Eric Neumayer

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Does Trade Openness

Promote Multilateral Environmental Cooperation?[1]

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Eric Neumayer

Department of Geography and Environment, London School of Economics and

Political Science, Houghton Street, London WC2A 2AE, UK

Phone: 0207-955-7598. Fax: 0207-955-7412. Email: e.neumayer@lse.ac.uk

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ABSTRACT

This article puts forward a number of arguments why trade openness might promote multilateral environmental cooperation. Most of these arguments are grounded in the substantive self-interest of the trading country. It tests the proposition using a range of proxy variables for general trade openness as well as specific export interests. The article examines whether countries open to trade are more likely to have signed three recent multilateral environmental agreements (MEAs) and are more likely to have ratified early on another three agreements with quasi-universal membership. After controlling for income, political freedom and population size, the empirical estimations find some weak evidence in favour of a possible synergy between trade openness and multilateral environmental cooperation. World Trade Organization membership as well as general export openness go hand in hand with greater willingness to participate in multilateral environmental cooperation in some cases. However, whether specific trade interests promote or hinder multilateral environmental cooperation depends on whether the relevant agreement is likely to threaten or accommodate the interests of exporting countries.

Keywords: trade openness, environmental commitment, multilateral environmental agreement, export interests, ratification speed.

1. WHY TRADE OPENNESS MIGHT PROMOTE MULTILATERAL ENVIRONMENTAL COOPERATION

This article examines whether trade openness promotes multilateral environmental cooperation. The reader might wonder what one has to do with the other, but the liberal, functionalist and neo-functionalist schools of international relations (IR) have long since argued that openness to trade might foster cooperation and disperse confrontation in other policy areas. Most prominently, the suggestion that trading states might be less prone to go to war against each other dates back to at least Eméric Crucé (1623 [1909]). Many of the classical liberal economists in the wake of Adam Smith (1776 [1979]) shared the same belief, most notably John Stuart Mill who saw 'the great extent and rapid increase of international trade' as the 'principal guarantee of the peace of the world' (Mill, 1852 [1965], p. 594). The case for a "liberal peace",[2] as comprehensively put forward in Rosecrance (1986), rests on both substantive self-interest as well as more idealistic grounds. As concerns the substantive self-interest, the major argument is that states with substantial mutual trading links have more to lose in terms of welfare if these links become interrupted by violent conflict. Also, the exploitation of trading opportunities can serve as a substitute and alternative for acquiring natural resources and markets by force. The more idealistic grounds suggest that international trade might foster a spirit of community and cooperation. Against this, proponents of the realistic school of IR have long since argued that trade is irrelevant as traditional political and military considerations dominate the decision to enter into violent conflict. The empirical evidence is somewhat indeterminate,

with the majority of studies supporting the idea of a liberal peace (see, for example, Oneal et al., 1996; Hegre, 2000; for conflicting evidence see, for example, Barbieri, 1996; Beck, Katz and Trucker, 1998).

A combination of self-interest and idealistic grounds could also suggest a case for trade openness promoting multilateral environmental cooperation. To start with, countries open to trade have a reputation to defend. In a world where imports of foreign goods are still regarded as mainly benefiting the exporter, exporting countries are always at the risk of being blamed for exploiting their good economic fortunes. To participate, and possibly to lead, in multilateral cooperation, environmental or not, can provide a mechanism to disperse these concerns to some extent. This incentive will be the stronger the more a country is a net exporter of goods and services. It will also be particularly strong in the environmental field if the country is engaging in economic activity that contributes to trans-boundary and possibly global negative environmental externalities.[3] It will be strongest if these economic activities are connected to the goods and services exported by a country.

Connected to the last point, if countries more open to trade have a more substantial interest in future trade agreements in order to expand trading opportunities, then their participation in multilateral cooperation, environmental

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[2] Thus called in tradition of the "democratic peace", which suggests that democracies rarely fight against each other.

[3] Note that the negative externality need not accrue in a physical form, but can be psychological as well. For example, cruel treatment to animals within the national boundaries of one country can have spill-over effects as individuals in other countries suffer from knowing about this cruel treatment.

or not, might serve as a signalling device. The signal sent out to other countries is that the country wants to be seen as serious about multilateral cooperation in general and therefore fit for multilateral cooperation concerning trade agreements in particular (Fredriksson and Gaston, 1999, 2000). Hoel and Schneider (1997, p. 155) go as far as arguing that a country might become excluded from a future trade agreement if it refuses to participate in multilateral environmental cooperation efforts. While there is little evidence that a country might become excluded from a trade agreement merely because of its refusal to participate in multilateral environmental cooperation, countries are in a constant process of "give" and "take" in multilateral negotiations where willingness to cooperate in the environmental arena might be necessary to achieve the country's objective in another policy field. A country that has not much to gain from multilateral environmental cooperation might still participate in order to reap the benefits of cooperation in other areas, particularly trade, where it has more to gain. Environmental concessions might therefore be the *quid pro quo* necessary to strike a deal in other areas of multilateral cooperation.

