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Economics versus Climate Change

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Abstract

This paper argues against the common-sense conclusion that climate change demands a global market-based solution, such as international emissions trading. First, current experience suggests global cooperation is not necessary for initial mandatory actions. Second, when domestic targets vary across nations, there are a variety of reasons why international emissions trading, even though it creates aggregate economic gains for all nations, may not be desirable. These reasons include concerns over legitimizing target variations for future negotiations, real and perceived consequences of capital flows across nations, and distributional impacts within nations. Finally, the underlying need for global technology solutions suggests domestic mitigation policies that balance clear emissions price signals, incentives for technology development and deployment, and mechanisms to finance deployment to developing countries. International efforts, in turn, might focus on encouraging these domestic actions, facilitating the developing country investment mechanisms, and providing credible reviews of national action.

Key Words: climate, change, international, treaty, Kyoto, emissions trading

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Contents

1. Introduction.....	1
2. Is International Agreement Necessary to Initiate Action on Climate Change?	2
3. Should We Pursue International Emissions Trading Now?	6
4. What Should Domestic Policies and International Action Look Like?	10
5. Conclusion	12
References.....	14

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William A. Pizer*

1. Introduction

There is a tendency in economics to focus on the big picture and key messages. In the arena of climate change, these might be: a global externality requires global cooperation, international emissions trading lowers costs for all nations, and emissions pricing is the key to the development of new, climate-friendly technologies. Such thinking clearly shaped the design of the Kyoto Protocol, a climate change treaty negotiated by more than 140 nations that establishes a global emissions trading system for greenhouse gases. And even among those who might quibble with the particular targets, timetables, or mechanisms, many would embrace the overall architecture of global cooperation and international emissions trading.

But is this the right message for economists to be bringing to the table? To the extent that economics is fundamentally about informing better public policy decisions, as well as understanding economic (and human) behavior as a means to that end, the discipline must confront three pieces of information in conflict with the earlier message. First, the United States is not part of the Kyoto agreement now and, for many reasons, probably may not ever join a Kyoto-like agreement. Second, developing countries are not lining up behind the Kyoto idea of binding emissions limits, a necessity for conventional emissions trading. Third, the kinds of technologies we need to solve the long-term climate challenge currently are not available at the prices many nations are willing to pay. For economic insight to be relevant to the climate policy debate, these facts need to be embraced.

In consideration of these facts, this paper asks three questions and in doing so sketches out the economic (and practical) arguments for both a more relaxed international framework—a “bottom up” or “pledge and review” approach as discussed by Bodansky et al (2004)—and flexible domestic architecture involving price mechanisms, technology policy, and vehicles for developing county investment. These three questions are: (1) Is international agreement necessary to initiate action on climate change? (2) Should we pursue international emissions

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trading, or more generally, globally harmonized marginal abatement costs, as a policy goal at this time? And (3) How can domestic and international actions encourage long-term solutions to climate change?

Summarizing, I find that the current state of affairs, whereby the United States has no mandatory emissions policy, while Europe already has initiated an emissions trading program, provides strong evidence that international agreement is not necessary for national governments to embrace mandatory policies—at least not agreement between the world’s two largest economic powers. On the second question, despite the cost-effectiveness of international emissions trading, there are easier ways to equalize prices (e.g., national price-based policies), while within-country concerns over equity and climate damage may argue against global price equalization in the first place. On the third question, in addition to considering national price-based policies, I find convincing arguments for explicit technology incentives based both on the existence of technology market failures and the practical desire to complement the “stick” of emissions regulation with the “carrot” of incentives. Finally, the real needs on the international front are successful mechanisms to tie national policies to developing country energy investments, where the majority of inexpensive global mitigation opportunities exist.¹ Credible international reviews of national actions could also speed up the necessary process of national decisions about future action. My conclusion, therefore, is that international efforts should focus primarily on spurring domestic action through bottom-up approaches, creating mechanisms for channeling funds to projects in developing countries, and providing credible reviews of national activities.

