Barriers to international climate policy

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Introduction

There has been growing scientific evidence in the last two decades that humanity alters the atmosphere by emitting greenhouse gases (GHGs) and that continuation of this trend may have potentially large negative consequences on human population in future. The international community responded by signing two agreements in the 1990s – a general convention that calls for protection of the climate system and a protocol to the convention with commitments for a group of advanced industrialized countries to limit their emissions of GHGs.[1] The Kyoto Protocol is generally seen only as a first step to any future arrangement to deal with causes and consequences of climate change. The protocol does not bind countries with significant shares in the present and projected global emissions nor does it embrace any targets after 2012, so its effect on the amount of global emissions is negligible. In December 2007, ten years after the Kyoto conference, the international community met in Bali to start negotiations on a new climate change regime after first Kyoto commitment period ends.

The article examines why it is difficult to have an international agreement on climate change. Four barriers to international cooperation are identified: the nature of the climate problem, scientific evidence of anthropogenic climate change, uncertainty about the net benefits of a climate change policy, and disagreement over sharing the burden of the climate change policy. These barriers may be seen as strictly disciplinary – the second as pertaining to science, the third to economics and the last one to ethics. Though the substance of these issues may indeed by disciplinary, they are all political as well.

[1] The United Nations Framework Convention on Climate Change (UNFCCC) was signed in 1992 and became effective in 1994. The Kyoto Protocol was negotiated in 1997 and became effective in 2005. The protocol binds developed countries (those that ratified it) to reduce their emissions of GHGs by specified percentage from the base year 1990 until the period 2008–2012.

Nature of the climate problem

Every country contributes to global climate change by emissions of GHGs. These gases accumulate in the atmosphere and enhance the greenhouse effect that increases global average atmospheric temperatures. The root of the climate problem lies in the fact that the cause and the effect are not tied together. Firstly, GHGs are stock pollutants with a long time of decay. Carbon dioxide, the most prevalent GHG, emitted at one point in time contributes to global warming many decades onwards. This has a dual implication for intergenerational equity – current emissions will affect the welfare of future generations as well as past emissions still affect the welfare of the current generation. So the responsibility for climate change is closely related to historical rather than merely present (at any point in time) emissions. Secondly, since GHGs mix uniformly in the atmosphere, the physical impacts of climate change do not correspond to the amount of gases emitted from a certain territory. The global climate system effectively separates the issues of responsibility and impacts, both *in time and place*.

Whether we understand a stable climate as a *public good* or climate change as a *public bad*, both conceptualizations call for some form of concerted international action. Though it may be in the *collective* interest of all countries to reduce global emissions of GHGs, no country is *individually* motivated to reduce its own emissions. Any country that reduces its emissions bears all the costs of the action, while the benefits accrue to all countries including those that made no reductions or even increased their emissions. Conversely, if the country does not reduce its emissions while others do, then the country is *free riding* on the efforts of others, and there is no way to exclude the country from drawing the benefits. Facing such costs and benefits, most countries tend not to reduce their emissions individually and therefore to overuse the climate as a sink for GHGs.

Scientific evidence of anthropogenic climate change

Solving a problem requires that one is familiar with its causes. So the first climate question is: Are the observed changes in climate attributable to human activities, i.e., to human emissions of GHGs? This is a crucial question for

policy-making. If the answer is negative, and we would expend costs related to reducing emissions of GHGs, then there are positive costs and no benefits, and the policy has a negative welfare effect. However, there is not much scientific uncertainty today concerning the causes of climate change. We know there are both natural and anthropogenic factors at work that contribute to climate change, and though we are not sure about the respective shares of these two factors, there is a scientific consensus that anthropogenic factors play the larger role. The evolution of this view can be traced in the assessment reports of the Intergovernmental Panel on Climate Change (IPCC). While the second report noted that humans have a discernible influence on global climate (IPCC, 1995), the third and fourth reports (IPCC, 2001, 2007a) made the link between anthropogenic GHG emissions and climate change stronger.[2] Very few climate scientists now believe that there is no such link or that the link is weak.

