The Crucial Role of Policy Surveillance in International Climate Policy

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October 2013

Abstract:

An extensive literature shows that information-creating mechanisms enhance the transparency of and can support participation and compliance in international agreements. This paper draws from game theory, international relations, and legal scholarship to make the case for how transparency through policy surveillance can facilitate more effective international climate change policy architecture. This paper critically evaluates the historic practice of monitoring and reporting under the global climate regime, with a focus on how surveillance affects the legitimacy, reciprocity, and adequacy of climate agreements. Given the inadequate nature of climate policy surveillance, I draw lessons from policy surveillance in multilateral economic, environmental, national security, and other contexts. I also describe how the institution of policy surveillance can facilitate a variety of climate policy architectures. This evaluation of policy surveillance suggests that transparency is necessary for global climate policy architecture.

1. Introduction

International climate negotiations occur within a system of international relations in which sovereigns maintain significant discretion of action and enjoy substantial deference in their policy decisions. This poses a challenge to designing multilateral agreements and institutions, especially in contexts characterized by strong free-riding incentives such as global climate change. An extensive literature on international agreements shows that information-creating mechanisms enhance the transparency of and can support participation and compliance in such agreements.

This paper draws from game theory, international relations, and legal scholarship to make the case for how transparency through policy surveillance can facilitate more effective multilateral climate agreements. Building on this intellectual foundation, I critically evaluate the historic practice of monitoring and reporting under the global climate regime, with a focus on how surveillance affects the legitimacy, reciprocity, and adequacy of climate agreements. Given the inadequate nature of status quo climate policy surveillance, I identify lessons from policy surveillance in multilateral economic, environmental, national security, and other contexts. I also describe how the institution of policy surveillance can facilitate a variety of climate policy architectures. This evaluation of policy surveillance suggests that transparency is necessary for global climate policy architecture.

The next section of this paper synthesizes the literature on how information-producing institutions support agreements. The third section details the shortcomings in the current international climate policy framework's transparency mechanisms. The fourth section draws lessons from various multilateral systems of policy surveillance. The fifth section describes how institutionalizing policy surveillance can serve an array of international climate policy architectures. The final section concludes.

2. Information and Agreements

Signaling the seriousness of commitment is often a condition for securing an agreement among parties. Schelling (1956) suggests that transparency of a party's ex ante pledge and ex post outcome can enhance the credibility of commitments:

> "A potent means of commitment, and sometimes the only means, is the pledge of one's reputation…. But to commit in this fashion publicity is required. Both the initial offer and the final outcome would have to be known; and if secrecy surrounds either point, or if the outcome is inherently not observable, the device is unavailable" (p. 288).

The “publicity” called for by Schelling can be established by the “information structures” created by the rules of international institutions (Keohane 1998). Simmons (1998) notes that “one function of international agreements is to enhance the reputational consequences of noncompliant behavior by providing mechanisms that increase transparency and therefore information regarding other states’ behavior” (p. 81). Chayes and Chayes (1991) find that transparency can induce compliance through “embarrassing and shaming a party that departs from treaty norms” (p. 321). Such information, even without an enforcement mechanism, may “contain deviance within acceptable levels’” (Klabbers 2007, p. 1004).

Keohane (1994) emphasizes the importance of information-producing institutions to facilitate collaboration among nations. He notes that “more extensive arrangements for monitoring others’ behavior” is required in collaboration games and can promote the reciprocity necessary to secure agreement in such games (Keohane 1994, p. 20). Robust policy surveillance can build trust among participating nations and facilitate confidence in international agreements (Wettestad 2007).

Political leaders who push for their nations to take on more ambitious climate change risk-reduction policies could benefit from an institution collecting and publicizing information on their actions; regular surveillance can legitimize domestic policies (Francois 2001). Such public information also increases the costs to political leaders of failing to deliver on commitments, opening them up to domestic stakeholder pressure and peer pressure from other leaders.

Given the potential net benefits associated with free-riding, some parties may find it in their interest to deviate from an agreement. Barrett (2003) notes the “incentive for parties to deceive creates an incentive for others to monitor” (p. 150). The probability of detecting deviations from an agreement increase with the transparency of the regime, which can thus reassure those countries predisposed to comply and deter those countries considering deviation (Chayes et al. 1998; Levy et al. 1993).

