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TOWARD A POST-KYOTO CLIMATE CHANGE ARCHITECTURE: A POLITICAL ANALYSIS

Robert O. Keohane

Woodrow Wilson School of Public and International Affairs, Princeton University

&

Kal Raustiala

UCLA Law School & UCLA International Institute¹

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Reports of the Intergovernmental Panel on Climate Change (IPCC) make it clear that the risks of global climate change are even greater than previously realized.² Yet commensurate progress in negotiating a meaningful future agreement remains elusive. Since maintenance of a stable climate is a public good, both theory and history suggest it will be undersupplied. Furthermore, 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 has been and will continue to be very difficult. With the 1997 Kyoto Protocol coming to an end in 2012, however, the design of a new regulatory regime is essential.

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 these goals are often in tension. The most direct trade-off is between participation and the strictness of the rules, since as rules become stricter, reluctant states become even more reluctant to be bound by them.⁴ Similarly, as participation becomes wider, agreement may only become possible on lax rules.

These problems require careful institutional design. But they cannot be solved without political commitment by national leaders. In democracies this means that the broader public must share that commitment. Gaining public commitment is a necessary condition for effective action, but it too is not sufficient. Commitment that leads to a poorly designed institutional structure—which fails to provide sufficient incentives to reduce emissions of greenhouse gases (GHGs)—will not solve the problem. Social scientists cannot create political commitment: climate scientists, NGOs, the media, and politicians have to play the principal roles. But we can think about ways to design institutions that contribute to effectiveness, contingent on the requisite political commitment. The standard that should be applied to an institutional design such as that proposed in this chapter is whether, given a level of political commitment, it will increase the likelihood of a satisfactory solution to the tripartite requirements of an effective regime: participation, sufficiently strict rules, and a robust compliance system.

Our goal in this chapter is to sketch such a design, particularly its compliance system, with careful attention to the realities of world politics. The first section discusses participation. Without participation by major emitters, no regime will be effective. The next section analyzes the problem of compliance and argues that a system of buyer liability under a cap-and-trade regime for limiting emissions is essential. We offer a unique version of buyer liability, in which emissions permits are annual and all permits from a given jurisdiction receive the same value. The last two sections of the chapter discuss the critical problem of assessing compliance with emissions caps and address potential weaknesses of the system we

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

³ Barrett 2003.

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

propose, including providing responses to these criticisms. Throughout, we write from the standpoint of the politics of international cooperation; our policy recommendations for a post-Kyoto system take into account the more technical literatures on compliance and liability but flow directly and primarily from our political analysis.

The attractions of a cap-and-trade architecture for participation

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. Recently, there has been some disillusionment with comprehensive approaches to cap and trade on the part of climate analysts attuned to political issues.⁵ Critics of proposals for a comprehensive regime 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.

In light of these difficulties, a variety of proposals have been put forward for other architectures, including both carbon taxes and a more eclectic approach that the editors of this volume characterize as “harmonized domestic policies.” These more decentralized architectures avoid the formidable negotiation problems involved in setting up a comprehensive cap-and-trade accord. They also would prevent the need for large financial transfers among countries, which raise political problems in sending countries and give rise to possible adverse effects resulting from corruption or economic distortions in recipients. We will briefly consider harmonized policies and then turn to carbon taxes.

In our view, true harmonization of national policies is extremely difficult—as even the experience of the European Union shows—and a non-integrated patchwork of national “policies and measures” will prove insufficient to deal with the climate change problem. Moreover, neither strategy adequately addresses the wide variance among states in political commitment to addressing climate change. That is, neither provides sufficient incentives for governments whose publics are indifferent to the climate problem to contribute to this global public good. In other words, these approaches lack the *institutionalized transmission belts* that we believe are critical to long-term success on a global scale. If only a few countries implement effective policies and measures to mitigate climate change, the overall response will surely be inadequate. What is needed is a system that will draw in many states, or at least the most important set of major emitters.

