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ANALYSIS

Trade and the environment: from a 'Southern' perspective

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Abstract

The relationship between free trade and the environment is one of the main issues of contention between environmental and ecological economics. Environmental economics assumes a positive relationship between free trade, economic growth and environmental policies. Environmental externalities may cause important damage. However, trade is not to be blamed for this. Instead, the fault lies with policy inadequacies at the national level. On the other hand, some ecological economists criticise the assumptions of environmental economics, especially the immobility of production factors and the positive correlation between income and environmental quality. They plead for measures to prevent deterioration of 'Northern' environmental standards in a 'race to the bottom' due to 'ecological dumping'' from the South. In this paper, we argue that neither environmental economics nor 'Northern' ecological economics take into account the structural conditions determining the international trade system. Based on some new empirical evidence on material flows, we stress the notion of environmental cost-shifting. If physical and political ecology perspectives are adopted, a 'Southern' approach to the trade-and-environment issue may arise.

Keywords: North–South trade; Dematerialisation; Environmental Kuznets curve; Environmental cost-shifting; Ecologically unequal exchange

1. Introduction

The relationship between trade and the environment is one of the main issues where a clear divergence between environmental and ecological economics can be found. The discussion started in the late 1970s and it is still a 'hot' issue in the literature (Verbruggen, 1999; Jayadevappa and Chhatre, 2000). Leveson-Gower (1997) recognises three different approaches on the subject: traditional, environmental and ecological. The former is essentially neo-classical trade economics. It tends to stress the dangers of environmental policy for the trade system rather than the reverse. The environmental trade approach also starts from neo-classical economics. It emphasises policy inadequacies at the national level and assumes a

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positive relationship between trade and environmental quality. Some ecological economists are representative of the third approach, the 'ecological'. This viewpoint questions the ability of the trade system itself to promote ecological sustainability. This paper will start by describing both main positions, and later, based on a political ecology perspective, it will emphasise North–South environmental conflicts. Presenting some empirical evidence, it will introduce a 'Southern' point of view on the debate, ending with some policy proposals.

2. The neo-classical theory and environmental economics

David Ricardo formulated the basis of the current economic theory of trade almost 200 years ago. Ricardo's main contribution was the 'law of comparative advantage'. He showed that the gains from trade still accrue to both sides even when a country has no absolute advantage whatsoever. As long as the cost ratios differ between countries in the absence of trade, every country will have a comparative advantage, an ability to find some good it can produce at a lower relative cost than other goods. This good should be exported in exchange for some others. So, trade is preferable to autarky. Eli Heckscher made the big second step in the economic theory of trade at the beginning of the 20th century. His ideas were developed later by his student Bertil Ohlin in the 1930s. The resulting model was called thereafter the Heckscher–Ohlin (H–O) theory. It can be summarised as follows: a country has a comparative advantage in producing and exporting the commodity in the production of which the relatively abundant production factors at home are used. Commodities requiring for their production locally abundant factors of production (labor, capital, technology, natural resources, etc.) and little of scarce factors are exported in exchange for goods that call for factors in the opposite proportions (Lindert, 1986). Trade is assumed to generate welfare increases, since every country produces and exports the commodities it can produce more efficiently. The H–O model is based, among others, on the following assumptions: (i) there are two countries producing n commodities with an endowment of m production factors that is different between the two countries; (ii) mobility of production factors is perfect among domestic industries but impossible internationally, and (iii) there are no externalities in production (van Beers and van den Bergh, 1996).

Building on the above indicated models and premises, the neo-classical theory (and environmental economists) state that free trade strategies lead to a win–win result: all participants gain. Trade promotes economic growth and welfare improvement in the exporter as well as the importer country. Growth enables governments to tax and to raise resources for a variety of objectives, including the abatement of pollution and the general protection of the environment. Moreover, growth affects positively the demand for a good environment. Also, trade enables pollution-fighting technologies available elsewhere to be imported. Freer trade can lead to better environmental outcomes also from a shift in the composition of production. Under this approach, international differences in environmental standards are perfectly natural (Bhagwati and Srinivasan, 1996). Each country will have less of the industry whose pollution it fears relatively more than other countries, and should not impose its environmental preferences abroad. Thus, the notion of 'unfair trade' and 'unfair competition' based on different environmental standards is illegitimate (Bhagwati, 1993). Each country has the right to impose local standards according to its particular priorities (Klevorick, 1996).

According to Repetto (1994), inward-looking development policies may produce as serious environmental problems as the outward-looking strategies, along with significantly lower living standards. India and China (already prior to economic reform) experienced a high rate of environmental degradation. Trade restrictions imposed by OECD countries also damage their own environments while reducing incomes abroad. US sugar-protectionist policy has produced a loss of 400 000 jobs in the Caribbean countries alone, an increase of 50% in domestic prices and extensive destruction of the Everglades ecosystem in South

Florida. According to this author, if developing countries collectively adopt reasonable environmental standards in commodity production and increase the prices to include the cost of environmental compliance, their terms of trade would improve because northern consumers, whose demand is relatively insensitive to prices in the primary sector, would be paying a larger share of the environmental costs associated with their consumption. Repetto (1994) proposes as key aspects of an agenda to conciliate environmental and trading policies the following points: (a) Reorient agricultural policy and reduce agricultural protectionism in OECD countries. (b) Reduce barriers in OECD countries to exports of labor-intensive manufactures from developing countries. (c) Use trade and investment incentives to induce co-operation in international environmental protection. (d) Developing countries should enforce reasonable environmental standards and the Polluter Pay Principle. (e) Governments should eliminate natural resources subsidies.

