LETTER

Climate robustly linked to African civil war

We previously documented a link between climate variation and historical civil wars in sub-Saharan Africa (1). Buhaug (2) disputes this link, generating a series of animated news reports. The relationship between climate and conflict is an important topic that deserves careful scientific scrutiny, but we believe Buhaug's approach is undermined by basic econometric mistakes, leading to what is currently an unhelpful debate. We briefly describe two main shortcomings in his analysis here, with a full analysis available as a working paper (3).

First, Buhaug argues that our results are not robust to dropping country fixed effects (table 1 in ref. 2). Country fixed effects capture unmeasurable time-invariant country-specific characteristics (such as the effects of political culture or past historical events) that may also be driving civil conflict. Given that fixed effects are widely considered to be essential to avoid omitted variable bias, Buhaug's "robustness check" (2) amounts to arguing that our results are not robust to increasing the extent of omitted variables bias. Such an approach almost surely leads to biased estimates of the effect of climate on conflict. Elsewhere (table 3 in ref. 2) Buhaug includes numerous independent variables that can be influenced by the anticipation of conflict (lagged country gross domestic product per capita, for example). As any econometric text explains, inclusion of these "endogenous" regressors biases all coefficient estimates in the regression. Buhaug's analytical approach thus reveals little of interest about the true causal relationship between climate and conflict.

Second, Buhaug (2) suggests that our results are not robust to adding minor conflicts (i.e., ≥25 deaths) to the major conflicts (i.e., ≥1,000 deaths) that were the focus of our PNAS article. We also find that the effects of climate are less evident in small conflicts, but we do not see why this is a valid robustness check if what we are primarily interested in is forecasting major conflicts. Major conflicts are of particular relevance to policy makers because of their especially damaging consequences, and indeed also of primary interest to political scientists. Furthermore, if climate shocks depress rural incomes and lower the opportunity cost of joining rebellions (4, 5), the years in which small wars become larger wars—i.e., the years in which negative climate shocks induce more people to rebel—are of particular interest, not the years in which the small wars began, as Buhaug prefers.

Overall, we find little merit in Buhaug's criticism of our previous work. Conflict is clearly too complex a process to be "blamed" on any single factor, and contrary to Buhaug's provocative title we made no such claims in our original work. One point on which we agree with Buhaug is that data since 2002, which were not included in our original publication, appear to show a much weaker relationship between conflict and climate. Understanding the underlying economic and political causes of these recent changes is a critical area for future research.

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