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Title: Assessment of the climate vulnerability of Brazilian coffee farmers

Brazil is the world’s leading coffee export country and the majority of its producers are smallholder farmers. Due to the climate change, however, the change in temperature and precipitation are expected to decrease coffee yield in Brazil and the negative impacts will be greater in the long-run. The smallholder farmers are prone to the climate change because their economic activities are dependent on the biophysical conditions. In addition, their poor socioeconomic conditions accelerate their exposure to climate change. To measure the magnitude of these conditions, we use econometric panel data methods to investigate a historical temperature and precipitation trend based on climate data and estimate impacts on yield from future climate change. Next, we generated an Adaptive Capacity Index (ACI) using a composite index approach to identify which regions are under adverse socioeconomic conditions. We then compare the residuals from our yield regressions with our ACI to see how correlated the ACI is with the variation in yields that is not due to climate variation. After that, we overlaid ACI on future scenarios of climate exposure to identify regions that are likely to be affected by large reductions in coffee yield but have adverse socioeconomic conditions and low capacity to adapt production.

The model on the panel dataset expects an inverted – U relationship between climate and yield, suggesting that the extreme temperature will have a negative impact on coffee yield. The ACI result shows that counties in the north and northeast where climate exposure is high, have the poorest adaptive capacity. The correlation test between ACI and residuals are positively significant so that the ACI is well designed.

Assesses the potential adverse impacts of climate change on coffee farmers would help to quantify and spatially visualize their vulnerability. Potentially, this study contributes to understand the how climate exposure and adaptive capacity interplay to influence human well-being and development.