Advocates of harmonized policies and measures typically respond to this objection by proposing some form of project-by-project aid to countries that are reluctant to act. But this raises a second key problem. Each such project will encounter high transaction costs—the costs of negotiating and enforcing agreements—which will cumulate across projects in a way that will tax the institutional capacity even of wealthy countries. Thousands of projects would have to be designed, agreed upon, and ultimately enforced. The existing evidence on implementation gives little reason to believe that this is possible.

⁵ See the articles by Scott Barrett, Thomas Schelling, and David Victor in Aldy and Stavins (2007).

Indeed, we have ample experience from foreign aid conditionality to counsel great caution. The dilemma of conditionality is that if the project has high priority for the government, the government will do it anyway, so that aid simply makes resources available for other projects. If the project has low priority, the government is likely not to devote the high-quality personnel and other inputs, complementary to the foreign aid, to assure that it will work. Compensatory efforts, when engaged in, for example, by the International Monetary Fund (IMF), have led to a proliferation of conditions without improving compliance.⁶ New conditions generate new efforts to evade them; and as conditions multiply, it becomes more difficult to insist on any one of them as crucial. As a result, transaction costs increase without corresponding improvements in performance. Moreover, determining that a project actually mitigated emissions as compared with “business as usual” is extremely difficult. Such a determination of “additionality” involves constructing a counterfactual baseline: what would have happened in the absence of the aid. Since this baseline is unobservable, it is impossible to determine it with a high degree of confidence: this is what is known as the “fundamental problem of causal inference.”⁷ The complexity of such projects will compound this problem, as will the inevitable political inference with efforts to evaluate them.

The Clean Development Mechanism (CDM) of the Kyoto system illustrates these problems. The CDM funds projects as part of an emissions credit system: members of the European Union Emission Trading System (EU ETS) purchase these credits in a growing market that even in 2006 was on the order of \$30 billion.⁸ The CDM experience to date supports our pessimism. Host governments seek certification of proposed credits and deal with verifiers who are dependent on the host governments for future business; furthermore, purchasers do not have a stake in assuring that projects are genuine, as long as they are certified. Normally, buyers limit the opportunism of sellers because they care about the quality of products or services, but in the case of the CDM, the buyers only care that *someone else* has certified the product they are buying as valid (Wara and Victor 2008). The CDM also produces perverse incentives—indeed, it “reduces the incentives of developing country governments to enact policies reducing emissions,” since by doing so they would reduce the credits they could earn from projects that, in a particular situation, correct the results of bad incentives.⁹

To summarize, project-oriented mechanisms for mitigating climate change, which will likely be attached to any harmonization-oriented policy scheme, have three disadvantages: They fail to send a comprehensive price signal to investors and governments; they incur very high transaction costs; and they require counter-factual determinations to assess additionality. Cap-and-trade approaches are markedly superior on all three counts. Before moving to abandon them, we should try to make them politically and institutionally feasible.

⁶ Mosley, Harrington, and Toye 1991: 61; Leandro, Shafer, and Frontini 1999; Stone 2002; Barnett and Finnemore 2004.

⁷ Holland 1986; King, Keohane, and Verba 1994: 79-80.

⁸ Hepburn 2007: 377.

⁹ Hepburn 2007: 386.

Global carbon taxes also avoid these varied problems, and there are strong purely economic arguments for them. For this reason many prominent economists favor carbon taxes.¹⁰ But taxes face major political hurdles. Most significant is the effect on reluctant states. Taxes would impose economic burdens on the industries of developing states without offering the offsetting gains of being able to sell emissions permits under a cap that made allowance for their much lower historic and *per capita* emissions. It therefore seems unlikely that developing countries, including China and India, would agree to such an arrangement, since these countries have refused to be bound by binding caps even when they would be compensated for doing so. Cap and trade has the enormous advantage that permits can be set in excess of future business-as-usual emissions for those reluctant to join the system. In other words, reluctant countries can be given “hot air.”

