

## Response to key themes in recent critiques of the Stern Review

The basic conclusion of the Stern Review is that the costs of strong and urgent action to avoid serious impacts from climate change are substantially less than the damages thereby avoided. This conclusion is robust to a wide range of assumptions. The Review goes on to examine the policy frameworks that will support effective action on adaptation and mitigation.

A number of responses to and critiques of the Stern Review have been published in recent weeks. These are a welcome contribution to the debate on the economics of climate change, and many of them have helped to build on, illuminate or explore particular areas of the Review and its recommendations.

However, a number of the recent critiques contain some basic errors and misunderstandings. Many of these points are covered by the Frequently Asked Questions document available at [www.sternreview.org.uk](http://www.sternreview.org.uk).

We will shortly be publishing one final paper that will respond to the major themes of the debate since the Review was published, point to further research and discuss ways forward on policy. It will include some further sensitivity analysis of the modelling work presented in the Review.

In advance of that, a number of issues deserve clarification immediately, since some commentators have suggested that they undermine our conclusions.

The scientific basis for the Review is robust. Our assumptions on the science of climate change are drawn in a balanced way from standard sources. In particular our modelling work uses a standard approach drawn from the central range of estimates of climate sensitivity, with parameters that reflect the range within the existing literature. In our qualitative analysis of impacts, we also draw attention to more recent papers highlighting the risks of further adverse outcomes in particular areas. A small number of commentators continue to raise the question of alternative scientific hypotheses about climate change, although many of the examples quoted have been refuted in the scientific literature. The IPCC will shortly be publishing the results of its Fourth Assessment Report on the science of climate change, and we look to that report to provide a comprehensive analysis of these questions.

The economic basis for the Review has also stood up to scrutiny. While there are some legitimate differences in perspective, and discussions about the effects of alternative assumptions, claims to have found errors and inconsistencies have generally been the result of misunderstandings.

1) There has been a lively technical debate on the role of discounting in estimating the scale of economic damages from climate change, and some questions as to whether alternative approaches to discounting would undermine the economic case for early action on climate change.

- The conclusions of the Review do not rest on any one model result. Chapters 3-5 of the Review presents a disaggregated analysis of the risks of climate change, including the risk that business-as-usual emissions paths would lead to more than a 50% probability of global average temperatures increasing by over 5°C. Changes on this scale would transform the physical and human geography of the world and would cause substantial dislocation to both rich and poor countries.

- In Chapter 6, the Review presents the results of one particular economic model, chosen because of its ability to handle more recent analysis of the probabilities of different outcomes of climate change. This model was used to explore how changes to the assumptions used in formal economic modelling of climate change might affect the results. The discount rate is not the only driver of the higher estimates compared with the wider economic literature, presented in the Stern Review. Also significant are:
  - the treatment of risk and uncertainty throughout the model (including the more recent scientific investigations of the risks of temperature increases at the upper end of the IPCC projections);
  - the incorporation of an illustrative scenario representing one example of natural feedback that could accelerate climate change; and
  - the approach to valuing impacts on poor people.
- The debate on discounting illustrates how important it is to understand the different ethical assumptions that drive economic modelling. The approach taken in the Review takes full account of the fact that future generations are likely to be richer than ourselves – we do discount for future changes in wealth. But we take the view that it is not appropriate to assume away the importance of major and irreversible impacts that will affect future generations simply because they come after us. Therefore, we use a low rate of ‘pure time preference’. The sensitivity analysis presented in the Postscript and Technical Annex to the Review (available at [www.sternreview.org.uk](http://www.sternreview.org.uk)) explores this further.

2) There have been some misunderstandings about the estimates presented in the Review for the costs of mitigation.

- Our central estimate of an annual cost of 1% of GDP applies through to the end of this century (with a range of +/-3% points by 2050). This is based on a very wide range of model estimates and does not stem from the use of one particular approach. This is not affected by discounting assumptions and is designed to be consistent with our approach in expressing likely climate-change impacts (using so-called ‘balanced growth equivalent’ paths).
- 1% of GDP is not a trivial amount. It represents a very significant change in the patterns of energy investment, in line with the replacement cycles for capital stock, towards low-carbon energy technology. It reflects the likely costs under a flexible, global policy, employing a variety of economic instruments in cost-effective ways to control emissions of a broad range of greenhouse gases. It would require clear long-term price signals and policy frameworks that encourage technological innovation. In the absence of these factors, or were action to be delayed, the costs could be significantly higher.

Overall, the conclusions of the Review remain robust, and the issues raised have been moved to centre stage. Our approach and findings have been welcomed and endorsed by a wide range of eminent economists.

We look forward to continuing to participate in academic and policy-focused debates on these issues in the coming weeks.