory dynamics behind MEAs. Some choose to model negotiations as cooperative games (such as Stag Hunt, in which the goal of the game is for players to cooperate), while others support a non-cooperative model (such as Prisoner's Dilemma, in which one cannot assume a goal of cooperation because most of the time the game ends with non-cooperation). Wagner (2001) finds unrealistic the possibility of describing MEA

signature as a cooperative game, since a cooperative scenario presupposes the country's ultimate desire to sign and precludes a nation's right to withdraw from negotiations and the agreement itself. Wagner then examines the self-enforcement provisions, such as minimum participation clauses, transfers (cash, perpetual rent, in-kind), and sanction threats, which contribute to the overall success of the agreement through his own theoretical analysis and summary of other papers' empirical results.

Finus, Altamirano-Cabrera, and Ierland (2005) look at the hypothetical effects of membership rules and voting schemes in keeping out free-riders and promoting MEAs. They simulate long-run greenhouse gas accumulation in twelve world regions and its responses to various coalitional groupings of these regions. They describe three benchmark scenarios: singleton coalition structure, grand coalition, and Kyoto coalition. Grand coalition has the highest global payoff, as it involves MEA ratification and implementation by all countries. However, it requires an unequal amount of sacrifice from countries, causing most to prefer the singleton structure of non-cooperation. The so-called Kyoto coalition, which entails partial cooperation, is similarly unstable as grand coalition and can quickly dissolve into non-cooperation. This instability is demonstrated in the "real world" by the decision of the United States to participate in negotiations regarding the Kyoto Protocol, but ultimately not to ratify the mentioned treaty in favor of private environmental protection efforts.

Murdoch, Sandler, and Vijverberg (2001) build a two-stage game to separate the ratification and implementation stages for environmental agreements. In the ratification stage, which takes place after negotiation and signature, a country decides whether to legally bind itself to the agreement. In the implementation stage, all countries decide whether or not to reduce emissions, regardless of membership, though parties in particular decide whether to go beyond

the agreement's mandated levels. Murdoch et al. then use the sub-game perfect equilibrium to form an empirical model, which they test with regards to the Helsinki Protocol. They find that the separation of decision stages allows for a better understanding of which variables affect a country's decision to ratify an MEA and which variables affect a country's environmental performance afterwards, regardless of signing. They find that spill-ins of polluted air (in the form of an emissions wind-transport matrix) positively affect the ratification decision. They also find that domestic environmental attributes, such as forest land, do affect the ratification decision, even though previous literature had rarely found significance in similar variables. Most interestingly, they find that wealth (GNP) has no effect on the ratification stage, though it has a positive influence on the implementation stage. Thus, wealthier countries were more likely to reduce their emissions beyond the levels mandated by the Helsinki Protocol, though they had no extra incentive to ratify the agreement.

Further studies have examined the effects of non-environmental international activities upon MEAs. Egger, Jeßberger, and Larch (2009) investigate the claim, made sometimes by environmental groups such as Greenpeace, that free trade is an obstacle to MEAs because it exacerbates the consumption of natural resources. Egger at al. also discuss how numerous other domestic factors and economic coalitions contribute to the number of MEAs a country signs. They divide their explanatory variables into three categories: economic determinants (such as GDP and exports), political determinants (political freedom, trade liberalization), and environmental determinants (current emissions, forests). Their variable of interest is international economic openness, and they find that international economic coalitions, in the form of bilateral investment treaties, improve the conclusion of environmental agreements.

Rose and Spiegel (2009) turn the typical model around and use MEA membership as an explanatory variable for international economic exchange seen in asset cross-holdings. They find that non-economic partnerships such as MEAs signal far-sightedness which, in turn, promotes international lending. Countries join MEAs for both direct environmental benefits, as well as the indirect benefits of reputation spillovers. Combined with Egger et al. (2009), the two papers seem to imply a story of two-way causality between MEAs and international investment agreements.

Most relevant to this paper is the examination of Beron, Murdoch, and Vijverberg (2003) of how interdependence among nations affects participation in MEAs. Beron et al. believe that interdependence causes free-riding to decrease because certain countries can exert influence over others. They argue that countries can exert political pressure over countries from which they import goods. The paper uses power matrices constructed from wealth and bilateral trade flows to include the effect of interdependence. These power matrices prove insignificant in the empirical study of the Montreal Protocol. The examination is then expanded with matrices reflecting military alliances, neighboring countries, and other trade considerations, but the only significant power matrix was based on differentiated exports as a share of GDP.

While many have focused on domestic variables of influence – wealth, production, cost, freedom, and so forth – this thesis takes specific interest in interdependence effects. Concerned with the intent of countries to participate in an MEA, the study counts both signatories and parties as "members," another departure from the literature. Similarly to Beron et al. (2003), this paper looks at the question of whether certain countries serve as leaders in signing agreements. It departs, however, from trade relationships and focuses on whether the total "size" of the first

members contributes to overcoming the voluntary nature of the agreement and leads to a snowball effect of participation.

3 Model

The model described in this section considers multiple countries without restriction upon entry into the MEA. A country will sign or ratify an MEA if its expected utility from partaking in the agreement is greater than its expected utility from not cooperating. Utility is affected by domestic attributes, as well as international relations. Expected utility is affected by information in both of these areas. As seen in the previous section, many papers study domestic determinants of MEA membership; their lead is followed in selection of control variables.

In regard to international relations, Beron et al. (2003) focused on the influence a net importer could have over its trade partners. However, sanctions and similar pressures can only be exerted upon countries already legally bound to an MEA. Though overall trade relationships may indicate a general willingness to participate in international agreements, net importation should exert little pressure upon countries in the decision stage and seems unrelated to MEA participation. Withholding voluntary aid may influence a country's decision to partake in the agreement, but it appears that this reasoning can be modeled better by the total income of the first participants than by trade relationships.

Theoretically, this thesis considers two other possibilities of how international characteristics may affect MEA participation. Early signatories and parties may consist of countries who have better information with regards to signing the treaty or whose membership contributes to the utility of the agreement itself. First, while a country has the best information regarding its own characteristics, it may not have reliable or complete information as to the

international merits of the agreement. Thus, it may be swayed in its decision to sign or ratify an agreement when it witnesses which countries declare participation early. Second, countries have asymmetric interests which help overcome the free-rider problem (Stigler, 1974). A country with great interest in participating in the agreement may overcome its scruples about externality provision and free-riders and join the agreement early. If enough such countries participate, they may increase the value of the MEA in such a way as to persuade even more countries to join, as their commitment indicates partial success of the agreement and increases expected success and value of the agreement.

Empirically, this paper does not distinguish between these two theoretical reasons behind leader country influence. "Leader countries" are simply identified as early participants. Possible measures of leader "size" are wealth, environmental research and development, standing in the international community, and pollution proportion. Unlike Beron et al. (2003) and Murdoch et al. (2003), this paper uses data from multiple MEAs as opposed to just one agreement. The control variables were chosen from among significant variables within the literature, including political freedom, forests, subject of agreement, and number of previous treaties signed, among others. The variables of interest which measure "size" will be summed across the defined leader countries.

4 Data Sources

Data was collected from various sources in order to construct an appropriate data set. The model requires economic and political variables, some which vary by country and treaty year, and some which vary only by treaty year. This section elaborates upon the data sources used in this paper.

4.1 Dependent Variable

The Socioeconomic Data and Applications Center, operated by the Center for International Earth Science Information Network, offers the Environmental Treaties and Resource Indicators (ENTRI), which compose a comprehensive dataset of MEA signatories. Because of interest in more current MEAs and limitations in data available for control variables, the time period for MEA introduction is limited from 1980 to 1999. This stipulation allowed for 199 MEAs and 208 participants, of which the majority consisted of sovereign nations. To control for treaties with a regional focus, a dummy variable was constructed to make note of especially regionally-specific, non-environmental titles, such as the "Treaty Establishing the African Economic Community" and the "Agreement Establishing the European Bank for Reconstruction and Development."

The SEDAC dataset also contains the current status of the country, i.e. whether it is a signatory, a party, or a former party. Signatories are those negotiate and sign an agreement. Parties, on the other hand, ratify or accede to the MEA domestically and are legally bound to follow its terms. Former parties are those countries who have departed from the agreement. This paper considers signatories, parties, and an aggregate of both as the dependent variables because of its concern with general participation in the agreement. A signature is deemed a statement of intent to follow the agreement, even if a signatory never formally ratifies the treaty. The dataset also contains information as to when the agreement was signed, and, if the country is a party, when the agreement was ratified or accepted. In the main regression analysis, these two were combined, and the earlier of the two was used as the date of declaration of intent when determining the leader countries.

4.2 Independent Variables

The control variables take into account political, economic, and environmental factors. As do Egger et al. (2009), this study includes the Fraser Institute's indicator of political and economic freedom. Data is available in five-year increments from 1970 until 2000, after which data is presented yearly until 2007 (Fraser Institute, 2009). To account for the costs of signing an MEA, the paper uses the percent of GDP from industry, available from the Earth Trends database of the World Resources Institute. Benefits from signing are measured by the percent of land area covered in forests, available from the Global Environment Outlook database of the United Nations Environmental Programme, and alternatively by the adjusted savings of depleted forests as a percentage of Gross National Income, available from the World Development Indicators.

The variables of interest are measures of the "size" of the countries which have signed the MEA in question before a specific time. Their purpose is to capture the effect of "large" players in the provision of the public good of a clean environment. This influence is measured in three ways: the leaders' summed environmental impact, wealth, and international negotiating power. Total environmental impact is proxied by percentage of GDP from industry – the control variable described above, summed over the defined leader countries. This measure can indicate general environmental impact, or at least international perception of impact, for the same reasons that the measure could reflect cost of participation. Wealth can be another demonstration of size: countries may sign an MEA, which a wealthy country has already signed, in hopes of establishing good rapport and receiving increased aid and investment in the future. Wealth is measured by real GDP, taken from both the World Development Indicators and the United States

Department of Agriculture's Economic Research Service, and by GDP per capita, also from the WDIs. Finally, a country's international negotiating power is represented by a binary variable for whether a country is on the United Nations Security Council at the time of the treaty's introduction. Being a member of the Security Council obviously increases power and recognition within the UN itself, where many MEAs are signed, and may add to the influence of a country.