As another reason grounded in self interest consider the fact that often multilateral environmental agreements (MEAs) contain trade restrictive measures. In as much as countries more open to trade are bound to be more affected by these restrictive measures than more closed countries, they have an incentive to participate in these MEAs in order to have a voice in the negotiations and influence the result according to their interest. To abstain carries the risk of being confronted with a *fait accompli* that might very well damage the trading interest of the abstaining country.

Self-interest can potentially deter countries open to trade from participating in MEAs as well, however. Participation in MEAs usually implies incurring real economic costs to achieve the environmental objectives. Countries open to trade might be particularly concerned about losses to their economy's "competitiveness" if they were to incur these costs (Stewart, 1993; Esty and Geradin, 1997). In particular, if a MEA is likely to contain trade restrictive measures that would considerably damage the economic prospects of a country, then specific export interests might deter rather than promote multilateral environmental cooperation. If a country perceives that in spite of participation it cannot exert enough influence to alter the trade and other restrictions contained in a MEA sufficiently towards its own interests, then this country might find it more attractive to stay outside the MEA. In particular, big and important countries might stand a chance to endanger the whole process of multilateral environmental cooperation if they perceive that the benefits are not worth the costs they incur and therefore boycott the MEA. Witness the United States opposition to the Kyoto Protocol, which puts the treaty itself in danger.

As concerns more idealistic grounds, the major argument is that people living in countries open to trade are not only exposed to foreign goods and services, but also to new ideas and information about the environmental and other conditions outside their own countries. Trade openness might thus foster an appreciation of the problems generated by trans-boundary and global negative environmental externalities, which might put pressure on a country's policy makers to participate in multilateral efforts to solve these problems. This incentive is likely to be stronger if a country actually imports significant amounts of goods and services and not just merely exports them.

Trade liberalisation and environmental protection are often, rightly or wrongly, claimed to be conflicting objectives. It would be beyond the scope of this paper to analyse and evaluate these claims (see Neumayer, 2001). What is important here is that since countries are bound to become increasingly open towards trade, environmentally grounded resistance to this trend is likely to become stronger. If, however, trade openness promoted multilateral environmental cooperation, then one important argument could be made in favour of a synergy, rather than conflict, between trade liberalisation and environmental protection.

2. RESEARCH DESIGN

a. Methodology

There are basically two methods available for analysing systematically whether trade openness promotes multilateral environmental cooperation. One is to examine whether countries open to trade are more likely to sign or ratify MEAs than closed countries. The dependent variable is therefore a dichotomous one: the country either signs/ratifies or not. The appropriate estimation technique for this method is probit or logit. The second method is to examine whether countries open to trade are more likely to ratify MEAs or otherwise become a party to the MEA *earlier* than closed countries. The dependent variable is therefore a continuous time variable. One possible estimation technique for this method is the Cox proportional hazards model, also known as a survival model. It assumes that there is a time-variant underlying base hazard of ratification at any point of time that depends on unobserved variables. Observed control variables increase or lower this base hazard by a constant proportional amount.

Both methods have their respective advantages and disadvantages. The first method is conceptually clear: a country failing to sign or ratify a MEA clearly fails to cooperate. Also, probit and logit are widely used estimation techniques. Its major disadvantage is that it cannot deal with MEAs that have a quasi-universal membership since the lack of variation would inhibit statistical testing. It might actually be advantageous to be forced to look at MEAs open to all, but without virtually global membership, however. This is because it is exactly these MEAs where environmental commitment is needed on behalf of countries to join. Global membership MEAs, on the other hand, are often agreements that can be joined without commitment to incurring any costs. It is doubtful whether they represent much gain in relation to the non-cooperative outcome.

The second method is conceptually less clear. Fredriksson and Gaston (1999, 2000) argue that early ratification can function as a proxy for a country's intensity of preference for multilateral environmental cooperation. They regard ratification delay as a clear sign for lack of commitment:

> Those countries that delay their ratification of treaty do so, either because they perceive the treaty provisions as too costly and severe, or lacking net benefits (or that it may be strategically worthwhile to "hold-out", in which case they risk non-implementation of the agreement). (Fredriksson and Gaston, 2000, p. 347).

In support of their argument they refer to Sand who argues that

...possibly the most serious drawback of the treaty method [for dealing with multilateral environmental problems, E.N.] is the time lag between the drafting, adoption and entry into force of standards. Sand (1991, p. 250).

However, while early ratification might show commitment to the environmental cause of the MEA, a delay in ratification can be caused by many factors other than lack of commitment. For example, some countries might find it difficult to achieve early ratification due to the peculiarities of their political system. Also, in the case of the Kyoto Protocol, for example, ratification by almost all countries with binding emission restrictions is delayed due to conflict about the specifics of some of the provisions contained in the Protocol.

