

## **The Impact of a Revised Kyoto Protocol on Developing Countries**

### **For *Business and Economy***

**Jeffrey A. Frankel**

**Harpel Professor of Capital Formation and Growth, Harvard University**

I leave it to the scientists to explain the effects of global climate change, including higher temperatures, rising sea levels, greater frequency and variety of storms, and risk of various big catastrophes. But it is worth noting that the biggest effects will come in developing countries like India, because they are more agricultural and because they are already located in hotter climates to begin with.

The Kyoto Protocol was negotiated in 1997 as a first step in addressing the problem of global climate change. It set targets for emissions of greenhouse gases by industrialized countries for the period 2008-2012. But many large obstacles continue to stand in the way of effective implementation of the Kyoto Protocol. One is that the omission of developing countries. Another is that the United States has refused to ratify the treaty.. A third is that it says little about emission targets for periods after 2012.

Whether or not the Protocol is abandoned, the day may come when all countries will want to make a more serious effort at tackling the climate change problem. I believe that building on the foundation of Kyoto might turn out to be the most feasible approach. If this is right, then I think developing countries, particularly large growing countries like India, at some point will have to agree, voluntarily, to accept binding quantitative targets for their emissions and to participate in the system of international trading of emission permits. Emissions trading and other related flexibility mechanisms are among the most important principles of the Kyoto Protocol, and explain why I, as an economist, believe that the foundation of Kyoto is worth building on.

The subject is very controversial. On the one hand, developing countries point out that they should not have to sacrifice their economic development, or otherwise pay the economic price, for a problem that the industrialized countries created. This is quite correct: Most of past emissions of greenhouse gases that are now accumulated in the atmosphere came from the industrialized countries.) On the other hand, rich countries point out that it is not possible to address the problem unless developing countries are full participants in the system. This too is correct: Most of the expected increase in emissions in coming decades comes from China, India, and other developing countries.

This is one of those rare issues where a bit of technocratic gimmickry -- we call it "policy wonkery" in the United States -- might help satisfy both sides' concerns, if only the various sides can quiet down long enough to listen to the details of what is being proposed. If quantitative targets are set for developing countries in a very careful way,

they can help achieve everyone's goals. Three important guiding principles in formulating such targets include gains from trade, progressivity, and protection against inadvertent stringency. An agreement on such targets can bring economic and environmental benefits for developing countries, at the same time as they do so for rich countries as well. Thus everyone should be able to agree that these targets represent an improvement, relative to the alternative of not having developing countries in the system, regardless of how much weight one wants to put on the economic interests of poor countries versus rich, and regardless how much weight one wants to put on environmental goals versus economic goals.

### ***Why we need developing countries in the system***

There are several reasons why meaningful participation from developing countries is essential to any effective effort to address climate change.

- First, a global problem requires a global solution. The issue is inherently one on which individual countries can make little progress on their own, due to the “free rider” problem. A solution requires that all countries agree to participate together
- The industrialized countries cannot address climate change without cooperation by developing countries because their emissions are increasing the most rapidly, and will soon pass those from the rich countries, if everyone proceeds according to “business as usual.” [The crossover may occur by 2010.] Thus, without the participation of major developing countries, emission cuts by the industrialized countries will not do much to avert climate change.
- If developing countries do not participate in the international regime, their emissions might rise by *more* than is currently forecast under their business-as-usual paths as a result of cutbacks in the participating countries. This is the problem of ***leakage***. Carbon emissions in the South might increase by ¼ ton for every ton of cuts in carbon emissions in the North. The relocation of carbon-intensive industries from participating to non-participating countries is one possible mechanism for such an unintended consequence of the Kyoto Agreement. Other possible mechanisms are declines in world prices for oil and coal. Thus, even if developing countries' emissions were only capped at business-as-usual levels, without cuts, that would yield significant environmental benefits in that it would forestall leakage.
- Finally, developing country participation is crucial because it would permit relatively low-cost reductions in emissions in the South in place of high-cost reductions in the North. If the United States does not have the option of paying for low-cost reductions elsewhere, the economic cost of meeting targets such as those built into Kyoto will be so high that it will not ratify a treaty even if a more enlightened president comes to office. Cuts in greenhouse gas emissions in India have the same global environmental benefit as reductions in industrialized countries, even though they are often much less costly. It thus makes sense, from both an environmental and an economic perspective, to incorporate emission reductions in developing countries into the international system.

### ***The viewpoint from the South***

Developing country representatives make several arguments on the other side.