Although granting hot air is essential to obtaining the participation of reluctant states, this will 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 giving out 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. None of this vitiates the major problem with hot air, which is that, by definition, hot air does not represent real emissions reductions. We recognize this, but believe that some hot air is essential to jumpstart the trading system. Over time, as we discuss below, it is equally essential that hot air allocations be eliminated. That is, any cap-and-trade system needs to chart a path toward genuinely binding caps on all significant emitters of GHGs.

Cap and trade is also a more likely global approach than carbon taxes 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. Moreover, the political system of the United States, the world’s second largest emitter, is famously hostile to new taxes. Indeed, even the relatively trivial energy (BTU) tax suggested by the Clinton Administration went nowhere, in part because of this aversion to taxes. For all these reasons we believe that a global carbon tax is less politically feasible than an emissions trading system, and we therefore assume—as a basis for our discussion of compliance—a cap-and-trade regime such as that discussed in this volume by Jeffrey Frankel.¹¹ 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.

Despite all these advantages, the task of negotiating a comprehensive cap-and-trade system will be daunting. Incentives for the most reluctant countries – or those that can bluff being most reluctant – to hold out for a better deal would be very great.¹² Although it would in principle be desirable to maintain the existing United Nations process of negotiating a universal treaty, and although the legitimacy of such a regime would be enhanced by its universality, it would be foolish to commit so irrevocably to an arrangement that gives potential hold-outs veto power. The option of beginning with a smaller “club” of

¹⁰ Cooper 2008.

¹¹ Frankel 2007.

¹² On such bargaining problems see Fearon 1998.

major contributors to global warming, plus any other states that chose to join, or of linking various different cap-and-trade systems (Jaffe and Stavins 2008) should be maintained.

Any club-like arrangement should, like the Kyoto Protocol itself, be open to the accession of all countries on generally known terms. A club with attractive incentives to join—for example, the prospect of substantial revenues from permits—would exert a strong magnetic pull. Whatever the ultimate structure, climate institutions must be designed to attract participants—such that, for example, the 30 largest Indian industrialists are motivated to meet with the Prime Minister and demand that India join the cap-and-trade system so that they can sell into it.¹³

In short, we favor cap and trade as the basic approach, but do so cognizant of the many problems it faces. We are not confident that such a system will work. However, we think it has the best political prospects of any plausible climate system, and we believe that careful institutional design can help ensure feasibility. For these reasons we view our proposal for a cap-and-trade regime coupled to buyer liability much like Churchill viewed democracy—the worst imaginable system, but for the alternatives.

The political logic of a buyer liability system

The fundamental problem of compliance in world politics is that it is virtually impossible to force powerful states to comply with international rules through a collective process. Rules that purport to ensure compliance lack credibility *ex ante*. Even where sovereignty has been curtailed, as in the 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 this disciplinary system in the first place.¹⁴

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 behavior.¹⁵ 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.¹⁶

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

¹³ Personal conversation, Nathaniel Keohane, September 2008.

¹⁴ See www.eubusiness.com/Finance/ecofin-council.06.

¹⁵ Victor, Raustiala, and Skolnikoff (1998) provide many examples.

¹⁶ Hathaway 2002

- 1) *Post-hoc penalties 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. 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 non-compliance.
- 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 (IMF) in *Lending Credibility*.¹⁷ 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.

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 percent penalty. As a response to sudden fluctuations beyond the control of states that are genuinely committed to meeting 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.¹⁸ 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 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 exit threats and introduce a serious problem of moral hazard.

The unrealistic nature of these provisions suggests the futility of a collective system for external enforcement. One alternative could be tariffs based on carbon or GHG content, imposed against countries that failed to adhere to an agreed international cap-and-trade regime.¹⁹ If followed universally, authorization to impose such tariffs could provide incentives for states to enter, and abide by, a climate regime. But if the offender were a powerful state, many countries would hesitate to impose tariffs, weakening the incentives for compliance. In states that did impose trade sanctions, on the other hand, decisions on the level of these tariffs would be subject to manipulation. Indeed, protectionist interests would surely seek to use them for their own purposes. (There are also likely to be complex issues relating to the rules of the World Trade Organization, if any of its more than 150 member states is involved). We propose below a system of buyer liability for permits that has

¹⁷ Stone 2002.