The second method's great advantage is that it allows for greater variation among countries since the dependent variable is not simply a dichotomous one. Connected to this point, it can examine MEAs with quasi-universal membership since countries will still differ with respect to the time of their ratification. This method's disadvantages are that the estimation technique used is far less familiar to readers. More importantly, this method cannot deal with very recent MEAs that have not been ratified by many countries yet since MEAs are usually signed at the same time by most prospective parties. For these cases only the first method is suitable. There is a disadvantage connected to analysing signature rather than ratification, however. This is because a country is not bound to a treaty unless it has ratified it. Signature is not a formal commitment. A good example for this is the *de facto* withdrawal of the United States from the Kyoto Protocol, which is of course easily possible since the country has not yet ratified the treaty.

b. The dependent variables

In this paper we will use both methods. We use the first method for three MEAs that do not have quasi-universal membership and are too recent to having been ratified by many countries:

- the Kyoto Protocol (84 signatures as of 26 October 2001; www.unfccc.org). It is a protocol to the United Nations Framework Convention on Climate Change (FCCC). It sets up restrictions for so-called Annex 1 countries (OECD-countries plus the economies in transition in Eastern Europe including the Russian Federation) on their emission of greenhouse gases. In its current form it does not contain any substantive trade restrictive measures, but it is expected to do so in the future (Neumayer, 2001).

- the Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention) (73 signatures as of 1 September 2001; www.chem.unep.ch). It is a MEA in pursuance of chapter 19 of the Agenda 21 on 'Environmentally sound management of toxic chemicals, including prevention of illegal international traffic in toxic and dangerous products'. Its objective is 'to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use' (Art. 1). Annex III of the Convention specifies the chemicals which are subject to the Prior Informed Consent (PIC) procedure (initially, Annex III encompasses 30 chemicals). This means, that a country

may only export one of these chemicals to another country if it has sought and received the PIC of the importing country. Furthermore, the exporting country has the duty to provide for 'labelling requirements that ensure adequate availability of information with regard to risks and/or hazards to human health or the environment, taking into account relevant international standards' (Art. 13:2). This applies to all chemicals listed in Annex III, all chemicals banned or severely restricted in the exporting country's territory (Art. 13:2) as well as to all chemicals subject to environmental or health labelling requirements (Art. 13:3). Exports of chemicals, the use of which is banned or severely restricted in the exporting country's territory, are subject to laborious information requirements for export notification as laid down in Annex V of the Convention.

- the Cartagena Protocol on Biosafety to the Convention on Biological Diversity (103 signatures as of 12 September 2001; www.biodiv.org). This Biosafety Protocol controls the use of living modified organisms, better known as genetically modified organisms (GMOs), which pose a threat to biodiversity as they represent an exogenously introduced disturbance of existing ecosystems and, in some cases at least, can mutate, migrate and procreate. It is a Protocol of the Convention on Biological Diversity (CBD). Art. 19:3 of the CBD calls upon parties to consider 'the need for and modalities of a protocol setting out appropriate procedures, including, in particular, advance informed agreement, in the field of the safe transfer, handling and use of any living modified organism resulting from biotechnology that may have adverse effect on the conservation and sustainable use of biological diversity'. The Biosafety Protocol does just that. The single most important trade restrictive element of

the Protocol is an advance informed agreement procedure similar to the prior informed consent mechanism of the Rotterdam Convention. The country of potential import can put conditions on the import or even ban the import. However, many types of GMOs are not subject to this procedure.

We use the second method for another three MEAs that have quasi-universal membership:[4]

- the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (155 parties as of 14 November 2001; www.cites.org). It restricts the trade in endangered species listed in its appendix I and II. Appendix I contains species (around 600 animals and 300 plant species), which are threatened with extinction and whose trade for commercial purposes is generally prohibited with few exceptions (Article III). Appendix II contains a further 4000 animals and 25,000 plants species, which might become threatened with extinction if their trade was not regulated. Their export is only allowed if the exporter has acquired an export permit from the state of export, testifying that the export will not be detrimental to the survival of that species, that the specimen were not obtained in contravention of protection laws of the exporting state and that any living specimen will be so prepared for transport that risk of injury, damage to health or cruel treatment is minimised (Art. IV).

- the Montreal Protocol on Substances that Deplete the Ozone Layer (180 parties as of 29 August 2001; www.unep.ch/ozone). The aim of the Montreal

Protocol on Substances that Deplete the Ozone Layer is to phase out ozone depleting substances (ODS): substances responsible for the thinning of the ozone layer in the stratosphere, which filters out ultraviolet radiation. The Protocol's major trade provisions are contained in its Art. 4. It bans imports (Art. 4.1) and exports (Art. 4.2) of controlled substances between parties and non-parties of the Protocol, unless non-parties can demonstrate that in spite of not being formally a party to the Protocol they nevertheless comply with its obligations (Art. 4.8). Art. 4.3 also bans the import of products containing controlled substances from non-parties.

