



“Act Now on Global Warming—But Don’t Cook the Books”

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William Cline’s new book provides a thoroughly careful and fully transparent analysis of the economics of global warming—an excellent demonstration of the application of the economist’s tool-kit to a pressing policy issue. But his conclusion—that an “aggressive” program of abating greenhouse gas emissions is warranted—rests heavily on lowering the discount rate used in cost-benefit analysis to around 2 percent.

We, too, believe that active policies to address greenhouse warming should be put in place now, but our recommendations do not hinge on such a low discount rate. Moreover, we believe strongly that it is wrong to assume that those who argue for relatively high rates are somehow less interested in the welfare of future generations than those arguing for relatively low ones. On the contrary, we feel that meeting the needs of future generations will only be possible if investible resources are channeled to projects and programs with the highest environmental, social, and economic rates of return. This is much less likely to happen if the discount rate is set significantly lower than the opportunity cost of capital.

We are concerned that the wealth passed on to future generations—in the form of clean air and water, and productive soil and forests, as well as the stock of technological knowledge, educated workers, and physical infrastructure—will be reduced if policymakers routinely accept investments that offer less

than the best return. We are also concerned that too low a rate—by changing the ranking of projects—will induce a capital intensive pattern of development, and promote investments with high up-front costs, such as dams, that could be harmful to the environment. The fact that environmental investment has often been woefully inadequate is due to the failure to account for the costs of environmental damage in cost-benefit calculations, not because discount rates have been too high.

Why then do Cline and others argue that we should lower the discount rate when dealing with a subject like global warming? In this article, we will first address the general arguments commonly put forward: that the environment is a special case, and that long-gestating projects demand lower discount rates. We will then address the two specific technical arguments raised by Cline—actually two assumptions that underlie his calculation of the discount rate: that resources required for investing in preventing global warming will come from consumption rather than from existing savings, and that the individual components of the social rate of time preference (SRTP) are such that the SRTP is very low.

The “special case” argument

Should the discount rate for investments in environmental protection be lower than for, say, those on health, education, or food production? Such special treatment is sometimes defended on grounds of uncertainty, potentially large and irreversible impacts, and the “intrinsic” values associated with the environ-

ment. We believe that such factors deserve special treatment, but are too important to be handled indirectly through manipulating the discount rate.

Lowering the discount rate is an imperfect and often misleading tool for capturing uncertainty and for dealing with large irreversible impacts—as economists like Partha Dasgupta, Joseph Stiglitz, and J.V. Krutilla have pointed out. In the case of uncertainty, a lower discount rate simply increases the weight we put on risks in the distant future compared to the near future. And, of course, uncertainty can go both ways; unknown technological breakthroughs could greatly decrease the benefits of current investments to reduce later global warming. The problems of uncertainty and irreversibility should be addressed head on through appropriate valuation techniques, and on this score, Cline agrees (as his chart shows, he incorporates uncertainty by adding a “high-damage” scenario).

The “intrinsic” or “spiritual” values associated with the environment also deserve explicit consideration by policymakers. Cline would be the first to admit that his analysis fails to capture these values. The costs of global warming he calculates are economic values (loss of agricultural production, increased need for air conditioning, reduced revenues from ski lifts, etc.). These are valuable calculations, but clearly partial. It would surely be fooling ourselves to believe that by imputing higher values to these future economic costs (by lowering discount rates) we are somehow taking account of the future noneconomic costs that were ignored in the

initial calculations. Economists need to recognize their own limits!

Cline is right in noting that many people today appear to be willing to make sacrifices to prevent global warming that they are not willing to make for child nutrition or soil protection in Africa—seeming to demonstrate a concern for future generations greater than implied by conventional discounting. Part of this apparent “willingness to pay” would disappear if citizens actually had to pay (which they have not yet), and priorities might shift if all available facts were known. But a strong concern about global warming nonetheless remains. It is hard to argue that this stems from a concern about the economic loss of a few percentage points of GDP two centuries from now (when by Cline’s calculations, individuals will be seven times richer than we are today). If this were the case, citizens should be equally concerned about policies that promote economic growth over the long term, which would swamp any potential economic impacts of global warming.

The public’s present concern is clearly more deep rooted. It may stem from a basic unwillingness to hand over to future generations a greatly altered, or “polluted,” natural world, an unwillingness that transcends the economic impacts of such pollution. Policymakers can get some help from economic analysts in assessing the importance of such values; carefully designed contingent valuation (questionnaire) exercises and a recognition that these are values to people alive today (and thus do not need to be discounted) can help disentangle economic from noneconomic values. A complementary approach is to incorporate noneconomic values through participatory decisionmaking after the strictly economic costs and benefits have been calculated and made public. But in neither case is it necessary or helpful to lower discount rates.