First, their main duty is to their own citizens. Specifically:

- Their priority must be raising their own economic standards of living
- This objective includes, in addition to raising market-measured incomes, also beginning to control local air and water pollution. Such pollution already takes a large toll on health. Controlling local pollution therefore must take precedence over controlling greenhouse gases, which are not visible and which may not have serious health effects until a century into the future.

Second, the developing countries should not be required to take any step that entails economic sacrifice until the industrialized countries have done so. There are two reasons for this:

- The industrialized countries created the problem, and
- They are richer and can more readily afford to make some sacrifice.

It is hard to disagree with these arguments. But “meaningful participation” in the Kyoto system need not entail economic sacrifice by developing countries. This argument is not based on diplomatic or political “happy talk,” but on sound economic logic, as we shall see.

### ***The gains from trade***

If developing countries were to join a Kyoto-like system of targets-with-trading, it would not only have environmental and economic advantages for the rest of the world; it would also have important environmental and economic advantages for the developing countries themselves. For the sake of concreteness, consider a plan under which developing countries do no more than commit to their “business as usual” (BAU) emission paths and join the trading system.

The first thing to notice is that this system is not going to hurt poor countries. India would have the right to emit whatever amount it would have emitted anyway. It need not undertake emission reductions unless a foreign government or foreign corporation offers to pay it enough to persuade it voluntarily to do so.

One anticipates that foreigners would indeed offer to pay India enough to persuade it voluntarily to reduce emissions below its BAU paths. The reason is that it could be expensive for the US, Europe and Japan to reduce emissions below 1990 levels if the reductions are made only domestically. But the cost of reductions is far lower in India. Thus governments and corporations in industrialized countries will be able to offer terms that make emission reductions economically attractive to India. The economic theory behind the gains from trading emission rights is analogous to the economic theory behind the gains from trading commodities. By doing what they do most efficiently, both sides win.

Why is it so much cheaper to make reductions in India than in the United States? One major reason is that, in industrialized countries, one would have to scrap coal-fired power plants far in advance of their 40-year useful life, in order to replace them with natural gas facilities or other cleaner technologies. This would be expensive to do,

because it would mean wasting a lot of existing capital stock. In rapidly growing countries, by contrast, it is more a matter of choosing to build cleaner power-generating plants to begin with, instead of building coal-fired plants. When contemplating large increases in future demand for energy, it is good to be able to plan ahead. The benefits include learning from the mistakes of others that have gone before, and taking advantage of their technological advances.

An extreme example of how measures to reduce carbon emissions can have low costs in developing countries is the case of subsidies to fossil fuels, especially coal, which is the most carbon-polluting form of fuel. Eliminating such subsidies would create substantial immediate benefits – fiscal, economic, and environmental – even before counting any benefits under a Kyoto agreement. [Subsidy cuts within a target-and-trade system would pay developing countries twice over – once in the form of the money that is saved by eliminating wasteful expenditure, and then again in the form of the money that is paid by a rich country for the claim to the resulting emission reductions.]

### ***Lower targets***

Developing countries fear that they will be asked to accept targets that are more stringent than BAU, especially in later budget periods. The final outcome will be determined by give-and-take-bargaining among the parties, such as took place among the countries that accepted targets at Kyoto. But it would not be reasonable for the rich countries to insist that the poor accept targets that fail to allow for their future economic growth. The developing countries, for example, should not consider targets that lie below their 1990 levels of emissions, as most of the rich countries agreed to at Kyoto, or even below their 2004 levels of emissions. Such negotiations may sound like a difficult zero-sum game with no good solution. But in fact there is a whole range of good solutions. It is useful to begin by expressing all possible targets as relative to BAU. Any proposed cuts are relative to BAU, not relative to the past.

A reasonable lower bound for developing country emission targets would be the “break even” level. This is the level that leaves them neither better off nor worse off economically than if there had been no treaty at all. In other words, it is a level where they have to make some low-cost reductions from the start, but where sales of emission permits at an intermediate price are sufficient to compensate them for their marginal reduction. The aim should be to fall somewhere in the range that is bounded above by BAU and bounded below by the break-even level. As long as the target is above the break-even lower bound, the developing countries benefit economically from the arrangement. As long as the target is below the BAU level, the rich countries benefit too. And everybody gains additionally from having taken the first step to fight global climate change.

It is reasonable for poor countries to propose BAU targets as their opening bids, and for rich countries to propose the break-even levels as theirs. What, then, would be a reasonable level where a negotiated compromise might converge? A fair target for developing countries might be one that fits whatever pattern tends to hold among the existing targets agreed at Kyoto. Even though the emission targets agreed at Kyoto reflected the outcome of political negotiations, rather than economists’ calculations of some definition of optimality, it is possible to discern systematic patterns in the numbers.

