

The Political Economy of International  
Environmental Accords: Kyoto versus Montreal

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*Introduction*

This paper addresses one of the most important puzzles of environmental public policy.

*Puzzle*

Why has the Kyoto Treaty failed while the Montreal Protocol was by all accounts a smashing success?

My goal in addressing this puzzle is to identify similarities and differences in the two accords and to show how differences in science and public perception shed light on the prospects for other international agreements, including several recent initiatives designed to address the problem of climate change.

I conclude that both the success of the Montreal Protocol and the failure of the Kyoto Protocol were largely driven by the decisions of the United States government, and those decisions were themselves driven by a form of purely domestic benefit-cost analysis. To the United States, the monetized benefits of the Montreal Protocol were estimated to dwarf the monetized costs, and hence the circumstances were extremely promising for American support and even enthusiasm for the agreement. (Consistent with this conclusion, President Reagan warmly embraced the Montreal Protocol.

Given the estimates of damages from depletion of the ozone layer it was worthwhile for the United States to act unilaterally to take the steps required by the Montreal Protocol. And for the world as a whole, the argument for the Montreal Protocol was overwhelmingly strong, but as I will show, the Kyoto Treaty presented a radically different picture. The United States was fully supportive of early phases of the Kyoto Treaty negotiations, but in 1998 the Senate voted 95-0 to prohibit further US involvement in these negotiations.

Part I of this paper provides a general model for examining many public policy issues, including but not limited to the particular cases discussed in this paper. Part II provides an introduction to the Montreal and Kyoto agreements. Part III explores the Montreal Protocol and the role of scientific evidence, European caution, American enthusiasm, and the benefit-cost analyses that explain the Montreal Protocol. Part IV examines the Kyoto Treaty and American reservations, with special emphasis on the possibility that the agreement would deliver low benefits for the world and impose significant costs on key nations -- with disproportionately high costs and particularly low benefits for the United States. Part V reports on recent developments including the publication of the Stern report that calls for aggressive measures to address climate change, and AB 32, a

California law to implement greenhouse gas control. Part VI concludes the paper with a brief exploration of the lessons and implications of the two accords.

### **Part I: Constrained self-interest and the formation of public policy**

Before examining the specifics of the Montréal and Kyoto accords, I set the stage by introducing a constrained self-interest model in which the various parties interact to shape public policy. After introducing the actors, I will explain how the prisoners' dilemma analysis and the rent-seeking insight are vital to understanding these two major environmental public policy initiatives and in explaining the different outcomes of the two accords.

Environmental policy may be examined by focusing on key players in our public policy drama. Political entrepreneurs seek to enhance the prospects for public office by stressing environmental ills and arguing for policies that they claim will cure these ills.

Bureaucrats working in environmental agencies invest in political issues and in the politicians who reward them with discretion, budget, and authority to implement the mandates that govern their respective agencies.

Firm managers whose companies impact the environment face challenges and bear costs imposed on their firms by environmentally-minded politicians and the bureaucrats of environmental agencies.

During the 1970s, non-governmental organizations (NGOs) emerged as major players in environmental policy development and implementation. These may be divided into three groups:

- o grass roots organizations focusing on purely local issues/problems;
- o national lobbying organizations and public interest groups; and
- o public interest law firms which use litigation to affect public policy.

Some NGOs display a mixture of these characteristics, but in general the NGO managers will face similar motivation. For example, the Sierra Club undertakes all three functions. They provide outdoor recreational programs for club members. A separate lobbying arm seeks to influence state and federal legislators to support their environmental goals. The Sierra Club Legal Defense Fund uses the courts to mold law in forms they favor.

The managers of grass roots organizations allocate resources among operations including recreational programs, education, fund raising, and advocacy through media and lobbying. National organizations allocate resources among competing projects and provide services to members. Environmental public interest law firms litigate to achieve objectives. In addition to the environmental improvement they may seek, their investment among environmental issues or cases will be affected by:

- o the institutions such as whether they qualify for standing to bring suits in which they have only an ideological interest,
- o the publicity value of different cases,
- o the availability of court-awarded legal fees, and

o possible impacts on their tax-exempt status.

In addition to the prospective impact on the law, the choice of cases by an individual lawyer may be affected by the type of experience the case provides them and the value to their career objectives. For example, those wishing a career in corporate practice may seek cases involving major corporations. Lawyers with an eye on public sector work, may choose cases dealing with administrative procedures or filling interstitial gaps in the law. Finally, cases with the potential for high impact or creative interpretations would be appealing to those seeking university or judicial appointments.

### ***The judiciary as interpreter and administrator***

The courts and judges have assumed a major role in interpreting and implementing environmental legislation. I address issues of this type in my work on the passage and implementation of the United States Clean Air Act (1970). The courts have been major players in environmental law, but mostly at the domestic level. Simply stated the transactions cost of a binding decision or interpretation to be reached in the courts is lower than in the legislature. It is more cost-effective for commercial and environmental interests to invest in convincing an individual judge or panel of judges than to win the favor of a majority of the 435 members of the House of Representatives and the 100 senators.

### ***Benefit-cost assessment of interest group pay offs***

Individual choice may be viewed as an exercise in optimization subject to constraints. Decision makers are guided by a benefit-cost analysis and subject to constraints regardless of whether the individual is a government employee, public interest manager, or private sector employee.

Benefit-cost calculations of a different sort are used by interest groups including governments to support policies they feel will benefit them (or their constituencies) and oppose policies which they perceive to impose cost on them.

### ***Prisoners' dilemma***

The simple structure of the prisoners' dilemma has often been used to analyze public policy to illustrate a conflict between individual and group rationality. The prisoners' dilemma story describes the arrest of two bank robbers who are placed in isolation cells and not allowed to communicate with each other. Economists have developed this in the context of game theory. Both alleged robbers wish to beat the charges and care little about the welfare of their accomplice.

A clever prosecutor offers them two choices: confess or remain silent. Each prisoner is told: If you confess and your accomplice remains silent I will drop all charges against you and use your testimony to ensure that your accomplice does serious time. Likewise, if your accomplice confesses while you remain silent, he will go free while you do the time. If you both confess I get two convictions, but I'll see to it that you both get early parole. If you both remain silent, I'll have to settle for token sentences on firearms possession charges."

The prosecutor puts them in a position in which they must contemplate uncertainty and potentially costly choices. The "dilemma" faced by each prisoner is that, whatever the other does, each is better off confessing than remaining silent. But the outcome obtained when both confess is worse for each than the outcome they would have obtained had both remained silent. A common view is that the puzzle illustrates a conflict between individual and group rationality. A group whose members pursue rational self-interest may end up worse off than a group whose members act contrary to rational self-interest. More generally, if the payoffs are not assumed to represent self-interest, a group whose members rationally pursue any goals may all meet less success than if they had not rationally pursued their goals individually.

### ***Rent seeking insight***

The prisoners' dilemma concept and the rent seeking insight are useful in explaining policy outcomes. Rent seeking is an economic form of behavior which aims at avoiding competitive or market pressure in order to bring about price distortions in one's own interest. The rent seeker attempts to obtain a special privilege such as a requirement that people must use their product, e.g., coal with specific sulfur content, a particular blend of gasoline, or a CFC substitute.

Rent seeking has many forms in public policy. In some instances, politicians know the prospect of enactment of an environmentally aggressive law is very remote and they can be seen as pro-environment, but not actually be subject to it. For example, Senator Muskie, a champion of the environment, was from Maine, a pristine state which would not incur costs to meet standards. Another example of rent seeking includes prevention of significant deterioration (PSD) in the Clean Air Act. In the mid-1970s the amendments to the Clean Air Act dealt with development in pristine areas (those much better than the air quality standards). PSD was very controversial as it prohibited clean areas from increasing emissions because it would degrade air quality to the ambient standards. They were not allowed to pollute even though their air was cleaner than other areas. Interstitial gaps in law and science also create the setting for rent seeking by providing the opportunity to create special privilege for their constituency. In a similar way, firms will try to impose hamstringing competitors by supporting regulations which disadvantage foreign or domestic competitors.

