The effect of fire-induced pollution on respiratory health: an econometric analysis of the case of the Brazilian Amazon

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ABSTRACT– Relevant uncertainty remains regarding the magnitude of the effect on respiratory illnesses caused by fires detected in the Brazilian Amazon. Available studies are not grounded in an explicit statistical strategy to identify the effect of fires on respiratory health through the mechanism of air pollution. An economic valuation of the respiratory impacts of fires is also lacking. This research aimed to fill the two gaps by presenting an explicit two-stage empirical strategy implemented both in the form of two separate equations and as an instrumental variables (IV) estimator. This is applied both to the count and the cost of hospital admissions due to respiratory illnesses, thus providing, in the latter case, a cost-of-illness (COI) appraisal. A municipal-monthly longitudinal dataset comprising 706 Amazon municipalities from 2008 to 2016 was used. The empirical strategy proved successful and detected a positive effect of fires on the cost, but not on the count, of illnesses. IV estimation uncovered an effect ten times larger on COI, compared to the two separate equation estimation. A policy simulation revealed that high dry season fires caused 0.2% of the respiratory COI from 2008 to 2016. Effects of greater magnitude found by previous studies seem to be biased by inaccurate methods and by data which, for capturing particular (extreme drought) years and locations (deforestation hotspots), are not up-to-date or general enough to represent the Amazon. Solutions to fill these gaps, such as the ones proposed in the paper, are necessary conditions for increasing efficiency of fire policy in the Amazon.

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