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How do environmental shocks affect competitors in an agricultural supply chain? Evidence from a competitors’ weighting matrix

FEDERICO CEBALLOS-SIERRA¹, JHORLAND AYALA-GARCÍA²

¹*The Alliance of Bioversity International and CIAT, Honduras*

²*Banco de la Rep. de Colombia, Centro de Estudios Económicos Regionales, Colombia*

Abstract

Coffee is one of the major commodities traded in the international markets, where the largest exporters for 2016 were Brazil (39.15 %), Vietnam (34.22 %), Colombia (14.95 %) and the main importers being the United States (20.8 %), Germany (17.4 %), Italy (7.6 %). This paper studies the impact of droughts on coffee production and exports considering droughts happening locally and in competitor countries. We develop a method of estimation that allows us to consider producer countries and competitor countries in the same regression, avoiding the omitted variable problem that can be a source of endogeneity.

Our approach consists of creating a row standardised weighting matrix of competitor countries, where the weights represent the market share of producer countries among all the producers facing the same international demand for the product each year. It is expected that a negative weather shock in a producer country that reduces local coffee production will also reduce the market segment of the same country in the international market. That segment will be captured by the closest competitors. As a result, this paper contributes to the literature by proposing a method for estimating this indirect effect of weather shocks applied to the coffee trade network.

We found that Brazil is the largest competitor for all countries, followed by Vietnam and Colombia, with small changes throughout the period 1995–2019. The results show that droughts reduce local coffee production, although no direct effect on exports was found. In addition, droughts in competitor countries increase local production and exports with a one-year lag, given the time needed for adjusting the growing seasonal production. Our findings are robust to the inclusion of country and time fixed effects, as well as other control variables such as temperature, precipitation, and GDP. These results contribute to the literature studying the mitigating effect of international trade to negative weather shocks. Ignoring the indirect impacts of natural disasters could lead to incorrect conclusions about the impact of extreme weather conditions.

Keywords: Coffee, droughts, spatial spillovers, supply shocks