

*Full Length Research Paper*

# The influence of Treaty Design on the participation of Developing and Developed Nations in International Environmental Agreements (IEAs)

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It is an observed fact that developing and developed countries participate in International Environmental Agreements (IEAs) to different levels. Do IEA provisions exert differential levels of influence on the participation of developing and developed countries? This paper relies on multivariate regression analysis to examine the relationship between key IEA provisions and the participation of developing and developed countries in thirty-one global IEAs. The texts of the selected IEAs are analyzed and coded for the presence (or absence) of key provisions pertaining to, inter alia, strength, flexibility, transparency, and participation incentives such as financial and technology transfers. Results of the analysis show that strong binding provisions within IEAs tend to detract both the developing and developed countries from participation. On the other hand, provisions supporting greater flexibility (e.g. clauses promoting dispute resolution through negotiations first) or greater transparency (e.g. through NGO observership or reporting requirements) seem to be attractive to both developing and developed countries. These findings suggest that effective international environmental cooperation cannot be compelled; rather, it needs to be made attractive through the right mix between enforcement mechanisms and flexibility clauses, as well as through appealing participation incentives.

**Key words:** Treaty design, international environmental agreements, environmental regimes, participation, international environmental cooperation.

## INTRODUCTION

In a world beset with increasing inequalities in terms of economic and human development, getting nation states to agree on a common framework of international environmental protection is a daunting challenge. Over the decades, international environmental agreements (IEAs) have emerged as a predominant structure for international environmental cooperation (IEC). In fact,

since the 1972 United Nations Conference on the Human Environment, the number of IEAs adopted by the international community has more than doubled, and the growth continues. Commensurate with this intensified environmental treaty-making has been a burgeoning field of research into themes such as international environmental negotiations, regime formation, compliance, and

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effectiveness (Andresen and Ostreng, 1989; Bodansky, 1994; Diehl, 1997; Keohane, 1984; Keohane and Nye, 1989; Young, 1997; Haas, 1990; Haas, 1992; Wilkening et al., 2000; Young and Osherenko, 1993; Sprinz and Vaahoranta, 1994; Churchill, 1996; Mitchell, 1994; Wettstad, 2001; Miles et al., 2002; Underdal and Hanf, 2000; Bohmelt and Pilster, 2010; Kutting, 2000).

Though research into compliance and effectiveness remains enduring (Bohmelt and Pilster, 2010; Breitmeier et al., 2011), of late there has been growing interest into understanding the factors influencing state participation<sup>1</sup> in IEAs. Both within the International Relations literature, and within the econometrics body of research, which has focused extensively on the theme of IEA participation, it is generally agreed that the design of IEAs does have an influence on the level of participation in the IEAs (Mitchell, 1994; Helm, 2000b p. 164; Sand, 1992; Schmidt, 2000b; Finus, 2001a pp. 236, 238; Helm and Sprinz, 2000). Research in this field has investigated the influence of specific IEA clauses on the level of participation sustained by the IEA. DeSombre (2000 pp. 190-228), for example, has investigated the influence of key “participation mechanisms” such as the presence of economic sanctions, provision of environmental aid, differential obligations, and the creation of club goods. A more comprehensive empirical analysis is Bernauer et al. (2013) recent investigation of the “depth versus participation” dilemma in 211 global IEAs. Findings from this study show that the presence of specific targets within IEAs reduces participation, while dispute settlement provisions and incentives such as technical or financial assistance increase participation. However, monitoring and enforcement provisions do not seem to impact participation levels, leading Bernauer et al. (2013 p. 495) to conclude that there is “only very limited evidence for a depth versus participation dilemma in global environmental cooperation.”

One crucial characteristic of the above analyses, however, is that they analyze the influence of IEA characteristics on *total* participation in IEAs, and do not differentiate between the participation of developing and developed countries. Yet, disagreements between the developing and developed countries in their international relations have a long history, dating back to the emergence of the non-aligned movement in the 1950s, and the demand for a New International Economic Order (NIEO) in 1973 (Hoskins, 1982 pp. 17-20). This North-South conflict has been very prominent during the 1992 United Nations Conference on Environment and Development (UNCED), especially with regard to negotiations pertaining to the issues of climate change, biodiversity, and the protection of forests (Borione and Ripert, 1994; Dasgupta, 1994; Nayar and Ong, 1996; Bowman and

Redgwell, 1996).

Disagreements typically relate to perceptions of equity and fairness, as well as the traditional concerns with economic repercussions. The US withdrawal from the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC), for example, was premised on an understanding that projected the clauses of the agreement as unfair and inequitable. The Byrd-Hagel Resolution, which passed the US Senate unanimously, clearly stipulated that the US would not sign any agreement relating to the UNFCCC which would harm the US economy and which would “mandate new commitments ...for the Annex I Parties, unless the protocol or other agreement also mandates new specific scheduled commitments ...for Developing Country Parties within the same compliance period.”<sup>2</sup> Similarly, negotiations pertaining to the transboundary exports of hazardous wastes were colored by North-South disagreements (Park, 1998). Viewing the trade in hazardous wastes as a “crime against Africa and African people,” the Organisation of African Unity (OAU), for example, negotiated the Bamako Convention<sup>3</sup> “in protest against the Basel Convention” (Park, 1998 p. 695). The OAU considered the Basel Convention<sup>4</sup> as an inadequate legal instrument in view of its failure to institute a ban against the trade of hazardous wastes to the African continent (Marbury, 1995 p. 251; Webster-Main, 2002; Park, 1998).

In such a context of different national priorities and development concerns, how can we strengthen IEC by adopting IEAs with provisions that meet the needs and aspirations of both the developing and developed countries? In order to answer this question, we first need to have an understanding of the exact impact of specific IEA clauses on the participation of developing and developed nations. Do developing and developed countries respond differently to key IEA provisions, and if so, how? Unfortunately, there is no clear answer to this question. Most of the existing research on the influence of IEA design on participation focuses on *total* participation, and does not address the issue of the potential differential impact of specific IEA clauses on the participation of developing and developed states. In view of the fact that securing wide participation in IEAs is a necessary precursor to global environmental protection, and also considering the fact that developing countries are projected to be the future major contributors to global environmental problems (Folmer and De Zeeuw, 2000 p. 452; Pearson and Fouquet, 1996; Blackman, 2002; Schmidt, 2000a p. 14), it is important to understand the impact of key IEA clauses on the participation of

<sup>2</sup>Byrd-Hagel Resolution. Thomas Locator. <http://thomas.loc.gov/cgi-bin/bdquery/z?d105:S.RES.98>

<sup>3</sup> Full title: Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (Bamako, 1991).

