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Toward a Post-Kyoto Climate Change Architecture: a Political Analysis

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The goal of the Harvard Project on International Climate Agreements is to help identify key design elements of a scientifically sound, economically rational, and politically pragmatic post-2012 international policy architecture for global climate change. It draws upon leading thinkers from academia, private industry, government, and non-governmental organizations from around the world to construct a small set of promising policy frameworks and then disseminate and discuss the design elements and frameworks with decision-makers. The Project is co-directed by Robert N. Stavins, Albert Pratt Professor of Business and Government, John F. Kennedy School of Government, Harvard University, and Joseph E. Aldy, Fellow, Resources for the Future. For more information, see the Project's website: <http://belfercenter.ksg.harvard.edu/climate>

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Abstract

Any international agreement to address climate change must rest on broad public support in developed nations for mitigation actions. We propose an international climate architecture that builds on such public support—which we hope will be forthcoming—and uses multilateral international institutions to extend its effects to countries without such “green” publics. First, we suggest that politicians’ desire for public recognition could be manipulated through an “economy of esteem” in which incentives, such as prizes for climate leadership, are used to encourage additional climate-related actions. Second, we argue that an international cap-and-trade system in which buyers are liable for the validity of their emissions permits is the only international architecture that is likely to solve the three problems of (1) participation by many nations, (2) effectiveness at reducing global greenhouse gas emissions, and (3) compliance by all participants (Barrett, 2003). Cap-and-trade systems have the enormous advantage that permits can be set to give valuable “hot air”—permits in excess of likely future emissions—to those nations reluctant to join the system. Even though international agreements cannot be credibly enforced against sovereign nations, compliance with emissions caps can be secured through a system in which domestic political will enforces caps in net-purchaser countries, and profit-seeking behavior enforces caps in net-seller countries. Under our proposed system, trading would take place among firms, but the eventual value of permits would be determined by international evaluations and would be the same for all permits from a given political jurisdiction. Such a provision would simplify monitoring and evaluation and generate internal pressures on uncommitted states to construct viable domestic enforcement systems. The value of our proposed approach is that it uses domestic political support in countries that are willing to address climate change to provide incentives for participation by less-motivated countries. Although some non-compliance is inevitable, the system that we outline provides a political foundation for a working system not doomed by enforcement problems. It could therefore lead to effective regulation of greenhouse gas emissions and, more importantly, help to generate the technological innovation that is widely agreed to be essential if climate change is to be brought under control.

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The work of thousands of scientists, summarized in reports of the Intergovernmental Panel on Climate Change (IPCC), most recently the Fourth Assessment Report, makes it clear that the risks and severity of climate change are even greater than previously realized.² Meanwhile, economists have developed various schemes to generate incentives for reducing emissions of greenhouse gasses, thereby promoting essential technical innovation. Yet commensurate progress in negotiating a meaningful future agreement remains elusive. Analysts and advocates have not even generated a consensus around the political and institutional arrangements necessary for such a regime to work. Critics of a comprehensive climate architecture point to many problems, in particular the difficulties of negotiating national emissions quotas, linking domestic regulatory systems coherently, monitoring implementation, avoiding renegotiation, and ensuring compliance with international obligations. Since maintenance of a stable climate is a public good, both theory and history suggest it will be undersupplied, and governments will fail to reveal their true preferences for it. Furthermore, the difficulties inherent in providing global public goods are exacerbated by the unpromising incentive structure of the climate change problem. In broad terms, the costs of climate change will largely fall on politically weak developing countries, whereas the costs of emissions reduction will largely fall on industrialized countries. Consequently, agreement on any meaningful international regulatory system, whether tax- or trade-based, has been and will continue to be very difficult.

Any international regime aimed at the mitigation of climate change must solve three problems: 1) secure sufficient participation to be effective; 2) achieve agreement on rules that are meaningful, so that if they were followed, climate change would indeed be mitigated; and 3) ensure compliance with the rules.³ That is, it must solve problems of *participation*, *effectiveness*, and *compliance*. Solving all three problems simultaneously is particularly difficult, since achieving one goal is likely to make at least one other objective harder to meet. The most direct trade-off is between participation and the strictness of the rules, since as rules become stricter, we can expect reluctant states to become even more reluctant to be bound

¹ The authors are indebted for comments on an earlier draft of this paper to the organizers of this project, Rob Stavins and Joe Aldy, to Scott Barrett, Dan Bodansky, Michael Oppenheimer, and David Victor, and to participants in the Harvard Project on International Climate Agreements Workshop, March 13-14, 2008, particularly Scott Barrett, Daniel Bodansky, Richard N. Cooper, Denny Ellerman, Nathaniel Keohane, William Pizer, and Kenneth Richards. We appreciate research assistance from Raneer Adipat.

² For the report, see the website of the Intergovernmental Panel on Climate Change (IPCC): <http://www.ipcc.ch>.

³ Barrett 2003.

by them,⁴ and as participation becomes wider, agreement may only become possible on lax rules.

These problems cannot be jointly solved without a political commitment by leaders of states to do so, and a willingness to pay the requisite costs. In democracies, this means that democratic publics must share such a commitment. From the standpoint of social scientists seeking to design more effective institutions, such as ourselves, such political commitment is exogenous. It is a necessary, but not sufficient, condition for effective action that we can do little to generate. Scientists, NGOs, the media, and politicians have to play the principal roles.

What we social scientists can do is to think about ways to design institutions that contribute to effectiveness *at the margin*. We do not purport to solve the problem of insufficient political commitment; nor do any of our suggestions properly bear the burden of creating such commitment. The standard that should be applied to suggestions such as those in this paper is whether, at the margin, they increase the likelihood of a satisfactory solution to the tripartite requirements of a regime: participation, sufficiently strict rules, and a compliance system that has prospects of reasonable success.

Section I of this paper addresses the trade-off between participation and strictness of rules, by proposing what we call an “economy of esteem for climate change.” The idea is to harness the human desire for esteem – which may be particularly acute among political leaders – to increase commitment. We do not propose our esteem-based solution as a panacea to the problem of political commitment: as Elinor Ostrom and her colleagues have argued, panaceas typically fail.⁵ Most real-world problems require a variety of approaches, each contributing something to the solution.

Section II discusses participation. We suggest that only a cap-and-trade architecture is likely to make it politically possible to secure sufficient participation to get a climate change mitigation regime up and running. There are potential pitfalls for effectiveness, but without wide participation by major emitters, no regime will be effective. Section III analyzes the problem of compliance and argues that a system of buyer liability under cap and trade is essential. In Section IV we discuss how institutions to assess compliance with emissions caps could be constructed. Finally, Section V addresses potential weaknesses of our buyer liability system and provides our responses to these criticisms. Throughout, we write from the standpoint of the politics of international cooperation; our policy recommendations take into account the more technocratic literatures on compliance, liability, and so forth but flow directly and primarily from our political analysis.

⁴ Downs, Rocke and Barsoom, 1996; Raustiala and Slaughter 2002.

⁵ Ostrom et al. 2007.

I. Political Commitment and an Economy of Esteem

Effective climate change mitigation requires political commitment. In the near term any approach to compliance with a climate change agreement will have to rely heavily on the commitment of publics in the advanced industrial democracies to take effective action. We hope such commitment will be forthcoming, and, as discussed in Section V of this paper, there is some reason to believe it will. That projection is uncertain, but one thing is certain: without such political commitment, no effective global action will be taken.

