Grow rich and clean up later?
Joint effects of IGO membership and democracy on environmental performance in developing countries

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Abstract:
Many forms of environmental degradation first increase, then level off and decrease as national income grows. Does this mean poorer countries have to grow rich before they can improve their environmental performance? This paper argues that integration into the international system in combination with democratic forms of government mitigates this dilemma. This argument is tested on panel data for 115 developing countries in 1970-2000. The empirical analysis shows that IGO membership, one important manifestation of integration into the international system, reduces air and water pollution in democracies and autocracies. However, democracy amplifies the positive integration effect with respect to air pollution, but less with respect to CO_2 emissions and water pollution. Moreover, international assistance, another indicator for international integration, has no pollution reducing effect in autocracies, but reduces SO_2 emissions in democracies.

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1. Introduction

Does integration into the international system help developing countries provide public goods? The importance of this question lies with the fact that poverty or low-national income is often associated with low levels of public goods provision, for example in areas such as health care, education or environmental sustainability. Wealthy nations, in stark contrast, are characterized by higher life expectancy, lower illiteracy rates[2], superior environmental performance[3], and other conditions that the Millennium Assessment Process[4] and policy-makers worldwide regard as highly desirable.

This paper concentrates on one important type of public good, namely environmental performance. The theoretical and empirical literature on the relationship between income and environmental degradation indicates that many forms of pollution tend to rise monotonically with growing income (Grossman and Krueger 1995). After a certain income threshold is reached, however, some pollutants tend to level off and decline. Typical examples include air and water pollution. This non-linear inverted U-shaped relationship has come to be called the Environmental Kuznets Curve (EKC) (Grossman and Krueger 1995; Selden and Song 1994). According to the logic of the EKC an increase in national income should be connected with better environmental performance if we consider industrialized countries whereas developing countries should be confronted with deteriorating environmental performance when experiencing growing GDP per capita.

Does this regularity imply that poor countries need to become rich to be able to offer high levels of environmental public goods to their population? A glimpse at a simple representation of the empirical pattern between environmental performance (defined here in terms of sulfur-dioxide (SO_2) emissions) and GDP per capita, as shown in Figure 1, suggests that this may not be the case. The wide variation in pollution levels around the regression line indicates that national income is not as decisive for the provision of environmental performance as the literature on the EKC suggests. Several countries seem to fit the EKC pattern, for example India or Sri Lanka. However, when we look at Albania or Lithuania for example we observe, even long after the collapse of communism and despite a growth in their national income levels, a strong rise in environmental quality. In contrast, in the case of Ecuador, Ivory Coast or Laos, environmental performance has worsened while at the same time their national income stagnated or even declined. Finally, we observe cases in which there is no obvious relationship between GDP per capita and environmental quality, for example in Cameroon, Haiti or the Philippines.

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[2] For a ranking of countries concerning life expectancy and illiteracy rates, see for example Human Development Index: http://hdr.undp.org/en/statistics/.

[3] The Environmental Performance Index (Center for International Earth Science Information Network 2005) shows that the average sustainability score of high-income countries is higher compared to those of middle- or low-income countries. This finding, however, should not obfuscate the fact that there is strong variation within income brackets: some high-income countries exhibit poor environmental performance and some low-income countries high environmental performance.

[4] http://www.un.org/millenniumgoals/

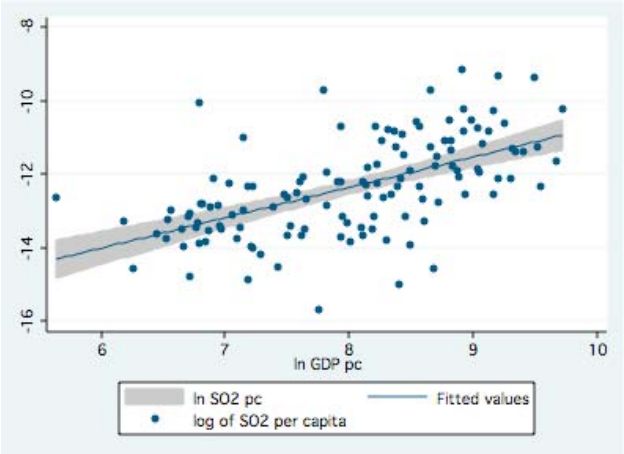

Figure 1: Relationship between SO_2 per capita and GDP per capita (year 2000)

Positive or negative deviations from the EKC for any given population of countries and environmental performance measures can in principle be due to a variety of factors. The existing literature pays considerable attention to the effects of democracy and economic openness to explain variation in environmental performance at any given level of income (Neumayer 2002b; Ward 2008; Baettig and Bernauer 2008). This paper adds to that line of research by developing and testing the argument that integration into the international system, measured in terms of membership in international intergovernmental organizations (IGOs), can help developing countries "cut through" the EKC (i.e. reach a turning point at lower environmental degradation levels, and/or earlier on in the stage of economic development).

In particular, I argue that membership in IGOs increases environmental performance in developing countries since IGOs constitute a channel by which these countries may receive technologies and resources necessary to reduce pollution. In addition, IGO membership allows for issue linkage and the diffusion of knowledge on environmental protection implying that these countries may undertake actions to take care of their environment already at this early stage of economic development. Moreover, I argue that being democratic or autocratic should *not* have an independent effect on environmental performance in developing countries. Only when we look at the interplay of IGO membership and regime type a country's political system may become decisive. More specifically, the positive effect of integration into the international system is argued to be intensified in democratic countries implying an interaction term between IGO membership on the one hand and a country's political system on the other hand. This interaction effect captures the idea that at any given level of IGO membership environmental performance will be higher in democracies relative to autocratic countries.

I empirically test the propositions of the theoretical arguments using time-series cross-section analysis of 115 developing countries from 1970 to 2000. The empirical analysis shows that IGO membership indeed reduces air and water pollution in both democracies and autocracies whereas the political regime type does not have an independent effect on environmental performance in developing countries. However, in line with the theoretical arguments, democracy amplifies the positive

integration effect with respect to air pollution, but contrary to theoretical predictions democracy dampens the effect with respect to CO_2 emissions and water pollution.

The theoretical implications of this paper for the study of public goods provision are firstly that in contrast to the findings of existing studies (Neumayer 2002a; Deacon 2003) political regime type per se seems to play no significant role for environmental performance in developing countries. Only in the interplay with the international system the political system gains in importance mediating the positive effect of IGO membership on environmental performance. Second, international integration should not be reduced to trade openness alone (Antweiler et al. 2001) since other important characteristics of the international system such as membership in IGOs seems to affect environmental performance in important ways. Finally, testing the theoretical claims in this paper for other types of public goods provision in developing countries such as education or public health provision should be straightforward.

The following section develops the theoretical argument and outlines the hypotheses to be tested. Part three describes the data and methods used. Section four presents the results of the empirical analysis. Part five summarizes the findings and discusses the theoretical and policy implications.

2. Theoretical Framework

My theoretical argument evolves in four parts. First, following the logic of the Environmental Kuznets Curve, I present arguments for why developing countries should theoretically face increasing environmental pollution. These arguments highlight the fact that developing countries usually have low environmental performance because they are lacking both the capability and the willingness to decrease pollution. Second, I derive from these arguments that the political system should not have an independent effect on environmental performance in developing countries. This implies that democratic developing countries per se should *not* be characterized by better environmental performance relative to their autocratic counterparts. Third, the effect of IGO membership is analyzed emphasizing two main effects on environmental performance. On the one hand, integration into the international system should enhance the willingness of developing countries to increase environmental performance through issue linkage and the diffusion of interest; and on the other hand, it should augment the capability of developing countries to foster environmental performance through the flow of resources in the form of knowledge and technologies. Finally, the interaction effect between international political integration and the political system is introduced to capture the idea that although democracy should not have an independent effect on environmental performance, it may however intensify the positive effect of IGO membership. Consequently, at any given level of political integration environmental performance should be higher in democracies relative to autocratic

countries because the presumably positive effect of IGO membership is stronger in democratic countries. Figure 2 outlines the theoretical argument.

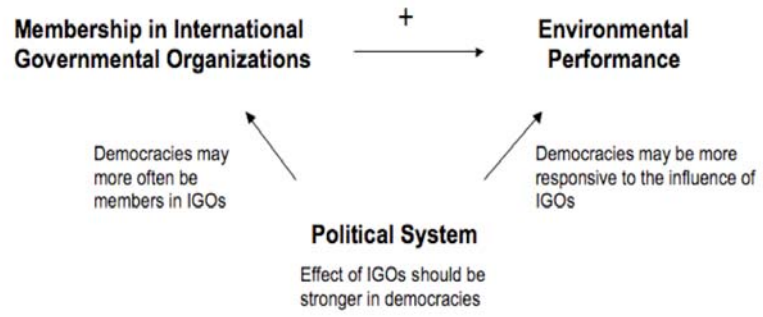

Figure 2: Theoretical Argument

2.1 Income and environmental performance

Many studies (Grossman and Krueger 1995; Selden and Song 1994; Shafik and Bandyopadhyay 1992) empirically find an inverted U-shaped relationship between GDP per capita and several indicators of environmental pollution and labeled this relationship Environmental Kuznets Curve (EKC). The logic underlying the EKC is that in the course of a country's economic development rising national income increases the scale of economic activity, which - all else being equal - leads to raising pollution levels (scale effect). However, after a certain threshold of national income has been reached, pollution is supposed to decline due to two effects: First, the composition of the economy is likely to change from manufacturing to service (composition effect); and second, with rising national income technological progress tends to lead to less environmental pollution (technology effect). In addition, there is a political component to the EKC: At early stages of economic development environmental quality is usually considered a luxury good[5] and because states have only limited resources available, environmental performance usually ranks far behind the demand for better economic conditions for example. However, once people attain a certain level of living standards environmental performance turns into a normal public good and constituents demand that their government takes actions to reduce or avoid pollution, for example by enacting appropriate environmental regulations (Selden and Song 1994).