2. Is International Agreement Necessary to Initiate Action on Climate Change?

While basic economic theory suggests that the solution to a global environmental externality like climate change requires global cooperation, recent experience presents challenges to that theory. The Kyoto Protocol has entered into force without the United States—the largest industrialized country responsible for almost one-quarter of the world’s emissions. Moreover, those countries that have pursued domestic policies to reduce emissions have done so with only partial linkages to their Kyoto obligations and mechanisms. Perhaps cooperation is not so important for a *first* step to address global climate change.

¹ Whether the Clean Development Mechanism under the Kyoto Protocol can become a successful funding vehicle remains to be seen.

Consider, for example, the hypothesis that the United States' departure from the Kyoto Protocol may have, in part, encouraged its eventual entry into force. On the one hand, absent the United States, the collective burden of the Kyoto parties was reduced substantially.² The United States, because of its rapid population and economic growth since the base year of 1990, as well as its relative size, faced an enormous shortfall to reach its target. Some of this shortfall could have been ameliorated through favorable decisions about sink credits, but the United States likely would have depended on the use of the protocol's flexibility mechanisms—emissions trading with Russia and Ukraine, who possess an allowance surplus, and developing country credits via the Clean Development Mechanism. Absent U.S. participation, these flexibility mechanisms have more capacity to address shortfalls in Europe and Japan.

On the other hand, the U.S. departure put Europe on the spot to prove it was serious about climate change (Grubb 2002). Because the treaty was constructed in a way that would allow it to enter into force without the United States, Europe, along with the other nations remaining in the protocol, faced the uncomfortable choice of either abandoning the treaty and appearing incapable of action absent the United States or continuing with the treaty without the world's largest emitter. Conventional economic theory suggests that continuing without the United States makes no sense: How do Kyoto parties convince the United States to take action in the future if they are not bargaining their own collective action in exchange? It is as though the Kyoto parties agree to lose the prisoner's dilemma; the United States benefits from their action and incurs no costs.

Yet, not only did the European Union quickly ratify the Kyoto Protocol despite U.S. inaction, it moved ahead to enact a 2003 directive creating an emissions trading scheme (ETS), partly in parallel to the protocol's trading mechanisms. While their own forecasts suggest that the EU-15 will be 8.5 percent above their 1990 target and the EU-23, including new Annex 1 member states such as Poland and the Czech Republic, 3.6 percent above their target (EEA 2005), the trading program remains a very tangible commitment to reduce emissions—and clear evidence that Europe is not waiting for U.S. cooperation.

Why would the European Union go forward with a trading program, absent a global commitment, with minimal consequences for the environment and very real consequences for their businesses? One could back up further and ask, why would the Annex I countries agree to

² EIA (2001) estimates that the Kyoto burden of the United States alone exceeded the collective burden of Annex I in 2010 (Table 2, page 14). See also Nordhaus (2001) and Babiker et al. (2002).

emission targets under the Kyoto Protocol, absent a developing country commitment, with minimal consequences for the environment and (assuming they enact enabling legislation) very real consequences for their economies? Or, why did the recent Bingaman–Specter resolution (U.S. Senate 2005) ask only that U.S. action encourage action by other nations, while the previous Byrd–Hagel resolution (U.S. Senate 1997) stipulated “new specific scheduled commitments to limit or reduce greenhouse gas emissions” by developing countries?

The answer is that initial action on climate change need not be entirely cooperative. First, most countries will themselves recognize benefits from their own mitigation, simply not the full, global benefit of that mitigation outside their own borders. Second, even acknowledging these internal benefits, it is unclear what drives some nations to become stronger advocates for action than others.³ Third, the push for cooperative action may slow real action by spending time and resources on the effort to reach an unnecessary agreement.

Meanwhile, there are many examples of multilateral issues where actions initially were idiosyncratic or unilateral and later became cooperative. Trade, disarmament, phase out of ozone-depleting substances, and other global environmental problems—all of these have (at times) involved with one or a few countries taking action. The key is that countries take an initial step in expectation of some level of reciprocation; countries take one step unilaterally, but not two.