As the scientists made the position clear, the politicians gradually accepted their conclusions. For example, US President George W. Bush referred to "the incomplete state of scientific knowledge of the causes of … global climate change" (Bush, 2001) two months after the third IPCC report was published. However, when the National Academy of Sciences (2001, p. 3) stated that the link between observed warming and increased concentrations of GHGs as presented by the IPCC "reflects the current thinking of the scientific community on this issue" in a report requested by Bush administration, President Bush gradually accepted the view. Indeed, it is difficult today to find high-level politicians that question the existence of anthropogenic climate change. After the acceptance of scientific findings developed, the public debate has moved to the question of what the adequate response should be.

[2] Compare the statements from the last three IPCC reports: "The balance of evidence suggests a discernible human influence on global climate." (IPCC, 1995, p. 2); "most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations." (IPCC, 2001, p. 10); "Most of the observed increase in globally averaged temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic greenhouse gas concentrations." (IPCC, 2007a, p. 10) The move from likely to very likely in the third and fourth report is significant – the IPCC defines probablity of occurence for "likely" to more than 66% and "very likely" to more than 90%.

Uncertainty about the net benefits of climate change policy

In economics, the criterion of *efficiency* is used to evaluate policies. An efficient policy maximizes net social benefits, i.e., the difference between total discounted benefits and total discounted costs. A primary tool to compare net present values of different climate policies (including non-action) is a *cost-benefit analysis*. The most recent cost-benefit analysis of climate change, the Stern review, concluded that "the benefits of strong and early action far outweigh the economic costs of not acting" and recommended stabilization at or below 550 ppm of carbon dioxide equivalent (Stern, 2007, p. xv).[3] When the review was published, it received both an applause and criticism from economists. The review was endorsed by several top world economists, including four Nobel Laureates; those who specialize in the economics of climate change were rather critical. Many points regarding the methods and assumptions used in the review were questioned (and some of them subsequently defended by the authors) of which discounting is the most important.[4] Several authors (e.g., Dasgupta, 2007; Nordhaus, 2007; Weitzman, 2007) pointed out that the review results are to a large degree an implication of the low discount rate, which they do not find justified. Dasgupta (2008) argued that it is mainly because the choice of different discount rates that two of the three well-known economic analyses of climate change (Cline, 1992; Stern, 2007) have recommended strong and immediate action to mitigate climate change, while the other one (Nordhaus, 1994) advised a gradual ramp-up of climate change policies starting in several decades.[5] There is a policy conundrum. In

[3] The Stern review suggested stabilization within the range of 450−550 ppm carbon dioxide equivalent though the strategies and costs calculations were based on 550 ppm target. In his later paper, Stern (2008) reviewed the target downward to 450−500 ppm (with strategies based on 500 ppm) following new scientific evidence indicating that 550 ppm target is more risky than had been assumed in the Stern review.

[4] Yohe and Tol (2008) summarize the critical points including references to literature. Dietz and Stern (2008) provide a response to some of the critics.

[5] In order to keep the article relatively straightforward, it focuses on emission control and leaves out other climate change strategies such as adaptation, geoengineering and carbon sequestration. The term "mitigation" is used here to mean mainly emission reductions, though it may be understood more broadly to include carbon sequestration in trees, depleted oil and gas fields or elsewhere.

any cost-benefit analysis we need to apply *some* discount rate. If we accept that it is legitimate to include value judgment in constructing the discount rate, then we may arrive at more than one legitimate policy prescriptions from the same cost-benefit analysis under different discount rates. The recommendations may even be opposite if the project has either costs or benefits in the distant future, as is the case of climate change.