We treat variation in public support for climate change mitigation as largely exogenous and unexplained. However, as we have noted above, designing institutional arrangements to improve prospects for effective climate change necessarily takes place at the margin. It therefore seems worthwhile to consider as an initial matter how to enhance existing incentives for politicians to act vigorously to mitigate climate change. To do so we look to the concept, developed by Geoffrey Brennan and Philip Pettit, of an “economy of esteem.”⁶

1. The Concept of Esteem

The economy of esteem refers to incentives provided not by material rewards and deprivations, or rewards and punishments administered by the state, but by the attitudes that other people form in response to the actions of protagonists. Individuals seek honor and respect as well as money and power, and this reality can be taken into account in designing institutions. Brennan and Pettit defend, at length and to good effect, the proposition that esteem can provide a compelling set of motivations for actions (good or bad), independent of material incentives or coercion. Here we briefly extend their thoughts to the climate arena.

By esteem we mean something similar to reputation--both concepts reflect comparative evaluative attitudes -- but there are subtle differences, of which three are worth noting.⁷ First and most important, esteem accrues to people regardless of our expectations of their future behavior. We can esteem people who are dead, such as Abraham Lincoln or Martin Luther King, Jr. The connotation of reputation, by contrast, is that it helps us predict future behavior. We would not say that Abraham Lincoln has a good reputation; we would say that he *had* a good reputation. Second, esteem implies a positive evaluation. “Disesteem” refers to negative evaluations. Reputations, by contrast, can be positive, negative, or neutral. Finally, esteem reflects *aggregate* evaluative attitudes toward a person – we esteem people or we do not. Reputations, by contrast, can be differentiated: someone can have reputations for being both kind and weak-willed. In many situations, of course, esteem and reputation cannot be disentangled, and actions designed to acquire esteem or reputation may have a

⁶ Brennan and Pettit (2004).

⁷ Brennan and Pettit do not distinguish esteem from reputation in general, only from “market reputation.” They argue that esteem is not merely a means of securing consumption goods. But neither is reputation, when considered outside the narrow market context. See Brennan and Pettit 2004, pp. 3-4. On reputation in international law see Guzman (2008).

variety of motivations. As Machiavelli said almost 500 years ago, even if a leader does not have admirable qualities, “it is very necessary that he should seem to have them.”⁸

2. *The Mechanisms of Esteem*

For esteem-based appeals to work, people need not be altruistic. But standards of good performance have to be clear and widely understood, and it needs to be generally understood that others also understand and support the standards. Furthermore, the normative symbolism of action or inaction has to be strong, and actual performance needs to be measurable. In human rights, for example, the symbolism of not killing or inflicting bodily harm on innocent people is powerful. Monitoring is often difficult, but the activities of non-governmental organizations are largely devoted to monitoring states’ actual practices, just as similar organizations monitor state compliance with an international climate accord and, in the future, private rating agencies may monitor the quality of emissions permits. A primary difference between the two issue-areas is that adherence to global climate change regulations, at least in the form of emissions caps, is more easily measured than compliance with human rights obligations. As a result a necessary condition for esteem to be generated and granted—knowledge of others’ behavior—is more likely to be met.

One mechanism for creating a robust economy of esteem for climate change could be the creation of a number of prominent awards and prizes. The British and the French governments, in the 18th century, established such prizes for technological innovations with some success, and some contemporary examples of major prizes for technological innovation also exist.⁹ Our focus, however, is on prizes for *politicians*, especially former leaders of governments. Prizes could be given to former leaders of governments who advanced efforts to mitigate climate change while in office. In this way, their incentives to act as pro-green activists while in office would be enhanced. In Africa, such a prize has already been instituted for democratic transitions from power (the Mo Ibrahim Prize for Achievement in African Leadership).

We anticipate that such an economy of esteem for climate change would be created in a decentralized way. It would not require coordinated agreement by states. Individual states, foundations, and wealthy individuals could establish the prizes, on the model of the Nobel Prizes. Foundations or other non-profits could establish ratings systems for evaluating the action or inaction of political leaders while in office. Since there is no need to wait for international agreement, the institution of such prizes could begin immediately. Indeed, there are first-mover advantages for those seeking to establish prizes, since they could pre-empt especially attractive areas of activity and gain more publicity than their followers.

We recognize that from the standpoint of ideal democratic theory, such externally-granted prizes could make elected leaders less accountable to their respective publics, and could therefore be viewed with suspicion.¹⁰ We agree with part of this critique: the point of

⁸ Machiavelli 1513/1977, ch. XVIII, p. 50.

⁹ Newell and Wilson 2005.

¹⁰ If the prizes that we suggest were given as rewards for inherent virtue, the economy of esteem would be subject to what Brennan and Pettit call the “teleological paradox”: that people who are perceived as acting well

such prizes is to make leaders more inclined to support vigorous measures to mitigate climate change than they would be purely on the basis of domestic political incentives. But it is unrealistic to think of democratic publics as always having fully-formed preferences, which accountable leaders should implement. Much of democratic leadership involves educating publics about important issues that may not be obvious to them, and inspiring them to make collective efforts that they would not otherwise make.

Recent actions in California, for instance, suggest this educative process can work. California has long been on the forefront of environmental regulation, to be sure, but movement toward more comprehensive emissions goals was clearly spurred by the actions of the Governor, a Republican who in the summer of 2006 declared that “when [California] act[s], the world takes notice and it has tremendous impact.”¹¹ Moreover, he stressed, “we have the responsibility to our people and to the rest of the world that we take care of our environment, and since we know there is global warming . . . we should stop it.”¹² Bold statements such as these help citizens reorient their political commitments and can lead publics toward new political outcomes. If prizes increase the incentives for democratic leaders to emphasize climate change in this way, increasing support for effective institutions to tackle public goods creation, this would in our view be a good thing – and entirely consistent with how democracy should work.

II. The Attractions of a Cap and Trade Architecture for Participation

The commitment of democratic publics is a necessary condition for constructing institutions. But it does not guarantee sufficient participation, which must include all major emitters, and insofar as possible be universal. We think that a cap and trade architecture is the best design to induce such participation.

Recently, there has been some disillusionment with cap and trade on the part of climate analysts attuned to political issues.¹³ No doubt, it will be very difficult to negotiate a comprehensive accord and to mesh national systems so that they operate coherently together. In light of these difficulties, some scholars have proposed abandoning the overall targets and timetables approach of Kyoto in favor of a “bottom up” multi-track system that would include R&D, new technologies, and investments in adaptation as well as mitigation.¹⁴ This more fragmented strategy avoids the formidable negotiation problems involved in

in order to be thought virtuous, are not considered virtuous. Pettitt and Brennan, 36-46. But we also give people esteem for good actions, irrespective of motivation. And since people seek to avoid disesteem, they may, at the margin, lean toward actions that produce esteem for them when they might otherwise be indifferent. Admittedly, some leaders seem indifferent to esteem from people outside their circles of friends and supporters, or appear content with insincere praise. But it is only necessary for esteem to be a positive force at the margin that *some* leaders will behave better than otherwise in the presence of potential prizes.

¹¹ Gov. Schwarzenegger, British Prime Minister Tony Blair Sign Historic Agreement to Collaborate on Climate Change, Clean Energy, July 31, 2006, available at <http://gov.ca.gov/index.php?/print-version/speech/2918/> (last visited Jan. 6, 2008).

¹² *Id.*

¹³ See the articles by Scott Barrett, Thomas Schelling, and David Victor in Aldy and Stavins (2007).

¹⁴ Victor, 2007; Barrett, 2007

setting up a comprehensive accord. It also seems to have the virtue of greater feasibility, and would prevent situations in which countries could evade their responsibility to reduce emissions simply by buying emissions permits from elsewhere. Yet there is reason to fear that, unless properly designed, a non-integrated patchwork of national “policies and measures” will prove insufficient to deal with the climate change problem. Most critically for our purposes, such a strategy provides insufficient incentives for governments whose publics are indifferent to the climate problem to contribute to this global public good. That is, it lacks the *institutionalized transmission belts* that we believe are critical to long-term success on a global scale. If only a few countries take effective policies and measures to mitigate climate change, the overall response will surely be inadequate.