There are at least two distinct advantages to this less cooperative, unilateral approach. First and foremost, it is a chance to determine what can be done domestically. Over the past decade in the United States, we have seen numerous efforts to tackle serious problems that have floundered over domestic or congressional support: health care, Social Security, major tax reform. There is also an issue of timing: The 1990 Clean Air Act Amendments that created the historic acid rain trading program were in part a product of successes and failures over the preceding decades (Kete 1993). Finally, the United States has a history of treaty law whereby it typically does not ratify a treaty without implementing legislation in place (CRS 2001). All of this suggests that attempting to negotiate an international agreement as a prelude to domestic action creates problems when the time comes to turn the international commitment into domestic action—or even to ratify the international agreement.

³ For example, Nordhaus (1998) estimates the largest impacts to be in Africa and India—yet those countries are far from leading the charge on the climate change. Interestingly, his estimates show Europe to have considerably higher impacts than the United States, Japan about the same, and Russia to see benefits (all from 2.5°C warming).

Second, focusing on domestic action first means that the international architecture benefits from an initial base of experience. Efforts to address sinks, project-based credits, penalties, and other details under the Kyoto Protocol arguably were hampered by little practical experience at the time these provisions were negotiated. More recent plans to incorporate project credits in the Regional Greenhouse Gas Initiative in the United States (spearheaded by Governor Pataki of New York), for example, have benefited from all the project-based activities that have occurred since 1997. Similarly, considerable expansion and improvement in the economic modeling of climate policies has made the near-terms costs of mitigation policy clearer—a significant advantage when setting targets.

From a more subtle economic view, climate change can be viewed as a repeated game. Unlike a static game where players are viewed as simultaneously jumping to the equilibrium, a repeated game allows many more possibilities. This includes the idea that one player will unilaterally follow a cooperative route in an attempt to lead the other player; if the other player does not follow, the cooperative route can be abandoned. And it need not be a particularly cooperative route—simply encouraging an initial round of policies where countries maximize their own net benefits could be a useful first step on the road to maximizing global net benefits. There even may be an advantage to moving first, if the “first-mover” is able to establish architecture and precedent in her favor or if she develops an expertise that is then valuable.

In concluding this discussion about cooperation, I would note that my use of current action as evidence about the necessity of cooperation (or lack thereof) might seem to raise an obvious concern: Does current action, in fact, represent an appropriate response given the current scientific understanding? For example, one might agree that the E.U. ETS is possible without U.S. cooperation but believe that more action is necessary now and that action requires cooperation with the United States. My point, however, is not that current action is too little, too much, or just right, merely that meaningful—that is, mandatory—action on climate change is possible unilaterally as a first step.

My lack of concern over international cooperation is also only in reference to initiation and first steps. Assuming the arguments for, and willingness to invoke, a stronger climate policy response continue to grow, international coordination and cooperation will become increasingly important.

3. Should We Pursue International Emissions Trading Now?

The preceding section has argued that initial mitigation efforts are not only possible but are actually occurring without the benefit of cooperation among key parties. But now I want to ask a second question: Suppose we see domestic, market-based policies evolving; should we pursue international emissions trading or alternative efforts to harmonize marginal abatement costs now? As the heading suggests, I find convincing evidence that the answer is “no.” First, economic analysis (and recent experience) suggests price mechanisms ought to be preferred to pure emissions caps; introducing price mechanisms makes an international trading program both more difficult and less important. Second, despite arguments for economic efficiency, there are a variety of reasons why countries might want to maintain or limit their domestic emissions at a particular level and, therefore, want to avoid international trading. Third, the kinds of cash flows associated with a global emissions trading program could create both economic and political challenges. Fourth, global trading in a general sense is unnecessary assuming the real supply of cheap mitigation opportunities is in developing countries. For efficiency, trading only needs to facilitate North–South movements of mitigation technology to capitalize on those opportunities. All of this suggests that a more pragmatic solution might focus on domestic mitigation programs that simultaneously create incentives to pursue opportunities in developing countries.