The “long horizon” argument

Cline does embrace another common argument for low discount rates—that when, as with global warming and other environmental

projects, an investment yields returns far into the future, a high discount rate makes no sense. By using a zero rate of pure time preference and assuming low long-term world growth rates in his calculation of the SRTP, he in effect argues that the discount rate should be adjusted to take into account the long ges-



tation of global warming projects.

In reality, however, the line between quick- and slow-return projects is impossible to draw. All good projects benefit future generations—either directly or through reinvestment. Educate a girl in Africa today; the yield will begin immediately, but the full benefits will not yet be experienced one hundred years from now. Similarly, investment in technology in the eighteenth century enabled Europe’s prosperity today, and investment in US railways and agricultural universities a hundred years ago made possible America’s agricultural productivity today. We would thus argue for the same discount rate for a long gestating project as for a series of shorter gestating projects. Cline caricatures our view as arguing for a “Fund for Greenhouse Victims,” implying an all-or-nothing decision at the outset between global warming avoidance or other types of investment. In the real world, the menu of op-

tions is richer—and each option deserves careful and equal treatment.

“Consumption matters” argument

How does Cline arrive at his 2 percent discount rate for global warming? He begins noting that the discount rate is a weighted average of the “capital share displaced,” which incorporates the opportunity cost of capital and the “consumption share displaced,” with the weights depending on whether resources come from consumption or other investment. (Cline’s assumed SRTP is an input to *both* of these shares.) He then argues that the capital share deserves little weight since most (80 percent) of the resources society would allocate to reduce global warming would come from consumption not investment. His thinking runs as follows: people will not agree to pay taxes to finance more education or better roads—in other words, the overall level of investment is socially sub-optimal. But because they are nervous about global warming, they might agree to some sort of controls on emissions, or even to taxes on emissions (which, in fact, by reducing GDP growth would ultimately tax them and their descendants anyway—and with a lower

expected benefit than the tax on education). He thus argues for a *lower* discount rate for global warming than for, say, schools or roads.

We have no problem with the formula—that is, with the concept of incorporating the SRTP into the consumption share and capital share, which as Cline notes is now in the “mainstream” of economic theory. But we disagree with the weights used for the two shares, because we believe it is the capital share displaced that matters for purposes of allocating scarce investment resources—and allocating scarce resources is always the central problem. (What this means is that the discount rate calculated from the formula, with full weight to the capital share displaced, is conceptually equivalent to the opportunity cost of capital.) Another way to put the same point: it is the economist’s job to assess the net benefits of an investment, telling policymakers where investment resources will yield

the highest return—not to assume *a priori* how society will finance investment choices.

This is why at the Bank, the starting point for the choice of discount rates used in project analysis is the opportunity cost of capital in borrowing countries, a criterion that does not vary depending on the investment financed. Since a dollar used to finance investment “A” cannot also finance investment “B,” the rate of return to a potential investment must be compared with alternative high return uses (taking into account environmental and social, as well as economic, factors)—or limited investment resources will be used poorly.

As a result, Bank-financed investments in roads, sanitation, education, environment, agriculture, and energy must pass a cost-benefit test applying discount rates in the order of 8–10 percent. We do accept that the opportunity cost of capital (and thus the discount rate for investment decisions) in industrial countries may be lower than the rates common in developing countries. Thus to the extent that investments in preventing global warming substitute for consumption or investment benefiting rich countries, a lower rate should be used (e.g., the 5 percent “test discount rate” used by the British Government).

A final point: although Cline concedes that in assessing how to allocate investment among competing uses it is the opportunity cost of capital that matters, he goes on to argue that in calculating the stream of costs and benefits from greenhouse projects, the shadow price on carbon emissions should be computed using his 2 percent discount rate. But it is logically inconsistent to calculate the shadow price at one discount rate and then calculate the present value of the project at another. Why should the monetary value of the externality used in calculating the shadow price be discounted at a different rate than other resources generated or consumed by the project?

“Low time preference” argument

The second factor underlying Cline’s 2 percent discount rate is his use of an SRTP of 1.5 percent—which is the summation of a “pure” rate of time preference (which he sets at zero) and a discount of 1.5 percent based on the assumption that incomes will increase over time and our descendants will be better off than we are. If the only thing that really matters is the opportunity cost of not investing in higher return projects, the calculation of the SRTP is irrelevant. But for the sake of argument, let us examine this figure.