- the Convention on Biological Diversity (182 parties as of 12 September 2001; www.biodiv.org). The Convention on Biological Diversity (CBD), which was one of the few tangible results of the United Nations Conference on Trade and the Environment (UNCED) in Rio de Janeiro in 1992, has as its objectives 'the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources' (Art. 1). It does not explicitly provide for trade measures.

Data on the status of signature and the date of ratification, acceptance, approval or accession are from the homepages of the respective MEAs.[5] Together these six MEAs cover a broad range of environmental concern: from climate

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[4] We do not look at ratification of the United Nations Framework Convention on Climate Change (FCCC), which has been analysed by Fredriksson and Gaston (1999, 2000).

[5] Note that none of the results reported further below changes substantially if all ratifications, acceptances, approvals and accessions before the agreed conditional date of entry into force are treated as equivalent.

change, ozone layer depletion, trade in hazardous chemicals and pesticides to genetically modified organisms, biodiversity and wildlife conservation. Because ratification is open to all countries at the same time, in principle left censoring is not a problem. However, some countries gained their independence only after the MEA was opened for ratification. In these cases, ratification delay was counted from the date of their independence, which was established with the help of CIA (2000). Belarus and the Ukraine are exceptions to this rule. They had a seat in the United Nations and the right to sign and ratify international agreements before their independence from the former Soviet Union.

c. The independent variables

There is no uniformly agreed measure of trade openness, our main independent variable of interest. We will use a range of proxy variables here. The first one is a simple dichotomous variable, which is set to 1 if a country is a member of the World Trade Organization (WTO), and 0 otherwise (information taken from www.wto.org). The idea is that WTO members have revealed a commitment to trade openness in participating in a multilateral regime whose objective is the liberalisation and expansion of trade.

The next two proxies are commonly used rather simple measures: one is the natural log of the sum of exports and imports divided by gross domestic product (GDP). The other consists of the natural log of exports divided by GDP as well as, separately, the natural log of imports divided by GDP.[6] Since the amount of goods and services traded can change quite a bit from year to year, the simple average of

the relevant data over the period 1994 to 1998 was taken (data from World Bank, 2000). The other proxies are more complex. The fourth variable is an index of trade openness published by the Fraser Institute (2000), as part of their 1997 Economic Freedom of the World index. It is a composite measure of taxes levied on international trade as percent of exports plus imports, the difference between the official exchange rate and the black market rate, the actual size of the trade sector compared to the expected size as well as restrictions on the freedom of citizens to engage in capital transactions with foreigners. It ranges from 0 (least trade open) to 10 (most trade open). The last proxy variable is an index of trade openness published by the Heritage Foundation (2001). Similar to the Fraser Institute index, it is part of their 2001 Index of Economic Freedom. It is a composite measure of a country's average tariff rate, existing non-tariff barriers and perceived corruption in a country's customs services. This index ranges from 1 (most trade open) to 5 (least trade open). In order to facilitate understanding it has been reversed for the estimations reported further below, such that 1 means least and 5 means most trade open.

In addition to these general trade openness variables, we also include a number of specific export interest variables for five out of the six MEAs looked at. For the Kyoto Protocol, a dummy is used for countries that export fossil fuels (data taken from World Bank, 2001). For the Biosafety Protocol, a dummy is used for countries with plantations of genetically modified crops in excess of 100,000 hectares (data taken from James, 2000). For the Rotterdam Convention a logged variable measuring the share of the value of chemical to all exports is used.

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[6] We log some variables if their distribution is skewed in order to reduce potential problems with

Chemical exports are taken from UNCTAD (2000), general export data from World Bank (2000). For the Montreal Protocol, a variable measures the log of net exports (production minus consumption) of chlorofluorocarbons (CFCs) in tons of ozone depleting potential averaged over the period 1986 to 1989, with data compiled from UNEP (1999). For the Convention on International Trade in Endangered Species a variable is used that measures the ratio of threatened species to all species, with data compiled from WCMC (1994). No trade related specific variable could be found for the Convention on Biological Diversity, which contains only few directly trade relevant provisions. However, we included as a general interest variable the logged total number of species estimated to be located within a country, with data compiled from WCMC (1994).

Apart from the variables for trade openness, three other general control variables are used throughout. In addition to theoretical justification they have also proven to be significant factors explaining environmental commitment in Neumayer (2002). The first is per capita income, which is expected to have a positive effect on a country's willingness to participate in multilateral environmental cooperation efforts. In economic terms this would mean that this willingness is a luxury good with an income elasticity greater than one. Note that this need not imply that poor countries care less about trans-boundary and global environmental problems per se. Rather, because of their poverty they might prioritise issues other than these. Income per capita is measured as GDP per capita in purchasing power parity (PPP) in US$ in 1998, taken from UNDP (2000). Second, big and "important" countries should be more environmentally committed

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heteroscedasticity.

