



Moral hazard in ecology

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The recent global financial crisis may have lessons for ecologists. One driver of the problems many countries faced toward the end of the previous decade was risky speculation by larger banks (Okamoto, 2009). In cases where such investments succeed, the bank is the winner. When such investments fail they have the potential to ruin the bank. However, the largest banks are often deemed to be so important to national economies that the optimal (short-term) strategy for governments is to bail them out when they are in danger of going under, that is, they are “too big to fail” (Kaufman, 1990). This tactic becomes problematic when banks start to base their investment behavior on the assumption that governments will provide a safety net, by investing more riskily than they would do otherwise. Banks then receive all of the benefit of high-risk investment, but bear less of the cost than they would do otherwise, since bailouts are funded through public tax. This tendency of one party to engage in more risky behavior when costs (risks) and benefits are not shared equally is known in economic theory as “moral hazard” (e.g., Holmstrom, 1979).

Situations in which parties are exposed to moral hazard are potentially common in ecology. Individuals of the same species often cooperate in joint ventures requiring investment from both parties, such as foraging and raising offspring. An example of this is seen in cooperative hunting in lions in which individuals commonly take the same position in the hunting pack (Stander, 1992). “Wingers” run at the edge of the line of advancing lions during hunts while “centers” take middle positions. Centers more often make the kill than wingers, an activity that brings a risk of injury. It would be predicted that

since wingers are exposed to less risk, they should be more willing to initiate hunts, even on risky prey, since they are unlikely to have to make the kill. This is borne out by the fact that wingers initiate hunts more frequently. However, this was not tested in relation to degree of risk presented by the prey in the original analysis; centers should be more willing to initiate non-risky hunts, while wingers should be more willing to initiate hunts on more feisty prey items. Understanding who has the power to take risks in these situations is important. The individual that is exposed to less risk may attempt to coerce other group members into making risky investments.

In addition to applying to predators that hunt cooperatively, these conflicts with regard to collective risk-taking potentially arise during a range of other ecological interactions. Behavior of prey in groups might also expose some group members to moral hazard. For example, in a herd of foraging herbivorous mammals, faster group members are more likely to want to forage in areas with higher predation risk, since they are better able to escape predators. Again the benefits would be similar for fast and slow group members, but slower group members bear the risk of the activity disproportionately. Joint ventures between individuals of different species might also lead to conflicts of this kind. In interspecific mutualisms, such as those between ants and their host plants [e.g., the ant-*Acacia* system (Palmer et al., 2008)], increased host growth might allow extra symbiont reproduction at increased risk to the host, although with potential payoffs to the host of extra growth as well. The potential for conflicts to occur when groups make consensus decisions is well documented (Conradt and Roper,

2005; Couzin et al., 2005). However, moral hazard relates specifically to asymmetries both in the power to take risks and to exposure to costs when such gambles do not pay off. Hence ecological moral hazard can be thought of as a particular kind of consensus decision making conflict.

Thus, thinking about interactions in terms of moral hazard is a useful exercise, as it enables predictions to be made about the decisions made by individuals. It is expected that moral hazard will be a factor in interactions between individuals in which there is an asymmetry in the risks of a particular behavior and for which any individual can initiate that action. This is likely to mean that considerations of moral hazard may be important across a wide range of ecological interactions. Asymmetries in risks and power are known to be important in economics (Okamoto, 2009) and understanding the politics of climate change (Samson et al., 2011). I suggest that investigation of the prevalence of moral hazard in ecological interactions between individuals could be a fruitful direction for future research.

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