We likewise are critical of global carbon taxes. Although Richard Cooper and others have presented strong economic arguments for carbon taxes, it seems unlikely that developing countries, including China and India, would agree to such an arrangement. Carbon taxes would impose economic burdens on their industries without offering the offsetting gains of being able to sell emissions permits, under a cap that made allowances for their much lower historic and *per capita* emissions.¹⁵ Since these countries have refused to be bound by binding caps even when such subsidies are implied, it is difficult to see how they could be induced to agree to a regime that omits subsidies. Cap and trade thus has the enormous advantage that permits can be set to give “hot air” –permits in excess of likely future emissions – to those reluctant to join the system. The best chance of securing their participation is a combination of persuasion – that climate change will be bad for them as well as for others – and material inducements in the form of valuable (because tradable) hot air.

Although hot air is essential to obtaining the participation of reluctant states, excessive hot air is troubling because it reduces actual emissions cuts: hot air given to reluctant states will merely shift more of the burden of real abatement to committed states. However, as a political matter this cuts both ways. Those who want to see swift and aggressive emissions reductions will resist the granting of hot air; but the enterprises and other entities in the industrialized democracies that will actually be taking on the largest commitments will favor it, as it will reduce the price of permits they will need to buy in a cap-and-trade system.

Cap-and-trade is also the most likely global approach because the EU has committed to it after a long period of resistance. Once the EU has gone through the painful process of reaching internal agreement, it is notably averse to change. For all these reasons we believe that a global carbon tax is less feasible than a cap and trade regime, and we therefore assume as a basis for our discussion of compliance a cap-and-trade regime such as that discussed by Jeffrey Frankel.¹⁶ We recognize that other policy elements will likely be present in any future regime, such as technology transfer provisions and adaptation measures. At the core, however, will likely be some form of trading.

To work, however, cap and trade must encompass developing as well as developed states. Trading without agreed caps on all participants is likely to lead to extensive fraudulent

¹⁵ Cooper, 2008, KSG conference draft

¹⁶ In Aldy and Stavins 2007.

activity. The Clean Development Mechanism, which is designed to encourage trading without setting a global cap, has led to large volumes of phony credits due to the lack of a coherent baseline and the ease of manipulating the baseline for chemicals such as HFC-23 (Wara and Victor 2008). Moreover, without effective controls on the rapidly rising emissions of large developing countries, even strict controls on rich countries are unlikely to achieve very much; and such controls become less likely in the absence of controls in developing countries.

Such a cap-and-trade system could seek to be universal at the outset, or could be formed around a “club” of major emitters, including the major developing countries, such as China, India, and Brazil. To be successful the relevant club must be very large when evaluated in terms of *total global emissions*, even if it is small in terms of the number of sovereign states. Insisting on universality from the start is likely to be self-defeating, because a small number of reluctant or free-riding states could prevent the regime from coming into being. Yet any club-like arrangement should, like Kyoto, be open to the accession of all countries on generally known terms. Universality is desirable because a troubling political implication of any emissions club is the likelihood of development of trade barriers. Rationalized to compensate for the cost differences between regulated and unregulated areas, such barriers could be used for covert protectionism by affected producer interests.¹⁷ In short, the choice between club and global approaches is essentially one of sequence and tactics. The eventual goal is a universal system, but it may be expedient to begin with a club.

III. Compliance under Cap and Trade: The Political Logic of a Buyer Liability System

The fundamental problem of compliance in world politics is that it is virtually impossible to enforce international rules against powerful states. This in turn generates a lack of credibility of such rules *ex ante*. This is not a feature specific to global climate change; it is a general feature of the existing system of sovereign states. Even where sovereignty has been curtailed, as in the European Union (EU), it remains very difficult to enforce international rules externally. In 2005 the EU could not even enforce, against France and Germany, its elaborate system of fines against states that exceeded its fiscal deficit limits – despite the fact that Germany had been the principal advocate of the disciplinary system in the first place.¹⁸

Difficulties of enforcement yield two common outcomes with regard to international agreements. One is the negotiation of weak or vague international commitments that largely match existing behavior. This outcome is particularly common in the environmental realm, where agreements have often been struck that exhibit high compliance—because they are carefully tuned to the status quo--yet do little to influence actual change in the behavior of

¹⁷ Indeed, Title VI of the Lieberman-Warner climate bill, discussed further below, contains some trade barriers for energy intensive goods such as aluminum and cement despite its assumption of binding caps on other parties.

¹⁸ See www.eubusiness.com/Finance/ecofin-council.06.

states and polluters.¹⁹ An equally undesirable outcome is the negotiation of ambitious (but sometimes vague) rules that are frequently violated. When untethered to any meaningful monitoring and compliance system, ambitious international rules run the risk of substantial non-compliance. This pattern of over-ambition followed by widespread non-compliance has been observed with respect to human rights treaties. Some have argued that such agreements actually make the underlying problem the treaty was intended to address worse.²⁰

More specifically, there are at least four major political constraints on compliance provisions for a comprehensive climate regime. Proposals that ignore these constraints will either not be implemented or will be ineffective if implemented.

- 1) *Post-hoc sanctions on powerful sellers are infeasible.* Non-compliant sellers whose participation in the regime is essential for its efficacy could renegotiate emissions limits in their favor, wielding the threat of exit from the regime. Those non-compliant sellers with other sources of political power could use those sources of power to punish or threaten states that seek to impose sanctions for noncompliance.
- 2) *Any system that requires interstate negotiations to determine arrangements for compliance will be subject to political strategy and pressure.* The point here is the one that Randall Stone makes about the International Monetary Fund in *Lending Credibility*.²¹ The IMF relaxed the rules on powerful states such as Russia under pressure from Russia's supporters, particularly the United States. Another possible result of interstate negotiations is deadlock, so that no rules are agreed.
- 3) *Any system that can be manipulated, or "gamed," will be.* The stakes are too high for such manipulation to be avoidable.
- 4) *Complex systems involving interstate negotiations are inherently non-transparent, and therefore have low accountability.* Political pressure and manipulation – with criteria dependent on bargaining positions rather than any objective factors related to emissions -- will be particularly strong under complex systems.

The Kyoto Protocol nonetheless contains compliance provisions built around the idea of external enforcement. States that violate the caps on emissions can in essence "borrow" emissions from the next commitment period with a 30% penalty. As a response to sudden fluctuations that are beyond the control of states that are genuinely committed to meet their long-term targets, this approach makes some sense. But it does not constitute an effective enforcement mechanism. Since states have yet to negotiate those future limits they can build the "penalty" into their future allocation.²² Moreover, as in many international treaties the Kyoto Protocol permits any party to exit at will. As a result, the Kyoto arrangements are akin to requiring homeowners who default because they cannot afford

¹⁹ Victor, Raustiala, and Skolnikoff (1998) provide many examples.

²⁰ Hathaway, 2002

²¹ Stone 2002.

²² See Article XV(5)a in *Procedures and Mechanisms Relating to Compliance Under the Kyoto Protocol*, FCCC/CP/2001/L.21, available at <http://unfccc.int/resource/docs/cop7/l21.pdf>

their mortgage payments to pay a higher interest rate next year, without any provision for foreclosure but with the opportunity for the borrower, in the future, to reset the terms of the loan or simply walk away largely unscathed. In other words, they open the door to renegotiations and introduce a serious problem of moral hazard. States that exceed their allotment and seek to renegotiate it can threaten to leave the regime if not accommodated.

The unrealistic nature of these provisions suggests the futility of demands for legalistic external enforcement. Strict enforcement is unlikely to work, and is likely to reduce participation.²³ However, compliance with a cap-and-trade regime need not be perfect. It merely has to be strong enough to sustain trading in the near term and to make states' commitments to reduce emissions sufficiently credible to create significant price signals over the medium term. This is because the most significant action to address climate change is more likely to come from innovation than trading per se. Moreover, compliance may also be bolstered by interest: in a cap and trade system participants who have made investments that are contingent on the system's integrity will have a continuing stake in the success of the system.

