

Strengthening Enforcement To Attract Wider Participation in the Climate Change Regime

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Introduction

A coming crisis is clear to everyone.¹ The current lifestyle and mode of production of global industrialized society is leading towards major physical changes to the planet with a probability distribution wider than any living human can probably contemplate. According to the best scientific evidence, if left unchecked, use of fossil fuels as the primary source of global energy will unleash complex geologic forces that may irrevocably alter the earth's climate and doom entire countries to destruction from deluge or disease. Global plans are in place to reverse this trend by reducing damaging emissions from fossil fuel combustion, but how can we ensure that all countries accept this bitter medicine?

The scope of the problem is well understood by scientists. The "greenhouse effect" is a function of greenhouse gas (GHG) concentrations in the lower atmosphere. GHGs capture infrared energy emissions reflected from the earth's surface (which would otherwise escape into space), trapping more energy within the geologic system than would otherwise be the case.² The technical term for this process is "radiative forcing." One of the most significant GHGs is carbon dioxide (CO₂), which is a significant byproduct of fossil-fuel combustion. During the 20th century, atmospheric concentrations of CO₂ increased "at least an order of magnitude

¹ There are of course a few exceptions to my categorical characterization. As I will discuss below, the United States government has disputed whether "climate science" is certain enough to undertake ameliorative action to avert global warming.

² Greenhouse gases include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and halocarbons. See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE WORKING GROUP I THIRD ASSESSMENT REPORT, *Climate Change 2001: The Scientific Basis* § 6.1, at http://www.grida.no/climate/ipcc_tar/wg1/214.htm [hereinafter IPCC WGI SAR].

faster” than the increase during the previous 20,000 years.³ Mostly as a result of anthropogenic GHG emissions⁴, global average temperature rose by about 0.6°C during the 20th century.⁵ An average of the best available computational climate models, assuming a doubling of atmospheric CO₂ concentrations within 70 years (projecting current trends forward), predict an expected global temperature rise of 1.8°C (with 0.4°C standard deviation in the probability distribution) and expected precipitation rise of 2.5% (with 1.5% standard deviation).⁶ Such a change will have various bad effects for human life, including increased evaporation from agricultural areas⁷; increased flood frequency and volume⁸; inundation, erosion and property damage in coastal areas⁹; financial vulnerability of public and private insurers¹⁰; and even reduced milk production by dairy cows.^{11,12}

CO₂ emissions from any point source mix homogeneously into the global troposphere; the effect on radiative forcing does not depend on the source.¹³ Because of this “public” character of GHG emissions, a given amount of CO₂ emissions abatement would create the same global benefit no matter what point source is the site of abatement.¹⁴ However, an individual factory or country executing emissions abatement will enjoy only a fraction of the global benefits resulting from this abatement. This dynamic encourages “free-riding” by potential abators: everyone

³ IPCC WGI SAR § 3.3.3, http://www.grida.no/climate/ipcc_tar/wg1/108.htm.

⁴ IPCC WGI SAR § 12.6, http://www.grida.no/climate/ipcc_tar/wg1/467.htm.

⁵ IPCC WGI SAR § 2.2.1, http://www.grida.no/climate/ipcc_tar/wg1/052.htm.

⁶ See IPCC WGI TAR § 9.3, http://www.grida.no/climate/ipcc_tar/wg1/349.htm. Unfortunately, a thorough discussion of the scientific issues is beyond the scope of this paper and, all too often, outside the information set available for policy makers.

⁷ IPCC WORKING GROUP II THIRD ASSESSMENT REPORT, *Climate Change 2001: Impacts, Adaptation and Vulnerability* § 4.3.3, http://www.grida.no/climate/ipcc_tar/wg2/159.htm [hereinafter IPCC WGII SAR].

⁸ IPCC WGII SAR § 4.3.8, http://www.grida.no/climate/ipcc_tar/wg2/171.htm

⁹ IPCC WGII SAR § 6.4.1, http://www.grida.no/climate/ipcc_tar/wg2/292.htm.

¹⁰ IPCC WGII SAR § 8.3.3, http://www.grida.no/climate/ipcc_tar/wg2/333.htm.

¹¹ IPCC WGII SAR § 5.3.3.3, http://www.grida.no/climate/ipcc_tar/wg2/212.htm.

¹² For a very readable discussion of climate science from policy writers, see Joseph E. Aldy, Peter R. Orszag, and Joseph E. Stiglitz, *Climate Change: An Agenda for Global Collective Action*, 2001 PEW CENTER ON GLOBAL CLIMATE CHANGE 2-7 (Oct. 2001), <http://www.pewclimate.org/media/stiglitz.pdf>.

¹³ IPCC WGI TAR § 6.3, http://www.grida.no/climate/ipcc_tar/wg1/218.htm.

wants to enjoy the benefits of a reduced greenhouse effect, but does not want to incur the costs of emissions abatement.¹⁵

As scientific evidence of the climate-change problem began to mount throughout the late 20th century, environmental groups and some governmental leaders began to press for concerted action to reduce GHG emissions. Around 1990, many OECD countries publicly pledged quantitative cuts of, variously, 3% to 25% in CO₂ emissions by the year 2000 or 2005.¹⁶ The United States government declined to announce any quantitative abatement target, however.

The United Nations Framework Convention on Climate Change¹⁷ (UNFCCC), signed at the Rio Conference on Environment and Development in 1992, committed signatory countries to reduce their GHG emissions to 1990 levels by the year 2000. The UNFCCC entered into force in 1994 when it was ratified by its 50th country; today it has 189 parties, more than any other international environmental agreement (IEA).¹⁸ The UNFCCC stipulated for an annual Conference of the Parties (COP) to resolve further issues on implementation of the treaty.

The third such meeting (COP3) in Kyoto, Japan in 1997 established the Kyoto Protocol to the UNFCCC, which requires 38 industrialized countries (“Annex I parties”) to reach particular GHG emissions abatement targets by the 2008-2012 period. The targets are phrased as percentage reductions from 1990 emissions levels; the percentages differ for each country.¹⁹ The Kyoto Protocol also has several devices²⁰ for trading of emissions quotas, which have been

¹⁴ Jonathan Baert Wiener, *Global Environmental Regulation: Instrument Choice In Legal Context*, 108 YALE L.J. 677, 691.

¹⁵ *Id.*

¹⁶ Scott Barrett, ENV'T & STATECRAFT 367 (2003).

¹⁷ Framework Convention on Climate Change, United Nations Conference on Environment and Development, opened for signature June 4, 1992, 31 I.L.M. 849 [hereinafter UNFCCC].

¹⁸ Barrett, *supra* note 16, at 369.

¹⁹ Most notably, the USA delegation committed to reduce its emissions by 7% from the 1990 levels; the EU delegation committed to reduce emissions by 8%; and Japan committed to reduce emissions by 6%. See Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 11, 1997, FCCC/CP/1997/L.7/Add.1, 37 I.L.M. 22 [hereinafter Kyoto Protocol], Annex B.

²⁰ See Kyoto Protocol, arts. 4, 6, 12, 17.

endorsed by economists as an efficient way of achieving a given amount of pollution abatement.²¹ The Protocol also specified that it would enter into force after at least 55 countries, including enough Annex I parties to account for at least 55% of the total 1990 CO₂ emissions from all Annex I parties, ratify the treaty.²² (This threshold was finally passed in 2004, when the Russian parliament agreed to approve the Protocol.²³ Russia, Japan, Canada, and the European Union (EU) countries together comprise over 55% of 1990 CO₂ emissions.²⁴)

The Compliance Problem

Although the ambitions have been lofty, compliance with the Kyoto targets appears unlikely. First, examine the performance of the United States (US), which signed the Kyoto Protocol in 1997. The US produces over one-quarter of global economic output and over one-third of global CO₂ emissions.²⁵ However, the US has not been very friendly to GHG-abatement plans since the first Bush administration signed the UNFCCC in 1992. Even before President George W. Bush took office in 2001, most of the Congress had already indicated opposition to any binding GHG-abatement commitments that did not include participation by developing countries like China and India.²⁶ In April 2001, the Bush administration surprised many when it announced that the

²¹ See, e.g., W.J. McKibbin and P.J. Wilcoxon, *The Role of Economics in Climate Change Policy*, 16 J. ECON. PERSPECTIVES 107 (2002).

²² Kyoto Protocol, art. 25.

²³ See *Russia's upper house backs Kyoto*, BBC NEWS ONLINE, Oct. 27, 2004, at <http://news.bbc.co.uk/1/hi/world/europe/3957717.stm>; *Kyoto Protocol comes into force*, BBC NEWS ONLINE, Feb. 16, 2005, at <http://news.bbc.co.uk/1/hi/sci/tech/4267245.stm>.

²⁴ Scott Barrett, *Political Economy of the Kyoto Protocol*, 14 OXFORD REV. ECON. POL'Y 20, 22 (1998).

²⁵ Data from UNFCCC, reproduced in Scott Barrett, *Political Economy of the Kyoto Protocol*, 14 OXFORD REV. ECON. POL'Y 20, 22 (1998).

²⁶ See S. Res. 98, 105th Cong. (1997); Senator Frank H. Murkowski, *The Kyoto Protocol Is Not The Answer To Climate Change*, 37 HARV. J. ON LEGIS. 345 (2000). Note, however, that China and India and many other developing countries are members of the UNFCCC, although the Kyoto Protocol imposed no obligations on these countries.

US was withdrawing from the Kyoto Protocol, rather than pushing for Senate ratification.²⁷ (Legally, we might call this “defection” or “non-participation” rather than “non-compliance,” but the result is the same.) President Bush has said that “considerable uncertainty” remains in climate-change science²⁸, and that CO₂ cuts would cost too much for the country in lost jobs and income.²⁹

Yale economist William Nordhaus has estimated that without US participation, if all other Annex I countries meet their commitments, the amount of global CO₂ emissions under the Kyoto commitments will only be about 1.5% less than under a business-as-usual scenario.³⁰ However, the US is not the only scofflaw under Kyoto. According to published reports, even large industrialized countries – Germany, Japan, and others – which have been most supportive of the UNFCCC process will probably not meet their CO₂ abatement commitments under Kyoto; many countries will either not cut emissions enough, or finish in 2008-2012 with emissions *above* 1990 levels.³¹ Finally, countries with huge (and exponentially growing) contributions to CO₂ emissions, including India and China, have made no commitments at all for any sort of abatement. What should we make of Kyoto’s likely failed goals?