### ***Government predation as rent seeking***

Fred McChesney, a law professor at Northwestern, extended the rent-seeking insight to develop a theory of predation by government. In his model, corporate coffers are fleeced by politicians through threats of action or offers to help (for a fee) firms avoid new or burdensome regulation. Governmental agencies may appear to collude with politicians in bringing oversight hearings, administrative actions, and burdensome requests for information. However, they may also be coerced by politicians to undertake actions which benefit the politician. This type of action has the effect of sensitizing firm managers to potential costs.

***Unlikely (even unseemly) coalitions often affect environmental policy: The phenomenon of strange bedfellows***

Occasionally settings such as the prisoners' dilemma and rent-seeking opportunities produce unlikely coalitions, called "strange bedfellows." Bruce Yandle offered a theory explaining the formation of social regulation.<sup>1</sup> He explained his theory by considering the role of two groups, those favoring illegal sales (either by timing or whether tax is paid, otherwise known as bootleggers) and the anti-alcohol forces (called Baptists) in the passage of laws restricting the sale of alcohol on Sunday.

In the abstract the actions of interest groups may appear to be narrow selfish interest versus altruistic moral concern. However, things are not always what they seem.

The Baptists support this regulation out of moral conviction. They truly believe that alcohol should not be consumed and consequently act to prevent it from being sold on Sundays. The Bootleggers also support this regulation, but only because they want less competition on Sundays which can be accomplished by eliminating the legal vendors. Thus a seemingly unlikely, but none-the-less powerful coalition emerges whose managers act in concert although for different objectives.

The Bootleggers grease the political machinery and curry favor among appointed officials while the Baptists provide the moral high ground with sincere, heart-felt public advocacy of prohibition. The result is a regulation that would not have existed, with only the support of one group, or the other. Coincidentally, after the passage of the regulation, the Baptists ensure that the law is enforced, thereby protecting the market for the Bootleggers. These are indeed strange bedfellows and you may ask the relevancy of the analogy for our environmental discussion. The story of how the payoff structure brings the two disparate interest groups into an implicit coalition is relevant to the story of the Montreal and Kyoto accords as environmental policy.

In *Clean Coal, Dirty Air* (1981), Ackerman and Hassler found an example of the bootleggers and Baptist phenomenon in the passage of the regulations involving removal of sulfur from coal. "Full scrubbing" was required despite the sulfur content of the coal. In the absence of high sulfur coal producer interest, it would have made sense simply to burn low sulfur coal. Certainly, environmental groups would prefer lower sulfur emissions to more sulfur emissions. Instead, a coalition of high-sulfur coal producers and environmental groups formed a coalition to support the requirement that low sulfur coal be cleaned by the same percentage as higher sulfur coal. In other words, coal which by nature endowed low emissions, would have to incur the same reduction costs as the high sulfur coal. This had the effect of making the power plants indifferent between coals of differing sulfur content.

Having briefly described the actors in this public policy drama and the institutions which are key to the public debate, let me turn to the two accords. We now apply this model involving politicians, bureaucrats, citizen group managers, or firm managers to understand the outcome in two major environmental initiatives.

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<sup>1</sup>. (Bootleggers and Baptists: The Education of a Regulatory Economist, *Regulation* vol. 7, no 3 [1983], pg. 12.

## **Part II: Two accords – the Montreal Protocol and Kyoto Treaty**

The depletion of the ozone layer once was, and climate change now is, widely believed to be the world's most pressing environmental problem. The two problems have many similarities. Both involve global risks created by diverse nations, and both seem to be best handled through international agreements.

Both raise serious intergenerational and international equity issues. Future generations stand to lose wealth, whereas the cost of restrictions taken now would be borne by the current generation. Further while wealthy nations are largely responsible for the current situation, poorer nations, e.g., Africa and India, could greatly benefit from investments in economic development rather than being hampered by environmental regulations.

The Montreal Protocol has served largely to eliminate the production and use of ozone-depleting chemicals, while the Kyoto Treaty has spurred only modest steps toward stabilizing greenhouse gas emissions.

What accounts for the dramatic difference between the outcomes of the two accords?

At least part of the explanation lies in the radically different self-interest judgments of the United States and in the very different payoff structures of the two agreements.

Influenced by the outcome of a purely domestic benefit-cost analysis involving reductions in ozone-depleting chemicals, the United States (Reagan Administration) enthusiastically supported the Montreal Protocol. (1987)

Influenced by the very different outcome of benefit-cost analyses for reductions in greenhouse gas emissions, the United States aggressively opposed the Kyoto Treaty.

An examination of the two accords suggests that neither agreement fits the simple structure of a prisoners' dilemma, in which a nation gains from an enforceable agreement, gains even more if it is the only nation not to comply while all others do, and loses most if it, and everyone else, pursue their own national self-interest.

For the United States compliance with the Montreal Protocol would have been justified even if **no** other country had complied. But analyses suggested that compliance with the Kyoto Treaty would not have been justified even if **all** other parties had complied.

An understanding of the judgments that surround the two accords indicates that even though moral considerations might require the United States to spend a great deal to protect citizens in other nations, and even though such considerations can influence behavior, the nation is unlikely to act in response solely to those considerations. A general implication is that any international agreement to control greenhouse gases is unlikely to be effective *unless* an assessment of the consequences leads the United States to believe that it has more to gain than to lose. The policy that emerges will be affected by interest groups, institutions, and their perceptions of their respective benefits and costs.

If we accept the science of climate change, an international agreement to control greenhouse gases is almost certainly in the world's interest. However, there are many obstacles which may be traced to the self-interest of the United States and China to the achievement of such an agreement.

An observation regarding the role of domestic self-interest is that some European nations, mostly the United Kingdom, contended that ozone depletion was a greatly exaggerated problem while later calling for strong controls on greenhouse gases. As shown later the British produced a lot of aerosol propellants, and stand to gain from reductions in Carbon emissions.

For an international accord such as the Kyoto Treaty, a very serious problem lies in the fact that while the United States and China would have to bear the major share of the cost of emissions reductions, both nations are projected to lose relatively less from climate change. At least as much as the United States, China has an incentive to refuse aggressive regulation of greenhouse gases, until a stage when the perceived benefits increase and/or the perceived costs decrease.

At first glance, the problems of ozone depletion and climate change appear to be closely related. In fact ozone depletion and climate change are so similar that many Americans are unable to distinguish between them.

*Similarities between the two environmental problems:*

1. Scientific concerns about ozone depletion and climate change received public recognition with an early paper in 1896 and perhaps as early as 1827, but the current scientific consensus on climate change is very much a product of the 1990s. However, the science of climate change remains contentious.
2. Both involve the effects of emissions from man-made technologies that come from diverse nations and that threaten to cause large-scale harm.
3. Both ozone-depleting chemicals and greenhouse gases stay in the atmosphere for an extremely long time, their effect is cumulative, and the extent to which immediate action is necessary is uncertain. Hence the relevant risks are difficult to reverse; even with action that is both immediate and aggressive, the underlying problems will hardly be eliminated all at once.
4. These are global problems. No *one* nation is able to eliminate either problem through unilateral action. Indeed, no nation is even able to make significant progress on either problem on its own. Given the diversity of contributors to these problems, the most effective solutions are to be obtained through international agreements.
5. Both problems involve issues of international equity. Wealthy nations have been the principal contributors to both ozone depletion and climate change,

and hence it is plausible to argue that corrective justice requires wealthy nations to pay poorer ones to reduce the underlying risks. This argument might well mean that poor nations should be compensated for their willingness to enter into any international agreements that reduce emissions levels. Wealthy countries might owe significant duties of financial and technological assistance, either to help in emissions reduction or to pay for adaptation to the underlying problems.

6. Both problems present problems of intergenerational equity in which future generations are likely to face greater risks than the current generation. A key question is how much the present should be willing to sacrifice now to benefit future generations. Two complications also arise. Although not able to vote now, future generations are likely to be much wealthier than our own, and expenditures by the present which decrease national wealth may end up harming future generations by ensuring that they too have less wealth on which to draw.
7. Finally, in dealing with both problems, the United States is probably the world's most important actor in several ways. The importance of the United States lies not only in its wealth and power; it also lies in the fact that the United States has been a major emitter of both ozone-depleting chemicals and greenhouse gases.

