

Global Warming and Economic Behaviour

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This study is motivated by the evidence of global warming, which is caused by human activity but affects the efficiency of the economy. We employ the integrated assessment Nordhaus DICE-2007 model. Generally speaking, the framework is that of dynamic optimization of the discounted inter-temporal utility of consumption, taking into account the economic and the environmental dynamics. The main novelty is that several reasonable types of behavior (policy) of the economic agents, which may be non-optimal from the point of view of the global performance but are reasonable from an individual point of view and exist in reality, are strictly defined and analyzed. These include the concepts of "business as usual", in which an economic agent ignores her impact on the climate change (although adapting to it), and of "free riding with a perfect foresight", where some economic agents optimize in an adaptive way their individual performance expecting that the others would perform in a collectively optimal way. These policies are defined in a formal and unified way modifying ideas from the so-called "model predictive control". The introduced concepts are relevant to many other problems of dynamic optimization, especially in the context of resource economics. However, the numerical analysis in this paper is devoted to the evolution of the world economy and the average temperature in the next 150 years, depending on different scenarios for the behavior of the economic agents. In particular, the results show that the "business as usual", although adaptive to the change of the atmospheric temperature, may lead within 150 years to increase of temperature by 2°C more than the collectively optimal policy.