than small and "unimportant" ones. As a proxy for this variable one could either take a country's total income or population since both economic power and population size should be positively correlated with "importance". The natural log of total population size is used as a proxy for a country's importance here (data taken from World Bank, 2000).[7] Note that more important countries might show signs of stronger willingness to participate in multilateral environmental cooperation efforts not necessarily due to stronger environmental concern per se. Rather, we hypothesise here that these countries will find it in their interest to demonstrate stronger willingness to participate in these cooperation efforts in order to demonstrate their importance in world politics, of which environment represents one part. In other words, important countries want to be seen as good citizens and leaders in world environmental affairs. Another incentive for these countries to participate in multilateral cooperation might be that it allows them to internalise part of the benefits generated by cooperation. The third and final control variable is a measure for "democracy" taken from Freedom House (2000), based on 1998 data. Their measure is derived from expert assessments of the extent to which a country effectively provides for political rights and civil liberties, both measured on a 1 to 7 scale (Karatnycky, 1999, pp. 546-553). Political rights refer to, for example, the existence and fairness of elections, existence of opposition and the possibility to take over power via elections. Civil liberties refer to, for example, the freedom of assembly, the right to open and free discussion, the independence of media, protection from political terror and the prevalence of the rule of law. For the estimations used below the two indices have

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[7] The reader should note that total income and population cannot be used simultaneously as this

been added and reversed in sign, such that 2 means lowest and 14 means highest measure of "democracy".

3. RESULTS

Table 1 reports the probit estimation results for the Kyoto Protocol, the Biosafety Protocol and the Rotterdam Convention.[8] Note that the reported coefficients are already changes in the probability for a one unit increase of a variable at the mean of all variables, not the non-transformed probit coefficients.[9] There are five different estimations for each MEA depending on which of our proxy for trade openness enters the estimated equation in addition to the three control variables included throughout. A more detailed discussion and interpretation of the estimated coefficients for the trade variables is presented in the next section.

Starting with the Kyoto Protocol, all our non-trade related control variables are statistically significant in all estimations: Richer, more democratic and more populous countries are more likely to have signed the Kyoto Protocol. As concerns our proxy variables for general trade openness, only the Fraser Institute index shows some statistical significance. Fuel exporters are less likely to have signed the Protocol and significantly so in four out of the five cases.

< INSERT TABLE 1 ABOUT HERE >

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would lead to perfect multicollinearity given that per capita income is another explanatory variable.

[8] Alternatively, logit estimates could have been undertaken. The two techniques generally provide very similar results (Verbeek, 2000).

[9] For a dummy variable, it represents the change in probability due to a change in the dummy from 0 to 1.

Turning to the Biosafety Protocol it can be seen that almost without exception democracy and the population size of a country have a positive impact upon the predicted probability of having signed this Protocol. The income variable, on the other hand, is insignificant throughout. The explanation for this is that Biosafety is of substantial environmental concern to developing countries as well and there are very limited costs in their participation. WTO membership and the Fraser Institute index are the only statistically significant proxy variables for general trade openness, both with a positive sign. Countries with substantial production of genetically modified crops are statistically significantly less likely to have signed the Protocol in four out of the five models tested. Note, however, that this variable needs to be treated with care. There are only six countries with substantial production, namely, the United States, Argentina, Canada and – albeit on a much smaller scale – China, South Africa and Australia. Due to the little variation in this dummy variable, the estimated coefficient is highly sensitive to any single one of these country's decision to sign or not. Argentina, Canada and China have signed the Protocol, Australia, South Africa and the United States have not.

As concerns the Rotterdam Convention, neither income nor population size is consistently estimated as having a positive significant effect on signature. WTO membership again assumes statistical significance. As before, trade openness as measured by the sum of exports and imports per GDP is insignificant, but note that in the case of the Rotterdam Convention this is triggered by the opposing effects export and import openness have: countries with a high exports to GDP ratio are statistically significantly more likely, countries with a high imports to GDP ratio are less likely to have signed the Convention. A greater share of

chemical among all exports does not have a statistically significant influence throughout.

Turning to the remaining three MEAs for which the second method was used, Table 2 reports estimated results from a Cox proportional hazards model for the Montreal Protocol, the Biodiversity Convention and CITES. Note that the reported coefficients are hazard ratios. A coefficient greater than one means that the corresponding variable has a positive impact upon the speed of ratification and a negative impact for a coefficient smaller than one. Starting with the Montreal Protocol, both income and population size speed up ratification. The clear significance of the income variable was to be expected as ozone layer depletion was strongly considered to be a "rich man's concern" at the time. Note that the only proxy for general trade openness statistically significant are the sum of exports and imports per GDP as well as exports per GDP, separately. Also, higher exports of CFCs result in a more rapid ratification of the Montreal Protocol.