Neither the Montreal Protocol nor the Kyoto Treaty fits the simple structure of a prisoners' dilemma in which a nation gains from an enforceable agreement, but gains even more if it is the only nation not to comply while all others do, and loses most if it, and everyone else, pursue their own national self-interest. For example, a country may support stringent regulations realizing that compliance will not be costly for them because their problem is not severe, others will pay them to reduce, or they simply will not enforce it.

Notwithstanding these similarities in the nature of ozone depletion and climate change, there is one obvious difference between the two protocols. An international agreement, originally signed in Montreal and designed to control ozone-depleting chemicals, was ratified by almost all nations (last count 183) in the world (including the United States, where ratification was unanimous).

Nations are complying with their obligations; global emissions of ozone-depleting chemicals have been reduced by over 95%; and atmospheric concentrations of such chemicals have been declining since 1994. By 2050, the ozone layer is expected to return to its natural level.

The Montreal Protocol stands as a spectacular success story owing a great deal to the actions not only of the United States government, which aggressively marketed the accord, but to American companies (DuPont and CFC substitute manufacturers) as well, which sought technical innovation leading to substitutes for ozone-depleting chemicals.

With climate change, the situation is disappointingly different. On the one hand, an international agreement, signed in Kyoto in 1997, went into force in 2005, when Russia ratified it, and this accord has now been ratified by over 130 nations. On the other hand, numerous nations are not complying with their obligations under the accord; some of the ratifying nations, including China, have no obligations under the protocol at all, notwithstanding their significant emissions of greenhouse gases. The United States firmly rejects the agreement, with near unanimity (95-0 for the Byrd-Hagel amendment prohibiting US involvement in climate change agreements) bipartisan opposition to its ratification.

Far from leading technical innovation as American companies did in addressing ozone-depleting chemicals, the United States has sharply opposed efforts to regulate greenhouse gas emissions, and insisted that the costs of regulation are likely to be prohibitive.

Between 1990 and 2004, the United States experienced a decline in emissions of ozone-depleting chemicals, to the point where such emissions are essentially zero. But in the same period, the United States experienced a rapid growth in greenhouse gases. Many of the wealthy nations also nominally committed to the Kyoto accord increased emissions and the worldwide emissions of greenhouse gases are projected to rise at a rapid rate.

To complicate matters further developing nations are not regulated by the Kyoto Treaty, and it is in those nations that greenhouse gases are increasingly most rapidly. In particular, India and China have a very rapid rate of growth of such emissions in recent years, and China will soon become the leading greenhouse gas emitter in the world.

It is unnecessary to accept any particular projection of costs and benefits, or to reach a final conclusion about whether ratification and compliance with the Kyoto accord might have been in the interest of the US. The only suggestion is that on the basis of the understandings of the relevant actors at the relevant time – including public officials at many different points in the ideological spectrum – the Kyoto accord was taken to be a bad deal.

### ***Prisoners' dilemma***

There is also a more general point to be made. For the United States, and for many nations, the payoff structures of the two agreements were fundamentally different. For some nations, most prominently the United States, unilateral compliance with the requirements of the Montreal Protocol was justified, even if no other nation chose to reject it. To repeat what has been stated above, it is simply not possible to make this point about the Kyoto Protocol.

It is plausible to suggest that for the United States, and China in particular, that compliance with the Kyoto Protocol was not justified even in the context that compliance was both necessary and sufficient to ensure that all parties complied. Neither Montreal nor Kyoto presented the basic requirement for an international agreement: a prisoner's

dilemma in which all or most nations will do badly if each acts in its individual self-interest, but gain a great deal if all are able to enter into a binding agreement.

The Montreal Protocol did not present a prisoners' dilemma because key nations, including the United States, would gain from unilateral action; and in fact, many nations engaged in such action.

The problem of climate change might well present a prisoners' dilemma, in the sense that nations and their citizens, acting in their private self-interest, may produce outcomes that can be avoided with a binding agreement outlining specific obligations.

Indeed, most believe that an international agreement which includes the developing countries and a mechanism for global emissions trading, would be in the world's interest. However, for the United States, and for some other nations as well, the Kyoto Treaty does not address the prisoners' dilemma. Further it might even generate an outcome still worse than what would follow from unregulated self-interested action by all sides.

In both cases, the United States (and other nations) acted like *homo economicus*, a self-interested welfare maximizer, focusing not on any perceived moral obligations, but on the perceived material incentives determined by weighing perceived benefits and costs

My analogy which is somewhat subjective suggests a kind of individual rationality constraint which operates at the level of nations. Of course nations are not individual people, and their decisions should not necessarily be expected to reflect or promote the interests of their citizens.

It remains necessary to specify the mechanisms by which perceived assessments of national interest constrain national decisions. Interest-group power, or moral commitments at some level of decision making, can overcome the results of any kind of domestic benefit-cost analysis. But in the context of my exploration, the different benefit-cost assessments help to explain other apparent anomalies as well.

***Optional subjectivist discussion (is it needed?)***

For example, they illuminate the pattern of apparently universal compliance with the Montreal Protocol and the likelihood of widespread noncompliance with the Kyoto Treaty. They help explain why many nations reduced their CFC emissions before the Montreal Protocol took effect—and why their reductions were not only in advance but also in excess of the mandates of the agreement. They also help explain the fact that United States industrial interests strongly supported the Montreal Protocol while sharply opposing the Kyoto Protocol.

They help explain why China and India refused to join the Kyoto Protocol. They illuminate another apparent anomaly: European nations, above all the United Kingdom, were initially quite cautious in reacting to the problem of ozone depletion, suggesting that the scientific evidence was both theoretical and speculative, while European nations, above all the United Kingdom, have been quite aggressive in reacting to the problem of

climate change. They even help to explain the particular commitments made in the Kyoto Protocol, commitments that, as we shall see, fit with the material self-interest of many of the relevant actors, including several of those commitments that seemed to promise significant control of greenhouse gases.

For the future, the implications of these points are simple. With respect to international agreements in general, the participation of the United States, and of other nations as well, is greatly affected by perceived domestic consequences. This is not to deny that moral judgments may affect decisions.

#### *Foreign aid*

Billions of dollars are spent each year on foreign aid, and an international agreement to control global environmental problems might operate as a form of such aid. Furthermore there are good reasons, grounded in corrective justice, to ask the United States to assist the nations that are most vulnerable as a result of climate change. This is unlikely as long as the United States perceives benefits to be less than costs.

For climate change in particular, it is reasonable to predict that the United States will ratify an international agreement to reduce greenhouse gases only if the perceived domestic costs of the relevant reductions decrease, the perceived domestic benefits increase, or both. The challenge, in short, is to make controls on greenhouse gases more closely resemble controls on ozone-depleting chemicals. For example, existing controls or public concern may spur technological innovation, greatly reducing the costs of controls. It is also possible that the perceived benefit-cost ratio of aggressive controls will change significantly with new information, or with better understanding of old information.

### **Part III. The Montreal Protocol**

#### *Ozone and Montreal: Science and Policy*

Chlorofluorocarbons (CFCs) were originally used as coolants for refrigerators, in part because they appeared to be far safer than the alternatives, which were either inflammable or dangerously toxic. CFCs came to be used in air-conditioning, as propellants in aerosol spray cans, and in commercial and military uses, producing billions of dollars in revenues for the suppliers.

The idea that CFCs posed a threat to the ozone layer was initially suggested in 1974 by Sherwood Rowland and Mario Molina. They argued that CFCs would migrate slowly through the upper atmosphere, where they would release chlorine atoms that could endanger the ozone layer, which protects the earth from the harmful effects of sunlight. In 1971, it had been suggested that a one percent ozone loss would cause an additional 7000 cases of skin cancer each year.<sup>2</sup> Hence the finding by Rowland and Molina that significant health risks might well be created by emissions of CFCs.

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<sup>2</sup> Id. at 25.

In the decade which followed, depletion of the ozone layer received widespread attention in the United States, which was the world's leading contributor, accounting for nearly 50 percent of global CFC use. A great deal of theoretical and empirical work was done within the scientific community by the National Academy of Sciences and others. At the same time, industry mounted an aggressive public relations campaign to discredit the association between CFCs and ozone depletion.