The repeated nature of climate negotiations provides an opportunity for transparency to inform subsequent rounds of negotiations. As Barrett (2003) notes in his discussion of monitoring in international environmental agreements, “transparency is of fundamental importance in a repeated game” (p. 284). Levy et al. (1993) also note that “effective monitoring is a condition for sustained cooperation.” In economic policy contexts, Simmons (1998) observes that “[g]reater transparency and opportunities for reciprocity also enhance compliance where there is repeated play within a small group, for example in the European Union or among the large countries in the WTO” (p. 81). An iterative approach that is structured on information collection and analysis, which in turn informs subsequent rounds of action, is also consistent with Thompson’s (2006) adaptive management scheme for international climate policy.

3. The Status Quo Global Climate Change Policy Surveillance Regime

Effective transparency mechanisms can legitimize countries' commitments comprising international agreements; facilitate reciprocity of actions that promote participation and compliance; and shed light on the adequacy of actions in attaining the agreement's objectives. This section reviews the United Nations Framework Convention on Climate Change (UNFCCC) transparency system along legitimacy, reciprocity, and adequacy dimensions.

3.1 Legitimacy

The current international climate change policy architecture suffers from a dearth of information on countries' contributions to climate change risk mitigation. Given this information vacuum, north-south rhetoric, as opposed to evidence, has informed the implementation of UNFCCC principles, such as "common but differentiated responsibilities and respective capabilities." For example, the 1995 Berlin Mandate, which culminated in binding emission targets for industrialized countries in the Kyoto Protocol, notes that this negotiating process "shall be guided" in part by "the fact that the *largest share of historical and current global emissions of greenhouse gases has originated in developed countries.*"[1] The "fact" that the "largest share of current global greenhouse gas emissions originated in developed countries" is not correct. Data published in a 1993 issue of *Climatic Change* show that the largest share of 1988 global emissions of greenhouse gases originated in the developing countries referred to as Non-Annex B countries under the Kyoto Protocol (Subak et al. 1993).[2, 3]

The Berlin Mandate suggests that contemporaneous share of global emissions serves as a measure of responsibility and should inform commitments. Unfortunately, there is no UNFCCC monitoring or reporting mechanism to provide information on developed and developing countries' respective share of global greenhouse gas emissions in a recent year. Independent estimates of annual carbon dioxide (CO_2) emissions from fossil fuel combustion show that the developing country share has grown each year since 1988 and comprised 60% of global fossil carbon emissions in 2011 (Le Quéré et al. 2013).[4]

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1 Emphasis added. Available online at: http://unfccc.int/resource/docs/cop1/07a01.pdf.

2 Subak et al. (1993) published data on CO_2, CH_4, and N_2O emissions for 142 countries. I constructed the Annex B aggregate from the paper's appendix, which omits two very small Annex B nations (Monaco and Liechtenstein) and includes 15 Non-Annex B countries in the calculation of Annex B aggregate emissions (circa 1988 Soviet Union and Yugoslavia are included among these Non-Annex B countries). Non-Annex B emissions are constructed as the difference between the reported world emissions and this Annex B aggregate estimate.

3 I use the terms "Annex B" and "Annex I" interchangeably to represent industrialized countries since their memberships are nearly identical.

4 Since developing countries have traditionally had a larger share of land use CO_2 and methane emissions, their share of total global greenhouse gas emissions in 2011 may well approach two-thirds. The absence of a credible monitoring regime complicates this assessment.

Under the UNFCCC, nations communicate to the UN reports on their climate change vulnerability, climate change policies, greenhouse gas emissions, and related topics. Industrialized countries each submitted five national reports to the UNFCCC through 2012, while developing countries submitted no more than two reports over this time frame. Moreover, developing countries are exempt from reporting annual greenhouse gas emissions to the UNFCCC.

China submitted information on its greenhouse gas emission inventory for 1994 (in its 2004 national report) and for 2004 (in its 2012 national report). A once-per decade snapshot of emissions, with nearly a decade-long reporting lag, is clearly inadequate to inform policy – especially given independent estimates indicating that Chinese fossil carbon emissions were 68% greater than U.S. emissions in 2011 (Le Quéré et al. 2013) – and begs questions regarding the legitimacy of a regime setting commitments on countries representing a small and decreasing share of the problem. Indeed, much of the 2012 Doha talks focused on a Kyoto Protocol second commitment period for countries representing about one-seventh of global emissions.