The problem of noncompliance with GHG-reduction goals is a relatively recent concern. The first few COPs of UNFCCC did not seriously address the compliance and enforcement problem, probably because just writing down goals and establishing institutional structure was a

²⁷ See, e.g., *Anger at US Climate Retreat*, BBC NEWS ONLINE, Mar. 29, 2001, at <http://news.bbc.co.uk/1/hi/sci/tech/1248278.stm>.

²⁸ *Bush and Kerry battle over science*, BBC NEWS ONLINE, Sep. 15, 2004, at <http://news.bbc.co.uk/1/hi/sci/tech/3660276.stm#climate>.

²⁹ See Jane Hughes, *Bush climate plan will not silence critics*, BBC NEWS ONLINE, Feb. 14, 2002, at <http://news.bbc.co.uk/1/hi/world/americas/1821425.stm>.

³⁰ *Climate treaty’s ‘minimal’ impact*, BBC NEWS ONLINE, Nov. 8, 2001, at <http://news.bbc.co.uk/1/hi/sci/tech/1646029.stm>.

³¹ See, e.g., Andrew Osborn, *EU nowhere near meeting Kyoto targets*, THE GUARDIAN, Dec. 3, 2003, <http://www.guardian.co.uk/climatechange/story/0,12374,1098635,00.html>; Geoffrey York, *Japan struggles to meet Kyoto targets*, The Globe & Mail, Apr. 26, 2005, at A16,

greater concern. Barrett (2003) reports that various negotiators in the UNFCCC/Kyoto process told him simply that “enforcement was something that was best addressed later.”³²

Finally, at COP6.5 in Bonn, Germany in July 2001, the UNFCCC parties agreed to a new compliance mechanism for enforcing commitments under Kyoto. First, the parties agreed to establish a Compliance Committee made up of ten members in a “facilitative branch” and ten members in the “enforcement branch.” The enforcement branch is charged with determining whether Annex I parties are fulfilling their abatement commitments as expressed in Annex B of the Kyoto Protocol.³³ This structure appears to be the “first time in environmental law history that a compliance procedure has such a dual nature.”³⁴ Any decision made by the enforcement branch must be made by a three-quarters vote of all members, including a majority of Annex I members and a majority of non-Annex I members.³⁵

The key enforcement provision of the compliance agreement is § XV, which lays out consequences of non-compliance. Also, if a party is found to not have a satisfactory plan or GHG inventory report, the non-complying party is required to submit an implementation plan.³⁶ The parties also agreed that any non-complying parties could have their eligibility to participate in emissions trading³⁷, Joint Implementation³⁸, or the Clean Development Mechanism suspended

<http://www.theglobeandmail.com/servlet/ArticleNews/freeheadlines/LAC/20050426/KYOTO26/international/International>.

³² Barrett, *supra* note 16, at 360.

³³ Procedures and mechanisms relating to compliance under the Kyoto Protocol, Annex to Marrakesh Accords, Decision 24/CP.7 [hereinafter Marrakesh Compliance Agreement], reproduced in FCCC/CP/2001/13/Add.3, §§ II, V, IX.

³⁴ Juliette van der Jagt, *Elaborating an international compliance regime under the Kyoto Protocol*, ISSUES IN INT’L CLIMATE POL’Y: THEORY AND POL’Y 223, 232 (Ekko C. van Ierland, Joyeeta Gupta, and Marcel T.J. Kok eds., 2003).

³⁵ Marrakesh Compliance Agreement, §§ II(3), II(9),

³⁶ *Id.*, § XV(2).

³⁷ Kyoto Protocol, art. 17.

³⁸ Joint implementation (and its cousin, the Clean Development Mechanism) involve Country A investing in some project in Country B which has the effect of reducing anthropogenic GHG sources or increasing GHG sinks. Country A then gets credited for a reduction of its own GHG emissions.

or limited if they are found to be in non-compliance with their Kyoto commitments.³⁹ The putatively strongest enforcement tool in the Bonn agreement gives the Enforcement Branch, upon a finding that an Annex I party is exceeding its Kyoto emissions limits during the 2008-2012 period, power to “penalize” the noncomplying country by deducting 1.3 times the excessive emissions from its (unspecified) assigned limits in the (unspecified) next commitment period.⁴⁰ (To make this more concrete: if a country is allowed 1000 tons per year under Kyoto and actually emits 5500 tons (1100 tons/year over 5 years) during the 2008-2012 period, then the excess is 500 tons. In the next commitment period, the country will have $500 \cdot 1.3 = 650$ tons deducted from its allowance.⁴¹)

A few months later, at COP7 in Marrakesh, Morocco in late 2001, the UNFCCC parties further elaborated the Bonn agreements and added the provision that any party may raise implementation questions to the facilitative branch or the enforcement branch; the investigating branch may consider information from either the complaining or responding party; experts; intergovernmental organizations; and non-governmental organizations.⁴²

Under the language of the Kyoto Protocol, new procedures for binding enforcement of compliance must be approved by an amendment⁴³, requiring approval of three-fourths of parties present and voting at a COP. Additionally, any amendment will only be binding on parties that

³⁹ Marrakesh Compliance Agreement § XV(4).

⁴⁰ *Id.*, § XV(5).

⁴¹ However, no provision has yet been made for UNFCCC commitments after the first Kyoto period. No provision has even been made for how the second-round commitments will be established. Presumably they will again be established via some process of negotiation and voluntary assent as in the 1997 COP3 in Kyoto.

⁴² See John H. Knox, *The International Legal Framework for Addressing Climate Change*, 12 PENN ST. ENVTL. L. REV. 135, 145 (2004).

⁴³ Kyoto Protocol, art. 18.

actually ratify it.⁴⁴ The “decision” reached at the Bonn and Marrakesh COPs was not an official amendment to the Kyoto Protocol, and thus does not appear to have binding legal authority.⁴⁵

In Pursuit of Pareto

Why is participation in the Kyoto regime so difficult? The substantive issues involved in other international regimes generally are such that every country benefits by participating in the system: the net payoff of, say, telephone switching, tariff reduction, and nuclear non-proliferation are presumed positive for any country, if many other countries participate.⁴⁶ However, this may not be the case in the climate issue area. Complicating the concept of cooperation is the fact that the benefits of averting climate change will not be equally distributed across all countries. Even putting aside the fact of different population sizes, the diverse ecologies and local climate systems of different countries (due to different latitudes, terrain, and proximity to the sea) suggest that some countries may benefit from climate change and some may be harmed. Additionally, technological progress and population size, also determinants of costs and benefits, are not equally distributed. A rough revealed-preference analysis of decisions by leaders in China, India, and the US suggests that they judge the costs of significant abatement as exceeding the gain from their individual action.

If a proposed climate regime is not Pareto improving (i.e. every party experiences a net benefit), it will not attract voluntary participation from all potential players. Even if the regime is Pareto improving, participation still might be less than complete: as Richard Steinberg

⁴⁴ Kyoto Protocol, art. 20.

⁴⁵ van der Jagt, *supra* note 34, at 230.

⁴⁶ However, this point does not necessarily hold for unilateral action. If my neighbor holds nuclear weapons, it would not be beneficial for me to disarm my nuclear weapons alone. In the case of trade, however, unilateral tariff reduction is seen in economic theory as a Kaldor-Hicks improvement for the reducing country, by expanding the feasible budget set. There might be uneven distribution of the gains among different groups within the country, however (consumers and importers would benefit, while import-competing firms would suffer).

observes, “individuals will often decline acceptance of a positive-sum package if the benefits are distributed inequitably.”⁴⁷ Violations of normative standards of equity, or concerns about shifts in relative power, may impose implicit costs on participation, and thus restrain participation even when every country would benefit from the envisioned outcome of cooperation.

At the very least, how can a Pareto-improving regime be created? Panayotou, Sachs, and Zwane (2002) point out that “for the temperate-zone [i.e., rich] economies, the contribution to rising carbon concentrations is much larger than their share of global damages, while the reverse is true for the tropics ... the [rich] economies are likely to impose severe net costs on the tropical regions [without any emissions mitigation action].”⁴⁸ They thus propose a regime of transfer payments (tacked on to an emissions-abatement scheme) in which each country receives a payment equal to its share of total global damage (defined as the sum of: harm resulting directly from climate change, and economic harm resulting from economic structural change due to abatement) and each country pays out a sum equal to its share of the anthropogenically enhanced global CO₂ stock. Under this scheme, “the direction of global compensation [will] be from the temperate-zone to the tropical-zone economies.”⁴⁹ The authors admit that they ignore many practical concerns relating to actual implementation and enforcement.⁵⁰

Other authors have suggested that one way to construct a Pareto-superior climate regime, which attracts participation by big developing countries, might be through a carbon-emissions-permit system, with the initial allocation of permits distributed relatively heavily toward tropical or poorer countries, such that poor countries have exactly enough permits to emit their business-

⁴⁷ Richard H. Steinberg, *In the Shadow of Law or Power? Consensus-Based Bargaining and Outcomes in the GATT/WTO*, 56 INTL. ORG. 339, 345 (2002).

⁴⁸ Theodore Panayotou, Jeffrey D. Sachs, and Alix Peterson Zwane, *Compensation for ‘Meaningful Participation’ in Climate Change Control: A Modest Proposal and Empirical Analysis*, 43 J. ENVTL. ECON. & MGMT. 437, 439 (2002).

⁴⁹ *Id.*, at 442.