Applied to the context of developing countries the EKC argument implies that most of these countries should be situated on the upward sloping part of the curve and hence be confronted with deteriorating environmental quality since at their present stage of economic development neither the composition nor the technological effect should be conducive to improve environmental performance.

[5] A luxury good is a good for which the demand increases with the income level. This implies that at low-income levels the good is usually not demanded or only in low quantities whereas its demand increases with growing income.

2.2 No independent effect of political system

In addition to the fact that according to the EKC argument developing countries should theoretically face increasing environmental pollution, the citizenry in these countries is also unlikely to demand from their governments to spend scarce resources to improve environmental performance at the expense of basic needs such as education and health. The particular nature of environmental performance as a luxury good (Rogowski 2003) implies that environmental quality is not or only very little demanded at low-income levels and that its demand increases with growing income. Hence, people in developing countries should therefore not demand from their governments to take actions in order to enhance environmental quality. As Neumayer (2002a: 150) notes: "This need not imply that poor countries care less about the environment per se. Rather, because of their poverty, they might prioritize issues other than the environment". Consequently, one can argue that the political system should therefore not have an independent effect on environmental performance in developing countries. If there is no or only very little public demand pressuring the government to increase environmental quality, democratic governments will consequently not have electoral incentives to spend scarce resources on improving environmental performance. Hence, democratic developing countries per se should *not* be characterized by higher environmental performance relative to their autocratic counterparts.

Taking together, these arguments suggest a very dark picture of environmental performance in developing countries and one could conclude that developing countries need to grow rich before they are able to clean up. However, this conclusion is not in line with the empirical picture of environmental performance presented above, which shows a wide variation in environmental performance that is unexplained by national income.

Moreover, this conclusion ignores the possibility that a country's capability and willingness to reduce pollution might also be affected exogenously. Up to this point only national factors have been presented as being decisive for the provision of better environmental quality. However, states do not act in a vacuum, they interact and are influenced by other states and international actors (such as IGOs and NGOs), by economic pressures and dependencies. Moreover, it is argued that international integration also influences the capacity and interest of states to provide environmental quality (Antweiler et al. 2001; Frankel and Rose 2005; Neumayer 2002b). However, the extent to which international integration affects a country's capability and willingness to provide public goods is likely to depend on the political system of the particular country. Thus, I argue that the effect of the international system on environmental performance may be mediated by the type of political system implying a different effect of international integration in democracies versus autocracies.

In the next sections I therefore elaborate on the mechanisms how international political integration and its interaction with the political system are to influence environmental performance. In terms of clarity of the argument I firstly analyze the impact of membership in IGOs on environmental quality and then incorporate its interaction with the political system.

2.3 Membership in International Organizations

The major part of the literature on globalization and the provision of public goods focuses solely on the economic facet of international integration, such as trade (Antweiler et al. 2001; Frankel and Rose 2005) and foreign direct investment (FDI) (Mani and Wheeler 1998; Busse 2004). Only very few studies have taken the political dimension of globalization into account. Ward (2006) is the notable exception as he examines whether countries that are more central to the network of international environmental regimes act more sustainably at the national level. He finds using social network analysis that indeed countries that are more central also care more about domestic environmental quality. Although his study concentrates on the network of international environmental treaties and organizations he notes that "the Kantian view is that IGOs, economic interdependence and democracy form a mutually supportive triangle that promotes peace. The network of IGOs facilitates deterrence of bad behaviour, mediation and problem-solving, sharing of information and the generation of norms and trust (Russett and Oneal 2001). This raises the possibility that nations' environmental records may relate to their general position in the international system, just as recent work suggests that joint membership of non-trade related IGOs increases trade between pairs of nations (Ingram et al. 2005)" (Ward 2006: 154).

Following Ward (2006), I consequently propose to analyze the impact IGO membership has on a country's willingness and capability to take care of its environment. Controlling for economic aspects of globalization such as trade openness and FDI inflows I thereby evaluate whether the inclusion of the political aspect of international integration adds to our understanding of environmental performance in developing countries.

The general purpose of international governmental organizations[6] is to enable or facilitate cooperation at the international level and thereby to enable countries to solve problems, which they often are unable to solve independently, and hence to realize benefits from mutual cooperation (Keohane 1984). IGOs promote cooperation by reducing transaction costs, by limiting uncertainty, by widening the shadow of the future, by increasing reputational costs and by allowing credible commitments (Keohane 1984; Abbott and Snidal 2000). Consequently, I argue that membership in international governmental organizations may influence environmental performance in developing countries due to the following reasons:

First, since IGOs raise the reputational stakes for reneging on agreements (Keohane 1984) members of a particular IGO should obey the corresponding rules. In addition, according to the particular IGO non-compliance could even be sanctioned meaning that the responsible organization

[6] According to (Pevehouse et al. 2004) an IGO is an organization that consist of at least three members of the COW-defined state system, that hold regular plenary sessions at least once every ten years and that possess a permanent secretariat and corresponding headquarters. According to this definition, IGOs are formalized forms of international cooperation.

can demand from participant countries to enforce the corresponding rules. However, this will only affect environmental performance directly in the case of IGOs that have some environmental purposes, which is of course only true for some international organizations such as the Multilateral Fund for the Implementation of the Montreal Protocol or the North Atlantic Salmon Conservation Organization.

Second, IGOs create norms on good behavior or rather what constitutes bad conduct (Ward 2006; Young and Levy 1999). Although an IGO might not have a direct link to environmental purposes, the general idea of seeing environmental protection as being of importance might be spread through membership in IGOs in general. Abbott and Snidal (2000) subsume these first two mechanisms under "techniques ranging from litigation and sanctions to persuasion, normative appeals, and shaming". Hence, international organizations can constitute a forum in which countries or other actors like environmental non-governmental organizations (ENGOs) that have an interest in environmental protection, can promote this idea and can try to influence other states in this direction. This consequence of IGO membership is emphasized in the literature on policy diffusion. Cao (2008) for example shows that interaction at the international level through trade ties or connections in the IGO network can serve as channels of information that allow countries to learn from other countries policy decisions and thereby provide for a socialization process among states.

Third, IGOs often deal with a variety of different issues (Vogler 1995; Young and Levy 1999) and states although often joining an organization because of a certain issue are then also influenced by the other issues dealt with in this organization. Hence, although countries become a member in an organization for other reasons e.g. financial assistance, they are also exposed to the other purposes of these organizations such as environmental protection (an example would be the World Bank or the European Union (EU)). (Jahn 2002), for example, argues that "[...] the membership in an international organization such as the EU may support the improvement of environmental standards. The rationale is that particular environmentally conscious countries take the role of pioneers that push environmental issues onto the agenda of countries that might be perceived as environmental laggards"[7]. The case of Laos illustrates this argument: by joining the Association of Southeast Asian Nations (ASEAN) in 1997 Laos was required to implement a number of agreements dealing with agro-economic development. The implementation of these agreements by trying to make the agrarian sector more sustainable had also, as a side effect, a positive impact on Laos' environment (UNEP 2001).

These first three arguments all refer to mechanisms through which IGOs might influence a country's willingness to enhance its environmental performance. In contrast, the final argument shows that membership in IGOs may also influence the capability of developing countries to enhance

[7] This idea is closely related to the concept of issue linkage (Keohane 1984): in order to achieve cooperation in an environmental issue, benefits in other areas like trade, financial or technological assistance etc., could be offered to countries that would not be willing to cooperate on environmental issues in general. Similarly, in the words of Ward (2006: 151) "there is greater scope for sanctioning non-compliance in relation to one regime when nations can withdraw their cooperation over other issues (Lohmann 1997); and there is greater scope for getting cooperation through issue-linkage, supposing there is some heterogeneity of preference (Martin 1995; Finus 2001). Thus the existence of multiple ties between nations allows sanctions and bribes to be used".

environmental performance by highlighting that IGOs also allow for information and technology transfer. (Porter et al. 2000) argue that due to new information and knowledge on environmental pollution, awareness of environmental quality as an important public good could be created and knowledge and technology on abatement possibilities could be distributed. This implies that a country that is better politically integrated in the international system can receive more relevant information and knowledge and can more easily draw on technical knowledge and assistance from international actors. Examples of IGOs that diffuse information and technologies that also profit the environment are the Food and Agrarian Organization (FAO) or the World Health Organization (WHO). By trying to improve sanitation facilities or access to safe drinking water these organizations although pursuing goals that are not necessarily motivated by environmental protection per se, often lead to advancements also in the field of environmental performance.

Taken together these arguments lead to the conjecture that membership in IGOs is expected to positively influence environmental performance in developing countries. Thus, the first hypothesis states:

H1: Developing countries that are a member to more IGOs provide higher levels of environmental performance.

2.4 Interconnection with the political system

Having presented mechanisms how IGO membership can alter the provision of environmental quality in developing countries, I now turn to its interconnection with the political system. I establish an interaction effect between IGO membership and the political system to capture the idea that although democracy should not have an independent effect on environmental performance in developing countries, it may however intensify the positive effect of international integration. Consequently, at any given level of IGO membership environmental performance should be higher in democracies relative to autocratic countries because the presumably positive effect of political integration is stronger in democratic countries.

I argue that the reason why the positive influence of IGO membership on environmental quality should be enhanced in democracies is twofold: First, democracies may in general be more inclined to join IGOs in the first place. Second, democracies may also be more responsive to the influence of IGOs using this influence for a higher provision of public goods than autocratic countries.

