

Trade and the Environment: an Empirical Analysis

Summary - November 2006

The aim of this project has been to provide orders of magnitude regarding the relationship between trade and the environment, with a particular emphasis on polluting emissions. It has consistently tried to base evidence on the largest possible data sets, and make use of the latest empirical techniques in order to provide an updated assessment on the three main issues. Overall, the results suggest that if environmentalists are serious about decreasing world polluting emissions, they could gain in considering trade as a potential ally rather than the perpetual enemy.

Three papers have come out of the project (see the list on the web page). They are briefly described below.

The classic vision of trade allowing dirty industries to migrate to poor countries with lax environmental policies, dubbed as the “pollution haven” argument, is still very influential in international policy debates. Equally important but less well known is the opposite “factor endowment” argument, which posits that most polluting industries being capital-intensive, they tend to locate in rich countries, because the abundant capital of the latter gives them a comparative advantage in dirty activities.

Paper 1 provides for the first time orders of magnitude of both effects at the world-wide level. It applies up-to-date empirical techniques (the gravity framework) to the analysis of the determinants of the pollution content of imports, taking into account a variety of different pollutants. The sample is composed of a large number of developing and developed countries. It turns out that pollution haven and factor endowment effects have the expected impact on the pollution content of imports, and significantly so. But their overall magnitude is weak, as the bulk of world trade is between rich countries which happen to be quite similar in terms of capital endowment and environmental policy. Regarding North-South trade, where differences are a lot larger between trade partners, the pollution haven effect has a substantial impact, and may increase the pollution content of imports by as much as 15%, depending on the pollutant. However, this influence is counter-balanced by the opposite factor endowment effect, which is of similar magnitude. Overall, the combined impact of both effects only changes the world pollution content of imports by a small percentage (between -3% and +7% depending on the pollutant).

When discussing the sources of polluting emissions, it is now commonplace to decompose the overall growth of emissions into a scale, a technique and a composition effect. This decomposition technique has already been applied several times at the country level. However, at the world level, the evidence is almost absent, essentially because of the lack of data to compare production techniques across countries. This lack of evidence is unfortunate, as it is an essential building block in assessing the impact of trade, which makes specialisation possible, and thus is the driving force behind the composition effect at the world-wide level.

Paper 2 proposes a simple method to estimate differences in SO₂ emission intensities across countries, combining the latest available data at the national level with previous estimates of

emission intensities across sectors. The generated data base is thus consistent with reported emissions at the national level and most critically provides the disaggregated data necessary to decompose emission growth into the three effects at the world-wide level. Over the 1990-2000 period it turns out that the technique and scale effects are the largest but cancel each other out. Thus the net effect corresponds to the (trade-induced) composition effect, which decreases annual world-wide emissions by a rough 1%, contrarily to the concerns of many environmentalists. The same data base is used to perform two additional first-order approximations. The first exercise compares the actual situation with one in which no trade is allowed, i.e. where each country would be producing its imports and give up producing its exports. The results show that trade, by allowing dirty countries to become net emission importers, reduces global emissions by a rough 2%. The second exercise compares the actual situation with extreme cases where labor is allocated world-wide so that world emissions are either maximized or minimized (maintaining world production unchanged). The result is a half relief: actual emissions are 60% lower than the maximum, but could potentially be reduced by an additional 60%.

The international allocation of rights to pollute is of critical importance in the political economy of environmental treaties such as the Kyoto protocol. Many large per capita polluters such as the USA oppose an allocation scheme that would be based on population rather than past emissions. This opposition would naturally weaken if the international evidence was that per capita emissions tend to converge in the long run. This helps explain why numerous studies have recently analyzed the convergence pattern of per capita emissions of greenhouse gases. However, to our knowledge, not a single study has yet addressed the issue of trade as a conditioning factor in emissions convergence. This is surprising given the (often controversial) role that trade plays both in enhancing growth and in shaping the allocation of polluting activities around the world.

Paper 3 intends to fill this gap in the empirical literature, and analyzes the role of trade in CO₂ per capita emissions convergence over the 1960-2002 period. It puts particular emphasis in completing data series, in order to based evidence on the largest possible sample (168 countries). Based on up-to-date techniques in the field, it confirms that emissions per capita tend to diverge at the world-wide level, but to converge within high-income OECD and within EU countries. Further evidence shows that convergence is in general more likely within preferential free trade areas than within arbitrarily defined groups of countries. However, trade per se is not sufficient to induce convergence in emissions, and it seems that the positive relationship with convergence only appears once a certain threshold of trade intensity between partners is reached. Further analysis is certainly needed in order to disentangle the overlapping influences of trade, geography and income per capita similarity in shaping the ultimate outcome.