<sup>4</sup> Full title: The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel, 1989).

<sup>1</sup> Participation is defined as country ratification of an IEA, or any other technical terms deemed equivalent to ratification – such as accession, approval, adherence, or acceptance. See UN Treaty Handbook (2012) for more details on the technical terms.

developing and developed states.

This paper aims to fill the existing gap in the literature and hopes to formulate some understanding of the differential impact of IEA design on the participation of developing and developed countries. Thirty-one global IEAs are examined and the influence of key IEA clauses on the participation of developing and developed countries is determined through multivariate regression analysis. Results of this study show that there is scope for strengthening IEC through IEAs which engender transparency mechanisms (e.g. through regular reporting requirements, observership by NGOs, etc.) and which provide for flexible means of dispute resolution (e.g. through negotiations first) – clauses which influence developing and developed countries similarly. Moreover, the results also show that both the developing and developed countries seem to not prefer IEAs with overly restrictive and binding provisions (e.g. legislative requirements, verification mechanisms, and trade sanctions), thus demonstrating that IEC might be better strengthened through incentives and capacity-building rather than through strict enforcement measures.

The rest of the article is structured as follows. The first part of the article summarizes current research in the field, the second part details the hypotheses and methodology, and the third part discusses the findings of the study.

## REVIEW OF RESEARCH INTO IEA DESIGN

In view of the crucial role played by IEAs in enhancing IEC, environmental economists have long been concerned with the theme of treaty participation and alliance building. This research has relied extensively on applications of game theory to explain state participation in IEAs. Within this body of research, IEA design has been deemed a “crucial” determinant of participation in IEAs, as well as a significant factor influencing the “stability and global efficiency” of the environmental coalition (Helm and Sprinz, 2000 p. 164; Sand, 1992; Schmidt, 2000a; Finus, 2001b pp. 236, 238; Helm, 2000a). In the case of the UNFCCC, for example, the “architecture” of the climate change regime has been deemed influential in determining both participation and compliance (Barrett and Stavins, 2003b p. 366).

Researchers have also analyzed the optimal size for an IEA, the cost-effectiveness of IEAs, and the design of instrument choices to attract high participation, often commonly referred to in the literature as the “incentive compatibility” of IEAs for enhanced cooperation (e.g. Carraro, 1999b; Downs, 1998; Helm, 2000a; Schmidt, 2000a p. 4).

Two types of incentives are mentioned in the literature: positive incentives, such as side payments and financial or technical assistance; and negative incentives, such as taxes, trade sanctions, external threats, and globally tradable emission permits (Arts, 2001; Barrett, 1995, 1992; Botteon and Carraro, 1998, 1999b, 1999a, 1997;

Carraro and Siniscalco, 1995; Cesar and De Zeeuw, 1994; Folmer and De Zeeuw, 2000; Heister et al., 1995; Katsoulacos, 1997; Schmidt, 2000a; Barrett and Stavins, 2003b pp. 361-367; Underdal, 1998a p. 106). Carraro and Siniscalco (1997) have also demonstrated the profitability and stability of linking negotiations on an IEA with Research and Development (R&D) cooperation, as the gains from the R&D cooperation have the possibility of offsetting free-riding incentives.

Studies on international environmental negotiations have highlighted the typical North-South discord that has characterized discussions between developing and developed countries (Najam, 1993; Borione and Ripert, 1994; Dasgupta, 1994; Nayar and Ong, 1996; Najam, 2002). In view of the fact that IEC cannot be effective without the solid participation of developing countries, international environmental negotiations have evolved to cater specifically to the special needs of developing countries in a bid to secure their greater participation in IEAs.

Principle 9 of the Stockholm Declaration<sup>5</sup> recognizes that conditions of underdevelopment and natural disasters lead to “environmental deficiencies” which can be improved by the transfer of financial and technological assistance from the developed to the developing countries to supplement the latter’s domestic efforts. Similarly, prior to the 1992 UNCED, the Forum of International Law of the Environment, which was convened in Siena from 17-21 April 1990, considered the issue of IEA participation and the means of widening such participation, with particular emphasis on overcoming the difficulties met by developing countries in ratifying such treaties (Maffei et al., 1996). Crystallized in international environmental law as the principle of common-but-differentiated-responsibility (CBDR), this recognition of the special needs of developing countries is deemed to increase the flexibility of IEAs, strengthen equity and fairness, and foster distributive justice (Okereke, 2008; Arenas, 2008; Honkonen, 2009). Indeed, important IEAs (e.g. the UNFCCC, the Montreal Protocol on Substances that Deplete the Ozone Layer, and the Convention on Biological Diversity(CBD)) do in fact recognize that the special needs of developing countries need to be taken into consideration, and that developed nations need to provide financial and technical assistance to allow the developing states to comply with their international environmental obligations without jeopardizing their development needs (Caldwell, 1988; Chasek, 2000; Evans, 2000). Both the CBD (Article 20(4)) and the UNFCCC, for example, mention that the extent to which

<sup>5</sup>Declaration of the United Nations Conference on the Human Environment (Stockholm, 1972), accessible online at <http://www.unep.org>. Principle 9 of the Declaration reads: “Environmental deficiencies generated by the conditions of under-development and natural disasters pose grave problems and can best be remedied by accelerated development through the transfer of substantial quantities of financial and technological assistance as a supplement to the domestic effort of the developing countries and such timely assistance as may be required.”

developing countries succeed in implementing their commitments under the conventions depends, in the first instance, on the developed countries' fulfillment of their obligation to provide financial and technological assistance. Research has shown that certain positive participation incentives such as provisions for financial or technical assistance do act towards increasing the participation of developing countries (Barrett and Stavins, 2003a pp. 361-367; Underdal, 1998b p. 106). Another IEA characteristic deemed to favor higher participation is the minimum ratification clause, often also called the threshold number or the n-rule (Black et al., 1993 p. 281). The threshold number normally specifies the total number of ratifications that are needed for a treaty to enter into force. The minimum ratification clause has been characterized as an "internal stabilization" instrument, making participation "contingent" on the participation of others (Schmidt, 2001 p. 220).