The reasons why democratic countries may join more IGOs in the first place are the following: First, democratic countries tend to be more transparent than autocracies and therefore they can more easily and credibly commit themselves to international cooperation (Remmer 1998; Gaubatz 1996). Similarly, Abbott and Snidal (2000) argue that strong domestic legal institutions and traditions as usually found in democracies should increase international credibility. Second, according to the literature on the democratic peace, democracies tend to cooperate more on the international level than

autocracies. This is because democracies are supposedly able to solve their domestic conflicts by cooperation and accordingly they are assumed to project this cooperative behavior also to the international realm (Russett and Oneal 2001). Altogether, the argument that democracies display more international environmental commitment is empirically supported by (Fredriksson and Gaston 2000) as well as (Neumayer 2002b, 2002a) who show that democracies not only tend to ratify more international environmental agreements but are also faster in ratifying these agreements. Overall, these arguments suggest that democracies should be more likely to be a member of IGOs than autocratic countries implying that the positive effect of IGO membership may be amplified for democracies just because they are better integrated in the international system.

The second possible reason why the political system might intensify the effect of international integration on environmental performance is that democracies may be more responsive to the influence of IGOs. As outlined above, IGOs diffuse resources such as knowledge and technologies to their member countries. These resources may constitute a ready opportunity for democratic leaders to provide public goods such as environmental quality and to thereby enhance their chances to stay in office.

Several authors (Deacon 2003; McGuire and Olson 1996; Bueno De Mesquita et al. 2003; Olson 1993; Deacon 1999) argue that democracies provide more public goods for their population than autocracies because in order to survive in office democratic leaders need the support of the majority of their citizenry. Following the terminology of Bueno de Mesquita et al. (2003) we can define the selectorate as the group in a society that is eligible to select or elect the leader of the country. In a democracy the selectorate would usually consist of all citizens over a certain age limit whereas in an autocracy the selectorate is composed of an elite group defined either by military power, party membership or heritage. The winning coalition is then defined as the subgroup of the selectorate whose support is necessary for the leader to gain or stay in power. In a democracy with majoritarian electoral system this would be at least 50 percent of the electorate whereas in an autocracy this would be again a small elite group usually consisting of military or party elites. Using Bueno de Mesquita et al.'s (2003) terminology we see that leaders in autocracies need to satisfy a smaller winning coalition in order to stay in power than leaders in democratic countries. Since leaders have only limited resources at their disposal to achieve political support, it follows that autocratic leaders can concentrate these resources on their small winning coalition whereas leaders in democracies need to disperse their resources to a larger group. Maximizing political support given their resources it should be more efficient for democratic leaders to provide public goods than to buy off their winning coalition with targeted private goods. Consequently, democracies should provide more public goods to ensure the support of a larger group whereas in autocracies leaders should mostly rely on private goods targeted to their small winning coalition.

On the contrary, it can be argued that autocracies might supply more public goods as usually their leaders have a longer planning horizon[8]. As most environmental problems develop slowly and often become apparent only in the distant future, democratic leaders who might be more myopic as they face frequently re-elections might not be interested in facing the short-term costs of providing long-term environmental quality (Congleton 1992; Midlarsky 1998). In addition, some studies claim that in mature democracies public goods are underprovided because special interest groups gained a disproportionate influence on the government. Therefore governments often provide private goods to these interest groups instead of providing public goods to the whole population (Midlarsky 1998; Olson 1982).

A huge part of the empirical literature, however, (Torras and Boyce 1998; Barrett and Graddy 2000; Bernauer and Koubi 2008) shows that democracies tend to be better providers of environmental quality. From these findings it can be derived that the influence of IGO membership by providing resources such as knowledge and technology may constitute a ready opportunity to provide higher levels of public goods, in this case environmental quality, and consequently to increase the chances of re-election of the government.

These two lines of reasoning taken together suggest that democratic political systems should amplify the positive effect of membership in IGOs because democracies may firstly be more inclined to join IGOs in general and secondly democracies may use the resources available to them through their IGO membership for a higher provision of public goods. I therefore expect an interaction effect between a country's political system and the effect of IGO membership on the provision of environmental quality:

H2: Democracy enhances the positive effect of IGO membership on environmental performance.

In summary, this paper postulates that membership in international organizations conditional on a country's political system influences environmental performance in developing countries. In particular, I argue that membership in IGOs increases environmental performance in developing countries by providing a channel through which these countries may receive technologies and resources necessary to reduce pollution. Moreover, I argue that in democratic countries this positive effect of political integration is intensified implying an interaction term between IGO membership on the one hand and a country's political system on the other hand. This interaction effect captures the idea that at any given level of IGO membership environmental performance will be higher in democracies relative to autocratic countries. This should be the case because democracies may firstly be more inclined to join IGOs in general and secondly because democracies may use the resources available to them through their IGO membership to provide better environmental performance relative to their autocratic counterparts.

[8] As Bueno de Mesquita et al. (2003) note: once autocratic leaders survive the first year in office they usually stay in office for a long period.

Having laid out the theoretical framework of my analysis, the following section deals with the empirical implications of my arguments.

3. Empirical Analysis

To test the above made theoretical arguments, this paper uses time-series cross-country (TSCS) analysis covering the years 1970 to 2000. The unit of analysis is consequently the country-year. According to the theoretical arguments, the sample consists of all developing countries. Every year the World Bank publishes a classification of countries into low-income, lower-middle income, higher-middle income and high-income[9]. Following this classification, I decided to include all countries that were characterized as non high-income. Since the classification threshold varies each year, the highest threshold, which is the one in the year 2000, was chosen. Hence, all countries with a GNI per capita level[10] of less than 9, 266 US dollar are in the sample, which results in a total of 115 countries. However, in order to test the robustness of my results all statistical models were re-calculated using the samples that include only all countries up to the lower-middle income (2,995 US dollar) or up to the low-income (755 US dollar) classification threshold respectively. In those cases in which the results are sensitive to the sample size, they are presented below, otherwise only the results for the sample including all countries with less than 9, 266 US dollar of GNI per capita are shown.

3.1 Variables

In the literature different measures of my dependent variable, environmental performance, are employed such as indicators of air quality (Grossman and Krueger 1995), water quality (Sigman 2002), or indices, which combine several measures of environmental quality such as the environmental sustainability index or the genuine savings index (De Soysa and Neumayer 2005). To refer to a broader picture of environmental performance this analysis uses different measures covering the most important aspects of environmental performance. However, availability of data that exist as time-series cross-section data limited the choice to Sulfur Dioxide (SO_2) and Carbon Dioxide (CO_2) emissions[11] measuring air quality and to biological oxygen demand (BOD) emissions[12] measuring water quality[13]. All indicators are measured in levels instead of growth rates due to two reasons. Since

[9] http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20420458~menuPK:64133156~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html$

[10] The World Bank calculates yearly GNI per capita levels using its Atlas method to diminish the impact exchange rate fluctuations have on the cross-country comparison of national incomes.

[11] Both are measured in thousand metric tons per capita. I use the natural log of both variables because of their long-right tails.

[12] BOD is measured in kilogram per day per capita. Again the natural log is used due to the long-right tail distribution.

[13] Although there exist environmental performance indices their use for time-series cross-section analysis is limited: the composition of the environmental sustainability index changes from year to year rendering it non-valuable for time-series analysis. The concept of genuine savings intends to measure the true rate of savings in an economy after taking into account investments in human capital, depletion of natural resources and damage

all my arguments refer to the state of environmental quality and not to changes in environmental performance I consider levels as more appropriate. In addition, changes could be misleading in the sense that the growth rate of pollution may be high implying bad environmental performance whereas the overall state of the environment is still good. In contrast, growth rates may be low and therefore hinting to great environmental performance while in reality the state of the environment is quite bad.

All three indicators reflect important aspects of environmental performance: SO_2 is a primary contributor to acid rain and detrimental for human health and the well-being of the ecosystem. It mostly arises from burning fossil fuels such as coal or oil and is to a great extent emitted by for example petroleum refineries, metal processing facilities, locomotives and large ships. The organic water pollutant BOD, which is a measure of water pollution, mostly arises from untreated sewage. Finally, CO_2, a greenhouse gas, originates among other things from the combustion of fossil fuels. Its increased emissions are a main contributor to global warming and climate change. The data on SO_2 emissions are taken from (Stern 2005) whereas the data on BOD and CO_2 emissions come from the World Bank's development indicators.

Two independent variables result from my hypotheses, namely membership in international governmental organizations and the political system of a country. The first independent variable is operationalized as the yearly cumulative count of each country's IGO membership. The data comes from the correlates of war project (Pevehouse et al. 2004). The use of this cumulative measure in contrast to for example the use of the number of new memberships in a certain year is appropriate as the cumulative measurement acknowledges that being a member of a certain number of IGOs limits a country's options for further membership.

The political system of a country is measured using the combined Polity IV (Marshall and Jaggers 2002) score ranging form 1 – most autocratic – to 21 – most democratic. Polity IV captures the competitiveness of political participation, the guarantee of openness and competitiveness of executive recruitment, and the existence of institutionalized constraints on the exercise of executive power. Since Polity IV has been criticized with regard to difficulties concerning the aggregation procedure (Munck and Verkuilen 2002) I use (Alvarez et al. 1996)'s dichotomous index of democracy (ACLP index) as a robustness check.[14]

In order to capture the interconnection between a country's political system and IGO membership, the political system variable is interacted with the count variable of membership in IGOs.

In addition to the two independent variables, a number of control variables are included in the model. Only control variables are included that are associated with both environmental performance

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caused by pollution. Although, it can be seen as a measure of weak-sustainability (De Soysa and Neumayer 2005) its environmental component is very small implying that genuine savings is not a valuable indicator of environmental performance.