⁵⁰ *Id.*, at 440.

as-usual level of GHG, but can sell permits to rich countries if the marginal cost of abatement in the rich country exceeds the marginal cost of abatement in the poor country.⁵¹ These proposals have found critics, however, mostly on fairness grounds.⁵²

The problem of Pareto efficiency can be addressed from the abstract rather than pragmatic level. Scott Barrett (1994) considers a game-theoretic model of international environmental agreements (IEAs) in which many countries choose how much abatement to carry out of a single pollutant.⁵³ In Barrett's model, all countries are identical. The benefits of participation for any single country are an inverse-quadratic function of global abatement^{54,55}; costs are a quadratic function of its own abatement. Barrett considers the outcome when countries "cooperate" (that is, jointly produce the globally optimal level of abatement) and the outcome when countries act opportunistically (that is, pick their individual abatement level by considering only their own

⁵¹ See, e.g., Bjorn Larsen and Anwar Shah, *Global Tradeable Carbon Permits, Participation Incentives, and Transfers*, 46 OXFORD ECON. PAPERS 841 (1994) (proposing an emissions-trading scheme in which permits are allocated to countries according to population, thus giving a windfall to poorer countries); Jae Edmonds, Marshall Wise and David W Barns, *The cost and effectiveness of energy agreements to alter trajectories of atmospheric carbon dioxide emissions*, 23 ENERGY POL'Y 309 (1995) (considering the implications of six possible permit-allocation schemes, including a scheme that does "no harm to developing countries"); Adam Rose, *Burden-sharing and climate change policy beyond Kyoto: Implications for developing countries*, 3 J. ENV'T & DEV. ECON. 392 (1998) (performing a mathematical simulation and finding that all developing countries could enjoy net benefits under such a scheme);

⁵² See, e.g., Stiglitz et al., *supra* note 12, at 18 (arguing that an allocation of permits according to population would reward developing countries for not controlling population, and would give a large share of the permits to a relatively small number of countries, including China and India); Barrett and Stavins, *supra* note 83, at 360 (arguing that giving out excessive "hot air" permits to one country or group of countries may discourage participation by other countries).

⁵³ Scott Barrett, *Self-Enforcing International Environmental Agreements*, 46 OXFORD ECON. PAPERS 878 (1994).

⁵⁴ As a result of this specification, marginal benefits of abatement are positive until total global abatement reaches a specified level. The marginal benefit to any country of its own abatement is decreasing in (a) its current level of abatement and (b) the total of all other countries' level of abatement. Put simply, when my neighbor decides to abate more, I have less incentive to abate.

⁵⁵ The functional form assumed for benefits in the game-theoretic models can be pivotal to the results. If (as in Barrett) an individual country's benefits (as a function of global abatement) is assumed to have a negative second derivative in the relevant range, i.e. the graph of benefits vs. global abatement is \cap -shaped, then the marginal benefit of my abatement decreases as everybody else does more and more abatement. As a result, my incentive to participate (and comply) in a GHG-abatement scheme decreases with an increasing number of participants. If, however, we assume that the individual-country benefits function has a positive second derivative, i.e. marginal benefits of my abatement increase as everybody else does more abatement, then we should observe *complementarity* in abatement: as my neighbor does more, I rationally want to do more. More empirical work can clarify the shape of the curves.

costs and benefits of abatement). Barrett shows that the improvement in global welfare from cooperation will be larger when the multiplicative parameters for the benefit and cost functions are large and equal.⁵⁶

Barrett then defines a “self-enforcing” IEA in this context as one of essentially a stable coalition: no signatory wants to withdraw unilaterally from the agreement, and no non-signatory wants to join.⁵⁷ In a different text, Barrett explains that in such an outcome, “an efficient equilibrium of a coordination game can be sustained without the need for enforcement.”⁵⁸

Barrett observes that many IEAs specify a minimum number of signatories before the agreement comes into force⁵⁹, and thus when the cost and benefit parameters are such that the self-enforcing IEA has a small number of countries in the stable coalition, the required number of signatories will not be achieved. Barrett’s result is frustrating: when the parameters are such that the self-enforcing IEA has a large number of countries in the stable coalition, and thus the formal ratification requirements can be met, cooperation will result in relatively small changes in abatement and global welfare. But when cooperation can result in large changes in abatement and global welfare, the stable coalition has a small number of countries, so an IEA will not be concluded, at least not with a satisfying number of countries. Barrett observes that in his model, “All countries receive higher net benefits when there exists a self-enforcing IEA compared with

⁵⁶ *Id.*, at 881-882.

⁵⁷ *Id.*, at 882. Formally, define $\pi_s(k)$ as the net payoff that a country gets by signing and participating in the treaty when k other countries participate. Define $\pi_n(k)$ as the net payoff that a country gets by not participating when k other countries participate. The self-enforcing equilibrium k^* is defined as the level of k such that $\pi_s(k^*) > \pi_n(k^* - 1)$ and $\pi_s(k^* + 1) < \pi_n(k^*)$.

⁵⁸ Scott Barrett, ENV’T & STATECRAFT 94 (2003).

⁵⁹ Barrett, *supra* note 53, at 885, n.10. Writing in 1994, before the Kyoto Protocol (which requires ratification from at least 55 countries representing 55% of 1990 CO₂ emissions) was adopted, Barrett observes that UNFCCC required ratification from 50 countries.

the noncooperative outcome, but nonsignatories take a free ride on signatories.”⁶⁰ What good is this model, then?

The self-enforcing model is useful in spurring thought about how to design a more complex regime, possibly with some sort of transfers, that will generally be a Pareto improvement: conditional on everyone else cooperating, cooperation is strictly preferred to non-cooperation for every country. That is: assume that a country would have zero or negative net benefits if it were to carry out a given level of abatement by itself (say reduction of 10% below 1990 GHG levels). The economic costs of structural change in the economy would exceed the benefit from averted climatic disruption stemming directly from that country’s abatement. However, the goal is to achieve a design such that if a large number of countries participate (say n) then the benefit for an individual country from global abatement would exceed the cost of that country’s abatement.

Black, Levi, and de Meza (1993)⁶¹ (writing before the Kyoto Protocol and even before ratification of the UNFCCC) consider a model of an international climate-change agreement with an “ n -rule” – that is, a minimum number of country ratifications required for the treaty to become binding. In their model, participation / ratification is a binary variable, and the extent of participation, i.e. the amount of abatement, is not considered. They observe that uncertainty about the net benefit of GHG emission is a primary obstacle to achieving a stable regime:

If the benefit that would be enjoyed by each country from a once-only offered policy to combat the [g]reenhouse [e]ffect were precisely known, and if the aggregate benefit exceeded the aggregate cost, implementation would be relatively straightforward. Specifically, the aggregate cost would be allocated such that each country benefits, and then a treaty ratification established such that all countries must agree to the programme before it is adopted by any. Assuming that countries really believe that there will be no further opportunities to negotiate, optimality is ensured. With each country standing to benefit, all will

⁶⁰ *Id.*, at 886.

⁶¹ Jane Black, Maurice D. Levi, and David de Meza, *Creating a Good Atmosphere: Minimum Participation for Tackling the ‘Greenhouse Effect’*, 60 *ECONOMICA* 281 (1993).

participate because were any one country to refrain the whole programme would be scuttled.”⁶²

The authors continue by arguing that if some countries might not benefit from the proposed treaty regime, and if the treaty is offered as a one-shot take-it-or-leave-it proposal, with no possibility of future negotiation, then optimality might require less than unanimous participation; that is, n should be reduced below the total number of countries. The higher probability that the regime enters into force would compensate for the narrower range of participating countries.⁶³

The authors do not reach the issue of what happens if the n -threshold is passed, but then one country defects and the number of complying countries drops below the n -threshold again. Should the treaty become un-binding at this point? For symmetry, it might be valuable to set a rule such that the commitments cease to be legally binding. Maintaining the assumption that an individual country finds it individually rational to not abate alone but to do abatement when all other countries are participating, this rule could be enough to make free-riding impossible; if my size makes me pivotal in reaching the n -threshold, my defection would make the whole deal fall apart. In game theory, this approach to repeated cooperative interactions is known as a “Grim Trigger”⁶⁴ strategy. However, Barrett (1998, in a less technical paper than his early “self-enforcing agreements” work), notes that such a threat might not be credible: after investing in compliance, the other parties may not want to reverse course.⁶⁵ Also, scrapping the whole treaty would do further damage to the global environment and could provoke great public outcry. Hovi

⁶² *Id.*, at 282.

⁶³ *Id.*, at 283.

⁶⁴ The Grim Trigger strategy calls for me to cooperate indefinitely over time with my partner, until my partner defects; then I defect indefinitely from then on. Both players playing Grim Trigger is a Nash equilibrium of some infinitely repeated cooperative games, such as the classic “Prisoner’s Dilemma” game. *See, e.g.*, Drew Fudenberg and Jean Tirole, *GAME THEORY* (MIT Press 1994).

⁶⁵ Barrett, *supra* note 24, at 37.

and Areklett note that such a strategy would not be “collectively rational”⁶⁶ and so would not be credible in deterring defection. They briefly consider the possibility of suspending the treaty only temporarily – but note that this strategy would not be credible either, because the other parties would rather just continue complying, rather than delaying.⁶⁷ Thus, deterring defection may be difficult in this setup.

Barrett also reaches the question of what happens to non-participants after the n -threshold, contemplated in Black/Levi/de Meza, is passed. It seems that no other country will have the incentive to join after the n -threshold; each would prefer to free-ride.⁶⁸ There is thus a tension between the pressures to make n low (to ensure that the treaty comes into force) and to make n high (to discourage non-participation if a high n could support a Pareto-efficient outcome). Presumably this calculus informed the decision to set $n=55%$ in the Kyoto Protocol negotiations.

Wiener (1999) contains the idea of participation efficiency – “attracting participation at least cost” – as an important criterion for evaluating a global climate regime. Wiener uses the same assumptions as economists like Barrett or Black/Levi/de Meza – that in an international law framework of voluntary assent to treaties, no country will join up unless the treaty (including transfer payments) has positive net benefits for that country. Thus, universal participation requires that the outcomes implied by the treaty be a Pareto improvement.⁶⁹ Wiener identifies several benefits of wider participation: control of globally dispersed sources; reduced “leakage” of emissions; a larger set of low-cost abatement opportunities; and reduced free-riding.⁷⁰

⁶⁶ Jon Hovi and Ivar Areklett, *Enforcing the Climate Regime: Game Theory and the Marrakesh Accords*, 4 INTL. ENVTL. AGREEMENTS 1, 9 (2004).

⁶⁷ *Id.*, at 10.

⁶⁸ Barrett, *supra* note 24, at 37.

⁶⁹ Jonathan Baert Wiener, *Global Environmental Regulation: Instrument Choice in Legal Context*, 108 YALE L.J. 677, 743 (1999).

⁷⁰ *Id.*, at 747.