5 Empirical Strategy

The effects of the variables listed in the previous section were tested on participation in an MEA, either by signing or ratifying a given treaty. The empirical model was specified as:

$$y_{it}|(f_{ij} \neq 1) = \beta_0 + \beta_n \mathbf{X_{it}} + \delta_m \mathbf{Z_t} + \alpha_j \mathbf{W_j} + \gamma_i \mathbf{V_i} + u_{it},$$

where y_{it} is a binary variable which is equal to 1 if the treaty is signed by country i in the first regression (or ratified in the second regression) at time t, and 0 otherwise, $\mathbf{X_{it}}$ is a vector of *n* control variables that vary by country and year, $\mathbf{Z_t}$ is a vector of *m* variables of interest that vary by year, $\mathbf{W_j}$ is a vector of *j* fixed-effects dummy variables distinguishing treaties, and $\mathbf{V_i}$ is a vector of *i* fixed-effects variables distinguishing countries. The dependent variable is conditional upon f_{ij} being not equal to one, where f_{ij} is a binary variable that indicates if country *i* is one of the early signers of treaty *j*. In order to make sure the model is robust, the early signers were defined in a few different manners, namely as those who indicated interest within the first week of negotiation and as the first third of those who participated.

The study experimented with both a linear probability model (LPM) and a probit model to estimate the regression. The initial detailed model is as follows:

$$y_{it} = \beta_0 + \beta_1 prevsigned_{it} + \beta_2 securitycouncil_{it} + \beta_3 freedom_{it} + \beta_4 GDPindustry_{it} + \beta_5 forests_{it} + \beta_6 realGDP_{it} + \delta_1 totalSecCouncil_t + \delta_2 totalrealGDP_t + \delta_3 totalGDPindustry_t + \alpha_j \mathbf{W_j} + \gamma_i \mathbf{V_i} + u_{it},$$

The alternative specification is as follows:

$$y_{it} = \beta_0 + \beta_1 prevsigned_{it} + \beta_2 securitycouncil_{it} + \beta_3 freedom_{it} + \beta_4 GDPindustry_{it} + \beta_5 forests_{it} + \beta_6 GDPpercapita_{it} + \delta_1 totalSecCouncil_t + \delta_2 totalGDPpercapita_t + \delta_3 totalGDPindustry_t + \alpha_j \mathbf{W_j} + \gamma_i \mathbf{V_i} + u_{it}.$$

5.1 Independent Variables of Interest

The variables of interest – $totalSecCouncil_t$, $totalrealGDP_t$ or $totalGDPpercapita_t$, and $totalGDPindustry_t$ – sum the Security Council membership, real GDPs, GDPs per capita, and percentages of GDP from industry across the leader countries, which are at first defined as the countries indicating interest within a week of the first participant. All four variables are expected to have positive coefficient, though $totalrealGDP_t$ and $totalGDPpercapita_t$ are not present in the same regressions, owing to concerns with high correlation. As Kuziemko and Werker (2006) find, having a turn on the UN Security Council increases receipt of foreign aid, indicating the general sentiment that other countries wish to gain favor with the Council members. Thus, more Security Council members among the first participants should lead to more membership intention, as other countries may want to express their goodwill and common interests with those on the Security Council in order to gain favor in other matters. More high GDP countries among the leaders may indicate more resources given to the implementation of

the treaty, and countries seeking aid may support the treaty in hopes of receiving aid. High GDP per capita indicates wealth similarly, but the measure may also capture the effect of a wealthy population and its demands. If a clean environment is a luxury good, then wealthier populations would pressure their governments to participate in MEAs more than poorer populations. Finally, a larger sum of percentages of GDP from industry may show that higher polluting countries are committing to the agreement, which could increase the value of the MEA far enough as to overcome the free-rider problem.

5.2 Control Variables

The signing of environmental treaties has been shown to be highly persistent (Egger et al., 2009), thus $prevsigned_{it}$ is the number of previous MEAs country i has signed at time t. A positive coefficient is expected. If a country has signed environmental agreements in the past, it has indicated its interest in such action and is therefore more likely to sign subsequent treaties dealing with other environmental issues. Also, a number of the treaties in the study are amendments to prior treaties; thus, this variable also captures the effect of ongoing commitment to an amended treaty. Using information from the SEDAC database, this variable was constructed starting at zero for the first year of treaties and then summing participation in the treaties in the study moving from period to period.

Whether or not an individual country served on the UN Security Council in the year of the treaty's introduction is represented by $securitycouncil_{it}$. A positive coefficient is expected. With a seat on the Council, a country could desire to fulfill some sort of perceived duty or to wield its influence more noticeably even if that country may have prioritized other issues ahead of environmental protection when not on the Council.

The Fraser Institute's Economic Freedom of the World index is represented by $freedom_{it}$. Though index is only available for every fifth year in the decades of this study, the coefficient is expected to be positive, as countries with more political freedom have been shown to be more likely to sign MEAs (Egger et al., 2009). Since countries with greater political freedom directly report to constituents, if the population believes environmental protection to be important, then politicians are more likely to support MEAs to increase chances of personal reelection. Autocrats, on the other hand, do not have this same incentive to participate in MEAs.

As mentioned before, $GDPindustry_{it}$, which is the percentage of GDP attributed to industry, will attempt to capture country i's costs of signing the MEA. Industrial pursuits have a high rate of emissions and pollution, a high cost of reducing said emissions and pollution, and monetary clout to lobby a government against signing an MEA. Thus, a negative coefficient is expected: the higher the percentage of GDP due to the industrial sector, the lower the chance of a country signing a particular MEA. Benefits from signing the MEA will be captured by $forests_{it}$, which is the adjusted savings of net forest depletion for a country. This variable captures the environmental benefits from signing an MEA. We expect a negative coefficient, as countries with high percentage of forest depletion have already demonstrated less regard for the environment than those without.

Finally, included are fixed-effect dummies for individual treaties, $\alpha_j \mathbf{W_j}$. Treaties may be more or less attractive based on the actual provisions of the MEA: requirements, self-enforcement strategies, etc. This fixed effect will also capture the effect of the treaty's subject upon membership success. Also in the model are fixed effects for individual countries, $\gamma_j \mathbf{V_j}$. This vector of dummies controls for the aspects of culture not captured in other variables that

may determine interest in MEAs, as well as political determinants that may affect the length of time it takes a country to declare its participation in a treaty.

6 Results

This section presents the results of the regressions run. The first tested dependent variable is whether or not a country is a member of a treaty, meaning whether the country has signed, ratified, or accepted the agreement in some manner. After a baseline regression without the variables of interest, the dependent variable is then made conditional on the country not being in the first third of those who declared support for the agreement. The first LPM regressions using membership as the dependent variable are summarized in Tables 1 and 2 below for all treaties. In Table 1, GDP is used as one of the independent variables, while in Table 2 GDP per capita is used. Both show just the effect of the vector of controls in their respective column 1. The regressions in the rest of columns restrict the dependent variable, as described in the empirical strategy section, to non-leaders. Column 2 adds the three summed variables of interest: summed leader GDP in Table 1 or summed leader GDP per capita in Table 2, summed percentage GDP from industry, and total Security Council members. Column 3 adds fixed effects by treaty, while column 4 adds fixed effects by country as well. Finally, column 5 adds a dummy variable to control for whether a treaty is regionally focused.

In Table 1, all controls are initially significant. The summed leader variables are also significant when added, though the individual control *securitycouncil* loses significance. Adding the fixed-treaty effects improves the explanatory power of the model greatly, though it causes GDP and summed leader GDP to lose significance and changes the sign on summed percentage of GDP from industry. Adding the fixed-country effects adds little explanatory power and wipes

out the significance of most of the controls as well as summed GDP. Finally, the dummy *regionaltitle* is significant when included. From this first round of regressions, the study finds that number of leader countries on the Security Council has a positive and significant effect, while the summed percentages of GDP from industry have a small, negative, but significant effect. Summed leader GDP is statistically insignificant, and the coefficient is so close to zero as to be real-world insignificant as well. Also, when *freedom* and *previoussigned* are significant, they are positive as expected.

