PROPERTY AND PRICES TO PROTECT THE PLANET

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INTRODUCTION

In this contribution to the symposium on "Local Property, Global Justice: Law and Resources in the Era of Climate Change," I examine a property theory approach to the international legal structure of climate change regulation. My analysis proceeds in three parts. Part I frames the discussion by describing the tragedy of the climate commons and the menu of regulatory instruments available to solve this global problem. Part II outlines the choice between the two most prominent regulatory instruments on the current menu: prices (taxes) versus property (a cap and trade system). Part III argues that the difficulty of engaging participation in international regulatory schemes means that the cap and trade system is better suited than a tax system to solving the problem of global climate change. I conclude that a property-based instrument has distinct advantages over a price-based instrument to protect the global climate commons at the international level.

I. THE TRAGEDY OF THE CLIMATE COMMONS AND POTENTIAL SOLUTIONS

The planet is suffering a tragedy of the climate commons.[1] Emissions of greenhouse gases (GHGs) pose external harms.

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1. For the classic exposition of tragedies of open-access resources, see generally Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968), *available at* http://www.sciencemag.org/cgi/content/full/162/3859/1243. For a more detailed application to the global climate problem, see generally RICHARD B. STEWART & JONATHAN B. WIENER, RECONSTRUCTING CLIMATE POLICY: BEYOND KYOTO (2003) [hereinafter STEWART & WIENER, RECONSTRUCTING CLIMATE POLICY].

Emissions emanating from anywhere on the planet mix globally in the atmosphere and cause global impacts, although those impacts vary regionally. The atmosphere is being treated as an open-access disposal site for GHGs. Abatement of GHG emissions is costly to the actors who undertake abatement, and the benefits of abatement are spread globally, so each actor faces an incentive to continue emitting – that is, to free ride on others' abatement efforts. The result is that abatement is underprovided compared to the global optimum.

The fundamental legal question, as in any tragedy of an open-access resource problem, is how best to restrict access. To solve the tragedy of the climate commons, the international community has a choice of regulatory instruments for environmental protection. The menu of options available includes regulatory instruments that restrict GHG-emitting conduct (such as regulations mandating, or forbidding, the use of particular technologies); instruments that restrict the quantity of access to the commons to dispose of GHGs (such as property rights, performance standards, and cap and trade systems); instruments that set the price of access to the commons to dispose of GHGs (such as taxes or liability rules that charge a price for each use of the resource); instruments that use information disclosure on GHG emissions to influence behavior; and instruments that attempt to engineer the climate directly.[2]

Historically, U.S. domestic environmental law often chose to regulate conduct by instructing firms to adopt particular designs or technologies to reduce pollution.[3] Examples of such conduct standards include requirements to install scrubbers to reduce air pollution, to install filters to reduce water pollution, or to avoid the use of certain types of fish nets.

More recently, the United States increasingly has used a second type of policy tool: quantity or property instruments that solve the

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2. For a more complete taxonomy and analysis of climate policy instruments, see generally Jonathan Baert Wiener, *Global Environmental Regulation: Instrument Choice in Legal Context*, 108 YALE L.J. 677 (1999) [hereinafter Wiener, *Global Environmental Regulation*]. The contributions by my colleagues in this symposium session focus on cap and trade and related offset systems. *See* Annie Petsonk, '*Docking Stations': Designing a More Welcoming Architecture for a Post-2012 Framework to Combat Climate Change*, 19 DUKE J. COMP. & INT'L L. 433 (2009) (arguing that docking stations can be a means of increasing the participation of major emitting nations in cap-and-trade programs); David Driesen, *Linkage and Multilevel Governance*, 19 DUKE J. COMP. & INT'L L. 389 (2009) (arguing that limiting linkage of different cap-and-trade markets while increasing efforts to stimulate innovation would better accomplish the goals of the cap-and-trade program).

3. *See* Wiener, *Global Environmental Regulation*, *supra* note 2, at 705-06.

tragedy of an open-access resource by limiting the quantity of access to the resource. In principle, this means dividing the resource, parceling it, and privatizing it in some way. For land, the U.S. legal system typically prevents open-access overuse by spatially dividing the resource into limited-access parcels (what we call private property). Such spatial parceling does not work very well for managing pollutants in the atmosphere or fish in the oceans. For mobile resources, the quantity/property instrument to limit access takes the form of a use right, not a fixed possessory right.

A limited use right could be created by a regulatory performance standard that limits overuse but (in contrast to conduct instruments) allows users "how" flexibility in choosing the methods of compliance or abatement. Examples of performance standards are regulations that set a maximum allowable amount of pollution or fish caught over a period of time.

Alternatively, such a limited use right might be made transferable among users, through a tradeable allowance, marketable permit or transferable quota system—all names for a cap and trade system. These instruments limit the quantity of access to the open-access resource, while providing users both "how" flexibility in choosing the methods of compliance and also "where" flexibility in choosing the location of abatement across users. If costs of abatement vary across methods and across users, then these two types of flexibility ("how" and "where") can improve the cost-effectiveness of the regulatory policy. "When" flexibility can also be afforded by letting sources shift their abatement effort over time, or by allowing banking and borrowing of allowances over time. For climate change, with wide variation in the costs of abatement across firms, sectors and countries, a cap and trade system could reduce costs very substantially compared to fixed performance standards and even more compared to central conduct standards.[4]

A third type of regulatory instrument relies on prices to limit access. A price instrument limits access to the open-access resource not by telling actors what to do nor how much they may do, but by telling actors the price they must pay to do it. Examples of price instruments include taxes on emissions, or subsidies to reduce emissions, or liability rules that impose monetary damages on emissions as nuisances.