For most environmental economists, lower environmental standards are unable to encourage industrial mobility. The empirical evidence seems to reveal that it has not happened in the past (Batabyal, 1995; Levinson, 1996; Eskeland and Harrison, 1997; Tobey, 1990) and for many authors it is unlikely to happen in the future. Basically, the reason is that the costs of compliance with environmental standards are not high in the North, not exceeding 3% of the total costs, and therefore they are outweighed by other factors affecting location decisions, labor costs for example (Batabyal, 1995). Xu (1999) found that the export performance (in monetary terms) of environmentally intensive products for most countries remained unchanged between the 1960s and the 1990s despite the introduction of stringent environmental standards in most of the developed countries. On the other hand, exploiting differences in standards may not be a good strategy to attract international capital because it may generate strong local resistance due to deterioration of life quality. Corporations may prefer to adopt standards from the headquarter-country to homogenise procedures, but also to avoid local and international suits and the cost of complying with subsequent changes in the local environmental legislation or retrospective 'Super-Fund' legislation (French, 1994; Bhagwati, 1995). Because of such evidence and arguments, most environmental economists believe that a generalised lowering of environmental standards (a race to the bottom) in order to attract foreign investment or to favor local industries is unlikely to happen.

Based on the above arguments, and assuming also that free trade gives the consumers the greatest opportunity to choose 'green' products and establishes the best climate for multilateral co-operation to solve environmental problems, the GATT (nowadays WTO) concluded that, since trade is such a great advantage, our present trading system should not be jeopardised by trade restrictions motivated by environmental concerns (Lee, 1994; Liebig, 1999). From the neo-classical environmental-economics point of view, the main challenge to achieve sustainability is the internalisation of environmental externalities. Environmental economists argue that a failure to place a 'right' value on environmental resources would undermine sustainable development even in complete autarky. Trade is seen, rather, as a 'magnifier'. If policies necessary for sustainable development are in place, trade promotes development that is sustainable.

3. Trade and ecological economics

One of the main criticisms of ecological economics against the environmental economics position on trade is that it assumes too easily two positive relationships: (i) between international trade and economic growth and (ii) between economic growth and environmental protection. Empirical evidence supporting the idea that countries with rapidly growing exports have a higher rate of GDP growth is abundant (Dollar, 1992; Frankel and Romer, 1999), and this proposition has been taken as a 'dogma' by many politicians and development economists. Nevertheless, empirical studies usually do not demonstrate the direction of the causal relationship between trade and income (Edwards, 1993). Moreover, ecological economists criticise GDP as a measurement of social welfare.

If economic growth rests on depletion of natural capital (as in the case of primary-goods exporters) and increasing environmental externalities, GDP can be a misleading indicator of real welfare (Daly and Cobb, 1994; Max-Neef, 1995; El Serafy, 1997; Faucheux and O'Connor, 1999). For example, Winter (1995) found no positive relationship between exports and economic growth in African countries specialised in non-renewable resources when a revised national income is applied (according to El Serafy or Repetto methods). The second positive relationship, between economic growth and environmental quality, has received support from the 'environmental Kuznets curve' evidence (Grossman and Krueger, 1995; Barbier, 1997; Ekins, 1997; Stern, 1998). Economists supporting this proposition assume that economic growth will change preferences toward environmental quality and will reduce pressure on the exploitation of ecosystems, whether in terms of natural resources inputs (dematerialisation) or pollution outputs. Nevertheless, if the economic process that generates economic growth results in irreversible environmental degradation, then the very process that generates demand for environmental quality in the future will undermine the ability of the ecosystem to satisfy such demand (van den Bergh and Nijkamp, 1991). Since much of the Southern environmental damage is irreversible loss of biodiversity and it cannot be made good because replacement costs are infinite, the South cannot blindly follow the rule 'damage the environment in order to grow, and then (with the revenues) cure it' (Goodland and Daly, 1993). Not only loss of biodiversity, also the dispersal of minerals cannot be reversed; we have no technologies to produce a new Cerro Rico of Potosí. As regards biodiversity, species are interconnected in a web of interrelations that are basically non-linear and discontinuous and there exist thresholds of diversity below which ecosystems lose the self-organisation that enables them to provide ecological services (Perrings and Opschoor, 1994). In many cases, these thresholds are unpredictable and once they are surpassed it is impossible or too difficult to come back to the initial state.

The income levels above which environmental degradation start to diminish found by the EKC studies only for selected environmental variables are often larger than the current world median GDP per capita. This would mean that extensive environmental degradation at a global level would carry on many years in the future. 'London' smog can be corrected at a relatively low level of income, but 'Los Angeles' smog (produced basically by cars) increases with income up to a very high level of per capita income. On the other hand, some pollutants do not show an inverted 'U' relationship with income (garbage per capita for example). It has been estimated, based on habitat loss, that 30 000 species a year are currently being lost in tropical forest, coral reefs, wetlands, islands and montane environments, almost all in the South (UNEP, 1995). If this rate continues for a few decades, the environmental consequences will be catastrophic. Since most of the current biodiversity rest in the South, and diversity thresholds (below which the changes in environmental functions' output are irreversible) are not known. To trust in an inverted-U curve between income and environmental condition may lead to surpass the ecological threshold before reaching the economic one. When economic growth has made people wealthy enough (to clean up the damage done by growth) it may be 'too late to be green'.

