Herd Behavior and Investment: Reply

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In our 1990 paper, we showed that managers concerned with their reputations might choose to mimic the behavior of other managers and ignore their own information. We presented a model in which "smart" managers receive correlated, informative signals, whereas "dumb" managers receive independent, uninformative signals. Managers have an incentive to follow the herd to indicate to the labor market that they have received the same signal as others, and hence are likely to be smart. This model of reputational herding has subsequently found empirical support in a number of recent papers, including Judith A. Chevalier and Glenn D. Ellison's (1999) study of mutual fund managers and Harrison G. Hong et al.'s (2000) study of equity analysts.

We argued in our 1990 paper that reputational herding "requires smart managers' prediction errors to be at least partially correlated with each other" (page 468). In their Comment, Marco Ottaviani and Peter Sørensen (hereafter, OS) take issue with this claim. They write: "correlation is not necessary for herding, other than in degenerate cases." It turns out that the apparent disagreement hinges on how strict a definition of herding one adopts. In particular, we had defined a herding equilibrium as one in which agent B *always* ignores his own information and follows agent A. (See, e.g., our Propositions 1 and 2.) In contrast, OS say that there is herding when agent B *sometimes* ignores his own information and follows agent A. The OS conclusion is clearly correct given their weaker definition of herding. At the same time, however, it also seems that for the stricter definition that we adopted in our original paper, correlated errors on the part of smart managers are indeed necessary for a herding outcome—even when one considers the expanded parameter space that OS do.

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We will try to give some intuition for why the different definitions of herding lead to different conclusions about the necessity of correlated prediction errors. Along the way, we hope to convince the reader that our stricter definition is more appropriate for isolating the economic effects at work in the reputational herding model.

An example is helpful in illustrating what is going on. Consider a simple case where the parameter values are as follows: $p = 3/4$; $q = 1/4$; $z = 1/2$, and $\theta = 1/2$. In our 1990 paper, we also imposed the constraint that $z = \alpha p + (1 - \alpha)q$, which further implies that $\alpha = 1/2$. The heart of the OS Comment is the idea that this constraint should be disposed of—i.e., we should look at other values of α. Without loss of generality, we will consider values of α above $1/2$, and distinguish two cases.

Case 1 [$\alpha > 5/8$]*:* In this case, which OS do not analyze at length, even the first agent A does not respond to his signal. Rather, he always "conforms to the prior," and invests no matter what. This can be easily seen by noting that, given the other parameter values, agent A's incentive constraint for separation [equation (3b) in OS] is not satisfied.

How should one interpret agent A's failure to respond to his signal? Clearly it cannot be herding in the sense of copying a previous player, since A is the first mover here. Rather, A is simply unwilling to contradict the prevailing prior wisdom that investment is likely to yield a successful outcome, since by contradicting the prior he makes it look like he has received a noisy signal, and is therefore dumb. The key point is that when one expands the parameter space, it is possible to obtain reputation-driven inefficiencies that are logically distinct from herding—i.e., that arise with just one player. We pointed out this feature of the model in footnote 10 of our original paper (page 475). And it was precisely for this reason that we focused on the balanced prior case where $\alpha = 1/2$—we wanted to set aside this "conform-to-the-prior" effect.

Case 2 [$1/2 < \alpha < 5/8$]*:* This is the case that OS concentrate on. Here, the conform-to-the-prior effect is not too strong for agent *A*, so *A* always follows his own signal. With respect to agent *B*, it can be shown that if *A* gets a good signal and invests, then *B* will disregard his own information—he will follow *A* by investing no matter what. This is true even if there is no correlation in the prediction errors. This appears to establish the OS claim, that there can be "herding with positive probability" even in the absence of correlated prediction errors, once we allow for α to differ from ½.

But what is the mechanism driving *B*'s unwillingness to follow his own information in this scenario? Note that if *A* gets a good signal, the updated probability of the good state, denoted by μ_G, is given by:

$$\mu_G = (\tfrac{5}{8}\alpha)/(\tfrac{5}{8}\alpha + \tfrac{3}{8}(1-\alpha)). \tag{1}$$

So it is easy to see that if $\alpha > 1/2$, then the updated probability of the good state satisfies $\mu_G > 5/8$. But this means that if *A* gets a good signal, then *B is in exactly the same position that A was back in Case 1*. That is, *B* is now facing an investment opportunity that has a high probability of success. So when *B* also invests, it is not because *B* perceives it to be better for his reputation to blindly do the same thing as *A*, but rather because *B* does not want to go against what is now too strong a likelihood of the investment succeeding. Said differently, given the updated odds of success, *B would always invest even if nobody else in the market could observe A's choice of action, and hence nobody could tell whether B was copying A*.

To drive the point home, consider what happens when, for the same parameter values, *A* gets a bad signal and doesn't invest. Now, if there is no correlation of the prediction errors, *B will not* mimic *A*—rather *B* will follow his own signal. This is because now the updated probability of the good state is closer to ½, so *B* is no longer forced to conform to the prior. Note that according to our stricter definition of herding—which requires that *B* always follow *A*, regardless of whether *A* initially draws a good or bad signal—we would say that there is no herding in this version of the model.

The bottom line is that OS are correct in arguing that, with an expanded parameter space, it is possible to have some outcomes where *B* ignores his signal and chooses the same action as *A*, even without correlated prediction errors. But it is questionable whether the phenomenon that is being captured in this case is herding. We would interpret it instead as simply choosing the action with the highest odds of success. And indeed, when following *A* means choosing an action that has relatively low odds of success, *B* will not do so, unless one introduces correlated prediction errors into the model.

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