Black et al. (1993) have analyzed the threshold number "as an instrument to create incentives" for IEC, and they report that the threshold number helps to increase participation in IEAs while deterring free-riding (Barrett, 2000 p. 137; Carraro et al., 2003). In this sense, the threshold number is seen as being important in making cooperation more profitable (Black et al., 1993) and more stable by decreasing the number of free-riders and increasing the number of signatories (Carraro et al., 2003). However, Schmidt (2001 p. 220) warns that "the more successful the minimum ratification clause is in making a large number of countries sign the agreement, the greater are the incentives to breach it afterwards."

In terms of the impact of strength on participation, several researchers have argued that the stricter the requirements of an IEA, the less likely it is that countries will participate in the IEA (Schmidt, 2001 p. 214), and free-riding incentives will prevail (Finus, 2001b p. 279). Carraro (1999b p. 9), for example, notes that those treaties which are "rather empty in terms of quantitative targets and/or deadlines" tend to enlist greater participation than those with precise commitments. Likewise, Finus (2001b p.314) considers that more countries sign IEAs which are meant to "achieve little." In his analysis of the UNFCCC, Barrett (2000 p. 119) considers that the UNFCCC benefited from earlier ratification and entry into force than the Kyoto Protocol because it did not require any "particular target by any particular date."

Sand (1992) interestingly posits a differential relationship of strength for developing and developed countries, arguing that developing countries seem to prefer to participate more in those treaties which have no binding commitments, and which are merely declaratory. Mechanisms to help reduce fears about other parties' free-riding and thereby increase the possibility of cooperation have been associated with transparency measures such as the inclusion of reporting requirements (Victor et al., 1994; Chayes and Chayes, 1995, 1991).

Most IEAs provide members with the possibility of

entering into reservations, of opting out of certain clauses, of proposing amendments to the IEA clauses, or of completely withdrawing from the treaties. It is generally agreed that allowing reservations tends to favor participation because it increases the flexibility of the IEAs (Harvard Law Review, 1992). On the other hand, disallowing of reservations, while effective perhaps in maintaining the desired strength of the IEAs, may nevertheless work against high rates of participation as it renders the IEA inflexible and not in line with the needs of potential party members. As stated by DeSombre (2002 p. 11):

*Although many complain about opt-out provisions in regulatory treaties, the fact that no state can be bound by international law against its will makes them a necessary evil. Without them few states would agree to regulation created by less than unanimous voting.*

Similarly, encouraging flexible means of dispute resolution (e.g. through negotiations) tends to appeal to a wider audience than strict requirements for recourse to the International Court of Justice (ICJ). The 1963 Optional Protocol Concerning the Compulsory Settlement of Disputes, negotiated under the 1963 Vienna Convention on Civil Liability for Nuclear Damage, has succeeded in securing only two parties to date,<sup>6</sup> compared to the thirty-seven parties to the parent treaty.<sup>7</sup> Under the Optional Protocol, all disputes arising under the parent treaty are to be dealt "within the compulsory jurisdiction of the International Court of Justice" (Article 1), unless the parties agree to alternate measures within a period of two months after notification of the dispute.<sup>8</sup> The low rate of participation in the Optional Protocol may be due to the general 'unpalatability' within the international community of submitting disputes to the ICJ, or due to the inflexible language of the text of the Protocol, connoted, for example, by the word "compulsory."

As is obvious from the above, many of the posited relationships between IEA provisions and state participation do not provide a comparative analysis of the influence of key IEA clauses on the participation of developing and developed countries. Yet, in view of the transboundary nature of environmental problems and the global scope of their impacts, it is important to understand how developing and developed countries respond to particular IEA provisions as the success of IEAs rests upon the participation of both the developing

<sup>6</sup>IAEA

<http://www.iaea.org/Publications/Documents/Infcircs/1999/infcirc500a3.shtml>

<sup>7</sup>Ronald B. Mitchell. 2002-2014. *International Environmental Agreements Database Project (Version 2013.2)*. Available at: <http://iea.uoregon.edu/>. Date accessed: 8 March 2014; Yearbook of International Cooperation on Environment and Development. 2003/2004. <http://www.greenyearbook.org/agree/nuc-saf/civillia.htm>

<sup>8</sup>Text of the parent treaty and the optional protocol available online at <http://sedac.ciesin.org/entri/texts/acrc/ProtVienna.txt.html> or at the IAEA site at <http://www.iaea.org/Publications/Documents/Infcircs/1996/inf500.shtml>.

and developed nations. This study is thus a first step along the way towards acquiring a greater understanding of the differential impact of key IEA provisions on the participation of developing and developed countries. Three core IEA provisions are investigated, namely, participation incentives, strength, and flexibility.

## METHODS

### Development of hypotheses

As discussed earlier, research has shown that certain positive incentive structures, such as financial transfers, tend to enlist greater participation in IEAs – especially from developing countries (Carraro, 1999a; Schmidt, 2000a; Helm, 2000a; Barrett, 1992; Barrett and Stavins, 2003b pp. 361-367; Underdal, 1998a p. 106). However, financial transfers may seem attractive to both the developing and developed countries in view of the added benefits to be accrued therefrom. For the developed countries, the possibility of providing financial assistance may likely imply some control over how that money is to be used within the developing economies, which also often implies control over the use of technology and processes. Thus, disbursing funds may be of benefit to local industries within the developed world. Similarly, the availability of funds for implementation of IEA provisions may be seen as attractive by developing nations as this would mean financial empowerment to address environmental concerns and to improve production processes. However, *ceteris paribus*, while financial mechanisms within IEAs may be favored by both the developed and developing nations, it is likely that such financial transfers may be more influential on the decision of developing countries to participate in IEAs or not, due mostly to the fact they are normally less empowered economically than their developed counterparts. This argument leads to the following hypotheses:

*H1: The inclusion of provisions for financial assistance in IEAs tends to increase participation from developed countries.*

*H2: The inclusion of provisions for financial assistance in IEAs tends to increase participation from developing countries.*

