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WORKING PAPER SERIES

Environmental Policies And North-South Trade :
A Selected Survey of The Issues

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Working Paper No: 8

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ENVIRONMENTAL POLICIES AND NORTH-SOUTH TRADE:

A SELECTED SURVEY OF THE ISSUES

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I would like to thank the discussant at the Oxford conference, Jong-il You for detailed comments. Manoj Panda, Jyotsna Puri and, above all, Mamta Mittal helped me find background reading material. None of them is responsible for the contents of this paper and for my continued ignorance on these issues.

1. *Introduction*

Concern over environmental issues has come a long way. From being the preserve of some cranks, it has been embraced even by those sections of business whose interests, it would seem, clash with any notion of regulation in the name of the environment. How within such a short time such a sea change has occured is still a bit of a puzzle, but the fact of the matter is that these issues have become popular and where business has to respond to organized public pressures (however imperfectly) it, at least, has to pay lip sympathy to the cause.

If this trend continues then environmental regulation is going to be one of the bigger items on the economic agenda in the near future. The problem with this--even for those who welcome the turnaround in public thinking--is that we do not have either enough factual information about the problems and further very little by way of how to conceptualize the way society should respond to the challenges posed by these issues.

Traditional economic theory would view the problem as a problem of externalities and public goods. Nordhaus refers to the environmental problem as the "grand-daddy of all public goods" (see Nordhaus (1991)). The intergenerational aspects of the problems would also be recognized by economists.But as will become clear later that when we try to go beyond this to the specifics of the issues involved we have almost no guidance from conventional wisdom.

The purpose of this chapter is to look at the interaction between environmental and other policies in the North and the pattern and the level of production and trade in the world. This is too vast an area to survey. We shall therefore restrict ourselves to a selective survey of some of the more important issues involved. The topics that are covered are: a discussion of the intertemporal issues involved (these are, of course, discussed at length

elsewhere in this volume), a brief history of the pattern of North-South trade since the second world war, the relation between pollution and growth, the role of the GATT, alternative tax policies and the gainers and the losers from these, the environmental implications of NAFTA,and the implications of a freer trade in food and coal on world welfare and pollution.

2 *Intertemporal issues*

Let us first look at the intertemporal issues involved in designing and implementing policies to protect the environment. We start off by thinking of the world as a closed economy (which it undoubtedly is!) and posing the question: how would we design policies, assuming for the moment that we can, which trades off our well-being (broadly defined) with those of the coming generations? Here we would need a lot of information about the magnitude and the timing of environmental degradation that is supposed to be taking place. *Ceteris paribus*, one would take more seriously those actions whose deleterious effects are going to be felt relatively soon. If this is accepted, then deforestation in the Third World due to population pressures, for instance, is probably more of a pressing problem than global warming or the disappearance of the ozone layer. This is not to deny for a moment the grave implications of the continued use of CFC's and other polluting gases, but just to remind ourselves that the "cottage industry" of pollution associated with underdevelopment is as important as the "large-scale industry"of pollution asociated with a mature economy, mainly because its costs (and the timings of these) are better documented though they may not make headlines like the depletion of the ozone layer.One should not overlook the fact that to reverse the deforestation that has occured in the Third World is going to be much more of a long drawn out a process than say the ease with which CFC substitutes have been developed. As we shall see below (in section 4) the Third World

countries are very inefficient in their use of energy--the carbon content per unit of GDP there is much higher than the OECD countries. Since the environment is inextricably linked to development in the Third World, any attempt to tackle one of them at a time is bound to fail.

Most environmental issues involve a society trading-off present production and welfare vis-a-vis the future. Some kind of a calculation has to be made about the gain to the future (may be unborn) generations from reducing prodution today. How pure should the environment that is to be handed down be? Remember the environment can left as it is if all production ceased but surely we do not want that. The task of evaluating the trade-offs involved and designing policy responses to these cannot be done by the market mechanism even in å neoclassical world because there firms would maximize expected (discounted) profits without regard to the negative production externality and the future generations are not enfranchised except through altruistic motives of the present generation towards their descendants and their descendants.