Wiener recommends a regime of tradable emissions permits, with initial “extra” assignments or permits to countries – probably developing countries like India and China – that are likely to experience net losses from a global GHG reduction scheme.⁷¹ Wiener sees this scheme as beset by less compliance problems than other plans, because it is more cost-effective for each country than other plans; international regulators can exclude violators from the trading market as punishment; new domestic constituencies may push for participation in the trading market; and allowance trading is easier to monitor.⁷²

Enforcing the Good Equilibrium

Once universal (or very wide) participation is established, how can that “good” equilibrium be maintained? Of course, the issues of participation and compliance are not completely separate. Stiglitz *et al.* subtly suggest that “compliance” may not be with a formal treaty but with international norms or customary law.⁷³ Thus, non-participation in the UNFCCC framework or with a specific goal like Kyoto can be seen as a form of non-compliance.

Hovi and Areklett (2004) consider the ability of the Marrakesh sanctions to effectively maintain a good equilibrium.⁷⁴ Following the idea that an effective climate regime would be a Pareto-superior move, we can assume that an *effective* climate regime, putting aside the question of how the momentary transition from no regime to active regime would work, would be embraced by all relevant players. In other words, full participation is a Nash equilibrium.⁷⁵

Hovi and Areklett observe that “non-compliance is best deterred by threatening *severe*

⁷¹ *Id.*, at 771.

⁷² *Id.*, at 772-773.

⁷³ Aldy, Orszag, and Stiglitz, *supra* note 12, at 14.

⁷⁴ Jon Hovi and Ivar Areklett, *Enforcing the Climate Regime: Game Theory and the Marrakesh Accords*, 4 INTL. ENVTL. AGREEMENTS 1 (2004).

punishment. In fact, the more severe the penalty, the more likely it is that compliance is sustained as a Nash equilibrium.”⁷⁶ Similarly, Barrett (1998) observes that “if a party is to be deterred from withdrawing—which it is entitled to do under international law—then it will need to be punished for withdrawing, and punished severely.”⁷⁷ Assuming that the Kyoto parties and the Kyoto central body are able to create some credible threat that effectively deters defection (i.e. canceling participation, or never participating to begin with) then it follows that non-compliance should be deterrable also: the worst harm that a signatory could wreak by not complying is simply to return to its desired level of emissions under non-participation. If that action is deterrable, then, argues Barrett, any less harmful non-compliant action should be deterrable by a credible threat of equal or less gravity.⁷⁸

However, it is obvious that not every threatened penalty (Hovi and Areklett raise the frightening thought of a nuclear strike) would be a credible threat by the Enforcement Branch. The authors further consider whether a particular penalty strategy announced by the committee would be “subgame-perfect”⁷⁹; that is, whether the Enforcement Branch would actually carry out that threat when a country fails to comply. Hovi and Areklett question whether the particular penalty of ejection from the permit-trading market would be credible: would the Enforcement Branch members go ahead with such a move even knowing that removing a permit supplier from the market could drive up the price of permits?⁸⁰

⁷⁵ In game theory, the concept of a Nash equilibrium means that I am playing my best action (in terms of my resulting net payoffs) in response to my co-players’ actions. And every other player can say exactly the same thing. *See, e.g.*, Fudenberg and Tirole, *supra* note 64.

⁷⁶ Hovi and Areklett, *supra* note 66, at 5.

⁷⁷ Barrett, *supra* note 24, at 36. Note again that Barrett elides the distinction between compliance and participation, treating them as functionally equivalent despite obvious legal distinctions.

⁷⁸ *Id.*

⁷⁹ This is another technical game-theory term requiring the analyst to look only at the “subgame” where some prior moves have already been established.

⁸⁰ *Id.*, at 8.

In a similar vein, it is important to note that the game-theory analysis presented above assumes the absence of coalition forming and renegotiation. If renegotiation is possible, then a group of parties may rationally choose to ignore the prescribed punishment upon a single important party's defection; institutional rules previously negotiated may be cancelled in favor of something else.⁸¹ One way to avoid this is by specifying that punishment *not* involve reversion to a Pareto-inferior state for the whole group. Hovi and Areklett (2004) suggest that punishment could involve a compensation scheme, in which a country that exceeds its permitted emissions limits in a given year would have part of its allowances for the next several years transferred to other countries. Countries would then have an incentive to comply, and to insist that penalties are executed.⁸²

Barrett and Stavins (2003), joining other voices, note that participation and compliance should not, for the most part, be treated as analytically distinct problems.⁸³ If joining a treaty presents an opportunity for an individual country to realize welfare gains, then the country will join and comply. If not, then the country will not join. Obviously, unexpected stochastic shocks, such as an economic recession, natural disaster, population boom, or oil discovery may push the ex post calculus away from "compliance" after the country has chosen to participate. However, the participation decision and compliance decision will be very strongly positively correlated.⁸⁴ Even after a country decides to join a treaty, if changing conditions then make compliance a welfare-reducing activity, the country may decide simply to withdraw from the treaty, and no

⁸¹ Hovi and Areklett term this the "let bygone be bygones" approach. *See supra* note 66, at 10.

⁸² Hovi and Areklett, *supra* note 66, at 12.

⁸³ Scott Barrett and Robert Stavins, *Increasing Participation and Compliance in International Climate Change Agreements*, 3 INT'L ENVTL. AGREEMENTS 349, 358 (2003).

⁸⁴ Barrett and Stavins ignore that there may be reputational effects or *quid pro quo* trades that a country can gain from joining an agreement, even without any intention to comply with the required commitments.

compliance-inducing instruments could help the situation.⁸⁵ In the climate area, this scenario materialized when the Bush administration announced its withdrawal from Kyoto in 2001.⁸⁶

An effective treaty, then, will deter both free-riding (i.e., encourage participation) and cheating (i.e. encourage compliance by participants). To stress again: meeting the first goal should imply that the second goal is met. If full participation (and nothing less, or at least nothing significantly less) is sufficient to ensure that the regime is Pareto-efficient, then an effective regime should ensure that full participation is maintained even in the face of stochastic shocks. A regime with easy defection would not be robust; one or two defections by important players could make participation non-optimal for everyone else, pushing the outcome back toward the bad equilibrium with low participation. Advanced game theory recognizes the possibility of a “trembling-hand” equilibrium, where relatively minor perturbations (a hurricane that destroys agricultural productivity, a war, an gushing oil strike) in the underlying distribution of payoffs can move the outcome away from the theoretical Nash equilibrium. An effective regime should be robust to these sorts of stochastic shocks, or at least move quickly to return to the Pareto frontier of performance. Given some temporary negative shock, it is likely that continued cooperation with Kyoto would still be in a country’s long-term interest, so defection should be discouraged by rules of the game.

Aldy, Barrett, and Stavins (2003) consider the question of participation and compliance from a simplified dichotomy of a “narrow but deep” agreement with few countries making big abatement moves, vs. a “broad but shallow” agreement with many countries making small

⁸⁵ Barrett and Stavins, *supra* note 83, at 364.

⁸⁶ It is true that the US government never ratified, through its Congress, the Kyoto Protocol, and so perhaps could not legally be said to have “participated” in the treaty. However, the administration has not suggested any alternative plans consistent with its 1992 UNFCCC obligations, which it did ratify. So it is difficult to say whether the United States is currently “not participating in” or “not complying with” the climate regime.

abatement moves.⁸⁷ They conclude that the broad-but-shallow regime could achieve a given amount of abatement at lower overall cost, and avoid the problem of “emissions leakage” whereby carbon use shifts to non-participating countries as a result of short-term price pressure and long-term capital re-allocation.⁸⁸ Additionally, shallow commitments by each country could have the advantage of being robust to variance in natural, technical, and economic conditions.

Return again to the “self-enforcing agreement” model of Barrett (1994, 2003). If the equilibrium has 2 participating signatories, the participating members could induce a third country to join with a side payment that leaves all parties better off. However, a problem lies in the fact that after making the side payment and inviting in new cooperating members, the original signatories would now have an incentive to defect from the regime. Barrett refers to an earlier paper by two Italian economists⁸⁹, who prove mathematically that side payments⁹⁰ will work only if the original signatories can commit⁹¹ to remaining as signatories. Under the latter model, side payments, (less than or) equal to the benefit that participating countries gain from additional members, can expand the coalition in a Pareto-improving manner.⁹² The authors describe four types of commitment in this model: first, commitment by the original members of the stable coalition; second, commitment by the original members and by any new members who are induced to join; third, commitment by a large number of countries such that all other countries can be induced to cooperate; and fourth, commitment by a subset of non-participating

⁸⁷ Joseph Aldy, Scott Barrett, and Robert Stavins, *Thirteen Plus One: A Comparison of Global Climate Policy Architectures*, John F. Kennedy School of Government Faculty Research Working Paper Series No. RWP03-012 (March 2003), at 6.

⁸⁸ See, e.g., Wiener, *supra* note 69, at 694.

⁸⁹ Carlo Carraro and Domenico Siniscalco, *Strategies for the International Protection of the Environment*, 52 J. PUB. ECON. 309 (1993).

⁹⁰ For the form of side payments, Carraro and Siniscalco advocate cash, or else trade, debt forgiveness, or technology transfers. See *id.* at 323.

⁹¹ Carraro and Siniscalco do not specify exactly how this commitment mechanism would work.

⁹² *Id.*, at 317.

countries, to bribe other non-participants to join the coalition.⁹³ These possibilities hold less strongly when the “best-reply” function of each country is negatively sloped; that is, when other countries reduce emissions, my optimal move is to do more emissions. The commitment possibilities hold more strongly when the best-reply function is orthogonal; that is, my optimal level of abatement/emissions does not depend on what my neighbors are doing.⁹⁴ The authors suggest that CO₂ emissions exhibit the latter “orthogonal” quality.⁹⁵ To use the language of benefit functions described above, this would correspond to a linear benefits-vs.-global abatement functional form in which the marginal benefit to one country is constant for all levels of global benefit.

Tools of Enforcement

To summarize, then: A better climate regime would (a) allow for some sort of transfers to countries that might lose from participation in a global climate-abatement scheme; (b) impose a credible and deterrent punishment upon countries that halt compliance, or halt participation. A very crude way of conceptualizing these goals is “carrots and sticks.”

Are the outcomes of international cooperative arrangements determined by the procedural rules which frame the regime, or the underlying economic (broadly construed) incentives of cooperation? One school of theorists stresses the role of rules in shaping attitudes towards behavior (ignoring the role of economic transfers as compelling carrots). As Steinberg (2002) observes, many legal theorists ignore or assume away the problem of compliance, resting on

⁹³ *Id.*, at 315-316.

⁹⁴ *Id.*, at 325.