Intense media attention to the problem greatly affected consumer behavior. American consumers responded to warnings by cutting their demand for aerosol sprays by more than half, thus dramatically affecting the market.<sup>3</sup> In 1977, public concern spurred Congress to amend the Clean Air Act to permit the Administrator of the Environmental Protection Agency to regulate "any substance . . . which in his judgment may reasonably be anticipated to affect the stratosphere, especially ozone in the stratosphere, if such effect may reasonably be anticipated to endanger public health or welfare." In 1978, EPA used the Toxic Substances Control Act<sup>4</sup> to ban the use of CFCs as aerosol propellants in nonessential applications and defined criteria for exemptions of "essential uses." As a result of the ban, US aerosol production fell by nearly 95 percent.

A significant reduction in the American contribution to ozone depletion was achieved in a way that was remarkably fast, simple, and seemingly rational on the part of consumers—and that imposed little cost.

Changes in consumer behavior were widespread and in sharp contrast with the parameters affecting the public perception of climate change. Two points are relevant here. First, skin cancer, the harm associated with ozone depletion, is easily envisioned; and especially likely to affect behavior much more than even vivid images of a loss of the earth's "protective shield." An individual's fear of skin cancer is far more likely to affect consumer choice than melting Polar icecaps and rising sea levels.

Secondly, the change in consumer behavior away from aerosols was not burdensome or expensive to most consumers. Servicing air-conditioning chemicals is expensive, but infrequent for most consumers. Because the relevant harms were vivid, directly involving human health, and because no real hardship was imposed by taking steps to reduce those costs, consumer behavior was significantly affected. In essence, the individual evaluation of benefits outweighed the costs.

As we shall see, there is no readily identifiable individual parallel in the context of climate change.

Despite the flurry of domestic activity regarding CFCs, no international agreement was in sight. The effort to generate international cooperation was at first "an unmitigated failure." A central reason was the skepticism and opposition of the European Community, which firmly rejected the type of regulatory measures undertaken by the United States.

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<sup>3</sup> Benedick at 28, 31.

<sup>4</sup> 15 USC 2605.

In Europe, it was widely believed that science did not justify those measures, which would inflict high and undoubted costs for speculative benefits.

Some American companies, such as DuPont, showed sensitivity to the scientific evidence and potential risks of CFCs. Their European counterparts, on the other hand, sought “to preserve market dominance and to avoid for as long as possible the costs of switching to alternative products.” [Citation to be provided] The United Kingdom was a central actor here, and it was not a coincidence that the British government was heavily influenced by Imperial Chemical Industries, one of the largest CFC producers in the world.

Equally important were major assessments of the problem in 1986 and 1988. In 1986, a NASA/World Meteorological Association group provided an exceptionally detailed review of the evidence. These studies concluded that continued growth in CFCs would produce large holes in the ozone layer.

In 1988, the Ozone Trends Panel, established by NASA, reiterated the basic finding that CFCs were the primary cause of the ozone hole with a new analysis of a significant global trend. These conclusions, generally taken as authoritative, helped to pave the way toward the negotiations that led to the Montreal Protocol.

Within the United States, the position of industry began to shift in 1986, apparently as a result of significant progress in producing safe substitutes for CFCs. While arguing that CFCs produced no imminent hazard, DuPont supported an international freeze on CFC emissions as a precautionary measure after the discovery of the Antarctic ozone hole. Indeed, DuPont and other producers pledged to phase out production by an early date and also supported international controls.

The reasons for this shift remain unclear, but public relations and commercial opportunities by American producers in the development and marketing of new products for which they had a comparative advantage over foreign producers provide an explanation.

It is noteworthy in this regard that the European Community speculated that the Reagan Administration’s support for aggressive controls was driven by the fact that “U.S. producers had secretly developed substitutes.” Through the late 1980s there was a period of intense discussions within the Reagan Administration, with sharp differences between the Office of Management and Budget, skeptical of aggressive controls, and the Environmental Protection Agency, favorably disposed to such controls.

A major break came in the form of a benefit-cost study from the President’s Council of Economic Advisers which concluded that, despite the scientific and economic uncertainties, the monetary benefits of preventing future deaths from skin cancer far outweighed the costs of CFC controls as estimated either by industry or by the EPA. The EPA and the Council of Economic Advisers concluded that the ozone layer depletion would cause a “staggering” increase in the number of deaths from skin cancer—over five million by 2165.

With the American position settled, the stage was set for an aggressive role by the United States in negotiation of an international agreement.

*Costs and Benefits*

The aggressive posture of the United States with respect to ozone depletion may be attributed to a study by the Council of Economic Advisors in 1987, suggesting that a well-designed agreement would give the United States far more than it would lose. An Environmental Protection Agency study of the costs and benefits of the Montreal Protocol<sup>5</sup> advanced the following estimates.

*Costs and Benefits of Montreal Protocol to the United States (in billions of 1985 dollars):*

	No controls	Montreal Protocol	Unilateral Implementation of Montreal Protocol by the United States
Benefits	—	3,575	1,363
Costs	—	21	21
Net benefits	—	3,554	1,352

These figures were generated by a projection of over five million skin cancer deaths by 2165, together with over twenty-five million cataract cases by that year -- figures that would be cut to 200,000 and two million, respectively, by a 50% CFC reduction. Another feature of the ozone depletion debate is that over time, the United States was anticipated to be a decreasingly large contributor to that problem. In the long-run, the United States would do much better with global cooperation, especially from developing nations, which would be increasingly important sources of ozone-depleting chemicals. American enthusiasm for the Montreal Protocol, and for aggressive regulatory steps, can be understood only in this light.

Although these estimates depend on assumptions which have been challenged, the conclusion is clear that the Montreal Protocol was a bargain for the world in general, as well as for the United States in particular. Its success had everything to do with this perception of the likely outcome if CFCs were not banned.

It is not surprising that the treaty was signed in 1987. The international agreement served several purposes. The United States itself was much better off with agreement from other countries, although, for some of those countries, the purely domestic benefit-cost calculus was undoubtedly less clear than it was for the United States. A number of nations were willing to make significant cuts only on the assumption that other nations would do so as well. - For the developing countries, cuts were not perceived as justified by reference to a domestic calculus, so side-payments were required and made by the United States. {In 1990 I served as Senior Advisor for Environmental Economics at the US State Department the side payment to India was some \$80 million to aid in CFC substitution. The total was \$400 million.)

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<sup>5</sup> See Barrett, *supra* note, at 228.

None of this means that the problem of ozone depletion presented a standard prisoners' dilemma, in which all or most nations needed an enforceable agreement to produce a result better than what would emerge from purely self-interested action. The ozone problem had no such structure. As we have seen, the United States essentially complied with the requirements of the Montreal Protocol before the Montreal Protocol, and many nations went well beyond those requirements both before and after the protocol (see Part IV of this paper.) The agreement was certainly in the interest of the United States, because it greatly increased the health benefits for the nation's citizens, and at least some of the parties would not have reduced at all or as much on their own.

#### **Part IV. Climate Change**

Concern about greenhouse gases arose in the same general time period as concern about ozone-depleting chemicals. However, in the two contexts, many of the major actors have reversed their positions. For example, the United States, once the most important proponent of the Montreal Protocol, is now a leading opponent to an international agreement to govern greenhouse gases. For ozone depletion, the United States first acted unilaterally, and then sought international restrictions. For greenhouse gases, the United States has hardly acted unilaterally. On the contrary, international action came first, and has spurred the exceedingly modest domestic measures that are now on the books.

Note: It is beyond the scope of this paper to explore the following point.

One must separate the US opposition to the Kyoto Protocol and support of climate change measures as found in the US participation in the Asia-Pacific Partnership on Clean Development and Climate. In January 2006, the US launched an initiative with Australia, China, India, Japan, and Korea to address the interconnected challenges of securing economic growth and development, poverty eradication, energy security, pollution reduction, and mitigating climate change.