Table 1: *Linear Probabilities Model Using Membership as the Dependent Variable, GDP as an Independent Variable*

Variables	**(1) LPM on Member**	**(2) LPM on Member^**	**(3) LPM on Member^**	**(4) LPM on Member^**	**(5) LPM on Member^**
freedom	.0102846***	.0059662***	.005772***	.0046836	.0046836
	(.0027001)	(.0022584)	(.0017066)	(.0042014)	(.0042014)
previous_signed	.0036999***	.0015155***	.0034973***	-.0003475	-.0003475
	(.0001904)	(.0001718)	(.0001758)	(.0003331)	(.0003331)
as_forestedpercent	-.0097445***	-.0053089**	-.00127	-.0007966	-.0007966
	(.0026638)	(.0021962)	(.0016637)	(.0039149)	(.0039149)
GDP	1.24e-14***	6.74e-15**	2.10e-15	1.36e-14	1.36e-14
	(3.73e-15)	(3.28e-15)	(2.47e-15)	(1.40e-14)	(1.40e-14)
percentGDPindustry	.0005001*	.000594**	.000407*	-.0000454	-.0000454
	(.0002971)	(.0002459)	(.0002406)	(.0004544)	(.0004544)
securitycouncil	.0373993***	.0071053	-.004249	-.011697*	-.011697*
	(.0089843)	(.0077709)	(.0058553)	(.0066562)	(.0066562)
fw_gdp		-6.10e-15***	-4.22e-15	1.13e-15	-4.52e-14***
		(9.95e-16)	(2.96e-15)	(2.97e-15)	(3.40e-15)
fw_percentgdpindustry		.0001156***	-.0001021***	-.0000927***	-.0004082***
		(.00001)	(.0000225)	(.0000224)	(.0000226)
fw_securitycouncil		.0093478***	.1793157***	.1719116***	.2975057***
		(.0028661)	(.0101034)	(.0100614)	(.0125671)
regionaltitle					.2578413***
					(.036613)
Fixed Treaty Effects	No	No	Yes[a]	Yes[a]	Yes[a]
Fixed Country Effects	No	No	No	Yes[b]	Yes[b]
constant	.0450524**	.001622	-.5813083***	-.5848015***	-.736151***
	(.0174801)	(.0147036)	(.0427458)	(.1115229)	(.1127542)
R-squared	0.0373	0.0304	0.4628	0.4733	0.4733
Adjusted R-squared	0.0370	0.0298	0.4565	0.4636	0.4636
F-stat	125.59***	58.97 ***	73.69***	48.43***	48.43***
Number of Observations	19443	16960	16960	16960	16960

* significant at 10%
** significant at 5%
*** significant at 1%

[a] most effects significant
[b] most effects insignificant

^ where *firstweek*=0

In Table 2, all controls are significant but percentage of GDP from industry. Restricting upon non-leaders and adding the variables of interest actually lowers the R-squared, but the three variables introduced are significant. Putting in the treaty fixed effects causes a jump in explanatory power, drops the significance of the net forest depletion adjusted savings, but makes both percent GDP from industry and Security Council membership significant. The treaty effects themselves were largely significant. Adding the country fixed effects wipes out the significance of all the control variables but *securitycouncil*, and the variables of interest stay significant. However, the country effects appear to be mostly insignificant. Finally, *regionaltitle* is insignificant when added. The new measure of wealth, GDP per capita, is more significant than GDP was; nevertheless, its coefficient is also especially close to zero. Surprisingly, the coefficient on *freedom* is negative when the variable is significant. Out of the summed interest variables, percentage of GDP from industry is also unexpectedly negative (though small), and Security Council leaders is positive. The coefficient of summed GDP per capita is, like the coefficient of summed GDP was, also very close to zero.

Table 2: *Linear Probabilities Model Using Membership as the Dependent Variable, GDP per capita as an Independent Variable*

Variables	**(1) LPM on Member**	**(2) LPM on Member^**	**(3) LPM on Member^**	**(4) LPM on Member^**	**(5) LPM on Member^**
freedom	-.0179717***	-.0078444***	-.0005678***	.004543	.004543
	(.0031843)	(.0026686)	(.0020395)	(.0042204)	(.0042204)
previous_signed	.0026497***	.0010355***	.0029664***	-.0004999	-.0004999
	(.0001999)	(.0001805)	(.0001991)	(.0003544)	(.0003544)
as_forestedpercent	-.0063794**	-.0036361*	-.0010647	-.0006793	-.0006793
	(.0026547)	(.0021955)	(.0016635)	(.0039185)	(.0039185)
GDPpercap	7.64e-06***	3.79e-06***	1.84e-06***	2.52e-06	2.52e-06
	(4.60e-07)	(3.99e-07)	(3.25e-07)	(1.63e-06)	(1.63e-06)
percentGDPindustry	.000373	.0005131**	.0005458***	.0000216	.0000216
	(.0002965)	(.0002463)	(.0001852)	(.000457)	(.000457)
securitycouncil	.0336304***	.0060305	-.0039058***	-.0119934*	-.0119934*
	(.0084407)	(.0073491)	(.0055624)	(.0066633)	(.0066633)
fw_gdppercap		-2.66e-07***	-8.09e-07***	-6.19e-07***	-5.60e-07***
		(3.64e-08)	(9.18e-08)	(9.28e-08)	(1.14e-07)
fw_percentgdpindustry		.0001659***	-.0004071***	-.0004108***	-5.03e-06
		(.0000112)	(.0000378)	(.0000376)	(.0000347)
fw_securitycouncil		.0054784**	.2382996***	.2340545***	.104028***
		(.0022519)	(.0081402)	(.0081105)	(.0181931)
regionaltitle					.017484
					(.035945)
Fixed Treaty Effects	No	No	Yes[a]	Yes[a]	Yes[a]
Fixed Country Effects	No	No	No	Yes[b]	Yes[b]
constant	.1819294***	.0669823***	-.683653***	-.6309846***	-.2823101***
	(.0192496)	(.0161905)	(.0419259)	(.075222)	(.0836832)
R-squared	0.0503	0.0365	0.4635	0.4730	0.4730
Adjusted R-squared	0.0500	0.0360	0.4572	0.4632	0.4632
F-stat	171.08***	71.25***	73.68***	48.24***	48.24***
Number of Observations	19397	16915	16915	16915	16915

* significant at 10%
** significant at 5%
*** significant at 1%

[a] most effects significant
[b] most effects insignificant

^ where *firstweek*=0

For the next regression, the dependent variable was further restricted. In the full data set, many of the treaties were only intended for regional participation. Thus, Table 3 shows the results for the regression on membership (signatory or party) for treaties where *regionaltitle* is equal to zero. The set-up parallels that of the previous two regressions. Initially, four of the controls are significant, and they stay significant after the inclusion of the three summed variables of interest. Adding the treaty fixed effects renders *freedom* insignificant, and this time adding the fixed country effects does not wipe out the significance of the other variables. The

country effects appear to reverse the freedom index's negative sign, which occurs in the presence of GDP per capita. The inclusion of the country effects also changes the coefficient of previous agreements signed to negative, which is rather unexpected. The signs and coefficients on the variables of interest are similar as before: summed GDP per capita is close to zero, summed percentage of GDP from industry is negative but small, and the summation of Security Council members is positive. In addition, the R-squared values are highest in this set of regressions.

Table 3: *Linear Probabilities Model Using Membership as the Dependent Variable, GDP per capita as an Independent Variable, Restricted on Non-Regional Treaties*[+]

Variables	**(1) LPM on Member**	**(2) LPM on Member^**	**(3) LPM on Member^**	**(4) LPM on Member^**
freedom	-.0320204***	-.0148429***	-.0014547	.0140819*
	(.0052839)	(.0049516)	(.0037094)	(.0074673)
previous_signed	.0032712***	.0020031***	.0056821***	-.0012356*
	(.000326)	(.0003388)	(.0003619)	(.0006527)
as_forestedpercent	-.0069875	-.0043862	-.0008787	-.0033108
	(.0044932)	(.0041177)	(.0030554)	(.0070545)
GDPpercap	.0000136***	7.87e-06***	4.04e-06***	6.53e-06**
	(7.62e-07)	(7.58e-07)	(6.01e-07)	(2.95e-06)
percentGDPindustry	.0014613***	.0013394***	.0012971***	-.0001063
	(.0004963)	(.0004563)	(.0003358)	(.0008206)
securitycouncil	.0198078	-.0078278	-.0247175**	-.0286429**
	(.0141157)	(.0138949)	(.0102936)	(.0121922)
fw_gdppercap		-8.39e-07***	-9.30e-07***	-5.57e-07***
		(6.28e-08)	(1.15e-07)	(1.18e-07)
fw_percentgdpindustry		.0002831***	-.0004038***	-.0004118***
		(.000018)	(.000047)	(.0000465)
fw_securitycouncil		.0115823***	.2425093***	.2347191***
		(.0035427)	(.0101332)	(.0100227)
Fixed Treaty Effects	No	No	Yes[a]	Yes[a]
Fixed Country Effects	No	No	No	Yes[b]
constant	.2960805***	.1527654***	-.7378926***	-.6359548***
	(.0319336)	(.0299775)	(.0545817)	(.1013896)
R-squared	0.0875	0.0723	0.5051	0.5270
Adjusted R-squared	0.0869	0.0712	0.4989	0.5140
F-stat	148.17***	67.44***	81.05***	40.27***
Number of Observations	9280	7800	7800	7800

* significant at 10%
** significant at 5%
*** significant at 1%

[a] most effects significant
[b] most effects insignificant

^ where *firstweek*=0
[+] where *regionaltitle*=0

For comparison, a probit model is used to test the same relationship – the same vector of controls on the dependent variable *member*, restricted to the non-leader countries of non-regional treaties. Table 4 below shows the probit results for regressions including the vector of controls, the three variables of interest, and combinations of the fixed effects. The treaty effects are significant in both regressions. Without the country effects, freedom and depleted forest area adjusted savings are insignificant, but the other variables – including the summed leader variables – are significant. The country effects appear to be insignificant when added. They decrease the significance of two control variables, but they do make *freedom* significant and improve upon the R-squared value. The effect of total of Security Council members among the leader countries is positive and significant as before, the effect of the summation of percentages of GDP due to industry is negative and significant, and the coefficient on summed GDP per capita is, once again, very close to zero. Of the control variables, *freedom* and *GDPpercap* are significant in both regressions, and the coefficients of their signs are positive as expected. The variable *previous_signed* is also significant in both, but it switches from positive to negative, of which the negative is unexpected.

