



Stage 4: Physical Quantification of Relevant Impacts

The Stern Review contains strong predictions about what the impacts of climate change are likely to be if the business as usual path is continued. For example:

Warming is very likely to intensify the water cycle, reinforcing existing cycles of water scarcity and abundance and increasing the risk of droughts and floods. (Stern Review, 2006, 2)

This conclusion based on a single study by Arnell (2004), which was heavily criticised because it ignored the adaptive capability of existing technologies as well as the possibility of new technologies being developed.

Melting glaciers will initially increase flood risk and then strongly reduce water supplies, eventually threatening one-sixth of the world's population. (Stern Review, 2006, 6)

Hanna et al (2005) show no significant trend in the size of the Greenland ice-sheet from 1961 to 2003, while Zwally et al (2005) found that, although the Greenland ice-sheet may be getting smaller at the fringes, increased snowfall at the centre of the ice-sheet is actually increasing its total mass.

Declining crop yields are likely to leave hundreds of millions without the ability to produce or purchase sufficient food, particularly in the poorest parts of the world. (Stern Review, 2006, 72)

The Stern Review's claim that between 250-550 million additional people will be at risk of hunger assumes zero fertilisation effect from increased CO2 levels.

If the assumption is changed to one of strong fertilisation, then there will be a decrease in the number of people who go hungry, even if there is a temperature increase of up to 3.5 degrees Celsius.

Vector-borne disease such as malaria and dengue fever could become more widespread if effective control measures are not in place. (Stern Review, 2006, 73)

While the Stern Review acknowledged that control methods could be improved, it failed to factor this into the model. Furthermore, various authorities have argued that malaria and dengue fever should be seen as diseases related to poverty as opposed to climate change.

Ecosystems will be particularly vulnerable to climate change, with one study estimating that around 15 - 40% of species face extinction with 2 degrees Celsius of warming. (Stern Review, 2006, 56)

This claim is based on a single study on ecosystem loss and extinction risk conducted by Thomas et al (2004), which is widely considered to be an outlier in terms of its extreme conclusions.

Stage 5: Monetary Valuation of Relevant Impacts

If, as is shown above, the Stern Review has exaggerated the quantification of the likely impacts of climate change, then there are serious implications for the monetary values it placed on those impacts.

(a) Costs of Business as Usual

Adaptive capacity: People will adapt to changes in the climate as far as their resources and knowledge allows. (Stern Review, 2006, 92)

One of the strongest criticisms of the Stern Review is that it acknowledges the adaptive capabilities of people to deal with climate change, but it fails to take this into account when estimating the costs of climate change.

The time period that is being worked with is extremely extended, more than two centuries, and therefore the scope for both adaptive change (including technological change) must be taken into account.

But developing countries lack the infrastructure (most notably in the area of water supply and management), financial means, and access to public services that would otherwise help them to adapt. (Stern Review, 2006, 92)

The Stern Review takes a monolithic view of developing countries: they are all characterised as low income economies that share the same experience of economic growth.

For developing countries located in the mid-latitudes, most projections predict that climate change could be beneficial. Furthermore, for those developing countries which have a growing industrial sector, it has been argued that manufacturing and services are unlikely to be seriously affected by climate change.

The model we use - the PAGE2002 IAM - can take account of the range of risks. (Stern Review, 2006, 153)

The integrated assessment model used by the Stern Review is the PAGE2002 model which has been criticised as being an outlier in terms of the costs that it predicts for changes in GDP - between 5% and 20% of global GDP.

This conclusion is based on the PAGE2002 model's highly speculative multiplier effects - that is, 'socially contingent responses' relating to labour supply and productivity, as well as social and political stability - which account for 80-90% of the costs predicted by the PAGE2002 model.

(b) The Cost of Mitigation

The Stern Review's apparent bias in over-estimating the likely benefits from mitigative action is matched by a similar bias in under-estimating the likely costs of mitigation.

Nevertheless, the exercise suggests that the inclusion in individual models of induced technology, averted non-climate-change damages (such as air pollution) and international emission-trading mechanisms (such as carbon trading and CDM flows), can limit costs substantially. (Stern Review, 2006, 243)

Whereas the Stern Review is extremely pessimistic in its outlook towards technologies that might help deal with the effects of climate change, it is equally optimistic in its acceptance of technologies that will bring down the costs of mitigation.

The Stern Review established a range of 1-3.5% of GDP as the like costs of mitigation, and when macroeconomic effects are taken into consideration, the range rises to 2-5%. However, the Review's conclusions refer only to the lower bound estimate of 1% of GDP.

Stage 6: Discounting of Costs and Benefits

...in carrying out the expected-utility valuation process, we use a pure rate of time preference (or utility discount rate) to weight (or value) the utility of consumption at each point in the future. This utility in the future has a different weight simply because it is in the future. (Stern Review, 2006, 160)

Market vs. Social Discount Rates

The Stern Review chose to make use of a social discount rate of 0.1% - based on pure time preference, the marginal utility of consumption and the future growth of consumption.

Stage 7: Applying the Net Present Value Test

Comparing the social costs of carbon on a BAU trajectory, we estimate the excess of benefits over costs, in net present value terms, from implementing strong mitigation policies this year, shifting the world onto the better path: the net benefits would be of the order of \$2.5 trillion. (Stern Review, 2006, 17)

Neither the costs nor the benefits as set out by the Review can be regarded as credible, while the choice of a remarkably low social discount rate had the effect of ensuring that future benefits would loom large.

Accordingly, the process by which the Stern Review arrived at the net present value of \$2.5 trillion is fraught with biased values and is not reliable.

Stage 8: Sensitivity Analysis

A major criticism of the Stern Review is that it did not conduct a sensitivity analysis on its results.

Belatedly the Stern Review released its version of a sensitivity analysis in the form of a technical annex, in which the discount rate was adjusted upward by 5%.

Variable-by-variable approach vs. scenario approach.

The Stern Review's 'sensitivity analysis' revealed that the costs of climate change declined from 5% to 1.4% - 2.9% of global GDP. Nevertheless, the Stern Review's overall conclusion remained fundamentally unchanged.

3. Conclusions

A flawed cost-benefit analysis?

The Stern Review presented a selective and arguably skewed assessment of the likely impacts of climate change and is therefore open to the charge of 'alarmism.'

The Stern Review was selective in choosing to reflect the upper limits of the damage costs from climate change but the lowest estimates of the costs of mitigation.

The Stern Review did not do justice to a very real concern. It was a missed opportunity.