Now if we move to a world of nations which do not trade with one another, but each with a planner of the type discussed above. It does not require much by way of sophisticated analysis to see that a poor economy with a large population at or near subsistance levels would find it more difficult to ignore the needs of those currently alive and thus would discount the future more than an economy which is relatively better off. It has a subsistance constraint which is truly binding. This brings us to a fairly important conclusion that even without the complications arising from trade and payments a relatively equitable distribution of initial endowments would make the task of environmental safeguard easier. For the relatively rich a small transfer of resources would not make much of a difference whereas for the poor it would allow them to at least think of the future. The *sine qua non* for this is a recognition on the part of the donor countries that such a transfer is twice

blessed. Whether such a transfer is possible and if possible how it might be effected is discussed below (see section 6).

To summarize, we see that to talk of environmental protection in a meaningful way we have to (1) have some notion of intergenerational trade-offs; (2) a more equitable distribution of the world's resources is likely to make the task of giving some weight to the future easier; (3) this in turn needs a recognition of interdependence; and (4) it would require state intervention since the market cannot be expected to produce efficient outcomes.

3 *A brief overview of North-South trade*

We are quite accustomed to talk about the nations in the South as a homogeneous undifferentiated entity, even though in reality it is not clear that they share many common attributes except a history of being colonized (though even here backgrounds vary). Even for a limited exercise like North-South trade what is common between India and Somalia, South Korea and Saudi Arabia? The debt experience of the various countries in the South has been very different. Their agricultural histories and responses have been diverse. As discussed in Section 4 below their use of polluting inputs is also very different.An ideal disaggregation for the kinds of problems discussed in this paper would be to treat the NIC's(including China) separately. Two other possible distinct blocs would be the OPEC countries and sub-Saharan Africa.

Still we shall not follow the preferred route outlined above and talk of a homogeneous South. The crucial distinguishing feature of the South as a bloc is that it is a net importer of manufactured goods and an exporter of primary goods. Even here the trend is towards a decline in the share of food and agricultural raw materials as a share of the South's exports (this fell from 77% in 1955 to 72% in 1960 to 55% in 1970 to 45% in 1978). The share of

manufacturing now constitutes well over half (58% in 1988) of the South's exports (rising from 10% in 1955 to 13% in 1960 to 27% in 1970 to 45% in 1978). Over 90% of South Korea's exports are manufactured goods. But the South as a whole still remains a net importer of manufactured goods --in 1980 the EC exported 124% more of manufatured goods than its imported (the corresponding figures for the US was 34% and for Japan 241%). Geographical location also matters. For instance in the export of capital goods the North has "divided up" the South among its various members -- Japan exporting to the Asian NIC's, the US to Latin America and Europe to Africa - The slow growth of Africa explains the slow growth of the European capital goods industry (see van Wijnbergen 1985).

In all the studies of North-South interaction the basic asymmetry about the size of the North and the South is highlighted--namely in economic size the North is very large compared to the South and that changes in the South have negligible effects on the North while the converse is not true. This implies that a Southern expansion on its own is likely to peter out, while a coordinated Northern expansion is expansionary worldwide.

It is by now well documented that in the last four decades there has been a secular deterioration in the terms of trade of primary goods producers in the South- the Prebisch hypothesis. This of crucial importance to some parts of the South, like Africa, but increasingly diminishing in importance for the South as a whole with its expanding export of industrial goods.

4 *Economic development and the enviroonment*

Now we come to the main question to be addressed in this paper: what are the implications for Southern production and trade of environmental policies in the North? Before attempting to answer this question we shall look at three points which will serve as a background for the discussion which follows.

First we shall look at the emission figures for greenhouse gases by various countries.The other points are related. Any discussion of the environmental consequences of relocation of production usually leads us to what we might loosely describe as the "cautious" view and the "optimist" view.The optimists point to the ease with which progress has been achieved in some international fora and also the relatively painless adoption of environmentally-friendly new technology by a few countries. The best example of the former is the Montreal protocol on the use of CFCs. A good example of the adoption of new technology is Japan. We look at these two examples in turn.

First let us briefly look at the pollution profile of various countries. These figures are taken from Whalley (1991) and are the fossil fuel emmisions of various countries in 1987. Note that these are not the only sources of environmental degradation (see the discussion on the trade-offs facing various countries and the discussion below on pollution and growth). These figures are however extremely important if the issue global warming is to addressed at all.