¹⁸ 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>

¹⁹ We thank an anonymous referee for this suggestion.

desirable incentive effects without either requiring weak states to punish strong ones or creating opportunities for protectionist manipulation.

No system will be perfect. But fortunately, perfect compliance with a cap-and-trade regime is not required.²⁰ Compliance 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, because the most significant action to address climate change is likely to come from technological innovation rather than from trading per se. In the longer term, the regime will surely have to be adjusted as a result of the extensive learning from experience that is bound to occur.

To summarize, in designing a cap and trade system we must not put great weight on external enforcement systems. Some alternative system of enforcement must exist to ensure that, over time, permits are allocated in ways that represent real reductions. Below, we advocate a system of buyer liability in which buyers of emissions permits are liable for those emissions should the permits not prove fully valid. We couple that recommendation to two other key features: an annual emissions assessment process and what we call "jurisdiction equality," meaning that all permits sold from a given jurisdiction (e.g. China) will have the same value.

The roles of states and enterprises

Seven years ago, David Victor proposed that the enforcement system under a cap-and-trade regime should be built on the principle of buyer liability.²¹ 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 2001.²² In this section we revive and amplify his arguments for buyer liability, since we believe that only such a system will be robust to the political constraints that we have just discussed. Technical critiques of this approach, while raising important points, are outweighed by the political benefits of a buyer-based system.²³ First we briefly introduce the basic features of our system. Then in later sections we delve into the details of buyers, sellers, incentives, and assessment.

Under either a comprehensive cap-and-trade architecture or linked regional cap-and-trade systems, each party creates, or adapts, a national regulatory system to meet its agreed

²⁰ Hypothetically, enforcement could even be too strong, deterring participation. However, typically there is weak enforcement of multilateral obligations and many loopholes, so this is unlikely to be a practical problem.

²¹ Victor 2001: 69-74.

²² Bluemel 2007.

²³ See OECD 2000. For analyses of buyer liability that explicitly recognize the enforcement problems entailed in seller liability, see Nordhaus et al. 2000a and 2000b and Zhang 1999. None of these papers emphasizes the political asymmetry that we stress between the commitments to action of buyer and seller countries.

emissions target.²⁴ Many states that expect to find it difficult to meet their 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 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 firms in these states, or in other states that accept stringent emissions caps, will frequently need to purchase permits from entities abroad in order to meet their domestic emissions obligations.²⁵ We advocate that these permits be issued annually.

Consistent with most analyses, we anticipate that some parties to any future climate accord will successfully negotiate overall emissions limits that exceed their projected emissions. 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 emissions markets already exist in various, often limited, forms.²⁶

Although caps on overall emissions will be established 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. For example, Duke Power in the United States might purchase Chinese-denominated permits from Xian Electric Power to cover its anticipated excess emissions in 2010, and it could re-sell these permits if it turned out to have more than it needed. States are nonetheless crucial to our proposal. States will have responsibility for overall emissions targets and will issue or sell permits to enterprises as they decide. States will also enforce compliance with national caps domestically. Most significantly in this regard, we advocate that all permits from a given jurisdiction be assigned the same value if sold.

In other words, under our system permit trading on the world market would be “*jurisdiction-equal*.” By this we mean that permit validity will be assessed on a national basis and permits will be discounted on a national basis as well. (We discuss assessment at length below). Consequently, the validity of permits sold by entities will depend on the *aggregate* validity of permits sold from a particular national jurisdiction, as decided by the assessment process. Hence all permits emanating from a given jurisdiction in a given year would ultimately be assigned the same validity.

Sellers will seek to command the highest price for their permits by ensuring that permits represent true reductions. Buyers will in turn seek the cheapest permits, adjusting for risk. Buyers of emissions permits that turned out to be invalid would be liable to make up

²⁴ Tickell (2008) proposes allocating permits directly to individuals rather than states. But the political impediments to agreement and the administrative difficulties to implementation seem debilitating.