Table 4: *Probit Model Using Membership[+] as the Dependent Variable, GDP per capita as an Independent Variable*

Variables	**(1) Probit on Members^**	**(2) Probit on Members^**
freedom	.0021292	.1078166*
	(.0275338)	(.05825)
previous_signed	.0364567***	-.0090669*
	(.0026325)	(.0051698)
as_forestedpercent	-.035074	-.0513301
	(.0268596)	(.0675299)
GDPpercap	.0000212***	.0000534**
	(4.13e-06)	(.0000228)
percentGDPindustry	.0127245***	-.0016073
	(.0025602)	(.006967)
securitycouncil	-.192673***	-.250523***
	(.0739469)	(.0953596)
fw_gdppercap	3.59e-06**	7.36e-06***
	(1.47e-06)	(1.61e-06)
fw_percentgdpindustry	-.0041853***	-.0049785***
	(.0002847)	(.0003533)
fw_securitycouncil	1.74837***	1.956863***
	(.0792623)	(.1018056)
Fixed Treaty Effects	Yes[a]	Yes[a]
Fixed Country Effects	No	Yes[b]
constant	-12.70323***	-14.8041***
	(.430042)	(.9795035)
Pseudo-R-squared	0.4776	0.5292
LR χ^2	3355.42***	3713.16***
Number of Observations	6420	6404

* significant at 10%
** significant at 5%
*** significant at 1%

[a] most effects significant
[b] most effects insignificant

^ where *firstweek*=0
[+] where *regionaltitle*=0

7 Robustness Checks

This section discusses further regressions run to test the relationships discovered in the main regressions in the previous section. The use of alternate data sets and variable definitions allows for further confirmation and understanding of the initial results.

7.1 Separation of Signatories and Parties Dependant Variables

The previous section examined the aggregate of signatories and parties. As explained earlier in the paper, either indicates some sort of intent to participate in the agreement. Of

further interest are the differences between the decision to sign and the decision to ratify or accept an MEA. Thus, the analysis from the previous section is repeated first using signatories as the dependent variable and then using parties as the dependent variable. The results are presented in Tables 5 through 8 in Appendix A.

The variables of interest are significant under the majority of specifications. The amount of leader Security Council members has a consistently positive effect on the decision to participate, while the coefficient on summed GDP per capita is always very close to zero. The coefficient on the summation of percentage of GDP from industry is also rather small, and the sign changes from regression to regression. Much of the time it is positive as expected, though at times it is negative.

The other control variables seem weaker in general. Of those that are significant, an interesting finding is that while *previous_signed* has a positive effect on signatory status but a negative effect on party status. Also, being on the Security Council appears to have a negative effect on non-leader participants' decisions to join, either through signature or ratification.

7.2 Restriction of Sample Size

Because many of the treaties are region-specific, and since the study is more concerned with global environmental treaties, some of the previous regressions restricted the treaties used to those with non-regional titles. This section examines the empirical model for MEAs in the same time period (1980-1999) with at least 30 members. These stipulations narrow down the data to 31 MEAs. After this, three treaties with especially regionally-specific, non-environmental titles underwent further elimination. Thus, this robustness check uses 28 MEAs (listed in Table 14 in Appendix B) and 194 countries.

The initial LPM estimation includes a vector of controls similar to the original model. The variable *previous_signed* is obviously constructed slightly differently, seeing as the number of treaties under study has changed. Also, adjusted savings of forest depletion have been replaced by *forestedarea*, the percentage of the country's land area that is covered in forests in the year the agreement was initially introduced, a variable oft used in the literature. Finally, real GDP is used as the measure of wealth instead of GDP per capita, and it is from the data of the US Department of Agriculture as opposed to the World Development Indicators. In addition, one set of regressions controls for treaty fixed effects, while a second set of regressions controls for subject fixed effects, in order to further investigate the effect of the subject matter of the treaty. Table 15 in Appendix B presents the eight treaty subject dummies created using treaty descriptions from the SEDAC database.

The regression results using this dataset are summarized in Table 9 and Table 10 in Appendix A. The variables *freedom*, *gdpindustry*, *previousigned*, and *realGDP* are all significant, and all the variables of interest (*firstweeksec*, *firstweekrealgdp*, and *firstweekgdpi*) are highly significant as well. Of the variables of interest, the effect of total Security Council members is positive, while the effects of summed real GDP and summed percentage of GDP from industry are very close to zero. Of the control variables, the coefficients on *freedom* and *previoussigned* are positive as predicted, though rather small. The coefficient on *realGDP* is higher using this data set than it was in the study's main regressions, though it is still close to zero. Surprisingly, the coefficient on *gdpindustry* is positive. The variable was included as an indicator of the cost of joining an MEA, as generally more industry leads to more difficulties in MEA participation. However, it appears that non-leader countries with greater percentage of GDP from industry are more likely to participate in MEAs.

Adding the fixed-subject effects increases the significance of *realgdp* (though the coefficient is still close to zero) but makes *previoussigned* out of the control variables and *firstweekgdpi* of the interest variables insignificant. The inclusion also switches the signs on *firstweekrealgdp* and *firstweekgdpi*, though both coefficients are so small as to be negligible in real-world situations.

The results of the probit regressions – once without the fixed-subject effects and once with them – are also shown in Tables 9 and 10 in Appendix A. The significance of the results largely corresponds to the LPM model with the same specifications.

The second robustness check using the smaller dataset involves an alternate definition of "leader" countries as the first third of participants. Rather than set the cut-off date a week after the first signature, the date was set so that at least one third of the members indicated participation before it. Treaty fixed effects are used once more, as opposed to the subject effects. The regressions using this specification are summarized in Table 11 in Appendix A. Without controlling for fixed-treaty effects, all of the variables of interest are significant: *totalsc* and *totalGDPind* are positive, while *totalrealGDP* is negative. Of the controls, *freedom* is the only significant variable, and it has a positive coefficient. The other controls have low t-statistics, making them statistically insignificant, and low coefficients, making them insignificant in real-world application. However, when fixed-treaty effects are added to capture the influence of the treaties' subject matters and legal constructions *totalGDPind* and *totalrealGDP* become insignificant. The variable *totalsc* is still positive and significant, indicating that the joining of Security Council members in the first third of the agreement encourages those countries which later join.

A probit model yielded similar results, also shown in Table 11 in Appendix A. Without fixed-treaty effects, *freedom* was positive and significant out of the control variables, as were all three the interest variables. Once fixed effects were added, *freedom* and *totalsc* was still positive and significant, but *totalGDPind* and *totalrealGDP* were no longer significant. In addition, the standard errors increased in both of the significant variables when moving from the LPM to the probit model and several observations were dropped.

8 Conclusions

With regards to UN Security Council membership, this thesis found that the total number of Security Council members among the early participants does increase the likelihood of an individual country joining the agreement afterward. This variable was significant in each of the regressions, in both the main study and the robustness checks, showing strong evidence that the early participation of Security Council members increases overall membership – a point to be noted for those interested in promoting MEA participation. The results are less clear in regard to the real GDP, GDP per capita, and percentage GDP from industry summed over the leader countries. The coefficients on these were significant in the majority of regressions, but the signs changed frequently and the magnitudes were so close to zero as to be negligible. Thus, this cannot offer conclusions as to how these measures of economic size and environmental impact of the leader countries affects MEA participation.

For the control variables, the study confirmed that the number of previous treaties signed was significant, as did Egger et al. (2009). The paper also confirms that political freedom is a factor in MEA participation, though opposite of what was expected. Freedom and per capita GDP are highly correlated, and when controlling for both, the study finds that freedom's effect

becomes negative. The positive effect when only real GDP is controlled for could be an artifact of how the wealth of citizens affects MEA participation. When this effect is captured by GDP per capita, it appears that greater political freedom decreases the likelihood of a country joining an MEA as a non-leader. Though the study does not replicate the significance of forested area shown in Murdoch et al. (2003) when tested in the robustness checks, the variable measuring adjusted savings of net forest depletion was found to be significant and negative in many of the regressions, indicating it a more appropriate proxy for environmental motivation.

9 Expansions

One of the main ways this study could be expanded would be to use a different proxy or instrument to measure the "size" of pollution of the leader countries. As environmental issues gain prevalence, new indices of pollution are constructed, which can be used to ascertain the effect of leader environmental impact upon membership decision. Currently, such indices are not constructed retroactively, especially in the time period of this study. The collapse of the Soviet Union led to the creation of many new states, and data from the Soviet period is difficult to obtain and to disaggregate for the shape of the world today.

Furthermore, since the model appears to function well in the case of MEAs, it could be expanded to other types of transnational agreements. Does the early support of Security Council members push countries to sign other types of treaties, such as those concerning human rights or disarmament? What types of variables do countries take into account when deciding whether to participate in international agreements in general, and what variables influence specific types of agreements?

Also of interest would be a study of the determinants of signing and ratification. While this study examines both types of members separately and together, it could be expanded to examine the dynamics of the combined probabilities, perhaps with a bivariate probit model. Such a study would be especially informative for policy makers hoping to increase accountability in MEA participation.

Most intriguing, though, would be to expand the research and theory behind how the relative "size" of the leader countries affects the others. Does "largeness," in fact, help fight the free-rider problem and entice countries to commit? Is there some other information factor behind the existence of leader countries? Further research into the actual negotiations and legal structures of the treaties, as well as detailed utility modeling, could more fully reveal the decision process behind MEA participation.

Works Consulted

Beron, K. J., J. C. Murdoch, and W. P. M. Vijverberg (2003) "Why cooperate? Public goods, economic power, and the Montreal Protocol," *The Review of Economics and Statistics* 85, 286-297. Retrieved January 26, 2010, from Business Module. (Document ID: 338910751).

Chander, P., and H. Tulkens (1997) "The Core of an Economy with Multilateral Environmental Externalities," *International Journal of Game Theory* 26, 379-401. Retrieved January 27, 2010, from ArticleReach (Request ID: 293699).

