

Curbing Carbon Emissions and the Kyoto Protocol: Perspective from the Administration

Jeffrey A. Frankel
Member, Council of Economic Advisers
The White House

Washington Policy Seminar
Macroeconomic Advisers, LLC
Georgetown Conference Center, Thursday, Sept. 10, 1998

I will make some general comments about the Administration position on the Kyoto Agreement, before responding to the two panelists who have gone before me.

The key bottom line of the economic analysis that we released in July was as follows, in qualitative terms: *Given key elements of the Agreement and of Administration policy (including tradeable permits and other flexibility features), the U.S. economic impacts are likely to be modest.*

Those key features are of several sorts. The Administration insisted that the design of the agreement be market-based, flexible, and global. The flexibility comes in three categories:

- “When” flexibility
 - 1st-period reductions less drastic than some countries wanted
 - targets phrased as multi-year averages
 - banking
- “What” flexibility
 - 6 gases included, not just carbon dioxide
 - sinks
- “Where” flexibility
 - international trading in emission permits
 - CDM

Finally, we require a global solution, to address a global problem.

- Without meaningful LDC participation, the President will not submit the Treaty for Senate ratification

Economic analysis of climate change policy is difficult for many reasons, which again fall into three categories.

- It is impossible to put a single monetary number on the benefits of averting Global Climate Change. Putting numbers on the economic costs of a 2-to-6 degree F increase in temperature or a 6-inch to 3-foot rise in sea level, which is what the IPCC scientists are forecasting for the next 100 years, is difficult enough. But that difficulty pales next to the uncertainties surrounding the appropriate discount rate, danger of catastrophic climate events, and appropriate risk aversion.

- Some terms of the international agreement are still uncertain.
- Econometric models are subject to inevitable limitations. Some are good at some things, other at others. No one model does it all.

Despite these difficulties, we used some estimates based on Battelle Labs' SGM, which is well-designed to handle international trading. The most important quantitative findings, supporting the qualitative finding that I led with, were as follows.

- Full and successful implementation of Annex I trading would reduce costs by one-half, relative to a situation where each country had to satisfy its commitment domestically.
- Full and successful implementation of global trading (including developing countries) would reduce costs by 80-87%.
- Global trading would reduce resource costs by an estimated \$7-\$12 b/yr in 2010, which is 0.1 % GDP in 2010. This is a cost that I would describe as, if anything, less than modest.
- The effect on the price of carbon is estimated at \$14-\$23/ton.
 - Δ price of natural gas = 3-5 %
 - Δ price of fuel oil = 5-9 %
 - Δ price of gasoline = 4-6¢ / gal.
 - Δ price of electricity = 3-4 %

In one respect, these estimates are optimistic: we cannot be sure of getting full developing-country participation in the near future. But in other respects they are conservative. They omit some factors that would reduce the net costs of the agreement:

- The Administration proposal for Federal electricity restructuring, which we consider part of our energy-and-environment policy, would save approximately \$20 billion in costs
- Allowance for sinks, such as land forestation, would potentially reduce the need for emission reductions substantially.
- The President's proposal to allocate \$6.3 billion over the next five years in Research and Development and tax breaks to develop and disseminate carbon-saving technologies could further reduce costs if it were enacted and if some of the technological payoff were to come in the next ten years. To be conservative, we assumed that it did not.
- Ancillary non-climate benefits, such as the health benefits of reduced air pollution could reduce net costs by an estimated one-quarter.
- Of course, the most important factor that has been left out of the above assessment is the benefit of mitigating climate change itself. (A full cost-benefit analysis would include mitigation in the benefits column. The only reason we have not done so, explained repeatedly above, is the difficulty in coming up with a number to capture the monetary

benefits.) But nobody should lose sight of our ultimate objective -- keeping our planet the hospitable home that we enjoy today.