²⁵ In most national legislation, including proposed laws in the United States, trading is limited to a small fraction of the overall entity cap. We anticipate that feature continuing for some time.

²⁶ Examples include the European Union Emission Trading Scheme and the Chicago Climate Exchange

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 insufficient valid permits at the end of the budget period would need to purchase more permits or engage in further internal reductions. Again, it is national governments that would enforce this commitment against private actors.

This system thus rests on the incentives of buyers, 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 and less corrupt national legal institutions than the likely permit-long countries. Furthermore, the permit-short 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, our system is designed to generate endogenous incentives for compliance on the part of permit-long, or seller, countries. These governments will gain economically from maintaining a high value for the permits that their enterprises sell, and will therefore seek to act in a way that maintains their reputations for compliance. This system, unlike many of the most prominent alternatives, provides “institutionalized transmission belts” for compliance to flow from the advanced industrial democracies, which have the strongest commitment to climate-change abatement, to the wide range of likely selling jurisdictions, which tend to have weak commitments to abatement. Below we flesh out some of the details of this process.

Buyers and incentives for prudence

As in all cap-and-trade systems, under our proposal emissions permits would trade on public markets. Their value would depend on buyers’ *ex ante* estimates of validity. Shortly after the end of the year for which permits were issued, a comprehensive assessment would decide their value. For instance, Indian-jurisdiction permits for the year 2010 might be evaluated by June 30, 2011, when all entities subject to caps on their 2010 emissions would be held accountable for their emissions, taking into account valid permits bought or sold.

Since *ex post* assessment problems are difficult and complex, we devote all of the next section to that topic. Here we focus on the incentives of buyers. In many respects a buyer liability system is broadly akin to the existing international bond market. After being issued by states, bonds trade on international markets, just as emissions permits would trade on such markets. Permits would trade at prices that would reflect market participants’ confidence that, when they came due for redemption, they would be valid. They would likely trade at discounts if their validity was viewed as questionable. Buyers of emissions permits that were invalid, like buyers of bonds whose issuers default, will incur losses at the end of the process; and market prices will reflect prevailing expectations of eventual validity or invalidity. Like buyers of bonds, therefore, buyers of permits will have strong incentives

to assess quality *ex ante*, price the permits accordingly, and hedge to some degree by purchasing excess permits.

Market participants would in turn have incentives to create or engage ratings 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. In a world of perfectly functioning markets, reliable ratings agencies would come into being endogenously, as a result of demand for their services; and to a considerable extent we expect this to happen.²⁷ The recent financial crash, however, illustrates the pitfalls of ratings. Ratings agencies themselves can have perverse incentives and therefore exhibit systematic bias.

One advantage of ratings on GHG emissions permits as compared to long-term bond ratings is that the feedback would, under our system, be annual: each year the *ex post* assessment system would evaluate permits, which would provide information about the validity of permits for future years from the same issuer. It would probably be necessary also to take some measures preventing highly leveraged large banks and bank-like entities from speculating in permits since, as we have seen in the recent housing crisis, these activities generate risks that governments may be required to socialize if financial collapse occurs. Perhaps a non-profit “watchdog” to evaluate the ratings agencies could be created. The watchdog institution could closely scrutinize a random sample of the ratings of each ratings agency, and itself provide a rating of their reliability, which investors could use in evaluating permit ratings and issuers could use in deciding which ratings agency to employ. We are agnostic about the precise structure of such a system, but we believe it is essential that permit rating work reasonably well.

In the US cap-and-trade system under Title IV of the Clean Air Act, sellers are liable for the value of their permits, and this liability is legally enforceable. Scott Barrett reports that “the penalty for non-compliance is so severe that in 2006, compliance was 100 percent.”²⁸ But as we have seen, no such enforcement is available at the international level. At this level a major 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.