European nations were significant obstacles to international regulation of ozone-depleting chemicals. They favored an approach of "wait and learn", but for climate change, they favored regulatory controls, with the United Kingdom in the forefront. The reversal of positions by the United States and the UK throws doubt on the characterization that the United States is skeptical of global solutions to environmental problems, or that the European Union is more committed to environmental goals. It is also inadequate to portray the American position on greenhouse gases as entirely a function of Republican leadership. The difference depends instead on assessments of national interest, public opinion, and the role of powerful private actors.

Note. It is beyond the scope of this paper to explore the development of the EU structure. It is possible that European opposition to the Montreal Protocol was a function of industrial interests while the EU's aggressive stance for climate control may be explained as the growth and development of EU governmental structure.

#### *The road to Kyoto*

Over the past twenty years, international organizations have shown a great deal of concern about climate change. In December 1988 the United Nations General Assembly

declared climate change to be a “common concern of mankind” and asked for a global response. In 1989, the European Community signaled that it would support an international agreement to deal with the problem. In 1992, more than 180 nations, including the United States, signed the Framework Convention on Climate Change during the Rio Conference on Environment and Development. The United States was the first industrialized nation to ratify the Framework Convention which set the stage for climate change negotiations.

It is important to note that unlike the Montreal Protocol, the Framework Convention lacked specific emissions reductions. The absence of such restrictions explains much of the posture of the United States which strongly resisted them. The Framework Convention was limited to information-gathering and the expression of goals and aspirations which called for stabilization of emissions to prevent “dangerous interference” with global climate and a return to earlier levels of anthropogenic emissions of carbon dioxide and other greenhouse gases.

At a later stage the parties agreed to produce a legal instrument that would establish quantitative limits for developing countries. The Convention was ratified by the United States Senate in 1992 and entered into force two years later. The Framework Convention inaugurated a new process of annual meetings

In 1995, the parties to the convention (including the United States, now led by President Clinton) met in Berlin and agreed to set emissions limits at specific periods and to agree to a protocol that would embody those limits. The Clinton Administration appeared to support the “Berlin Mandate,” asking industrialized nations to accept restrictions on greenhouse gas emissions. But other national leaders were not enthusiastic about this commitment. In 1997 a unanimously adopted Senate Resolution 98, which asked President Clinton *not* to agree to limits on greenhouse gas emissions if the agreement would injure the economic interests of the United States or if it did not “mandate new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period” as for the United States. The unanimous Senate concluded that any “exemption for developing country parties is inconsistent with the need for global action on climate change and is environmentally flawed” and further noted that it “strongly believed” that the proposals under consideration “could result in serious harm to the United States economy, including significant job loss, trade disadvantages, increased energy and consumer costs, or any combination thereof.”<sup>6</sup>

It is worth noting the bipartisan nature of the vote. No democratic senator opposed it. As we shall see, the opposition of developing countries stemmed from a calculation overlapping with that of the Senate. To be sure, it was possible for such countries to urge that wealthy nations had been responsible for the problem in the first instance, and that they should not have to bear significant costs when wealthy nations had already benefited from the technologies that contribute to climate change. Their argument which invoked

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<sup>6</sup> <http://www.opic.gov/GeneralOPIC/senateresolution98.htm>

corrective justice, but with a distributional component, was not made and could not be made by the United States. Apparently many developing countries also believed, not without reason, that they would lose more than they would gain from restrictions on greenhouse gases. As we shall see, China was and remains the most important actor here. China stands to lose relatively little from climate change, and it would have to spend a great deal to reduce greenhouse gases. This explains China's reluctance to participate in an international accord and parallels the position of the United States.

The United States opposed mandatory "domestic measures," such as energy taxes, and sought ample mechanisms to ensure emissions trading, a sensible idea that would have the advantage of driving down costs. The restrictions supported by the United States were less aggressive than those sought by the European Union and Japan. In conformity with Senate Resolution 98, American negotiators made serious efforts to persuade the developing countries to agree to limit their emissions at some future date, but they refused.

A plausible explanation is that such nations, above all China and India, were aware that regulatory controls would impose significant burdens and costs – and that certainly for China, the anticipated effects of climate change have been projected, by at least some observers, to be relatively modest.

#### *Costs and benefits of controlling greenhouse gases*

For the United States and the world, the benefits of the Montreal Protocol were projected to dwarf the costs. The relevant figures for the Kyoto Treaty present a different picture and there is undoubtedly vigorous disagreement about the likely costs of future climate change and the likely expense of emissions reductions to prevent that change from occurring.

My focus is the benefits and costs as they were perceived at the relevant times in the Kyoto Protocol deliberation. Of course members of the Senate do not base their decisions on formal benefit-cost analysis, and the role of such analysis within the executive branch varies over time. But the underlying figures, or at least a rough perception of their magnitude, undoubtedly affect domestic behavior.

#### *Costs to the United States*

An early analysis in the Clinton Administration found "modest" costs from the Kyoto Treaty, producing a mere \$.04 to \$.06 increase in the price of gasoline, and an annual increase in the average family's energy bill of \$70-\$110 by 2010.<sup>7</sup> Within the Clinton Administration itself, however, these projections were disputed. A study by the Department of Energy projected substantial gasoline price increases from \$1.39 to \$1.91, and 20 percent to 86 percent increases in the price of electricity by 2010.<sup>8</sup> These figures differ from an industry-funded study done at the Wharton School. This study projected costs far in excess of these projections<sup>9</sup>—including a loss of 2.4 million jobs and \$300

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<sup>7</sup> Pring at 194.

<sup>8</sup> Id. at 196.

<sup>9</sup> <http://www.api.org/globalclimate/wefastateimpacts.htm>

billion in the nation's GDP, with an average annual cost of \$2700 per household, including a 65 cent per gallon increase in the price of gasoline and a near-doubling of the price of energy and electricity.<sup>10</sup>

### *Emissions trading*

These estimates received a great deal of publicity. William Nordhaus and Joseph Boyer.<sup>11</sup> argue that costs will depend in large part by the amount of emissions trading. If trading were freely available, the cost to American companies would be dramatically reduced, because they could avoid expensive emissions reduction requirements and rely instead on purchasing permits.<sup>12</sup>

Other sources of uncertainty about the numbers stem from the fact that technological innovation might drive down costs as occurred in the context of CFCs.<sup>13</sup> According to Nordhaus and Boyer, the worst-case scenario for the Kyoto Treaty, involving no effective trading, would produce total costs of \$852 billion in present value.<sup>14</sup> The best case, involving global trading, would generate a cost of \$91 billion.<sup>15</sup> Nordhaus and Boyer suggest that the most likely figure is \$325 billion, involving trading among the Annex 1 nations.<sup>16</sup>

For the world as a whole, the costs are actually lower at \$217 billion in the case of Annex 1 trading, and \$884 billion in the case of no trading.<sup>17</sup> The reason is that many nations, especially those in Eastern Europe, would receive revenues from permit sales, and hence they would count as net winners quite apart from any benefits from reducing global warming.

The grant of permits produces tens of billions of dollars in gains for both Russia and Europe for a total of \$112 billion from Annex I trading.<sup>18</sup> It is a real question whether these billions of dollars in revenue, amounting to a wealth transfer, should count as a "benefit" from the Kyoto Protocol. But even if such amounts are included, the worldwide costs of the protocol are in the hundreds of billions of dollars.

### *American benefits*

What would the United States and the world receive in return for these costs? There is a great deal of uncertainty – even more so than on the cost side.<sup>19</sup> Let us begin with the

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<sup>10</sup> Id.

<sup>11</sup> Nordhaus and Boyer, *supra* note.

<sup>12</sup> Id. at 155-162.

<sup>13</sup> See above.

<sup>14</sup> Id. at 159.

<sup>15</sup> Id.

<sup>16</sup> Id.

<sup>17</sup> Id.

<sup>18</sup> Id. at 162.

<sup>19</sup> For valuable overviews, see *Avoiding Dangerous Climate Change* (Hans Joachim Scellnhuber et al. eds 2006); Richard Tol, *The Marginal Damage Costs of Carbon Dioxide Emissions: An Assessment of the Uncertainties*, 33 *Energy Policy* 2064 (2005); Nordhaus and Boyer, *supra* note; Cline, *supra* note; Ackerman and Finlayson, *supra* note.

anticipated costs of climate change in general, and then turn to the effect of the Kyoto Treaty. The two issues are quite different, and it is important to separate them. Even if the anticipated costs of climate change are high, a particular response might do little to reduce those costs, and hence produce little in the way of benefits.