Dixit, A., & Olson, M. (2000). "Does Voluntary participation undermine the Coase Theorem?" *Journal of Public Economics*, *76*(3), Retrieved from http://www.sciencedirect.com/science/article/B6V76-403W3YS-2/2/0674bacd9976b99450bd8430c31e7da1. DOI: 10.1016/S0047-2727(99)00089-4

Ecchia, G., and M. Mariotti (1998) "Coalition Formation in International Environmental Agreements and the Role of Institutions," *European Economic Review* 42, pp. 573-582. Retrieved January 27, 2010 from Science Direct.

Egger, P., C. Jeßberger, and M. Larch (2009) "The Determinants of Multilateral Environmental Agreement Membership."

Finus, M., J. Altamirano-Cabrera, E. C. Van Ierland (2005) "The Effect of Membership Rules and Voting Schemes on the Success of International Climate Agreements" *Public Choice* 125, No. 1/2, pp. 95-127. Retrieved January 26, 2010.

Kuziemko, I., & Werker, E. (2006). "How much is a seat on the Security Council worth? Foreign aid and bribery at the United Nations." *Journal of Political Economy*, *114*(5), Retrieved from http://www.journals.uchicago.edu/doi/abs/10.1086/507155

Mitchell, R. (2003) "International Environmental Agreements: A survey of their features, formation and effects," *Annual Review of Environment and Resources* 28, pp. 429-461.

Murdoch, J.C., T. Sandler, and P.M. Vijverberg (2003) "The participation decision versus the level of participation in an environmental treaty: a spatial probit analysis," *Journal of Public Economics* 87, pp. 337-362.

Rose, A. K., and M. M. Spiegel (2009) "Non-economic Engagement and International Exchange: The Case of Environmental Treaties," *Journal of Money, Credit and Banking* 41(2-3), pages 337-363, 03.

Stigler, G. (1974). "Free riders and collective action: an appendix to theories of economic regulation." *The Bell Journal of Economics and Management Science*, 5(2), Retrieved from http://www.jstor.org/stable/3003114.

Wagner, U. (2001). "The Design of Stable International Environmental Agreements: Economic Theory and Political Economy." *Journal of Economic Surveys*, 15(3), Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1028782.

Appendix A: Regression Tables for Robustness Checks

Table 5: *Linear Probabilities Model Using Signatories as the Dependent Variable*

Variables	**(1) LPM on Signatories**	**(2) LPM on Signatories^**	**(3) LPM on Signatories^**	**(3) LPM on Signatories^**
freedom	-.0155339***	-.001913	-.0003628	-.0003628
	(.0028485)	(.0016671)	(.00346)	(.00346)
previous_signed	.0036268***	.0026332***	.0009377***	.0009377***
	(.0001788)	(.0001627)	(.0002906)	(.0002906)
as_forestedpercent	-.0039901*	-.0002451	-.0022907	-.0022907
	(.0023748)	(.0013598)	(.0032125)	(.0032125)
GDPpercap	5.85e-06***	9.34e-07***	-6.83e-07	-6.83e-07
	(4.11e-07)	(2.66e-07)	(1.33e-06)	(1.33e-06)
percentGDPindustry	-.0000948	.0001203	.0000387	.0000387
	(.0002652)	(.0001514)	(.0003747)	(.0003747)
securitycouncil	.0309818***	-.0062501	-.0138702**	-.0138702**
	(.0075505)	(.0045467)	(.0054627)	(.0054627)
fw_gdppercap		-4.51e-07***	-3.49e-07***	-3.01e-07***
		(7.50e-08)	(7.60e-08)	(9.32e-08)
fw_percentgdpindustry		.0000887***	.0000871***	.0000383
		(.0000309)	(.0000309)	(.0000285)
fw_securitycouncil		.042866***	.0407064***	.0529851***
		(.0066539)	(.0066492)	(.0149151)
regionaltitle				-.0314287
				(.0294685)
Fixed Treaty Effects	No	Yes[c]	Yes[a]	Yes[a]
Fixed Country Effects	No	No	Yes[c]	Yes[c]
constant	.1325034***	-.1320748***	-.0458917	-.0801167
	(.0172195)	(.0342704)	(.0616686)	(.0686053)
R-squared	0.0624	0.3916	0.3990	0.3990
Adjusted R-squared	0.0621	0.3845	0.3878	0.3878
F-stat	215.11***	54.91***	35.67***	35.67***
Number of Observations	19397	16915	16915	16915

* significant at 10%
** significant at 5%
*** significant at 1%

[a] most effects significant
[b] most effects insignificant
[c] effects of mixed significance

^ where *firstweek*=0

Table 6: *Linear Probabilities Model Using Signatories as the Dependent Variable, Restricted for Non-Regional Treaties*[+]

Variables	**(1) LPM on Signatories**[+]	**(2) LPM on Signatories^**	**(3) LPM on Signatories**[+]**^**
freedom	-.028833***	-.0042858	.0036961
	(.0047339)	(.0030374)	(.0061671)
previous_signed	.0052708***	.0048866***	.0018407***
	(.0002921)	(.0002964)	(.0005391)
as_forestedpercent	-.0033031	.0000425	-.0068292
	(.0040255)	(.0025019)	(.0058263)
GDPpercap	.0000102***	2.07e-06***	3.55e-07
	(6.83e-07)	(4.92e-07)	(2.43e-06)
percentGDPindustry	.0004905	.0004542*	.0000108
	(.0004446)	(.0002749)	(.0006777)
securitycouncil	.0169615	-.0227985***	-.0310487***
	(.0126464)	(.008429)	(.0100694)
fw_gdppercap		-5.54e-07***	-3.84e-07***
		(9.43e-08)	(9.71e-08)
fw_percentgdpindustry		-.0000925**	.0000922**
		(.0000385)	(.0000384)
fw_securitycouncil		.0461506***	.042835***
		(.0082976)	(.0082777)
Fixed Treaty Effects	No	Yes[c]	Yes[c]
Fixed Country Effects	No	No	Yes[b]
constant	.2104386***	-.1543742***	-.0922386
	(.0286095)	(.0446944)	(.0837368)
R-squared	0.1066	0.4469	0.4623
Adjusted R-squared	0.1060	0.4399	0.4474
F-stat	184.35***	64.16***	31.06***
Number of Observations	9280	7800	7800

* significant at 10%
** significant at 5%
*** significant at 1%

[a] most effects significant
[b] most effects insignificant

^ where *firstweek*=0
[+] where *regionaltitle*=0

Table 7: *Linear Probabilities Model Using Parties as the Dependent Variable*

Variables	**(1) LPM on Signatories**	**(2) LPM on Signatories^**	**(3) LPM on Signatories^**	**(3) LPM on Signatories^**
freedom	-.0123296***	.0015446	.0054132	.0054132
	(.0027258)	(.0017496)	(.0036069)	(.0036069)
previous_signed	-.0000834	.0011765***	-.0023144***	-.0023144***
	(.0001711)	(.0001708)	(.0003029)	(.0003029)
as_forestedpercent	-.0034174	-.0001191	-.0003202	-.0003202
	(.0022725)	(.001427)	(.003349)	(.003349)
GDPpercap	6.81e-06***	2.43e-06*	-6.83e-07	2.43e-06*
	(3.94e-07)	(1.39e-06)	(1.33e-06)	(1.39e-06)
percentGDPindustry	-.0123296***	.0006342***	-.0000828	-.0000828
	(.0027258)	(.0001588)	(.0003906)	(.0003906)
securitycouncil	.0220032***	.0045269	-.0001694	-.0001694
	(.0072254)	(.0047717)	(.0056948)	(.0056948)
fw_gdppercap		-6.26e-07***	-4.32e-07***	-4.83e-07***
		(7.87e-08)	(7.93e-08)	(9.72e-08)
fw_percentgdpindustry		-.0005105***	-.0005165***	-.0000506*
		(.0000324)	(.0000322)	(.0000297)
fw_securitycouncil		.2415228***	.2373472***	.0953005***
		(.0069831)	(.0069316)	(.0155486)
regionaltitle				.0613669**
				(.0307201)
Fixed Treaty Effects	No	Yes[a]	Yes[a]	Yes[a]
Fixed Country Effects	No	No	Yes[b]	Yes[b]
constant	.1315947***	-.6943879***	-.646373***	-.2626787***
	(.016478)	(.0359662)	(.0642878)	(.0715192)
R-squared	0.0261	0.4750	0.4883	0.4883
Adjusted R-squared	0.0258	0.4689	0.4787	0.4787
F-stat	86.70***	77.18***	51.27***	51.27***
Number of Observations	19397	16915	16915	16915

* significant at 10%
** significant at 5%
*** significant at 1%

[a] most effects significant
[b] most effects insignificant
[c] effects of mixed significance

^ where *firstweek*=0

Table 8: *Linear Probabilities Model Using Parties as the Dependent Variable, Restricted for Non-Regional Treaties*[+]

Variables	**(1) LPM on Signatories**	**(2) LPM on Signatories^**	**(3) LPM on Signatories^**
freedom	-.023267***	.0006958	.00915
	(.0047642)	(.0032103)	(.0064153)
previous_signed	-.0003214	.0022078***	-.0045475***
	(.000294)	(.0003132)	(.0005608)
as_forestedpercent	-.0016838	.0003602	-.0008901
	(.0040512)	(.0026443)	(.0060607)
GDPpercap	.0000114***	3.49e-06***	4.29e-06*
	(6.87e-07)	(5.20e-07)	(2.53e-06)
percentGDPindustry	.0016951***	.0013651***	-.000191
	(.0004475)	(.0002906)	(.000705)
securitycouncil	.0128057	-.0006688	-.0003145
	(.0127273)	(.0089087)	(.0104746)
fw_gdppercap		-6.64e-07***	-2.80e-07***
		(9.96e-08)	(1.01e-07)
fw_percentgdpindustry		-.0005102***	-.0005226***
		(.0000407)	(.0000399)
fw_securitycouncil		.2431896***	.2350931***
		(.0087698)	(.0086108)
Fixed Treaty Effects	No	Yes[a]	Yes[a]
Fixed Country Effects	No	No	Yes[b]
constant	.220653***	-.7330001***	-.6771286***
	(.0287927)	(.0472382)	(.0871066)
R-squared	0.0439	0.5241	0.5518
Adjusted R-squared	0.0433	0.5181	0.5394
F-stat	71.02***	87.46***	44.50***
Number of Observations	9280	7800	7800