There is a number of other issues in the Stern review that could be handled differently, and some that should. But it is not the case that the whole analysis is completely flawed as some economists claimed. Provided we accept the ethic underlying the discount rate, the final call for immediate and strong action may be justified.[6] But we should be aware of how the "precise" numbers of the cost-benefit analysis are made. A cost-benefit analysis of climate change has to estimate costs and benefits in uncertain distant future, transform them into monetary values, and aggregate them by discounting. Though it is quite complicated to estimate costs, it is not comparable to the difficulties related to estimation of benefits, i.e., damages that would not occur provided the policy is implemented. There are non-linear processes in the global climate system, which makes any forecasts in the distant future highly uncertain; assigning probabilities to climate outcomes is a difficult task. Cost-benefit analysis is constructed on estimates, approximations, and assumptions, whether they were made by the authors themselves or by other researchers whose work was used as inputs. Future costs and benefits are discounted, and their present values are highly dependent on the applied discount rate; the choice of the discount rate is a matter of controversy. Given all these difficulties, it is only natural that there are differing views on many aspects of the analysis. At the same time, we should be cautious to see any cost-benefit analysis of climate change as something that could unequivocally vindicate any *precise* climate policy.[7]

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[6] It should be noted that the ethical framework (rate of pure time preference of 0.1% and the elasticity of marginal utility of consumption of 1) developed by the Stern review together with its 1.3% estimate of the rate of growth and the rest of economic analysis does not ask the current generation to spend money to help future generations impoverished by climate change. In any scenario of the Stern review the future generations (after accounting for any damages that could occur from climate change) are expected to be much richer than we are (see Neumayer, 2007).

[7] The view that cost-benefit analysis shall be the basic tool for assessing projects and policies is generally uncontestable among mainstream economists. Recently, Cambridge economist Partha Dasgupta (2008) and Harvard economist Martin

A growing number of economists see climate change as something akin to risk management where the essential question is how much insurance we should buy against uncertain but potentially catastrophic outcomes. Weitzman (2008) argues that a proper economic analysis of climate change should not ignore the possibility of catastrophic outcomes; though they are rather unlikely, their cost may be enormous.[8] He concludes that if this factor is included into analysis, it may outweigh the impact of discounting and support immediate and strong action even with higher discount rates than the one used in the Stern review. The case for climate action then does not come from an analysis that takes into account the most probable outcomes from climate change, but is based on avoiding the risk of large catastrophes.

Many scholars, mainly non-economists, advocate the setting of a safe level of temperature increase implying some level of atmospheric concentrations of GHGs that should not be exceeded. There are scientists who explore the non-linearities of the Earth's system to estimate the "tipping points" (see Lenton et al., 2008) that should be rather avoided. The alternative approaches are legitimate, but they are not necessarily better than analysis of costs and benefits. For example, the safety principle emphasizes the benefits of climate change policy; but should the damages be avoided at *any* cost? It seems that some weighting of costs and benefits, whether explicit or implicit, cannot be escaped. The policy recommendations from the alternative approaches also may not be more credible. What constitutes "safe level" is not a purely scientific question, and so it is open to interpretation. Neither the risk approach tells us how much insurance we should buy.

Weitzman (2008) expressed their doubts about the application of standard cost-benefit analysis to climate change. The view that cost-benefit analysis may not be suitable for climate change was for some time advocated by some ecological and few neo-classical economists. However, when two eminent economists note that such application may be a case of "misplaced concreteness", it may mark the beginning of innovative approaches to the issue, for example some form of "non-standard" assessment (and presentation) of costs, benefits and risk. As Weitzman (2008, p. 35) noted: "Perhaps in the end the climate-change economist can help most by *not* presenting a cost-benefit estimate for what is inherently a fat-tailed situation with potentially unlimited downside exposure as if it is accurate and objective – and perhaps not even presenting the analysis as if it is an approximation to something that is accurate and objective".

[8] For the opposite argument, that we should not "be obsessed with either extreme tail of the distribution" see Schelling (2007, p. 4).

Coming back to the Stern review, not all its critics challenge its main conclusion that we should act to mitigate climate change. In fact, there is almost a consensus among economists that a mitigation policy is warranted, but differing views on the stringency and timing of the policy.

Neither cost-benefit analyses nor other approaches provided us with a credible *specific* target for stabilization of GHG emissions and a *specific* path of emission reductions. But that is not what we could have expected; given the uncertainties and ethical choices we should not expect anything precise and objective from *any* economic analysis of climate change. Even if economics could provide the definitive answer on the optimum path of emission reductions, politics could override it; but when it is missing it places more weight on politicians. At the same time, it was the general consensus between climate scientists and climate economists that influenced public opinion and allowed politicians to support action.

