# Stern Review on the Economics of Climate Change
# What is the Economics of Climate Change?

**General Comments**

- Need to explicitly identify what is meant by costs (economic only or more broadly interpreted to include economic and social costs, as well as environmental costs).
- It has been argued that mitigation becomes less effective as the time horizon for unacceptable/dangerous impacts approaches because the benefits of mitigation take some time to be realized, making collective adaptation increasingly important by default. This suggests that mitigation could be viewed as inherently anticipatory rather than reactive.
- Mitigation responses will need to be taken by nations/states and communities that will also need to be adapting. The importance of this preoccupation with adaptation will become more significant as the impacts of climate change approach or surpass unacceptable levels. The capacity to support mitigation (human and financial resources) and the options that may be available will be challenged by the urgency of dealing with the present unacceptable impacts (i.e. the closer one gets to unacceptable/dangerous impacts the greater will be the efforts to maintain welfare or function).

**Specific Comments:**

*Executive Summary*

Paragraph 3

- Effective collaboration will require not only a shared understanding of the incentives and institutions needed, but also a global consensus on the most effective process(es) for defining and achieving the ultimate goal of the UNFCCC. The 'costs' of climate change are being felt now and will continue to be felt over a long period, affecting all societies over the entire globe.

Paragraph 5

- Action taken to avoid 'dangerous' costs are possible and practical. Mitigation is an anticipatory response that focuses on reducing the magnitude of future impacts through reducing future climate forcing. Adaptation actions are necessary to reduce the impacts associated with climate changes that are occurring or to which we are already committed. Adaptation actions are needed to reduce the impacts below tolerance levels or delay the onset of unacceptable/dangerous impacts.

Paragraph 6

- Caution should be exercised when using descriptors such as 'worst' and 'most severe' as these are normative and have restricted meaning within the international climate change community. I would suggest using descriptors such as 'unacceptable' or 'dangerous' which, although yet defined, at least have some currency within the deliberations.

- Avoiding 'unacceptable/dangerous' climate change will require both mitigation (anticipatory action to reduce the future rate and amount of climate change) and adaptation (reduce or delay the consequences, both of which can, in some cases, work to avoid the unacceptable/dangerous impact).

Paragraph 7

- I would argue based on the point made under paragraph 5, that effective action requires an understanding of how mitigation and adaptation may effect economic and social growth (and well-being)

Paragraph 9

- Policies should also take into consideration the need to enhance the general resilience of energy systems.

Paragraph 10

- Irreversibilities are also a key part of the story as result of irreversible changes in impacted systems (e.g., loss of ecosystems, species, communities), but also due to potential impacts on human health and well-being for which some would argue there is zero-tolerance for negative changes.

Paragraph 12

- Would suggest that tackling climate change needs to be consistent with continued and sustainable socio-economic growth and development.

Paragraph 13

- The scientific literature (e.g., IPCC) suggests that climate change is already here and, that as a result of past and current emission, we are committed to climate change throughout and beyond the current century. Even if GHG emissions are stabilized at a level that prevents atmospheric concentrations from more than doubling pre-industrial levels, global climate will continue to become less similar to our current climate for the next century or so not just over the next 30 years. Some of the resulting impacts are expected to be unacceptable by many and, as such, adaptation will need to be part of a considered and effective response strategy.

*Part One*

Paragraph 6

- Would prefer to see the language more closely aligned with that in paragraph 13 which recognizes that one cannot explain the recently observed changes in climate (temperature) without including human activity,

Paragraph 9

- There has been some dialogue but little definitive results regarding defining 'most severe' impacts (a normative description). This is related to the research and deliberations around the issue of defining 'dangerous' climate change. The IPCC have indicated that those with the least resources have the least capacity to adapt and are the most vulnerable. But this does not equate to they will experience the most severe impacts. It is becoming increasingly recognized that relatively less-developed societies may have considerable adaptive capacities based on indigenous knowledge, social ties and networks, and it is becoming clearer that more developed societies may have

considerable vulnerability to climate change partly as a result of being more closely linked with the rest of the world through global trade and investment (e.g., New Orleans and the impacts of Katrina, and France in the summer of 2003) and partly because a developed society becomes less aware of ongoing climate effects as adaptation to these effects is hidden from the bulk of the population.

Paragraph 12

- Measurements supporting the picture of a warming planet have been compiled from thousands of climate stations and satellite observations that cover the entire planet.
- The rate and scale of the 20th century warming has been unprecedented for at least the past 10,000 years

Paragraph 16

- Need to clarify more precisely what is meant by 'risks' as this term is used in various paragraphs throughout the document and appears to have a variable meaning. In some cases it appears that the term risks is being used in place of impacts, others in place of changes to the climate (e.g., temperature, precipitation, etc.), and still in others to changes in the climate system (e.g., major ice sheets, ocean circulation patterns, etc.).

Paragraph 18 and Figure 13

- There is some debate as to whether or not the resulting distributions are probability distributions as traditionally defined. I believe that if you check with those that produced the results depicted by figure 1.3b you will find that they have never called this figure anything more than a frequency distribution.

Paragraph 19

- There are some who are uncomfortable with the continuing use of the term 'debate' in the context of science preferring to recognize that further scientific inquiries will continue to shed light on our understanding of the behaviour of the climate system, including the drivers of change. This scientific process includes consideration of all the drivers/hypotheses of change; however the current theory is a better explanation than any competing theory in terms of explaining the growing mass of evidence.

Paragraph 20

- Need to be clear and consistent in the metric being used (use Gigaton of Carbon = a billion tons).