Another key point of disagreement between environmental and ecological economics is the role of international competition in determining environmental and labor standards. Some ecological economists (Daly, 1993; Ayres, 1996) argue that competition promoted by free trade will encourage lowering of environmental standards and wages at a global level, producing environmental deterioration in both North and South and lower wages and enlargement of unemployment in the North. According to this position, free competition between different cost-internalising regimes is utterly unfair because it would produce a 'race to the bottom'. Overpopulation and the high rates of population growth in the South will collaborate to maintain the wages in poor countries low and to push the northern wages downward. They point out also that the key assumption of immobility of factors of production (on which the neo-classical model of trade is based) cannot be accepted easily

nowadays. Currently, capital flows along the world almost without any restriction. Thus, what really matter are absolute advantages and not comparative ones. Capital can migrate to countries having absolute advantage, and a few countries may have absolute advantage for many products. So, only a few countries may attract most of the world's capital (and yield most of the world's production), leaving other countries in an 'absolute disadvantage'. The fear of some ecological economists is that lowering of environmental and labor standards may become the main strategy used by countries to achieve absolute advantage (Daly, 1997). For example, lower environmental standards in Mexico seem to have played an important role in the reallocation of maquiladoras to the US-bordering area of Mexico (Steininger, 1994) and this has produced employment loss in the US and serious environmental damage and health problems in Mexico (Wallach and Naiman, 1998).

Currently, the WTO allows trade restrictions for products generated by some 'social dumping' like prisoners' labor (although not children's labor) and also for products that may harm the importing country's environment or health. WTO lets countries choose their own processes of production, including environmental standards (Eglin, 1995). In the current controversy on genetically modified (GM) agricultural imports (maize, soybeans) into Europe, one sees clearly the distinction between the presumed health risks in the quality of the product (which, for instance, has led to call for labeling by the British Medical Association), and the environmental and health risks because of the process of production — for instance, gene transference to wild relatives of GM crops in exporting countries. Some ecological economists (Daly and Goodland, 1994; Steininger, 1994) argue that WTO should include an article permitting importing countries to establish trade barriers to avoid unfair competition between local industries and foreign industries benefiting from weaker environmental standards. In general, this measure would protect local industries in the North against 'ecological dumping' from the South. Although, there are some cases in which free trade implies 'ecological dumping' from North to South rather than the reverse. For instance, exports of maize from the US to Mexico under NAFTA threaten Mexico's wealth of maize varieties (around 1600), which have co-evolved with southern Mexico peasants during thousands of years (Martinez-Alier, 1993; Boyce, 1996; Dragun, 1998).

Other authors suggest an approach that simultaneously accelerates progress towards trade liberalisation and encourages countries to pursue first-best policy solutions to global environmental problems, including international agreements (Young, 1994) or appropriate local abatement-pollution tax policies (Lee and Roland-Holst, 1997). It has been also proposed that trading partners and integrated trading zones (like NAFTA and MERCOSUR) should enact common trade agreements with emphasis on environmental aspects (DeBellevue et al., 1994). Market segmentation through product certification (eco or green-labeling) has been proposed also as a mechanism to reach international harmonisation of environmental regulations. In these cases, the demand in the North for green products will play a key role in changing the patterns of production in the South (May and Segura, 1997). Duchin et al. (1995) argue that this process of environmental harmonisation has as a prerequisite large transfers of technology from the North to the South, though in other cases (coffee production under shade, and in multi-cropping systems) the question is to preserve the traditional technology rather than to import a new one.

4. Race to the bottom or polarisation of environmental conditions?

The viewpoint that conceives international competition and capital mobility as important forces driving down environmental standards responds mainly to 'Northern' fears (Bhagwati, 1997). The North is afraid of losing its high standards through eco-dumping from the South and it is interested in putting trade barriers based on environmental considerations. This strategy, however, may become easily an 'eco-imperialistic' measure. Currently, non-tariff barriers are the

most important mechanisms halting international trade and ecological concerns may be used to hide economic interest of lobbies in the North. In this sense, the point of view from the South would be closer to that of environmental economists, who state that each country has the right to impose its own environmental standards according to its development priorities. But the key part of the argument in favour of trade restrictions may be looked at from an opposite perspective. If one conceives international flows of cheap primary products (or environment-intensive products in general) as 'ecological flows', that is, as environmental-cost shifting from the importing to the exporting country, then freer trade can promote increasing environmental-load displacement from the importing to the exporting country. Imports of environment-intensive goods may be a way to improve local environmental standards at the expense of environmental degradation abroad. Ekins (1997) points out that it is possible that the consumption of environmentally intensive goods is increasingly being met by imports. For example, there is some evidence showing that US pollution control programs have induced changes in the US trade pattern, favoring more imports of high-abatement-cost goods (Robinson, 1988). The EKC may be the result of international specialisation: poor countries may attract 'dirty' and material intensive production while richer countries specialise in clean and material extensive production, without altering the consumption pattern (Stern et al., 1994; Suri and Chapman, 1998). If this hypothesis applies, the 'race to the bottom' is a fallacy because free trade does not promote a general deterioration of environmental standards, but instead it produces environmental improvement and economic growth in the North and environmental deterioration and economic stagnation in the South. From this viewpoint, in a free trade system, capital migration to poor countries will not convert affluent countries in 'absolute losers' (as Daly and Ayres fear). Instead, poorest countries may become the real losers by suffering the environmental load of 'affluent' consumption. According to Porter (1999), the race to the bottom does not apply to those countries with already high standards and strong institutions. However, in countries with low-standards and weak institutions, competitive pressures do have a substantial impact, creating what might be called the 'stuck at the bottom' effect. This could lead to a polarisation of the international environmental conditions.