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4. *Id.* at 716.

A fourth type of instrument is information disclosure, which force actors to report or reveal their emissions or other risk-related behavior. Examples include the Toxics Release Inventory, and proposals for a GHG Emissions Inventory.

A fifth type of instrument seeks not to reduce emissions of GHGs, but to manage the heat balance of the planet directly through geoengineering projects, such as mirrors put into orbit around the earth, or sulfate aerosols injected into the upper atmosphere to try to cool the planet.

The choice of regulatory instruments for environmental protection should always be based on a pragmatic evaluation of which instruments will yield the best results. In discussing the strengths and weaknesses of any regulatory instrument, it is always necessary to ask, compared to what alternative?

II. THE CHOICE BETWEEN TAXES AND TRADING

In this section, I focus on the choice currently being debated between a GHG tax (price instrument) and a GHG cap and trade system (quantity/property instrument) as alternative tools to limit emissions, especially at the international level. Many (though not all) economists favor taxes rather than cap and trade as an instrument to regulate greenhouse gas emissions.[5] These economists argue that taxes produce at least two major advantages. First, taxes contain costs, because setting the tax lets firms know what the price per unit of emissions will be. If the true cost of abatement turns out to be higher than the tax, firms will pay the tax instead of undertaking the abatement, and thereby the tax sets the upper limit on costs. The downside is that it is unclear what the emissions result will be. (Some say that cap and trade hides the cost while taxes make the cost explicit; but one could equally say that taxes hide the emissions result

5. Economists favoring taxes include, for example, William D. Nordhaus, *To Tax or Not to Tax: Alternative Approaches to Slowing Global Warming*, 1 REV. ENVTL. ECON. & POL'Y 26 (2007) (favoring taxes); Ian. W. H. Parry & William A. Pizer, *Emissions Trading Versus CO2 Taxes Versus Standards*, *in* ASSESSING U.S. CLIMATE POLICY OPTIONS: A REPORT SUMMARIZING WORK AT RFF AS PART OF THE INTER-INDUSTRY U.S. CLIMATE POLICY FORUM 79 (2007) (favoring taxes), *available at* http://www.rff.org/rff/Publications/upload/31809_1.pdf.

Economists favoring cap and trade include, for example Robert N. Stavins, *A Meaningful U.S. Cap-and-Trade System to Address Climate Change*, 32 HARV. ENVTL. L. REV. 293 (2008) (favoring cap and trade); Nathaniel Keohane, *Cap and Trade, Rehabilitated: Using Tradable Permits to Control U.S. Greenhouse Gases*, 3 REV. ENVTL. ECON. & POL'Y 42 (2009) (favoring cap and trade).

while cap and trade makes the emissions result explicit.) Many economists argue that in the tradeoff between the risk of cost escalation (under cap and trade) and the risk of emissions escalation (under taxes), it is better to limit costs and to tolerate some emissions escalation.[6]

Second, some economists often prefer pollution taxes on the ground that they raise revenues,[7] which can in turn be used to replace and reduce other more distortionary taxes on labor and capital – as Al Gore says, we should "tax what we burn, not what we earn."[8] Others see this revenue as a source of funding to invest in clean technology projects.

Neither containing costs nor raising revenues, however, should be understood as a fundamental objection to cap and trade. They are both important considerations. But cap and trade systems can be designed to meet both of these objectives.

Cap and trade systems can be designed to contain costs in several ways. First, the stringency of the cap obviously affects costs. Second, given a cap, the design of the trading system can help avoid cost escalation. Most directly, the "how" and "where" flexibility in cap and trade systems keep costs low by allowing firms to find the least-cost methods and locations of abatement. Third, a broader and thicker market enhances the cost-effectiveness of trading by engaging lower-cost abatement opportunities. Extending the cap and trade market to include all sectors of the economy, and to include international participants,[9] will further ensure cost-effectiveness.

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6. *See* PARRY & PIZER, *supra* note 5, at 83 (suggesting that a cap and trade program with cost-containment mechanisms represents a compromise between cost escalation and emissions escalation). This line of argument derives from the classic paper by Martin L. Weitzman, *Prices vs. Quantities*, 41 REV. ECON. STUD. 477 (1974).

7. *See* Lawrence H. Goulder, *Environmental Taxation and the Double Dividend: A Reader's Guide*, 2 INT'L TAX & PUB. FIN. 157 (1995); Lawrence H. Goulder et al., *Revenue-Raising versus Other Approaches to Environmental Protection: The Critical Significance of Preexisting Tax Distortions*, 28 RAND J. ECON. 708 (1997); Lawrence H. Goulder et al., *The Cost-Effectiveness of Alternative Instruments for Environmental Protection in a Second-Best Setting* (Nat'l Bureau of Econ. Research, Working Paper No. 6464, 1998); Ian W. H. Parry, *Pollution Taxes and Revenue Recycling*, 29 J. ENVTL. ECON. & MGMT. S64, S65, S76 (1995). *But see* Wallace E. Oates, *Green Taxes: Can We Protect the Environment and Improve the Tax System at the Same Time?*, 61 S. ECON. J. 915 (1995) (questioning the validity of the double-dividend argument).