General comments on the other two panelists

We, as economic modelers, all have one important goal in common (among others). That is to avoid giving non-economists grounds to confirm their prejudices that models are of little use -- that they all say different things, depending on the inclinations of the modeler. It is true that if you listen to one-sentence summaries of the conclusions of different studies, the predicted effects of the Kyoto Protocol will appear to vary over a wide range. But for the most part the numbers pertain to different experiments. The questions vary, and so the answers vary -- as they should. It is important to be clear and explicit about the question that is being asked. We at the CEA have tried to do this in our public reports (the congressional testimony that Janet Yellen presented last last spring and the recent Administration Economic Analysis). Fortunately I think that the two papers that have been presented are also very clear and explicit.

Unfortunately, the experiments to which the central Jones and Montgomery conclusions pertain are not the experiments that correspond to real aspects of the Kyoto Protocol and essential elements of the President's Climate Change policy:

- 1) Their main conclusions do not allow for Annex I trading;
- 2) They do not allow for LDC participation (no CDM or "growth targets"); and
- 3) They do not include the role of other gases and sinks.

When these studies are interpreted so as to take into account these factors, they reinforce and underscore our own analysis and negotiating position that flexible mechanisms are essential to responding to climate change. I am particularly pleased that David Montgomery has approximately replicated the results of the Administration Economic Analysis when allowing for full trading of emission rights. These results in part underly our judgment that the economic costs of complying with the Kyoto Agreement are likely to be modest.

Russell Jones Analysis

Jones and Dougher use the "Kaya Identity" (emissions = carbon intensity of energy * energy intensity of output * per capita output * population) to look at historical changes in the factors contributing to our emissions to show that the changes necessary to meet Kyoto commitments are "unprecedented". This approach offers a useful perspective. Attaining Kyoto-sized reductions in domestic emissions will not be completely effortless for the United States, or for other industrialized countries. Anyone who thinks otherwise -- e.g., that "technology will save us," even without price signals or any other government actions -- ought to think seriously about the Kaya identity.

But it does not follow that complying with Kyoto is impossible or even that it will impose large economic costs on us. There are two very crucial steps separating the analysis in this paper from a negative verdict on Kyoto.

- **The analysis assumes commitment is met entirely at home.** The Kyoto Protocol includes various flexibility mechanisms that enable us to reduce emissions elsewhere at lower cost. Our estimate is that international trading can reduce the costs by as much as 80-87 percent. After taking into account trading, the required domestic reductions are within the range of historical efforts as viewed in the Kaya framework.
- **The United States has never tried to reduce carbon intensity of energy.** Looking at historical changes in the carbon intensity of energy is misleading. The oil shocks of the 1970s raised the prices of oil (moderately high carbon content) and natural gas (low carbon content), far more than it raised the price of coal (highest carbon content). While we have tried to improve our economy's energy intensity in the past, we have never tried to improve our carbon intensity of energy. Therefore, looking at our historical experience in this field will not be indicative of what we may expect in the future.

Charles River Associates (Montgomery) Analysis

The model used by Charles River Associates' (CRA) is capable of analyzing the effects of changes in the price of carbon that go outside our historical experience. Their capsule assessment of the Administration's economic analysis of Kyoto says that the costs would be higher than the Administration's estimates. Again, this verdict leaves out central elements of the Kyoto Protocol and of the Administration's policy.

- **"Realistic" Trading Assumptions.** CRA argues that without trading, the costs of complying with our Kyoto target would be higher. We have no disagreement here. This is precisely why the Administration advocated and won international trading and other flexibility mechanisms in the Kyoto Protocol and is insisting on meaningful participation by developing countries. Assessments purportedly of the Kyoto Protocol that exclude trading, or assume trading constraints, are neither analyses of the Protocol nor of the Administration's position on implementing the Protocol. As I already mentioned, we are pleased to see that the CRA model, given the relevant assumptions, does generally replicate the low price effects estimated with Pacific Northwest Laboratories' SGM Model and in the Administration's economic analysis.¹
- **"Rapid" replacement of coal plants with natural gas plants.** CRA claims that the Administration assumes extremely rapid replacement of coal-fired plants with natural gas plants by 2008. I don't believe this is right. The Administration's estimates of natural gas consumption and coal consumption, relative to what they would be without any efforts to