In emission per capita the US leads with a figure of 5.03 tons per capita, (the world average being 1.08 tons per capita) followed by Canada, Australia etc..Saudi Arabia is the top among the non-North countries, followed by Poland and South Korea (which at 1.14 tons per capita is just above the world average). Three countries the US, the USSR and China together accounted for over 50% of the total world emission. But in terms of inefficiency of fuel use, calculated as grams of carbon/$ of GNP, China is way ahead of the rest at 2,024, (world average 327) followed by Egypt and India. One thing that is transparent from these figures is that the North is the villain in terms current consumption but that any unregulated transfer of industry to the South could have disastrous environmental consequences. The only thing that seems to be preventing the South from contributing to global pollution more is its

poverty.

Second there is the ease with which the major players reached an agreement on the use of CFCs.The Montreal protocol signed in September 1987 provided for a timetable for a reduction and the ultimate ban on the use of these ozone-layer depleting gases. Can this example be emulated elsewhere? The answer is almost certainly a "no". The first reason is that the market for CFCs is controlled by a few firms who also produce CFC substitutes. Also the ozone depleting nature of CFCs is scientifically well-established. Faced with the prospect of being sued by skin-cancer patients the companies were not unwilling for a switch in technology. A global ban is a facilitating device in that no one then would be able to use CFCs.

Finally there is the example of the remarkable ease i.e.,without a loss of competitiveness with which Japan has been able to switch to clean technology. Japan imports 99.6% of all its oil and 81% of all energy (1987 figures). For the US the figures are 38% and 14% respectively (all figures are taken from Institute of Energy Economics (1992)). In 1987 energy consumption per capita and per unit of GNP was 3.04 tons of oil/person/year and 0.262 tons of oil/$1,000 of GNP for Japan. The corresponding figures for the US are 7.65 and 0.441, the OECD averages being 4.74 and 0.41. Only the Netherlands does better than Japan on these counts. To get an idea of Japanese fuel efficiency over time, we note that the TPER/GNP index fell from a value of 100 at the time of the first oil price shock to 64.4 in 1990.

Japan's position in Asia is also worthy of some comment. China and Nepal have an energy to GNP ratio which is 7 times that of Japan. Thailand and India use 2.5 times energy per unit of GNP than Japan, while South Korea and Malaysia use about twice the amount. In crude steel production Chinese energy consumption is three times that of Japan, whereas India uses 75% more but S.Korea is more efficient by 20% (figures for 1986). In cement China

consumes twice the amount of energy and India 60% more than Japan.

There are however two factors which make it unlikely that the Japanese experience can be emulated by other industrial countries. First there is the almost total dependence on imported oil and the wild gyrations in its price that forced the Japanese to look for energy saving methods much before the environment became important. To the extent other countries have some own sources of energy this becoms less pressing. Second Japan is uniquely placed among OECD countries in terms of its growth rate of output and the level of investment. A high rate of invesment implies a high rate (or the potential of) a high rate of scrapping and the installation of new machinery. This can be seen from any simple model of vintage capital where a faster growing economy would have a higher proportion of new machines using cleaner technology. Western European investment on the other hand has been relatively sluggish and thus the introduction of a clean technology has been more painful.

Let us turn to the main question posed at the beginning of this section. In an internal World Bank memorandum Larry Summers the then Vice- President of that organization wanted to support a migration of dirty industries from North to the South. Three reasons were suggested why this should be encouraged. First, since wages were lower in the South so that lost earnings from death and injury from environmental hazards were lower in the South. Second, richer countries valued the environment more than the poorer countries. And finally, the capital-poor South was less polluted than the capital rich North. So, it was felt, the countries in the South had a better capacity to absorb the dirty industries.

Ignoring for the time being that these reamarks are tinged with racism, this suggestion seems a good starting point to begin an analysis of economic growth, trade and the environment.

En passant, we note that all the three reasons advanced cause

complications for a Heckscher-Ohlin model based explanation. Obviously factor returns are different and factor flows occur in response to these. Tastes are also internationally different (more correctly they are not identical homothetic). This apart from environmental externalities being obviously present.

If dirty industries moved to the South and exported their products to the North then the arguments about eco-dumping become relevant. Eco-dumping occurs when one country (the importing one) forces its producers to internalize the environmental costs whereas the others (the exporting ones) do not.

