Author's respond to the comment of Richard Tol

First, I wish to apologise for my delayed response. Second, I wish to thank Richard Tol for his challenging comment, as it made me aware of that I should re-address the focus of my paper. The revised version of my paper is attached.

I had hoped that my 2004 paper would be the last on dual discounting.

Tol (2004) is actually on dual-rate discounting when the income elasticity of demand for environmental quality might be larger than one. In contrast, my paper is more on dual-rate discounting when there is environmental resource scarcity, as in Hoel and Sterner (2007).

Dual-rate discounting is confusing and an unnecessary approximation.

I agree that I should have given more credit to the "classical approach", which adjusts the impact function for environmental concerns and then discounts the impact function at the consumption discount rate. Richard Tol is right that this is equivalent to dual-rate discounting, which discounts the unadjusted impact function with an environmental discount rate. I also agree with Richard Tol that the classical approach is the most natural approach to pursue. I made these points clear in the revised version of my paper. The earlier version of my paper also gave the wrong impression that only dual-rate discounting can justify substantial emission reductions. This is however incorrect, as properly adjusting the impact function in the classical approach can also justify substantial emission reductions. I also added this point to the revised version.

What follows is nice but irrelevant math.

Here I disagree. In addition, I also disagree to an indirectly suggested view in Richard Tol's comment that it is in general enough to properly account the impact function for environmental concerns. Instead, my alleged irrelevant math shows that in the classical approach one has in addition also to adjust the consumption discount rate for environmental concerns unless there is, by and large, fulfillment of the knife-edge case that environmental quality and goods consumption are neither substitutes nor complements in the Edgeworth-Pareto sense (substitutability in the Edgeworth-Pareto sense describes the change of the marginal utility of goods consumption from increasing environmental quality). I am not the first who recognised the need of fulfilment of knife-edge conditions for the consumption discount rate to be unchanged from environmental effects (see instead Traeger (2007) and Gollier (2008)). However, nobody before recognised its relation to substitutability in the Edgeworth-Pareto sense (which I believe is not an exotic concept and therefore a potential contribution to the literature).

References

Gollier, C. (2008). Ecological Discounting. Paper presented at the EAERE Annual Conference 2008 in Gothenburg, Sweden.
Traeger, C. (2007). Sustainability, Limited Substitutability and Non-Constant Social Discount Rates. Department of Agriculture and Resource Economics Discussion Paper 1045, University of California, Berkeley.