At the UNFCCC conference in Bali, where negotiations for a post-2012 arrangement began in December 2007, the parties agreed on a vague statement that "deep cuts in global emissions" are necessary, though the EU pressed for a more stringent target of global emissions to peak in ten or fifteen years.[9] It is clear that stabilization of atmospheric concentrations at levels discussed by scientists, economists and politicians at present (roughly around 500 ppm of carbon dioxide equivalent) would require that global emissions must peak relatively early. In July 2008 at a summit in Tōyako, the G8 leaders expressed that they would seek to negotiate the goal of achieving at least a 50% reduction in global emissions by 2050 during UNFCCC negotiations, though the baseline was not specified and the target was conditioned by participation of all major economies. UNFCCC negotiations for the post-2012 regime are planned to conclude in December 2009 in Copenhagen with the adoption of a final agreement. But the negotiations may fail, and if they do, the prime reason may not be the disagreement over the global goal but rather its distribution. So the issue of setting the global target is closely linked to the question of how the costs of climate change policies shall be shared among countries.

[9] Since there is a link between GHG emissions, atmospheric GHG concentrations and temperature increase, the target may be set in any of these three variables. However, only emissions may be directly controlled.

Disagreement over burden sharing

According to the UNFCCC, its parties should protect the climate system "on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities". Various criteria of equity have been proposed in literature, but responsibility and capability are generally accepted and shared. Because countries differ in their responsibilities for causes of climate change and capabilities to deal with them, the extent of their action should differ. Today's developed countries are responsible for the bulk of global historical and present emissions and have more capacity to act than developing countries, so they are asked to bear a disproportionate share of the costs of global climate policies. The average person in the developed world currently emits about four times more GHGs than the average person in the developing world.[10] However, both total and per capita emissions of developing countries are rising and they are projected to rise at least for several decades onwards. The capability criterion, which can be deduced from national income, also points to developed countries. There are other equity criteria and most of them would imply that developed countries should act much more strongly than developing countries. The UNFCCC does not contain any formula on how the notion of equity and common but differentiated responsibilities and respective capabilities shall be converted into a specific distribution pattern. There is already a general consensus that developed countries should bear a higher share of the burden than developing countries. However, since equity is a normative concept, there is disagreement over how higher the burden should be.

One of the approaches to equity calls for allocation of equal emission rights per capita.[11] Since climate change is caused by exploitation of a global common resource, goes the argument, it should not be framed as a question of burden sharing but rather one of resource sharing, where every person has an equal right to its use. Setting emission targets for individual countries

[10] The respective numbers are 16.1 and 4.2 ton carbon dioxide equivalent per capita; with only 20% of global population the developed world generated 46% of global GHG emissions and 57% of global GDP in purchasing power parity (IPCC, 2007b). Data are for 2004, data on emissions include gases from land-use.

[11] See Baer (2002) for this argument and Neumayer (2000) for its extension to account for historical responsibility. Beckerman and Pasek (1995) provide critique of both approaches.

that is based on their present or historical emissions (as the Kyoto Protocol did) must then be viewed as inequitable since it rewards large emitters for their high emissions instead of penalizing them for overusing the common resource. The resource sharing approach to climate change policy is a perfect example of how perceptions of equity and cost considerations play a role in global negotiations. If a system that allocates equal emission rights to every person on Earth is now implemented on a global scale, it would lead to a large redistribution of wealth from developed to developing countries. Many citizens of rich countries may see equal emission rights attractive and equitable in theory but less so when they realize what it entails; few would support such policy in practice. Rich countries are not willing to make such sacrifices for the benefit of developing countries. Along with equity principles, both absolute and relative costs stand high in negotiations, and the distribution of the burden becomes a highly political question.

In July 1997, before the Kyoto summit began, the US Senate passed a resolution stating that the United States should not sign any agreement that (a) would set commitments to limit GHG emissions for developed countries and at the same time leave out the commitments for developing countries, or (b) would seriously harm the US economy. Facing such opposition, President Clinton has never presented the Kyoto Protocol to the Senate for ratification. After the administration had changed, President Bush called the protocol "fatally flawed" and declared he would not support it, generally for the same reasons as stated by the Senate. Other rich countries may have somehow softer positions on this, as is likely to have the new US administration in 2009, but there are limits to the willingness of rich countries to bear the costs of climate change policies.