Buyer Liability: the Roles of States and Enterprises

Seven years ago, David Victor proposed that the enforcement system for climate change, under a cap and trade regime, should be built on the principle of buyer liability.²⁴ He argued for buyer liability on political grounds: "Buyer liability enforces compliance through rule-based markets, whereas seller liability requires weak and politicized international institutions to identify and penalize sellers that have not complied." Victor's arguments, though compelling, have not been adequately incorporated into the recent literature on the design of climate institutions or into the provisions for implementing the Kyoto Protocol agreed in the Marrakesh Accords of 2001.²⁵ In this section we revive and amplify his arguments for buyer liability, since we believe that the political constraints enumerated above imply that only such a system will be robust to the political constraints that we have just enunciated. Technical critiques of this system, while raising important points, are outweighed by the political benefits of a buyer-based system.²⁶

Under the standard cap and trade architecture that we adopt, each party create, or adapt, a national regulatory system to meet its internationally-agreed emissions target. Many states that expect to find it difficult to meet that target (buyer countries, or "permit-short" countries) will enact legislation authorizing enterprises operating within their jurisdictions to purchase emissions permits from suppliers abroad in countries that are also members of the regime. (We expect there to be trading between enterprises within these permit-short

²³ For a general discussion of the participation problem see Barrett, 2003, Chap 7.

²⁴ Victor 2001: 69-74.

²⁵ Bluemel 2007.

²⁶ There is a technical literature on various liability schemes, dating from around 2000. For instance, see OECD 2000. For an analysis of buyer liability that explicitly recognizes the enforcement problems entailed in seller liability, see especially Nordhaus et al. 2000a and 2000b. These enforcement problems are also recognized by Zhang 1999. None of these papers views issues of choice of liability regime in the context of the political asymmetry that we point out between the commitments to action, and therefore the likelihood of voluntary compliance, of buyer and seller countries.

jurisdictions as well). In the near-term the permit-short countries will likely include the United States, members of the EU, Japan, Australia, Canada, Norway, and New Zealand, as well as some others. Enterprises such as power companies or industrial enterprises in these states (or other states that accept stringent emissions caps) will frequently need to purchase permits from entities abroad in order to meet their domestic emissions obligations.

Such permits will be available because we anticipate, consistent with nearly every analysis of post-Kyoto cooperation, that some parties to any future climate accord will successfully negotiate overall emissions limits that exceed their projected emissions—i.e., hot air. These seller, or “permit-long,” countries are likely to include China, Russia, India and other developing countries for some period into the future; obtaining hot air will be the *sine qua non* of their participation in the regime. Through their own national processes, states that are permit-long will sell or assign permits to enterprises or other entities within their jurisdiction. If permit prices are cheaper than the buying entity's internal cost of reductions, purchasing permits will be attractive and markets for emissions trading will emerge. These markets already exist in various, often limited, forms.²⁷

Although the caps on overall emissions will be at the national level, it is important to emphasize that in our scheme actual trading will take place between enterprises, whether private or state-controlled. Enterprises in permit-short countries would buy permits from enterprises in permit-long countries to cover their shortfalls during specific periods of time. For example, Duke Power in the U.S. might purchase Chinese-denominated permits from Xian Electric Power in China to cover its anticipated excess emissions in 2010. Trading on secondary markets could also take place among enterprises in various developing countries, or within countries. For example, if in the middle of 2010 Duke Power discovered that it held more permits than it would need to meet its legal cap, it could sell the Chinese-denominated permits that it had purchased from Xian Electric Power to enterprises anywhere in the world.

For political reasons we anticipate limits on the proportion of permits purchased abroad. For example, the current Lieberman-Warner proposal in the US Senate (the "Climate Security Act of 2007") provides that regulated facilities could meet up to 15% of their compliance obligation with emissions allowances purchased abroad from nations (or entities within these nations) that have accepted an emissions cap, and 15% from domestic offsets. Regulated entities could also borrow emissions, with a penalty, from future years. Limitations such as these are likely to be common. But they still suggest that ample trading will be part of the global climate regime.

Buying and selling will largely be between enterprises, but states are nonetheless crucial to our proposal. States will have overall emissions targets and will issue or sell permits to enterprises as they decide. Some states may handle emissions trading themselves; others may leave it to private markets. They will create the domestic regulatory framework and enforce emissions restrictions on entities. However, and this point is crucial, *permit validity would be assessed on a national basis and permits will be discounted on a national basis as well*. That is, under our proposal the validity of permits sold by entities depends on the *aggregate* validity of permits sold from a particular national jurisdiction, as decided by an *ex post* assessment

²⁷ Examples include the European Union Emissions Trading Scheme and the Chicago Climate Exchange

process. Hence all permits emanating from a given jurisdiction in a given year would ultimately be assigned the same validity: permits issued in 2010 by the Xian Electric Power Company and Shanghai Electric would have the same value. Permits would be "jurisdiction-equal."

Under a system of buyer liability, buyers of emissions permits that turned out to be invalid would be liable to make up the difference in some way. By invalid we mean permits that do not represent the full amount of carbon reduction their face value implies. Buyers who hold valid permits that do not sum to the excess of their own emissions over their cap at the end of the budget period would need to reenter the market to purchase more permits or engage in further internal reductions.

This system rests on the incentives of buyers in permit-short jurisdictions, which will largely be in industrialized democracies, to comply with domestic emissions controls and the incentives of sellers, largely outside these states, to command and maintain the highest price in the market. It is therefore very important to note, as Victor does, that the likely permit-short countries, in which enterprises will be net buyers of permits, on balance have stronger national legal institutions than the likely permit-long countries. Furthermore, the permit-long countries are overwhelmingly democratic. We therefore rely on *internal* structures and incentives, such as democracy and the rule of law, to ensure that permit-short countries comply with the system. Indeed, the *political asymmetry* – in rule of law and democracy – between buyer and seller countries is central to our advocacy of buyer liability. Another way of expressing this point is to say that incentives for compliance for net buyer countries are exogenous to the institutional system that we propose.

By contrast, the system is designed endogenously to generate incentives for compliance on the part of permit-long, or seller, countries. These governments will gain economically from maintaining the value of the permits that their enterprises sell, and will therefore seek to act in a way that maintains their reputations for compliance.

Buyers and Incentives for Prudence

Since the system rests on buyer liability, we begin our analysis with the incentives of buyers. In many respects a buyer liability system is broadly akin to the international bond market. After being issued by states, bonds trade on international markets, just as emissions permits, issued by permit-long countries to enterprises operating within their jurisdictions, would trade on such markets. Buyers of bonds whose issuers default, or for which expectations of default increase, incur losses. These buyers therefore have strong incentives to assess quality *ex ante* and price the bonds accordingly. Likewise, buyers of emissions permits would have strong incentives to assess their validity before purchasing and to price the permits accordingly.

Thus we envision emissions permits that trade on public markets. Market participants would in turn have incentives to create or engage rating agencies or other entities to evaluate the quality of permits *ex ante*, just as we see bonds rated by existing agencies as a way to express and monetize the risk of default. As in the bond market, no government action would be necessary; the market would reflect private ordering and exchange based on the relative price of abatement and expectations of the validity of

abatement actions. Permits would likely trade at discounts if their validity was viewed as questionable. In other words, they would be priced and traded based on their anticipated validity.

One major advantage of buyer liability has been noted: the buyers are more likely than the sellers to be found in states with well-functioning regulatory systems. A second advantage of a system of buyer liability is that buyers face incentives to monitor and assess the behavior of sellers: private markets, therefore, would carry out extensive informational tasks that might otherwise be left to governments. This advantage is again compounded by the political reality of likely buyers and sellers.