Paragraph 28

- In the first sentence the use of the phrase 'global and regional effects of climate change that are predicted consistently across most climate models' can be somewhat misleading (e.g., precipitation projections could never be described as being predicted consistently). Climate models more often are associated with providing projections of changes in the climate, most often manifested by changes in climate variables (temperature, precipitation, etc.). These in turn result in global and regional effects/impacts that are identified by climate impacts models.
- In terms of the last sentence, the identified response is somewhat confusing. Accelerated melting of glaciers could lead to increased

flooding risks not only in the spring but throughout the period of increased melting. Once the glacier has disappeared (completely melted), there would be no further glacial melt contributing to water supplies.

Paragraph 34

- Third question – an important over-arching aspect of this question is related to identifying the capacity of policy-makers to respond. This requires broader scope of knowledge as well as the resources and support systems to respond.
- Fifth question – the question should also recognize that the problem, although global in its origin and effects requires action globally, regionally, nationally and locally in a manner that will define solutions that respond to the common and differentiate realities of the problem.

Paragraph 36

- First point – would be helpful to understand triggers/drivers of change and thresholds (e.g., tolerance levels and/or unacceptable impacts)
- Third point – would also be helpful to understand the social consequences of strategies to reduce greenhouse gases
- Additional point – would be helpful to better understand adaptive capacity and limits of adaptations (socio-economic defined).

Paragraphs 43 and 44

- Suggest that consideration should be given to the institutional support required for adaptation. As impacts can be defined at various scales – global, regional, national/state, local. There may be some advantage to considering institutional structure that would be effective in supporting adaptation at the regional, national/state and local levels.

*Part Two*

Paragraph 53

- An effective response should include both adaptation and mitigation. Global collective action is essential for mitigation and adaptation will benefit from global collective action. In terms of adaptation, however the nature of impacts (differentiated expression within and across geography and political space as well as a reflection of differentiated vulnerability and adaptive capacity) necessitates that this global collective action be tempered/complemented with action at the appropriate scale.

Paragraph 57

- First point – the manner which the term ‘adaptation’ is used in this point is dissimilar to how it is used within the climate change community. The consequence of climate change for growth and development are more commonly referred to as the impacts of climate change. Adaptation is an adjustment in human or natural systems in response to actual or expected climatic stimuli or their effects, which moderates the harm or exploits beneficial opportunities.
- Consider expanding to include five points under this paragraph - impacts/consequences, vulnerabilities, adaptation, mitigation and uncertainties

Paragraph 61

- An additional channel for macroeconomic consequences to manifest would be as a result of diversion of resources/capital to deal with climate change directly (e.g., resources required to undertake adaptation options in reaction to an real/existing impact or to correct a maladaptive response)

Paragraph 62

- First sentence needs some clarification in terms of the definition of severe climate change (may want to use unacceptable), as well as verifying that the ability to assimilate, etc. is referring to the economy (or affected community). In terms of the last sentence within this paragraph, it may be helpful to refer to countries/communities that have limited adaptive capacity or use determinates of adaptive capacity to define those that are most vulnerable.

Paragraph 65

- The definition as to who will be 'worst' affected is fraught with minefields and should be avoided. Developing countries are more vulnerable primarily as a result of deficiencies in adaptive capacity, and overarching socio-economic, political and environmental conditions. Once again, taking a vulnerability approach (see IPCC TAR) and talking about unacceptable impacts is probably a more sound approach.

Paragraph 66

- See earlier comments regarding the significance of the next 30 years. The commitment is climate change over a longer timeframe.
- In terms of adaptation itself, many of the methods are well understood and based on available technology (e.g., demand-based response within water management). What are in the early stages are methods for assessing the viability and cost-benefits of adaptation decisions within the framework of uncertainties. One thing that should be kept in mind is that a number of adaptive options although requiring an initial investment, can reduce overall operational costs and the need for future capital investment (e.g., improving water infrastructure efficiencies and reducing demand can have positive impacts on the operations of the water supply system, reduce the need for additional investments in increasing the supply, and have side benefits for society, the environment and economy.

Paragraph 67

- Suggest looking at the monetary values of world-wide damages may give only part of the picture – although there will be limited available information, it would be useful to recognize and where possible factor in non-monetary costs, including social well-being.

Key questions for the Stern Review

- Third question – focus should be looking at the drivers/levers needed to support/promote adaptation and how these vary

Paragraph 85

- Suggest that also need to look at feedback from climate change, adaptation and mitigation to growth.

Part Three

Paragraph 94

- Need to recognize that mitigation will be required at the same time as adaptation is required (mitigation is anticipatory). As climate changes become more evident and approach/exceed acceptable levels, more resources will be diverted to reduce impacts. This focus on adaptation may limit investments and attention, especially when the impacts and the need for a response are now and local.

Paragraph 109

- It should be noted that impacts are already being felt by populations in the Arctic – not necessarily developing countries but vulnerable populations.

Paragraph 111

- Although probably not important within this paragraph, it needs to be stated that the UK will also need to adapt and that adaptive action here should wherever possible be seen as part of socio-economic growth and development.
- Second point (Costs) – should consider how to balance this with the benefits of adaptation (e.g., many of the proposed adaptive measures make good economic sense, increase resilience) and that in a number of cases involves employing existing technologies. There are social 'costs' that are also worth mentioning such as implications of changing social behaviour.
- Additional points – Under improving information or as a separate point, understanding our vulnerabilities, including how to increase our adaptive capacity is a key issue for adaptation. This includes understanding determinates of adaptive capacity and limits to and drivers of adaptive capacity. It is worth noting that limits to adaptation, whether defined by social, economic or political acceptability, will play a role in defining the need for mitigation.

Paragraph 112

- May want to ensure that when giving examples of types of adaptive action that both building adaptive capacity and delivering adaptation actions are reflected.