In its 2001 report, the Intergovernmental Panel on Climate Change (IPCC) projected an increase of between 1.4 and 5.8 degrees Centigrade by 2100.<sup>20</sup> An increase of 1.4 degrees would cause far less damage than an increase of 5.8 degrees. To these points it must be added that there is disagreement about the likely damage from climate change, even assuming a particular increase in global mean temperatures.<sup>21</sup> For example, if climate change is abrupt, the cost will be far higher than otherwise since abrupt climate change may lead to worldwide catastrophe.<sup>22</sup>

How to incorporate a risk of catastrophe is a disputed question; perhaps a significant margin of safety is appropriate. In addition, a great deal turns on the selection of the discount rate. Since many of the gains from emissions reductions will be experienced in the future, a low discount rate would obviously mean higher benefits from risk reduction than would a high discount rate.<sup>23</sup>

Nordhaus and Boyer further argue that the Kyoto Protocol would actually have a meager effect on climate change, reducing anticipated warming by a mere 0.03 C by 2100.<sup>24</sup> According to another estimate, the agreement would reduce anticipated warming by 1.2 C by 2300.<sup>25</sup> The reason is that climate change is a function of aggregate emissions of greenhouse gases, and the Kyoto Treaty would have only a small effect on those aggregate emissions.

There are three points to consider here. First, emissions from China, India, and other developing countries—now substantial contributors to climate change, and anticipated to be larger contributors in the near future—are not regulated by the agreement at all. Second, past emissions of greenhouse gases will contribute to warming so it follows that even a substantial reduction in future emissions would not eliminate the problem. Third, the Kyoto Treaty requires the parties not to make substantial cuts in emissions, but merely to return to a point slightly below emissions levels in 1990. It is for these reasons that its contribution to the problems caused by climate change are anticipated to be small.

### *Effects of the agreement for the United States*

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<sup>20</sup> Percival et al., *supra* note, at 1058.

<sup>21</sup> See Tol, *supra* note; Houghton, *supra* note.

<sup>22</sup> See Richard A. Posner, *Catastrophe* (2005); *Avoiding Dangerous Climate Change*, *supra* note.

<sup>23</sup> For relevant discussion, see DeCanio, *supra* note (supporting intergenerational neutrality and suggesting that a low discount rate is compatible with this principle); Richard B. Howarth, *Against High Discount Rates*, in *Perspectives on Climate Change: Science, Economics, Politics, Ethics* 99 (Walter Sinnott-Armstrong and Richard Howarth eds. 2005).

<sup>24</sup> Nordhaus and Boyer, *supra* note, at 152.

<sup>25</sup> See Cline, *supra* note, at 29.

According to prominent projections, the most serious damage from climate change is most unlikely to be felt in the United States.<sup>26</sup> Some estimates show that American agriculture will actually be a net winner as a result of climate change.<sup>27</sup> Other estimates show that Americans will be net losers, but not nearly to the same extent as other nations.<sup>28</sup> In this light, we can offer a projection of the costs and benefits of the Kyoto Treaty for the United States alone – a projection designed not to offer anything like an unimpeachable point estimate, but to describe what prominent analysts projected when the United States was making its key decisions <sup>29</sup>.

*Costs and Benefits of Kyoto Treaty for the United States (in billions of 2000 dollars):*

	No Controls	Kyoto Treaty	Unilateral Action to Comply with Kyoto Treaty
Benefits	—	12	0 <sup>30</sup>
Costs	—	325	325
Net Benefits	—	-313	-325

These numbers show that the Kyoto Treaty is not a good bargain for the United States. The anticipated benefits of \$12 billion are hardly trivial, but they are dwarfed by the anticipated costs of \$325 billion. For the United States, significant unilateral action to comply with the Kyoto Treaty may well produce no benefits at all, and on these projections, it would not be easy to defend in benefit-cost terms. If the United States engaged in emissions reduction on its own, it would be taking extremely costly action for speculative benefits – or at least prominent actors so perceived the situation at the time.

The larger point is that for the United States, the perceived values presented a very different picture for the Kyoto Treaty than for the Montreal Protocol. The perceived costs of the Kyoto Treaty were much higher than the costs of the Montreal Protocol (by some \$313 billion), and the perceived benefits of the former were much lower than the benefits of the later (by some \$3,562 billion!).

<sup>26</sup> See Nordhaus and Boyer, *supra* note, at 96-97.

<sup>27</sup> See Olivier Deschenes and Michael Greenstone, *The Economic Impacts of Climate Change: Evidence from Agricultural Output and Random Fluctuations of Weather* (2006), available at <http://www.aei-brookings.org/publications/abstract.php?pid=1031>; compare the suggestion in Nordhaus and Boyer, *supra* note, at 97, that “the economic impact of gradual climate change (that is, omitting catastrophic outcomes) is close to zero for a moderate (2.5 degree C) global warming.” Note that this conclusion does not come to terms with the economic effects on the United States that would come from the very fact of serious economic harms in other nations.

<sup>28</sup> See Nordhaus and Boyer, *supra* note.

<sup>29</sup> Compiled on the basis of Nordhaus and Boyer, *supra* note, at 156-67.

<sup>30</sup> This estimate is of course rough. It is based on the assumption that unilateral action would have no significant effect in reducing the harms associated with climate change for the United States – and that any such effect might be counteracted by benefits.

I do not mean to suggest that the relevant decision makers, in the Senate or in the Bush Administration, were aware of the specific figures, or based their decisions on a formal benefit-cost calculation of any kind. Recall that nations are not persons, and that any national response to benefit-cost analysis has to explain the mechanism that makes that response possible. The central point is rather that an intuitive understanding of consequences – that the Kyoto Treaty would deliver few benefits, because of the exclusion of the developing nations, while imposing significant burdens – played a key role. In the Senate, both Republicans and Democrats appeared to be aware that the Kyoto Treaty would impose significant costs and deliver relatively low benefits, because of the exclusion of developing nations. In the executive branch, this view was widely held, even among those who believed that climate change was a significant problem.

*Costs and Benefits of the Kyoto Treaty for the World (in Billions of 2000 Dollars)*

	No Controls	Kyoto Treaty
Benefits	—	96
Costs	—	338 or 217 (if we include, as offsetting benefits, \$112 billion in permits for Europe including Russia)
Net Benefits	—	-242 or -119

These numbers must be taken with many grains of salt, as they depend on contentious assumptions about:

- o the degree of emissions trading,
- o technological innovation,
- o discount rates,
- o the likelihood of abrupt or catastrophic warming, and
- o the valuation of life and health.

With a lower discount rate, and modest changes in underlying assumptions, the benefits of greenhouse gas reductions can grow dramatically.

Reasonable people might expect the costs to be significantly lower or offer a significantly higher estimate of the benefits.<sup>31</sup> Perhaps the Kyoto Treaty would have served, and might still serve, as a start toward a broader and more inclusive agreement. But on the numbers that confronted the United States at the pertinent times, the argument for ratification of the Kyoto Treaty was certainly unclear—far more so than the argument for ratification of the Montreal Protocol. This brings us to another question.

*Why was the Kyoto Treaty possible at all?*

Why did so many nations express enthusiasm for it? Part of the answer undoubtedly involves an assessment of domestic costs and benefits—an assessment that seemed favorable or at least not unfavorable for many of the signatories, and uniquely unfavorable for the United States. Many nations undoubtedly had more to gain than to

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<sup>31</sup> Cline, *supra* note, at 31, suggests that the Kyoto Protocol would deliver worldwide benefits in excess of costs, while also suggesting that it accomplishes relatively little in reducing warming.

lose, e.g., Eastern European nations, which acquired valuable emissions licenses. Some of the nations that appeared to make ambitious promises, such as Germany and the United Kingdom, made no such net gains.