8. *See* John M. Broder, *House Bill for a Carbon Tax to Cut Emissions Faces a Steep Climb*, N.Y. TIMES, Mar. 7, 2009, at A13 (quoting Al Gore), *available at* http://www.nytimes.com/2009/03/ 07/us/politics/07carbon.html.

9. I am referring here to an international system of cap and trade policies, not to a U.S. cap and trade policy linked to offset credits purchased in countries without caps. Such uncapped

Fourth, allowing "when" flexibility through multi-year budgets, banking, and borrowing can further reduce costs.

Fifth, a cap and trade system can be modified by adding price ceilings and price floors, ensuring that the cap and trade market will operate within a constrained range of prices. (These price ceilings and floors can be set to rise over time.) A pure price ceiling on a cap and trade system is known colloquially as a "safety valve," because it enables sources to purchase unlimited additional allowances at the price ceiling, thereby preventing the market price from rising too high.[10] In effect, the safety valve converts that cap and trade system into a tax at the price ceiling; it removes the cap at that price. This is attractive to those concerned about cost escalation, but worrisome to those concerned about emissions escalation.[11] On the other hand, the addition of a price floor ensures that the market price for allowances will not fall too low, thus ensuring some pressure to reduce emissions. Modifying a cap and trade system by applying both a price ceiling and a price floor might be an attractive compromise. The combination of upper and lower bounds on allowances prices could reduce price volatility and associated investment uncertainty, lower the expected cost of the cap and trade system, and ensure at least some incentive to reduce emissions. This symmetric approach could even lower costs so much that it enables policy makers to adopt a more stringent cap at a lower cost than an unmodified cap and trade system.[12]

An alternative to a price ceiling is to create a limited reserve of additional allowances, which could be sold once the market price rises to a trigger price. This limited quantity reserve is similar to a safety

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offset credits, like the Clean Development Mechanism (CDM) under the Kyoto Protocol, can further reduce costs, but they are less effective at reducing actual emissions because the credits come from countries without caps. *See* STEWART & WIENER, RECONSTRUCTING CLIMATE POLICY, *supra* note 1, at 74, 90-92.

10. *See, e.g.*, William A. Pizer, *Combining Price and Quantity Controls to Mitigate Global Climate Change*, 85 J. PUB. ECON. 409, 431 (2002).

11. An additional problem with a price ceiling, particularly in the international context, is strategic: if multiple countries have safety valve policies that authorize them to sell extra allowances, and if these allowances can satisfy obligations in multiple countries, then as emitters seek to purchase the lowest-priced extra allowances they can find worldwide, country governments will compete to sell allowances at lower prices – that is, to lower their safety valve price ceilings, thus further relaxing the constraint on emissions. *See* STEWART & WIENER, *supra* note 1, at 90-92.

12. *See* Dallas Burtraw, Karen Palmer & Danny Kahn, *A Symmetric Safety Valve*, (Resources for the Future Discussion Paper 09-06, Feb. 2009), *available at* www.rff.org; Cedric Philibert, *Price Caps and Price Floors in Climate Policy: A Quantitative Assessment* (Int'l Energy Agency, Dec. 2008).

valve, except that the quantity of the reserve is not unlimited as it would be under a pure price ceiling, or it can be seen as a limited opportunity to borrow against future allowance allocations for current use.[13] A limited quantity reserve would pose less risk of emissions escalation than a pure price ceiling.

Furthermore, cap and trade systems can be designed to raise revenues by selling or auctioning the allowances. Cap and trade is a quantity instrument (limiting emissions) that derives from a property approach (parceling temporary use rights) to solving the tragedy of the climate commons. These use rights can be given away by the government to historical users (called "grandfathering"), but they can also be sold to users. In a sale or auction of GHG emissions allowances, the state earns the revenues from the allocation of use rights in the public commons, rather than awarding the scarcity value of those use rights to private emitters for free.[14] The Obama administration's first budget, introduced in February 2009, projects significant revenues from auctioning GHG allowances.[15] Under an international cap and trade system, presumably the choice of whether to auction or otherwise distribute allowances would be left to each country to decide.

Thus, cost containment and revenue generation are not fundamental differences between a tax and a cap and trade system. But there is a key difference, as I discuss in the next section.

III. PRICES, PROPERTY, AND PARTICIPATION

The deeper distinction between taxes (price instruments) and cap and trade (quantity/property instruments) lies in their different abilities to engage effective participation. At the international level, there is no global sovereign to select a policy and compel

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13. *See* Brian C. Murray, Richard G. Newell & William A. Pizer, *Balancing Cost and Emissions Certainty: An Allowance Reserve for Cap-and-Trade* (Nat'l Bureau of Econ. Research, Working Paper No. 14258), *available at* http://www.nber.org/papers/w14258. The allowance reserve could operate automatically when the market price rises to the trigger price, or the allowance reserve could be managed by a "Carbon Fed" board with the power to authorize additional allowance sales or greater use of offset credits. *Id.* at 20.

14. *See* Gerald Torres, *Who Owns the Sky?*, 18 PACE ENVTL. L. REV. 227, 281-82 (2001).