The keys to permit markets working smoothly are the accurate assessment and pricing of permit validity. If assessments *ex ante* are accurate, buyers can simply discount permits appropriately and buy more nominal permits than they require in order to meet emissions limits set by their governments. As in other markets, actors will hedge against risk. Insurance markets may also arise to cover the risk of permit invalidity. We expect that buyers will also police the actions of other buyers, for they will eventually have a large economic stake in the permit system. Those who abide by the rules and accurately assess and pay for quality permits will not want competitors to gain by purchasing cheaper, riskier permits. If those riskier permits fail, the buyers of them, now facing a shortfall, will surely seek political renegotiation of their domestic emissions restrictions. But other buyers will now have incentives to resist this siren song, since they have (in our example) successfully invested in valid permits (or in sufficient quantities of invalid permits such that they still meet their national emissions cap).

The central point is that buying entities as a group will likely become politically invested in the system over time, and will therefore seek to ensure that others do not benefit from *ex post* gaming. We do not want to overstate this dynamic; surely many buyers will favor a system where they can appeal to their governments for relief in the event their permit purchases prove insufficient. Indeed, all market participants might favor that *ex ante*. But once the system is operating, those who were successful in the market will face strong incentives to oppose any *ex post* relief, because that relief will in essence inflate away the value of their permit stock and, perhaps, advantage a competitor.

The most frequently expressed objection to buyer liability systems is that the difficulties of gaining sufficient information to assess the validity of permits *ex ante* would be very great, or even insurmountable; and that as a result, the risk, and therefore transaction costs, of such a system would be inordinately high. A secondary objection is that the invalidity of permits from a single seller could lead to a “cascade” by which a succession of states become out of compliance with the rules, due to the invalidity of the permits that they purchases. We address these objections in Section V.

Sellers and incentives for validity

If buyers bear the liability for invalid permits, what incentives do sellers have to ensure that the permits they sell are backed by real emissions reductions at the national level? Under our system, the first-level consequence of public discovery that some permits lacked full validity would be a depreciation of their value on secondary markets, with the loss borne

by buyers that held the permits at that time. As noted above, these buyers would not only have losses on their investments; if they needed the nominal value of their permits to meet nationally-imposed limits, they would have to purchase additional valid permits or somehow generate further internal reductions.

Although states and state enterprises are not necessarily the buyers or sellers of permits, their role is central. In jurisdictions that are permit-short governments are crucial to the creation and enforcement of a robust set of domestic emissions regulations. These governments are motivated not by fear of external enforcement, but by domestic political pressure. In seller (permit-long) jurisdictions governments are crucial to ensuring the validity of permits and therefore the economic rents they generate.

As a result, the issue of seller incentives at bottom refers to governments of permit-long countries, not to enterprises within that jurisdiction. Because these jurisdictions are net sellers, and because the validity of permits--and by extension their price--is set for the entire jurisdiction, these governments also will face domestic pressure to ensure high permit validity. In both buying and selling jurisdictions, in other words, governments will act as internal enforcers--a role they are well-suited to play--and will be pushed to do this by the political and economic interests of their domestic constituencies

Nonetheless, many question whether these governments will ensure that permits sold abroad are valid and represent real emissions reductions. Our response rests on the assumption that the trading system would continue over time, and that states whose entities are net sellers of permits could expect this situation to continue into the indefinite future. An ongoing market creates an incentive to ensure quality. More specifically, if the rate at which states that are net sellers of permits discount future gains is sufficiently low, and the magnitude of expected future sales of permits sufficiently high, they will have incentives to generate reputations for selling valid permits.²⁸ Michael Tomz (2007) has shown that such national-level reputation effects are very strong in international bond markets, and there seems no reason to believe that they would not be equally strong in emissions markets. Sellers of fully valid permits would also have an incentive to cooperate with and even support credible monitoring systems, so that their permits would be regarded *ex ante* as valid and could command their full price. That is, the “market for lemons” logic famously outlined by George Akerlof would prevail.²⁹ Indeed, support by sellers for independent monitoring would be a *signal* of being honest, and therefore valuable in itself.

In sum, this buyer liability system is self-enforcing. It does not require that an international organization ensure compliance with international commitments. This provision is essential, since only national governments have coercive enforcement powers over enterprises.

²⁸ Axelrod 1984; Tomz 2007.

²⁹ Akerlof 1970.

IV. The Problem of Assessment

To be effective, any cap and trade regime, whether involving buyer or seller liability, requires an accurate and prompt *ex post* assessment of permit quality. Constructing a viable assessment system is a complex issue, and we do not purport to have developed a workable design. The key feature of any assessment system is that it be credible and widely accepted. In view of our assumption that any system that can be gamed for strategic advantage will be gamed, any technically complex system of assessment should be examined closely from a political standpoint. As in liability systems, complex technical arrangements can be strategically manipulated in ways that are not transparent. If so, their very complexity may be self-defeating.

A basic problem with assessment is measurement. Measuring the use of some globally-traded fuels is relatively straightforward (at the aggregate national level) but other fuels and sources pose greater problems. Most problematic of all are land-use changes, where measurement is fraught by issues such as the relevant time period that a new forest can be said to be sequestering carbon, and what to do in the event of a fire later on. The most serious problem of measurement, however, is political: as we noted above, that any system that can be gamed will be gamed. An international assessment process will be vulnerable to political pressure, and like judges on international courts, participants may feel strong pressures to support the positions of their national government.³⁰

Jurisdiction-equality and assessment

Critics of the Kyoto Protocol have pointed to the enormous problem of assessment under the CDM. The key flaw is the lack of a clear baseline in developing countries that sell CDM permits.³¹ The CDM therefore fails to solve the fundamental problem of such emissions markets--that sellers and buyers alike face incentives to collude and claim high reductions even where none exist.

This devastating objection does not apply to the system we propose; under our system all states in the system will have emissions caps. Hence the baseline will be established by treaty. The need for a clear jurisdiction-wide baseline demonstrates the importance of our proposal that permit validity be assessed (and discounted) on a national basis. "Jurisdiction equality" ensures that governments of permit-long jurisdictions will seek to assure that the permits their domestic enterprises offer for sale are valid, because if they fail to do so future permits *from any enterprise within their jurisdiction* will be devalued. This may appear unfair, since it penalizes those seller entities that scrupulously abate emissions but whose counterpart entities, in the same jurisdiction, fail to meet their obligations. But this unfairness is essentially a national problem, since it could only be the result of lax enforcement at the national level and can only be fixed via national action.

³⁰ Posner and de Figuerido, *Is the International Court of Justice Biased?* SSRN draft

³¹ See in particular Wara and Victor, 2008; and Wara 2007.

Furthermore, the jurisdiction-equalizing provision has two very important virtues. First, it avoids having very thin markets for thousands of permits from often obscure entities whose permit quality might be impossible to assess by outsiders. Second, and perhaps most important, unfairness for some enterprises is a political virtue. Enterprises that meet their emissions targets have strong incentives to press their governments to correct internal compliance problems; in other words, to enforce the system against shirkers. The system therefore generates domestic political pressures for measures to assure permit validity. And since the issuing country as a whole would suffer from having devalued permits--permits are, after all, a valuable commodity--the government would have multiple incentives to correct these problems.

If there is a valid assessment process, buyer liability will not mean that sellers are unconstrained. Sellers with long time horizons will have incentives to ensure the validity of their permits. The key mechanism to ensure that sellers ultimately comply with this scheme is *reputation*. Markets for permits would be lucrative for sellers, and would extend over an indefinite time horizon. Under such conditions, both theory and empirical work demonstrate that sellers would have substantial incentives to maintain strong reputations, in order to maintain the value of the permits that they would subsequently issue.³² They might even make up shortfalls as a way to husband that reputation. Not only would the honest buyers stuck with phony permits suffer; so would honest sellers, who would have to sustain lower permit prices.³³ This is a key feature of the “market for lemons” phenomenon: not only do buyers seek verification of quality, but honest sellers also do so.