< INSERT TABLE 2 ABOUT HERE >

In case of the CBD, all non-trade related control variables are significant throughout. Note that the income variable is smaller than one throughout and significantly so in all but one case. This is triggered by the fact that the CBD with its promise of a 'fair and equitable sharing of the benefits arising out of the utilization of genetic resources' (Art. 1) soon became an MEA favoured by developing countries. As concerns the general trade openness variables, WTO membership, export openness and the Fraser Institute index are estimated to have a positive significant effect on ratification speed. Import openness has the opposite

effect. Greater biodiversity results in ratification delay. This can be explained with the fact that biodiversity-rich countries were for a long time sceptical about the CBD as they feared it would encroach into what they perceived as their sovereign right over the genetic resources within their territory.

For CITES, democracy and population size have a positive impact upon ratification speed, whereas income has a significantly negative impact in two estimations. WTO membership, the Fraser Institute index as well as exports per GDP exert a statistically significantly positive impact upon ratification speed. Note that, again, imports per GDP are statistically significant with the opposite sign.[10] A higher ratio of threatened to all species on a country's territory speeds up ratification.

4. DISCUSSION OF THE EFFECT OF TRADE OPENNESS

The results reported above provide some evidence for trade openness promoting multilateral environmental cooperation. None of the proxies for trade openness consistently appears to be a statistically significant explanatory factor. Nonetheless, it is interesting to note that WTO membership assumes statistical significance for four out of the six MEAs under investigation. Note that causality is not necessarily claimed here. But it suggests that being accustomed to cooperate in multilateral trade affairs goes, to some extent at least, hand in hand with countries' willingness to cooperate in multilateral environmental affairs as well. This is a good message because a WTO dispute over some trade restrictive

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[10] The latter result mirrors a finding by Fredriksson and Gaston (1999), where export openness proved to have a positive and import openness a negative effect on ratification speed for the United Nations Framework Convention on Climate Change (FCCC).

measure contained in a MEA is most likely to break out between two WTO members, where one is and the other is not a party to the MEA (Neumayer 2000). Hence, if WTO membership tends to promote a country's willingness to cooperate in multilateral environmental affairs, there is less danger of such a dispute.

How strong is the effect? After controlling for other variables, WTO members are estimated to have a 30 per cent higher likelihood to have signed the Biosafety Protocol and a 26 per cent higher likelihood to have signed the Rotterdam Convention than non-members, which is certainly not negligible. Interpretation of the relevant coefficient in the case of the Convention on Biological Diversity and the CITES is not quite as straightforward. Note that the coefficients signify the hazard ratio of becoming a party to the MEA at any point of time associated with a one-unit change in the variable or a change from 0 to 1 for a dummy variable, conditional on all other variables remaining constant and given a certain underlying time-dependent baseline hazard that represents exogenous unobserved variables. The effect of WTO membership is estimated to increase this hazard by about 64 per cent for the Convention on Biological Diversity and by about 95 per cent for the CITES.

General export openness also assumes statistical significance in four out of the six cases. It is striking that export openness assumes statistical significance in all three MEAs that contain quite elaborate trade restrictive measures (Rotterdam Convention, Montreal Protocol and CITES). One could interpret this as evidence in favour of the theoretical proposition that countries with a large export sector want to be seen as taking on responsibility in multilateral environmental affairs and want to have a voice and vote in negotiations of MEAs that contain trade restrictive measures that potentially affect their trading interests.

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General import openness, contrary to general export openness, is irrelevant in most cases and has a negative impact on multilateral environmental cooperation in two cases. One plausible explanation for this is that these countries do not have as much interest in multilateral environmental cooperation because they are less vulnerable to critique if they fail to cooperate and are less vulnerable to any potential trade restrictive measures as well, which usually tend to affect exports stronger than imports. As an example, consider the Montreal Protocol, which went as far as threatening to ban or restrict imports from non-parties of goods made with, but not containing, controlled substances (Article 4.4), which poses a significant and clear threat to exporting countries. The finding also invalidates the theoretical suggestion that import openness promotes multilateral environmental cooperation via an influx of ideas and an appreciation of environmental problems beyond the nation's borders.

How strong is the effect of general export and import openness? A one point increase at the mean of the logged export to GDP ratio variable, ln(EXP), leads to 31 per cent greater likelihood of having signed the Rotterdam Convention. The same increase in the logged imports to GDP ratio, ln(IMP), leads to 44 per cent less likelihood of having signed the Convention, which is certainly not negligible even if one considers that the standard deviations are 0.66 for ln(EXP) and 0.57 for ln(IMP), respectively. A one-unit increase in ln(EXP) raises the hazard by 40 per cent in the case of the Montreal Protocol, by 61 per cent in the case of the Convention on Biological Diversity and by 113 per cent in the case of CITES.

As concerns the composite measures of trade openness, the Heritage Foundation index tests insignificant throughout. The Fraser Institute index assumes statistical significance in the case of four MEAs. However, one cannot be

sure whether the significance is not spurious. This is because of the high collinearity of this measure of trade openness with the income and democracy control variables (partial Pearson correlation coefficients greater than 0.6). High correlation with the control variables is much less a problem for the other proxies of general trade openness, which suggests that one can be more confident that they do not merely artificially assume some explanatory power that rightly belongs to one of the other control variables.

