

**Comment on ‘Common Goods, Matrix Games and Institutional Response’, by  
Katharina Holzinger in  
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Dear Editor:

We are pleased that our article ‘Goods, Games and Institutions’ (Aggarwal and Dupont, 1999) has generated considerable interest (Wallner, 2002; Aggarwal and Dupont, 2002). Our basic objective was to develop a unified theoretical framework linking types of goods with bargaining games, with the goal of better understanding the bases of international cooperation and the role of institutions.

Katharina Holzinger’s article ‘Common Goods, Matrix Games and Institutional Responses’ in *EJIR* 9(2) develops several very interesting themes. Holzinger provides a somewhat different cut into the relationship of goods, games and institutions that we initially developed, and provides a carefully developed treatment of the implications of this type of modeling work for environmental regulation. We continue to believe that this avenue of theoretical and empirical work will prove highly productive, and commend Holzinger for her useful extensions and empirical application of our modeling approach.

In an effort to provide the reader with an overview of advances in research in this area, we focus on three issues — (1) the conceptual nature of public goods and common pool resources (CPRs); (2) the modeling of the provision problem; and (3) the value of institutions in the provision of goods.

### *Providing Goods*

The concept and provision of public goods and common pool resources (CPRs) has been a central focus in international relations. If all goods could easily be privatized, there would be little role for international institutions. When goods are unlikely to be provided unilaterally by individual actors, the design of institutions is of particular interest. Yet defining what the nature of a public good is and how this concept can be applied to different issue areas is not a trivial problem.

Holzinger makes several useful contributions in the area of environmental regulation, providing an insightful discussion of the basic nature of the goods problem including the multiple levels at which goods might be considered, the definition of which goods are public and which CPRs, and the likelihood of their provision.

In discussing the nature of public goods and CPRs, she claims that they are generally not indivisible and could be provided in continuous increments (p. 179). Her view that both public and CPRs are marked by divisibility, however, does not appear to hold. In the environmental area, for example, the notion of a maximum sustainable yield in fisheries suggests a clear threshold point. Moreover, as Taylor (1987: 37) notes, public goods are generally characterized by lumpiness. Thus while it might be possible to create some divisibility of public goods, this would not seem to be the norm — at least not for the initial ‘tranche’. It is worth noting that if public goods were fully divisible, the challenge of providing them would be markedly reduced.

### *Modeling the Provision of Goods*

Much of Holzinger’s analysis consists of a critique and elaboration of our approach to modeling the provision of public goods and CPRs, with particular focus on our assumptions about information and levels of resources, the definition of costs and benefits, and the related taxonomy of provision cases. The main problem she identifies is the definition of the strategy of ‘contribute’. She argues that we are modeling a conditional strategy, which is inconsistent with our basic modeling choice of a matrix game. The problem, however, is a misunderstanding of our definition — in our set up, actors must contribute to the provision of a good by putting down resources equal to the cost of the good or by deciding not to contribute. In the case where both actors simultaneously decide to pay for the good, they get a partial refund — if their commitment is matched by the other player (Aggarwal and Dupont, 1999: 397).

Holzinger’s misunderstanding gives us the opportunity to point to a central modeling assumption in our previous work — the question of the

extent to which one receives a ‘refund’ if one withdraws their contribution. An example from the classic case of the provision of a lighthouse ties this point together nicely with the question of the issue of the divisibility of public and CPR goods. We begin first with the issue of costs. Let us say that it takes 200 bricks to build the lighthouse and there are two actors involved in possible provision. If Actor 1 loads 100 bricks into his car to meet his counterpart and assumes that Actor 2 will do so as well, then what will happen if Actor 1’s action is unreciprocated? If we assumed that there were no costs involved in returning the bricks and driving back, then we could well expect that there is no fear of opportunism and thus little difficulty in cooperating to provide the good.

A second possibility is that the good may be divisible. In this case, one might argue that there exist an infinite number of equilibria. I would simply drive to the site with one (or possibly more bricks) and then not contribute another brick until my counterpart did so. This strategy is thus akin to extending the shadow of the future by slicing up a one shot play of the PD into an iterated game. In such games, the so-called ‘folk theorem’ asserts that a host of equilibria are possible when players are sufficiently patient. The problem with this notion of the provision of public goods is that it takes a minimum number of bricks to build a lighthouse and that under that minimum threshold there is an important opportunity cost for actors of *not* having the good (which will, of course, vary with the utility of the good). While slicing up the problem of providing a lighthouse by returning every day with one brick helps to reduce uncertainty of the other actor’s actions, our ships may be crashing on the shoals! Thus, waiting for a lengthy period of time can obviously be problematic. This type of problem can easily be modeled using an extensive form game approach (Aggarwal and Dupont, 2002).

### *What Role for Institutions?*

Under what circumstances might an international institution help to resolve the dilemmas raised by the games that reflect the underlying public goods or CPRs provision problem? While in general Holzinger agrees with our assessment of the need for institutions, she claims we believe that ‘sharp asymmetry in power is equivalent to unilateral provision . . .’ (p. 184). Yet this is a significant misreading of our argument. As we note, ‘sharp asymmetry in power *rarely* guarantees that goods will be provided’ (italics added) (Aggarwal and Dupont, 1999: 404). Moreover, we concluded by noting:

Hegemonic actors need institutions for different tasks. In the case of CPRs, when the other actor is unable to unilaterally produce the good, an institution

is essential to ensure that a hegemonic actor will provide the good to begin with. However, in other cases, a hegemonic actor will desire an institution either to alleviate its burden or preserve against reckless preemptive behavior. (Aggarwal and Dupont, 1999: 404)

To sum up, we believe that Katharina Holzinger has made several valuable points. While we have some quibbles with her analysis of our work, our agreements are much deeper than our differences. We hope that others will contribute to what we believe is a fruitful research program that links goods, games and institutions.

#### *Note*

1. See, for example, Oye (1985).

#### *References*

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