Developing countries emphasize that they should not be asked to restrict their economic growth for climate change mitigation; poverty reduction and improving the living standards take precedence over solving the problem they have not caused. For a long time spokesmen from developing countries opposed any quantitative limits on their emissions, and this position does not seem to have changed. During the Tōyako G8 summit in July 2008, Indian Prime Minister Manmohan Singh declared that for the present, developing countries cannot "even consider" quantitative restrictions on their emissions and that any reductions in developing countries are conditioned by significant reductions on the part of developed countries. It is indeed unlikely that

developing countries would accept any absolute limits on emissions in the near future, though they may accept some form of relative limits.

There is a growing body of literature on what the climate regime may look like in the post-2012 future (see Aldy and Stavins, 2007). The so-called "target and timetables" approach adopted in Kyoto is not the only model that is viable. However, each proposal implies a certain equity pattern, whether or not the criteria are made explicit, and a certain distribution of costs. A general notion of equity may be a good starting point for negotiations, but practical policy will have to consider the cost side as well. It may well be that political negotiations will determine the meaning of equity rather than the other way round.

Conclusion

There is enough scientific evidence that climate change is real and that it is primarily caused by anthropogenic GHGs. This can no longer be seen as a barrier to an international climate change agreement. The economists have provided an argument for climate change policy in general but they differ on the timing and stringency of emission reductions. There are limitations as to what economic analysis of climate change can provide, so any target may be seen as somehow arbitrary. Though we may need a common vision of a long-term global target, it should not be understood as a fixed target. As the time goes by, the target may not be viewed as suitable in light of new realities and scientific understanding, and therefore it should be open to revision. Given the uncertainties it is reasonable that the climate regime is to be negotiated gradually, but it is also inevitable – future governments may renege on the commitments made by their predecessors and so any long-term commitments would not be viewed as a credible policy (Frankel, 2007).

Speaking about political viability, it is easier to imagine that global leaders agree on a necessity for a long-term global goal than on the distribution of costs. Though global participation is preferable, it is possible to have an effective regime with a limited number of largest present and future emitters. However, when some of the largest emitters are (and increasingly will be) developing countries, this may not be much easier than a global deal. Developing countries like China and India still have much lower per capita emissions than developed countries, but their absolute emissions are high

and they are projected to rise. However rich countries reduce their emissions, it can be easily outweighed by growth in developing countries. Though developing countries may press for no restrictions on their emissions on the grounds of equity, this cannot be done for too long if global emissions are to peak early and decrease afterwards. Allocation of equal per capita emissions is politically unfeasible at present, but convergence of per capita emissions can hardly be avoided. It is unlikely that developing countries would restrict their emissions without substantial reduction on the part of developed countries. If the challenge of climate change is such that it requires deep emission cuts to achieve very low average per capita emissions, no country would be willing and able to achieve near-zero per capita emissions to offset above-average per capita emissions of other countries (Stern, 2008).

The challenge of climate change requires some form of international action, preferably a concerted one. Free riding may be restricted by a global agreement with commitments that are honored. Such an agreement can only be effective when it covers the majority of global emissions, and can only be negotiated when the parties perceive it to be in their own interest. How to negotiate such a deal when distribution is the issue and how to ensure compliance when commitments cannot be enforced on sovereign nations is a political challenge of our time.

References

ALDY, J. E., STAVINS, R. N. (eds.) (2007): Architectures for agreement: addressing global climate change in the post-Kyoto world. Cambridge University Press, New York.

BAER, P. (2002): Equity, greenhouse gas emissions, and global common resources. In: Schneider, S. H., Rosencranz, A., Niles, J. O. (eds.) Climate change policy: a survey. Island Press, Washington, DC.

BECKERMAN, W., PASEK, J. (1995): The equitable international allocation of tradable carbon emission permits. Global Environmental Change 5 (5), pp. 405–413.