15. OFFICE OF MGMT. & BUDGET, EXECUTIVE OFFICE OF THE PRESIDENT, A NEW ERA OF RESPONSIBILITY: RENEWING AMERICA'S PROMISE 21 (2009), *available at* http:// www.whitehouse.gov/omb/assets/fy2010_new_era/A_New_Era_of_Responsibility2.pdf ("Through a 100 percent auction to ensure that the biggest polluters do not enjoy windfall profits, this program will fund vital investments in a clean energy future totaling $150 billion over 10 years, starting in FY 2012.").

compliance.[16] We must act, if at all, with current institutions. A basic principle of international law is that treaties bind countries only by their consent. Thus, an effective climate treaty must engage countries' participation – and engaging participation is powerfully influenced by the choice of the regulatory instrument.

A. Global Emissions

Central to the choice of regulatory instrument and the challenge of attracting participation is the fact that greenhouse gases mix globally in the atmosphere – a crucial reason that GHG emissions pose a tragedy of the climate commons. Because GHG emissions from anywhere on the planet affect the planet globally, any effective regulatory framework will require participation by multiple countries to produce the global public good of climate protection. Emissions from major developing countries, unconstrained under the Kyoto Protocol, have been rising rapidly.[17]

Moreover, partial action, in the form of a regulatory regime that covers only some emitting countries, is vulnerable to the problem of "leakage": cross-national movement of emissions-intensive activities.[18] Leakage could occur through relocation of specific facilities, or through changing relative prices in the world economy which induce shifts in emissions-intensive activities. Economic studies of how the world economy would respond to partial regulation suggest that leakage could be quite significant. For example, the MIT Joint Program on the Science and Policy of Global Change, which has developed a very extensive integrated assessment model, has found that leakage rates could be very high, even exceeding 100%, depending on the stringency of the cap or tax and depending on which countries are covered.[19]

Leakage exceeding 100% means that partial regulation by some countries (such as the US and Europe) would actually contribute to

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16. Some highly concerned about climate change might seek to establish a coercive world government, but even if that could be done (with all its drastic disadvantages), it would likely take too long to be relevant to solving the climate problem.

17. *See* Jonathan B. Wiener, *Climate Change Policy and Policy Change in China*, 55 UCLA L. REV.1805, 1807-10 (2008); INTERNATIONAL ENERGY AGENCY, WORLD ENERGY OUTLOOK 2008 (2008).

18. *See* STEWART & WIENER, *supra* note 1, at 39, 88.

19. *See* Mustafa H. Babiker, *Climate Change Policy, Market Structure, and Carbon Leakage*, 65 J. INT'L ECON. 421, 441 (2005) ("[T]he global carbon leakage rate is found to range . . . [as high as] 130%, in which case a policy to limit carbon emissions in the OECD has the perverse effect of increasing global emissions.").

more GHG emissions, not less, by shifting emitting activities to other countries. To see how this could happen, it is useful to look at the micro level. There is anecdotal evidence that leakage already is occurring from Europe (seeking to restrict its GHG emissions) to China (where GHG emissions have been growing rapidly). A December 2007 front page story in the *New York Times* attributed a reduction in Germany's emissions, restricted under European policies, to leakage.[20] According to the article, German steel factories were dismantled, shipped to China, and rebuilt there, where steel manufacturing emits three times more carbon dioxide per ton of steel because of a different fuel mix and inefficiencies in production.[21]

Leakage also imposes political costs. Leakage renders receiving countries like China more GHG-intensive and thus more reluctant to restrict emissions. At the same time, the fear of leakage inhibits countries like the United States from adopting restrictions on their own greenhouse gas emissions. Such political costs explain, for example, why the U.S. Senate voted 95-0 not to ratify a treaty like the Kyoto Protocol in 1997 for fear of leakage of industry and jobs.[22]

B. Participation

Thus, the pivotal criterion for achieving an effective international regulatory regime for climate change is whether the international community can accomplish sufficiently broad participation. Participation need not include every single country in the world, but the great majority of current and future major emitting countries must participate in the regime for it to be effective. Such participation might require as few as the top twenty or thirty emitting countries. This still poses the significant challenge in a post-Kyoto treaty (currently being negotiated) of adding the major developing countries (including China, India, Brazil, Indonesia, Mexico, South Africa, Korea, and others), as well as the United States, to the set of

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20. *See* Joseph Kahn & Mark Landler, *China Grabs West's Smoke-Spewing Factories*, N.Y. TIMES, Dec. 21, 2007, at A1 ("[T]he same hulking blast furnace, dismantled and shipped piece by piece from Germany's old industrial heartland to Hebei Province, China's new Ruhr Valley. The transfer, one of dozens since the late 1990s, contributed to a burst in China's steel production, which now exceeds that of Germany, Japan and the United States combined. It left Germany with lost jobs and a bad case of postindustrial angst. . . . China's less efficient steel mills, and its greater reliance on coal, meant that it emitted *three times as much carbon dioxide per ton of steel* as German steel producers." (emphasis added)).

21. *See id.*

22. *See* Byrd-Hagel Resolution, S. Res. 98, 105th Cong. (1997). After this vote, the Clinton-Gore administration never submitted the Kyoto Protocol to the Senate for ratification.

countries that were obliged to limit their emissions under the Kyoto Protocol (including Europe, Japan, Canada, Australia, and Russia)

The consent voting rule in international treaties is quite different from the voting rule we have for the adoption of most environmental regulation, most property rule systems, and most legal systems. Consider the spectrum of voting rules running from unitary fiat at one end, where one autocratic ruler can choose the regulatory policy; through majority rule in the middle, where 50% plus one of a polity can choose a regulatory rule; to consent and even unanimity at the other end of the spectrum.[23] Along that spectrum, more and more votes are required to adopt a policy. Recruiting these votes requires showing that it is in the interest of each actor to endorse or join the proposal.