Daly's appeal (Daly and Cobb, 1994) to the self-interest of the United States working class to prevent entry of products produced with low social and environmental standards is perhaps too optimistic. First, the US working class is surely worried about cheap Chinese steel imports (as shown in the 'battle of Seattle' of late 1999), but it is also a big consumer, interested in cheap imports of oil, other raw materials and consumer goods. Second, when US capital moves to countries that produce cheaply because of their absolute advantages and low social and environmental standards, the US economy profits, and it carries its working class along. Third, one part of this working class is ill-paid and demoralised, but another part is becoming interested in the stock market, privately and through pension funds. Cheap imports, a large trade deficit made possible by a strong dollar and high-yielding investments in other countries, resemble more a 'Swiss rentier way of life' than an 'American working class way of life', but they are attractive. The political constituency for the ecological economics viewpoint is not so much the American working class as the populations in the South who suffer from their inability to prevent exports that imply ecological and social dumping.

At the global level, there is a clear flow of primary commodities from poor to rich countries. Developed countries consume the majority (two-thirds) of all primary commodity exports and these kinds of products account for the majority of export earnings in the Third World (Arden-Clarke, 1992; OECD, 1997). Clearly, the Third World is specialised in exploitation of natural resources. Specialisation in resource-intensive or environment-intensive products (especially those with low income elasticity) may generate a 'specialisation trap'. When the economic activity is based on non-processed products, attempts to increase earnings need either an agreement among exporters, which is difficult to organise, or an

increase in supply, which produces a downward pressure on prices and deterioration in the terms of trade. If this pattern is not broken, 'free' trade becomes, in reality, 'forced trade' (Ropke, 1994). Moreover, most developing countries have huge debt-loads. In order to pay these obligations, countries need to foster resources exploitation and supply (Schatan, 1998), collaborating in the fall of prices. In the last decades prices of primary resources have dropped substantially. In order to maintain their revenues, countries must sell growing quantities of resources, thus generating increasing environmental damage. Specialisation in natural resources-intensive products with a low degree of processing may have also important consequences for the prospect of development in the future. Raw materials production does not promote technological innovation or development of labor skills as do the information-intensive sectors. Therefore, countries specialised in the primary sector tend to have a limited range of occupational choices, staying back in the creation of new ways of generating revenues. Not every comparative advantage promotes development in the same way. Countries that specialise in the least dynamic comparative advantage may find themselves locked into economic stagnation (Ekins et al., 1994). Moreover, tariff escalation (import duties that rise with the level of processing of the goods purchased), very common in the current world trade system (Hecht, 1997), may play a key role in the maintenance of the specialisation trap.

On the other hand, there is empirical evidence showing that the growth of primary exports exhibits little or no external impact on the non-export sector, which constitutes the bulk of the economies in most developing countries (Fosu, 1996). This evidence is against the staple theory of growth, a classic export-led development model that states that the expansion of the resource-based exporting sector induces higher rates of growth of aggregate per capita income due to links with other sectors of the economy (Watkins, 1963). If the staple theory's assumptions are not well founded and the resource-exporting sector is 'delinked' from the rest of the economy, policies intending to promote (cheap) primary exports expansion as an engine of growth can be misleading and they can lead to unsustainable ways of development. Thus, strategies of development intending to attract international capital to the export-oriented primary sector, as those implemented by Bolivia, Peru, Chile or Venezuela, for example (ECLAC, 1998), and also Indonesia and other countries in South East Asia, may lead to increasing (national and international) income distribution asymmetries and 'illusory' growth in the short term, but unsustainable development in the long term (Tussie, 1999).

The fact that the non-exporting sector constitutes the bulk of the economy in most developing countries (exports of good and services in the developing world usually are below 30% of GDP) does not necessarily imply low environmental pressure from the exporting sector. Primary commodities still account for the largest share of developing countries' export earnings and 45% of developing countries have primary products (fuel and non-fuel) as the main source of export earnings (IMF, 1998). Unprocessed raw materials accounted for an estimated 75% of the 48 poorest countries' exports in 1995 (OECD, 1997). Thus, although the exporting sector in most developing countries is not the main economic activity in terms of revenue and employment, it can have a great environmental impact relative to its economic share because it mostly relies on the exploitation of natural resources. Additionally, international financial institutions 'recommend' an outward strategy of development by exploiting local comparative advantages. This probably will lead to a general increment of exports, and the environmental cost associated with it (Rock, 1996), and it could also lead to an oversupply of natural resources and therefore to deteriorating terms of trade for the primary sector.

There could be an alternative look at the problem. Under an institutional perspective, and taking into account the international market structure of primary products, it is misleading to consider countries as the most suitable unit for the analysis of the 'trade and environment' issue. First, there is an uneven distribution of power inside countries. For example, revenues and environmental costs from oil exports or from copper exports in Nigeria and Indonesia are enjoyed by

and fall upon different sectors of the population. How are a country's environmental preferences to be aggregated? Second, corporations play a determining role. For example, the international market in the mining sector is increasingly dominated by transnational corporations due to capital requirements and a generalised strategy of privatisation in the Third World. Extractive industries may function as enclaves, which rely largely on inputs imported from the parent company to which the subsidiary 'export' the production and repatriate the bulk of its profits, creating important balance of payment problems in the 'exporting' countries (Jenkins, 1987). Moreover, if national governments use tax incentives to attract international capital (as it has been the case in many developing countries) the asymmetries in the distribution of profits can be even greater. A substantial part of world trade now takes place within corporations (Gilroy, 1989; OECD, 1993) and it allows, among other things, transfer pricing. By systematic under or overstating the price of commodities in intra-enterprise transactions, multinational firms can increase their global profits, reduce risk, move funds across national boundaries and allocate them between subsidiaries (Lecraw, 1985). TNCs have been reluctant to accept any environmental liability. There is no international agreement or treaty regulating the conduct of TNCs. There have been attempts to control TNCs' behaviour at the international level, one from the UN and another from the 'group of 77' (the latter code was related specifically to environmental liability). However, both attempts failed because of the opposition from the transnational corporations and the governments of US, UK and Japan (Goodland and Daly, 1993).