The first point, ironically, is supported by both economic theory and political practicality. Most economic analysis shows that price-based mechanisms are much superior to quantity-based approaches in terms of expected welfare (Pizer 2002). This follows from the basic Weitzman (1974) intuition that relatively flat marginal benefits favor price instruments coupled with the extreme persistence of greenhouse gas emissions. That is, cumulative contributions over even a number of years are sufficiently small compared to cumulative contributions since industrialization so as to not affect marginal consequences (Newell and Pizer 2003). Even absent academic studies, debate in the United States suggests that the economic uncertainty associated with an emissions cap is problematic (NCEP 2004). Conveniently, a “safety valve” can be introduced into an otherwise ordinary emissions trading program to make it behave like a price mechanism: the government stands ready to sell additional allowances at the safety-valve price, mimicking a price policy.

In an international trading program, however, who sells those extra allowances? If national governments do this, the outcome is tricky. A shortage in one country could lead firms to purchase from that government or to import allowances from another country and shift the shortage to the exporting country. Whichever government ends up selling allowances, however, ends up generating revenue for itself—a clear national benefit. If this hazy outcome about who

ends up generating revenue is not acceptable, then a single international agency needs to sell the allowances—but again the question arises, how will the revenue be used? For some, the idea of buying additional emissions allowances from a U.N.-type organization is itself problematic. But all of this is really unnecessary; if a safety valve exists, it can be used to set a common price across countries via domestic programs without the need for trading.

A second question arises when countries have different ideas about what they believe emissions reductions are worth and what allowance prices ought to be. Arguably, that is the case right now: Allowances in the E.U. ETS recently traded at nearly €30 per ton of carbon dioxide (Point Carbon 2005), while there is currently no market signal in the United States.⁴ If one were to guess about likely prices in a future U.S. trading program, something closer to \$5–10 is perhaps reasonable.⁵ Suppose this occurs and two potentially compatible trading systems exist: Europe with a €20–30 price and the United States with a \$5–10 price; would we want trading?⁶

Basic economics says yes: Both countries stand to gain from trade. The European Union gets cheap reductions in the United States, and the United States gets to sell reductions at a profit to the European Union. But wait. Does the European Union really want to legitimize what it may believe is an inappropriately weak target in the United States? Not only legitimize, but actually allow the United States to make money off their weak choice? What if the European Union sees €20–30 prices as necessary to encourage technological change? And, from the U.S. perspective, the choice of a \$5–10 price may reflect important domestic interests, such as preserving a particular level of coal production or limiting energy price increases.⁷ That is, trading into the European Union likely means higher allowance prices, large gains for allowance holders, and

⁴ Though previous analyses of the E.U. ETS suggested costs of €26 per ton of carbon dioxide, this arose in the later, more stringent Kyoto compliance phase (2008–2012) and only under the assumption of no trading beyond the European Union (Criqui and Kitous 2003). With trading, the cost was estimated to be as low as € per ton; presumably the easier targets in the warm-up phase should also result in lower costs.

⁵ Recent analyses of a U.S. climate proposal by U.S. Senator Jeff Bingaman and the National Commission on Energy Policy suggests costs of around \$5 per ton (EIA 2005). This proposal has caught the attention of Senator Pete Domenici, the Republican chairman of the Senate Energy Committee, who has indicated his possible support (Fialka et al. 2005). The more favorable analyses of the McCain–Lieberman proposal were also in the \$10-per-ton range (Paltsev et al. 2003).

⁶ There could even be a third system: Canada is pursuing a trading program for larger emitters with a limiting price of C\$15 per ton of CO₂.

⁷ Support by the United Mine Workers of America for the National Commission on Energy Policy recommendations, for example, hinged partly on the fact that while coal growth slows under their climate recommendations, it remains positive (UMWA 2004).

large losses for those purchasing energy or involved in coal mining, with the net welfare change being a relatively small gain.

