

Letter

'Business as usual' is not an environmentally viable option

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From Prof Graciela Chichilnisky and Dr Armon Rezai.

Sir, We fully agree with Robin Harding, in "[A high price for ignoring the risks of catastrophe](#)" (February 18), that the current academic discourse focuses too narrowly on optimal pricing, and ignores the potentially catastrophic nature of climate change. We would like to add two items to the list: first, the concept widely used in economics to evaluate catastrophic risks is plainly not helpful in informing decisions about rare but disastrous events, and second, carrying on with "business as usual" is neither environmentally viable nor economically sensible.

The current standard theory of decision-making under uncertainty is insensitive to rare events. When John von Neumann and Oskar Morgenstern developed their expected utility hypothesis in the mid-20th century, they introduced the assumption of continuity which is a convenient mathematical feature but leads to the exclusion of fat tails.

However, the global financial crisis and the tragedy of the Deepwater Horizon oil spill have reminded us of the existence and relevance of catastrophic risks or "black swans". Policy makers need sound statistical decision theory which does not sweep the unlikely but catastrophic under the carpet. An example for this is the US army, which considers catastrophic climate change a threat to national security. What is more, expected utility theory has been shown to be inconsistent with the actual choices humans make.

Applying standard expected utility theory to rare events is, therefore, running against prudence and common sense. How should one then form decisions in the presence of rare events? One of us has made the case for new axioms for choice under uncertainty when catastrophic risks are involved (Chichilnisky, G (2010). "[The Foundations of Probability with Black Swans](#)", Journal of Probability and Statistics, vol. 2010), leading to a natural extension of expected utility maximisation which includes the avoidance of extreme outcomes. Examples for such extreme events are bankruptcy, hurricanes, oil spills, market crashes, biodiversity loss, or the extinction of our species. Replacing the continuity assumption with what we call the assumption of "no insensitivity to rare events" will lead to the derivation of a rigorous mathematical theory of decision-making and allow us to stop living in methodological denial.

Further, recent emission projections place end-of-the-century global mean temperature at around 5C above pre-industrial levels. Carrying on with business as usual is not an environmentally viable

option. A comprehensive solution is the carbon market of the Kyoto protocol created by one of us in 1997 which has been international law since 2005 – yet most emissions of carbon dioxide are still unpriced and therefore pose a negative externality. Business as usual, therefore, is not even an economically sensible option.

We agree with Mr Harding that trying to quantify the unknown climate externality is a worthy and policy-relevant cause, and this is what carbon markets accomplish, but in any case we should do so using the appropriate statistical techniques. We must not forget that, whatever the exact price, plain vanilla welfare economics tells us to initiate rapid abatement today.

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