It is usually assumed that multinational corporations in the primary sector have a far better environmental performance than state-owned enterprises because of more efficient production and management and updated technology (Hodges, 1995). It is also commonly assumed that TNCs tend to maintain parent-country's environmental standards in the subsidiaries. Nonetheless, there have been well-known recent (largely unsuccessful) attempts of class action environmental suits in US courts against TNCs (on DBCP pesticides in banana plantations, on the practices of Texaco in Ecuador, Freeport McMoRan in West Papua (Indonesia), the Southern Peru Copper Corporation).

In summary, TNCs' activities in the agriculture, mining, mineral processing, paper and chemical sectors are usually directed to cover the demand of industrialised countries. Many primary markets are oligopolistic, dominated by few TNCs. Intra-firm trade represents a remarkable part of the international primary products flows. Lastly, there could be important asymmetries in the distribution of profits between TNCs and the host-economies in the environmentally intensive sectors. Then, from a political ecology perspective, one could address the 'trade and environment' issue, emphasising the strategic managerial decisions inside multinational corporations instead of focusing on how national economies exploit comparative advantages to compete in a 'perfect' international market. Despite the increasing importance of TNCs in the world economy, this 'institutional' approach has been almost absent in the current debate on trade and the environment. Further research is needed on this topic.

5. Looking at some 'weighty' evidence

Table 1 shows the percentage of change between 1971–1976 and 1991–1996 in the average aggregated imports (weight and prices) of the US, Japan, France, Italy, Germany (Federal Republic from 1971 to 1996 and unified Germany from 1991 to 1996), Netherlands, Spain, Sweden, Denmark, UK and Ireland of non-renewable materials coming from developing countries. One hundred percent of change means an increase by a factor of 2. Low and middle income countries, according to the World Bank classification (World Bank, 1998), are considered here as developing countries. Data comes from the World Trade Annual, a periodical (annual) hard-format publication of the UN statistical office. It reports commodity imports and exports (in weight and value) by country, specifying also the place of origin or destination. For the selected developed countries and the period specified, we gathered

data for the share of the total quantity of some non-renewable materials imports coming from developing countries. Prices of these imports were also taken into account. Table 1 shows that, in general, physical de-linking between economic growth in the North and non-renewable resources imported from the South is not taking place and also that prices for most of these products have deteriorated considerably in 20 years.

These data suggest that the North's economic growth goes together with: (a) increasing consumption of non-renewable resources coming from developing countries; and (b) worsening terms of trade for exporting countries specialised in non-renewable resources. Oversupply, rather than decreasing demand, is likely the principal cause of price deterioration and probably it is the result of the 'specialisation trap'. Table 1 seems to reveal that, in general, imports of raw materials have increased less than imports of semi-processed materials. This indicates a trend towards more value-adding activity in the South (of products facing a deteriorating evolution of prices). However, imports of semi-manufactured materials may imply larger environmental cost shifting compared to imports of non-processed materials because they embody the environmental impacts of both extraction and processing.

Table 1
Change in South–North non-renewable resources flows and prices between 1971–1976 and 1991–1996[a]

Item	% of change	
	Weight	Price (US$ 1987)
Aluminum	660	−12
Pig iron	306	−26
Iron and steel shapes	238	−31
Petroleum products	230	−21
Nickel (alloys)	196	−22
Gas natural and manufactured	128	10
Zinc	87	−35
Copper ores	70	−52
Copper (alloys)	32	−35
Bauxite	30	71
Tin (alloys)	12	−63
Lead	9	−46
Zinc ores	8	−45
Nickel ores	−3	−46
Iron ores	−10	−32
Lead ores	−10	−34
Crude petroleum	−12	−10
Fertilisers	−51	−17
Tin ores	−97	22

[a] Data source: authors' calculations on the basis of the World Trade Annual (UN statistical office).

Environmental problems associated with trade of natural resources include habitat destruction (specially deforestation), species loss, land, water and air pollution and promotion of human diseases (Lee, 1996). Worsening terms of trade prevent internalisation of these environmental externalities. In this sense, countries specialised in polluting products, whose prices tend to fall down along time, tend to have fewer opportunities to internalise environmental costs into prices. On the other hand, private sector practices, such as transfer pricing, can make the situation even worse. If international conditions determining prices make the South less able to internalise externalities, then there is a transfer of wealth from poor countries to rich countries. This mechanism has been called unequal (ecological) exchange (Martinez-Alier and O'Connor, 1996; Hornborg, 1998). In this sense, externalities can be seen not so much as 'market failures', but as 'cost-shifting successes' allowed by social asymmetries in the distribution of (mostly de facto) property rights, income and power (Martinez-Alier and O'Connor, 1999). If non-renewable resources flows are seen as ecological flows and prices of these products tend to deteriorate, then we can argue that the North is transferring environmental costs to poor countries.