Consider Figure 1, showing a simple welfare analysis for the coal market when allowances prices rise with trading. The net welfare gain is given by the small gray triangles. Alongside this gain, however, are transfers from consumers and producers of coal to allowance holders equal to the much larger hatched quadrilaterals. If redistribution is difficult, perhaps the gains to trade are less important than preserving a domestic balance.⁸

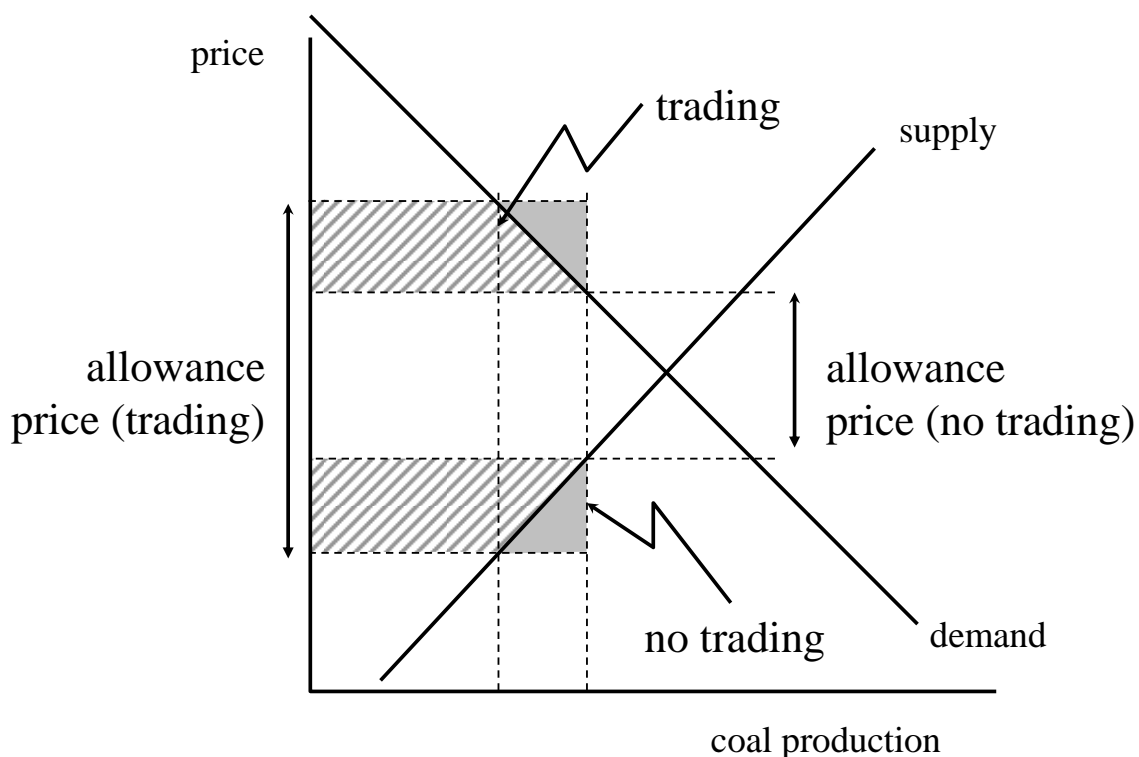


Figure 1. Simple Analysis of Welfare Effect of Greenhouse Gas Allowance Trading in a Coal Market When Allowances Prices Rise

⁸ Note that differences in relative prices among countries could be maintained by having non-uniform trading ratios; for example, two U.S. allowances might be required to obtain one E.U. allowance.

A third point concerns the more general political and economic practicality of large trade flows in emissions allowances. McKibbin et al. (1999) show that trading under the Kyoto Protocol could have had important and adverse effects on capital flows. Indeed, the first motivation for a safety-valve mechanism was to avoid these flows rather than to address cost certainty (McKibbin and Wilcoxon 1997). At a more gut level, one has to wonder about the eventual political response to large voluntary cash flows to other industrialized countries based on some negotiated allowance allocation among countries—can such transfers be sustained? It is almost ironic that in order to sustain a trading program, you may need an allocation that does not, in fact, lead to systematic trading in one direction or another.

Finally, it should be noted that the important trades really need to occur between developing countries, where the very cheapest mitigation options exist, and industrialized countries, where the mitigation burden will (at least initially) be placed, and not among industrialized countries. On the plus side, this is an area where we might expect a political acceptance of capital flows—there are already various forms of aid flowing from industrialized to developing countries; allowance purchases would be one more form. Further, this flow would likely translate into purchases of mitigation technology from the very industrialized countries initiating the flow. On the minus side, developing countries are both less equipped to establish an emissions trading program—in terms of monitoring and enforcement capacity—and less motivated to adopt a binding cap.

