The Food Problem and the Aggregate Productivity Consequences of Climate Change
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This paper combines local temperature treatment effects with a quantitative macroeconomic model to assess the potential for reallocation between agricultural and nonagricultural production to reduce the costs of climate change. First, I use firm-level microdata from a wide range of countries to show that extreme heat reduces productivity much less in manufacturing and services than in agriculture, implying that hot countries could achieve large potential gains from responding to climate change by increasing imports of food and shifting labor toward manufacturing. To investigate the likelihood that such gains will be realized, I next embed the empirically estimated productivity effects in a model of sectoral specialization and trade covering 158 countries. Simulations suggest that climate change does little to alter the geography of agricultural production, however, as high trade barriers in developing countries mute the response to shifting comparative advantage. Instead, climate change accentuates the existing pattern, known as "the food problem," of poor countries specializing in relatively low productivity agricultural sectors to meet subsistence consumer needs. The productivity effects of climate change reduce average welfare by 1.5 to 3 percent and by 6 to 10 percent for the poorest quartile of the world in the main projection with current levels of trade costs. However, in an alternative policy scenario that assigns all countries to the 90th percentile level of trade openness, welfare costs fall by 31 percent overall and by 68 percent for the global poor as specialization responds more closely to comparative advantage.