Two possible assessment regimes: an illustration

Assume that permits are purchased in 2010. At the beginning of 2011 official evaluation of the permits would assess the *actual validity* of permits and assign a final and official figure to permits. It is not essential that this process yield a fully accurate assessment of emissions, but it is essential that it generate certificates of validity that are broadly accepted. This evaluation would be done by an international monitoring agency, and would occur at the country level—again, with the same discount applied to the entire jurisdiction.

Suppose that China has an internationally-binding emissions cap of 7 billion metric tons for 2010 and expects to emit only 6 billion tons, leaving 1 billion tons of permits to be sold. It then allocates these permits to state or private entities through its own national processes. If the official assessment in 2011 finds that actual emissions corresponded with expectations, the permits would be fully valid and no further consequences would ensue. But suppose total Chinese emissions were 6.2 billion rather than 6 billion tons of carbon equivalent. China has oversold .2 billion tons. What happens then?

At least two possible systems can easily be envisaged, and others could probably be devised. One is a proportionate value system and the other is a Last-In First-Out system. In a proportionate system, permits would be devalued proportionately to the extent to which

³² Axelrod 1984; Tomz 2007.

³³ Tomz (2007) shows that issuers of international bonds develop reputations that affect interest rates bond prices in secondary markets, and the availability of capital. Likewise, issuers of greenhouse gas permits would develop reputations that would affect the price of their permits.

emissions, plus permits sold by China, exceeded their allowable emissions. Suppose, as in our example, that the Chinese permits are assessed at only 80% of face value. They would therefore be worth only 80% of their nominal value, minus some penalty for failing to meet validity requirements. They might therefore only be valued, for emissions accounting purposes, at 75% of their nominal value. Under the proportionate value system, this would be true of all permits emanating from China. Permit buyers that paid more than 75% of face value for their permits would suffer an economic loss. The parallel between this system and discounts for international bonds from bankrupt governments, by which the government pays pennies on the dollar, is close. If a permit buyer purchased 100 one ton permits from China to meet its national emissions limitation, it would now need to buy an additional 25 one ton permits or find 25 tons of reductions in some other way.

The proportionate value system has the advantage that all permits in a given period emanating from a given jurisdiction would have the same value, simplifying trading. However, it has the liability that purchasers early in a permit period would have worse information than those who purchased the permits early in the period, and would therefore bear more risk. Markets would likely correct for this by pricing the risk, so it is difficult to predict whether this would be a serious problem.

In response to this problem some authors have suggested following a Last-in-first-out (LIFO) scheme, by which permits purchased earlier would have greater validity than those purchased later.³⁴ Such a LIFO system might minimize risk and facilitate transactions, but at the cost of much greater administrative complexity. Hence, consistent with our belief that any political process of allocation and pricing will be gamed, we are inclined to favor the simpler proportionate value system and let the market adjust prices for risk rather than seek to do so administratively. Our overall proposal, however, does not turn on this choice.

Under either variant of buyer liability, in the short term China, as a selling jurisdiction, would not lose. The key to Chinese compliance, as a result, would not be legal penalties from some international authority with respect to permits sold in 2010 (as we have made clear, such penalties are illusory), but its loss of reputation as a credible source of valid permits, which would lead to a devaluation of the value of the permits that it issued for 2011 and subsequent years. For both buyers and sellers, therefore, it is *anticipation of future consequences* that creates self-enforcement.

Assessment: an evaluation

It is extremely difficult to insulate any assessment system against political pressures. Indeed, the most important point of this discussion is not the merits of any particular arrangement, but the necessity of undertaking a careful political analysis that considers strategies that opportunist states and enterprises could follow to manipulate the system. We nonetheless think that in considering approaches to assessment, it may be possible to build on existing provisions in the Kyoto Protocol. Currently, Kyoto mandates a reporting and review system for Annex I parties that may usefully be tweaked to perform this function.³⁵ ("Annex I" encompasses those parties, mostly industrialized democracies, who have binding

³⁴ Zheng 1999 proposes such a system.

³⁵ We thank Dan Bodansky for this suggestion.

emissions targets). Annex I parties must create a national inventory of greenhouse gas emissions. They must also report, in a standard format, annual data on these emissions as well as removals along with an explanation of the methodologies used. The national submissions are in turn subject to review by an "Expert Review Team" convened by the Secretariat of the UNFCCC. These expert reviews sometimes include country visits (brief, of about a week's duration) and are meant to be fairly comprehensive. Similar forms of global accounting take place in the OECD, the IMF surveillance process, and the GATT/WTO Trade Policy Review Mechanism.

A well-functioning future system would require regular assessments, in-country and on-site inspections (perhaps done randomly), and a "true-up" period for states to work out shortfalls. Our proposal, with annual assessments of permit validity, certainly requires significantly more resources than have been allocated to the Kyoto review process to date. But the basic structure and approach is complementary. And while direct inspections of major emissions sites by an international organization will surely raise sovereignty concerns among many parties, there is substantial precedent for this model in the Chemical Weapons Convention, which permits inspections on national territory of chemical production sites, including so-called "challenge inspections" by the treaty secretariat's Inspectorate Division.³⁶ The much less intrusive review we envision for a post-Kyoto system thus falls within established norms in international law. Although we think that the Kyoto Protocol process may provide a structure on which to build a more comprehensive system, our main point is simply that any approach to assessment will have to be thoroughly political – alert to strategic manipulation – as well as technically competent and feasible.

V. Potential Weaknesses of the Buyer Liability System

Any attempt to get around what often appear as insuperable problems of agreement and compliance will have potential weaknesses. So before discussing the weaknesses of a buyer liability system, it is important to emphasize that alternative systems run directly afoul of the political constraints enumerated earlier. Seller liability is highly vulnerable to the first constraint of non-compliance, as Nordhaus et al. (2000a), Victor (2001), and Bluemel (2007) point out. There simply is no credible set of institutions available in world politics to enforce sanctions against even moderately important states.³⁷ Hybrid options such as the one proposed by Nordhaus et al. (2000b) are subject to our second constraint– that results of interstate negotiations are always politically biased in favor of those with strong bargaining positions -- since they require interstate bodies to make estimates of future emissions. These estimates will be affected by bargaining power. As Nordhaus et al. (2000a) point out, triggering systems that validate sales until a certain level of sales relative to anticipated allowances is reached are likely to be gamed by selling a very large number of permits to take advantage of the lag between sales and assessment of sales. Finally, the hybrid liability systems in general are complex and therefore inherently non-transparent; their administrative and transactions costs are also likely to be very high. The most serious of these problems is that *post hoc* sanctions are vulnerable to renegotiation under the threat of

³⁶ Convention on the Prohibition of the Development, Production, Stockpiling, and Use of Chemical Weapons, at www.opcw.org

³⁷ Bluemel (2007, at note 64) says: "most analysts agree that a pure seller-liability rule, in combination with a weak enforcement regime, will result in overselling under the Kyoto Protocol."

exit. This constraint is particularly severe in view of the fact that some major sellers will be very reluctant participants and can always avail themselves of the exit option.

Therefore, any effective system cannot be one of pure seller liability. There has to be some component of buyer liability. The only real question is whether it is preferable to have pure buyer liability or a hybrid system. It is conceivable that a hybrid system would be preferable to pure liability, but pure buyer liability is the only system that is robust not only to state non-compliance – if the shadow of the future is sufficiently long – but that does not require state negotiations. State negotiations inevitably raise the other three issues – renegotiation, gaming, and non-transparency. Hybrid systems will typically be subject to at least one of these three problems: vulnerability to political discrimination between the weak and the powerful; strategic gaming; and non-transparency. To prefer a hybrid system over pure buyer liability, it would have to be shown that the net benefits of the hybrid system are superior, not merely that buyer liability raises some potential problems.