In Latin America, the CEPAL school of the 1950s and 1960s (led by the Argentinean economist Raul Prebish) argued that there was an inescapable trend towards deterioration of the terms of trade for primary commodities for the following reasons. As productivity increases in the production of minerals, metals, oil and agricultural commodities, the gains in productivity are not captured by increasing wages because of the large supply of cheap labor. On the other hand, the markets for such commodities are competitive (and, we would add, future demand for exhaustible resources is heavily discounted). On the

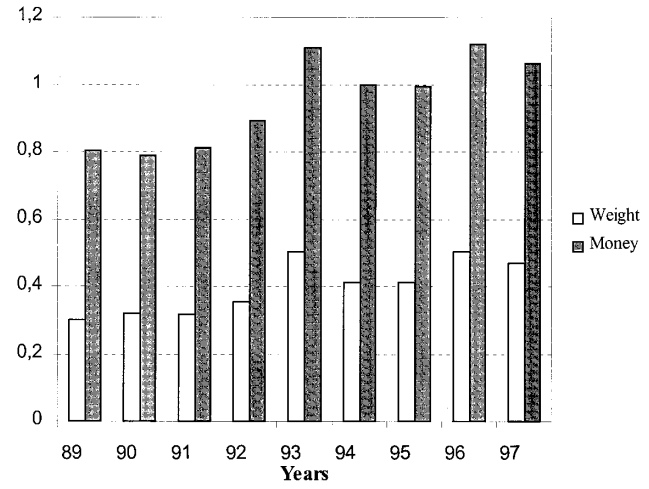

Fig. 1. European export–import ratios (world) for the six most polluting sectors.

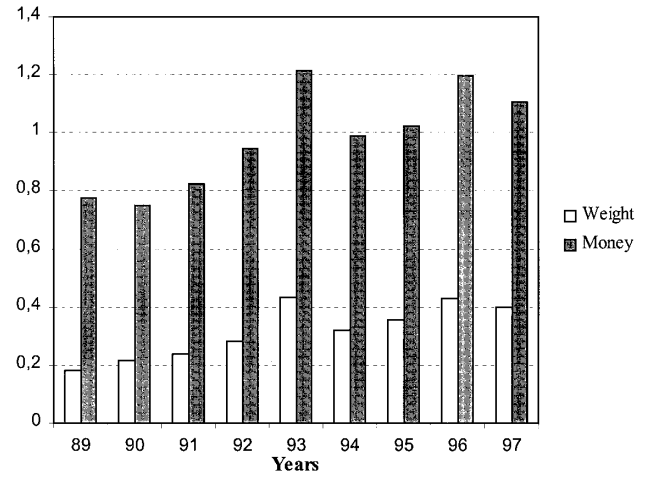

Fig. 2. European export–import ratios with developing countries for the six most polluting sectors.

contrary, markets for imported manufactured products or services are more oligopolistic, and gains in productivity in the rich countries were not translated into declining prices but into higher wages and salaries because of the existence of well-organised unions. The environmental issues were not considered in the CEPAL's argumentation, but they could be added to it.

Apparently contrary to our main thesis, in a recent report (World Bank, 1998), the World Bank published some data about *monetary* export–import ratios in low, middle and high income countries for the six most polluting economic sectors: iron and steel, non-ferrous metals, industrial chemicals, petroleum refineries, non-metallic mineral and pulp and paper products. The results show that with few exceptions developing countries tend *not* to specialise in heavy polluting industries. Instead, exports are lower than imports for the polluting sectors and the export–import ratio is less than one. This means that poor countries are net importers of environmentally intensive products. The World Bank also concludes that developed countries are increasingly net exporters of products with big environmental rucksacks. Figs. 1 and 2 show the exports–imports ratios for the same six most polluting sectors in the European Community with the rest of the world and with developing countries, respectively. They present the trade ratios in *monetary* and *weight* units. Data was taken from the Eurostat (1998) database of intra and extra EU trade.

It is clear that conclusions can vary importantly if we adopt one or another unit. Now, in order to estimate the environmental effects of trade, the problem necessarily has to be addressed in physical terms. Monetary variables are inappropriate because of price variation along time, among products and among countries. Instead, physical units can be translated into emissions and materials hidden flows (Adriaanse et al., 1997). Figs. 1 and 2 reveal that Europe is in some years a net exporter in monetary terms, being always a net

Table 2
US foreign trade for polluting sectors (1993) (million metric tons)[a]

Category	Exports	Imports	Export–import ratio
Minerals	47.8	54.2	0.88
Metals and ores	27.0	76.4	0.35
Chemical and allied products	41.3	14.4	2.87
Petroleum products	34.1	96.9	0.35
Paper and board	6.2	11.9	0.52
Total	156.4	253.8	0.62

[a] Source: US Bureau of the Census (in Wernick, 1996).

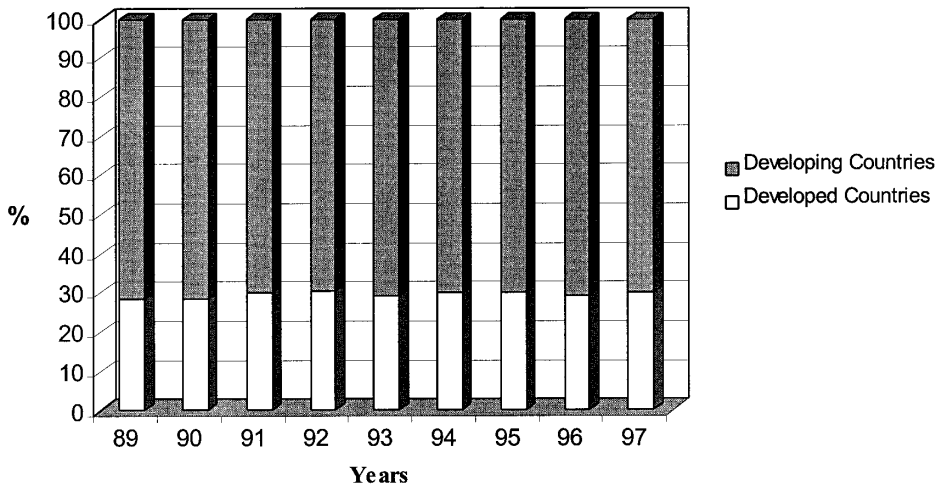

Fig. 3. Origin of European imports for the six most polluting sectors. Weight.

importer in physical terms. Table 2 shows that the US (at least for 1993, chosen because of data availability) is also a net importer (in weight units) for five pollution-intensive sectors.

