Foreign trade and declining pollution in Sweden: a decomposition analysis of long-term structural and technological effects

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Abstract

This article examines whether there exists any causal relationship between foreign trade and declining pollution in developed countries. In other words, do developed countries outsource their problems to less developed countries rather than solve them? The case study is the Swedish economy and the two environmental indicators employed are energy consumption and CO_2 emissions. No causal relationships are found, since Sweden has long been a net exporter of embodied energy and CO_2 and continues to be so after 1970, when energy consumption stabilizes and CO_2 emissions decline. In addition, the ratios of net exported energy and CO_2 to total consumption remain stable, which means there were no effects on the energy intensity or CO_2 intensity either. These results suggest that internal forces, like efficiency improvements, changed consumption patterns and transformation of the energy system, have been crucial for relative environmental improvement in Sweden, while foreign trade has played no role.
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1. Introduction

According to a majority of economists, international trade contributes to an increase in total world production, which will be distributed among countries according to their relative strength on the international markets, expressed in the relative prices of their products. The world economy benefits from this. There is, however, warranted concern among many scholars about the possible detrimental effects of trade on the environment and on working conditions in developing countries. Laxer regulation of working conditions and of environmental standards in developing countries compared to that in the developed countries may stimulate the establishment of enterprises, which are neither friendly to human health nor to the environ-

ment. The idea that the location of industry is determined by environmental regulations is called the pollution haven hypothesis (Copeland and Taylor, 2004). Several studies have been conducted that attempt to show such effects with mixed results. One reason why such effects are not found more frequently is that environmental costs hardly ever surpass 4% of production costs and therefore could not have a decisive impact on localization (Xepadeas and De Zeeuw, 1999). There is, however, support in the most recent studies (1999–2004) for a pollution haven effect, i.e. that lax environmental regulations play a marginal role for location decisions, but not for the pollution haven hypothesis that lowering trade barriers leads to a shift in the location of polluting activity to the regions with the weakest regulation (Copeland and Taylor, 2004). Still there is some economic logic in developing countries specializing in labor-intensive and sometimes also natural-resource-intensive production. This could naturally imply that some environmental improvement in developed countries is achieved at the expense of

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worsened conditions elsewhere in the world. Against this stands the fact that it also makes sense, according to trade theory, that developed countries specialize in capital intensive production, which is generally more energy demanding and polluting than labor-intensive production.

According to the Environmental Kuznets Curve (EKC) hypothesis, the negative environmental effects of economic development increase until a certain income is reached. Thereafter the environmental impact, usually measured as pollution emissions, will decrease (Panayotou, 1992). Suspicion is warranted that this downward slope of the curve, or the environmental improvement, is somehow related to international trade (Stern et al., 1996). It may very well be that as countries develop they reach another position in the world economic system, which means that instead of exporting natural-resource-intensive goods they import such goods (Hermele, 1995). This would imply decreasing energy demand and concomitant pollutants in those countries. For this system to continue to function, there is a need for other countries, at a lower stage of development, to enter the international trade arena, and to become net exporters of products that cause pollutant emissions and/or put high pressure on finite natural resources. This means that there are not necessarily any environmental gains in the world system if some developed countries show the EKC trajectory. If this geographical shift, rather than elimination, of environmental problems is an important feature of development, this has adverse consequences both for developing countries and for the global environment: the latter because some problems like the greenhouse effect are truly global in scope.

It may, of course, instead be the case that the downward slope of the EKC stems from internal causes in the developed countries. Higher income leads to changed demand for goods and services, which may give rise to consumption in that country that is less material intensive and more knowledge intensive. In addition, people at a higher level of income, with more knowledge about environmental problems and perhaps also more effective democratic institutions, may devote resources to cleaner production. Coupled with technical change on the production side, these demand side changes may cause an EKC (Kriström, 2000).

The case does not necessarily have to be simple. It does not have to be either foreign trade or internal causes that explain the downward slope of the EKC; it may well be a combination. Therefore, the issue of a possible causal relationship between trade patterns and pollution merits attention, and if such a relationship can be established there is a need for a quantification of these effects compared to the effects of internal forces.

Some of the previous research, which has related international trade to the EKC, has done this under the a priori assumption that international trade stimulates economic growth, which in turn increases environmental problems. Environmental problems do, however, decline during the later stages of the growth process, according to the EKC. The impact of trade on the environment is hence estimated as the net result of growth (causing increasing emissions) and the EKC (causing declining emissions) (Dean, 2002). This kind of research does not examine whether there is any causal relationship between trade and the EKC or not.

Researchers who have addressed the question of a possible causal relationship between trade and the EKC path have reached different conclusions. Antweiler (1996) constructs a pollution index for 1987 and finds that highly developed countries export more products that cause emissions than they import. Hence, the idea of environmental dumping in less developed countries is not supported at all. Agras and Chapman (1999) use an econometric model where they find energy prices to be the single most important explanatory variable for energy/GDP and carbon dioxide/GDP ratios, while trade, to their surprise, is insignificant. Chapman and Suri (1998), on the contrary, find trade to be an important explanatory variable for the EKC, when they use a combined time-series and cross-section model, and test for factors determining energy–GDP ratios. They draw the conclusion that trade causes both the upward and downward slope of the EKC. Muridian et al. (2002) provide some support for the impact of trade. They study embodied emissions in imports and exports for 18 industrialized countries in the period 1976–1994 in their trade with developing countries. However, a clear cross-section trend between embodied pollution in exports and imports was not found. As pointed out by the authors, this is probably due to differences in the composition of production among the countries. Cole (2004) finds some evidence of trade effects on the EKC when studying 10 air and water pollutants, but these effects do not seem to be widespread or large.

Most of these studies are based on econometric techniques, which have the advantage of covering several countries, which in turn allow general conclusions. The main disadvantage is that the adverse environmental effects of trade are not addressed directly, but are instead approached through related indicators, like the export/production and import/production ratio for manufacturing industry (in economic terms) or trade openness defined as the ratio of the sum of imports and exports to GNP. This is mainly since economic data are readily accessible, while data relating these economic figures to environmental indicators, i.e. detailed historical environmental accounts, are in short supply.

Our article contributes to the discussion by focusing on one country, namely Sweden, over a longer period than previous studies, combining the results of our two independent studies (Kander, 2002; Lindmark, 2001) of