

## Carbon Policy and the Structure of Global Trade

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COUNTRIES considering the adoption of environmental regulations are rightly concerned that their policies may be undermined by international market forces. For example, restrictions on carbon dioxide (CO<sub>2</sub>) emissions in one country may lead producers in CO<sub>2</sub>-intensive industries to move production to countries without CO<sub>2</sub> regulations. Since CO<sub>2</sub> is a global pollutant, this process—called “carbon leakage”—may reduce the effectiveness of environmental regulations undertaken by individual countries or blocs of countries. Also, since carbon restrictions may lead to higher costs for energy-intensive producers, producers operating in countries with carbon policies may lose competitiveness with producers in countries without similar carbon restrictions. For these reasons, it is important for policymakers to consider, and for economists to quantify, the interaction of inter-

national markets and environmental regulations.

To inform this discussion, economists use simulation models to estimate how environmental regulations by one or more countries can impact markets, industries, and pollution levels. In this paper, the authors analyze three simulation model frameworks with differing assumptions. First, the authors analyze an economic model in which countries trade uniformly identical products (“Hecksher-Ohlin”). The second type of model assumes that there are regional differences in goods (“Armington”). Finally, the authors analyze a “monopolistic competition” model with assumptions used by many contemporary analyses of international trade (“Melitz”). The assumptions and structure of these simulation models has important implications on carbon leakage and the location of energy-intensive production.

The authors find significant differences across results for all three model structures. Under the Hecksher-Olin and Melitz models, trade patterns are substantially shifted. Models using those structures will indicate higher leakage rates than Armington models. In fact, the authors suggest that Armington models will understate both carbon leakage rates and the competitive impacts on energy-intensive industries. Economic intuition suggests that manufacturing economies not participating in CO<sub>2</sub> regulation should have lower energy costs and receive higher prices for exporting their products. The Melitz model illustrates those results, but the Armington model indicates losses for those countries without CO<sub>2</sub> policies. These results suggest the Armington model structure is much too limiting. In contrast, the Melitz structure deserves broader consideration by economists and policymakers.