[14] I refrain from using the ACLP index as the main measure of a country's political system because being a dummy variable it only distinguishes between democracies and autocracies per se masking variation in regime type between these two extremes.

and any of the independent variables having thereby the potential to bias the interaction effect between international political integration and the political system of a country on its environmental performance.

To control for the effect of national income on pollution the log of GDP per capita is included in the model. Although the logic of the environmental Kuznets curve (EKC) suggests including both GDP per capita and its square term in the regression model, doing so leads to the fact that both terms become insignificant[15]. This is due to the fact that we only consider a particular sample of countries. Looking only at developing countries, we observe a negative effect of income on environmental performance because none of the countries has yet reached the turning point after which income is supposed to be associated with increasing environmental performance[16]. Therefore, using a quadratic specification of GDP per capita does not capture the linear relationship between national income and environmental performance for the countries included in this sample. Hence, only the linear term is included in the model. The data on national income comes from Gleditsch (2002), which is an updated version of the Penn World Tables.

In addition to GDP per capita, I also include economic growth to control for the fact that a growing economy is often associated with environmental degradation. Furthermore, economic growth plays an important role in the literature on democratization (Barro 1996) having therefore the potential to bias the mediating effect of the political system. Since a larger population usually consumes more natural resources and thereby produces greater environmental degradation population density (Correlates of War 2008; Singer et al. 1972) is part of the statistical model.

Some existing studies have already examined economic facets of globalization and their influence on environmental performance. To be able to separate the impact of international political integration from the economic aspects of international integration I also include a country's trade openness and its foreign direct investment (FDI) inflows in the statistical model. The literature on economic globalization and public goods provision mainly points out two mechanisms how economic integration may affect environmental performance: general welfare enhancing gains vs. regulatory competition (Frankel and Rose 2005).

According to the first argument, higher economic integration should have on average a positive effect on environmental performance because of the welfare enhancing gains of globalization. It is argued that increasing economic integration allows countries to specialize in industries in which they have a comparative advantage allowing for a more efficient allocation of resources and higher productivity. As a result a country's national income is supposed to increase leading to a higher public goods provision (Frankel and Rose 2005; Antweiler et al. 2001).

[15] Results are available upon request.

[16] Estimating a quadratic model of GDP per capita on environmental performance using all countries yields to a turning point of 23,192 in the case of SO_2 and to turning points that are out of sample in the case of CO_2 and BOD.

According to the second argument, increasing economic interdependence leads to strong regulatory competition between countries (Zarsky 1999). In order to increase their competitiveness and attract foreign capital, countries are pushed towards less stringent regulations, which can lead to either a regulatory chill or even to a race to the bottom that would undermine the provision of public goods such as environmental quality and social welfare benefits. Which of the two effects actually prevails is mainly an empirical question (Frankel 2003). Trade openness is measured by the yearly ratio of the sum of exports and imports to GDP (Gleditsch 2002). FDI inflows are measured in percent of GDP and the data is taken from the World Bank development indicators.

Finally, a time trend is added to the model in order to control for time effects. Table 1 displays descriptive statistics of the variables used in the regression models.

Table 1: Descriptive statistics[17]

Variable	Mean	Std. Dev.	Min	Max
SO2 per capita (in thousands)	0.01	0.03	0.00	0.30
BOD per capita (in thousands)	4.37	4.30	0.01	19.65
CO_2 per capita	2.19	3.51	0.00	28.79
Ln Trade Openness	-16.00	0.95	-21.14	-12.56
Polity IV	9.11	6.79	1	21
FDI inflows in % of GDP	1.95	5.32	-82.81	145.13
IGO membership	45.96	17.23	1	96
GDP per capita	3510.00	2950.769	281.26	18680.46
Population density	48.42	84.38	0.01	852.64
Growth	1.01	0.29	0.36	17.98

3.2 Empirical Results

In order to analyze the empirical implications of my theoretical model I use a fixed-effects model with panel corrected standard errors (PCSE) and a Prais-Winsten specification to control for autocorrelation. A fixed-effects model[18] was chosen because it allows for unit heterogeneity in contrast to OLS with PCSE - a method suggested by (Beck and Katz 1995), which assumes a common intercept for all units (Wilson and Butler 2007). Since it is unlikely that my statistical model captures

[17] Negative values for FDI net inflows per capita imply that more capital is going out of the country than coming into the country.

[18] Hausman test rejects the use of random effects.

all unit heterogeneity it is warranted to include unit effects in the statistical analysis[19]. Due to data availability the time span of the analysis is limited to the years 1980 to 2000 in the case of BOD. Since IGO membership may not affect environmental performance contemporaneously as the effects may need some time to trickle through the political system of a country all independent and control variables are incorporated into the model with a one-year time lag[20].

Table 2: Results testing hypothesis 1:[21]

	(1) ln SO_2 pc	(2) ln CO_2 pc	(3) ln BOD pc
IGO membership	-0.02***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)
Polity	-0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)
Trade openness	0.03	0.09***	0.02
	(0.03)	(0.02)	(0.02)
FDI	0.00	-0.00	-0.01*
	(0.00)	(0.00)	(0.00)
ln GDP pc	0.47***	0.52***	0.60***
	(0.06)	(0.05)	(0.07)
Population density	-0.00	0.00***	0.00***
	(0.00)	(0.00)	(0.00)
ln growth	-0.01	-0.04	-0.14**
	(0.05)	(0.06)	(0.07)
Time trend	0.01**	0.01***	0.00
	(0.01)	(0.00)	(0.00)
Constant	-12.94***	-1.77**	-10.80***
	(0.68)	(0.85)	(1.01)
Observations	2625	2716	1200
Number of countries	111	115	98
R-squared	1.00	0.88	0.99

Panel corrected standard errors in parentheses;
*** p<0.01, ** p<0.05, * p<0.1

Table 2 shows the results testing hypothesis 1, which states a positive relationship between IGO membership and environmental performance. As postulated membership in international organizations has a positive influence on environmental performance as measured by any of the three indicators (SO_2, CO_2 or BOD emissions)[22]. Since the dependent variable is the log of SO_2, CO_2 or BOD the coefficients have a percentage interpretation (Wooldridge 2003). For example, if a country's

[19] This approach is additionally indicated because the unit effects are highly statistically significant and because the results slightly change if OLS with PCSE is used - which can be interpreted as a sign that unit effects influence the parameters of interest (Wilson and Butler 2007).

[20] However, results do not change if contemporaneous variables are used. In contrast, some results would be even more significant. Consequently, using a one-year time lag of all independent and control variables seems to be the more conservative approach. Results using contemporaneous variables are available upon request.

[21] Country effects are not displayed in the regression tables.

[22] Since the dependent variable is pollution emissions a negative coefficient sign implies a reduction in emissions and therefore an increase in environmental quality.

IGO membership increases by one unit (i.e. one further membership) the model predicts a reduction in this country's SO_2 emissions by 2% and a reduction in its CO_2 and BOD emissions by 1%.

Table 3: Results testing hypothesis 2:

	(1) ln SO_2 pc	(2) ln CO_2 pc	(3) ln BOD pc
IGO membership	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)
Polity IV	0.03***	-0.01	-0.01
	(0.01)	(0.00)	(0.01)
IGO * Polity	-0.00***	0.00	0.00
	(0.00)	(0.00)	(0.00)
Ln trade openness	0.02	0.09***	0.01
	(0.03)	(0.02)	(0.02)
FDI	0.00	-0.00	-0.01**
	(0.00)	(0.00)	(0.00)
Ln GDP per capita	0.47***	0.52***	0.60***
	(0.06)	(0.05)	(0.07)
Population density	-0.00	0.00***	0.00***
	(0.00)	(0.00)	(0.00)
Ln growth	-0.00	-0.04	-0.14**
	(0.05)	(0.06)	(0.07)
Time trend	0.01**	0.01***	0.00
	(0.01)	(0.00)	(0.00)
Constant	-14.67***	-1.67***	-9.74***
	(0.86)	(0.79)	(1.75)
Observations	2625	2716	1200
Number of countries	111	115	98
R-squared	1.00	0.89	0.99

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

As argued in the theoretical part, democratic developing countries do not perform better with regard to the provision of environmental performance relative to autocratic countries. The empirical results show no statistical significant effect of the political regime type on any of the indicators of environmental performance. These results therefore confirm that at the stage of low economic development environmental performance is usually seen as a luxury good. Hence, constituents do not demand from their governments to spend scarce resources to enhance environmental performance implying that the political system per se should not be decisive at this stage of economic development. Only if interacted with a country's level of international integration the political system should play a decisive role concerning environmental performance.

The results containing the interaction effect of IGO membership and a country's political system are presented in table 3. In order to facilitate interpretation of the interaction terms I calculated marginal effects and plotted them in various graphs[23]. The first picture in figure 3 shows the marginal effect of IGO membership, i.e. the effect of a one-unit increase in IGO membership, on SO_2 emissions over the range of the democracy variable. As predicted by the theory IGO membership reduces SO_2

[23] All figures showing marginal effects with interaction terms were produced using the computer code of (Brambor et al. 2006).