⁹⁵ *Id.*, at 326.

their “faith in the effectiveness of, compliance with, and commitment to international law.”⁹⁶

Chayes and Chayes (1995) argue that facilitative, management approaches can be superior to hard “enforcement” measures for ensuring compliance with international agreements.⁹⁷ For example, they dismiss the efficacy of negative sanctions⁹⁸, and instead argue that “reporting [of data] can be [an] early warning system for substantive compliance problems”⁹⁹ and “state behavior conforms to applicable norms all or most of the time.”¹⁰⁰ Under this view, the primary instrument for ensuring treaty compliance is “an iterative process of discourse” (in other words, verbal persuasion) between the member countries and other stakeholders.¹⁰¹

In the view of the Chayeses and their adherents, noncompliance with international agreements is often not the result of intentional and conscious cheating or free-riding, but rather “incapacity and inadvertence,”¹⁰² perhaps due to a lack of clarity about performance obligations and the expected outcomes.¹⁰³ One suggested response to this problem is a more robust monitoring system to provide constant feedback on countries’ emissions behavior and related environmental outcomes¹⁰⁴; technical assistance when a country falls out of compliance due to incapacity¹⁰⁵; and even positive feedback as a reward for “overcompliance” and innovation.¹⁰⁶

The Chayeses also suggest that when a treaty creates a formal organization or secretariat, the

⁹⁶ Richard H. Steinberg, *In the Shadow of Law or Power? Consensus-Based Bargaining and Outcomes in the GATT/WTO*, 56 INT’L ORG. 339, 343 (2002).

⁹⁷ Abram Chayes and Antonia Handler Chayes, *THE NEW SOVEREIGNTY* (1995). It is also instructive to note that the authors are very critical of the “rational actor” model and especially of economic analyses of international relations or treaty enforcement, arguing that “the usefulness of this approach is limited by the impossibility of quantifying or even approximating, let alone monetizing, any of the relevant factors in the equation.” *Id.* at 20. Of course, I and many actual economists strongly disagree with this assumption.

⁹⁸ *Id.*, at 29.

⁹⁹ *Id.*, at 155.

¹⁰⁰ *Id.*, at 112.

¹⁰¹ *Id.* at 25.

¹⁰² Ronald D. Mitchell, *Institutional Aspects of Implementation, Compliance, & Effectiveness, in INT’L REL. & GLOBAL CLIMATE CHANGE* 221, 232 (Urs Luterbacher & Detlef F. Sprinz eds., 2001).

¹⁰³ *Id.*, at 228.

¹⁰⁴ *Id.*, at 236-37.

¹⁰⁵ *Id.*, at 239.

body “may serve as a focus for mobilizing the political impetus for a higher level of compliance,”¹⁰⁷ even if the underlying incentives for collective action have not changed.

Similarly, David Victor looks at the Montreal Protocol on Substances That Deplete the Ozone Layer (which has often been portrayed as an inspiring precursor to the UNFCCC) and praises its use of “soft” tools for addressing noncompliance, including discussion, recommendations, and transparency – in other words, public dissemination of information.¹⁰⁸ However, somewhat tautologically, the influence of the Montreal Protocol’s Implementation Committee “has been most evident when countries have found it relatively easy to comply.”¹⁰⁹ In other words, despite Victor’s main claims, he admits in part that the force of the Committee as an alterer of incentives has not been extremely strong. Victor suggests that both carrots and sticks are necessary: “[The ozone regime’s non-compliance procedure] has been most effective when it blends the two approaches. Management avoids the most severe and unproductive antagonism, but the credible threat of tougher actions, including sanctions, helps ensure cooperation, especially when dealing with parties who are unswayed by management alone.”¹¹⁰

Tallberg (2002) examines mechanisms within the European Union for ensuring compliance with supranational rules, and finds that a combination of centralized police control plus decentralized “fire-alarm” management allows the EU to ensure compliance effectively.¹¹¹ The latter strategy is required when countries choose to violate their treaty obligations not because of cold cost-benefit analyses but because despite a desire to meet commitments, the states face

¹⁰⁶ *Id.*, at 242.

¹⁰⁷ Chayes and Chayes, *supra* note 97, at 20.

¹⁰⁸ See David G. Victor, *The Operation and Effectiveness of the Montreal Protocol’s Non-Compliance Procedure*, in *THE IMPLEMENTATION AND EFFECTIVENESS OF INTERNATIONAL ENVIRONMENTAL COMMITMENTS: THEORY AND PRACTICE* 137, 149 (David G. Victor, Kal Raustiala, and Eugene B. Skolnikoff eds., 1998).

¹⁰⁹ *Id.*, at 163.

¹¹⁰ Victor, *supra* note 108, at 139.

¹¹¹ Jonas Tallberg, *Paths to Compliance: Enforcement, Management, and the European Union*, 56 INT’L ORG. 609, at 610 (2002).

“capacity limitations and rule ambiguity.”¹¹² In this view, knowledge transfer and dispute settlement, used to great effect in the EU¹¹³, work not to change the costs that member states face for non-compliance, but to relax a binding constraint which limits compliance.¹¹⁴

Tallberg also recognizes the role of pure enforcement mechanisms in the EU, including “name and shame” tactics and economic sanctions.¹¹⁵ The formal mode of enforcement involves the European Commission (EC) initiating an infringement proceeding against the allegedly violating member state; if not settled, the case eventually escalates to the European Court of Justice (ECJ). However, Tallberg observes that only 11% of infringement proceedings actually make it to the ECJ – suggesting that the Commission’s enforcement powers are effective in encouraging negotiation and settlement. Also, since the EC obtained the power in 1997 to impose economic sanctions against violators of ECJ judgments, only one case has actually resulted in the imposition of penalties¹¹⁶; in 20 other cases where the Commission proposed penalties against ECJ violators, the member country quickly came into compliance.¹¹⁷ It appears to be the threat of penalties rather than actual police power which induces action by member governments. Before the EC had power to impose economic sanctions on violating member governments, “disrespect for judgments of the ECJ could not be backed up with a threat of sanctions, but only with the initiation of new legal proceedings. The result was a substantial and ever-increasing number of disregarded decisions.”¹¹⁸

¹¹² *Id.*, at 613.

¹¹³ *Id.*, at 615.

¹¹⁴ *Id.*, at 613.

¹¹⁵ *Id.*, at 617.

¹¹⁶ See *Waste management: Commission pursues legal action against Greece over further violations of EU waste law in Crete*, EC Representation in Cyprus, IP/05/418, Apr. 12, 2005, <http://www.delcyp.cec.eu.int/en/news/050414b.htm>.

¹¹⁷ *Id.*, at 619.

¹¹⁸ Tallberg, *supra* note 111, at 633.

However, there is a limit to the efficacy of jawboning alone, if not backed up by actual enforcement acts. Consider the European Union's Stability and Growth Pact¹¹⁹, which limits the fiscal deficit of each member state to no more than 3% of gross domestic product (GDP) and limits the public debt to 6% of GDP, and authorizes the European Commission (EC) to impose fines for violations. France and Germany breached this rule in 2002, 2003, and 2004¹²⁰, and the EC threatened to impose fines on the French and German governments. French and German leaders balked at this prospect and asked for more time to reduce their deficits; eventually, European finance ministers agreed to this proposal and the EC agreed to "erase" France and Germany from the list of deficit offenders.¹²¹ The EC has admitted that as a result of these events, it has suffered a "loss of credibility and ownership and institutional uncertainty."¹²² It should have followed through on its constitutional authority to levy penalties.

¹¹⁹ TREATY OF MAASTRICHT AMENDING THE TREATY ESTABLISHING THE EUROPEAN COMMUNITY, Feb. 7, 1992 [hereinafter Maastricht Treaty], art. 104, <http://europa.eu.int/eur-lex/en/treaties/selected/livre223.html>; MAASTRICHT TREATY, Protocol on the excessive deficit procedure, <http://europa.eu.int/eur-lex/en/treaties/selected/livre335.html> (defining terms and setting out the numerical parameters for the fiscal rules); Resolution of the European Council on the Stability and Growth Pact, 1997 O.J. (C 236) 1, Jun. 17 1997 (committing member states to follow the fiscal limits and committing the European Council to "always impose sanctions" for violations); Resolution of the European Council on the strengthening of the surveillance of budgetary positions and the surveillance and coordination of economic policies, 1997 O.J. (L 209) 1, Jul. 7, 1997; Resolution of the European Council on speeding up and clarifying the implementation of the excessive deficit procedure, 1997 O.J. (L 209) 6, Jul. 7, 1997 (inter alia, relieving the obligation for penalties, in various exigent circumstances). For a nice webpage linking to all these documents, see http://europa.eu.int/comm/economy_finance/about/activities/sgp/sgp_en.htm.

¹²⁰ See, e.g., *France misses deficit deadline*, BBC NEWS ONLINE, Oct. 3, 2003, at <http://news.bbc.co.uk/1/hi/business/3160494.stm>; *Four 'to bust eurozone deficit rules'*, BBC NEWS ONLINE, Apr. 19, 2004, at <http://news.bbc.co.uk/1/hi/business/3638167.stm>;

¹²¹ See, e.g., *Euro pact rules to be reviewed*, BBC NEWS ONLINE, Jun. 24, 2004, at <http://news.bbc.co.uk/1/hi/business/3836291.stm>; *Can the European Stability Pact Survive?* BBC NEWS ONLINE, Dec. 14, 2004, at <http://news.bbc.co.uk/1/hi/business/4091837.stm>;

¹²² Strengthening economic governance and clarifying the implementation of the Stability and Growth Pact: Communication from the Commission to the Council and the European Parliament, COM(2004)581 final, Sep. 3, 2004, http://europa.eu.int/comm/economy_finance/publications/sgp/2004/comm581_en.pdf, at 3.

