



Climate mitigation: sustainable preferences and cumulative carbon

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We develop a stylized AK growth model with both climate damages to ecosystem goods and services and sustainable preferences that allow trade-offs between present discounted utility and long-run climate damages. The simplicity of the model permits analytical solutions. Concern for the long-term provides a strong driver for mitigation action. One plausible specification of sustainable preferences leads to the result that, for a range of initial parameter values, an optimizing agent would choose a level of cumulative carbon dioxide (CO₂) emissions independent of initial production capital endowment and CO₂ levels. There is no technological change so, for economies with sufficiently high initial capital and CO₂ endowments, optimal mitigation will lead to disinvestment. For lower values of initial capital and/or CO₂ levels, positive investment can be optimal, but still within the same overall level of cumulative emissions. One striking aspect of the model is the complexity of possible outcomes, in addition to these optimal solutions. We also identify a resource constrained region and several regions where climate damages exceed resources available for consumption. Other specifications of sustainable preferences are discussed, as is the case of a hard constraint on long-run damages. Scientists are currently highlighting the potential importance of the cumulative carbon emissions concept as a robust yet flexible target for climate policymakers. This paper shows that it also has an ethical interpretation: it embodies an implicit trade off in global welfare between present discounted welfare and long-term climate damages. We hope that further development of the ideas presented here might contribute to the research and policy debate on the critical areas of intra- and intergenerational welfare.