In principle, it is possible to estimate the relationship between extraction and processing of materials and pollutants emissions (Hettige et al., 1995), habitat degradation or removed land. Materials flow can be translated into 'ecological flows', in terms of environmental load in the exporting country by unit of consumption in the importing country. In this sense, Europe and the US, being net importers (in weight) for the most polluting sectors, could have an 'ecological deficit', especially with developing countries (see Fig. 3).

However, it is difficult to use these kinds of figures to estimate real environmental load displacement, because too much information is lost due to aggregation. Since externalities associated with trade depend on the specific pollution intensity of products, calculations of environmental cost shifting must be addressed taking into account the 'environmental rucksack' of each tradable item separately. The most relevant point here is that World Bank's conclusions about international specialisation could change substantially if a 'physical' perspective is adopted.

6. Weak vs. strong sustainability

The adoption of monetary units to deal with environmental issues may also distort local and global policies intending to conciliate economic growth and environmental sustainability. For example, the World Bank takes weak sustainability criteria to evaluate its projects (UNEP, 1995). In macroeconomic accounting, it publishes 'genuine savings' indicators (also based on weak sustainability), according to which most poor countries have a low or negative savings rate and all of developed countries a high and positive one (Hamilton and Clements, 1999). (For a critique of World Bank's 'genuine savings' numbers for Ecuador, see Falconi, 1999). Under the weak sustainability approach, complete substitution between human-made and natural capital is assumed, and the sustainability is achieved when the sum of both kinds of capital is at least constant in time, that is, when savings are equal or larger than the sum of depreciation of both natural and human-made capital. Some studies, including calculations for depletion of natural capital and externalities, have shown that the world as a whole is currently 'sustainable' in the above-described 'weak' sense, (Pearce and Atkinson, 1993) and its degree of sustainability is increasing along time (Proops et al., 1999). These

results arise basically because the huge net savings of developed countries compensate natural capital depletion at a global level. However, since depletion of natural capital is calculated according to actual prices of natural resources, which are low and tend to drop along time, to adopt a weak sustainability criterion to design policies may lead to an irreversible loss of 'critical natural capital' (Victor, 1991). Moreover, the larger the difference between the value-added of manufactured products and services in the North and the prices of natural resources sold by the South, the larger the possibility of savings in the North and therefore the larger the degree of sustainability of the world in a weak sense. Therefore, under this preposterous perspective, worsening terms of trade for the South will be favorable for the global sustainability (measured in monetary units). To rely solely on the weak sustainability concept is particularly dangerous in the case of the World Bank because of the immense leverage this institution has in economic and social policies of developing countries (Krueger and Rajapatirana, 1999).

Environmental problems in the North related to increasing material consumption are perceived mainly with respect to waste disposal after final use. However, in the life cycle of materials great environmental loads are also associated with the first steps: extraction, purification and processing. Therefore, it is possible that environmental costs of Northern material requirements are mainly suffered by exporting countries. If this is the case, there would be fewer incentives to reduce total material throughput in affluent countries. Dematerialisation has been proposed as a key strategy to achieve sustainability, and for many authors a reduction of material flows should be introduced as a priority in the agenda of developed countries in order to achieve a sustainable development pathway (Daly, 1991, 1995; Hinterberger et al., 1997; Hinterberger and Schmidt-Bleek, 1999). However, if the environmental costs of these flows (pollution, habitat destruction, loss of biodiversity, etc.) are not suffered in the industrialised world, it will be a hard task to convince the lay community and decision makers to adopt 'dematerialising' measures or policies. Additionally, economic incentives are lacking because prices of raw materials do not tend to rise and minerals scarcity does not seem to be a serious problem at least for the next century (Hodges, 1995). On the other hand, there is a possible perverse side on a dematerialisation strategy in the North: a falling demand of natural resources probably will produce a drop in the prices and even worse terms of trade for the South. Therefore, in any case, dematerialisation in the North should be accompanied by a progressive abandonment of the current natural resources export-oriented pathway in the South.

7. Policy proposals

From our point of view, the South has three possible ways to address the problem of deteriorating terms of trade and North-to-South environmental cost shifting. One tactic may be to create international cartels of natural resources producers like the OPEC. These cartels should include among its explicit purposes (and this would be a novelty) that a part of the increased revenues must go to alleviate the environmental liabilities generated by the exploitation of natural resources. In this sense, they could be seen as 'eco-cartels'. Nonetheless, the political feasibility of this kind of agreement seems low. There have been many attempts to establish international cartels for non-renewable resources in the past, but almost all of them have failed.

Another possibility is to apply international monetary environmental policies. Globalisation should not be only accompanied by free movement of capital, it also should imply the extension of the institutional control of the economic activity at a global level. The same logic underlying the application of state intervention in a national level can be applied at a global scale. Costanza et al. (1997) propose to shift the taxation of 'goods' like income and labor to 'bads' like ecological damage and consumption of natural resources. They consider as crucial measures to achieve sustainability the implementation of a 'natural capital depletion tax' to promote reduction in the total throughput, the adoption of the precautionary principle and an environmental assurance bonding system. This latter would consist in posting bonds (deposit-refund system) equal to current best estimate of the largest potential future environmental damage

from current projects and activities. Portions of the bond (plus interest) would be returned if and when the agent could demonstrate that the suspected worst case damages had not occurred or would be less than the originally assessed. This kind of measure could be applied in an international arena (especially to assure TNCs' environmental liability).