Many IEAs also provide for the possibilities of technical training and capacity-building, especially for developing party members which do not have the necessary technical and technological infrastructure for the implementation of the IEAs. Developed countries especially may prefer to provide technical training and capacity-building rather than having to disburse funds for developing countries to implement the IEA provisions. For developing countries, possibilities for benefiting from technical know-how and much needed training can prove to be an attractive package for participation. This leads to the following hypotheses:

*H3: The presence of clauses allowing for training and capacity-building tends to increase participation from developed countries.*

*H4: The presence of clauses allowing for training and capacity-building tends to increase participation from developing countries.*

As discussed earlier, the minimum ratification clause (or the threshold number) acts as an incentive for enhanced IEC by minimizing opportunities for free-riding (Black et al., 1993; Barrett, 2000; Carraro et al., 2003). Further, states' concerns with preventing loss in their relative or absolute power, and their interest in preventing loss of control on their national sovereignty may incite them to participate in IEAs only if they can be sure that a good enough proportion of the international community is committing to the same obligations and constraints stipulated within the relevant treaty texts. A high threshold number can therefore have a positive

influence on participation in IEAs – both from the developed and developing countries.

*H5: The higher the threshold number, the greater is the level of participation from developed countries.*

*H6: The higher the threshold number, the greater is the level of participation from developing countries.*

While negotiating the texts of IEAs, there is always a concern with resolving the tension between IEA strength and IEA flexibility. It is critical to strike the right trade-off in order to secure maximum participation in the relevant IEAs. As discussed earlier, several mechanisms have been utilized to increase the flexibility of IEAs – examples include the permissibility of reservations, the allowing of withdrawals from the treaty, and the provision of flexible dispute resolution methods. It is to be expected that countries prefer to sign flexible IEAs – for example, those offering the possibility of reservations (Birnie, 1988; Sand, 1992; GAO, 1992; Granda, 1990; Hurrell and Benedict, 1992). Flexibility helps to provide a reassurance mechanism that states can still maintain their own control over their political and socio-economic decision-making and they can always find means to 'get out' if the IEAs prove to be too costly to them. This suggests that we can expect IEA flexibility to exert a positive effect on participation level – both from developing and developed countries. Thus, the following hypothesis can be postulated:

*H7: The more flexible an IEA is, the greater the level of participation from developed countries.*

*H8: The more flexible an IEA is, the greater the level of participation from developing countries.*

Closely related to the above argument is the fact that countries tend to prefer less binding commitments (Carraro, 1999a). Strong IEA clauses clearly limit a state's ability to maintain full control over its domestic policies, which in essence translate into a loss of power. A few researchers (Sand, 1992) have stated that developing countries seem to prefer to participate more in those conventions which have no binding commitments, and which are merely declaratory. This may likely be true since developing countries are still lagging behind the developed countries in terms of their economic and industrial development, and may therefore not welcome constraints on their development processes – as has been clearly demonstrated in negotiations pertaining to the climate change regime. In this context, a weak IEA may indeed seem more preferable than a strong one. Developed countries, on the other hand, may prefer binding commitments in view of the fact that they are often the ones being called upon to disburse financial and other resources for the implementation of the relevant IEAs. They may want to ensure that the resources transferred are being used to meet targets which are binding on both their developed competitors and the recipients of the resources. The following hypotheses can therefore be postulated:

*H9: The stronger the IEA is, the lower the level of participation from developed countries.* *H8: The stronger the IEA is, the higher the level of participation from developing countries.*

Game theorists often claim that the nature of information available to countries is of fundamental importance for the latter to determine their costs and benefits for engaging in IEC. It can therefore be assumed that mechanisms which help to reduce uncertainties and increase transparency are bound to favor IEC. Accordingly, several researchers have stated that reporting requirements, by increasing transparency on implementation, help to reduce fears about other parties' free-riding and thereby increase the possibility of cooperation (Victor et al., 1994; Chayes and Chayes, 1995, 1991). An increasing number of IEAs now include provisions for observership, either by NGOs or by other interested parties (e.g.

other non-member states or United Nations (UN) agencies). The following hypotheses can be postulated:

*H10: The stronger the IEA is, the higher the level of participation from developed countries.*

*H11: Presence of transparency requirements tends to increase the level of participation from developing countries.*

*H12: Presence of transparency requirements tends to increase the level of participation from developing countries.*

### Models and operationalization of variables

The above hypotheses are tested from data compiled from the Environmental Treaties and Resource Indicators (ENTRI) database of the Socioeconomic Data and Applications Center (SEDAC).<sup>9</sup> To understand the impact of IEA characteristics on total participation as well as participation from developing and developed countries, three dependent variables are used, and three models are proposed, as follows: (i) total participation,  $P_T$ , calculated as a percentage of total allowable parties (Model I); (ii) developed country participation,  $P_{DD}$ , calculated by dividing the total number of developed country members by the total number of developed countries allowed to participate (Model II); and (iii) developing country participation,  $P_{DG}$ , obtained by dividing the total number of developing party members by the total number of developing countries allowed to participate (Model III).<sup>10</sup>

A total of thirty-one global IEAs was selected dealing with various issue areas: 10 dealing with natural resources and nature conservation; 7 dealing with the atmosphere; 6 dealing with hazardous substances and nuclear radiation; and 8 dealing with marine waters and marine resources. Moreover, 8 of the IEAs were framework conventions and 6 were protocols. There is no existing dataset for the independent variables of direct relevance to the formulated hypotheses. This analysis therefore relies on extensive content analysis of the selected IEAs and the IEAs were coded based on specific IEA characteristics of direct relevance to the formulated hypotheses. To qualify the design of the IEAs, the presence of specific IEA clauses was indicated by 1 and absence was indicated by 0. The independent variables are thus either binary variables (0, 1) or a combination of the binary variables constituting a particular IEA characteristic. To measure the strength of the IEAs, the total score of the IEAs was calculated based on the presence (or absence) of each of the following measures for the variable *strength*: clear quantitative targets, implementation deadlines, requirements for enactment of legislation, review and verification mechanisms, and membership or trade sanctions. Participation incentives were measured by financial transfers and capacity-building provisions. The *fintransfers* variable was determined by analyzing the IEA text for presence/absence of provisions allowing for such financial transfers. Capacity-building (denoted by the variable *capacity*) relates to whether the IEA allows for education, training or specifically refers to the term 'capacity-building' in its provisions; whether there is provision for technical and scientific cooperation; and whether there are provisions for cooperation on R&D. Flexibility of the IEA is determined by whether the IEA allows parties to settle disputes through negotiations *first* (variable *Dispneg*) and whether the IEA allows individual party to propose amendments to the treaty (variable *Amendpty*). *Transparency* was obtained by adding the score for: whether the IEA allows non-governmental organizations (NGOs) and other

organizations to act as observers in the proceedings of the treaty affairs; whether there is the requirement to prepare yearly reports either by the parties or by the treaty bodies; and whether there is the requirement for parties to report on their implementation measures. The threshold number (variable *threshold*) is obtained direct from the IEA text which normally specifies the minimum number of ratifications required before the IEA can enter into force. The coding template is provided in Table 1.