To be sure, it is possible that some nations were acting as global altruists. Perhaps some had an unusually pessimistic account of the consequences of climate change. On this view, the agreement was a kind of “cheap talk” - a way of signaling a commitment that would not operate as a commitment in practice. Let us now explore some evidence for this view.

*Where we are*

The Kyoto Treaty has been ratified by all of the Annex1 nations except the United States and Australia. Mere ratification disguises substantive compliance and many signatories are very far from their targets under the Kyoto Treaty.

EU Countries			
Country	Target	% Change in Emissions between 1990 and 2003	Compliant?
Austria	-13%	16.50%	no
Belgium	-7.50%	1.30%	no
Denmark	-21%	6.80%	no
Finland	0	21.50%	no
France	0	-1.90%	yes
Germany	-21%	-18.20%	almost
Greece	25%	25.80%	almost
Ireland	13%	25.60%	no
Italy	-6.50%	11.50%	no
Luxembourg	-28%	-16.10%	no
Netherlands	-6%	1.50%	no
Portugal	27%	36.70%	no
Spain	15%	41.70%	no
Sweden	4%	-2.30%	yes
United Kingdom	-12.50%	-13%	yes

Note that compliance varies by country and is not required until some time between 2008 and 2012. hence widespread noncompliance does not foreclose the possibility that the situation will be better when the actual due dates arrive. Nonetheless, the UK, Sweden and France (with its heavy reliance on nuclear power) are the only EEC nations that have already met their targets under the Kyoto Treaty. The current numbers, and the existing trends, suggest that it is highly likely that a majority of EU nations will fail to meet their obligations.

There is a large contrast here with the Montreal Protocol, for which compliance is essentially perfect. To be sure, Germany and Greece are close to their targets; we have seen the explanation for the first two [I don't understand this last point]. The more important point is that the vast majority of nations are very far from what Kyoto requires, often showing increases where they should be showing reductions.

Now consider Annex I countries<sup>32</sup>:

Annex 1 Countries			
Country	Target	% Change in Emissions between 1990 and 2003	Compliant?
Bulgaria	-8%	-50%	yes
Czech Republic	-8%	-24.20%	yes
EEC	-8%	-1.40%	no
Estonia	-8%	-50.80%	yes
Latvia	-8%	-58.50%	yes
Liechtenstein	-8%	5.30%	no
Lithuania	-8%	-66.20%	yes
Monaco	-8%	30%	no
Romania	-8%	-46.10%	yes
Slovakia	-8%	-28.30%	yes
Slovenia	-8%	-1.90%	no
Switzerland	-8%	-0.40%	no
United States	-7%	13.34%	no—refuses to ratify
Canada	-6%	24.20%	no
Hungary	-6%	-31.90%	yes
Japan	-6%	12.80%	no
Poland	-6%	-34.40%	yes
Croatia	-5%	-6%	yes
New Zealand	0	22.50%	no
Russian Federation	0	-38.50%	yes
Ukraine	0	-46.20%	yes
Norway	1%	9.30%	no
Australia	8%	23.30%	no—refuses to ratify
Iceland	10%	-8.20%	yes

The most remarkable fact presented here is that while the United States is one of only two Annex 1 nations that have declined to ratify the Kyoto Treaty, a number of countries show emissions increases comparable to or higher than those of the United States. These include Canada, New Zealand, Australia, Austria, Greece, Ireland, Portugal, Spain, and Italy. Although it is true that substantial reductions in greenhouse gas emissions can be found in Bulgaria, Estonia, Latvia, the Czech Republic, Lithuania, Hungary, Poland, Russia, Ukraine, Iceland, Luxembourg, the United Kingdom, Sweden, and Germany,<sup>33</sup> most of these nations are in Central and Eastern Europe, which has suffered serious economic distress in the relevant period. This distress accounts for substantially lower

<sup>32</sup> Id.

<sup>33</sup> See UNFCCC, Key GHG Data: Greenhouse Gas (GHG) Emissions Data for 1990-2003, submitted to the UNFCCC, at 16-17 (November 2, 2005).

levels of energy use and hence lower levels of emissions, in fact an overall reduction of 37 percent of emissions in the relevant period.

Because of the latter figure, the good news is that from 1990 to 2003, greenhouse gas emissions from Annex I parties did decrease by 5.9 percent, or a total of 18.4 billion tons—an average decrease in line with the Kyoto target.<sup>34</sup> But it is important to be careful with this figure. It is true that the average decrease, under that target, is 5.2 percent, but Kyoto's distribution of targets among nations would eventually produce far greater overall decreases than those captured by the immediately preceding table. The reason is that the decreases have occurred in nations with already low emissions rates, while the nations with high emissions rates (above all the United States) are generally increasing, not decreasing, their emissions. By 2010, overall emissions from wealthy nations may grow by as much as 17% from 2000.<sup>35</sup> In view of the likely increase in emissions from wealthy nations, and because the economies of Eastern European nations are recovering, Kyoto's goals are most unlikely to be met.<sup>36</sup>

### *Where we are and Lessons and Implications*

A possible response is that if Vice President Gore had won the presidency in 2000 – and he was very close to doing so – the United States might well have ratified the Kyoto Treaty, and hence the material interest of the United States, as reflected in the numbers above would not necessarily have been determinative. Counterfactual history is full of speculation, but there is every reason to believe that no American president would have been able to persuade the Senate to ratify the Kyoto Treaty in the first years of the twenty-first century. Recall that no member of the United States publicly supported ratification. Recall also that even as Vice President, Gore was pressed to say that the Clinton Administration would not ask the Senate to ratify the treaty without “meaningful participation” by developing countries.<sup>37</sup> Of course leadership is important, and we cannot exclude the possibility that an aggressive and agile president, firmly committed to the Kyoto Treaty, might have persuaded the nation to accept it. History is full of such speculations. But at the very least, it can be said that any president would have faced a serious uphill battle, unless it could have been shown that the costs of compliance would have been far lower than many experts projected. The unanimous opposition of the Senate, in the relevant period, speaks volumes.

We can sharpen the distinction between the two accords by offering an observation. Some international agreements can solve prisoners' dilemmas, by enabling nations to make binding promises to undertake action that no individual nation, or few individual nations, would undertake on their own.

At first glance, the problems of ozone depletion and climate change might seem to have this structure. Indeed, a sensible agreement to control climate change might well solve a prisoners' dilemma. But neither the Montreal Protocol nor the Kyoto Treaty solves a

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<sup>34</sup> Id at 14.

<sup>35</sup> <http://www.commondreams.org/headlines03/0610-07.htm>

<sup>36</sup> Id.

<sup>37</sup> See supra.

prisoners' dilemma. Unilateral compliance with the requirements of the Montreal Protocol was in the interest of the United States, and probably many other nations as well [where is your evidence for this assertion?]. Hence the United States and many others [really?] would rationally do as the Montreal Protocol required even if no other nation did so. By contrast, the Kyoto Treaty solved no prisoners' [plural] dilemma for the United States. On the contrary, serious analyses suggested that compliance with the requirements of the Kyoto Treaty would probably have made Americans worse off, even if such compliance ensured that all other parties complied as well. It is possible to imagine an agreement that would make all or most nations better off, but the Kyoto Treaty was not that agreement.

### *Lessons*

With respect to the United States, the lesson of the Montreal Protocol can be captured in a single sentence: Where the domestic assessment strongly favors unilateral action, and where the same assessment suggests that a nation is likely to gain from an international agreement, that nation will favor such an agreement. This is true unless well-organized private groups are able to persuade it not to do so. For the Kyoto Treaty, the lesson is equally simple:

Where the domestic assessment suggests that unilateral action makes little sense, and where the same assessment suggests that a nation will lose from an international agreement, that nation is unlikely to favor such an agreement—unless, perhaps, the public is willing to demand that it do so. In light of these simple lessons, the two protocols present polar cases, and actually easy ones to understand.

## Part V. Where we are

### *The Stern report on climate change calls for emission trading*

On October 16<sup>th</sup>, on behalf of the British government, Sir Nicholas Stern released his independent report on the economics of climate change. It had been commissioned by the Prime Minister and the Chancellor of the **Exchequer**. Stern who holds a doctorate in economics (Nuffield College, Oxford) and is said to have political aspirations.