* significant at 10%
** significant at 5%
*** significant at 1%

[a] most effects significant
[b] most effects insignificant

^ where *firstweek*=0
[+] where *regionaltitle*=0

Table 9: *Results Summary for Regressions with Leader Countries Defined as the "First Week," Fixed-Treaty Effects*

Variable	**(1) LPM on Member^**	**(2) LPM on Member^**	**(3) Probit on Member^**	**(4) Probit on Member^**
securitycouncil	.0346897	.0295671	.116733	.1225046
	(.0331173)	(.0299104)	(.1070065)	(.1190525)
freedom	.0951425***	.0898491***	.2982541***	.352101***
	(.009754)	(.0088171)	(.031712)	(.0359353)
gdpindustry	.0025048***	.0025933***	.0081492***	.0105161***
	(.000912)	(.0008231)	(.0029028)	(.0032325)
forestedarea	-.000833*	-.0008334**	-.0025702*	-.0033305**
	(.0004369)	(.000394)	(.0013751)	(.001539)
previoussigned	.0006757	.0004806	.0020494	.001807
	(.0004704)	(.0004257)	(.0014852)	(.0016565)
realGDP	.0000297**	.0000302***	.0000974**	.0001412***
	(.0000127)	(.0000115)	(.0000443)	(.0000501)
totalsc	.0545046***	.0523817***	.1791303***	.3070667***
	(.0057743)	(.0085589)	(.0197856)	(.0674007)
totalrealGDP	-7.24e-06***	2.39e-06	-.0000278***	-3.81e-07
	(1.84e-06)	(4.75e-06)	(6.15e-06)	(.0000188)
totalGDPind	.0002163***	-.0000254	.0006717***	-.0007158**
	(.0000263)	(.0000502)	(.0000893)	(.000306)
Treaty Fixed Effects	No	Yes[a]	No	Yes[a]
constant	-.4757781***	-.2192982**	-3.008351***	-2.382513**
	(.0661628)	(.099174)	(.2222664)	(.4057454)
R-squared	0.2399	0.3900		
Adjusted R-squared	0.2365	0.3807		
Pseudo-R-squared			0.1986	0.3405
F-stat	70.23***	42.23***		
LR χ-squared			549.21***	916.39***
Number of Observations	2013	2013	2013	1951

* significant at 10%
** significant at 5%
*** significant at 1%

[a] most effects significant

Table 10: *Results Summary for Regressions with Leader Countries Defined as the "First Week," Fixed-Subject Effects*

Variable	**(1) LPM on Member^**	**(2) LPM on Member^**	**(3) Probit on Member^**	**(4) Probit on Member^**
securitycouncil	0.03732	0.03713	0.13830	0.12948
	(0.03532)	(0.03302)	(0.10658)	(0.11270)
freedom	0.10052***	0.09282***	0.29275***	0.30310***
	(0.01037)	(0.00971)	(0.03140)	(0.03338)
gdpindustry	0.00265***	0.00251***	0.00791***	0.00828***
	(0.00097)	(0.00090)	(0.00287)	(0.00300)
forestedarea	-0.00070	-0.00064	-0.00217	-0.00222
	(0.00047)	(0.00044)	(0.00139)	(0.00146)
previoussigned	0.00084*	0.00069	0.00231	0.00200
	(0.00050)	(0.00047)	(0.00149)	(0.00157)
realGDP	0.00002*	0.00003**	0.00007	0.00012**
	(0.00001)	(0.00001)	(0.00004)	(0.00005)
firstweeksec	0.15624***	0.09807***	0.51808***	0.35091***
	(0.00981)	(0.01224)	(0.036190)	(0.04707)
firstweekrealgdp	0.00005***	-0.00004***	-0.00015***	-0.00014***
	($3.50x10^{-6}$)	($4.03x10^{-6}$)	(0.00001)	(0.00002)
firstweekgdpi	-0.00014***	0.00005	-0.00040***	0.00022
	(0.00003)	(0.00004)	(0.00010)	(0.00014)
Fixed Subject Effects	No	Yes	No	Yes
constant	-0.13689**	0.10367	-1.86548***	-1.37238***
	(0.06598)	(0.06607)	(0.20036)	(0.22203)
R-squared	0.1771	0.2845		
Adjusted R-squared	0.1733	0.2785		
Pseudo-R-squared			0.1477	0.2440
F-stat	45.64***	47.28***		
LR χ-squared			389.50***	643.40***
Number of Observations	1918	1918	1918	1918

* significant at 10%
** significant at 5%
*** significant at 1%

Table 11: *Results Summary for Regressions with Leader Countries Defined as the "First Third"*

Variable	**(1) LPM on Member^**	**(2) LPM on Member^**	**(3) Probit on Member^**	**(4) Probit on Member^**
securitycouncil	.0203218	.0192649	.0779395	.07805
	(.0384353)	(.0346225)	(.1211989)	(.1349013)
freedom	.0741857***	.0728925***	.2386628***	.287025***
	(.0107601)	(.0096977)	(.0344807)	(.0388619)
gdpindustry	.0016221*	.0016033*	.0054218*	.0068914**
	(.0009626)	(.0008662)	(.0030839)	(.0034413)
forestedarea	-.0006873	-.0006112	-.0020869	-.0024048
	(.000474)	(.0004263)	(.0014894)	(.0016673)
previoussigned	.0007938	.0006695	.002225	.0024871
	(.0005092)	(.0004598)	(.0016077)	(.0017966)
realGDP	.0000152	.0000195	.0000331	.000084
	(.0000163)	(.0000146)	(.0000503)	(.0000559)
totalsc	.0547353***	.0590675***	.171456***	.2880628***
	(.0065048)	(.009949)	(.021746)	(.0688918)
totalrealGDP	-.0000101***	2.37e-06	-.0000355***	1.35e-06
	(2.07e-06)	(4.76e-06)	(6.81e-06)	(.0000189)
totalGDPind	.000262***	-4.66e-06***	.0008058***	-.0005073
	(.0000277)	(.0000542)	(.0000935)	(.0003113)
Treaty Fixed Effects	No	Yes[a]	No	Yes[a]
constant	-.4141028***	-.2130002**	-2.790857***	-2.315284***
	(.071161)	(.1034151)	(.2364017)	(.4216564)
R-squared	0.2443	0.3996		
Adjusted R-squared	0.2402	0.3887		
Pseudo-R-squared			0.1978	0.3278
F-stat	60.09***	36.66***		
LR χ-squared			460.18***	730.94***
Number of Observations	1683	1683	1683	1621

* significant at 10%
** significant at 5%
*** significant at 1%
[a] most effects significant

Appendix B: Construction of the Data Set

Table 12: *Countries in the Study and Assigned Codes*

Country	Code
Afghanistan	1
Albania	2
Algeria	3
Andorra	4
Angola	5
Antigua and Barbuda	6
Argentina	7
Armenia	8
Australia	9
Austria	10
Azerbaijan	11
Bahamas	12
Bahrain	13
Bangladesh	14
Barbados	15
Belarus	16
Belgium	17
Belize	18
Benin	19
Bhutan	20
Bolivia	21
Bosnia and Herzegovina	22
Botswana	23
Brazil	24
Brunei Darussalam	25
Bulgaria	26
Burkina Faso	27
Burundi	28
COE Council of Europe*	29
Côte d'Ivoire	30
Cambodia	31
Cameroon	32
Canada	33
Cape Verde	34
Central African Republic	35
Chad	36
Chile	37
China	38
Colombia	39
Comoros	40
Congo	41
Conseil de l'Entente*	42
Cook Islands	43
Costa Rica	44
Croatia	45
Cuba	46
Cyprus	47
Czech Republic	48
Democratic People's Rep. of Korea	49
Denmark	50
Djibouti	51
Dominica	52
Dominican Republic	53
EC European Communities*	54
Ecuador	55
Egypt	56
El Salvador	57
Equatorial Guinea	58
Eritrea	59
Estonia	60
Ethiopia	61
FAO Food & Agriculture* Organization of the UN	62
Fiji	63
Finland	64
France	65
Gabon	66
Gambia	67
Georgia	68
Germany	69
Ghana	70
Greece	71
Grenada	72

Guatemala	73
Guinea	74
Guinea-Bissau	75
Guyana	76
Haiti	77
Holy See	78
Honduras	79
Hongkong	80
Hungary	81
ICAO International Civil Aviation Organization*	82
ILO International Labor Office*	83
IMO International Maritime Organization*	84
Iceland	85
India	86
Indonesia	87
Iran (Islamic Republic of)	88
Iraq	89
Ireland	90
Israel	91
Italy	92
Jamaica	93
Japan	94
Jordan	95
Kazakhstan	96
Kenya	97
Kiribati	98
Kuwait	99
Kyrgyzstan	100
Lao People's Democratic Rep.	101
Latvia	102
Lebanon	103
Lesotho	104
Liberia	105
Libyan Arab Jamahiriya	106
Liechtenstein	107
Lithuania	108
Luxembourg	109
Macedonia (The former Yugoslav Republic of)	110
Madagascar	111
Malawi	112