With these fundamental political constraints in mind, we mention five potential weaknesses of a buyer liability system. For each of the weaknesses that we identify, we make a counter-argument that alternative schemes are less promising.

Preferences

Our proposal fundamentally depends on publics in democracies having strong green preferences. This drives their governments to enforce domestic restrictions and to accept the granting of hot air permits to reluctant states. This set of preferences is in turn augmented by the preferences of market participants who, we anticipate, will develop an economic stake in the integrity of the system. With regard to the public, such preferences do not yet seem to exist. But as we noted at the beginning of this paper, in the absence of green pressures, there is *no* promising scheme to mitigate climate change. Hence it is not an objection to our particular institutional design that public support for costly measures for mitigation may not be forthcoming.

Nevertheless, we are cautiously optimistic, based on growing evidence that democratic publics are pressing for effective action on climate change. The European Commission, for example, has recently proposed a plan to cut its emissions by 20 percent in 2020 relative to 1990 levels, and to increase the use of renewable energies to 20 percent of total consumption by that same date.³⁸ We recognize that some EU countries have overshot their internal emissions targets substantially and the overall EU effort to date is mixed. Yet at the same time public opinion is highly supportive of new, more intensive measures. Indeed, the *Financial Times* characterized the recent emphasis of the EU on climate change as a “Damascene conversion.”³⁹ Likewise, in the recent Australian elections, dubbed “the world’s first climate change election” by the *Guardian* newspaper, climate change was a major issue, working against the incumbent conservative government of John Howard and in favor of his Labour challenger, Mark Rudd.⁴⁰ In the final week of the Australian campaign “climate change” was the second most-mentioned item in the press and on the radio, TV,

³⁸ See www.eubusiness.com/news-eu/1201095122.03.

³⁹ See *Financial Times* (London), June 19, 2007, special section on energy, p. 5.

⁴⁰ Julian Glover, *The Lucky Country?*, *The Guardian*, Nov 23, 2007

and internet. Polls showed that voters viewed the economy and climate change as tied for the most significant issue in the election.⁴¹ Rudd carried through on his campaign promise; in a dramatic trip to the UN climate conference in Bali, Australia ratified the Kyoto Protocol --the first official act of the new Labour government.

There is also increasing evidence of support by the American public and by state governments for effective action, despite major resistance from the Bush Administration. Much of this action is occurring at the state or municipal level. California, home to 1 in 8 Americans, is committed to reducing greenhouse gas emissions to 1990 levels by 2020, and to 80% of 2005 levels by 2050.⁴² Similar laws are in place in many other states; 17 now have state-wide targets.⁴³ In Congress, since 2005 nearly 300 bills, resolutions, and amendments have been introduced relating to climate change. The more prominent examples, such as the Lieberman-Warner Act, propose large emissions reductions; in this case, reducing 2005 emissions by 19% by 2020 and 70% by 2050.⁴⁴ To be sure, these bills and laws face opposition and in some cases their constitutionality is being fought out in the federal courts. But what they signify is more important than their likelihood of implementation. They suggest that the level of public support for costly action on climate change in the United States is growing.

In sum, the keystone of a strategy for effective climate change institutions starts with domestic politics in wealthy democracies governed by the rule of law. Without a real push from domestic publics, there will be no effective multilateral regime. We do not know whether climate change will grow into a sustained political issue in the advanced industrial democracies. But in our view there is sufficient activity in the major democratic powers to make this a plausible working assumption.

Information and Sudden Changes in Expectations

A common objection to a buyer liability system is that it would create too much risk, and high transaction costs, as a result of insufficient information about the future validity of permits. From a “markets for lemons” perspective, this informational problem is two sided. On the one hand, Akerlof shows that asymmetrical information can prevent otherwise mutually profitable trades from taking place. Cautious buyers will refrain from purchasing permits in the face of this uncertainty and the market as a result will be very thin. Abatement costs will consequently be higher because foregone trades will require the utilization of more expensive local options. On the other hand, the market for lemons argument suggests that institutions will develop to correct the market failure, if there are financial incentives to do so. In a tradable permit regime, there would be such incentives: buyers (as well as independent rating organizations akin to Moody’s) can gain enormously by credibly

⁴¹ The Numbers, *The Australian*, Nov. 29, 2007; Matthew Warren, Global Warming a Red-Hot Issue, *The Australian*, Oct. 20 2007. It is of course unclear how decisive climate change was to the Labour victory. And as Scott Barrett has suggested to us, Australia may now have a surplus of permits thanks to changes in land use rules. But all the accounts of the election suggest that it played an outsized role in the political debate and was a substantial topic of discussion by both parties.

⁴² The former via the CA Global Warming Solutions Act, the latter by executive order of the Governor.

⁴³ Pew Center on Climate Change, Climate Change 101: State Action (2006) and 2007 Update.

⁴⁴ S. 2191, summary can be accessed at www.pewclimate.org/congress/110th/ghg_limits.

evaluating tradable permits just as they evaluate and rate government bonds. These ratings will help to determine prices in a global carbon market.

The buyer liability model rests to some degree on assumptions about the ability of such an incentive system to generate and widely distribute accurate information, and the system will work well only if accurate information about permit validity is widely dispersed.

However, if information about validity is not widely dispersed—if it is largely private and/or secret—and if this situation is not widely appreciated, we may see many mistakes by buyers. The ongoing mortgage crisis in the U.S. suggests that even in well-established markets it is surprisingly easy for sophisticated participants to misprice goods. For our system to work, the *ex post* monitoring system will have to be sufficiently reliable and credible, and sufficiently prompt, that adjustments can be made quickly, and fairly smoothly, to failures of permit-settling countries to fulfill emissions requirements.

One mitigating factor with respect to the information-cost problem is that emissions permits will likely be quite valuable. In view of the increasingly pessimistic scientific findings about climate change, any effective regime for mitigating climate change will require sufficiently severe caps on emissions that the price of carbon will be very high, generating great incentives for trading. Over time, these incentives will endogenously generate the private monitoring institutions required to provide information and reduce risk. That is, the very magnitude of the broader climate change problem (often seen as a barrier to effective action) is part of the solution to the transactions costs problem. Therefore, the transactions costs/information/risk problem is likely to be a short-term one. In light of this reality, it might even be possible to consider subsidy and capacity-building schemes to speed up the process by which non-state monitoring mechanisms (for-profit enterprises or NGOs) could be created and sustained.

In the end, however, the objection that buyer liability generates too high transactions costs founders on the false premise that seller liability has lower transaction costs. On the contrary, the defense of seller liability on the grounds of lower transactions costs is spurious: it simply “achieves” lower costs by ignoring the problem of non-compliance.⁴⁵ Its efficacy depends on imposing penalties on sellers of bogus permits. But neither internal nor external enforcement is likely to be effective. We cannot count on internal enforcement since many sellers of climate change permits will be entities in jurisdictions, such as China and Russia, with weak internal regulatory systems and little domestic public pressure for effective action. We cannot count on external enforcement because these same states are strong and sensitive to issues of sovereignty. Hence, as we indicated at the outset, systems of externally enforced legal liability are unlikely to work. Because neither internal nor external enforcement is likely to be effective, a seller liability system is likely to break down at the compliance stage.

⁴⁵ “Underlying [the US view in favor of seller liability] is the view that when Parties ratify the Protocol and agree to abide by its terms, they are manifesting a seriousness of purpose and are likely to act in good faith.” American Bar Association 2000, p. 5. For a brief but cogent critique of this assumption, see Victor (2001).

Negative Cascades

A third potential problem with buyer liability is that the system could generate negative “cascades.” If enterprises in a country that is “permit-short” overvalue permits *ex ante* – buying permits that turn out to be worth less than expected – then the state where the buyers reside could miss its international target. The worst-case result would be a cascade or contagion effect, in which the devaluing of one seller's permits (say, Russian permits) then triggers noncompliance in other states whose enterprises hold Russian permits. Market expectations would eventually adjust, but in the short run, shortfalls in compliance would occur if entities could not buy sufficient permits from other sellers.

