

Interactive comment on “On determining the Point of no Return in Climate Change” by Brenda C. van Zalinge et al.

Brenda C. van Zalinge et al.

q.feng@uu.nl

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We thank the reviewer for the useful comments on the manuscript and a point-by-point reply follows below. The aim of the manuscript is to introduce the new methodology combining stochastic viability theory, linear response theory and economic modeling to address the concept of the Point of no Return π_t . We indeed realize that the models used are only illustrative of the methodology and not aimed to provide a realistic estimate of π_t . Although this was mentioned in the original manuscript (in the discussion), it will be mentioned much more explicitly in the revised manuscript.

1: Climate system not well behaved

Reply:

C1

In section 3 of the paper we show (using a simplified energy balance model (EBM)) that in principle tipping points can be taken into account to determine π_t once the PDF of the GMST can be computed (as can be done for the EBM). However, when linear response theory is used to compute PDFs, such as in section 4 for the PLASIM, indeed tipping behavior cannot be captured. This will now be mentioned more explicitly in the revised discussion of the paper.

2. GMST normally distributed

Reply:

This is indeed an assumption limiting the applicability of the methodology. The PDFs of PLASIM are approximately Gaussian but this is not expected to hold for any climate model and in particular when transitions do occur, PDFs are not Gaussian. Again this will be mentioned in the revised discussion.

3. Optimal mitigation scenario

Reply:

We do agree that this view on the economic costs of mitigation is simplified although we directly use results from the POLES model regarding the stabilization scenarios (Edenhofer et al. 2010). However, by the recommendation of both reviewers, we will delete section 4.3 of the paper, but we will mention the possibility of determining optimal mitigation scenarios in the revised discussion.