The global climate regime also recognizes countries' "respective capabilities" as a principle to guide policy action. It is difficult to reconcile the "differentiation" in emission reporting – i.e., no reporting for the developing countries responsible for more than three-fifths of current global emissions – with respective capabilities. First, note that developing countries have the capacity to report annual detailed inventory data under the Montreal Protocol. Second, many developing countries have greater capacity than at least some of the industrialized countries that have annual UNFCCC emission reporting requirements. About 50 Non-Annex I countries have higher per capita incomes than the poorest Annex I country. In addition, about 40 Non-Annex I countries rank higher on the Human Development Index than the lowest-ranked Annex I country (Aldy and Stavins 2012).

The differentiation in monitoring occurs in the frequency and quality of reporting and review. Developed countries submit annual emission reports, pursuant to established guidelines subject to expert review. In contrast, developing countries emissions reports are made as a part of their infrequent national reports, and are neither subject to the same data standards as developed countries nor undergo expert review (Breidenich and Bodansky 2009; MacFaul 2006). Even the regular reporting of developed countries emissions is insufficient to characterize the effectiveness of emission mitigation actions in these countries (Ellis and Larsen 2008; Breidenich and Bodansky 2009; Thompson 2006). The reviews of industrialized countries typically draw, in an ad hoc nature, from government-sponsored experts (from academia, business, and government sectors) to conduct a review, with occasional in-country visits, as opposed to relying on a professional bureaucracy.

3.2 Reciprocity

In order for a set of countries to perceive their contribution to mitigating climate change as fair, they need information to assess the reciprocity of effort. The absence of credible, legitimate means for comparing effort affects the determination of the set of countries that take on commitments, the ex ante assessment of countries' proposed commitments, and the ex post evaluation of countries' performance in delivering on those commitments.

Comparing emission-mitigation effort remains a daunting question. The most "successful" countries, given UNFCCC and Kyoto Protocol objectives – in terms of achieving emissions below 1990 levels – are former members of the Soviet bloc. The shutting down of old Soviet industrial infrastructure and the transformation from planned to market economies has resulted in dramatic emission reductions. Since the UNFCCC entered into force in 1994, Russia's greenhouse gas emissions have never exceeded 60% of their 1990 level (the emission target Russia agreed to in the Kyoto Protocol). In 2007, the old EU-15 had aggregate emissions 5% below 1990 levels, while the expanded EU-27 had emissions 11% below 1990 levels, illustrating how far central and eastern European countries' emissions had fallen. The world cannot learn from this "success" in designing future climate policy; these countries did not achieve the emission reductions through innovative abatement policies, but rather through painful economic restructuring. Comparing current emissions to 1990 levels provides a noisy signal of effort.

The Copenhagen Accord and Cancun Agreements present myriad forms of emission commitments – emission targets relative to a base year, emission reductions relative to a business-as-usual forecast, improvement in the emission-to-GDP ratio, as well as sector-specific policies and goals. There was no transparency mechanism to evaluate and compare these proposed commitments in the lead up to the Copenhagen talks. This yields several adverse consequences for the negotiations.

First, only the largest and most advanced governments have the capacity to evaluate other countries' proposals, thus putting smaller, less developed countries at a negotiating disadvantage. Second, the small set of countries that can assess others' proposals may shape or censor information dissemination consistent with their negotiating strategies. Third, there may be no comprehensive evaluation of proposed commitments. Fourth, views on a specific proposal may differ and thus create confusion in the negotiations. For example, was China's 2009 proposal to lower its CO_2-to-GDP intensity 40-45% through 2020 an ambitious game-changer or just continuing along business-as-usual? The determination may depend on resolving an important ambiguity in China's proposal – how is GDP measured in the intensity calculation – nominal, constant-year Yuan, or real purchasing power parity? If nominal GDP is used, then this improvement is less ambitious than historic trends (Aldy and Pizer 2013). These are potentially important questions to which a transparency mechanism could focus attention, instead of the ad hoc manner of the status quo.