Malaysia	113
Maldives	114
Mali	115
Malta	116
Marshall Islands	117
Mauritania	118
Mauritius	119
Mexico	120
Micronesia (Federated States of)	121
Moldova (Republic of)	122
Monaco	123
Mongolia	124
Morocco	125
Mozambique	126
Myanmar	127
Namibia	128
Nauru	129
Nepal	130
Netherlands	131
New Zealand	132
Nicaragua	133
Niger	134
Nigeria	135
Niue	136
Norway	137
Oman	138
Pakistan	139
Palau	140
Palestine	141
Panama	142
Papua New Guinea	143
Paraguay	144
Peru	145
Philippines	146
Poland	147
Portugal	148
Qatar	149
Republic of Korea	150
Romania	151
Russian Federation	152
Rwanda	153

Sahrawi Democratic Arab Republic	154
Saint Kitts and Nevis	155
Saint Lucia	156
Saint Vincent and the Grenadines	157
Samoa	158
San Marino	159
Sao Tome and Principe	160
Saudi Arabia	161
Senegal	162
Seychelles	163
Sierra Leone	164
Singapore	165
Slovakia	166
Slovenia	167
Solomon Islands	168
Somalia	169
South Africa	170
Spain	171
Sri Lanka	172
Sudan	173
Suriname	174
Swaziland	175
Sweden	176
Switzerland	177
Syrian Arab Republic	178
Tajikistan	179
Thailand	180
Togo	181
Tokelau	182

Tonga	183
Trinidad and Tobago	184
Tunisia	185
Turkey	186
Turkmenistan	187
Tuvalu	188
UN United Nations*	189
UNESCO UN Educational, Scientific & Cultural Organization*	190
Uganda	191
Ukraine	192
United Arab Emirates	193
United Kingdom	194
United Republic of Tanzania	195
United States	196
Uruguay	197
Uzbekistan	198
Vanuatu	199
Venezuela	200
Viet Nam	201
WHO World Health Organization*	202
WMO World Meteorological Organization*	203
Yemen	204
Yugoslavia	205
Zaire	206
Zambia	207
Zimbabwe	208

Table 13: *Multilateral Environment Agreements (1980-1999), Assigned Codes, and Assigned Subject Effect*

Treaty Title	Code	Year
Agreement on the Protection of Confidentiality of Data related to Deep Sea-bed Areas for which application of Authorisation has been made	1	1984
ASEAN Agreement on the Conservation of Nature and Natural Resources	2	1985
Additional Protokoll No 4 to the Revised Convention on Navigation on the Rhine	3	1989
Agreement between the Central African States concerning the Creation of a Special Fund for the Conservation of Wild Wild Fauna	4	1983
Agreement concerning Interim Arrangements relating to Polymetallic Nodules of the Deep Sea Bed	5	1982
Agreement constituting the National Commission for the Development of the Riverbed Rio Pilcomayo	6	1995
Agreement establishing the European Bank for reconstruction and development	7	1990
Agreement establishing the Fund for the Development of the Indigenous Peoples of Latin America and the Caribbean	8	1992
Agreement establishing the South Pacific Regional Environment Programme	9	1993
Agreement for Cooperation and Consultation between the Central African States for the Conservation of Wild Fauna	10	1983
Agreement for Cooperation in Dealing with Pollution of the North Sea by Oil and other Harmful Substances	11	1983
Agreement for the Establishment of Southern African Centre for Ivory Marketing (SACIM)	12	1991
Agreement for the Establishment of the Indian Ocean Tuna Commission	13	1993
Agreement for the Establishment of the Near East Plant Protection Organization	14	1993
Agreement for the Establishment of the Network of Aquaculture Centres in Asia and the Pacific	15	1988
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	16	1995
Agreement on Co-operative Enforcement Operations directed at Illegal Trade in Wild Fauna and Flora	17	1994
Agreement on Regional Co-operation in Combating Pollution of the South-East Pacific by Hydrocarbons or other Harmful Substances in cases of Emergency	18	1981
Agreement on the Action Plan for the Environmentally Sound Management of the Common Zambezi River System	19	1987
Agreement on the Conservation of African-Eurasian Migratory Waterbirds	20	1995
Agreement on the Conservation of Bats in Europe	21	1991
Agreement on the Conservation of Cetaceans of the Black Sea	22	1996
Agreement on the Conservation of Seals in the Wadden Sea	23	1990
Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas	24	1992
Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin	25	1995
Agreement on the European Economic Area	26	1992
Agreement on the Organisation for Indian Ocean Marine Affairs (IOMAC)	27	1990
Agreement on the Preparation of a Tripartite Environmental Management Programme for Lake Victoria	28	1994
Agreement on the Preservation of the Confidentiality of Data concerning Deep Seabed Areas	29	1986
Agreement on the Resolution of Practical Problems with Respect to Deep Seabed Mining Areas	30	1987
Agreement on transboundary cooperation with a view to preventing or limiting harmfull effects for human beings property or the environment in the event of accidents	31	1989
Agreement relating to the Implementation of Part XI of the United Nations Convention on the	32	1994

Law of the Sea of 10 December 1982		
Agreement to Establish the South Centre	33	1994
Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas	34	1993
Amendment to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Art.XXI)	35	1983
Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	36	1992
Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	37	1990
Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	38	1997
Amendment to the Treaty for the Prohibition of Nuclear Weapons in Latin America	39	1990
Amendment to the Treaty for the Prohibition of Nuclear Weapons in Latin America	40	1991
Amendments of the Agreement for Co-operation in dealing with Pollution by Oil and other Harmful Substances	41	1989
Amendments to Annexes I and II to the Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft	42	1985
Amendments to Articles 6 and 7 of the Convention on Wetlands of International Importance especially as Waterfowl Habitat	43	1987
Amendments to the Annexes to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	44	1980
Amendments to the Convention for the Protection of the Mediterranean Sea against Pollution	45	1995
Amendments to the Convention on Fishing and Conservation of the Living Resources in the Baltic Sea and the Belts	46	1982
Articles of Association of the South Asia Co-operative Environment Programme	47	1981
Benelux Convention on Nature Conservation and Landscape Protection	48	1982
Comprehensive Nuclear Test - Ban Treaty	49	1996
Convention Creating the Niger Basin Authority	50	1980
Convention concerning Indigenous and Tribal Peoples in Independent Countries	51	1989
Convention concerning Safety in the Use of Asbestos	52	1986
Convention concerning the Protection of Alps	53	1991
Convention establishing a marine scientific organization for the North Pacific Region (PICES)	54	1990
Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region	55	1981
Convention for the Conservation of Anadromous Stocks	56	1992
Convention for the Conservation of Salmon in the North Atlantic Ocean	57	1982
Convention for the Conservation of Southern Bluefin Tuna	58	1993
Convention for the Conservation of the Biodiversity and the Protection of Wilderness Areas in Central America	59	1992
Convention for the Prohibition of Fishing with Long Driftnets in the South Pacific	60	1989
Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region	61	1983
Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific	62	1981
Convention for the Protection of the Marine Environment of the North-East Atlantic	63	1992
Convention for the Protection of the Marine and Coastal Environment of the Eastern African Region	64	1985
Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (SPREP Convention)	65	1986
Convention for the Protection of the Ozone Layer	66	1985
Convention on Access to Information Public Participation in Decision-Making and Access to Justice in Environmental Matters	67	1998
Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	68	1986

Convention on Biological Diversity	69	1992
Convention on Conditions for Registration of Ships	70	1986
Convention on Cooperation for the Protection and Sustainable Use of the Danube River	71	1994
Convention on Early Notification of a Nuclear Accident	72	1986
Convention on Environmental Impact Assessment in a Transboundary Context	73	1991
Convention on Nuclear Safety	74	1994
Convention on Supplementary Compensation for Nuclear Damage	75	1997
Convention on Transboundary Effects of Industrial Accidents	76	1992
Convention on civil liability for damage resulting from activities dangerous to the environment	77	1993
Convention on fisheries cooperation among African States bordering the Atlantic Ocean	78	1991
Convention on multilateral cooperation in North-East Atlantic fisheries	79	1980
Convention on the Ban of the Import of Hazardous Wastes into Africa and on the Control of their Transboundary Movements within Africa	80	1991
Convention on the Conservation of Antarctic Marine Living Resources	81	1980
Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	82	1989
Convention on the International Commission for the Protection of the Oder	83	1996
Convention on the Law of Treaties between States and International Organizations or between International Organizations	84	1986
Convention on the Law of the Non-Navigational Uses of International Watercourses	85	1997
Convention on the Prohibition of the Development Production and their Destruction	86	1993
Convention on the Prohibition of the Use Production and Transfer of Anti-Personnel Mines and on their Destruction	87	1997
Convention on the Protection and Use of Transboundary Watercourses and International Lakes	88	1992
Convention on the Protection of the Black Sea against Pollution	89	1992
Convention on the Protection of the Environment through Criminal Law	90	1998
Convention on the Protection of the Marine Environment of the Baltic Sea Area	91	1992
Convention on the Protection of the Rhine	92	1999
Convention on the international commission for the protection of the Elbe	93	1990
Convention relative à la collecte riception des dichets survenant en navigation rhenaneet intirieure	94	1996
Convention relative aux transports internationaux ferroviaires (COTIF)	95	1980
Convention to ban the Importation into Forum Island Countries of Hazardous Wastes and Radioactive Wastes and to control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific	96	1995
Cooperation Agreement for the Protection of the coasts and waters of the North-East Atlantic against Pollution	97	1990
Eastern Pacific Ocean Tuna Fishing Agreement	98	1983
Energy Charter Protocol on Energy Efficiency and related Environmental Aspects	99	1994
Energy Charter Treaty	100	1994
European Convention for the Protection of Pet Animals	101	1987
European Convention for the Protection of Vertebrate Animals used for Experimental and other Scientific Purposes	102	1986
European Outline Convention on Transfrontier Co-operation between Territorial Communities or Authorities	103	1980
Fourth ACP-EEC Convention	104	1989
Framework Convention for the Protection of National Minorities	105	1995
Inter-American Convention for the Protection and Conservation of Sea Turtles	106	1996
International Convention for the Protection of New Varieties of Plants (consolidated version)	107	1991