Accurate assessment and pricing are thus key to permit markets working smoothly. If assessments *ex ante* are accurate, buyers can simply discount permits appropriately and buy more nominal permits than they require 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. All these features push toward compliance in the permit-short jurisdiction. However, if riskier permits fail, the buyers of those permits, now facing a shortfall, may in severe situations seek political renegotiation of their domestic emissions restrictions rather than purchase more permits. This is a serious problem—of moral hazard—that we address in a later section of this chapter.

²⁷ See Sinclair 2005.

²⁸ Barrett 2008: 4-5.

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? Permits that lacked full validity would have a reduced value, with the loss borne by buyers that held the permits at that time. How would this give *sellers* incentives to follow the rules?

Under our proposal (and indeed under nearly all trading systems) emissions trading would be structured to continue for many years. Such an ongoing market creates an economic incentive for sellers 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 permit sales is sufficiently high, states will seek reputations for selling valid permits.²⁹ 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.³⁰ Indeed, support by sellers for independent monitoring would be a signal of being honest, and therefore valuable in itself. In short, buyer liability makes seller incentives largely *economic* rather than *political*. Seller incentives would not rest on concern about climate change; they would rest on an ongoing desire for profit.

Reputation (for high value permits) is consequently at the center of this self-enforcement mechanism. It is therefore crucial to design the allocation system so that sellers of permits would face the prospect of a substantial stream of revenue many years into the future. If the “shadow of the future” is too short, incentives for compliance will tend to vanish.³¹ In the long run, of course, the caps will have to “bite” even on those countries who were net sellers of permits when they originally joined. Our expectation is that over time, countries such as China would increasingly recognize their stake in mitigating climate change; that is, at the state level incentives would become political as well as economic, even if private entities would continue to be primarily motivated by profit. Having been part of a cap-and-trade system, these governments would also have developed the institutions necessary for effective participation, and acceptance of meaningful caps would therefore create a less uncertain prospect for them. In other words, ideally the period of being large net sellers of permits would be a transition phase, easing countries’ way into full membership.

There are many potential problems with this system, as we discuss below. However, the cardinal virtue of a buyer liability system is that it would not require that an international

²⁹ Axelrod 1984; Tomz 2007.

³⁰ Akerlof 1970.

³¹ Axelrod 1984.

organization ensure compliance with international commitments—a condition that, as we have seen, cannot be met. This system would instead be self-enforcing.

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. 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.

Permit assessment rests on the measurement of aggregate emissions in selling jurisdictions. Measuring the use of some globally-traded fuels is relatively straightforward (at the aggregate national level) but other fuels and emissions 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. But a cap-and-trade system has the decisive advantage over project-based systems that it does not have to evaluate what would have happened in the absence of a given project. The assessors simply calculate actual emissions and subtract them from the agreed cap, which is public knowledge. They only have to assess a factual situation—actual emissions—rather than both a factual and a counter-factual. One promising way to simplify this process is to focus on “upstream” emissions—to measure the carbon inputs into the energy system – which enter at relatively few points—rather than emissions from thousands or millions of sources.³²

The most serious problem of measurement, however, is political: as we noted above, 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, individuals responsible for conducting an assessment may feel strong pressures to support the positions of their national government.³³ As a result, strenuous efforts must to insulate the assessment process from political pressure.

One way to do so would be to employ a structure like the IPCC, which is run by scientists whose judgments are not directly subjected to override by politicians and diplomats. Another would be for private foundations to endow a non-profit entity to carry out the assessment process. Neither is foolproof. However, the politics of assessment in a buyer liability system will be fundamentally different from those in a seller liability system, and much more benign. In a seller liability system, sellers have every incentive to obstruct assessment. In the absence of clear proof of cheating they are unlikely to be punished. Obstruction generally will pay. In a buyer liability system, by contrast, the reputation of any

³² Tickell 2008: 90-92. A carbon tax would also be relatively simple to administer but founders on likely political resistance from developing countries, who will refuse to join a system that does not offer them credible compensation. Allocating them excess permits on a temporary basis does this; a carbon tax does not.

