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The Kyoto Agreement on Global Climate Change: The Administration Economic Analysis

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In the two-plus years I have been at the CEA, I have been privileged to work on many fascinating topics. But I have spent more time on global climate change than on just about any other single topic.

I am going devote most of my remarks to the subject of the likely cost of U.S. efforts to avert climate change. But first, it is important to recognize the costs and risks facing our nation should we fail to act. Current concentrations of greenhouse gases have reached levels well above those of preindustrial times. As a consequence, the Intergovernmental Panel on Climate Change estimates that global temperatures will increase by between 2 to 6 degrees Fahrenheit in the next 100 years, with a best guess of about 3.5 degrees Fahrenheit. There are considerable scientific uncertainties around the details of global warming, but not around the fact of its existence. The IPCC also predicts sea level increases of 6-inches to 3-feet by 2100. Furthermore, storms and other extreme weather events may become more frequent and more severe.

Despite the difficulties of deriving quantitative assessments of the damages from climate change, researchers have developed rough monetary estimates of damages that prompt substantial concern, and range in the tens of billions of dollars per year for temperature changes projected to occur in the next century. These estimates do not, and cannot, accurately reflect the unknown risk of large-scale and potentially irreversible events with potentially catastrophic consequences -- such as reversal of the Gulf Stream, break-up of the Antarctic ice-shelf, or positive feed-back mechanisms (e.g., methane release from perma-frost). There is a strong argument for the Kyoto Protocol as a form of insurance against a serious environmental threat.

I am pleased that economists' thinking has played a large role in the development of the American position, and in turn in the Kyoto Agreement. The result has been a market-oriented approach. I only wish that the economics agencies in European and other governments were as heavily involved in the process as we are.

Some in the Congress or the private sector express concern about the possible economic

costs. Thus the CEA has been called upon to explain our thinking. In July the White House released a 139-page document titled “The Kyoto Protocol and the President’s Policies to Address Climate Change: Administration Economic Analysis.”

The key bottom line of the economic analysis was as follows, in qualitative terms: *Given key elements of the Agreement and of Administration policy (including tradeable permits and other flexibility features), the impact on the U.S. economy is 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:

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| “When” flexibility | <ul style="list-style-type: none"> • 1st-period reductions less drastic than some countries wanted • targets phrased as multi-year averages • banking |
| “What” flexibility | <ul style="list-style-type: none"> • 6 gases included, not just carbon dioxide • sinks |
| “Where” flexibility | <ul style="list-style-type: none"> • international trading in emission permits • Clean Development Mechanism |

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. It is difficult enough to put numbers on the economic costs of a 2-to-6 degree F increase in temperature. 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 models are good at some things, other at others. No one model does it all. The estimates of each are subject to wide bands of uncertainty,

Despite these difficulties, we used some estimates based on Battelle Labs’ SGM, a model

that 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. This shows why we think unrestricted trading is so important [and will fight European proposals for caps on trading].
- Full and successful implementation of global trading (including developing countries) would reduce costs by 80-87%, again relative to the no-trading case. This illustrates one reason why we think that developing country participation is so important.
- Global trading would reduce resource costs to 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 %
- Effect on the energy bill of the average household is estimated at \$70-\$110

The SGM model, along with many other leading econometric models, participates in the Stanford-based Energy-Modeling Forum. The most recent compilation by the EMF of the results of ten of these models shows the SGM, the model that we used, in the middle of the pack of estimates of the costs of Kyoto, when standardizing on the policy experiment under consideration. The SGM's estimates of costs in 2010 are near the median, in the experiment with no international trading or in the case with Annex I trading. With full global trading, SGM cost estimates are a bit below the median, but far from the lowest of the models.

In one respect, our estimates are optimistic: we cannot in fact be sure of getting full developing-country participation in the near future (though, if I have time, I can explain why the target-and-trade framework of Kyoto turns out analytically to be well-designed to appeal to developing countries, once they come to understand the economic and environmental advantages *to them* of joining).

In other respects, our estimates 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 --

potentially enough to offset the increase in the household energy bill.

- 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. [Most, though not all, of the first-year slice of this program was funded in last week's budget agreement.]
- 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 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.