Thus, for example, obtaining a majority coalition requires persuading members of Congress that they should vote in favor of a particular regulatory policy. Obtaining consent to a treaty requires persuading governments of each country to adopt that treaty. Such voting requirements have a fundamental implication for the design and the choice of regulatory instruments at the international level, as well as at the national level.[24] The comparison of taxes to cap and trade typically assumes a voting rule of unitary fiat - what James Buchanan has called a supposed benevolent despot who will choose the normatively efficient instrument.[25] Such analysis recommends the instrument that maximizes aggregate net benefits to society. In the international law arena, however, no unitary fiat actor exists. There is no global sovereign. As a result, the solution has to engage cooperation and participation by countries, and it must do so on terms that governments find attractive - otherwise they will decline to join.

As with any international policy problem, there are ways of using sticks and ways of using carrots to achieve the policy goal. Here I will not dwell at length on sticks; military coercion to reduce GHG emissions is unlikely, and trade sanctions tend to be ineffective

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23. For a more detailed discussion, see Wiener, *Global Environmental Regulation*, *supra* note 2.

24. *See id.*; STEWART & WIENER, *supra* note 1.

25. *See* James M. Buchanan, *The Constitution of Economic Policy*, 77 AM. ECON. REV. 243, 243 (1987) ("Economists should cease proffering policy advice as if they were employed by a benevolent despot, and they should look to the structure within which political decisions are made. . . . [We should] postulate some model of the state, of politics, before proceeding to analyze the effects of alternative policy measures.").

because they are often not credible (given the harms they inflict on the imposing country's own consumers) and because target countries often rally to resist and deflect them. And if trade sanctions were effective, they might undermine rather than enhance the target country's economic capacity to remake its economy on a low-GHG emissions path.

In the absence of effective sticks, the key issue is carrots, including the direct benefits of climate protection, and side payments provided by the international regime. The question is thus not just which regulatory instrument to choose, but how to pair the necessary inducements that attract countries to participate with the regulatory instrument. On this question, property (cap and trade) and prices (taxes) perform quite differently.

Attracting China to participate in a GHG emissions limitation regime will not be easy. A main concern has been that China would not participate in a climate change treaty on the grounds that China's leaders thought the costs to China would be high and the benefits to China would be low or negative.[26] Yet there are indications that China's stance on the issue is now changing. China's leaders are seeing greater incentives to join a serious effort that limits its own greenhouse gas emissions, as well as those of other countries, for several reasons: first, the impacts of climate change in China are now looking more serious than earlier anticipated; second, the co-benefits in public health protection of limiting emissions from fossil fuel production are growing; third, the Chinese government may be concerned about political instability arising from extreme weather events associated with climate change, against the backdrop of a history of dynastic change in China triggered by past climate changes and a public philosophy connecting natural disasters to regime change; and fourth, the strong interest of the Chinese government and people in prosperity can be promoted through the design of the international climate regime itself.[27]

The last point is crucial: the international regime must offer attractive reasons to China, and other major developing countries, to join and to implement effective policies. Otherwise their emissions will grow unabated and may accelerate due to leakage. Attracting

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26. *See* STEWART & WIENER, *supra* note 1; Cass R. Sunstein, *The World vs. the United States and China? The Complex Climate Change Incentives of the Leading Greenhouse Gas Emitters*, 55 UCLA L. REV. 1675, 1682 (2008).

27. These reasons are developed more fully in Wiener, *Climate Change Policy and Policy Change in China*, *supra* note 16.

their participation means offering a combination of benefits – in climate protection, reduction in co-pollutants, economic gains, national reputation, fairness, and side payments (as well as other benefits) – that justify the costs and make joining in the perceived national interest of each country.

At the international level, taxes are unlikely to attract participation. Taxes impose costs not only on emissions, but also on infra-marginal emissions – that is, they not only discourage emissions, but they also require parties to pay for their remaining unabated emissions. If a country views the benefits of joining a climate treaty as small or even negative, then it is unlikely to adopt a tax on its own emissions, and even less likely to allow an international body to impose that tax on (and keep the revenues from taxing) the country's emissions.

To attract participation, a tax could be combined with some kind of side payment to repay the costs of the tax, such as direct government-to-government foreign aid. Foreign aid, however, is often an inefficient way to deliver resources. It is often distorted by corruption, and often undermines indigenous industry. If coupled with a tax on GHG emissions, foreign aid to repay the cost of that tax would undermine the incentive effect of the tax in reducing emissions. The essential feature of price instruments – that they restrict access to the commons by setting the price but not constraining the quantity of resource use – means that coupling taxes with side payments of cash will tend to offset the price instrument's effectiveness in reducing emissions. Indeed, pure payments to abate emissions can even turn out to increase net emissions by attracting more investment to the subsidized industry.[28]

This logic means that taxes combined with cash aid will be less effective at controlling emissions than pure taxes or than quantity/property instruments that cap emissions. This is not surprising, as the key point of the economics literature comparing taxes and trading, discussed above, was that taxes limit costs while