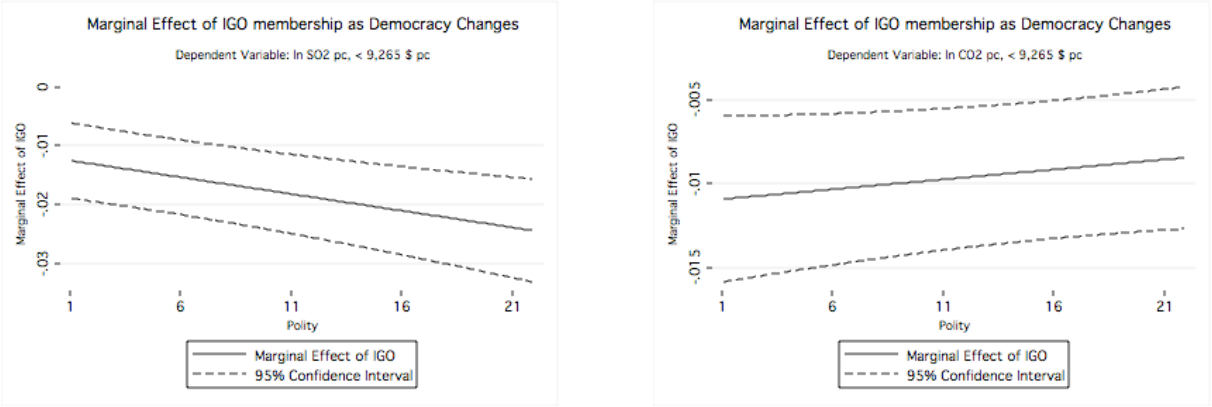
emissions significantly no matter whether the country is a democracy or an autocracy. However, the effect is much more pronounced in democracies than in autocracies, which is supportive to hypothesis 2. Hence, a one-unit increase in IGO membership implies about a 1% reduction in SO_2 emissions in an autocratic country whereas it implies about a 2.5% decrease in a full democracy.

These results are a first indication confirming the above made theoretical arguments. A country's number of IGO memberships has a positive influence on air quality independent of the political system of a country. Furthermore, a democratic political system increases this positive effect of integration into the international system.

In contrast, if we look at the effect of IGO membership on CO_2 and BOD emissions the picture is reversed, as displayed in the second and third picture in figure 3. Although IGO membership is again associated with a statistically significant reduction in CO_2 and BOD emissions for all different regime types, the effect is now stronger in autocracies and less pronounced in democracies. These results, although in line with hypothesis 1, are therefore in contrast with the second hypothesis.

However, the difference in effect size between full autocracies and full democracies are not as distinctive as in the case of SO_2. A one-unit increase in IGO membership implies about a 1.1% reduction in CO_2 emissions in an autocratic country and is reduced to a 0.8% decrease in a full democracy. If we look at water pollution, see third picture in figure 3, we see that any further IGO membership reduces BOD emissions by 0.14% in an autocracy and by 0.11% in a democracy.

Figure 3: Interaction effect of IGO membership



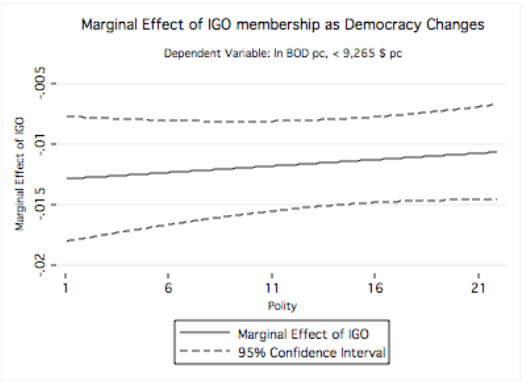
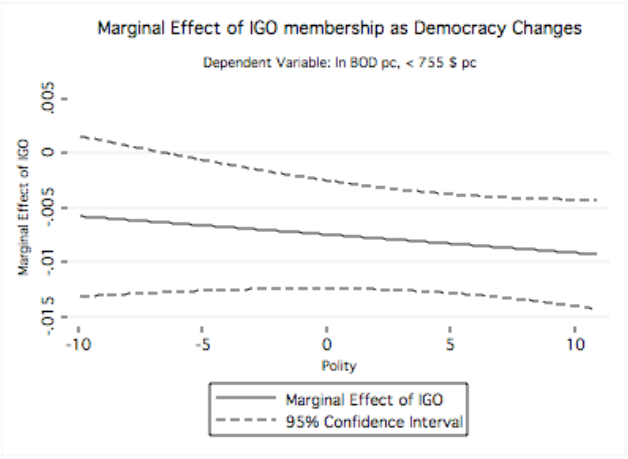


Figure 4: Interaction effect of IGO membership and political system (low-income countries)



Looking at different sample sizes the results concerning the interaction effect between IGO membership and the political system stays the same with the exception of water quality in low-income countries. As figure 4 shows, if we only consider countries with a GNI per capita level below 756 US Dollars, which is the World Bank classification threshold for low-income countries, we see that the effect of a IGO membership is now stronger in democracies compared to the effect in autocratic countries. This is in line with hypothesis 2 indicating a reduction in water pollution independent of the regime type with the effect being much more pronounced in democracies than in autocracies.

Table 4: Results testing hypothesis 2 (low-income sample)

	(1) ln SO_2 pc	(2) ln CO_2 pc	(3) ln BOD pc	(4) ln SO_2 pc	(5) ln CO_2 pc	(6) ln BOD pc
IGO membership	-0.02***	-0.01***	-0.01	-0.03***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Polity IV	0.05***	-0.00	0.01	0.01	0.00	-0.00
	(0.02)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
IGO * Polity	-0.00***	0.00	-0.00			
	(0.00)	(0.00)	(0.00)			
Ln trade openness	0.02	0.08***	0.03	0.03	0.09***	0.02
	(0.04)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)
FDI	0.00	-0.00	-0.02***	-0.00	-0.00	-0.02***

	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)
Aid	0.00	-0.00	-0.00	0.00**	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Ln GDP per capita	0.60***	0.37***	0.59***	0.66***	0.37***	0.59***
	(0.10)	(0.08)	(0.12)	(0.09)	(0.08)	(0.12)
Population density	-0.00*	0.00***	0.01***	-0.00**	0.00***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Ln growth	-0.05	-0.02	-0.19	-0.06	-0.02	-0.17
	(0.07)	(0.09)	(0.14)	(0.07)	(0.09)	(0.14)
Time trend	0.02***	0.01**	-0.02***	0.03***	0.01**	-0.02***
	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Aid * Polity				-0.00***	0.00	0.00
				(0.00)	(0.00)	(0.00)
Constant	-16.48***	-1.98**	-9.36***	-16.33***	-5.62***	0.00
	(0.82)	(0.85)	(1.09)	(0.79)	(0.81)	(0.00)
Observations	1231	1301	386	1231	1301	386
Number of countries	52	55	43	52	55	43
R-squared	1.00	0.82	1.00	1.00	0.82	1.00

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Except for GDP per capita, which is in all cases associated with an increase in pollution as predicted by the EKC argument, none of the control variables exerts a robust influence. Population density is associated with an increase in CO_2 and BOD emissions but is not statistically significant for SO_2 emissions. Trade openness turns out to be significant only for CO_2 emissions implying that countries that are characterized by higher trade openness are facing higher CO_2 emissions.

3.3 Validating the empirical results

Measuring IGO membership using a count variable of a country's IGO memberships implies that we assume that all IGOs influence environmental quality in the same way. However, it may be the case that certain IGOs, e.g. environmental IGOs, have a stronger influence than others. (Boehmer et al. 2004) show for example that only highly structured and institutionalized IGOs contribute to interstate peace while organizations that are only minimally institutionalized do not affect conflict between states. Ingram et al. (2005) code IGOs according to their mandate into general umbrella, political, economic and social organizations. Thereby, they are able to show that even IGOs with a social and cultural mandate advance trade between their member states.

Following the example and the coding instructions of Ingram et al. (2005) I have coded all IGOs according to their mandate into military (e.g. NATO), umbrella (e.g. ASEAN, EU), economic general (e.g. World Bank, IMF), economic standardization (e.g. Caribbean Postal Union), social (e.g. WHO, ILO, UNESCO), environmental (e.g. Global Environmental Facility GEF), nuclear (e.g. IAEA), and agricultural (e.g. FAO) organizations. Since Ingram et al.'s (2005) coding only covers the time period until 1992 and because they subsume nuclear and agrarian IGOs, which often are characterized by strong environmental provisions, under different IGO mandates I decided to undertake this additional coding effort while following closely their coding instructions as described in Ingram et al. (2005).

Table 5 shows the results using the disaggregated IGO variables instead of the general count variable[24]. Interestingly, only membership in social, umbrella and military IGOs exert a significantly negative effect on pollution over all three indicators while controlling for membership in any of the other IGO types. Membership in nuclear IGOs is of great importance when considering air quality but has no effect on water pollution. In contrast, agricultural IGOs are associated with better water quality but with worse CO_2 emissions. Surprisingly, economic as well as environmental organizations are almost never connected with better environmental performance.

In addition to being interesting in its own right, disaggregating IGO membership can provide us with some evidence concerning the underlying mechanisms how membership in IGOs may affect environmental performance in developing countries. The strong effect of umbrella organizations such as the EU or ASEAN, for example, is a first indication that some IGOs seem to be very successful in connecting different issues. Although environmental protection is usually not the main goal of these umbrella organizations, countries joining these IGOs out of economic or political interest are as a side effect also influenced with regard to their environmental performance. Moreover, the strong and robust effect of social IGOs seems to hint at two different mechanisms. On the one hand, these organizations may constitute a good context for information dissemination and thus for the socialization of countries by diffusing environmental protection as proposed in the literature on policy diffusion (Cao 2008; Simmons and Elkins 2004). On the other hand, many of these organizations like the WHO and ILO or research related organizations such as the International Commission for the Scientific Exploration of the Mediterranean Sea might diffuse knowledge and technology helpful to the environment in general while aiming to improve or preserve human health, labor conditions or biodiversity.

