Sharing the Burden of GHG Reductions

by **Henry D. Jacoby, Mustafa H. Babiker, Sergey Paltsev,**
and **John M. Reilly**

Overview

Success in upcoming climate negotiations will require a clear-eyed view of the relationship between emissions targets and equity goals. This paper uses the MIT Emissions Prediction and Policy Analysis (EPPA) model to estimate the welfare and financial implications of various distributional and emissions reduction outcomes. The results indicate that a target of reducing global emissions by 50% by 2050 while meeting equity targets is extremely ambitious, and would require large financial transfers from developed to developing countries.

Discussion

International climate negotiations have produced a variety of emissions reduction goals. For example, the G8 has proposed reducing global emissions by 50% by 2050. At the same time, there is a general sense that developed countries should take a disproportionate share of the reduction burden, with goals of 70% to 80% reductions by 2050 expressed by a number of them, plus there are calls for positive incentives for mitigation action by developing nations and for protection from the indirect (e.g., terms-of-trade) effects of mitigation elsewhere.

To assess the compatibility of these environmental and equity goals, this paper uses the EPPA model to explore the mitigation effort and financial transfers that would be necessary, using a cap-and-trade system as an example. Burden-sharing agreements are represented by initial allowance allocations and subsequent emissions trade. One output of the calculation is the size of the financial transfers that developed countries would have to make to compensate developing countries. Several burden-sharing rules are assessed, including allocating the entire burden to developed countries, allocating burden based on specific equity goals for developing and developed countries, and allocating burden based on simple allocation rules implied by current proposals.

Key Findings & Recommendations

➢ *The proposed target of a 50% global reduction below 2000 emissions level by 2050 is very ambitious.* Absent near universal participation, such a goal is not achievable, because economic activity and emissions would shift to nations that do not sign the agreement. Even with all nations taking on commitments, this goal would require a complex web of financial transfers to simultaneously satisfy widely-discussed burden-sharing goals.

➢ *Two interacting equity concerns would have to be dealt with in seeking the global emissions goal.* First, incentives and compensation for developing country participation will be required. Second, since mitigation costs and compensation payments by developing countries will be substantial, they also will need to find an acceptable burden-sharing arrangement among themselves.

➢ *Simple emissions reduction rules are incapable of dealing with the highly varying circumstances of different countries.* For example, a 30-70 proposal (in which developing and developed nations reduce their emissions by 30% and 70%, respectively, by 2050) initially appears to be a generous offer from the developed countries. However, it turns out that it could result in net purchases of allowances by some developing countries from the developed countries, in effect partially compensating the richer ones for their mitigation and counteracting the intent of the Bali Action Plan.

Other simple rules, such as distributing allowances on a per-capita basis or inversely related to GDP per capita, would shift costs toward richer countries but raise other difficulties. For some developing countries, they produce large net benefits beyond costs related to mitigation. For others, they are even more costly than the terms of the 30-70 proposal.

➢ *Successful climate negotiations will need to be grounded in a full understanding of the substantial amounts at stake.* If developing countries are fully compensated for the costs of mitigation in the period to 2050, then the average welfare cost to developed countries is around 2% of GDP in 2020 (relative to reference level), rising to 10% in 2050. The implied financial transfers are large—over $400 billion per year in 2020 and rising to around $3 trillion in 2050. The United States' share of these transfers would be $200 billion in 2020, and over a trillion dollars in 2050.

➢ *With less than full compensation, the welfare burden on developing countries would rise, but the international financial transfers would remain of unprecedented scale*. It is an extreme assumption that developing countries will demand complete compensation. If, as is likely, they are willing to bear some costs, then the welfare burden on the developing countries will be reduced. Also, the burden is lowered somewhat if compensation only covers direct mitigation costs and not other losses associated with the policy, as might come through terms-of-trade effects. In the process, the required financial transfers are reduced as well, but they remain large.

CONCLUSION

The G8 countries have called for an aggressive global emissions goal, while previous climate agreements and the Bali Action Plan create an expectation of incentives and compensation for developing country participation. Unfortunately, the magnitude of the implied international financial transfers suggests that this combination of targets may have been chosen without sufficient regard for the difficulty of finding a mutually acceptable way to share the economic burden.

AUTHOR AFFILIATION

Henry D. Jacoby, Mustafa H. Babiker, Sergey Paltsev, and John M. Reilly, *Joint Program on the Science and Policy of Global Change,* Massachusetts Institute of Technology (MIT)

ABOUT THE HARVARD PROJECT ON INTERNATIONAL CLIMATE AGREEMENTS

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

Major funding for the Harvard Project on International Climate Agreements has been provided by a grant from the Climate Change Initiative of the Doris Duke Charitable Foundation. Additional support has been provided by Christopher P. Kaneb (Harvard AB 1990); the James M. and Cathleen D. Stone Foundation; Paul Josefowitz (Harvard AB 1974, MBA 1977) and Nicholas Josefowitz (Harvard AB 2005); the Enel Endowment for Environmental Economics at Harvard University; the Belfer Center for Science and International Affairs at the Harvard Kennedy School; and the Mossavar-Rahmani Center for Business and Government at the Harvard Kennedy School.

Project Email: *climate@harvard.edu*
Full paper available at: *http://belfercenter.ksg.harvard.edu/publication/18613*