Sticks, Not Carrots

Convinced that international rules and norms may not be enough to compel desired behavior and outcomes from national governments, others have raised the possibility of social sanctions against non-complying or non-participating countries. For example, a non-complying country could be banned from the Olympics, or civil society could independently decide to boycott that country's products.¹²³

However, the usual instrument offered as a quasi-grim trigger punishment is not dissolution of the Kyoto regime, but heavy trade sanctions on the non-complying country. Could trade sanctions be an effective – or legal? – mode of punishment for non-compliance? Chang (1995) recommends trade sanctions as an instrument for coercing compliance because (one) alternative instrument, subsidies, may induce private actors and governments to falsely posture as polluters or high-cost avoiders of emissions, in order to qualify for transfer payments.¹²⁴ Looking specifically at the climate regime, Stiglitz *et al.* suggest a multilateral carbon tax imposed on the noncomplying country's exports, so that the total revenues are equal to some multiple of the domestic carbon tax which the noncomplying country could (should?) have implemented.¹²⁵

However, not all observers give credence to the prospect of an enforcement regime with police powers or authority to impose trade sanctions. Wiener (1999) argues that trade sanctions may not be of a large enough magnitude to induce targeted countries to change their behavior, and would be seen as unfair.¹²⁶ Additionally, trade sanctions may not be a credible threat because often “countries that punish non-cooperating countries will harm themselves in the

¹²³ See, e.g., Aldy, Orszag, and Stiglitz, *supra* note 12, at 14-15.

¹²⁴ Howard F. Chang, *An Economic Analysis of Trade Measures to Protect the Global Environment*, 83 GEO. L.J. 2131, 2158 (1995).

¹²⁵ Aldy, Orszag, and Stiglitz, *supra* note 12, at 15.

¹²⁶ Wiener, *supra* note 14, at 758, 759.

process.”¹²⁷ Barrett (2003) observes that trade sanctions following the model of the Montreal Protocol, which has been very successful in inducing participation and compliance, would require calculation of the CO₂ “content” of every good and service, which would be difficult.¹²⁸

From a more legalistic perspective, many observers have examined the relevant treaty language and taken a pessimistic view of the prospect for trade sanctions as a permitted punishment instrument under the climate regime. Article I of GATT¹²⁹ requires a government to give “most favoured nation” treatment to the products of *all* WTO member states. Article III requires a government to treat foreign products at least as favorably as equivalent (“like”) domestic products. Finally, Article XI prohibits quantitative restrictions on trade. The only exceptions to these vigorous pro-trade rules are found in Article XX(b) – which allows trade restrictions when “necessary to protect human, animal or plant life or health” – and Article XX(g), which allows restrictive measures “relating to the conservation of exhaustible natural resources” if the government also places restrictions on domestic production or consumption.

Generally these rules do not extend to regulation of production processes in other countries: a WTO member may not impose import barriers on the grounds that the good was manufactured using an energy-intensive (CO₂-intensive) production process.¹³⁰ Also, WTO jurisprudence usually construes Articles XX(b) and XX(g) as relating to conditions inside the relevant country’s territory.¹³¹ Even the UNFCCC treaty language is bearish on the possibility of trade sanctions. Article 3.5 of UNFCCC states that “measures to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a

¹²⁷ Barrett and Stavins, *supra* note 83, at 362.

¹²⁸ Barrett, *supra* note 16, at 388.

¹²⁹ General Agreement on Tariffs and Trade, Oct. 30, 1947, 55 U.N.T.S. 194 [hereinafter GATT].

¹³⁰ Gary P. Sampson, *WTO Rules and Climate Change: The Need for Policy Coherence*, in *INTER-LINKAGES: THE KYOTO PROTOCOL AND THE INTERNATIONAL TRADE AND INVESTMENT REGIMES* 69, 78 (W. Bradnee Chambers ed., 2001).

¹³¹ *Id.*, at 79.

disguised restriction on international trade.”¹³² Similarly, the Kyoto Protocol cautions governments to pursue GHG goals “in such a way as to minimize adverse effects . . . on international trade.”¹³³

A few observers take a more favorable view of the role of trade sanctions as punishments for climate noncompliance or nonparticipation. Stokke (2004) observes that about 20 out of 200 IEAs include provision for trade-related compliance measures, and looks ambiguously at the potential for trade sanctions to encourage compliance in the Kyoto regime.¹³⁴ Stokke argues that “the stronger clout of the WTO compliance system and the compulsory nature of its dispute settlement procedures suggest that should a [WTO member] believe that its rights are violated by climate-related trade measures, the [conflict] would be settled by WTO bodies.”¹³⁵

On the other hand, Stokke argues that because the Kyoto Protocol (1997) was concluded more recently than the Uruguay Round of GATT (1994), it could be argued that the climate rules should trump the trade rules under the *lex posterior* principle of customary international law.¹³⁶ In implicit contrast to the arguments of Barrett and others, Stokke suggests one area where non-participation vs. non-compliance may be a functionally important distinction: a Kyoto party which fails to comply with its commitments would be the subject of various intra-Kyoto penalties, described *supra*. Such a non-complying country could resist trade sanctions on the ground that the Compliance Committee (or some analogous body) had not yet exhausted all available non-trade-distorting measures. However, country that is a WTO but not Kyoto participant could not make the same argument; Kyoto enforcement instruments would not be

¹³² UNFCCC, *supra* note 17, art. 5.

¹³³ Kyoto Protocol, *supra* note 19, art. 2(3).

¹³⁴ Olav Stokke, *Trade Measures and Climate Compliance: Institutional Interplay Between WTO and the Marrakesh Accords*, 4 INT’L ENV. AGREEMENTS 339 (2004).

¹³⁵ *Id.*, at 352.

¹³⁶ Stokke, *supra* note 133, at 346.

available to the Compliance Committee.¹³⁷ Thus, for punishing non-compliance at least, trade sanctions may not be the most plausible instrument of enforcement.

Dispute Settlement

What is really needed is a central authority with “bite” that can make credible threats so as to deter noncompliance or total defection from the regime. For example, Hovi and Areklett (2004) yearn for a centralized, legalistic enforcement and dispute settlement system within the Kyoto framework, so that defectors and non-compliers could be punished without altering any incentives faced by participating, complying parties.¹³⁸ In other words, what is needed for the Kyoto regime is a neutral, detached, rule-based adjudicator which can make objective decisions and draw legitimacy and respect from all parties. How likely is that to be achieved?

Abbott, Keohane, Moravcsik, Slaughter, and Snidal (2000) consider several elements of “legalization” in institutions, including obligation (of state actors to be bound by rules); precision (of scope of the rules) and delegation (of authority to third parties).¹³⁹ The existing international climate-change does not lack precision or ostensible obligation inherent in its rules. Defining compliance under Kyoto may not be as important a function of a dispute-settlement mechanism as in the trade issue area.¹⁴⁰ However, identifying violations and enforcing penalties is a valuable role of a dispute-settlement mechanism for the UNFCCC regime. Also, by increasing the certainty of rules and commitments under UNFCCC, a legalistic dispute-settlement system

¹³⁷ *Id.*, at 353.

¹³⁸ Jon Hovi and Ivar Areklett, *Enforcing the Climate Regime: Game Theory and the Marrakesh Accords*, 4 INTL. ENVTL. AGREEMENTS 1, 12 (2004).

¹³⁹ Kenneth W. Abbott, Robert O. Keohane, Andrew Moravcsik, Anne-Marie Slaughter, and Duncan Snidal, *The Concept of Legalization*, 54 INT’L ORG. 401, at 401 (2000).

¹⁴⁰ See James McCall Smith, *The Politics of Dispute Settlement Design: Explaining Legalism in Regional Trade Pacts*, 54 INT’L ORG. 137, 146.

increases the confidence of private-sector actors in the inevitability of fossil-fuel use reduction, inducing more investment in cleaner or alternative energy sources and production processes.¹⁴¹

Abbott *et al.* write, “Dispute settlement mechanisms are most highly legalized when the parties agree to binding third-party decisions on the basis of clear and generally applicable rules; they are least legalized when the process involves political bargaining between parties who can accept or reject proposals without legal justification.”¹⁴² In a related article, Abbott and Snidal (2000) briefly discuss the virtues of “hard legal commitments,” including the reputational costs of violating an adjudication.¹⁴³ Legalization improves the credibility of international commitments by “constraining self-serving autointerpretation” and increasing the reputational costs of noncompliance with agreements.¹⁴⁴ Formally legalized commitments also “mobilize legally oriented interest and advocacy groups” and expand the role of legal bureaucrats within government agencies.¹⁴⁵ Legalized commitments can reduce the chances of opportunism when the benefits of defection are great or compliance is difficult to verify.¹⁴⁶ The authors advocate “softer” legalization (less precise commitments or dilution of the binding character of commitments), in order to lessen the perceived lost sovereignty; to provide freedom for action under uncertainty; and to facilitate compromise between countries with different preferences or different strengths.¹⁴⁷

There are obvious reasons why national leaders will be reluctant to entertain such a body. James McCall Smith (2000) observes that “legalistic” dispute settlement (defined as binding adjudication by third parties) in the trade policy area tends to constrain the political autonomy of

¹⁴¹ Smith, *id.* at 147, makes the analogous argument for private-sector certainty in the trade regime.

¹⁴² *Id.*, at 415.

¹⁴³ Kenneth W. Abbott and Duncan Snidal, *Hard and Soft Law in International Governance*, 53 INT’L ORG. 421, at 427 (2000).

¹⁴⁴ *Id.*

¹⁴⁵ *Id.*, at 428.

¹⁴⁶ *Id.*, at 429.

government leaders.¹⁴⁸ Smith then asks: “If legalistic trade dispute settlement poses such a clear domestic political threat, why would trade negotiators ever consider, much less adopt, any binding procedures?” Smith argues that legalistic dispute settlement mechanisms improve government compliance and support business confidence. Although political leaders may find their policy discretion limited, the overall economic effect for society is positive. This, in turn, can yield domestic political benefits which happen to redound to the benefit of the same leaders.¹⁴⁹ Jackson (1998) raises the question: “If a nation has consented to a treaty and the norms it contains, why should it object to an external process which could rule on the consistency of that nation’s actions with the treaty norms?” Following Smith’s discussion, concern about loss of sovereignty and flexibility may be one reason; a government may secretly want an “escape clause” when stochastic factors suddenly make compliance unpalatable.¹⁵⁰ Alternatively, a government may be concerned that dispute-settlement procedures are biased, procedurally flawed, or overreaching.¹⁵¹

The best example in recent history of governments agreeing to actually create a dispute-settlement and enforcement body with bite in an international regime is in the world trade issue area. The absence of effective enforcement power¹⁵² under the General Agreement on Tariffs and Trade (GATT) induced the member governments to approve a stronger dispute-settlement facility when the Uruguay Round of trade negotiations was concluded in 1994.¹⁵³ Under Article

¹⁴⁷ *Id.*, at 436-450.

¹⁴⁸ Smith, *supra* note 139, at 145.

