

# INTERNATIONAL TRADE AND EMISSIONS: AN LONGITUDINAL INPUT-OUTPUT ANALYSIS

Topic: Environmental input-output modeling IX

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Nowadays, an important debate in the international economies is the problem of greenhouse gas (GHG) emissions and climate change related. Discussions begin to gain the world with the signature of the Kyoto Protocol, December 1997, where an international agreement was reached to reduce global emissions to the atmosphere. Thus, in terms of CO<sub>2</sub> emissions, the majority of European countries, including the European Union as a whole agreed to reduce such emissions.

However, in this context of mitigation, many controlling policies are based on reducing domestic emissions of greenhouse gases, which ignores, for example, CO<sub>2</sub> emissions embodied in international trade flows. Thus, in order to reduce GHG emissions is necessary to investigate not only the major sources of emissions, but also the location and the sectors involved, i.e. the assignment of responsibilities for emissions as an important step.

Moreover, given sudden expansion and globalization of world economies, pollution embodied in trade flows becomes important for measurement of responsibilities, because the use of final goods and production inputs that a country need not necessarily produced by itself, leading to a growing concern about the problem of carbon leakage.

Thus, many studies have taken into consideration the estimated emissions embodied in international trade through, for example, the input-output analysis, where issues involving responsibility for GHG emissions and international trade are incorporated, giving focus to sectoral and interactions between countries in relation to CO<sub>2</sub> emissions.

In this context, this paper seeks to make an empirical investigation on the responsibility for emissions and international trade. We use data from WIOD, where the data structure consists of Input-Output Tables (IOTs) for 40 countries (27 EU countries and 13 other selected countries) plus the "Rest of the World" (RoW) for the period 1995 to 2009. Furthermore, the production side is disaggregated into 35 productive sectors, i.e. shows the transactions between the 35 industries in 40 countries and the rest of the world and these industries for families, governments and users of capital goods for the same set of countries. Finally uses atmospheric emissions of CO<sub>2</sub> for the same 40 countries selected and RoW and the same range of time and sectors of the input-output tables.

The overall aim is to measure emissions embodied in international trade and to analyze the interactions in terms of sectors and regional, from such countries. We propose the following specific aims: a) to observe, through CO<sub>2</sub> emissions in international trade, if there is a concentration of emissions and if this behavior is maintained over the years (1995-2009), b) measure CO<sub>2</sub> emissions embodied in production and consumption, c) measure the CO<sub>2</sub> emissions embodied in exports and imports of each country and thus verify if the international trade has been used as a way to reduce emissions by countries, d) construction carbon balance for each country, and e) approach issues involving carbon leakage.

The methodology used involves input-output techniques for calculating carbon emissions embodied in international trade. Thus, aggregate indicators for different countries are obtained, such as coefficients of intensity of CO<sub>2</sub> emissions, allowing classifying the country as intensive or not. Moreover, trade balances global CO<sub>2</sub> emissions embodied in international trade are calculated for

the 40 countries and the major net exporters and net importers of CO<sub>2</sub> emissions in the world economy are identified, being able to show the extent to which the final demand of a country is responsible for emissions abroad, for example.

Moreover, these indicators represent the empirical basis for the discussion on the responsibility for emissions, being possible, for example, to make a discussion of responsibilities between producer and consumer countries for environmental impacts.

Finally, Miyazawa multipliers are calculated, a methodology that approach the issues of feedback loop between countries, through the decomposition of the Leontief inverse matrix in sub-matrices.