Tutorial 6 – Environmental economics: trade, firms, and technologies

Thomas Douenne – University of Amsterdam

December 8, 2021

Instructions:

Form groups of two. Select one of the articles listed below, and present:

- the research question;
- the methodology;
- the main results;
- the main takeaway.

Aim for 12 minutes of presentation. If you cannot access the article online, let me know, I will forward it to you.

Article list:

- Rahel Aichele & Gabriel Felbermayr, 2015. "Kyoto and Carbon Leakage: An Empirical Analysis of the Carbon Content of Bilateral Trade". *The Review of Economics and Statistics* 97 (1): 104–115. link

  Abstract: Has the Kyoto Protocol induced carbon leakage? We conduct the first empirical ex post evaluation of the protocol. We derive a theoretical gravity equation for the carbon dioxide content of trade, which accounts for intermediate inputs, both domestic and imported. The structure of our new panel database of the carbon content of sectoral bilateral trade flows allows controlling for the endogenous selection of countries into the Kyoto Protocol. Binding commitments under Kyoto have increased committed countries' embodied carbon imports from noncommitted countries by around 8% and the emission intensity of their imports by about 3%. Hence, Kyoto has indeed led to leakage.

- Barrows, Geoffrey & Ollivier, Hélène, 2018. "Cleaner firms or cleaner products? How product mix shapes emission intensity from manufacturing," *Journal of Environmental Economics and Management*, Elsevier, vol. 88(C), pages 134-158. link

  Abstract: We explore the contribution of product mix in determining firm and aggregate emission intensity. First, using detailed firm-product emission intensity data from India, we find that more efficient firms are less emission intensive, and that products with the largest sales tend to be cleaner than other products within the firm. We also find that emission intensity in India dropped significantly between 1990-2010 through reallocations across firms, while product mix played a

counteracting role in increasing firm emission intensity. Next, we develop a multi-product multi-factor model with heterogeneous firms, variable markups, and monopolistic competition in which each product has a specific emission intensity. We find that pro-competitive market developments lead to an improvement in the aggregate emission intensity – through reallocations across firms – even though firms can become dirtier or cleaner through product mix. This theoretical result fits particularly well the empirical facts.

- Matilde Bombardini & Bingjing Li, 2020. "Trade, pollution and mortality in China," *Journal of International Economics*. link

  Abstract: Did the rapid expansion of Chinese exports between 1990 and 2010 contribute to the country's worsening environmental quality? We exploit variation in local industrial composition to gauge the effect on pollution and health outcomes of export expansion due to the decline in tariffs faced by Chinese exporters. In theory, rising exports can increase pollution and mortality due to increased output, but they may also raise local incomes, which can in turn promote better health and environmental quality. The paper teases out these competing effects by constructing two export shocks at the prefecture level: (i) the pollution content of export expansion and (ii) the export expansion in dollars per worker. We find that the pollution content of exports affects pollution and mortality: a one standard deviation increase in the shock increases infant mortality by 4.1 deaths per thousand live births, which is about 23% of the standard deviation of infant mortality change during the period. The dollar value of export expansion reduces mortality by 1.2 deaths, but the effect is not statistically significant. We show that the channel through which exports affect mortality is pollution concentration. We find a negative, but insignificant effect on pollution of the dollar-value export shocks, a potential "technique" effect whereby higher income drives demand for clean environment. Finally, we find that only infant mortality related to cardio-respiratory conditions responds to exports shocks, while deaths due to accidents and other causes are not affected.

- A. Costinot, D. Donaldson and C. Smith, 2016. "Evolving Comparative Advantage and the Impact of Climate Change on Agricultural Markets: Evidence from 1.7 million Fields Around the World", *Journal of Political Economy*, vol. 124, pp. 205-248 link

  Abstract: A large agronomic literature models the implications of climate change for a variety of crops and locations around the world. The goal of the present paper is to quantify the macro-level consequences of these micro-level shocks. Using an extremely rich micro-level data set that contains information about the productivity—both before and after climate change—of each of 10 crops for each of 1.7 million fields covering the surface of the earth, we find that the impact of climate change on these agricultural markets would amount to a 0.26 percent reduction in global GDP when trade and production patterns are allowed to adjust. Since the value of output in our 10 crops is equal to 1.8 percent of world GDP, this corresponds to about one-sixth of total crop value.

- Cristea, Anca & Hummels, David & Puzzello, Laura & Avetisyan, Misak, 2013. "Trade and the greenhouse gas emissions from international freight transport" *Journal of Environmental Economics and Management*, Elsevier, vol. 65(1), pages 153-173. link

  Abstract: We collect extensive data on worldwide trade by transportation mode and use this to provide detailed comparisons of the greenhouse gas emissions associated with output versus

international transportation of traded goods. International transport is responsible for 33 percent of world-wide trade-related emissions, and over 75 percent of emissions for major manufacturing categories. Including transport dramatically changes the ranking of countries by emissions per dollar of trade. We systematically investigate whether trade inclusive of transport can lower emissions. In one quarter of cases, the difference in output emissions is more than enough to compensate for the emissions cost of transport. Finally, we examine how likely patterns of global trade growth will affect modal use and emissions. Full liberalization of tariffs and GDP growth concentrated in China and India lead to transport emissions growing much faster than the value of trade, due to trade shifting toward distant trading partners.

- Levinson, Arik, 2009. "Technology, International Trade, and Pollution from US Manufacturing." *American Economic Review*, 99 (5): 2177-92. link

  Abstract: Pollution emitted by US manufacturers declined markedly over the past several decades, even as real manufacturing output increased. I first show that most of the decline in US manufacturing pollution has resulted from changing production processes ("technology"), rather than changes in the mix of goods produced. I then show that increased net imports of polluting goods ("international trade") accounts for only a small portion of the pollution reductions from the changing mix of goods. Together, these two findings demonstrate that shifting polluting industries overseas explains only a minor part – less than 10 percent – of the cleanup of US manufacturing.