

Climate risks, tipping points and emission reduction

Peter Tankov^{1,*}, Tiziano De Angelis²

¹ CREST, ENSAE, Institut Polytechnique de Paris, *peter.tankov@ensae.fr

² School of Management and Economics, Department ESOMAS at the University of Turin and Collegio Carlo Alberto

Abstract

We develop a simple model of optimal emission reduction in the presence of climate tipping points, where the remaining carbon budget before reaching a tipping point is uncertain, and the detection of its occurrence is subject to measurement noise. Assuming that agents are reluctant to reduce emissions before the tipping point occurs, but are averse to the physical climate risks that will materialize afterward, we formulate the optimal emission reduction problem as an optimal switching problem under partial information. We then characterize the optimal strategies as a function of the remaining carbon budget and the perceived likelihood of crossing a tipping threshold. Our results show that the optimal emission reduction trajectory does not follow a smooth path, but instead consists of alternating periods of strong and weak climate policy, depending on the public perception of the catastrophic risks associated with tipping points.

Keywords: Climate risks, Climate tipping points, Optimal emission reduction, Optimal switching, Partial information.