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Sharing pollution permits under welfare upper bounds. (English) Zbl 1443.91027
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Summary: We consider a pollution permit sharing problem: there are a finite number of countries and each country owns a fixed amount of permits and a technology. Each country's output production is limited by the amount of permits it has and the permit is the only input for the technology. Permits are considered as rival goods and are perfectly transferable between countries. Technologies are nonrival but exclusive. Efficiency requires the permits to be able to be reallocated between countries so that the joint total production is optimal. The main question is how to share the total optimal output. A solution assigns to each permit sharing problem an allocation of the optimal output between the countries. In this paper, we consider two upper bounds for a solution. We define two coalitional games. The aspiration upper bound with given technologies (AUBT) game assigns to each coalition the optimal output the coalition can generate using the permits available from all the countries with the technologies available to the coalition. The aspiration upper bound with given permits (AUBP) game, on the other hand, assigns to each coalition the optimal output the coalition can generate using the technologies available from all countries with the permits available to the coalition. These two games define two natural welfare upper bounds for a solution. We show that both the AUBT and the AUBP games are concave (Theorems 1, 2). The Shapley values of these two games satisfy the two welfare upper bounds, respectively.

MSC:

[91A12](#) Cooperative games

[91B76](#) Environmental economics (natural resource models, harvesting, pollution, etc.)

Keywords:

[pollution permits](#); [cooperative games](#); [aspiration upper bounds](#); [Shapley value](#)

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