3.3 Adequacy

The UNFCCC surveillance program does not report global aggregate greenhouse gas emissions. There is neither a reporting nor a monitoring mechanism that would even permit a UNFCCC global emission estimate. For a global treaty focused on stabilizing atmospheric greenhouse gas concentrations, it is striking that it does not track the flow of global emissions, especially since international negotiations have focused on emission commitments for the past two decades.

Independent estimates of fossil fuel CO_2 emissions provide little evidence that the UNFCCC has delivered adequate effort. Global fossil carbon emissions in 2011 were more than 50% greater than they were in 1992 (Le Quéré et al. 2013). Global emissions grew about 2.8% annually in the decade after the Kyoto negotiations, dramatically faster than the 1.2% annual rate in the decade leading up to the Kyoto Conference.

Of course, there are many voices in the academic and advocacy communities who have noted that current actions are inadequate. The problem is more than that there is a gap in ambition between countries' commitments and what some believe is called for. It is that there is no transparency mechanism within the UNFCCC that allows for a rigorous assessment of the aggregate effect of countries' commitments and actions. As a result, the negotiations lack an easily observable focal point to measure of progress and facilitate subsequent rounds of negotiations.

4. Lessons on Surveillance from Other International Policy Regimes

Given the deficiencies in the status quo UNFCCC transparency regime, this section draws a series of lessons on the design and implementation of policy surveillance from an array of international policy regimes, including International Monetary Fund (IMF) Article IV consultations, Organisation for Economic Co-operation and Development (OECD) economic surveys, the World Trade Organization (WTO) trade policy review mechanism, the Montreal Protocol reporting on ozone-depleting substances, the G20 fossil fuel subsidies agreement, arms control agreements, and the monitoring of trade in endangered species.

4.1 Expert Review

In a number of contexts, a team of permanent staff experts make in-country visits as part of policy and data reviews. An Article IV consultation includes an annual visit by IMF experts to the member country. Countries are required to provide information to the IMF to enable the review of its economic environment and relevant economic policies (IMF 2001; Schafer 2006). As a part of OECD economic policy reviews, a team of experts from the OECD Secretariat typically visits the country

under review, draws data from a variety of public and private sources, and employs the latest research to evaluate the country's economic policy program (OECD 2003; Schafer 2006). Under the Trade Policy Review Mechanism, the WTO Secretariat expert team typically visits the country under review and draws from multiple sources – government data, third-party data sources, data in the public domain – in compiling its assessment of the country's trade policy (Mavroidis 1992). Even under the Intermediate Range Nuclear Missile Force Treaty, the United States and the Soviet Union provided for on-site inspection and monitoring (Chayes and Chayes 1991). Subsequent arms control agreements have included "intrusive inspection procedures" (Chayes et al. 1998, p. 48).

Victor (2007) calls for a climate change review mechanism based on the IMF model, especially because of its permanent review staff. Aldy (2013) also suggests that a formal institution with permanent staff could implement a transparency mechanism for the global climate policy regime. Such an institutional capacity could provide the confidence in the review mechanism as a function of its reliability, competence, and independence. Chayes et al. (1998) note that "it is no coincidence that the regimes with the most impressive compliance experience – ILO, IMF, OECD, GATT – depend upon substantial, well-staffed, and well-functioning international organizations" (p. 58).

4.2 Peer Review

Expert reviews serve as inputs to a peer review mechanism in IMF, OECD, and WTO surveillance. In the OECD economic survey process, a delegation from the country under review responds to the draft expert report in a meeting of all OECD members. At this meeting, two lead examiners are drawn from the membership of the OECD to initiate the discussion of the draft report's findings and recommendations for policy reforms. The final published report reflects this discussion and must secure agreement among all OECD members before it is completed. Second, the Trade Policy Review Body, comprised of all WTO members, receives the Secretariat's report on the country under review and then hosts a delegation from that country to discuss the findings in the report. After a country visit, the IMF expert team compiles a report that serves as the basis for a peer review by the Executive Board, which includes 24 country directors representing member countries or groups of countries (IMF 2001; Schafer 2006).

Providing a forum for member states to engage one another through peer review can facilitate learning about effective policy practice and promote understanding about countries' individual policy design and implementation. As a review among peers, the OECD and IMF approaches serve as a facilitative process, not a compliance mechanism, and thus enable more candid dialogue among participants. Schelling (2002) describes the effectiveness of "reciprocal multilateral scrutiny" among government negotiating teams in the talks on the allocation of Marshall Plan resources after World War II.