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28. *See* WILLIAM J. BAUMOL & WALLACE E. OATES, THE THEORY OF ENVIRONMENTAL POLICY 211-28 (2d ed. Cambridge Univ. Press 1988) (1975) (noting that abatement subsidies would reduce emissions at each firm but increase the size of the polluting industry and observing that using subsidies could conceivably increase net emissions); Wallace E. Oates, *Economics, Economists, and Environmental Policy*, 16 E. ECON. J. 289, 290 (1990) ("[I]n a competitive setting, [abatement] subsidies will lead to an excessively large number of firms and industry output. . . . [I]t is even conceivable that aggregate industry emissions could go up!" (citations omitted)); Robert E. Kohn, *When Subsidies for Pollution Abatement Increase Total Emissions*, 59 S. ECON. J. 77, 84-85 (1992).

letting emissions vary, whereas cap and trade limits emissions while letting costs vary. The pivotal new dimension at the international level, not addressed by that literature, is that a tax or cap and trade system cannot simply be imposed on emitters; countries must consent to be bound by a treaty, so they will often require side payments to attract their participation. The side payments, like subsidies to abate, introduce their own inefficiency. Combining side payments with taxes is less effective at limiting GHG emissions than using a cap and trade system to allocate side payments.

A better system to limit GHG emissions at the international level is a cap and trade system in which the allowance allocation delivers the side payment that attracts countries to join. Giving major developing countries "headroom" allowances amounting to some future growth in emissions would confer on them some of the scarcity rents in the new market for limited emissions use rights, which they could sell in the trading market to higher-cost abaters (firms in industrialized countries) at a profit. The developing countries would thereby reap the side payment attracting their participation, while still acceding to a quantity limit on emissions which prevents the perverse effect of side payments on aggregate emissions. China, for example, could be a net loser under a system of national caps or national taxes, but a net gainer under a system of cap and trade with allowance allocations that embody this principle. Thus, a quantity/property-based cap and trade system can more effectively (or less inefficiently) combine emissions limits with side payments to attract participation than can a tax or pure subsidy approach.[29]

Empirically, the quantity/property approach to engaging participation appears to have proven more successful than the price approach. During the 1990s the European Union tried to adopt an EU carbon tax, and failed in large part because it could not secure consent among its member states to adopt the same tax in poorer and richer countries alike. After a decade of pursuing this carbon tax unsuccessfully while denouncing cap and trade, the EU changed its position on instrument choice during 1998-2001 and successfully adopted the EU Emissions Trading System, using its "burden-sharing agreement" (in effect, an allocation of allowances) to attract

29. For more detailed discussion, see Wiener, *Global Environmental Regulation*, *supra* note 2.

participation by member states.[30] Similarly, the US used the allocation of allowances in its 1990 Acid Rain Trading Program to build the majority coalition for passage in the Congress, and the Kyoto Protocol used the allocation of allowances to engage participation by Russia and Ukraine.[31]

The implications for global justice are direct. A cap and trade system would deliver both future climate protection benefits to vulnerable countries (which are often poor countries), and also side payments in the form of headroom allowances that will support their development goals, local industry, and prosperity in the near term through trade in a new global marketplace of investment in cleaner technology and land use conservation. It would do so through cost-effective transactions by competitive private market actors. By contrast, an international GHG tax system either will impose costs on developing countries (leading to their choice not to participate), or will be combined with side payments that undermine the climate protection effectiveness of the tax and that are delivered through government foreign aid. Government foreign aid, generally speaking, is less cost-effective than market trade, is often distorted by corruption, often undermines local industry, and can yield perverse increases in emissions. International cap and trade thus promises to be more cost-effective, less bureaucratic, more supportive of poverty alleviation, and more fair than an international tax system.

A caveat: The "clean development mechanism" (CDM) under the Kyoto Protocol, or other systems for purchasing GHG emission offsets via project-specific investments in abatement in countries without caps are not truly cap and trade systems and lack its key advantages. The CDM and similar offset programs are trading without caps. They may have helped somewhat in beginning the flow of financing to developing countries to help bend downward the trajectory of their future emissions. But their impact has been modest. And a formal cap and trade system could have both reduced emissions more and delivered greater economic and environmental

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30. *See* FRANK CONVERY, DENNY ELLERMAN, & CHRISTIAN DE PERTHUIS, THE EUROPEAN CARBON MARKET IN ACTION: LESSONS FROM THE FIRST TRADING PERIOD: INTERIM REPORT 7-8 (2008), *available at* http://web.mit.edu/globalchange/www/ECM_Interim Rpt_March08.pdf.

31. *See* Wiener, *Global Environmental Regulation*, *supra* note 2, at 754-55, 781-82. When the US withdrew from the Kyoto Protocol in 2001, the expected value of Russia's ability to sell its headroom allowances was undercut; this was one reason why Russia then hesitated for four years before joining the Kyoto Protocol, and bargained for additional inducements from the European Union.

benefits to developing countries. Payments for GHG emissions offsets in countries or sectors without caps – as occurs under the CDM – is vulnerable to within-country leakage, and could even increase aggregate emissions if emissions at the CDM project are reduced but aggregate emissions increase elsewhere in the recipient country and as investment is attracted to the subsidized sector. In addition, uncapped offset systems may also discourage countries from joining a formal cap and trade system. If the country can sell uncapped credits at a price that is almost as high as the price at which formal cap and trade allowances would sell, then there is less reason to accept the cap.[32] In a post-Kyoto treaty and in new US legislation, the CDM and offset programs should be folded into a formal international economy-wide cap and trade system.