Under our proposed system the cascade problem would be alleviated by the fact that permits that are not fully valid would suffer only percentage reductions, not complete invalidation. Second, a work-out period could be arranged so that the full impact of holding partially invalid permits was not immediate for the buyers. Insofar as buyers are located in countries with strong internal political reasons to comply with the system, this provision is unlikely to generate a huge loophole.

To even out the consequences of unanticipated shortfalls, it might be desirable to have “banking and borrowing” provisions that allow the buying jurisdiction, which suffered from holding invalid permits, to make up the deficit in future years.⁴⁶ Consistent with our argument about the comparable Kyoto provisions above, such measures would make sense as a way to smooth out burdens arising from sudden changes in conditions, but they are not enforcement provisions. As Robert Stavins says, referring to the United States, “credible mechanisms need to be established to ensure that the use of borrowed allowances is offset through future emission reductions.”⁴⁷ In our scheme, those credible mechanisms result from public commitments to mitigate climate change.

Moral Hazard: Seller Default

Despite the reputational incentives to maintain the future value of their permits, some sellers may sell permits that turn out to be worth less than their nominal value, either due to opportunism or misjudgment. Buyers of these devalued permits would have to engage in further internal reductions or, much more likely, buy additional permits to reach their nationally-mandated caps. The consequence of seller defaults would therefore be *increases* in the price of carbon as buyers (typically) go into the market to cover shortfalls. This is actually a great advantage of the system, since without such a mechanism, defaults would lead to a lower effective price of carbon. (This is because in effect permits in excess of real reductions would have been issued, driving down the price of permits overall by increasing supply relative to demand.)

⁴⁶ An advantage of such a provision could be as follows. Sellers that had defaulted, and now suffered reputational costs, would find that to regain their reputations, they would have to sell valid permits. But for a period of time they would have to sell these permits at a discount due to the damage they had suffered to their reputations. Insofar as they sought to redeem their reputations, the permits they sold in future years would be cheap relative to their value, giving buyers the opportunity to make up losses suffered earlier. For a discussion of how such patterns have worked out for sovereign debt, see Tomz 2007.

⁴⁷ Stavins 2008: 8.

To maintain the incentive of buyers to avoid buying invalid permits, they must not be able to renegotiate their domestic emissions caps, or otherwise receive compensation from their governments, in the event that their purchased portfolio of permits is insufficient to reach their cap. That is, governments of permit-short countries need to protect against “moral hazard,” similar to moral hazard problems of bailing out banks that engage in risky lending practices and later seek government bailouts.

We cannot guarantee that authorities will not, under pressure, engage in activities that create moral hazard in a climate change permit system. Indeed, in response to the current subprime mortgage crisis, measures by the Federal Reserve System to prevent bank failures have raised issues of potential moral hazard, and bills in Congress to bail out borrowers and banks are vulnerable to the charge they would certainly create moral hazard. Experience with responses to bank failures around the world does not necessarily provide reason for optimism. Explicit legislative provisions to prohibit *post hoc* subsidies and renegotiation will be essential, and the media and non-governmental environmental organizations will have to be alert to the danger. In the end, preventing moral hazard will depend on two factors. One is the interests of other buyers who will seek to ensure that their competitive advantage and investment in permits and internal emissions reductions are not bargained away by the state. They will constitute, we believe, a powerful interest group with a stake in the integrity of the system. Two, the accountability of governments to their publics, and the commitment by those publics to compliance with a meaningful international climate regime, is also likely to play a role. If democratic publics are not committed to compliance, the regime is likely to dissolve, since in that case, publics would not sanction their governments for lifting enterprise (and therefore national) emissions caps in response to their enterprises’ failure to purchase sufficient quantities of permits.

Buyers in Non-Democratic Countries

We have assumed throughout that sellers will largely be from non-democratic states such as Russia and China. However, a different concern arises if such states become net buyers of permits. Perhaps as non-democratic states change their status from sellers of permits to buyers their internal politics will change, so that they have civic groups and publics that can exert pressure for effective climate change mitigation policies. But we recognize that our system depends on the commitment of permit-short state to discipline their buyers and remain within their caps. If that condition is not met, the liability system we develop may be undercut. Absent a well-functioning rule of law system, which many large states lack, there is little reason to believe that buyers will be deterred from buying fraudulent permits by the threat of domestic sanction. The more the market for permits shifts in this manner, the more fragile our system becomes. On the other hand, it may well be that a trading system need only operate well for perhaps 20 years until technological innovations bring about more dramatic change in emissions. In any event, no emissions regime will be either foolproof or permanent. Our claim is that the system we suggest is better than the alternatives, over the relevant time horizon of two decades.

V. Conclusion

In world politics, strong commitment by the parties is essential to effective regulation through multilateral action. States must prefer participation in multilateral arrangements to non-participation. We therefore began this paper with some suggestions on how, at the margin, to enhance state commitment to mitigation of climate change through the operation of an "economy of esteem." Political leaders already are seeking to distinguish themselves via their stances on climate change; we have suggested that this can be strengthened still further by other actions, such as prizes for climate leadership. We suggest that the desire for esteem by political leaders, if esteem is credibly awarded, can encourage further costly climate action that we might not otherwise observe. We continued, in Section II, by reviewing reasons why a cap and trade regime is the most likely to induce sufficiently widespread participation among significant emitters to create the possibility of effectiveness.

Sections III to V dealt with the third component of the participation-effectiveness-compliance triad. International obligations cannot be reliably enforced against states. For global regulatory regimes to work well, states must, on the whole, choose compliance over violation. The severity of the global climate problem does not by itself entail meaningful action under these conditions; for many states the costs of abatement are higher than the benefits of a more stable climate, and for some states climate change itself may even be welcome. Moreover, the bulk of the harms from climate change will fall on those states least able to forestall or adapt to climate change. For these reasons many are pessimistic about the prospect for a meaningful post-Kyoto regime. On the other hand, we observe around the world recent actions that counsel some optimism. These actions are most notable in the advanced industrial democracies: in Australia, the EU, and even the US, to date the leading laggard in the climate arena.

In the end, any robust regulatory system to address climate change must rest on the preferences of domestic publics in democratic states to mitigate climate change. Our proposed compliance model builds on these preferences and extends the effects of those preferences, through multilateral institutions, to countries without such green publics. Our buyer liability-based system is incentive-compatible and "politician-friendly." Although some non-compliance is inevitable, the system that we outline provides a political foundation for a working system not doomed by enforcement problems. It could therefore lead to effective regulation of greenhouse gas emissions and, most importantly, help to generate the technological innovation that is widely agreed to be essential if climate change is to be brought under control.

The regime that we propose has some distinctive features. Trading would take place among enterprises and other entities, but the eventual value of permits, after the closing evaluations, would be the same for all permits from a given political jurisdiction. Such a provision would simplify monitoring and evaluation, and generate internal pressures on states to construct viable domestic enforcement systems. Buyers, not sellers, would suffer first-order losses if permits were not fully valid. The prospect of such losses would, we argue, make buyers attentive to the quality of permits, and therefore to monitoring permit validity. Since states whose entities and enterprises sell permits could expect this pattern to

recur over a period of many years, they would have incentives to maintain good reputations as a means to enhance the value of permits sold by entities within their jurisdictions. That is, the self-interests of “permit-long” states would give them incentives to ensure the sale of valid permits even if they had no moral or political commitment to the global climate regime. On the other side of the market, however, the ultimate incentives to comply with the regime for permit-short states would have to be political. We therefore believe that such a regime will only work if most states whose entities are buyers of permits on global markets are democracies whose publics have strong commitments to mitigating climate change.

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