Based on the OECD model, an effective review process would "allow scrutiny of national policies" (Pizer 2007, p. 309). Pizer suggests annual meetings for discussion of review, provision of feedback, and opportunities to adjust commitments. The UNFCCC review process does not include a formal peer review mechanism, although the system of international consultations and analysis initially established in the 2009 Copenhagen Accord could provide for a consultative process among peers.

4.3 Global Review

Chayes et al. (1998) note that "creating transparency in international treaties generates information for assessing compliance of individual parties as well as evaluating overall regime effectiveness" (p. 49). The IMF conducts regular surveillance of the global economy – in effect, an assessment of the aggregate impact of various economic, monetary, and fiscal policies of the member countries – and publishes the World Economic Outlook typically twice per year. The WTO's trade policy evaluations inform assessments of the overall effectiveness of the global trading regime. Indeed, it is this experience in trade policy that motivates Victor's (2007) proposal to include an assessment of the collective consequence of individual country efforts in a climate change transparency regime.

For example, global climate policy reviews could draw from annual reporting of greenhouse gas emissions from every country, the policy surveillance undertaken that year, as well as thematic analyses. These reviews would also provide near-term forecasts for greenhouse-gas emissions growth and identify policy reforms that could reduce emissions. Doing so would provide a rigorous benchmark for the review of the adequacy of effort called for under the UNFCCC.

4.4 Frequency and Coverage

The OECD facilitates reviews of member states' economic policies every one to two years (OECD 2003; Schafer 2006). IMF Article IV consultations typically occur annually and apply to all IMF members. WTO members are subject to a regular review of their trade policies (Mavroidis 1992). The four countries with the largest share of world trade undergo policy review every two years, while the next sixteen participate in reviews four years, and all other countries take part in reviews every six years.

Universal coverage of reporting and monitoring requirements could strengthen international climate agreements. Compliance with an institution's rules is likely to be better when "they follow commonly held notions of fairness and morality; for example… prescribing reciprocal rather than uni-obligational behavior" (Simmons 1998, p. 87).

The frequency of individual country policy reviews could vary with the level of current greenhouse gas emissions, like the WTO review process. For example, the largest X number of sources of

greenhouse gas emissions in 2010 would undergo annual surveillance. The next Y number of sources by size would undergo review every two years. All other countries would participate in reviews every three years.

4.5 Analysis of Information

An effective transparency mechanism not only collects information on emissions and policies from all nations participating in an agreement, but also provides analysis and evaluation of policy actions and outcomes. Analyzing and disseminating data on countries' actions under an agreement are necessary for transparency to contribute to regime compliance (Chayes et al. 1998). The feasibility of collecting and analyzing information on country participation in an agreement can affect the nature of agreement and the forms of commitments.

For example, technical limitations to monitoring likely constrained serious arms control talks in the 1950s. As Fearon (1998) notes, it was not until satellite monitoring remedied some of the monitoring barriers in the 1960s that the United States and the Soviet Union engaged in meaningful arms control negotiations. This may suggest the value in designing commitments in terms of pledged policies instead of the outcomes of policies (e.g., emissions). The former are easier to observe than the latter, which can facilitate agreements and review (Schelling 1956). Thompson (2006) calls for shifting the focus of reporting and review "toward information on successes and failures of various policies and measures implemented at the domestic level" (p. 25).

The analysis of information would allow for the comparison of effort reflected in countries' climate policy proposals, which would facilitate the negotiation of an agreement (Victor 2007; Aldy and Pizer 2013). Thompson (2006) notes the need to improve policy surveillance to facilitate comparability under the UNFCCC. Indeed, he found that the incomplete and inconsistent approach to national reports undermines the comparison of effort among countries *and* comparison within a country over time.

4.6 Best Practices

Levy et al. (1993) note that international policy surveillance institutions can "foster capacity-building by providing policy-relevant information in a form that is readily usable" (p. 415). Aldy (2013) notes that identifying best practice policies through the experiences of countries undertaking emission mitigation can provide important information for developing countries as they design their mitigation programs.

