Referee report for “On the relation between dual rate discounting and substitutability” by Tomas Kogel

Summary

The paper deals makes refinements to the literature on dual discounting by specifying the implications of different concepts of substitutability between consumption and environmental goods that have been discussed in the literature. In particular the paper discussed the varying implications of Edgeworth-Pareto substitutability and Hicks-Allen substitutability.

General comments

1) There is no need for a definition of the various forms of substitutability in the abstract.
2) Whether or not the Stern Review is “disrespectful” to the “standard literature” depends on which literature one regards as standard. If one regards Ramsey (1928), Harrod (1950) and other luminaries of economics on the one hand, and e.g. Cline on the other, as the standard literature, then Stern was very respectful indeed. If one regards the positive (descriptive) approach of Nordhaus and Tol and the like as the standard literature, then yes, Stern looks like an outlier. Even Weitzman thinks that Stern was “right but for the wrong reasons”. Of course the debate continues. The implication from this comment is that you are going to resolve the problem between Nordhaus and Stern by presenting situations in which potentially more realistic discounting assumptions converge with the Stern view. In this sense, the paper takes a descriptive approach which may well coincide with Stern’s more normative approach.
3) There are some definitions throughout the paper that I recommend should be placed in footnotes. For instance, when notation is explained such as differences and means at the top of page 6, and in later pages too.
4) The paper should be re-read by someone with English as a first language. The paper is perfectly understandable, and the message is conveyed well, but there are some peculiar phrases here and there. E.g. fn6, “the need of approximation” should read “the need **for** approximation....”. “no substitutes”, which is used throughout, should be “**not** substitutes” in most places. “goods consumption” should probably just become “consumption” once the distinction between goods and environment is made clear up front.

Specific Comments

1) I am having difficulty with the need for the assumption that the project is sufficiently large to influence the discount rate, made in Section 2. Firstly, I don’t see where this assumption is exploited in this section. Secondly, the Ramsey type equations that are developed in (5) and (6) are first order approximations. That is they are valid for only marginal perturbations in the consumption path. However, the section opens with a statement which suggests that we are looking at non-marginal changes in growth which influence the discount rate. I am just a little puzzled here. I think some explanation is required to convince the reader that this is the right framework for non-marginal changes.

For instance, are formulas 5 and 6 still valid when considering non-marginal changes? I think not, and Stern agreed with this view too.

2) The above also affects the marginal conditions for the path of environmental prices that is exploited in the derivation.
3) The non-marginality assumption is dropped in section 3 however. An explanation for how this assumption is exploited is necessary. A footnote should do it.
4) In section 2, with discount rates which tend to infinity for consumption, this says to me that the NPV criterion is no longer a valid one, rather than it generating an NPV of 0. An NPV of zero speaks to indifference between going ahead with the project and not. This is not what is going on in the Leontief case. I am a little puzzled by the negative infinity also. From the penultimate equation in Section 2 seems to imply that 1+g tends towards a negative value.
5) One implication of the result in Section 2 is that, notwithstanding the issues of non-marginality, the standard Ramsey approach is valid when environmental goods are non-substitutable in the EP sense.
6) Perhaps more can be made of the fact that you are distinguishing between inter and intra temporal substitution capabilities. In reality, we would expect more substitution over time than at a given point in time.
7) On time varying discount rates, in terms of the numerical values of parameters such as alpha, perhaps reference could be made to some of the empirical evidence or normative justification for this parameter (depending on your view of discounting). In fact, there is no risk in this model, so it doesn't really make sense to think of this parameter as risk aversion. In the case of social discounting it should really reflect the social (rather than individual) inequality aversion. Evans, inter alia, has analysed such revealed preferences. Alternatively, Dasgupta argues from a normative standpoint. Interestingly the result for time varying discount rates doesn't rely on pure time preference, but only on relative values of alpha. Does this mean that Stern and Nordhaus would agree on the schedule of discount rates over time? My point is, perhaps a deeper discussion of the parameter values is required.
8) Regardless of the previous comment, I am not sure that the concluding paragraph of section 4 reflects the result. Both intra and intertemporal substitution are important, clearly. Not only that, but many authors tend to think that the term alpha represents intra and intertemporal inequality aversion, rather than simply intertemporal. A comment on this would be useful in clarifying the conclusions.

Minor comments

1) In terms of the concepts of substitutability, perhaps it would be useful to present these, and the implications for the various parameters, in a table for ease of reference.
2) Given that you have an extensive appendix, perhaps the text should display the final derivation, rather than the final 2 steps. E.g. 5, 5' and 5'''
3) "risk avers" should be "risk averse" at the top of page 11.

Conclusion

Overall the clarification given here is a useful one. It is important that when economists and policy makers refer to substitutability between environment and consumption, and its implications for discounting, that they are singing from the same hymn sheet. This paper goes some way to ensuring this. I would recommend publication once the comments above regarding presentation and the more substantive issue of non-marginality have been satisfactorily addressed.