



## **Fixed capital and bounded rationality effects on extreme global temperature impacts**

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Damages from the climatic change could come from the extreme events falling on an economic system that is not adapted anymore, however these damages haven't been assessed yet. The aim here is to study the importance of two biases arising from agent's bounded rationality: 1) the bias introduced by using a simple approach for temperature change detection; 2) the difference between an anticipated adaptation and a reactive adaptation. The inertia caused by the capital fixity and the climate change detection is explicitly represented.

The economic model is a simple model calibrated on the SRES scenario A1, with a two sectors world economy. One sector corresponds to the infrastructures, while the other corresponds to the other activities. That modelling allows to take into account the longer lifetime of infrastructures which are highly impacted by extreme events. The climatic model is based on an emission function, a simple carbon cycle and a simple temperature trend model calibrated on the LMDZ GCM. The variability of the global temperature is calibrated on the present variability and is added to the trend. The climate sensitivity determines the rhythm of the temperature trend.

The system is adapted to a temperature that lags behind the temperature used for new investments. Three hypothesis are tested for the temperatures used for new investments: when the adaptation is reactive the current temperature is used. When the adaptation is anticipated, the temperature predicted for the capital mid-life is used. Two hypothesis are tested for the temperature prediction, an exponential oversight and the use of Kalman filtering. With Kalman filtering the uncertain parameter is the climate sensitivity.

The impacts are represented by a reduction of the capital lifetime occurring whenever the global temperature is outside of the economic system coping range.

With these settings there is not much difference in the adaptation with the different detection hypothesis. There is a huge difference between the reactive and the anticipative adaptation, however. The effect of the inertia and the non-linearity of impacts leads to a very non-linear response to an increase in the climate change rhythm.