International Convention on Arrest of Ships	108	1999
International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea	109	1996
International Convention on Oil Pollution Preparedness Response and Co-operation	110	1990
International Convention on Salvage	111	1989
International Convention to Combat Desertification in those Countries Experiencing Serious Drought and or Desertification	112	1994
International Plant Protection Convention (1997 Revised Text)	113	1997
International Tropical Timber Agreement	114	1983
International Tropical Timber Agreement	115	1994
Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	116	1997
Joint Protocol relating to the application of the Vienna Convention and the Paris Convention	117	1988
Kyoto Protocol to the United Nations Framework Convention on Climate Change	118	1997
North American Agreement on Environmental Cooperation	119	1993
North American Free Trade Agreement (NAFTA)	120	1992
Protocol Agreement on the Conservation of Common Natural Resources	121	1982
Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean	122	1995
Protocol Concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region	123	1990
Protocol I to the Convention for the the Prohibition of Fishing with Long Driftnets in the South Pacific	124	1990
Protocol II to the Convention for the the Prohibition of Fishing with Long Driftnets in the South Pacific	125	1990
Protocol Relating to Modification of the International Convention for the Conservation of Atlantic Tunas	126	1984
Protocol additionnal to the Convention for the Protection of the Rhine from Pollution by Chlorides	127	1991
Protocol amending the Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft	128	1989
Protocol amending the Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft	129	1983
Protocol amending the Convention for the prevention of marine pollution from land-based sources	130	1986
Protocol amending the European Agreement on the Restriction of the Use of certain Detergents in Washing and Cleaning Products	131	1983
Protocol concerning Co-operation in Combating Marine Pollution in cases of Emergency in the Eastern African Region	132	1985
Protocol concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region	133	1983
Protocol concerning Co-operation in Combating Pollution Emergencies in the South Pacific Region	134	1986
Protocol concerning Co-operation in combating Pollution in cases of Emergency	135	1981
Protocol concerning Marine Pollution resulting from Exploration and Exploitation of the Continental Shelf	136	1989
Protocol concerning Mediterranean Specially Protected Areas	137	1982
Protocol concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region	138	1985
Protocol concerning Regional Co-operation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency	139	1982
Protocol for the Conservation and Management of Protected Marine and Coastal Areas of the South-East Pacific	140	1989
Protocol for the Prevention of Pollution of the South Pacific Region by Dumping	141	1986
Protocol for the Protection of South-East Pacific against Pollution from Land-Based Sources	142	1983

Protocol for the Protection of the Marine Environment against Pollution from Land-Based Sources	143	1990
Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources	144	1980
Protocol for the Protection of the South-East Pacific against Radioactive Pollution	145	1989
Protocol for the implementation of the Alpine Convention in the field of mountain agriculture	146	1994
Protocol for the implementation of the Alpine Convention in the field of mountain forests	147	1996
Protocol for the implementation of the Alpine Convention in the field of nature protection and landscape conservation	148	1994
Protocol for the implementation of the Alpine Convention in the field of town and country planning and sustainable development	149	1994
Protocol for the protection of the Mediterranean Sea against pollution resulting from exploration and exploitation of the continental shelf and the seabed and its subsoil	150	1994
Protocol of 1996 to amend the Convention on Limitation of Liability for Maritime Claims	151	1996
Protocol on Substances that Deplete the Ozone Layer	152	1987
Protocol relating to the Development Fund of the Niger Basin	153	1980
Protocol relating to the International Convention for the Safety of Life at Sea (SOLAS PROT 1988)	154	1988
Protocol to Amend the Convention of 31st January 1963 Supplementary to the Paris Convention of 29th July 1960 on third Party Liability in the Field of Nuclear Energy as amended by the Additional protocol of 28th January 1964	155	1982
Protocol to Amend the Convention on Third Party Liability in the Field of Nuclear Energy of 29th July 1960 amended by the Additional Protocol of 28th January 1964	156	1982
Protocol to amend Paragraph 2 of Article X of the International Convention for the Conservation of Atlantic Tunas	157	1992
Protocol to amend the Convention on Wetlands of International Importance especially as Waterfowl Habitat	158	1982
Protocol to amend the International Convention on Civil Liability for Oil Pollution Damage	159	1992
Protocol to amend the International Convention on Civil Liability for Oil Pollution Damage	160	1984
Protocol to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage	161	1992
Protocol to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage	162	1984
Protocol to amend the Vienna Convention on Civil Liability for Nuclear Damage	163	1997
Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes	164	1991
Protocol to the 1979 Convention on Long-range Transboundary Air Pollution on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at Least 30 per Cent	165	1985
Protocol to the Antarctic Treaty on Environmental Protection	166	1991
Protocol to the Convention on Long-Range Transboundary Air Pollution concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes	167	1988
Protocol to the Convention on Long-Range Transboundary Air Pollution on Heavy Metals	168	1998
Protocol to the Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants	169	1998
Protocol to the Convention on Long-Range Transboundary Air Pollution on further Reduction of Sulphur Emissions	170	1994
Protocol to the Convention on Long-range Transboundary Air Pollution on Long-Term Financing of Co-operative Programme for Monitoring and Evaluation of the Long Range Transmission of Air Pollutants in Europe (EMEP)	171	1984
Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	172	1996
Protocol to the International Convention for the Safety of Fishing Vessels	173	1993
Protocol to the Treaty on Southeast Asia Nuclear Weapon - Free Zone	174	1995

Protocole d'adhésion de la Principauté de Monaco à la Convention sur la protection des Alpes	175	1994
Protocole d'application de la convention alpine de 1991 dans le domaine de l'énergie	176	1998
Protocole d'application de la convention alpine de 1991 dans le domaine du tourisme	177	1998
Protocole d'application de la convention alpine de 1991dans le domaine de la protection des sols	178	1998
Provisional Understanding Regarding Deep Seabed Matters	179	1984
Regional Agreement on the transboundary movement of hazardous wastes	180	1992
Regional Convention for the Conservation of the Red Sea and of the Gulf of Aden Environment	181	1982
Regional Convention for the management and conservation of the natural forest ecosystems and the development of forest plantations	182	1993
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	183	1998
Second Protocol amending the Convention on the Canalization of the Mosel	184	1983
Single European Act	185	1986
South Pacific Fisheries Treaty	186	1987
Statutes of the International Centre for Genetic Engineering and Biotechnology	187	1983
Supplementary Protocol of 26 March 1998 to the Convention concerning the Regime of Navigation on the Danube	188	1998
Supplementary Protocol to the Agreement on Regional Co-operation in Combating Pollution of the South-East Pacific by Hydrocarbons or other Harmful Substances	189	1983
The African Nuclear-Weapon-Free Zone Treaty	190	1996
The South Pacific Nuclear Free Zone Treaty	191	1985
Third ACP-EEC Convention	192	1984
Third Protocol amending the Convention on the canalization of the Mosel	193	1987
Treaty Establishing the African Economic Community	194	1991
Treaty of the Southern African Development Community	195	1992
Treaty on European Union	196	1992
Treaty on the Southeast Asia Nuclear Weapon - Free Zone	197	1995
United Nations Convention on the Law of the Sea	198	1982
United Nations Framework Convention on Climate Change	199	1992

Table 14: *Multilateral Environmental Agreements (1980-1997) with 30 or More, Assigned Codes, and Assigned Subject Effect*

Treaty	Code	Year	Subject Effect
Amendments to the Annexes to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	1	1980	7
Protocol to amend the Convention on Wetlands of International Importance especially as Waterfowl Habitat	2	1982	2
United Nations Convention on the Law of the Sea	3	1982	7
Amendment to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Art.XXI)	4	1983	2
International Tropical Timber Agreement	5	1983	4
Protocol to the Convention on Long-range Transboundary Air Pollution on Long-Term Financing of Co-operative Programme for Monitoring and Evaluation of the Long Range Transmission of Air Pollutants in Europe (EMEP)	6	1984	1
Convention for the Protection of the Ozone Layer	7	1985	1
Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	8	1986	5
Convention on Early Notification of a Nuclear Accident	9	1986	5
Amendments to Articles 6 and 7 of the Convention on Wetlands of International Importance especially as Waterfowl Habitat	10	1987	2
Protocol on Substances that Deplete the Ozone Layer	11	1987	1
Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	12	1989	3
Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	13	1990	1
International Convention on Oil Pollution Preparedness Response and Co-operation	14	1990	7
Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	15	1992	1
Convention on Biological Diversity	16	1992	2
Protocol to amend the International Convention on Civil Liability for Oil Pollution Damage	17	1992	7
Protocol to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage	18	1992	7
United Nations Framework Convention on Climate Change	19	1992	1
Convention on the Prohibition of the Development Production and their Destruction	20	1993	3
Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982	21	1994	7
Convention on Nuclear Safety	22	1994	5
Energy Charter Protocol on Energy Efficiency and related Environmental Aspects	23	1994	6

Energy Charter Treaty	24	1994	6
International Convention to Combat Desertification in those Countries Experiencing Serious Drought and or Desertification	25	1994	8
International Tropical Timber Agreement	26	1994	4
Comprehensive Nuclear Test - Ban Treaty	27	1996	5
Convention on the Prohibition of the Use Production and Transfer of Anti-Personnel Mines and on their Destruction	28	1997	2

Table 15: *Subject Effect Key*

General Subject	**Code**
Air, atmosphere, climate, outer space	1
Animal species protection and management, land use and protected areas, general environmental conservation	2
Hazardous substances and general wastes	3
Forest conservation, management, and exploitation	4
Radiation	5
Renewable energy sources and energy conservation	6
Seawater pollution, sea navigation and jurisdiction, conservation and management of marine resources, fishing	7
Soil quality and pollution	8