The following equations summarize the investigation:

Model I:  $P_T = \alpha + \beta_1(\text{strength}) + \beta_2(\text{incentives}) + \beta_3(\text{flexibility}) + \beta_4(\text{transparency}) + \beta_5(\text{threshold number}) + \xi$

Model II:  $P_{DD} = \alpha + \beta_1(\text{strength}) + \beta_2(\text{incentives}) + \beta_3(\text{flexibility}) + \beta_4(\text{transparency}) + \beta_5(\text{threshold number}) + \xi$

Model III:  $P_{DG} = \alpha + \beta_1(\text{strength}) + \beta_2(\text{incentives}) + \beta_3(\text{flexibility}) + \beta_4(\text{transparency}) + \beta_5(\text{threshold number}) + \xi$

## ANALYSIS AND RESULTS

Since the dependent variables are continuous variables (percentage participation), the analysis is amenable to multiple linear regression analysis.<sup>11</sup> A preliminary analysis was done and the plots of residuals versus predicted values were analyzed to detect any patterns in the plots. Though there was no definite pattern in the plots, which hints at lack of heteroscedasticity, the regressions were rerun with robust standard errors to control for any non-visual heteroscedasticity that may be present in the data. The Jarque-Bera (JB) test showed that no statistically significant claim can be made that the distribution is not normal.<sup>12</sup> The results of the regression analyses are presented in Tables 2 – 4.

### Model I: Total participation

For Model I (Table 2), the F-value of 8.47 is statistically significant at  $p < 0.005$ , showing good model fit. In line with theoretical expectations, stronger agreements show a negative association with total participation, and flexible provisions such as emphasizing negotiations as a means of dispute settlement or allowing any party to propose amendments to the IEA texts, show a positive relationship with total participation. The variable 'capacity' is showing a negative relationship with total participation, implying

<sup>11</sup> Pearson's correlations coefficients do not show any strong correlations among the independent variables. The highest correlation is between threshold number and provisions for financial transfers (*fintransfers*), with a correlation of 0.821. However, the high correlation of 0.821 does not seem to constitute a collinearity problem. The Variance Inflation Factor (VIF) for the different regressors in the model all range below 5, showing that collinearity is not affecting the regression coefficients.

<sup>12</sup> To test the normality assumptions underlying the multiple linear regression analyses, the Jarque-Bera (JB) test was used, which provides a test for any non-normality in the residuals. The hypotheses for the JB test are as follows:

$H_0$ : The residuals are normally distributed

$H_a$ : The residuals are not normally distributed

The JB test fails to reject the null hypothesis of the distribution being normal at a significance level of 0.05. In other words, the JB test shows that no statistically significant claim can be made that the distribution is not normal.

<sup>9</sup> Website: <http://sedac.ciesin.columbia.edu/entri/>

<sup>10</sup> The total number of countries included in the dataset is 196, with 44 developed and 152 developing states. Thus, for total participation,  $P_T$ , actual participation level was divided by 196; for  $P_{DD}$  and  $P_{DG}$ , actual participation was divided by 44 and 152 respectively to yield the percentages for developed and developing country participation.

**Table 1.** Operationalization of variables.

Variable code		Legal provisions analyzed	Values
Strength	Strength	Presence of: (i) legislative requirements [1,0]; (ii) review [1,0] and verification mechanisms [1,0]; (iii) target deadlines [1,0]; (iv) trade [1,0] or membership sanctions [1,0]; (v) requirement for participation for specific countries (or group of countries) before into force [1,0]	Maximum possible value of 7; minimum 0.
	Fintransfers	Provisions for financial transfers among parties	Minimum of 0; maximum of 1.
Incentives	Capacity	(i) Provisions for education, training, or capacity-building [1,0] (ii) Provisions for technical and scientific cooperation [1,0] (iii) Provisions for cooperation on Research and Development [1,0]	Minimum of 0; maximum of 3.
	Dispneg Amendpty	Provisions for dispute resolution by negotiation first Provision for any party to propose amendments to the treaty	Minimum of 0; maximum of 1 Minimum of 0; maximum of 1.
Flexibility	Transparency	Presence of: (i) observership by NGOs [1,0] and other interested parties [1,0]; (ii) presence of reporting requirements [1,0]; (iii) requirements for submission of yearly reports by parties [1,0] and by treaty bodies [1,0]	Maximum possible value of 5; minimum 0.
	Threshold	Minimum participation requirement	As stipulated in treaty text: minimum value of 3; maximum of 60.

**Table 2.** Regression results for Model I – dependent variable: total participation.

Model I total participation P <sub>T</sub>	Unstandardized coefficients		Standardized coefficients		
	B	Robust Standard Error	Beta	t	Significance
Constant	19.381	8.376		2.31	0.030
Strength	-12.247	5.370	-0.453	-2.28	0.032**
Transparency	7.728	3.273	0.441	2.36	0.027**
Threshold	0.291	0.441	0.155	0.66	0.515
Dispneg	19.404	10.650	0.331	1.82	0.081*
Amendpty	6.334	9.946	0.095	0.64	0.531
Fintransfers	2.488	15.463	0.036	0.16	0.874
Capacity	-1.085	5.707	-0.043	-0.19	0.851

N, 31; R<sup>2</sup>: 0.5009; F-statistic, 8.47\*\*\*; \*\* significant at the 0.005 level; \* significant at the 0.05 level; † significant at the 0.1 level.

that there is a tendency among states to view provisions for capacity-building in an unfavorable light.