BUSH, G. W. (2001): Text of a Letter from the President to Senators Hagel, Helms, Craig, and Roberts. March 13, 2001. Available at: http://www.whitehouse.gov/news/releases/2001/03/20010314.html, [16/10/2008].

CLINE, W. R. (1992): The economics of global warming. Institute for International Economics, Washington, DC.

DASGUPTA, P. (2007): The Stern review's economics of climate change. National Institute Economic Review 199 (1), pp. 4–7.

DASGUPTA, P. (2008): Discounting climate change. Journal of Risk and Uncertainty 37 (2-3), pp. 141-169.

DIETZ, S., STERN, N. (2008): Why economic analysis supports strong action on climate change: a response to the Stern review's critics. Review of Environmental Economics and Policy 2 (1), pp. 94–113.

FRANKEL, J. (2007): Formulas for quantitative emission targets. In: Aldy, J. E., Stavins, R. N. (eds.) Architectures for agreement: addressing global climate change in the post-Kyoto world. Cambridge University Press, New York.

IPCC (1995): Climate change 1995. Contribution of Working Group I to the Second Assessment of the Intergovernmental Panel on Climate Change. Summary for policymakers. Available at: http://www.ipcc.ch/, [16/10/2008].

IPCC (2001): Climate change 2001: synthesis report. A report of working group I of the Intergovernmental Panel on Climate Change. Summary for policymakers. Available at: http://www.ipcc.ch/, [16/10/2008].

IPCC (2007a): Climate change 2007: The physical science basis. Contribution of working group I to the fourth assessment report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge.

IPCC (2007b): Climate change 2007: Mitigation of climate change. Contribution of working group III to the fourth assessment report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge.

LENTON, T. M., HELD, H., KRIEGLER, E., HALL, J. W., LUCHT, W., RAHMSTORF, S., SCHELLNHUBER, H. J. (2008): Tipping elements in the Earth's climate system. Proceedings of the National Academy of Sciences 105 (6), 1786–1793.

NATIONAL ACADEMY OF SCIENCES, COMMITTEE ON THE SCIENCE OF CLIMATE CHANGE, NATIONAL RESEARCH COUNCIL (2001):

Climate change science: an analysis of some key questions. National Academy Press, Washington, DC.

NEUMAYER, E. (2000): In defence of historical accountability for greenhouse gas emissions. Ecological Economics 33 (2), pp. 185–192.

NEUMAYER, E. (2007): A missed opportunity: the Stern review on climate change fails to tackle the issue of non-substitutable loss of natural capital. Global Environmental Change 17 (3–4), pp. 297–301.

NORDHAUS, W. D. (1994): Managing the global commons: the economics of climate change. The MIT Press, Cambridge.

NORDHAUS, W. D. (2007): A review of the Stern review on the economics of climate change. Journal of Economic Literature 45 (3), pp. 686–702.

SCHELLING, T. C. (2007): Climate change: the uncertainties, the certainties, and what they imply about action. Economist's Voice, July 2007, pp. 1–5.

STERN, N. (2007): The economics of climate change: the Stern review. Cambridge University Press, New York.

STERN, N. (2008): Key elements of a global deal on climate change. The London School of Economics and Political Science. Available at: http://www.lse.ac.uk/collections/granthamInstitute/publications.htm, [16/10/2008].

US SENATE (1997): Byrd-Hagel Resolution. 105th Congress, 1st session, S. RES. 98. Report No. 105-54. Available at: http://www.nationalcenter.org/KyotoSenate.html, [16/10/2008].

WEITZMAN, M. L. (2007): A review of the Stern review of the economics of climate change. Journal of Economic Literature 45 (3), pp. 703–724.

WEITZMAN, M. L. (2008): On modeling and interpreting the economics of catastrophic climate change. July 2008 version. Available at http://www.economics.harvard.edu/faculty/weitzman/papers_weitzman, [16/10/2008].

YOHE, G. W., TOL, R. S. J. (2008): The Stern review and the economics of climate change: an editorial essay. Climatic Change 89 (3–4), pp. 231–240.