The Stern report advocates aggressive (and costly) action to reduce carbon emissions to avoid climate change. The 700-page report argues that “the price of inaction would be extraordinary and the cost of action modest.” By “modest” Stern means the cost of dealing with stabilizing concentrations of CO<sub>2</sub> at 550ppm which the report estimates would cost between minus 4% and 15% of world GDP. Stern devotes a large part of the report to explaining how market mechanisms can accommodate both the developing world's desire for self-enrichment, and its need to avert serious climate change.

The Stern report has been both heralded and criticized. Bjorn Lomborg, the author of *The Skeptical Environmentalist* (Cambridge, 2001) criticizes Stern's findings on a

number of grounds.<sup>38</sup> Lomborg counters Stern's estimates of the costs and benefits of reducing greenhouse gases now.

For example, in focusing on the report's finding that climate change is increasing hurricane damage in the US, Lomborg argues that hurricane damage is due to demographic factors. More people with more goods to be damaged have chosen to settle in ever more risky habitats. Stern calls for the more costly approach of reductions in carbon emissions which will reduce hurricane damages by 1% to 2%. Lomborg points out that hurricane damages could be reduced by more than 80% by bracing and securing roof trusses and walls. Bjorn criticizes Stern's estimates of the social costs of CO<sub>2</sub> emissions at \$85 per ton emitted. Yale economist William Nordhaus estimates the social cost of CO<sub>2</sub> at \$2.50 per ton.

Lomborg criticizes Stern's finding that the cost of stabilizing concentrations of CO<sub>2</sub> at 550ppm to address climate change is in the range of minus 4% to 15% of GDP. In contrast, the UN found it would cost 0.2% to 3.2% of GDP. Stern's argument for immediate and strong action *now* is based on the argument that doing nothing about climate change costs 20% of GDP now, and doing something costs only 1%.

His numbers are suspect on other grounds. For example, he chooses a low GDP estimate for the 22<sup>nd</sup> century and an unrealistically low discount rate which pumps up the numbers. Stern argues that global climate change will further disadvantage the world's poorest developing countries. Lomborg disagrees with Stern's view that developing countries wish to sacrifice environment for development. Lomborg asked 24 United Nations ambassadors to prioritize the world's greatest challenges. In his survey, called the Copenhagen consensus, improvements in health and nutrition, water supplies, sanitation and education, were ranked far ahead of global warming.

*Comments on Stern (optional for presentation)*

Critics have focused on Stern's cost estimates. The greens are pushing to get America's government on board. But looking at the broader picture, getting America on board is a relatively small challenge. Most observers think it is likely to happen sooner or later. Few think that change will come with the current president, but both of the current front-runners for 2008, John McCain for the Republicans and Hillary Clinton for the Democrats, are likely to seek to federalize the control of greenhouse-gas emissions. Again, the institutions developed in the Clean Air Act are likely to be the model for addressing greenhouse gases.

Regardless of how the United States proceeds, America is not going to be the world's biggest emitter for much longer. China looks set to overtake it by 2015. Emissions from developing countries will soon dwarf those of the rich world.<sup>39</sup>

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<sup>38</sup> "Stern review," *Wall Street Journal*, A12, Nov 2, 2006.

<sup>39</sup> *The Economist*,

The counter-argument here is that developing countries are also the ones that will sustain the most damage, most quickly. The Himalayas, for instance, act as a great sponge. The snow and ice on their upper reaches hold water which is released slowly into India's rivers through the dry spring and summer months. If the water melts too quickly, the crops die. It is here that we can learn from the Montreal Protocol, which was widely supported by the United States government and considered highly successful.

The Stern report argues that the future of climate negotiations may lie in controversial new markets developed to commoditize both clean air and the right to pollute it. Emissions trading, as set out in Article 17 of the Kyoto Treaty, provides for signatories (called Annex I Parties) to acquire units from other Annex I Parties and use them towards meeting their emissions targets under the Kyoto Treaty.

#### *The Clean Development Mechanism*

This Kyoto Protocol provision permits firms in rich countries to buy emissions credits from firms in poor countries. For example, an Italian power company which has run out of carbon allowances might buy more credits more expensively through the European emissions-trading scheme, or more cheaply from a company in a developing country which has cut its own emissions or has invested in clean technology. *The Economist* categorized this as "In effect, methane from Brazilian pig effluent, Chinese industrial gases and African trees are being sold to rich-world companies that want to increase their carbon emissions."

When the trading mechanism was set up, it was widely regarded as the sort of economist's conceit which was fine in theory but doomed in practice. And yet it does seem to be working. Up until 2012 (the end of Kyoto's first stage) developing countries should get between \$5 billion and \$15 billion for cutting emissions by 1 billion tons of carbon-dioxide equivalent (a quantity about equal to India's annual emissions).

Those dollars, of course, come straight from the pockets of consumers, and mostly European ones, since European countries have taken the Kyoto protocol most seriously.

But they are being put to good use. Because developing-world industry is so dirty, it is much cheaper (ie, more efficient) to cut pollution there, than in the rich world. Which is why Stern can argue that markets do work, and why one of the best ways for rich countries to set about protecting the wider world is by extending and enlarging this scheme.

#### *California out in front again*

On September 27, 2006, Governor Schwarzenegger signed AB 32, the Global Warming Solutions Act which caps California's greenhouse gas emissions at 1990 levels by 2020. This legislation represents the first enforceable state-wide program in the U.S. to cap all greenhouse gas emissions from major industries that includes penalties for non-compliance. It requires the State Air Resources Board (CARB) to establish a program for statewide greenhouse gas emissions reporting and to monitor and enforce compliance with this program. The Act authorizes the state board to adopt market-based compliance mechanisms including cap-and-trade, and allows a one-year extension of the targets under extraordinary circumstances.

With respect to the AB 32, the peculiar electoral dynamics of California undoubtedly played a key role. Many residents of California are greatly concerned about climate change, and the state's governor, who faced a serious battle for reelection, likely benefited from showing his own commitment to the problem.

This serves to illustrate a situation in which an energized citizenry may produce an outcome that is not justified by a consideration of material costs and benefits. Since the 1960s environmental advocacy groups have been very powerful in California politics.

It should be noted that California was ahead of the curve with regard to the regulation of air pollution. While federal legislation allowed states to be more stringent than federal law, this was not to be. The federal government leapfrogged California in order to only one system. Otherwise it would have been a forty-nine state system and California.

AB 32 challenges my account, but in a sense, California is in the same position as was the United States with respect to the Kyoto Treaty, exploring an option that would apparently produce small benefits at significant cost. But California was willing to select that option. Certainly, the political dynamics played some role. Of course the national context is different, in part because the political dynamics are quite different, at least at the present time.

The pressure behind AB 32 came from the Natural Resources Defense Fund and other activist groups. Perhaps the citizens were motivated by moral considerations or simply to step up to the plate. It is also possible that their perception of costs and benefits that was not accurate. Certainly there is a symbolic element to California's action as it might spur additional reductions, both domestically and internationally, while also leading to technological changes that drive down the costs of emissions reductions. It may also be an effort by its environmentalist sponsors to affect the policy debate by forcing the federal government to take the more stringent route which was taken in the Clean Air Act. Of course, this is mere speculation on my part, but it is based on factors which affected the Clean Air Act.

## **Part VI. Conclusion**

For those who are concerned about the risks of climate change, it would be appropriate to emphasize that the United States has been a principal contributor to those risks, and that addressing the nation's economic self-interest does not exhaust its moral obligations. To the extent that the citizens of the United States have benefited from activities that impose environmental harm on other nations, those citizens are properly asked to help—through reducing their own emissions, through paying other nations to reduce theirs, and through payments to ease adaptation.

But on the basis of our discussion of the Montreal and Kyoto accords, one is led to expect that domestic self-interest will continue to be an important motivating force. The position of the United States will likely remain unchanged unless the domestic benefits of emissions reductions are perceived to increase or if the perceived domestic costs decline, perhaps as a result of technological innovation. To conclude on a note of optimism, the

task is to devise an international agreement that resemble the Montreal Protocol in one critical respect: Its signatories, including the United States, must reason that participation produces more benefits than costs.