¹⁴⁹ *Id.*, at 146.

¹⁵⁰ John H. Jackson, *THE WORLD TRADE ORG.: CONST. & JURISPRUDENCE* 74 (Royal Institute of Int’l Affairs, 1998).

¹⁵¹ *Id.*, at 75.

¹⁵² Under GATT, a member state could bring a dispute only on grounds of “nullification or impairment” of benefits expected under the treaty, rather than an alleged breach of legal obligation. Also, the member states themselves investigated and decided cases, rather than a neutral tribunal. See John H. Jackson, *THE WORLD TRADING SYSTEM: LAW AND POL’Y OF INT’L ECON. REL.* 114-115 (2d ed. 2000).

¹⁵³ See, e.g., Ernst-Ulrich Petersmann, *The Dispute Settlement System of the World Trade Organization and the Evolution of the GATT Dispute Settlement System since 1948*, 31 *COMMON MARKET L. REV.* 1157 (1994).

22 of the Understanding on Rules and Procedures Governing the Settlement of Disputes, a complainant can bring an allegation that another WTO party is not in compliance with WTO rules. The Dispute Settlement Body can authorize a first-stage panel of three “well-qualified” governmental or non-governmental persons to consider the case and issue a report.¹⁵⁴ If the panel finds against the respondent state and the respondent fails to come into compliance within a reasonable period, the dispute settlement body can authorize trade retaliation by the complaining state.¹⁵⁵ Additionally, parties have the right of appeal, to a group of three experts in trade law, unaffiliated with any government.¹⁵⁶ The Appellate Body’s report will be adopted and “unconditionally accepted” unless the Dispute Settlement Body decides by consensus to reject it. Because all parties to the relevant trade agreement are also members of the Dispute Settlement Body in a particular issue¹⁵⁷, the winning party in any case has the right to object to the rejection of an appellate decision¹⁵⁸. Finally, the recommendations of a panel or Appellate Body appear to have binding character under international law.¹⁵⁹

Although the first-stage panel may not have members who hold citizenship with one of the disputing governments, this rule does not apply to Appellate Body members.

To a great extent, the dispute settlement process is structured so that that the Appellate Body members “feel they should not be identified with any particular nation-state member, but rather give importance to their role as an international impartial judicial-type official.”¹⁶⁰ However, the Dispute Settlement Body is not quite a supranational court. John H. Jackson writes: “As ‘heroic’

¹⁵⁴ Understanding on rules and procedures governing the settlement of disputes [hereinafter Dispute Settlement Understanding], arts. 6, 8(1), Annex 2 to Marrakesh Agreement Establishing the World Trade Organization, Apr. 15, 1994, http://www.wto.org/english/tratop_e/dispu_e/dsu_e.htm.

¹⁵⁵ Dispute Settlement Understanding, art. 22.

¹⁵⁶ *Id.*, art. 17(14).

¹⁵⁷ Dispute Settlement Understanding, art. 2(1).

¹⁵⁸ Jackson, *supra* note 149, at 76.

¹⁵⁹ Jackson, *supra* note 151, at 126.

¹⁶⁰ Jackson, *supra* note 149, at 79.

as they may appear, the dispute procedures of the WTO have a number of features that are obviously designed to ‘protect sovereignty’ of the WTO members, and to prevent too much power being allocated to the dispute process.”¹⁶¹

An important consideration in the design of dispute-settlement systems is the question of who may initiate dispute proceedings. In the GATT/WTO setting, only a member country may initiate a complaint against another member country for violations of treaty obligations.¹⁶² On the other hand, Keohane, Moravcsik and Slaughter¹⁶³ identify several international dispute-resolution tribunals with high access for private actors, including the European Court of Justice, European Court of Human Rights, and Inter-American Court of Human Rights. The authors find that “as the actors become more diverse, the likelihood that cases will be referred increases, as does the likelihood that such cases will challenge national governments—in particular, the national government of the plaintiff.”¹⁶⁴ This “transnational dispute resolution” gives more power to courts and valorizes legal norms like logic, precedent, and adherence above the interests of member states.¹⁶⁵ Additionally, “individuals with access to dispute settlement are able to generate information about compliance at minimal cost to member states.”¹⁶⁶

The EC may initiate infringement proceedings against (alleged) treaty violators; private citizens and corporations may also seek redress in national courts for state violations of EC

¹⁶¹ *Id.*, at 78.

¹⁶² *Id.*

¹⁶³ Robert Keohane, Andrew Moravcsik, and Anne-Marie Slaughter, *Legalized Dispute Resolution: Interstate and Transnational*, 54 INT’L ORG. 457, 469 (2000).

¹⁶⁴ *Id.*, at 472, 475.

¹⁶⁵ *Id.*, at 478.

¹⁶⁶ Smith, *supra* note 139, at 141.

law.¹⁶⁷ In contrast, these flexible modes of enforcing compliance are not available in the GATT/WTO setting. As a result, the number of cases initiated is far less in the WTO arena.¹⁶⁸

Marrakesh: A Grim Trigger or a Slap on the Wrist?

The Bonn/Marrakesh agreements make provision for some trade-related sanctions, binding dispute settlement, and other enforcement instruments, but these need to be both credible and deterrent if they are to be effective in inducing greater compliance with Kyoto commitments. The first thing to note is that non-compliance with GHG reduction obligations can be observed and punished only two years after each commitment period, due to the time required for reporting and verification by the compliance committee.¹⁶⁹ What of the featured deal at Marrakesh, the 30% penalty for excess emissions? Because the 30% penalty amounts to a postponement of abatement to a future period, with some multiplicative factor, this device is equivalent to “borrowing” emissions permits at an effective 5% rate of interest.¹⁷⁰ Nentjes and Klaassen (2004) show that if Annex I member countries expect the present value of the emissions permit price to be lower in a future period than in the current period, the “borrowing” provision can improve overall compliance (that is, increase overall abatement) and reduce total costs by equalizing marginal abatement costs across periods.¹⁷¹ The penalty rate on excess emissions functions as the “minimum price sellers want to receive for supplying allowances and simultaneously ... the maximum price buyers are willing to pay for allowances.”¹⁷² Their model

¹⁶⁷ Tallberg, *supra* note 111, at 636.

¹⁶⁸ *Id.*, at 637. Tallberg observes that under the new WTO dispute-settlement procedure since 1995, an average of 30 cases have been initiated each year.

¹⁶⁹ Andries Nentjes and Ger Klaassen, *On the quality of compliance mechanisms in the Kyoto Protocol*, 32 ENERGY POL'Y 531, 532 (2004).

¹⁷⁰ *Id.*, at 538.

¹⁷¹ *Id.*, at 538.

¹⁷² *Id.*, at 534.

allows for heavy discounting of the stated penalty rate, based on the low probability that cheating will be discovered and penalties will ever become meaningful.

How effective is the option of restricting membership in emissions trading markets? Nentjes and Klaassen note that “if formal compliance mechanisms are absent, emission trading can work only insofar as incentives to protect reputation exist.”¹⁷³ However, if reputational costs of noncompliance serve as a surrogate for a real externally imposed penalty, emissions permit trading can lead to more GHG abatement than would occur otherwise. If reputational costs are greater for buyers than for sellers (that is, if expectations of compliance are much lower for countries in Eastern Europe which happen to have excess emissions permits), the availability of emissions trading may actually increase the compliance gap, by encouraging sellers to sell permits which are not actually backed by emissions reductions. Additionally, if reputational costs are greater for buyers, suspension of sellers’ eligibility to trade (for example, because they sell emissions permits which are not actually backed by emissions reductions) can improve compliance.¹⁷⁴

Several authors, notably ZhongXiang Zhang¹⁷⁵, have examined the question of who should be liable under international law when it turns out that a seller of emissions permits actually needed those permits to cover its GHG emissions at the end of the emissions period. This over-selling problem, as noted above, may actually increase noncompliance with Kyoto commitments. One solution to the problem may be to require verification of excess allowances prior to any permit selling.¹⁷⁶ A related solution may be to require that any revenues from excess permit selling be deposited into an escrow account until verification that the permits actually were

¹⁷³ *Id.*, at 537.

¹⁷⁴ *Id.*, at 541.

excess.¹⁷⁷ Alternatively, sellers could be required to purchase compulsory insurance to cover the risk of over-selling, although this option is fraught with serious moral hazard problems.¹⁷⁸

The current Kyoto framework appears to use seller's liability;¹⁷⁹ that is, sellers who over-sell may be subject to penalties, but buyers should treat any acquired permits as valid. However, as described above, the current enforcement and dispute resolution framework for Kyoto may lack authority to impose penalties on sellers. In contrast, Zhang describes a theoretical system of buyer's liability, in which buyers who acquire over-sold permits will have their permits invalidated or discounted.¹⁸⁰ Nentjes and Klaassen note that a shift to buyer's liability would improve compliance in cases where buyers have greater reputational considerations.¹⁸¹

How Much Police Power Is Enough?

In light of the above discussion, the Bonn and Marrakesh compliance agreements are less than satisfactory; there are no independent modes of enforcing the rules, either via domestic law or supranational penalties outside the Kyoto framework.¹⁸² The only penalties for breaking Kyoto obligations appear to be sanctions that make it harder to play the Kyoto game, as well as unclear reputational costs of non-cooperation. Under the rules agreed to at Bonn, a country could continually fail to meet its abatement commitments in each period, but continue to pass on

¹⁷⁵ See ZhongXiang Zhang, *International greenhouse gas emissions trading: who should be held liable for the non-compliance by sellers?*, 31 *ECOLOGICAL ECON.* 323 (1999); ZhongXiang Zhang, *The liability rules under international GHG emissions trading*, 29 *ENERGY POL'Y* 501 (2001).

¹⁷⁶ *Id.* (Zhang 1999), at 324.

¹⁷⁷ *Id.* at 325.

¹⁷⁸ Zhang (2001), *supra* note 48, at 504-505.

¹⁷⁹ See Zhang 1999, *supra* note 48, at 324.

¹⁸⁰ *Id.*, at 326 (describing a "Last In, First Out" system in which the most recent permits acquired would be the first to be voided; this system would punish most harshly the buyers who bought permits towards the end of the commitment period when it seemed most obvious that a seller was having compliance problems).

¹⁸¹ Nentjes and Klaassen, *supra* note 168, at 537.