Further a number of multinationals have in any case produced and sold products which are banned in the North e.g., DDT and asbestos. There is also some evidence that multinational firmslocated in the developing countries observe lower levels of safeguards compared to their units located in the OECD countries.We shall give three examples. The first and the most publicised one is the Bhopal disaster. On the night of December 2-3, 1984 , a gas leak (vapours of methylisocyanate (MIC))from the plant of Union Carbide killed between 2000 to 5000 people and permanently damaged the lungs of 86,000 people. Union Carbide's plant in India had lower standards compared to their plant in West Virginia in the USA. These included inferior vapour detection equipment and a lack of adequately sized and automatically operated emergency equipment.

In the second example in 1982 Mitsubishi a Japanese chemical company set up a plant in a small town in Malaysia. This company disposed of its radioactive thorium waste in plastic bags. Following protests, initially Mitsubishi denied any wrong doing but public and legal pressure forced it to backtrack.

The third example concerns the production and sale of asbestos products.It is legally required in many countries that the seller bears the

responsibility for any failure to warn potential consumers about non-obvious hazard associated with its use. In the US many persons had in fact sued sellers of asbestos products, but the sale of asbestos products continued without proper warning in other countries (see Castleman (1987) for many other examples).

This discussion shows that the mutinational firm which may have been motivated to move to the South for a variety of reasons e.g. low wages, tariff protected domestic markets etc., also enjoy a lower environmental cost. This is a source of worry for trade unionists etc., in the OECD countries that domestic firms might move to less environmentally regulated countries (See the discussion on the GATT below).

Recently a number of US multinationals have tried to ensure the same safety standards at home and abroad. This sometimes could be self-defeating: e.g., in the absence of similar conditions of waste-disposal in a LDC, a multinational decides not to undertake the project at all (see Cairncross (1992),p.9).

This brings us to the another aspect of Larry Summers' argument. Is it really true that the Southern countries have a greater ability to absorb pollution? There are two distinct points here. First, the urban centres in the South where these industries are likely to move are as polluted as the Northern cities (of course life is cheaper in the South!). Delhi, Mexico City or Bangkok are hardly examples of clean air.

Second, different kinds of pollution are associated with different stages of development. Lack of urban sanitation concentration of lead and cadmium in river basins (95% of urban sewage in LDC's is untreated) and high levels of ambient particles and lead are inversely related to the level of income. At a middle level of per capita income we find sulphur dioxide, nitrates, chemical oxygen demand, biological oxygen demand reaching a maximum (i.e.,these have an

inverted u-shaped relationship with per capita income). Here also the turning points vary between pollutants. The very rich dirty their economies differenly. Average per capita carbon-dioxide emissions, which are much less life threatening, peak at very high levels of per capita income (see Cairncross (1992) and Grossman (1993) for some figures). It is undoubtedly true that most developing countries are likely to be more tolerant of pollution than developed countries. Most of the environmental degradation in the South is non-traded and the North is quite content to live with that. It is only pollution crosses over to the South either in traded goods or in terms of global warming potential of deforestation of tropical forests that the North takes notice.

The Southern countries which have embarked on a path of industrialization face a dilemma. They cannot choose the environment over growth initially. So a clean environment has to wait for them to attain a certain standard of living (see the discussion on Japan). But the world just would not be able to bear all the developing countries following the Northern path of growing first. Imagine the amount of CO_2 emissions before China and India attain a per capita income of $ 15,000. Whatever other quibbles one may have with the notion of sustainable development, on this issue, at least, it is difficult to argue against. There has to be some recognition "... of biophysical constraints on growth from the side of finite environmental sources of raw materials and energy or finite environmental sinks for waste matter and energy ." (Daly (1992) p 2).

Environment in the previous paragraph has to be interpreted in a wide sense. There is ample evidence that incomes per capita have to grow before population growth slows down (in the absence of coercion). Since population growth is associated with environmental degradation in poorer countries e.g. deforestation, lack of sanitation, use of chemical fertilizers due to the

pressure on land etc., this constitutes a potential threat to the environment in the South.

5 *The GATT and the environment*

In this section we look at the relationship between the environment and institutional arrangements governing trade. In particular what would happen in the case of an environment related trade dispute? What mechanisms exist to ensure that eco-dumping does not occur? Who will set standards related to the environment?.

The GATT aims to provide a framework for freer trade. It seeks for its signatories equal treatment (the most favoured nation status and non-discrimination) and the gradual removal of barriers to free trade (quotas, tariffs, export subsidies etc.).