The latter reflects a view that emissions caps, however generous at the outset, could eventually be used to limit development and growth and that climate change simply is not a priority when viewed alongside poverty, hunger, and education (Kopp 2005). I worry that the strength of this view among developing countries may be underestimated among economists theorizing about global trading. If true, a critical piece of a global solution to climate change is developing successful mechanisms to channel industrialized country resources into developing countries' mitigation activities. It is really this piece of the puzzle that leads me to question the value of an international agenda focused now on international emissions trading and/or equalizing marginal costs of mitigation.

As with the first question concerning the importance of international cooperation, this view does not extend to the longer term if policies evolve toward tighter controls. At such a point in time, concern over international competition, as well as emissions leakage necessitates some effort to harmonize allowance prices/marginal mitigation costs. Further, tighter controls without sufficiently global participation may require trade instruments to address competition and leakage with non-participants.

4. What Should Domestic Policies and International Action Look Like?

Hopefully, none of what I have said so far will be construed to imply that climate change is not an important global issue or that should it be ignored in international forums. Rather, I see the international stage as a place to re-enforce domestic action in key countries, to challenge those countries to step up and do more where appropriate, but not—for now—to focus on global caps and allocation of emissions rights or even specific commitments. I believe it is important to recognize the variety of actions that are going on around the world focused both on mitigation and technology development. The preceding section suggested that some countries may pursue more expensive mitigation options than others. Some countries will pursue greater technology development; others higher efficiency. Some will embrace nuclear power; others will reject it. Some will pursue emissions taxes, others emissions trading, and yet others some form of hybrid policy.⁹

While recognizing the wide variety of potential domestic responses, it is worth noting that economics has produced convincing evidence supporting particular policy directions. I have already noted the strong arguments—both economic and practical—favoring price-based mechanisms or some other approach to modulating cost shocks (Pizer 2002; Newell et al. 2005). Others have focused on the need to combine technology and mitigation policies, based on dual market failures (environment and innovation) as well as practical concerns about adequate emissions pricing (Jaffe et al. 2004). This combination also possesses the politically appealing feature of coupling the carrot of technology incentives with the stick of emissions regulation (NCEP 2004). Finally, there is the issue of project-based mechanisms to take advantage of opportunities in developing countries (Fischer 2004).

Lurking behind all of these features is the reality that climate change is a long-term problem where the key is to incentivize technology development. While economists have long focused on getting the prices right, a central question is whether nations can sustain those prices in the face of competing forces.¹⁰ Those forces include economic competition with developing countries without similar controls, domestic pressure to preserve the status quo, and the voting public who, while concerned about global warming, rank it relatively low compared to other

⁹ New Zealand recently enacted a NZ\$15 carbon dioxide tax. Japan recently considered (but did not enact) a ¥2500–3000 tax per ton of carbon. Canada is pursuing a hybrid emissions trading program with a C\$15/ton CO₂ safety valve.

¹⁰ Montgomery and Smith (2005) have argued that emissions pricing is totally unnecessary.

issues (Krosnick et al. 2000). There is also the concern noted earlier that developing countries may fail to invoke any price on emissions in the foreseeable future. For these reasons, the concepts of stable economic costs, linkage with technology policies, and mechanisms for exporting technologies to developing countries are all important in the design of domestic policies.

Despite this reasoning, the creation of the E.U. ETS obviously has created momentum for an architecture with little attention to cost shock modulation or technology incentives and linkages to developing countries only via the Kyoto Clean Development Mechanism.¹¹ A key concern, then, is whether the E.U. ETS might falter for exactly these reasons. Experience with the RECLAIM program in California, for example, suggests that simply establishing an emissions trading program does not guarantee its success (Coy et al. 2001).