In contrast, the negligible impact of environmental organizations seems to suggest that promoting environmental performance by establishing IGOs that pursue environmental interests is not very promising. Although, countries by joining environmental IGOs bind themselves to the idea of taking care of their environment, they do not seem to act according to this idea at the national level. However, this non-existing influence of environmental IGOs on environmental performance has also a positive side as it allows us to assess the problem of endogeneity. One potential risk of looking at IGO membership and its influence on environmental performance is that, at least concerning environmental IGOs, countries may self-select into these IGOs. This would imply that for example only countries with a very good environmental record would join environmental IGOs because these countries can be sure to meet the obligations of the respective organization. In contrast, one could also imagine that countries with huge environmental problems may be more willing to join environmental organizations. On the one hand, these organizations could provide laggard countries with adequate technology and know-how to fight their environmental problems and may therefore provide these countries with an

[24] In the appendix all interaction effects between the different disaggregated IGO variables and the political system can be found.

incentive to join these organizations. On the other hand, big polluting countries may join environmental organizations to signal their citizenry that henceforward they are planning to take the environment more seriously.

Table 5: Disaggregating IGO membership

	(1) ln SO_2 pc	(2) ln CO_2 pc	(3) ln BOD pc
Social IGOs	-0.02***	-0.01*	-0.01**
	(0.01)	(0.01)	(0.01)
Environmental IGOs	0.00	-0.01**	-0.00
	(0.01)	(0.01)	(0.01)
Nuclear IGOs	-0.19***	-0.03**	0.01
	(0.04)	(0.02)	(0.02)
Agricultural IGOs	0.02	0.03**	-0.04***
	(0.01)	(0.01)	(0.01)
Umbrella IGOs	-0.03**	-0.04***	-0.03*
	(0.01)	(0.01)	(0.02)
Military IGOs	-0.14***	-0.06***	-0.04**
	(0.03)	(0.02)	(0.02)
Economic Standardization IGOs	0.00	-0.00	-0.00
	(0.01)	(0.00)	(0.01)
Economic General IGOs	-0.02***	-0.00	-0.00
	(0.01)	(0.00)	(0.00)
Polity	-0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)
Ln trade openness	0.03	0.10***	0.01
	(0.03)	(0.02)	(0.02)
FDI	0.00	-0.00	-0.01**
	(0.00)	(0.00)	(0.00)
Ln GDP per capita	0.45***	0.50***	0.59***
	(0.06)	(0.06)	(0.07)
Population Density	-0.00**	0.00***	0.00***
	(0.00)	(0.00)	(0.00)
Ln growth	0.02	-0.02	-0.14**
	(0.04)	(0.06)	(0.07)
Time trend	0.01**	0.01***	-0.00
	(0.01)	(0.00)	(0.00)
Africa	-3.08***	-1.70***	-0.55
	(0.63)	(0.35)	(0.84)
Asia	-2.64***	-2.07***	-1.23
	(0.69)	(0.25)	(0.82)
Latin America	-1.07*	0.25	0.21
	(0.60)	(0.27)	(0.86)
Middle East	-1.83***	-0.56***	-0.73
	(0.57)	(0.19)	(0.82)
Constant	-12.55***	-0.99	-9.67***
	(0.80)	(0.63)	(1.05)
Observations	2625	2716	1200
Number of countries	111	115	98
R-squared	1.00	0.88	0.99

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Since environmental IGOs except in the case of CO_2 emissions are not associated with environmental performance at all we can be rather confident that countries do not self-select into these

organizations. In contrast, the general positive effect of IGO membership on environmental performance is according to the results in table 5 above all due to non-environmental IGOs such as umbrella and social IGOs. Consequently, membership in IGOs seems indeed to constitute channels through which developing countries are urged to take better care of their environment by providing them with technologies and resources necessary to reduce pollution.

Table 6: Robustness checks

	(1) ln SO_2 pc	(2) ln CO_2 pc	(3) ln BOD pc	(4) ln SO_2 pc	(5) ln CO_2 pc	(6) ln BOD pc
IGO membership	-0.02***	-0.01***	-0.01***	-0.02***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
ACLP democracy mesure	-0.02	-0.00	0.01			
	(0.02)	(0.02)	(0.02)			
Ln trade openness	0.03	0.09***	0.02	0.03	0.09***	0.02
	(0.03)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
FDI	0.00	-0.00	-0.01**	0.00	-0.00	-0.01*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Ln GDP per capita	0.49***	0.52***	0.60***	0.47***	0.52***	0.60***
	(0.06)	(0.05)	(0.07)	(0.06)	(0.05)	(0.07)
Population Density	-0.00	0.00***	0.00**	-0.00	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Ln growth	-0.01	-0.02	-0.14**	-0.01	-0.04	-0.14**
	(0.04)	(0.06)	(0.06)	(0.05)	(0.06)	(0.07)
Time trend	0.01**	0.01***	0.00	0.01**	0.01***	0.00
	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Polity				-0.00	0.00	-0.00
				(0.00)	(0.00)	(0.00)
Africa				-2.20***	-1.90***	-0.63
				(0.79)	(0.66)	(2.26)
Asia				0.40	-2.02***	-1.31
				(0.48)	(0.31)	(2.26)
Latin America				-2.72***	-0.78***	0.14
				(0.93)	(0.20)	(2.28)
Middle East				-1.57***	-0.70***	-0.74
				(0.43)	(0.21)	(2.23)
Constant	-15.52***	-1.77**	-10.72***	-12.94***	-1.41**	-9.76***
	(1.30)	(0.86)	(0.96)	(0.68)	(0.61)	(2.36)
Observations	2675	2804	1214	2625	2716	1200
Number of countries	112	118	100	111	115	98
R-squared	1.00	0.89	0.99	1.00	0.88	0.99

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

In addition to disaggregating IGO membership, the robustness of the results were further checked by including regional dummies and by replacing the Polity IV measure of democracy with the dichotomous ACLP democracy variable (Alvarez et al. 1996). The results in table 6 show that replacing the measure of democracy does not change the conclusions made above. At the stage of early economic development political regime type does not affect environmental performance. As long as constituents do not demand from their political leaders to use scarce resources for reducing

pollution, democracies are no better caretakers of their environment than their autocratic counterparts. Including regional dummies into the model does not alter the overall results. In general it seems to be the case, that countries outside Europe, which is the baseline category, are characterized by lower pollution levels.

4. Conclusion

Do developing countries need to grow rich in order to provide their citizens with high levels of public goods? To answer this question this paper focuses on how membership in international organizations conditional on a country's political system influence the provision of environmental performance in developing countries. Although this study shows that at the early stages of economic development political regime type has no independent effect on environmental performance, I find an important interaction effect between a country's political system and its IGO membership. Hence, even though being democratic does not seem to matter for environmental performance in general, it seems to play a crucial role in mediating the effect of the international system on a country's environment.

Using time-series cross-section analysis of 115 developing countries from 1970 to 2000, this paper shows that membership in IGOs increases environmental performance in developing countries, as IGOs constitute a channel by which these countries receive technologies and resources necessary to reduce pollution. In addition, IGO membership allows for issue linkage and the diffusion of knowledge on environmental protection implying that these countries can undertake actions to take care of their environment already at this early stage of economic development. When we look at the interplay of IGO membership and regime type we see that democracy amplifies the positive integration effect with respect to air pollution, but contrary to theoretical predictions democracy dampens the effect with respect to CO_2 emissions and water pollution.

The implications of this paper for the study of public goods provision are firstly that it is worthwhile to enlarge the focus of existing studies and to include additional aspects of the international system into our analysis. As we can see in the empirical section of the paper, trade openness and foreign direct investment, which have been an important component of past research on environmental quality (Antweiler et al. 2001; Mani and Wheeler 1998), do not seem to play a crucial role for environmental performance in developing countries. In contrast, membership in international organizations is robustly and for very different indicators of environmental quality associated with a reduction in pollution levels. Second and in contrast to the findings of existing studies (Neumayer 2002a; Deacon 2003), political regime type per se seems to play no significant role for environmental performance in developing countries. Only in the interplay with the international system the political system gains in importance mediating the positive effect of IGO membership on environmental performance.

Altogether the results of this paper show that developing countries do not necessarily need to grow rich before taking care of their environment. Developing countries that are a member to more international organizations are characterized by higher air and water quality relative to countries with a lower number of memberships. As predicted theoretically, the political system of a country is mediating the influence of IGO membership. Interestingly, depending on the form of pollution the effect is stronger in democracies (as in the case of SO_2) or more pronounced in autocracies (as in the case of CO_2 or water pollution). This seems to suggest that democracies are not necessarily more responsive to the influence of international organizations.