³³ Posner and de Figuerido 2005

seller that obstructed assessment would fall, and the value of the permits that it issued would fall accordingly. Doubt about the validity of permits would have a similar effect: markets hate uncertainty. Sellers would therefore have strong economic incentives to accept and even welcome thorough assessment, to remove such doubts and therefore raise prices.³⁴

Jurisdiction-equality and assessment

As we have seen, the Kyoto CDM faces a serious assessment problem. The key flaw is the lack of a clear counterfactual baseline in developing countries that sell CDM permits.³⁵ 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. Under our proposal for “jurisdiction equality,” 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. Discounting all permits from a given jurisdiction at the same rate 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 best be fixed via national action.

Furthermore, jurisdiction-equality has two very important virtues. First, it avoids creating very thin markets for thousands of permits from often obscure entities whose permit quality might be impossible to assess by outsiders. Such a system would lead to very high transactions costs and very thin markets. Second, and perhaps most important, unfairness 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. Governments themselves will also face incentives to seek low (or zero) discount factors, since aggregate national sales and, relatedly, tax revenue will turn on permit price. The system therefore generates *endogenous* domestic political pressures for measures to assure permit validity. 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 avoid and correct these problems.

Assessment: an evaluation

It is extremely difficult to insulate any assessment system against political pressures. Indeed, the central thrust of this discussion does not concern the merits of any particular

³⁴ For a similar argument in the context of arms control, see Schelling 1960: 146-150.

³⁵ See in particular Wara and Victor 2008; and Wara 2007.

arrangement, but the necessity of undertaking a careful political analysis that considers strategies that opportunists could follow to manipulate the system.

A well-functioning cap-and-trade system would likely 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 Protocol 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.³⁶ The much less intrusive review we envision for a post-Kyoto system thus falls within established norms in international law.

But the most important point is one already made: buyer liability will give sellers incentives to facilitate assessment and show that they have done so. This is not true of other assessment processes involving developing countries that have failed or been heavily resisted, such as IMF surveillance and the WTO Trade Policy Review Mechanism.³⁷

Potential weaknesses of buyer liability

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 unlikely to work because there simply is no credible set of institutions available in world politics to enforce sanctions against even moderately important states.³⁸ Therefore, any effective system cannot be one of pure seller liability.

The only real question is whether it is preferable to have pure buyer liability or a hybrid system, such as the one proposed by Nordhaus et al. (2007). We prefer pure buyer liability because it is the only system that is robust to state non-compliance—if the shadow of the future is sufficiently long—and that does not require frequent state negotiations. Such negotiations inevitably raise issues of renegotiation, gaming, and non-transparency. Hybrid systems will typically be subject to at least one of these three problems. 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. We doubt this is possible, and hence favor pure buyer liability.

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

³⁷ On the WTO TPRM see Ghosh 2008.

³⁸ 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.”

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

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. There is some basis for this concern. Yet 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 can gain enormously by credibly evaluating tradable permits just as they evaluate and rate government bonds. These ratings will help to determine prices in a global carbon market.

That said, our 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 suggests that even in well-established markets it is surprisingly easy for sophisticated participants to misprice goods. For the system to work, the *ex post* monitoring system will have to be sufficiently reliable, credible, and prompt that adjustments can be made quickly, and fairly smoothly, in the event that permit-settling countries fail to fulfill emissions requirements. Again, we stress the annual nature of assessment. Such a system provides a steady stream of information, albeit inevitably somewhat imperfect, about emissions and permit validity.

In the end, however, the objection that buyer liability generates transaction costs that are too high 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 transaction costs is spurious: it simply “achieves” lower costs by ignoring the problem of compliance. Its efficacy depends on imposing penalties on sellers of bogus permits. But neither internal enforcement under seller liability 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. For these reasons a seller liability system is far more likely to break down at the compliance stage.

Negative cascades

A second potential problem relates to 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 that particular year shortfalls in compliance would occur, if two additional features exist: entities both did not hedge adequately and could not buy sufficient new permits from other sellers.