C. Implementation

A further issue deserves attention: implementation after adoption. Countries might agree to a treaty, but do little to carry out its terms. Here again, the choice of regulatory instrument matters. Lower cost should make both adoption and implementation easier, so both taxes and cap and trade should be more successful than higher-cost instruments such as central conduct standards.

One concern might be that implementing and enforcing a cap and trade system would require a bureaucracy or institutional capacity that developing countries lack. But that concern applies to all instruments. It is true that a cap and trade system requires a monitoring and enforcement system to measure emissions, track allowances as they are acquired and traded, and impose sanctions on sources whose emissions exceed their allowance holdings in each period. Likewise, though, a tax requires a monitoring and enforcement system to measure emissions, calculate and levy taxes, check for cheating, and punish tax evaders. The extent of bureaucracy and institutional capacity needed to implement a cap and trade program seems no greater than, and could be considerably less than, that needed to implement a tax. Just think of the enormous enforcement machinery and time and expense of collecting taxes in the US.

There are two reasons to think that cap and trade, at least at the international level, is likely to enjoy more successful implementation and enforcement than taxes. The first reason involves what I have

32. *See* STEWART & WIENER, *supra* note 1, at 74, 90-92.

called "fiscal cushioning."[33] Through myriad changes to their other policies (taxes, subsidies, tariffs, and the like), countries are likely to seek to cushion the burden on their domestic economies of emissions taxes or cap and trade limits. Under a GHG tax, such cushioning strategies will affect the level of emissions. A country could be in full nominal compliance with an agreed GHG tax, but, through cushioning tactics, it could minimize the actual effect of the tax on the domestic economy and thus could vitiate the effect of the tax on actual emissions. By contrast, under a cap and trade system, a country could use cushion tactics to shield its economy, but the quantity cap would still limit its actual emissions. (Instead, other distortions would be generated in its economy.)

The problem of fiscal cushioning can be seen as a principal-agent monitoring problem. The treaty regime will have more difficulty monitoring the actual efficacy of national GHG taxes, and less difficulty monitoring the actual efficacy of GHG caps. Amidst the numerous fiscal cushioning tactics being undertaken, it would be quite difficult for outside observers (the treaty regime) to monitor a country's actual implementation and forecast the true effect of a tax on GHG emissions, muddied as it would be by the fiscal cushioning tactics, and with no limit on emissions.[34] But it would still be straightforward for outside observers to monitor the actual implementation and true effect of a cap and trade system on GHG emissions, just by monitoring aggregate emissions compared to the cap. This difference derives from the basic difference between price instruments such as taxes and quantity/property instruments such as trading: the former work by setting the price but do not directly limit emissions, whereas the latter limit emissions and let the price vary in the market. And this difference derives from the reality of national sovereignty confronting regulatory regimes at the international level, where there is no centralized benevolent policy maker to choose the optimal instrument regulating firms, but only national governments adopting and implementing (or not) an agreed framework. Fiscal cushioning interferes directly with the effect of price instruments on the quantity of emissions, but not with the effect of quantity

33. *See* Wiener, *Global Environmental Regulation*, *supra* note 2, at 785-88.

34. *See* JOSEPH ALDY, EDUARDO LEY & IAN PARRY, A TAX-BASED APPROACH TO SLOWING GLOBAL CLIMATE CHANGE 26-28 (Resources for the Future Discussion Paper No. 08-26, 2008) (recognizing the problem of fiscal cushioning, and proposing complex monitoring regimes to try to salvage an international GHG tax from fiscal cushioning), *available at* http://www.rff.org/RFF/Documents/RFF-DP-08-26.pdf .

instruments on the quantity of emissions. In the presence of fiscal cushioning tactics in an international system, nominal compliance is not the same as true effectiveness, and real reductions in emissions are easier to monitor and enforce under quantity/property instruments than under price instruments.

The second difference in implementation relates to the political economy of regulation. Under a tax, every taxpayer has an incentive to lobby to relax or remove the tax. And the tax authority, seeking revenues, has an incentive to keep the taxed activity going strong and generating tax revenues, thus setting a revenue-maximizing tax that is lower (less stringent) than the optimal externality-controlling tax.[35] These forces combine to yield pollution taxes that are suboptimally low. Under cap and trade, by contrast, allowance holders quickly constitute a lobby in favor of keeping the allowances scarce – that is, in favor of enforcement of the cap – because lax enforcement means that their allowances lose value.[36] This helps overcome the concern about an enforcement deficit. More generally, it raises the question of revising the cap (or tax) over time. The climate change treaty regime and national legislation should build in mechanisms for adaptive management – for periodic review of the stringency of the cap and whether it should be tightened or loosened in light of new information.[37]

CONCLUSION

At the international level, given the structure of international law, a quantity/property-based cap and trade system has distinct

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35. *See* STEPHEN G. BREYER, REGULATION AND ITS REFORM 284 (1982) (suggesting that tax authorities may administer pollution taxes "with more of an eye toward increasing government revenues than protecting the environment"); Peter Bohm & Clifford S. Russell, *Comparative Analysis of Alternative Policy Instruments*, *in* 1 HANDBOOK OF NATURAL RESOURCE AND ENERGY ECONOMICS 395, 437 (Allen V. Kneese & James L. Sweeney eds., 1985) (finding that in practice, most pollution tax systems have been adopted to raise revenue rather than to deter pollution); Nathaniel O. Keohane et al., *The Choice of Regulatory Instruments in Environmental Policy*, 22 HARV. ENVTL. L. REV. 313, 314-15 (1998) (observing the political forces contributing to this result); *see generally* MIKAEL SKOU ANDERSON, GOVERNANCE BY GREEN TAXES (1994) (finding that pollution taxes in Europe have been low).