¹⁸² See Aldy, Barrett, and Stavins, *supra* note 87, at 8-9 (noting, *inter alia*, that the penalty applies only if a country consents to be bound by it, and the "sting" of the penalty depends on the emissions reduction commitment for the next period).

its “penalty” reductions into future periods indefinitely.¹⁸³ Also, the country with excess emissions in the 2008-12 period is free to negotiate for any abatement commitment it wants in the next period (although it is not clear what years will be covered by the next commitment period, or whether those obligations will be negotiated before or after the 2008-12 period).

In order to address these problems, an effective regime needs more power, authorized by legal instruments. Article 8 of the UNFCCC established a standing Secretariat, located in Bonn, Germany, which functions in support of the COPs and other elements of the UNFCCC. This was a promising beginning for creating a central authority. At COP6 in 2000, it was proposed that the appellate body for decisions of the envisioned Enforcement Branch under Kyoto might be three experts from diverse fields.¹⁸⁴

However, one year later, the Marrakesh Accords established that when the Enforcement Branch of the Compliance Committee makes a decision against a party, the party has the right to appeal to the Conference of the Parties or Meeting of the Parties¹⁸⁵, which can override the Enforcement Branch’s decision by a three-quarters majority vote.¹⁸⁶ Thus, the WTO model of detached adjudicators was rejected. Also, the Compliance Committee created at COP7 at Marrakesh was not agreed to through an official amendment to the Kyoto Protocol, as required in article 18 of Kyoto. This probably-intentional eliding of the rules should be acknowledged and repaired, by passing an amendment with a three-quarters vote of the parties, in order to give the Compliance Committee more legalistic legitimacy.

Who gets access to dispute resolution under the current rules? In the Compliance Committee agreed to at Marrakesh, the Secretariat appears to have the competence to initiate proceedings

¹⁸³ See Barrett, *supra* note 16, at 386.

¹⁸⁴ See FCCC/SB/2000/CRP.15/Rev.2; van der Jagt, *supra* note 34, at 237.

¹⁸⁵ In the jargon of international law, the annual meetings of treaty members prior to its entry into force are called the Conference of the Parties. After entry into force, the meetings are called the Meeting of the Parties.

against allegedly non-complying parties; it is unclear whether a party state may initiate proceedings against another party.¹⁸⁷ The bureau of the Compliance Committee will have authority to decide which branch (Enforcement or Facilitative) will take the case, and the appropriate branch will carry out a preliminary examination, before deciding whether to proceed.¹⁸⁸ The Marrakesh Accords provided that the adjudicating branch should use all relevant information from expert review teams, the party alleged to be in noncompliance, the COP, other intergovernmental bodies, and non-governmental organizations.¹⁸⁹ The model of the ECHR, in which private actors are able to challenge noncompliance, was rejected, however.

Many observers¹⁹⁰ have raised the possibility of a World Environment Organization that would have a mandate to impose binding sanctions on members. Hanafi (1998), in the context of discussing the best institutional structure to manage Joint Implementation under the Kyoto framework, observes that “few nations would agree to ... an international authority ... with power to promulgate common policies and regulations and enforce them ... especially considering the uncertain effects that global climate mitigation may have on their economies.”¹⁹¹ Until such an organization is created, the best hope may be to strengthen dispute resolution capacity under the current UNFCCC institutions.

Finally, what about the “grim trigger” punishment needed to deter non-participation, non-compliance, and defection? The work of Carraro and Siniscalco, described *supra*, shows that

¹⁸⁶ Marrakesh Compliance Agreement § XI.

¹⁸⁷ van der Jagt, *supra* note 34, at 232.

¹⁸⁸ *Id.*, at 233; Marrakesh Compliance Agreement § VII.

¹⁸⁹ Marrakesh Compliance Agreement § VIII.

¹⁹⁰ See, e.g., Frank Biermann, *Strengthening Green Governance in a Disparate World Society: Would a World Environment Organization Benefit the South?*, 2 INT'L ENV. AGREEMENTS 297 (2002) (expressing concern that the goals of environmental treaties are often vague and ambiguous, so punitive enforcement of compliance may be inappropriate); Daniel C. Esty, *Stepping Up to the Global Environmental Challenge*, 8 FORDHAM ENVTL. L.J. 103 (1996) (advocating a Global Environmental Organization that would consolidate the roles of six or seven current United Nations bodies, creating a “single mechanism for addressing transboundary harms”)

¹⁹¹ Alex G. Hanafi, *Joint Implementation: Legal and Institutional Issues for an Effective International Program to Combat Climate Change*, 22 HARV. ENVTL. L. REV. 441, 496 (1998).

side payments for expanding participation in a voluntary international environmental agreement may only be supported if governments can credibly commit to remain part of an agreement. This requires vesting some central body with authority to punish defection as well as noncompliance. The Compliance Committee has no intrinsic power itself, absent a major shift in attitudes toward international agencies. Imposing buyer's liability for "bad"¹⁹² acquired permits may be one fruitful step: a country that cheats and sells bad permits will find itself facing the ire of its customers. Banning participation in emissions trading is another useful step. However, the Enforcement Branch should have ability to authorize trade sanctions on a noncomplying country or a defecting country, similar to the WTO's Dispute Settlement Body. Notwithstanding WTO rules and also practical difficulties with calculations, tariffs based on carbon content of goods and services, or even tariffs directly on fuel imports from that country and fuel exports into that country, could be a practical step toward maintaining a "good equilibrium."

Conclusion

Much of this paper has taken an economic and game-theoretic approach to understand governments' incentives. Of course, the pure rational-choice economic model may not be sufficient to explain outcomes in environmental and/or international regimes. For example, several observers have noted the "paradox" that in the domestic setting, private firms appear to comply with environmental regulations more than a simple economic analysis of compliance costs and expected penalties should suggest.¹⁹³ This may be due to firm managers overestimating the probability of penalties for noncompliance¹⁹⁴; reputational costs from being

¹⁹² That is, permits sold by a country which, it turns out, needed those permits to cover its actual emissions.

¹⁹³ Anthony G. Heyes, *Making Things Stick: Enforcement and Compliance*, 14 OXFORD REV. ECON. POL'Y 50, 59-60 (1998).

¹⁹⁴ *Id.*, at 60.

found noncompliant¹⁹⁵; or dynamic signaling between a firm and a regulatory agency.¹⁹⁶

Similarly, Nentjes and Klaassen stress the reputational costs of noncompliance in an international setting, due to the value of future interactions with other countries and also heavy cultural pressures for maintaining agreements.¹⁹⁷ For this reason, authors like Barrett and Stavins may too readily dismiss the Bonn/Marrakesh compliance mechanisms as completely powerless. Additionally, a pure interest-based model may not explain why the United States is skeptical about climate change and CO₂ abatement, while the countries of Western Europe, also post-industrial societies, are far more attitudinally committed to the task.

For example, why is the US government under the Bush administration choosing not to participate? It may be that President Bush and his advisors truly believe that uncertain benefits and big costs from GHG abatement make Kyoto participation a bad move for the United States. Alternatively, the Bush administration may believe that some global GHG-abatement regime is inevitable and desirable for the United States, and is simply holding out, thus increasing the credibility of its threats to not participate, for a more favorable settlement. Alternatively, Bush and his advisors may just be “stubborn,” and simply ideologically or dispositionally opposed to international cooperation for reducing fossil-fuel use. Vice President Dick Cheney famously said in 2001 that although “conservation may be a sign of personal virtue,” more domestic fossil-fuel production is needed.¹⁹⁸

Thus, moving beyond the Chayes recommendation of “soft” instruments for inducing compliance, and beyond economic approaches that advocate punishments for noncompliant behavior, the most effective avenue to achieving wider participation may be to change the

¹⁹⁵ See S.G. Badrinath and P. Bolster, *The Role of Market Forces in EPA Enforcement*, 10 J. REG. ECON. 165 (1996).

¹⁹⁶ See Winston Harrington, *Enforcement Leverage When Penalties are Restricted*, 37 J. PUB. ECON. 29 (1988).

¹⁹⁷ Nentjes and Klaassen, *supra* note 168, at 535.

opinions and interests of political leaders and private actors in the noncomplying countries.¹⁹⁹

Obviously, this is a subject for ten other papers.

More directly, what are the practical probabilities of effecting a dispute settlement regime with authority to make binding decisions? In forming *ex ante* attitudes towards the institutional design of dispute-settlements systems, a national leader is likely to consider how valuable is his country's participation and compliance, to the collective benefits of other member states. Countries with stronger threat points will be less likely to favor legalistic, binding dispute settlement procedures.²⁰⁰ As a result, we should expect "less legalistic dispute settlement in accords between parties whose relative economic size and bargaining leverage are highly unequal."²⁰¹ Although the author was writing about the trade issue area, high "leverage" in the UNFCCC setting can be interpreted as meaning a greater effect on climate outcomes. China, India, and the United States may be opposed to a stronger dispute settlement body. A coalition of smaller countries – perhaps the European countries, plus Japan and Canada – should push for a dispute settlement facility authorized as an amendment to the Kyoto Protocol, with an appellate committee of experts, access for non-state actors to bring complaints, and greater powers to authorize penalties.

Hey (2001) suggests that the current system of public international law may be "ill-equipped to address common interest [global environmental] problems, due to its reciprocal character."²⁰² Furthermore, some international legal practitioners, steeped in habit and precedent, may resist change and remain wedded to the view that "the international legal system as we have known it

¹⁹⁸ Vice President Dick Cheney, Remarks by the Vice President at the Annual Meeting of the Associated Press (Apr. 30, 2001), <http://www.whitehouse.gov/vicepresident/news-speeches/speeches/vp20010430.html>.

¹⁹⁹ See Aldy, Orszag, and Stiglitz, *supra* note 12, at 17.

²⁰⁰ Smith, *supra* note 139, at 148.

²⁰¹ *Id.*, at 149.

²⁰² Ellen Hey, *The Climate Change Regime: An Enviro-Economic Problem and International Administrative Law in the Making*, 1 INT'L ENVTL. AGREEMENTS 75, 91 (2001).

is here to stay.”²⁰³ Change is inevitable, however. When the next round of negotiations under UNFCCC begins and clever diplomats begin envisioning a regime with appropriate transfers to make participation palatable for rich and poor countries, a stronger dispute settlement body with credible power to punish violations should give more countries confidence that commitments mean what they say and that a plan that appears Pareto-improving really will be.

²⁰³ *Id.*, at 90.