# Adaptive dynamics of the Maskin-Baliga model of contribution for a public/common good

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Maskin and Baliga [MB03] argue that in the consumption or provision of a public or common good, when non-excludable externalities (i.e. externalities from which no one can be excluded) appear, such as is the case of air pollution, individuals must be compelled to participate in a "mechanism" to ensure a Pareto-efficient consumption or provision of such good. Since such goods are non-excludable it may give rise a free-rider problem. In Maskin and Baliga's model for the contribution to a public good such as reduction of air pollution, with the case of several communities interested in air cleaning all communities except one have incentives to free-ride, i.e., with only one community willing (the one with highest valuation for clean air) to face the costs that air cleaning implies.

We introduce the evolutionary adaptive "myopic" dynamics for the effort/contribution for the provision of public good for the Maskin-Baliga free-riders *vs.* cooperation game and we show that the Maskin-Baliga equilibrium corresponding to the single maximum contributor for the maintenance of the good is the globally asymptotically stable equilibrium, all the others being unstable. If the aggregated contribution level for the public good is lower than the optimal level of the agent that less prefers the good, like in the case of a natural catastrophe, then all agents will contribute to the current aggregated level of effort that will increase and converge to the Maskin-Baliga equilibrium value. However, with the increase of the aggregated contribution/maintenance level of the good, free-riding behaviour occurs and hence the agents, except one, will drop one by one from contributing. Hence, at the end, the agent that most prefers the public good is the single one maintaining the public good, with his/her individualistic optimal level of effort, and this equilibrium is globally stable, and with all the other agents being free-riders on this effort by the maximum contributor. This reasserts the need for some cooperation enforcing mechanism focusing on achieving the social goal of preservation of the good, as in the example of reducing air pollution, as argued by Maskin and Baliga.

**References**

[MB03] Eric Maskin and S. Baliga. Mechanism design for the environment. In K.G. Mäler and J. Vincent, editors, *Handbook of environmental economics*, pages 306–324. Elsevier Science/North Holland, 2003.