36. This political pressure can also help keep the total number of allowances from being raised. It may be too strict. An example is taxicab medallions in New York City: the city allocated just fewer than 12,000 taxi medallions in 1937, and, under pressure from medallion owners, forestalled the issuance of any additional medallions until 60 years later, when the city added just 400 in 1996. *A Revolution! New York's Cabs*, THE ECONOMIST, Feb. 2, 1996, at 21.

37. Jonathan B. Wiener, *Radiative Forcing: Climate Policy to Break the Logjam in Environmental Law*, 17 N.Y.U. ENVTL. L.J. 210, 234-35 (2008).

advantages over other instruments such as a tax: better incentives to engage participation and implementation, and better prospects to deliver both efficiency and justice. These are the crucial criteria for successful international response to the tragedy of the climate commons.

A tax may have advantages in cost containment under uncertainty. But a cap and trade system can contain costs through "how," "where," and "when" flexibility, through broad market scope, and perhaps (though this deserves further study, especially at the international level) through carefully designed modifications such as a combined price ceiling and price floor (set to rise over time). A tax can raise revenues, but so can allowance auctions.

Two decades ago, in 1990, Richard Stewart and I proposed a comprehensive international cap and trade system for climate change protection.[38] At that time, some in the Bush (father) administration disliked the cap idea, even though they were advocating cap and trade for acid rain control in the domestic Clean Air Act. Meanwhile, the EU and some environmental groups disliked the trading idea, even though the Environmental Defense Fund was a leading architect of cap and trade systems. The cap and trade idea was informally included in the 1992 Framework Convention on Climate Change (dubbed "joint implementation"), and then more formally authorized in the 1997 Kyoto Protocol's article 17 (as well as the uncapped offsets market of its CDM), but still faced strong opposition in Europe and elsewhere. Meanwhile the Berlin Mandate in 1995 exempted developing countries from emissions limits, thereby leaving their growing emissions unconstrained and also leaving them out of a cap and trade system from which the developing countries could have earned net gains. After 2000, the cap and trade idea was adopted in the EU ETS, and in the Lieberman-McCain bills and subsequent proposals in the US Congress. Some developing countries expressed interest in joining such a system.[39]

As we negotiate the post-Kyoto treaty regime toward the Copenhagen meeting in December 2009, the prospects for international cap and trade are looking brighter. The pivotal advantage of a quantity/property-based cap and trade system in

38. For the history, see Jonathan B. Wiener, *Something Borrowed for Something Blue: Legal Transplants and the Evolution of Global Environmental Law*, 27 ECOLOGY L.Q. 1295 (2001).

39. *See* Petsonk, *supra* note 2.

engaging international participation is now coming to be widely recognized. As Al Gore put it recently, "For more than 20 years, I have supported a CO_2 tax offset by an equal reduction in taxes elsewhere . . . However, a cap-and-trade system is also essential and actually offers a better prospect for a global agreement, in part because it is difficult to imagine a harmonized global CO_2 tax."[40]

There is reason to be optimistic, given the history of the shift from central conduct standards towards cap and trade systems, such as the cap and trade systems adopted in the United States for acid rain and in Europe for GHGs. Europe's switch, from favoring taxes and denouncing cap and trade during the entire decade of the 1990s, to adopting the European Emissions Trading System, is particularly significant. (The ETS had some problems in its pilot phase, but it is being improved in its first full phase.) The new Obama administration has firmly backed a cap and trade approach.

In the larger context, global climate change is one of the major global issues on which the United States and China will need to construct a global geopolitical partnership over the coming decades. This is an opportunity for global strategy on a scale of centuries. China in a longer historical sense is returning to its former status as a great power; China represented about a third of world economic output before the European industrial revolution.[41] If the Chinese leadership takes a very long run perspective on its role in the world, and views the peaceful rise of China and its harmonious society as a very long term project, then the United States will need to engage China's participation to protect the global climate in that same long-term context. It will need to show how a cost-effective approach to climate protection can benefit China's long-term development. That is a project in which a creative American administration can take the lead to work together with China, Europe and others to construct a new world order that is successful for planetary protection as well as for world prosperity, alleviating poverty, freedom, and other crucial issues. It would mean constructing a new property regime to conserve the global commons.

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40. Broder, *supra*, note 8, at A13.

41. *See* ANGUS MADDISON, CONTOURS OF THE WORLD ECONOMY 1-2030AD (Oxford Univ. Press 2007). Graphs depicting Maddison's data are posted on Greg Mankiw's Blog at http://gregmankiw.blo gspot.com/2006/09/milken-on-world-economy.html (covering 1820-2001), and on Catherine Mulbrandon, Visualizing Economics, at http://www.visualizingeconomics.com/ 2008/01/20/ share-of-world-gdp/ (covering 1500-2000).

After centuries of the evolution of property law into its modern multifaceted elements, and several decades of designing regulatory instruments, including two decades of analyzing and advocating a quantity/property cap and trade instrument for climate protection, we have learned a great deal. Can we now protect the planet with a comprehensive cap and trade system? Yes we can.