Variables which are statistically significant at the 5% level are 'strength' and 'transparency', while 'dispneg' (dispute settlement through negotiations first) is statistically significant at the 10% level. The threshold number,

together with 'amendpty' (amendment by party), 'fintransfers' (financial transfers), and 'capacity' are not statistically significant.

From these results we can conclude that IEAs which have strong clauses tend to elicit lower participation rates, while IEAs which favor dispute resolution through

**Table 3.** Regression Results for Model II: Dependent variable: Participation from developed countries.

Model II Participation from developed countries P <sub>DD</sub>	Unstandardized coefficients		Standardized coefficients		
	B	Robust standard error	Beta	t	Significance
Constant	35.584	12.820		2.78	0.011
Strength	-12.336	5.515	-0.472	-2.24	0.035**
Transparency	7.767	3.860	0.458	2.01	0.056*
Threshold	0.044	0.520	0.024	0.08	0.933
Dispneg	20.639	10.862	0.364	1.90	0.070*
Amendpty	-1.990	13.004	-0.031	-0.15	0.880
Fintransfers	-4.652	14.626	-0.069	-0.32	0.753
Capacity	2.261	6.654	0.093	0.34	0.737

N, 31; R<sup>2</sup> 0.4178; F-statistic, 4.21\*\*\*; \*\*\* significant at the 0.005 level; \*\* significant at the 0.05 level; \* significant at the 0.1 level.

negotiations first tend to sustain higher levels of participation from the international community. Further, IEAs which include transparency measures, such as allowing NGOs and other interested parties to act as observers, or requiring parties to report on their implementation, tend to elicit higher participation rates from the international community.

With all other variables held constant, the incorporation of an additional clause for strengthening an IEA will result in a loss of participation from 12 states, while the inclusion of an additional clause for increasing the transparency of an IEA will cause the IEA to sustain participation from 7 additional states. The legal possibility of resolving disputes through negotiations first will tend to increase participation in an IEA by 19 more states.

From the beta weights of the variables, the strength of an IEA seems to exert the greatest influence on total participation, followed very closely by the transparency provisions of the IEA. With all other variables held constant, an increase of one standard deviation in the strength of an IEA will result in a decrease of 0.45 standard deviation in total participation, while an increase of one standard deviation in the transparency of the IEA will result in an increase of 0.44 standard deviation in total participation. Similarly, with all other variables held constant, an increase of one standard deviation in the variable 'dispneg' (dispute resolution through negotiation) will cause an increase of 0.33 standard deviation in participation.

### Model II: Participation from developed countries

For Model II (Table 3), the F-statistic (value of 4.21) is significant at  $p < 0.005$ , attesting to good model fit. From the direction of the associations, strong clauses within an IEA seem to detract from high participation from developed countries, while transparency provisions seem to attract more developed states to participate in the IEA. Moreover, developed countries seem not to favor clauses

allowing any party to propose amendments to the treaty text, as well as clauses allowing financial transfers to take place among parties. On the other hand, developed countries seem to favor measures for capacity-building.

Variable 'strength' is statistically significant at the 5% level, while 'transparency' and 'dispneg' (dispute settlement through negotiations first) are statistically significant at the 10% level. Variables 'threshold', 'amendpty', 'fintransfers' and 'capacity' do not show any statistical significance with participation from developed countries.

The results show that developed countries tend to participate less in stronger agreements, and more in those agreements which include provisions enhancing transparency or favoring dispute settlement through negotiations first. With all other variables held constant, the inclusion of one additional clause for strengthening an IEA will cause a decrease in participation from 12 developed countries. One additional clause for enhancing the transparency of an IEA will result in an increase in participation from 7 more developed nations. Presence of a clause allowing for dispute resolution through negotiations first will result in an increase in participation from 20 developed countries.

From the beta weights, the strength of an IEA seems to exert the greatest influence on participation from developed countries, followed by the presence of transparency clauses. With all other variables held constant, an increase of one standard deviation in the strength of an IEA will result in a decrease of 0.47 standard deviation in participation from developed countries, while an increase of one standard deviation in the transparency of an IEA will result in an increase of 0.46 standard deviation in participation from developed countries.

### Model III: Participation from developing countries

For Model III (Table 4), the F-statistic (value of 9.22) is statistically significant at a p-value of less than 0.005%



**Table 4.** Regression Results for Model III: Dependent Variable: Participation of developing countries.

Model III Participation from developing countries P <sub>DC</sub>	Unstandardized coefficients		Standardized coefficients		
	B	Error	Beta	t	Significance
Constant	14.746	7.610		1.94	0.065
Strength	-12.042	5.442	-0.433	-2.21	0.037**
Transparency	7.791	3.258	0.432	2.39	0.025**
Threshold	0.328	0.438	0.170	0.75	0.461
Dispneg	19.016	11.017	0.316	1.73	0.098*
Amendpty	8.383	9.526	0.122	0.88	0.388
Fintransfers	4.509	16.527	0.063	0.27	0.787
Capacity	-1.875	5.739	-0.073	-0.33	0.747

N, 31; R<sup>2</sup> 0.504; F-statistic, 9.22\*\*\*; \*\*\* significant at the 0.005 level; \*\* significant at the 0.05 level; \* significant at the 0.1 level.

level, showing good model fit. The direction of the regression coefficients shows that developing countries tend not to favor strong IEAs and those which have provisions for capacity-building, and to prefer IEAs which are transparent, include provisions for amendments by any party, allow for dispute resolution through negotiations first, and include mechanisms for financial transfers.

The variable 'strength' and 'transparency' are both statistically significant at the 5% level, while 'dispneg' (dispute settlement through negotiations first) is statistically significant at the 10% level. The variables threshold, 'amendpty' (any party can bring amendment to IEA text), 'fintransfers' (provisions for financial transfers) and 'capacity' do not depict statistical significance with participation from developing countries. The results show that developing countries tend to participate less in stronger IEAs than in weaker ones, and that they favor IEAs which enhance transparency and favor flexibility. With all other variables held constant, an additional clause meant to strengthen an IEA will result in a loss of participation from 12 developing countries, while an increase of an additional clause on transparency will result in an increase in participation from 7 developing nations. The possibility of resolving disputes through negotiations first causes an increase in participation from 19 developing countries, if all other variables are held constant. Both the strength and transparency provisions of IEAs seem to exert the same level of influence on participation from developing countries. If there is an increase of one standard deviation in the strength of an IEA, participation from developing countries will decrease by 0.43 standard deviation, while all other variables are held constant. Similarly, if transparency of the IEA increases by one standard deviation, participation from developing countries increases by 0.43 standard deviation, when all other variables are held constant.