First, the “pure” rate. Cline’s zero level is attractive, since it recognizes that we should take great care in making decisions that will affect future generations, who cannot participate in those decisions. Indeed, it builds in di-

rectly the notion of “stewardship”; we do not want to discount posterity’s interests at all—not even to the extent we might discount our own future consumption (e.g., anticipating some probability of our own death cutting off future consumption benefits). But a zero rate implies I care as much about my and your descendants in the year 2300—about ten generations from now (within the time horizon Cline says should be considered)—as I care about the more than one billion people living today in poverty in developing countries. In terms of “emotional” proximity, are we sure that we would not rank higher an improvement in the welfare of children in Somalia today than an increase in the welfare of our descendants who might be living in the year 2300?

Moreover, there is another way to look at the issue. Consumers in developing countries are willing to borrow at high real rates of interest, higher than 10 percent, reflecting the tradeoff they see between current and future consumption for themselves. Cline maintains that the interest rate on consumer saving, not borrowing, better reflects time preferences, because the former is not affected by taxes and other distortions that drive up the cost of capital. But the fact remains that many of the poor in developing countries value current consumption highly—perhaps because they are poor and the marginal utility of additional current consumption is very high. Should we ignore this evidence?

Second, what about Cline’s discount for future income growth? He assumes long-run future income growth per capita of 1 percent. But in the past four decades, such growth in the industrial and developing worlds has been 2 percent a year per capita. Furthermore, in Germany, Japan, and the Republic of Korea, per capita growth has been far greater, averaging more than 5 percent a year in the latter two over more than two decades. Predicting long-term growth rates is a tricky business; the World Bank has been overoptimistic in projecting income growth in Africa. However, in choosing between projects that would benefit Africans (e.g., education versus reduced global warming), does Cline really want us to assume that income growth will only be enough to provide the average Malian with an income of \$2 a day in 2050?

What then is the right SRTP? We do not know, but we think it could be higher than 1.5 percent. If it is, then the appropriate discount rate would be greater than 2 percent. In fact, if we assume per capita income growth of 2 percent, a pure rate of time preference of 1 percent, and all of a project’s resources potentially being used for other investments, the discount rate, using Cline’s method, would be 8 percent. (As the reader should see, we thus have no ar-

gument with the formula for the SRTP itself—only with the weights Cline uses and his numerical assumptions in applying the formula to global warming.)

A strategy for global warming

We agree with Cline that active steps to address the possible costs of global warming should be put in place now. In fact, Cline’s “aggressive” program for the next decade is not much different from that spelled out in the *World Development Report 1992*. The three-fold strategy over the short term includes:

- adopt policies that can be justified for reasons in addition to their beneficial impact on global warming: eliminate energy subsidies, adopt modest carbon taxes (especially in countries with low energy taxes), and invest in afforestation and agroforestry;

- embark upon an aggressive program of research to reduce the uncertainty surrounding the problem and find solutions; in rich countries, of all public energy research funds, only 4 percent go to renewable energy;

- support the search for solutions in developing countries; rich countries should help poorer ones enjoy rapid economic growth while keeping greenhouse emissions low (e.g., through the Global Environment Facility).

Apparent differences with Cline arise mainly over his specific proposals on what to do starting a decade from now. For example, Cline recommends a tax of \$100–\$200 per ton of carbon “sometime after the turn of the century,” but he qualifies this by saying the recommendation should be “subject to further scientific confirmation.” This puts him in a similar position to the Bank, which, as the *WDR 1992* makes clear, also believes that over the longer term, as evidence accumulates, a stronger response may be warranted (e.g., international tradable permits for carbon emissions). We thus think Cline exaggerates the contrast between his and the Bank’s position; his argument contrasting an “aggressive” policy to what the Bank now advocates is a “tempest in a teapot.”

In sum, our difference with Cline arises over a principle rather than specific measures: while awaiting scientific confirmation, we think it will harm future generations to use low discount rates to justify locking in low-return investments. Indeed, if we are to make genuine progress in addressing the huge challenges of sustainable development, every investment will need to earn its way. As the Bank’s former Chief Economist has noted in the article to which Cline refers: once costs and benefits are properly measured, it cannot be in posterity’s interest for us to undertake investments that yield less than the best return. There is no need to cook the books. ■