

# Response

## “Estimating the Productivity Impacts of Technology Adoption in the Presence of Misclassification”—Author Response to Comment

We thank Karen Macours for her insightful comments on our article. While we agree with many of her suggestions, we wish to respond to three main points: (a) the measurement and relevance of the instruments, (b) the exogeneity of instruments and interpretation of results, and (c) the interpretation of behavioral adjustment effects.

The instruments we used in this analysis (i.e., the adoption status of friends and neighbors) were directly elicited from farmers. Macours argues that, given farmers' misclassification of their own varieties, their response on the adoption status of other farmers must also contain at least as much error, making the instruments imperfect. We acknowledge that the instruments might be measured with error, but the first-stage result suggests that they are also usefully predictive.

Macours also raised concerns about the exogeneity of the instruments. We acknowledged that the exogeneity assumption might be violated if, for example, farmers learn not only about improved varieties but also about other productivity-enhancing techniques from neighbors/friends. As a remedy, albeit imperfect, we included in all our regressions extensive controls such as crop management, soil quality, and input use-related variables. As a robustness check, we relax the exogeneity assumption, and estimates are qualitatively unchanged. We note, however, that this check is encouraging but not definitive proof of exogeneity.

In view of the above two concerns, Macours suggested that results in tables 4, 5, 6, and 7 should be interpreted as associations. In fact, we indeed interpret the results in all

but table 7 as associations. In table 5, we only reported the attenuation bias attributed to exogenous misclassification. We maintain that IV results in table 7 should be cautiously interpreted as causal effects.

Macours rightly points out that behavioral adjustment is not a bias. We want to clarify that we do not consider such adjustments as a source of bias. Instead, we noted that only observable adjustments were controlled for in our regressions. Since false negative and positive groups may differ in unobserved characteristics, we used a sub-sample of our data to estimate effects after any behavioral adjustments. However, as Macours mentions, quantifying behavioral adjustment effects is difficult, as LATEs for samples with and without misclassification are not directly comparable. We assume no treatment effect heterogeneity. Finally, while we agree that DNA-fingerprinting is not immune to any error, integrating such approaches in designs that allow for causal inference (e.g., RCT) would be key given the prevalence of counterfeit seeds in the market.

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