Developed and emerging economies have substantial experience in implementing policies that can affect the investment in low-carbon technologies. Drawing lessons from these successes and

failures can inform the design of new policies in all countries, but especially those in developing countries that may lack the institutional capacity to fully evaluate policy options. Establishing a set of "best practice" policies can draw from past efforts to promote the deployment of low-carbon technologies, and tailor guidance for countries' specific economic and cultural circumstances. As some developing countries become expert on adaptation, they can export best adaptation practices.

The global climate policy architecture could publicize best policy practices through a variety of outlets. First, the regular reviews of individual countries' climate policy programs could include recommendations of policies appropriate to the geographic, cultural, and economic context of that country. Second, best policy practices could be highlighted in annual aggregate surveillance reports. This would need to be more substantive than the current synthesis of industrialized countries' national reports, which is little more than a descriptive summary of information presented in national reports.

4.7 Standards and Support for Developing Countries

The IMF supports standards for data dissemination and codes for good policy practice that facilitates annual surveillance and benefits member countries in their implementation of economic policy. Such standards provide transparent, timely, and measurable metrics for evaluating policy performance and identifying potential economic vulnerabilities. Implementing these standards has "enhance[d] the technical and professional capacities of finance ministries and central banks" (Chayes et al. 1998, p. 53). Developing countries may solicit technical assistance from the WTO Secretariat in preparation of trade policy reports. The WHO, FAO, and WMO provide technical assistance to developing countries as a primary programmatic activity (Chayes et al. 1998).

The Secretariat to the Montreal Protocol on Ozone Depleting Substances (ODS) facilitated developing-country reporting by elaborating procedures for tracking and reporting ODS data, providing data reporting templates, and explaining ways to improve domestic monitoring. The Montreal Protocol increased the costs for failing to submit adequate ODS data reports by linking access to financing for projects to reduce ODS consumption to satisfying the reporting requirements (Wettestad 2007). Conditioning financing from the IMF on the adoption and adherence of standards and codes of practice could improve the quality of its surveillance regime (Fischer 1999).

International institutions of information collection and dissemination can lower the costs of an international agreement. Technical and financial assistance for key elements of capacity building could enable improved monitoring, reporting, and evaluation in developing countries (Keohane 1994). International institutions can formally undertake monitoring that lowers the transaction costs

of an agreement. The provision of standards and reporting templates can improve the transparency of the reporting and review and enhance surveillance effectiveness. A robust international system of transparency will require improving the technical capacity in many countries to adequately monitor and report their climate policy activities (MacFaul 2006).

4.8 Transparency and Role for Civil Society

Shining a light on policy implementation and outcomes can empower stakeholders and members of civil society. For example, making public Article IV consultations enables stakeholders to push for better economic policies in their respective countries and improves the quality of the IMF review product by subjecting the reviewers to external assessment (Fischer 1999). Requiring transparency and permitting civil society scrutiny can enhance the accountability of an international agreement (Keohane 1998). Nongovernmental organizations have provided information to challenge claims made by some countries in the reporting of their human rights policies and practices (Chayes et al. 1998). The Convention on International Trade in Endangered Species (CITES) formally relies on international nongovernmental organizations – the World Conservation Union and the World Wildlife Fund – to provide independent reviews of national reports and a trade monitoring network (Wettestad 2007). Public dissemination of emissions data and policy evaluation can enable nongovernmental organizations to contribute more effectively to domestic policy design and international negotiations.

5. Integration with Climate Policy Architectures

This section illustrates how transparency could improve the design and implementation of a variety of international climate policy architectures and policy components.

5.1 Kyoto-Style Emission Commitments

Policy surveillance could inform the design of new, top-down international agreements on emission mitigation. For example, Frankel (2010) proposes a formulaic approach to setting emission targets as a function of incomes, historic emissions, and per capita emissions. Such an approach requires rigorously evaluated data from participating countries in order to set and evaluate compliance with targets. Policy surveillance could play the role of compiling necessary data for the ex ante target-setting exercise and the ex post performance evaluation.

5.2 Harmonized Carbon Tax

Cooper (2010) calls for harmonized domestic CO_2 taxes as the basis for an international climate policy regime. In his proposal, the IMF would review countries' carbon taxes. A system of policy

surveillance could ensure that economic activity around the world faces a common carbon price, including evaluation of any efforts at fiscal cushioning (e.g., lowering energy taxes while increasing CO_2 taxes). The policy surveillance could also evaluate the effectiveness of CO_2 tax policies in reducing emissions to inform subsequent rounds of talks on future CO_2 tax levels.