According to the OECD's Polluter Pay Principle, the additional production costs arising from stronger environmental measures should be internalised into prices, so that eventually they are paid by consumers. The Polluter Pay Principle then equates the User Pay Principle (Kox, 1993). According to this, benefits from eco-taxes should go to compensate damage at the point where it is suffered, not where consumption occurs. If environmental costs arising from natural-resources exports are not internalised, then ultimate consumers in importing countries are implicitly subsidised at the expense of welfare and environmental losses in exporting countries. To correct this, a natural capital depletion tax could be implemented. It should be equal to the needed investment to create an equivalent human-made capital, which will produce at least the same economic revenues. This is equivalent to a fiscal implementation of El Serafy's rule. This has as premises that: (a) total benefits (in the market or not) produced by natural capital can be calculated; (b) there is a high degree of substitutability between both kinds of capital; and (c) the market role of interest is accepted as a sustainable rate of return on the invested capital. This means, a natural capital depletion tax assumes a high commensurability of values and a 'weak' sustainability criterion. If a weak sustainability criterion is assumed, an international natural depletion tax on inelastic products would produce a redistribution of income at the global level, displacing savings from developed countries to resources-exporting developing countries, but it would likely not change the 'environmental' performance of the world's economy. Proops et al. (1999) report that some oil-exporting countries are not sustainable in a 'weak' sense, but the global economy and all the industrialised countries are so. Therefore, oil-importing countries have enough savings to pay capital depletion to exporting countries, but this transference is not occurring. These results seem to reveal that some redistribution of income may occur through a natural capital depletion tax, but also that if this transference does take place, and a weak sustainability rule is taken to define social aims, nothing substantial would change about the environmental repercussions of the global economic performance. What matters is not the financial compensation of environmental degradation in itself, but rather whether the money flows from natural capital depletion taxes would be incorporated into resource-saving technologies (for instance, solar energy).

What are the limits of this international fiscal policy? Would it guarantee sustainability?

Perhaps we should see natural depletion taxes (which we favor) in a 'cost-effective' perspective only. That is, the objective would be to reduce to some (politically negotiated) extent the material export flows from poor countries, to promote technological innovation and to improve their terms of trade and environmental conditions. In this approach, no pretense of sustainability is implied. As pointed out by Victor (1991), Martinez-Alier and O'Connor (1996, 1999), and other authors, in ecological economics allocative and distributional issues cannot be dealt with independently. Endowment of property rights and the distribution of income and power are predetermining the allocative outputs. It can be completely efficient in economic terms to allocate pollution to poor countries or poor communities in the same country because, as Summers (1992) argued, ''the measurement of the costs of health impairing pollution depends on the foregone earnings from increased morbidity and mortality. From this point of view, a given amount of health impairing pollution should be done in the country with the lowest cost, which will be the country with the lowest wages''. Under neoclassical thought it will be perfectly logical to displace environmental load to poorer countries even if the rich countries have to financially compensate the environmental degradation of cheap land and diseases and

deaths of poor people. However, when there are huge income inequalities and disparities in power between economic agents, economic policies, although improving economic efficiency, may lead to unsatisfactory results from an equity viewpoint. Social, spatial and temporal ecological inequalities, like social asymmetries in the use of natural resources or in the burdens of pollution, between different human groups can persist even when implementing perfectly estimated Pigouvian taxes.

Environmental economic policies intending to internalise externalities are not enough to resolve environmental conflicts because valuation depends on income and power, but also because the market is not the universal arena where human conflicts can be resolved. Poor communities often appeal to extra-market principles and values to resolve inequalities in the ecological distribution. Examples of that are the different civil movements against environmental inequalities that have arisen in the South, also called the environmentalism of the poor, and the Environmental Justice movement in the US (Guha and Martinez-Alier, 1997). These environmental–social movements may become a key force for achieving sustainability. Extra-market mechanisms to enforce sustainability may be more important than economic measures in cases where there exist remarkable asymmetries in the distribution of income or power, or exploitative and unfair definition of property rights, and also where uncertain externalities are not at all measurable in monetary terms.

We consider as the best policy for developing countries, the generalisation of a development path intending to change current comparative advantages and to reinforce South–South networks of co-operation and trade. Since not every comparative advantage is dynamically equivalent, by following the neo-classical advice the South would stay specialised in natural-resources-intensive products, and it would be condemned to stay economically behind. A change of emphasis is necessary from 'exploiting comparative advantages' to 'changing comparative advantages'. The key premise of the import substitution industrialisation strategy of development in the 1950s was that a deterioration in the international price of raw materials would result, in the absence of industrialisation in the developing world, in a ever-growing gap between rich and poor countries. This is still completely valid currently. In fact, income inequalities in the world never have been as extreme as nowadays, most developing countries are still specialised in primary products and prices of commodities are in general now lower in real terms than 40 years ago. The challenge is how to promote stronger internal markets and non-primary industrial development in the South without the negative effects (monopoly, inefficiency, etc.) of protectionist measures. One strategy could be to attract foreign investments to the non-primary sectors. Special attention has to be devoted to avoid the appearance of new monopolies. In Latin America for example, some foreign-owned monopolies are replacing former state-owned inefficient monopolies in the service sector, not resolving what constituted the main problem of the import-substituting strategy.

It is clear that international structural conditions and asymmetries in power or income are not the unique causes of extensive environmental degradation in the South. Many times, corrupt and weak regional or national institutions are directly responsible for environment-degrading activities in developing countries. Undoubtedly, in order to allow the emergence of real participatory democracies and sustainable ways of development in the South, changes in the international conditions have to be accompanied by internal structural and institutional reforms. North–South networks of civil society cooperation can be crucial in promoting this kind of change.

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