This approach turns out to allow some *progressivity*, with richer countries making larger reductions than poor ones. Yet it does not go nearly so far as the massive redistribution of wealth that some poor-country representatives unrealistically ask for.

Out of 30 industrialized countries' targets agreed at Kyoto (those with adequate data, including some that have not subsequently ratified), the average reduction from BAU was 16%. For the less-rich half of the countries, the average reduction was 5% below BAU, which shows the progressivity in a very simple way.

Statistical analysis can help us understand the progressivity of the targets. To explain the targets chosen, we use data on four variables (the numbers as they were measured at the time): per capita income, emissions growth projected between 1990 and 2010 (i.e., BAU), coal as a share of total energy consumption, and a dummy variable representing those countries that were beginning the transition from central planning. Controlling for the latter three variables, the statistical analysis exhibits a pattern of progressivity: each 1% increase in per capita income implies a 0.11 to 0.17% greater sacrifice, expressed as greater emissions reductions from BAU. In absolute terms, an increase in income is associated with an increase in the level of the emission target. But we know that an increase in income also implies an increase in the BAU level. The reason we get our key result, that richer countries are making greater sacrifices, is that the increase in the assigned target is less than the increase in BAU. These results are statistically significant.

As an illustrative example, when the pattern is extrapolated to China, the projected target is about 5 percent below BAU. This number takes into account not only per capita income, but also such factors as coal use. That percentage cut happens to lie inside the desirable range: below BAU but above the breakeven point. In other words, if China accepted such a target, economic benefits would accrue both to it and to the rich countries who would pay China to reduce emissions further. As a rough guideline, 5 percent is not an unreasonable benchmark for India and other countries as well.

### ***Resolving concerns about unintended target stringency***

One important objection concerns uncertainty regarding how stringent targets would turn out to be. Calculations regarding the BAU path or the cost of deviations from it are subject to great imprecision and unpredictability. Poor countries worry that uncertainty surrounding their forecasted economic performance is so great that they cannot in 2004 risk adopting an emissions target that would be binding five or ten years in the future. Even if a particular numerical target appears beneficial *ex ante*, it might turn out to be something different *ex post*. If the country turns out to achieve unexpectedly rapid growth, the last thing it wants is to have to put a stop to it because the accompanying emissions threaten to overrun the target. A response to this concern would be to structure international agreements on these countries' targets to reduce the risk of being inadvertently stringent.

Symmetrically, environmentalists have also expressed a concern on the other side, that a target may turn out *ex post* to be too lax. They fear that such a target might fail to

result in environmental benefits in terms of actual emissions reductions relative to what would have happened in the absence of a treaty. [If, for example, Korea or Thailand had accepted targets at Kyoto in 1997, the sharp slowdowns that began in East Asia in the same year would have turned out to imply that they might have been paid for emission reductions that would have happened anyway. This is known as the problem of “hot air.”] Thus, it is desirable to mitigate the risk of inadvertent stringency while also mitigating the risk of inadvertent laxity – to narrow the variability of the effective stringency of the target without relaxing or tightening the intended target itself.

One solution is indexation of the emissions target. The general notion is to agree today on a contract under which the numerical target depends in a specified way on future variables whose values are as yet undetermined. (An analogy is a cost-of-living adjustment clause in a labor contract. It specifies a given increase in the wage for every rupee increase in the Consumer Price Index – thus reducing uncertainty over *real* wages.) Future economic growth rates are probably the biggest source of uncertainty. A simple format would index a country’s aggregate emissions to future income alone. Other possible proposals include in the format other variables like population or temperature.

More specifically, for every percentage point in GDP growth that is higher or lower than forecast, the emissions target is raised or lowered by a corresponding amount. If the relationship were fully proportionate, this rule would be equivalent to what is called an emissions efficiency standard. But a better formula would make the adjustment a little less than proportionate. For example, every 1 percent of extra growth might call for an automatic 0.7 percent increase in the target. (Or the coefficient could be 0.5, which would make the formula into a simpler “square root” rule.) The proposal would require countries that are doing a bit better to contribute more than those that are not, maintaining principles of progressivity and insurance without penalizing them unduly for their success.

Indexation is only one possible approach to removing some of the economic uncertainty that holds back commitment to a quantitative emission target. Another possible idea is suitable for any country that is willing to implement its program for meeting its targets via a carbon tax or tradable permit system: an escape clause or safety valve, which eases the quantitative limit when the price of carbon threatens to rise above a pre-agreed threshold. These solutions to the uncertainty problem would make it more likely that the target will turn out to fall within the range intended, where it brings benefits – both environmental and economic – to developing countries and industrialized countries alike.