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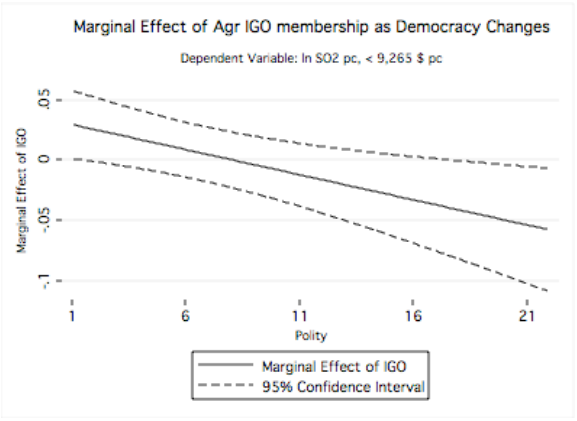
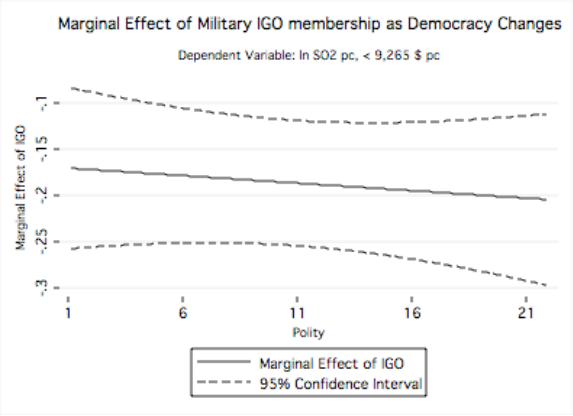
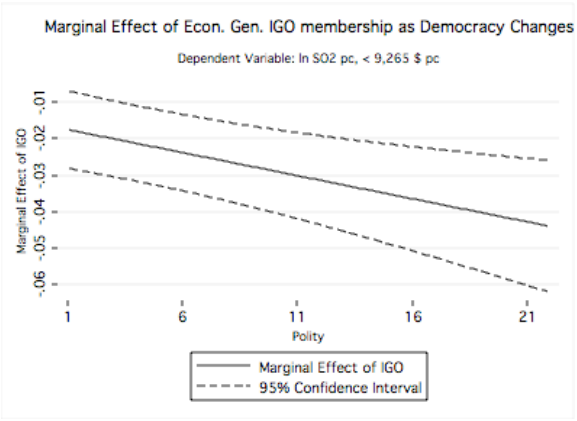
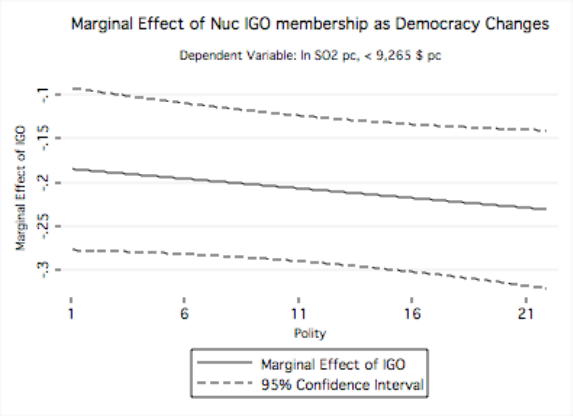
Appendix

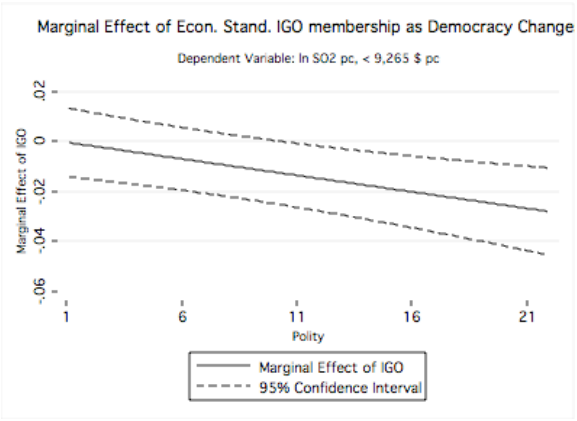
Interaction Effects of all disaggregated IGO variables on SO_2 emissions:

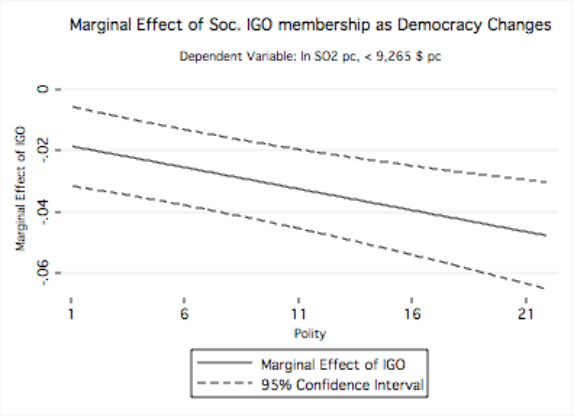


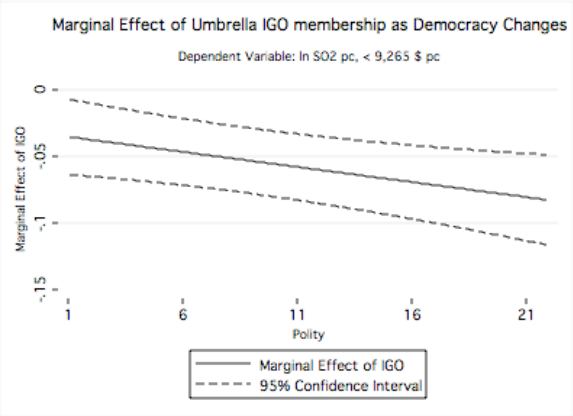


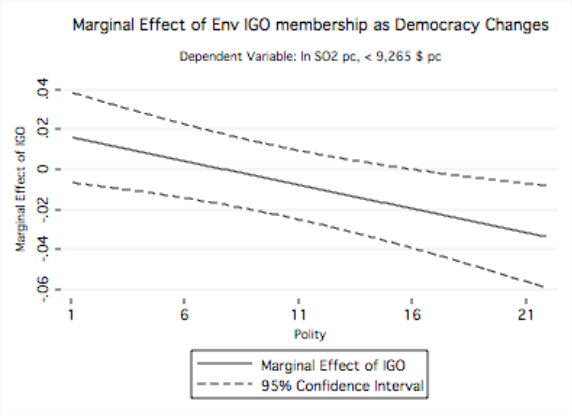




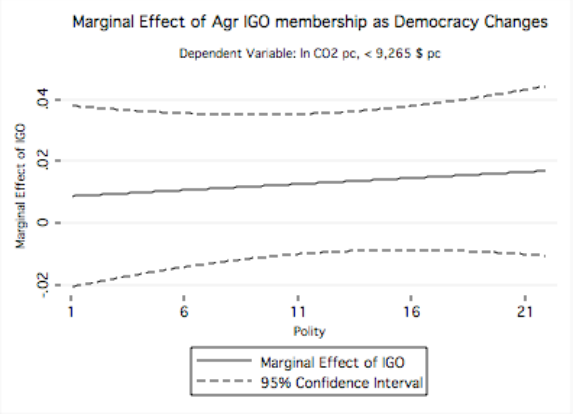


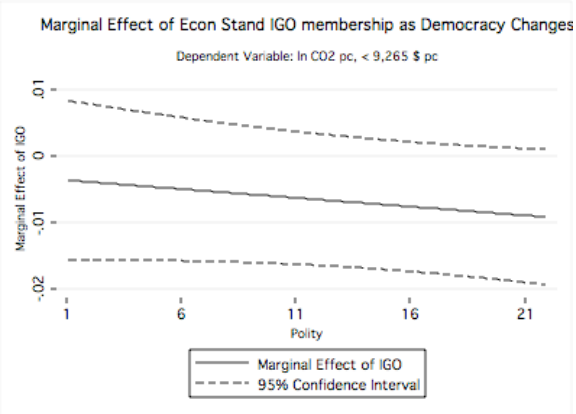


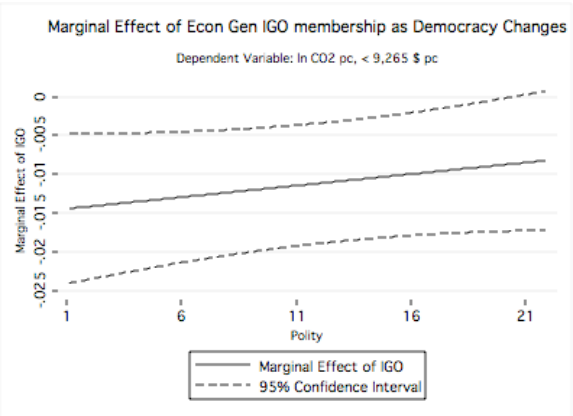


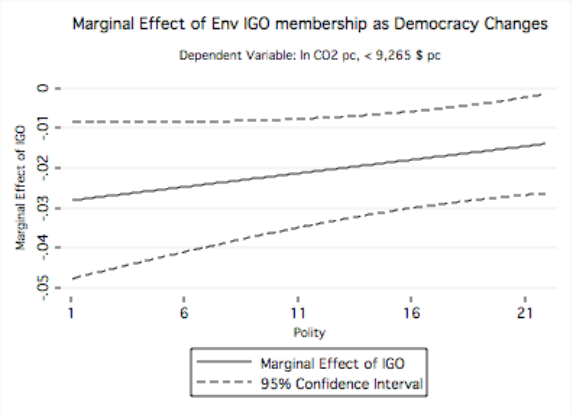


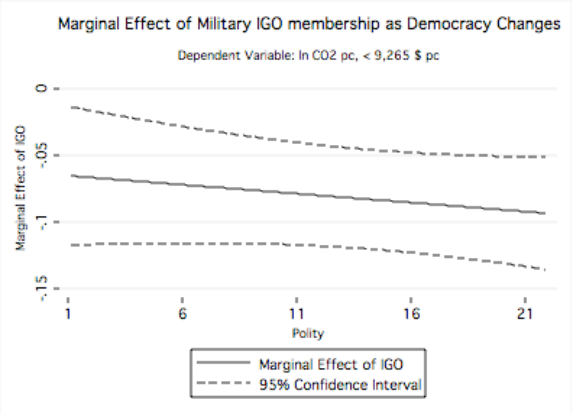
Interaction Effects of all disaggregated IGO variables on CO_2 emissions:

