

Example 20.1

Social Discounting and the Economics of Climate Change*

In October 2006, the UK Government published the independent *Review of the Economics of Climate Change* led by Sir Nicholas Stern (HM Treasury, 2006). It attempted a systematic assessment of the economic costs of climate change and hence the potential benefits of government intervention to reduce carbon emissions. Its conclusions were stark:

‘The overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP each year, now and forever. If a wider range of risks and impacts are taken into account, the estimates of damage could rise to 20% of GDP or more’¹.

It called for governments around the world to spend 1% of global gross domestic product (GDP) per annum (equivalent to \$580 billion in 2010) on cutting carbon emissions.

Doing a social cost–benefit analysis (CBA) of climate change is far from straightforward. There are scientific uncertainties surrounding both the climatic impacts of carbon emissions on the environment, and the impacts that changes in climate and weather will have on people’s lives. Then, all these impacts must be given a monetary value in order to be captured by the CBA. They include effects on crops and livestock, property, individual health (including the possibility of death), and quality of life – many of which do not have obvious market values. Also, the costs of climate change are not likely to be distributed evenly across the global population. Developing countries are likely to be worst hit because of their geography, their greater dependence on agriculture, and because, with fewer resources, they are less able to adapt to the consequences of climate change. Moreover, because they are poorer, every \$1 worth of damage is likely to have a bigger impact on people living in developing countries and this needs to be reflected in the CBA by applying appropriate distributional weights.

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¹ *Review of the Economics of Climate Change* led by Sir Nicholas Stern (HM Treasury, 2006). Executive Summary, page vi

But the part of Stern's analysis that appears to have generated the most controversy has been the choice of the public or social discount rate used to calculate the present value of future costs and benefits. Most of the benefits of reducing carbon emissions occur far into the future. The damage caused by one unit of carbon emitted today lasts for over 400 years. Indeed, the damage in the immediate future is relatively small; it rises quickly, peaks in around 100 years' time, and then gradually declines. Therefore, the choice of discount rate is crucially important for determining how much weight future costs of climate change should be given relative to the costs to today's generations of cutting carbon emissions.

Typically, the discount rate used in social CBAs reflects either the opportunity cost of capital (the gross return on investment) or individuals' rates of time preference (the net return on savings). However, even the lower of these would imply a discount rate of around 5% and would give a near-zero value to £1 of benefits received 100 years from now. This would clearly dramatically lower the optimal level of mitigation.

There seems to be something inherently wrong with this outcome and, in fact, there are a number of reasons why current market rates of return may be inappropriate to use in making long-term government decisions. One is that there is considerable uncertainty about what the market rate of return will be over the horizon in which the costs and benefits accrue. Another is that the market return to saving, for example, reflects the time preferences of individuals who may not be well informed, may not take account of social as well as private considerations, and may not consider the interests of future generations.

At the other extreme, it has been argued that the government should not discount costs and benefits to future generations at all – indeed that it is morally wrong to do so because it fails to treat all people as equal. Instead a position of zero discounting puts an equal weight on £100 worth of benefits occurring in five hundred years' time and £100 worth of benefits occurring today. This would massively increase the payoff to engaging in activity to reduce global warming and would increase the optimal level of investment in climate change mitigation. Very broadly, this is the approach taken in the Stern Review – although it does discount for a very small probability of global extinction as a result of, say, an asteroid hitting the planet.

But this approach is also not without its problems:

First, it fails to consider that investment in reducing carbon emissions has an opportunity cost, since the money could be invested in other productive alternatives. Money spent reducing carbon emissions could be spent funding programmes to combat malaria or AIDS, or to increase human capital in developing countries. The UN has estimated that \$75 billion would be enough to give everyone in developing countries clean drinking water, sanitation, basic health care, and education – and many believe that this would be a better way to spend the money.

Second, while a positive discount rate may result in the tyranny of current generations over future ones, zero-discounting may lead to the tyranny of future generations in policy making. Nordhaus (2007) illustrates this by means of the

following “wrinkle experiment”: suppose that scientists discover a wrinkle in the climate system that will cause damages equal to 0.1% of global consumption starting in 2200 and continuing indefinitely. If the interests of future generations were given equal weight in a cost–benefit analysis, then removal of this wrinkle would justify a reduction in current consumption of up to 56%.² Thus, the current generation is required to make a huge sacrifice in order to benefit future generations.

A final point about valuing and discounting costs and benefits occurring far into the future is that the CBA adopts a welfarist approach – it values the effects of policies in terms of their impact on individuals today and in the future. But, when considering costs and benefits to individuals hundreds of years from now, it is quite possible that individual welfare will not be determined in the same way as it is today. The CBA reflects today’s valuations, and in turn, the preferences of society today. But, as Nordhaus argues, in several hundred years’ time, individuals are likely to consume goods and services that are unknown today and live in societies that have benefited from enormous technological advances. When we think how different the world is today from what it was in the 17th century, who knows how future generations will value the benefits from reducing carbon emissions in 2008.

Sources

HM Treasury, *The Stern Review of the Economics of Climate Change* (2006), www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm

W. Nordhaus, “The Stern Review on the Economics of Climate Change,” *Journal of Economic Literature*, Vol. XLV (September 2007), pp. 686–702

² W. Nordhaus, “The Stern Review on the Economics of Climate Change,” *Journal of Economic Literature*, Vol. XLV (September 2007), p. 696