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**Global warming and the role of exogenous shocks in enhancing international cooperation:
Are we there yet****Anna Malova**

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There are several well-established facts in the literature on climate change. First, is that international agreement are not able to sustain high levels of participation and deep emission cuts at the same time. Second, with appropriate use of sticks and carrots, they are. Third, that by deterring non-participation, we deter non-compliance as well. Fourth, from the story of the Montreal Protocol it follows that when necessary, countries can cooperate on the Pareto-efficient outcome of the underlying game. Lastly, climate change poses an existential threat to humanity and we do not have much time left to stop. Now, we nonetheless observe suboptimal levels of individual abatement and modest levels of cooperation. Thus, the purpose of this study is to establish the role of unilateral actions in the solution of the collective problem of climate change and to investigate whether external shocks can increase international cooperation. Using game-theoretic approach a model was built which incorporates uncertainty in the form of damages from the natural disasters that have a certain probability of occurring and can be altered by the levels of players' abatement. There are three major findings: (1) No IEA will be stable unless it requires unilaterally chosen levels of abatement; (2) time-inconsistent players tend to procrastinate, but under certain values of parameters can turn into time-consistent due to higher perceived probability of future damages; and (3) time-consistent players can, on the contrary, become time-inconsistent and deviate from transition to business-as-usual over time. External shocks will have no effect on the chosen abatement levels unless politicians exhibit some form of statistical biases when estimating the probability of future damages. To increase global abatement, it is necessary that countries unilaterally set more ambitious targets. Otherwise free riding and non-compliance are unavoidable.

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