## DISCUSSION OF FINDINGS

The results of the regression analyses show that strong

and binding provisions exert a negative impact on total participation in IEAs, while provisions which promote transparency and flexible means of dispute settlement tend to increase participation in IEAs. Thus, emphasizing binding commitments is clearly counterproductive to securing wide participation in IEAs, which has been described as "a first priority of international cooperation" (Barrett and Stavins, 2003b p. 358). For stronger IEC, therefore, there is a need to promote transparency and flexibility measures within IEAs, and not focus overly on making IEAs more binding. Moreover, focusing on making IEAs more binding, without attendant measures for enhancing the capabilities of countries to implement the IEAs, will likely result in lack of compliance and implementation failures. As noted by Cameron et al. (1996 p. xiv), "punitive sanctions alone will not provide solutions" in so far as compliance procedures within IEAs are concerned; rather, they tend to "exacerbate tensions."

Contrary to expectations, *both* developing and developed countries seem to disfavor IEAs with strong binding provisions. This congruence in preferences between the developing and developed countries opens up a space for potential enhanced IEC, given that the concerns are the same. Though nation states are traditionally concerned with maintaining their sovereignty over their natural resources, the concept of sovereignty does evolve to accommodate the new drive for greater IEC (Handl, 1991). However, this "greening of sovereignty" (Litfin, 1999) and the various "sovereignty bargains" (Litfin, 1997) that occur in the face of global environmental challenges also rest upon adequate incentives and flexibility mechanisms to entice states to participate in the IEAs. It seems that IEAs will have to be engineered such that they succeed in striking the right balance between flexibility and strength. As argued by Barrett and Stavins (2003b p. 359) in the case of the UNFCCC, it might be better to go for a "broad but shallow" IEA rather than a "narrow but deep" one as the former is more likely to solicit greater participation, and thereby reduce the total costs of mitigation.

In all likelihood, statements referring to the preference of developed countries for stringent environmental measures may fit the regional landscape better than the global one. In the case of regional IEAs (e.g. the Baltic Sea Protection treaty,<sup>13</sup> Protection of the Rhine,<sup>14</sup> the Acid Rain Treaty<sup>15</sup>), developed countries are more directly and seriously impacted by the environmental problems, and ensuring that free-riding and non-compliance do not occur become important objectives of the negotiations. Thus, the developed countries may prefer that all neighboring states commit to the same high binding standards. Moreover, as argued by Cameron et al. (1996 p. xv), the “common culture” shared by regional states may also play a part in the success of “more sophisticated control regimes” at the regional level. Cameron et al. (1996 p. xv) also note that “[r]egional regimes seem to allow Parties to remain in closer contact with real problems and potential solutions; the Parties’ interests tend to be less disparate and their concerns more immediate.”

The predilection on the part of both the developed and developing countries for transparency measures (e.g. through regular reporting requirements) within IEA texts and for flexibility to resolve potential disputes through negotiations first reinforce the potential for strengthened IEC. These findings can be understood in terms of states’ concerns with satisfying themselves that other party members are not free-riding and that they can maintain some level of control on the dispute resolution process. Clauses enhancing transparency will likely make the processes of treaty implementation more open to international scrutiny and will likely contribute positively towards building trust and enhancing collaborative endeavors to address the specific global environmental issues. Transparency also increases the likelihood that the IEA will be effective by shedding light on various management problems such as misuse of funds transferred for treaty implementation, or inadequate domestic efforts to fully comply and implement the IEA provisions. Thus, the potential negative impact of including binding provisions can be mitigated by reinforcing transparency measures.

Control over dispute resolution is crucial in international relations among states. Loss of such control can potentially be viewed as an erosion of national sovereignty, and thus less palatable to states. The general preference for negotiations as the first means of addressing conflicts points to the fact that, at least in the international environmental domain, countries are interested in avoiding protracted tensions in their relationships and believe that they can arrive at mutually agreeable positions through the normal processes of negotiations. This is an important finding as it holds promise for peace. A preference for

negotiations is a potential harbinger of friendly debates and an open and frank atmosphere to resolve conflicting interests and establish mutually recognized rights and obligations in the environmental domain. This ties in with prior research which demonstrates clearly the peace-building potential of environmental initiatives (Frerks et al., 2014 p. 19; Conca, 2001; Conca and Dabelko, 2002; Conca et al., 2005).

The variable ‘threshold’ does not show any direct impact on total participation, as also on participation from the developing or developed nations. This is antithetic to the increasing economic exposés which posit that IEC tends to increase when there is a minimum ratification clause embedded in the treaty text. While economic analysis seems to argue that making participation contingent on that of other states will likely increase overall participation, in real policy-making contexts, this needs not be an automatic outcome. It is likely that countries may not be concerned so much about the number of required ratifications, as about the nature of participation. In other words, while countries may not care about how many other states have already ratified a particular treaty, they may nevertheless be interested in whether a particular country or a particular group of countries is ratifying or not. In this sense, the number does not really matter. Canada’s withdrawal from the Kyoto Protocol, for example, followed suit to US’s withdrawal in 2002 (Ljunggren, 2011, December 13). It might be better therefore for IEAs to come into force right after the period for signature ends. This means that as soon as a country ratifies an IEA, the IEA provisions enter into force for that country immediately, without having to wait for a specific number of minimum ratifications. Given that many environmental impacts are irreversible, and that time is of the essence for many serious issues such as global climate change, having IEAs enter into force for ratifying members right after ratification is a sensible strategy.

Though the variables ‘threshold’, ‘amendtpy’ (amendment by any party), ‘fintransfers’ (financial transfers), and capacity-building do not depict any statistical significance for both the developing and developed countries, what is interesting is that they depict different directions of association in each case. The results show a positive association between developing country participation and provisions facilitating financial transfers, as well as provisions allowing any party to propose amendments to the treaty. Moreover, developing country participation shows a negative association with measures for capacity-building. On the other hand, developed country participation shows a negative association with clauses allowing amendment propositions from any party member, and provisions for financial transfers; and a positive association with provisions for capacity-building measures (Table 5).