For several reasons we do not think this scenario is likely. We expect hedging to take place for the reasons given above. There is also reason to think that permits will be available in the event of a shortfall, albeit at higher prices. Third, 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. Fourth, the problem would also be limited to the year in question. Finally, a work-out period could be arranged so that the full impact of holding partially invalid permits was not immediate for the buyers. Likewise, 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.

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. However, as Robert Stavins argues with respect to the United States, “credible mechanisms need to be established to ensure that the use of borrowed allowances is offset through future emission reductions.”³⁹ For this reason we advocate using such banking measures only cautiously.

Moral hazard and 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 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, overselling of permits would lead to a lower effective price of carbon by increasing permit supply.

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 the moral hazard problems of bailing out banks that engage in

³⁹ Stavins 2008: 8.

risky lending practices and later seek government bailouts. This is probably the most serious weakness of our system, though it is a weakness shared by nearly every alternative model as well.

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 prospect of bank failures set off by the recent financial crisis, the US Federal Reserve System and the Treasury have taken radical measures to prevent bank failures. These measures have raised serious issues of moral hazard.

Explicit legislative provisions to prohibit *post hoc* subsidies and renegotiation will consequently be essential, and the media and non-governmental environmental organizations will have to be alert to the danger; but these measures are unlikely to be sufficient if the invalidity of seller permits threatened a banking crisis in the buyer country. One aid to resisting *post hoc* adjustments is likely to be pressure from buyers of valid permits, who will seek to ensure that the value of their investments is not squandered by the state. They will likely constitute a powerful interest group with a stake in the integrity of the system. Another source of resistance to moral hazard lies in the accountability of governments to their publics, and the commitment by those publics to compliance with a meaningful international climate regime. Publics will need to understand that succumbing to pressure to compensate buyers for invalid permits will destroy the climate change mitigation system.

However, neither reliance on competitors nor reliance on publics would be likely to suffice if very large banks or bank-like entities were faced with insolvency as a result of having purchased large quantities of invalid permits. Regulation will have to occur *ex ante* to ensure that such a situation does not arise. That is, regulation will have to assure, as noted above, that banks and bank-like entities cannot speculate in emissions permits with highly leveraged debt.

Conclusion

In world politics, strong commitment by states is essential to effective multilateral action. States must prefer participation to non-participation. We therefore began this paper 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. Proposals for assistance with projects and policies carry enormous transaction costs and have little prospect of being sufficiently effective; and an international carbon tax is unlikely to be acceptable to reluctant developing countries and the major industrialized states as well. In the end, a cap-and-trade regime must rest on strong preferences in democratic states to mitigate climate change. These are demanding political conditions, but we see no alternative arrangement that could generate sufficiently effective and timely action. And we observe around the world recent actions that counsel some optimism, in Australia, the EU, and even the United States.

Yet any cap-and-trade regime at the international level will encounter pressures toward non-compliance. As with participation, for global regulatory regimes to work well, states must, on the whole, choose compliance over violation. Since there is no external

enforcer, arrangements such as that in the Kyoto Protocol for seller liability will not work. Compliance will neither reliably occur *ex post* or be expected to occur *ex ante*. 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.

Our proposed system for a post-Kyoto regime rests instead on a model of buyer liability coupled to annual *ex post* assessments and jurisdiction-equal discounting of invalid permits. This system is incentive-compatible for two reasons: buyers have incentives to monitor the system and price permits according to perceived validity, and sellers have incentives, if allocations are correct, to maintain their reputations for reliability. The system will not operate automatically: In particular, institutions will need to be created to assure that *ex post* assessment is reliable and, *ex ante*, that ratings agencies are also reliable. Indeed, one of the major conclusions of this paper is the urgent need for social scientists to think more carefully about assessment institutions that could be effective in a climate change regime with buyer liability.

Some non-compliance in climate change cooperation is inevitable. Yet the system that we propose is the least bad choice, because it is consistent with the fundamental features of world politics we have described. For this reason, it provides at least the outline of a political foundation for a working international system not doomed by enforcement problems. It could therefore contribute to effective regulation of GHG 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.

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