Contrary to general export openness, specific export interests do not play a consistent role. Fossil fuel exporters are less likely to have signed the Kyoto Protocol. The same is true for countries growing crops that are genetically modified in the case of the Biosafety Protocol. For the Rotterdam Convention a higher ratio of chemicals exports to all exports does not have a statistically significant effect on countries' willingness to cooperate. On the other hand, for the Montreal Protocol countries with greater exports of CFCs are estimated to have ratified the Protocol earlier on. The same is true for countries with a higher ratio of threatened to total species for CITES. The explanation for these differences probably lies in the nature of the MEAs. Fossil fuel exporters have much to lose from a MEA such as the Kyoto Protocol that tries to curb greenhouse gas emissions, which mainly stem from fossil fuel consumption. Countries growing crops that are genetically modified might resist a treaty that regulates and in many instances restricts trade in these crops.[11] For the Rotterdam Convention, it is unclear whether chemical exporters have more to gain from participating and influencing the treaty process or abstaining, which is reflected in the

insignificance of the chemical exports variable. For CITES, countries with a high ratio of threatened species to total species were presumably better off cooperating and influencing the decision making process than facing potential trade boycotts by Western countries outside their control. As concerns the Montreal Protocol, Murdoch and Sandler (1994) argue that the major producers (and therefore exporters) had enough incentives to reduce their emissions out of their own self-interest. The Montreal Protocol might merely have codified the non-cooperative Nash strategies of the major players who would have undertaken the emission reductions in any case. Given that the same industries that produced CFCs before were also the prime candidates for producing substitutes, the major exporters had a strong incentive to bring the Montreal Protocol into force early on.

5. CONCLUSION

All in all, similar to Fredriksson and Gaston (1999, 2000), but based on a much wider sample of MEAs and a broader set of proxies for trade openness, this article finds some evidence that general trade openness promotes multilateral environmental cooperation. As countries are likely to become more and more open to trade this could have a positive effect on multilateral environmental cooperation. However, one cannot rely on increased trade openness having a strong positive effect on multilateral environmental cooperation efforts. Looking across the MEAs it is striking that general export openness plays most of a role in exactly those treaties that contain elaborate trade restrictive measures, namely the Rotterdam Convention, the Montreal Protocol and CITES. General export

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[11] As explained in the last section, this variable needs to be treated with caution, however, due to its

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openness might therefore only promote multilateral environmental cooperation in those cases were significant trade-relevant provisions are at stake. Whether specific trade interests promote or hinder countries' willingness to cooperate in MEAs depends on whether the MEA under consideration is likely to threaten or accommodate the interests of exporters. Fossil fuel exporters have much to lose from the Kyoto Protocol, hence they are less likely to have signed it. The same is possibly true for countries producing crops that are genetically modified in the case of the Biosafety Protocol. For the Montreal Protocol and CITES, however, specific export interests might have helped to bring about multilateral environmental cooperation.

For successful MEAs to be negotiated, signed and speedily ratified political commitment by the community of nation states is necessary. Trade openness might help as this article has tried to demonstrate. Clearly, however, more research is warranted on this important issue. Questions worth investigating include whether this paper's results remain valid for other MEAs and for other indicators or proxy variables for multilateral environmental cooperation, however difficult finding these might be.

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low variation (only six countries grow crops on a large scale that are genetically modified).

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Table 1: Signature of MEAs (Probit estimations).

	Kyoto Protocol					Biosafety Protocol					Rotterdam Convention				
	I	**II**	**III**	**IV**	**V**	**I**	**II**	**III**	**IV**	**V**	**I**	**II**	**III**	**IV**	**V**
ln(GDP)	0.21***	0.21***	0.19***	0.15**	0.16***	-0.01	-0.01	-0.02	-0.06	-0.04	0.10**	0.12**	0.06	0.07	0.06
	(4.16)	(3.80)	(3.27)	(2.24)	(2.68)	(0.20)	(0.15)	(0.36)	(1.18)	(0.69)	(2.10)	(2.17)	(0.93)	(1.03)	(1.04)
DEMOCRACY	0.04**	0.06***	0.04**	0.06***	0.03*	0.04***	0.04***	0.04***	0.01	0.04***	-0.00	0.01	0.01	-0.01	0.01
	(2.45)	(3.47)	(2.39)	(2.70)	(1.78)	(3.11)	(3.25)	(3.44)	(0.70)	(3.35)	(.28)	(0.56)	(0.70)	(0.16)	(0.35)
ln(POP)	0.06**	0.09***	0.09**	0.09**	0.05*	0.08***	0.07**	0.06**	0.06**	0.09***	0.07**	0.06	0.03	0.05	0.05
	(2.33)	(2.76)	(2.56)	(2.22)	(1.87)	(3.30)	(2.24)	(1.96)	(2.13)	(3.06)	(2.49)	(1.55)	(0.90)	(1.03)	(1.16)
WTO-dummy	-0.09					0.30***					0.26**				
	(.80)					(2.68)					(2.37)				
ln(TRADE)		0.14					-0.13					-0.08			
		(1.24)					(1.35)					(0.89)			
ln(EXP)			0.15					0.08					0.31**		
			(0.97)					(0.60)					(2.05)		
ln(IMP)			0.02					-0.23					-0.44**		
			(0.10)					(1.45)					(2.42)		
FRASER				0.06*					0.06**					0.03	
				(1.92)					(2.20)					(1.02)	
HERITAGE					0.07					0.02					0.05
					(1.47)					(0.51)					(1.19)
FUEL-EXP-dummy	-0.40**	-0.46**	-0.47**	-0.41*	-0.28										
	(2.20)	(2.48)	(2.50)	(1.83)	(1.25)										
GMO-dummy						-0.39*	-0.41*	-0.40*	-0.45**	-0.39					
						(1.76)	(1.74)	(1.71)	(1.96)	(1.61)					
ln(CHEM-EXP)											-0.01	-.01	-0.01	0.02	0.02
											(0.17)	(0.15)	(0.05)	(0.28)	(0.39)
Observations	175	160	159	121	143	175	160	159	121	143	175	160	159	121	143
Pseudo R^2	0.26	0.30	0.31	0.37	0.25	0.16	0.12	0.12	0.08	0.12	0.13	0.09	0.11	0.07	0.08