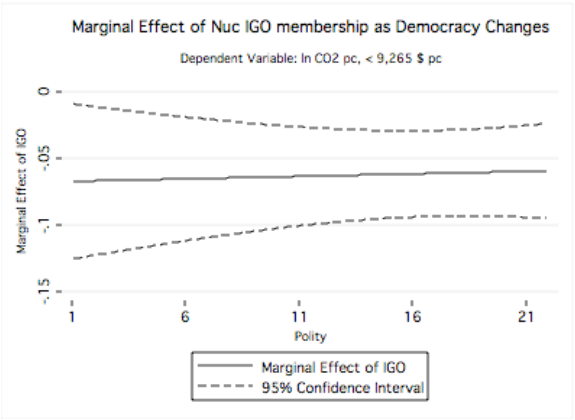


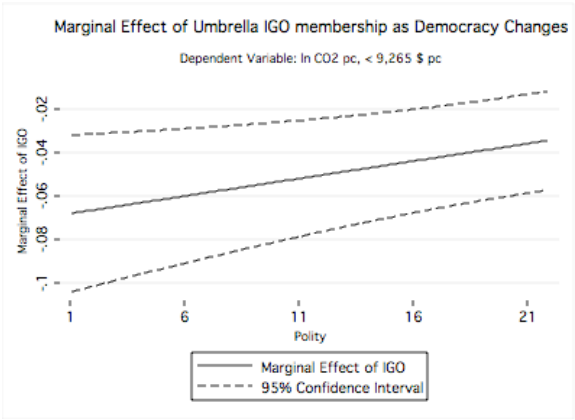


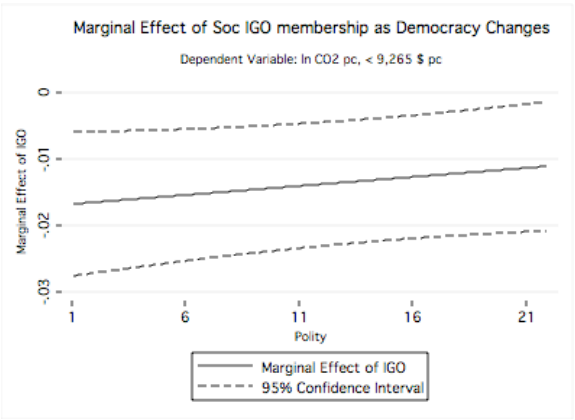




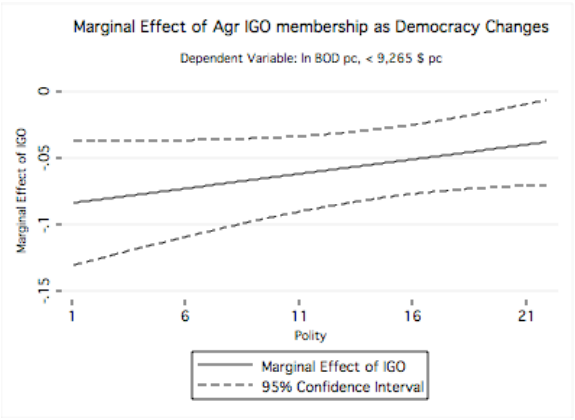


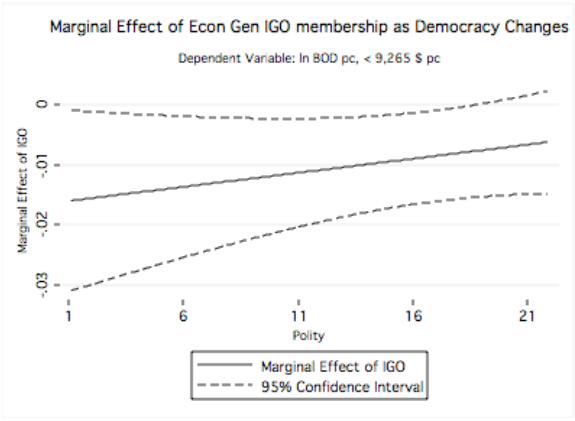


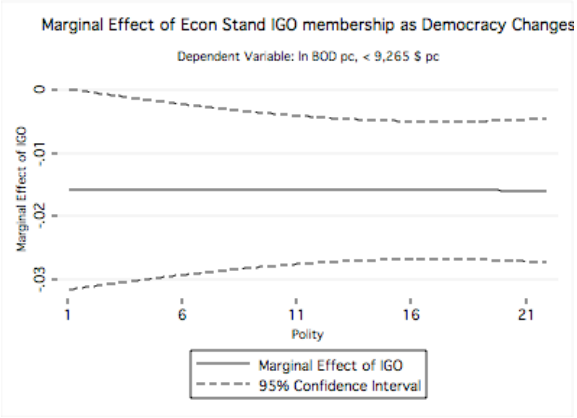


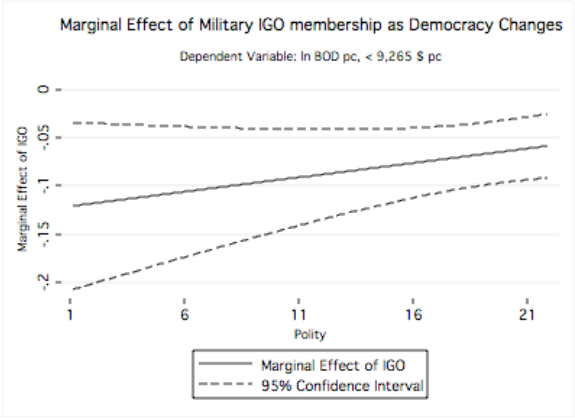


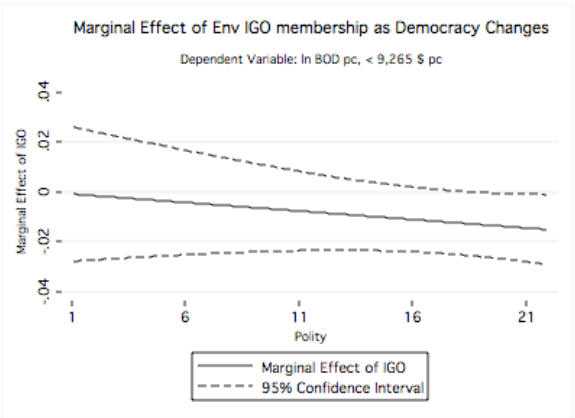
Interaction Effects of all disaggregated IGO variables on BOD emissions:

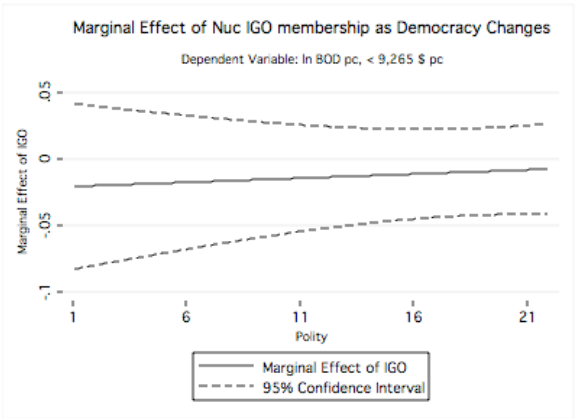


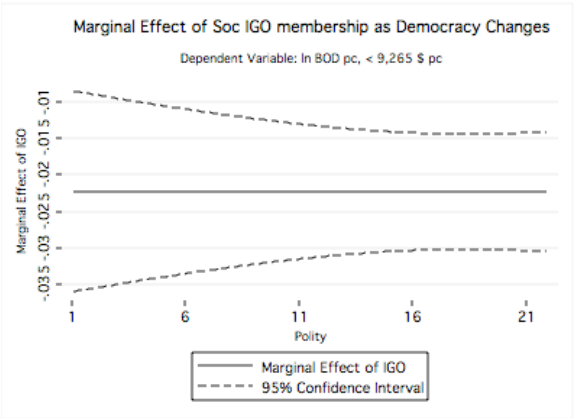


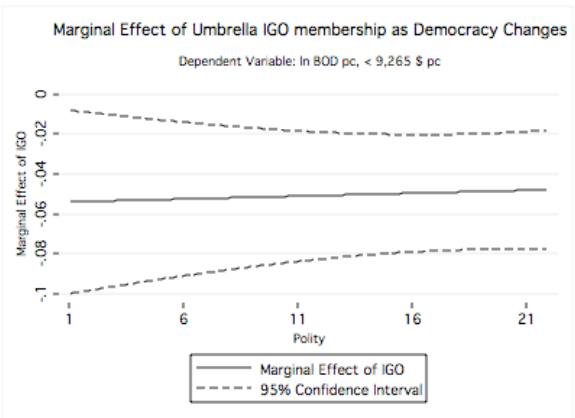

Marginal Effect of Econ Stand IGO membership as Democracy Changes
Dependent Variable: ln BOD pc, < 9,265 $ pc
Marginal Effect of IGO
0
-.01
-.02
-.03
1
6
11
16
21
Polity
Marginal Effect of IGO
95% Confidence Interval


Marginal Effect of Military IGO membership as Democracy Changes
Dependent Variable: ln BOD pc, < 9,265 $ pc
Marginal Effect of IGO
0
-.05
-.1
-.15
-.2
1
6
11
16
21
Polity
Marginal Effect of IGO
95% Confidence Interval


Marginal Effect of Env IGO membership as Democracy Changes
Dependent Variable: ln BOD pc, < 9,265 $ pc
Marginal Effect of IGO
.04
.02
0
-.02
-.04
1
6
11
16
21
Polity
Marginal Effect of IGO
95% Confidence Interval


Marginal Effect of Nuc IGO membership as Democracy Changes
Dependent Variable: ln BOD pc, < 9,265 $ pc
Marginal Effect of IGO
.05
0
-.05
-.1
1
6
11
16
21
Polity
Marginal Effect of IGO
95% Confidence Interval


Marginal Effect of Soc IGO membership as Democracy Changes
Dependent Variable: ln BOD pc, < 9,265 $ pc
Marginal Effect of IGO
-.01
-.015
-.02
-.025
-.03
-.035
1
6
11
16
21
Polity
Marginal Effect of IGO
95% Confidence Interval


Marginal Effect of Umbrella IGO membership as Democracy Changes
Dependent Variable: ln BOD pc, < 9,265 $ pc
Marginal Effect of IGO
0
-.02
-.04
-.06
-.08
-.1
1
6
11
16
21
Polity
Marginal Effect of IGO
95% Confidence Interval