5.3 Pledge-Implement-Review

Policy surveillance would play a critical role as the "review" element of bottom-up climate-policy pledge-implement-review schemes (Schelling 2002; Pizer 2007; Victor 2007). For example, the pledge and review system reflected in the Copenhagen Accord and the Cancun Agreements would certainly benefit from a rigorous review program. This is evident in the agreement for "international consultations and analysis" of developing country mitigation actions, policies, and goals as well as in the assessment of international climate finance. If these review mechanisms are well-designed and employed in practice, then the reviews could assess whether countries fully implemented their pledges and determine the effectiveness of various policy approaches to reduce emissions. In this case, the ex post policy surveillance of a round of commitments can inform negotiations over the subsequent round of commitments.[5]

5.4 Pledge-Review-Repledge

Policy surveillance could inform commitments within a given round of talks through a "pledge-review-repledge" system. In this case, the negotiations occur in three parts. First, countries propose or pledge commitments. Second, the policy surveillance mechanism undertakes an ex ante review of the proposed commitments. Finally, countries negotiate over the final commitments in which the analysis produced by the review mechanism could inform the final agreement.

5.5 Linking Cap-and-Trade Programs

A number of countries have linked their domestic cap-and-trade programs (e.g., the EU and Norway, California and Quebec), and future linking could serve as part of a global climate policy architecture (Jaffe and Stavins 2010). The linking of any two programs would likely involve a mutual assessment to ensure comparable integrity. Domestic stakeholders in each system may demand this. First, environmentalists who successfully champion a stringent cap in country A would likely oppose "weakening" the policy by permitting linking with a non-binding cap in country B.[6] Second,

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5 This kind of review of pledged actions may be important in various issue-specific building block approaches to climate change raised by Stewart et al. (2013).

6 The 1997 Kyoto talks illustrate this phenomenon. The EU pushed for more stringent emission caps and opposed international emission trading out of concern that Russia could sell surplus emission allowances (because its cap was expected to be non-binding) to the United States through emission trading.

businesses in country A expecting to be allowance sellers within country A's cap-and-trade program may oppose linking with country B if it allows significant low-cost abatement competition. The transparency mechanism of an international climate regime could inform this evaluation for any two cap-and-trade programs considering linking. Indeed, linking provisions of domestic authorizing legislation or regulations could specifically call on the international transparency regime to perform this evaluation.

5.6 Border Tax Adjustments

Some domestic climate policies may include a border carbon tax on the emission intensity of imported goods from countries without comparable domestic climate change programs. For example, the 2009 American Clean Energy and Security Act in the U.S. House of Representatives included such a border measure and required an assessment of the adequacy of other countries' domestic climate programs to determine the applicability of the border measure. A given country could review the policy evaluations undertaken through the climate transparency regime in its assessment of whether trade partners merit a waiver of the border tax. Analysis of domestic policy actions among a set of trade partners, including a formal assessment of the comparability of effort, could inform these domestic actions on border measures and allow for an evidence-based determination of the border measure's consistency with the WTO's non-discriminatory application standard.

5.7 Climate Finance

With the growing role of climate finance in the international negotiations – with agreements over quantified metrics of finance (e.g., Copenhagen's "fast-start" financing agreement) and financial institutions (e.g., Cancun's Green Climate Fund) – surveillance of finance will become more important. First, recipient countries have an interest in information on the delivery of pledged financial resources. Second, donor countries have an interest in information on the efficacy of their transferred resources. Systematic surveillance of climate finance could address these interests. In addition, donor countries could condition delivery of finance to recipient countries on their participation in policy surveillance broadly, including on mitigation efforts and actions. Thus, policy surveillance could provide a potential linkage in negotiations between emission mitigation and climate finance.