Note: Dependent variable is signature (1 = country signed; 0 = country did not sign). Reported coefficients are changes in probability for a one unit change in the variable at the mean of all variables (for a change from 0 to 1 for dummy variables). Robust standard errors. Absolute z-values in parentheses.
* statistically significant at 90% level ** at 95% level *** at 99% level

Table 2. Ratification speed of MEAs (Cox proportional hazard model).

	Montreal Protocol					Convention on Biological Diversity					Convent. on Int. Trade in Endangered Species				
	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V
ln(GDP)	1.41***	144***	1.38**	1.42***	1.39***	0.80**	0.81**	0.72***	0.70***	0.78**	0.93	0.89	0.77***	0.75***	0.92
	(3.08)	(3.12)	(2.53)	(2.70)	(2.62)	(3.28)	(2.40)	(3.35)	(3.22)	(2.49)	(.92)	(1.53)	(2.71)	(2.86)	(0.96)
DEMOCRACY	1.03	1.02	1.02	1.01	1.01	1.10***	1.12***	1.13***	1.10***	1.19***	1.10***	1.13***	1.14***	1.09**	1.14***
	(.98)	(1.00)	(1.03)	(0.19)	(0.37)	(3.88)	(3.81)	(4.48)	(2.91)	(3.26)	(3.54)	(4.37)	(4.48)	(2.54)	(4.30)
ln(POP)	1.18***	1.24***	1.20***	1.20***	1.17***	1.18***	1.19**	1.06**	1.18*	1.18**	1.28***	1.32***	1.23***	1.23***	1.25***
	(4.04)	(4.39)	(3.85)	(3.51)	(3.79)	(2.81)	(2.34)	(2.06)	(1.95	(2.46)	(6.73)	(5.39)	(4.49)	(4.00)	(4.67)
WTO-dummy	1.16					1.64**					1.95**				
	(0.77)					(1.96)					(2.33)				
ln(TRADE)		1.29*					0.99					1.24			
		(1.81)					(0.05))					(1.21)			
ln(EXP)			1.40*					1.61*					2.13**		
			(1.94)					(1.95)					(2.50)		
ln(IMP)			.83					0.56*					0.46**		
			(0.87)					(1.91)					(2.41)		
FRASER				1.03					1.13**					1.16***	
				(0.75)					(2.24)					(2.94)	
HERITAGE					1.08					1.05					0.95
					(0.98)					(0.51)					(0.54)
ln(CFC-EXP)	1.02***	1.02***	1.02***	1.02***	1.02***										
	(4.19)	(3.93)	(3.74)	(5.01)	(3.15)										
ln(BIODIVERSITY)						0.70***	0.68***	0.65***	0.74**	0.77***					
						(4.47)	(4.44)	(4.96)	(2.01)	(3.42)					
THREATENED SPECIES											1.55***	1.42**	1.41**	1.52***	1.44**
											(3.40)	(2.19)	(2.12)	(2.62)	(2.00)
Observations	172	157	156	120	140	175	160	159	121	143	174	160	159	121	142
Log likelihood	-679	-604	-599	-432	-530	-708	-639	-632	-451	-557	-632	-589	-580	-436	-499
Pr(Wald) > chi^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0035	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000

Note: Dependent variable is survival time (time until failure event occurs). Failure event is accession, acceptance, approval or ratification of MEA. Reported coefficients are hazard ratios. Robust standard errors. Absolute z-values in parentheses.
* statistically significant at 90% level ** at 95% level *** at 99% level