Many people besides me have ideas about what an effective domestic program should look like, and I believe international forums should be used to encourage domestic activities in whatever form they take. Further, they should provide opportunities to describe and evaluate the alternative routes taken by different countries. A key element of the earlier assumption, that domestic action can occur with something less than internationally agreed targets and timetables, is the idea that national governments will willingly take one unilateral step on climate change but not two. Additionally, they are even more likely to take a more meaningful step when they see others doing so. Both of these points suggest an important role for international institutions to both describe current actions as well as provide multilateral reviews of their consequences. For example, there is no doubt that as Europe moves ahead with its trading program, assuming some measure of success, arguments against such mandatory action in other countries will be weakened. Further, while the decision to take future steps (unilateral or multilateral) inevitably hinges on a country's own assessment about what their allies and competitors are doing, such assessments can be facilitated by multilateral reviews.

Much of what I am describing has been described previously as a bottom-up approach or “pledge and review” (Bodansky et al. 2004). The chief disadvantage cited in the literature is the potential reluctance of countries to pursue significant reductions absent a firmer commitment—if one believes significant reductions and firmer commitments are both appropriate and possible.

¹¹ As noted in the introduction, the effectiveness of the Clean Development Mechanism at channeling resources to developing countries remains to be seen.

Note that even if one believes significant reductions are appropriate, the question of what is possible still could lead one to prefer the bottom-up approach. And note that the pledge step may or may not be important: As nations go through their domestic policy processes, dictated by their idiosyncratic political schedules and cycles, they inevitably will face their choices with a keener focus on what they believe other nations are in fact doing, versus what they might have pledged. Finally, even if an international pledge activity itself leads to more ambitious goals, it is not obvious that these goals will translate into different choices when domestic politics is brought to bear. For example, despite more than a decade of international debate focused on 1990 emissions levels as a policy goal, it is hard to see how that has influenced serious proposals for domestic caps in either Europe, the United States, or in other countries.¹²

5. Conclusion

This paper began with the hypothesis that basic economic concepts applied to the problem of climate change may have lead us down the wrong path. The ideas that a global environmental externality requires a global intervention, that efficiency requires global trading, and that correctly pricing emissions is the way to bring forward future climate-saving technologies all follow from economic principles and are enmeshed in the current Kyoto targets and timetables approach. Yet there are signs of trouble ahead: There is no indication that the United States or developing countries will engage on these terms, few parties to the protocol are on track to meet their commitments, and we have yet to see the consequences of €20–30 allowances—a considerably higher price than forecast even for the Kyoto-phase of the E.U. ETS.¹³

This paper then tried to look more closely at the three ideas noted above and to ask how economic theory and practical issues might reverse those conclusions. Viewing climate negotiations as a repeated activity, where countries can take one step and see how other respond, suggests many more possibilities than a once-off chance at cooperation. Recognizing the within-country distribution of effects from emissions trading provides one of several reasons why

¹² For example, the McCain–Lieberman bill in the United States eventually abandoned any reference to 1990 levels. In Europe, the National Allocation Plans have focused on deviations from current or forecast emissions levels more than 1990 levels.

¹³ Recent attention, for example, has focused on the tight correlation of ETS allowance prices and electricity prices, raising concerns about unfair profits for electric generators who received their allowances for free (IFIEC 2005).

equalizing prices across countries may not be desirable even if it lowers aggregate costs. Finally, the relative importance of long-term technology development and deployment over near-term mitigation argues for a program that is broader and more flexible than ordinary emissions trading—providing cost certainty through a safety-valve mechanism, coupling technology-push policies with the demand pull of emissions pricing, and pursuing various approaches to channel resources toward developing country energy investments.

Much of the emphasis of future research and action, then, might be on domestic policy development that later can be ratcheted up as more countries become engaged. This bottom-up approach is not new. What may be new is an economic rationale coupled with a clearer suggestion about what international action could usefully focus on: encouraging developed country action, creating mechanisms to channel funds to projects in developing countries, and providing credible reviews of national activities. This, in turn, calls into question the value of either seeking new agreements on targets or further development of international trading mechanisms, with the exception of funding vehicles for developing country technology investments.

As the first Kyoto compliance period draws near and active discussions are occurring in virtually every industrialized country concerning domestic climate change policies, including those both in and out of the Kyoto Protocol, the time is clearly ripe for debate on these issues.

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