¹ "By taking the structure and results of the SGM model, the CRA model can be modified to produce essentially the same results, provided the same assumptions are run on both models." (p.8)

reduce greenhouse gas emissions, rebut this claim. With permit prices of \$14 to \$23/ton, natural gas consumption is roughly equal to what it is projected to be otherwise, while coal consumption, though somewhat lower than it would otherwise be, is still higher than present consumption. Thus there is no rapid reduction of coal-fired capacity.

- **Measurement of Economic Costs.** CRA claims that the Administration's assessment of economic costs underestimates the true costs to the whole economy (by a factor of 2-4).
 - First, it should be noted that this claim only concerns the definition and calculation of total resource costs given a specific permit price -- the argument does not address the estimated effects on prices. Prices seem to be the area of greatest interest to many in Congress, business, and the political process more broadly, as opposed to theoretical economists. [On price there is much less disagreement, once the experiment is specified carefully.]
 - Second, I have checked the references given, and can't find there anything like this proposition regarding indirect costs.
 - Third, CRA does not provide any specific demonstration or intuition as to what the indirect costs are, or why the total (direct and indirect costs) would be several times higher than what is evident in the measurement of direct costs. I am aware of several arguments, incorporated in some models, as to why the indirect effects might operate to reduce total resource costs, but not to add to them.
 - The first is that, if tradeable permits were auctioned off to generate revenue, which was then recycled as pro-investment reductions in distortionary taxes, then the real resource cost would be reduced. We have never included this effect; the Administration has not yet decided whether even to distribute permits by auction.
 - But the second argument is potentially more relevant: raising the price of energy has auxiliary benefits, such as reducing SO₂ pollution and thus reducing health costs. (Our estimates are that these benefits offset roughly 1/4 of the economic costs of meeting the Kyoto targets.)
 - Third, because the US is large in the world, we have some monopsony power. Policies to reduce the domestic demand for oil will thus work to reduce the price on world oil markets, improving our national terms of trade.

We have not included this effect either. But these are the indirect effects I

can think of. I would like to hear from David Montgomery what are the indirect effects in his model that go the other way.²

In the absence of more information, I can only think of two possibilities.

- The first possibility is that he is looking at indirect effects on industries that are more energy-intensive than the average, neglecting the indirect effects on industries that are less energy-intensive than the average.
 - The second possibility is that he is generalizing from historical studies of command-and-control policies, which do indeed tend to have costs that go beyond the increase in price of the commodity directly effected. This would be inappropriate, however, because the Administration's oft-stated plan is to implement its reductions through efficient market-oriented policies, not inefficient command-and-control policies. I offer these two possible hypotheses only as questions.
-
- **Technology Assumption.** Finally, I would like to highlight that in the Administration Economic Analysis we did not give in to the temptation of assuming that technology would bail us out, without help from price signals or other government policies.³ Rather, we adopted the default assumption about energy efficiency improvement used by the modelers who developed the Second Generation Model (AEEI = .96 % a year).⁴

² Perhaps something to do with factor market efficiency costs? [EPA 812 SAB: "can be 25-75 % higher than firm-level compliance costs."]

³ CRA in May 19 testimony had erroneously guessed that the Administration's analysis must have employed "free lunch" technology optimism.

⁴ The assumption is based on the projected energy consumption in EIA's Annual Energy Outlook . One could debate the technical reasons for the step from .92 (rounded down to .9 in the 1997 AEO) to .96, as Montgomery does. But this difference seems too small to spend much time on. One must recognize that the standard errors around estimates of such parameters are so large as to dwarf a difference of .04.