5.8 Geoengineering

The international community has taken little action regarding geoengineering policy despite the emergence of the issue in the scientific community (e.g., the August 2006 issue of *Climatic Change*) and the identified need for governance in the social science community (e.g., Barrett 2008). Given

reservations about unintended consequences of geoengineering, a surveillance system could facilitate efforts to improve knowledge about how various kinds of geoengineering interventions could affect the planet. “Dual-use” global climate modeling could improve our understanding of climate change as well as our understanding of potential geoengineering interventions. Coordinating the dissemination of research findings related to the impacts of geoengineering would provide a necessary information foundation for thoughtful governance design in the future.

6. Conclusions

A rigorous transparency regime focused on the policies designed to mitigate the risks of climate change is necessary for a successful international climate change agreement. Compiling and analyzing information on climate change policies can enhance the legitimacy of the global climate framework, provide information on the reciprocity of action that can facilitate trust and agreement among countries, and identify the adequacy of the collective effort to combat climate change. This paper illustrates how transparency could facilitate the operation of a wide array of policy architectures and policy components of an international agreement. Let me close with comments on the institutional design of a transparency mechanism and the objective for policy and regime learning under a climate change policy framework.

In another paper, I have called for creating a Bretton Woods Climate Institution (Aldy 2013). Such an institution would have a permanent, professional bureaucracy focused on policy surveillance, like some of the staff to the IMF, the OECD, the WTO, and other international institutions. This institution could undertake the regular reviews of countries’ climate change policies and associated outcomes, host periodic consultative peer reviews among member states, compile assessments of the collective impact of policy actions, synthesize the results of reviews through policy guidance, provide technical assistance to lower-income countries, and identify and disseminate information collection and analysis standards to participating countries. In the near-term, such an institution could be staffed by current experts at other international organizations. It could be governed by an executive board that reflects the contributions to the institution and geographic diversity, which would meet regularly to discuss the draft reports by the expert review teams. Given the importance of the challenge posed by climate change, investing resources in a policy surveillance mechanism like this Bretton Woods Climate Institution would improve the rigor and robustness of policy evaluation and put climate change policy on par with economic and trade matters in the international arena. Given the inadequate approach to climate policy surveillance since 1992, a more sophisticated, rigorous, and professional approach to surveillance is needed.

Finally, the international effort to combat climate change would benefit from an understanding of the benefits of: (1) an incremental dollar expended on mitigation; (2) an incremental dollar

expended on adaptation; and (3) an incremental dollar expended on geoengineering. A robust transparency regime can facilitate the learning necessary to provide the understanding of the relative returns to various approaches to mitigating climate change risk. Absent this knowledge, it will be quite challenging to structure international climate change agreements and design domestic policy efforts that can efficaciously and cost-effectively address climate change.

Acknowledgements

Scott Barrett, Roger Fouquet, Bard Harstad, Trevor Houser, Jonathan Pershing, Billy Pizer, Rob Stavins, Rob Stowe, participants at the 2008 Third Atlantic Workshop on Energy and Environmental Economics provided comments on an earlier version of this paper. Sarah Cannon, Napat Jatusripitak, Ryan Powell, and Sarah Szambelan provided valuable research assistance. Support for this work has been provided by the Harvard Project on Climate Agreements.

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ACKNOWLEDGEMENTS

The Harvard Project on Climate Agreements is grateful to the Harvard University Center for the Environment for generous current support. The Harvard Project receives additional support from the James M. and Cathleen D. Stone Foundation and ClimateWorks Foundation. The Project receives ongoing support from the Belfer Center for Science and International Affairs at the Harvard Kennedy School. The Project is grateful to the Doris Duke Charitable Foundation, which provided major funding during the period 2007 – 2010.

The closely affiliated, University-wide Harvard Environmental Economics Program receives additional support from the Enel Endowment for Environmental Economics at Harvard University, the Enel Foundation, the Alfred P. Sloan Foundation, the Mossavar-Rahmani Center for Business and Government at the Harvard Kennedy School, Bank of America, Chevron Services Company, Duke Energy Corporation, and Shell.

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The goal of the Harvard Project on Climate Agreements is to help identify and advance scientifically sound, economically rational, and politically pragmatic public policy options for addressing global climate change. Drawing upon leading thinkers in Argentina, Australia, China, Europe, India, Japan, and the United States, the Project conducts research on policy architecture, key design elements, and institutional dimensions of international and domestic climate policy. The Project is directed by Robert N. Stavins, Albert Pratt Professor of Business and Government at the Harvard Kennedy School.

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