Why would developed countries depict a low preference for provisions for financial transfers? Most likely it is because, in all probability, they will be the ones

<sup>13</sup>Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki, 1992)

<sup>14</sup>Convention on the Protection of the Rhine (Berne, 1999)

<sup>15</sup>Convention on Long-Range Transboundary Air Pollution (Geneva, 1979)

**Table 5.** Differences of IEA preferences for developed and developing countries.

IEA Characteristics	Direction of association	
	Developing countries	Developed countries
Capacity-building provisions	Negative	Positive
Amendment by any party	Positive	Negative
Financial mechanism	Positive	Negative

responsible for disbursing funds for the financial transfers. Concerns with the misappropriation of funds, lack of accountability, corruption, or dwindling financial resources (Thérien et al., 2000; Winters, 2010) may explain why developed countries seem to prefer to invest in measures for capacity-building (such as training, technology transfers, and R&D cooperation) rather than on direct monetary transfers. On the other hand, the preference of developing nations for financial transfers may be understood in terms of their perceptions that they are entitled to such disbursements since they were not responsible for creating the environmental problems in the first place. As discussed earlier, many IEAs do recognize the fact that the special needs of developing countries need to be taken into consideration.

Overall, therefore, arguments relating to the CBDR framework need to be taken seriously if the participation of developing countries is to be secured. There are serious issues of equity and capabilities that need to be successfully addressed for effective IEC. Promoting financial transfers makes sense if the goal is to increase international commitment to the protection of the global environment. The fact that developing nations are often heavily dependent on foreign aid and face high levels of various social challenges (such as malnutrition, high infant mortality, poverty) makes financial transfers an indispensable strategy for global environmental protection – as has been recognized in many of the recent IEAs. The negative relationship between developing country participation and the measures geared towards capacity-building only strengthen the finding that financial transfers seem to be a better strategy to attract developing nations to participate in IEAs. Developing nations' negative relationship with capacity-building provisions may also stem from the fact that such measures often are very diffusely framed, with no clear or concrete plans of action or outcomes. Moreover, the promise of capacity-building may not materialize in the short-time frame, as opposed to financial transfers, which are more likely to have clearly specified *modus operandi* and specific timelines. The difference in preference between developed and developing nations in so far as amendment clauses are concerned can be understood in terms of the parameters of IEA formation and adoption. Though IEA negotiations are more open to participation from developing countries nowadays, the developed countries have traditionally been the main party in agenda-setting (Shearer, 1994).

Developed nations have typically been more highly involved in the negotiations, drafting and adoption of a particular IEA text than developing nations. If after protracted negotiations a final IEA text is finally adopted, it makes sense that the negotiating partners would not welcome any one future party member to bring amendments to the treaty texts. Allowing amendments by any party member will likely alter the structure of the calculations of costs and benefits which the developed nations relied on to participate in the IEAs in the first place. Given the fact that withdrawing from IEAs is not itself without costs, amendments can only be a trigger of additional costs rather than benefits for the developed world. Developing countries, on the other hand, show a positive association with the ability to bring amendments to IEA provisions. This likely reflects developing countries' desire to safeguard their national interests and concerns in a process which did not involve them significantly in the initial phases. It is likely that the developing nations may not find all aspects of the IEA to be in their favor and they may desire to have the freedom to request for a modification of the status quo if need be.

## Conclusion

This study shows clearly that effective IEC requires that IEAs be engineered such that they succeed in striking the right balance between flexibility and strength, and that the common aspirations of both the developing and developed nations be taken into account. This means that serious attention has to be given to issues of equity and state capabilities for implementing IEAs. Findings from this study show clearly that there is great scope for strengthening IEC through the adoption of IEAs which allow for flexibility in dispute resolution, which promote transparency in implementation (e.g. through reporting requirements or NGO observership), and which do not include too many binding and restrictive sanctioning mechanisms (e.g. through legislative requirements, trade or membership sanctions, verification mechanisms, etc.). The key is to flexibly solicit, rather than compel, IEC and to establish goals and targets in a framework that takes seriously the concerns of states with equity and fairness as far as international burden-sharing is concerned.

One possible starting point is to build on the preference of states for the inclusion of transparency measures

within IEA texts. This study shows that strengthening reporting requirements and allowing non-state actors to act as observers within the treaty proceedings can potentially improve participation rates. There has indeed been a definite trend towards the inclusion of such parameters in the most recent IEAs (e.g. the UNFCCC, the CBD, the Montreal Protocol, and the Kyoto Protocol, and the Desertification Convention,<sup>16</sup> *inter alia*). On the other hand, strength and flexibility need not be in competition with each other. IEAs can be built such that binding clauses are complemented with flexible mechanisms of implementation, especially taking into account the differing capabilities of countries, and keeping the framework of the CBDR principle in mind. Developing countries' inherent logistical constraints (such as low levels of economic development, poverty, and low quality of life) will have to be met with special provisions to allow them to benefit from much needed financial transfers and capacity-building. Moreover, a package for capacity-building may be made more enticing and more effective by incorporating results-oriented strategies and programs. Flexibility in this sense may further empower participating states in their goals of abiding by the mandated targets and deadlines.

Overall, it seems that a mix of participation incentives and a right balance between strength and flexibility is important for both developed and developing countries. From a holistic perspective, therefore, state participation in IEAs has to be placed within the context of national development trajectories. Even though state leaders may consider that participating in specific IEAs is worthy as a cause, domestic development exigencies may run counter to such goals. Participation in IEAs has to be viewed as an attractive endeavor, and therefore, the international community will score greater success if emphasis is placed on developing incentives and enhancing the capabilities of nation states to participate in the IEAs, rather than highlighting sanctions and strict enforcement measures.

Given the great challenges posed by global environmental problems, there is no doubt that the concept of participation incentives has to be broadened beyond the traditional understanding of financial transfers and capacity-building. Many of the constraints faced by the developing world are related to the structure of the international order. The trading and financial international order will have to be revamped to allow developing countries to pursue human development while maintaining their commitment to sustainable growth. Unless and until the underlying root causes of massive poverty levels and low levels of human development are addressed, sustainable development will likely suffer from lack of prioritization in the policy arena.

<sup>16</sup> The United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (1994)

## Conflict of Interests

The author has not declared any conflict of interests.

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