The leading players have however not been committed to free trade enough to want to give up all control over trade policy. GATT, therefore, allows for exceptions to the most favoured nation status (e.g., in its treatment of countries with a balance of payments problems) and also allows for situations where the rules can be superseded by "waivers". This reluctance to cede policy autonomy on the part of the leading players also makes GATT relatively toothless. It cannot for instance initiate action against non-compliance.

Non discrimination is a principle as we shall see below which is likely to clash with the likely use of trade policy for environmental ends. A country can impose whatever rules or taxes it likes on its imports as long as domestic production issubjected to the same taxes. It can set product quality but it cannot, as a rule, set process requirements.

There are three areas where trade liberalization espoused by GATT could run foul of environmental considerations. First, countries are concerned about their trading partners being lax in implementing stringent environmental

policies i.e.,"eco-dumping". As mentioned above this causes costs of production to be lower in the countries where the cost of pollution is not internalized. An import duty would be seen to be correcting this distortion if the extent of noninternalization could somhow be calculated. This is, however, in violation of GATT which does not recognize eco-dumping as a valid reason for the suspension of the non-discrimination principle (see Wiemann (1993)).

Internalizing environmental costs is easier said than done. They have not been incorporated in national income accounts. At the micro level the problem is even more difficult. From an international perspective there is the added complication that different countries may have different prefernces for a clean environment (see Daly (1992)).

Second, countries could impose very detailed product standards. A few years ago the EC decided that the hormone content of US beef was too high -to which the US reacted by banning the import of EC agricultural products. In 1991, Germany passed a law requiring companies to take back and recycle their packaging. Cars in Germany may be required to be sent back to their manufacturers at the end of their economic lives. This puts foreign companies at a disadvantage in that their transportation costs are almost doubled. Some other examples of product standards are toxic chemical contents of leather goods and garments, emission standards regulations of motor cars.

If these product standards are applied on domestic and foreign goods (i.e., without discrimination) then these do not violate GATT rules. GATT however does forbid setting process standards i.e., specifying how a good is to be manufactured. In some cases one can infer process standards from product standards. Examples of these are hormone content of meat, toxic content of leather goods. But in most cases such an inference is not possible.

It is of some interest whether within a trading bloc e.g., the EC, whether harmonization of product standards take place and at what level this harmonization takes place. If such harmonization takes place around the high standard countries then it augers well for a world where some countries set high environmental standards. In the E.C. for most products because of disagreements harmonization has not been achieved and the member states have settled for mutual recognition of standards. Thus Denmark is allowed to insist on soft-drinks bottles to be returnable whereas other countries do not (this decision was upheld by the European Court in 1988). In other cases there has been agreement at the EC level e.g., on the Large Combustion Plant directive to get power stations to reduce emission of gases which contribute to acid rain. This movement originated in Germany but was extended to the whole of EC in order to ensure Germany did not lose out as a consequence of its green preferences.

A third area where trade policy may be used in violation of GATT is when countries use such policies to protect Global Commons. Can a country concerned about global environmental consideration use trade restrictions for non-compliers. From the perspective of GATT this is not permissible. To quote from a recent GATT document "...it is not possible under GATT's rules to make access to one's market dependent on the domestic environemntal policies or practices of the exporting country...(This) protects trade relations from degenerating into anarchy through unilateral actions in pursuit of unilaterally defined objectives...however valid they may appear."(GATT(1992), vol. 1, p.24).

Seventeen of the 127 environmental agreements examined by the GATT contain trade provisions. The Montreal protocol, the Basle convention on trade in hazardous waste and the Convention of Trade in Endangered Species (CITES) all rely on trade trade sanctions as the primary deterrent for the countries

violating the agreement.

It should be pointed out that trade restrictions need not solve the problem. First it does not help if the country concerned does not import the good in question (unless an across the board embargo is envisaged). The US does not buy any fish from a country in violation of the International Whaling Convention. It could not have limited itself to a ban on whale meat since it does not import any whale meat anyway.Second, an import ban unless imposed by all importers could just divert the banned products elsewhere. This happened in the tuna-dolphin case (discussed below). As a consequence of the US refusal to buy Mexican tuna, the Italian and Japanese consumers benefited from the fall in its price. Third, a country subject to a trade embargo might switch to producing other products which are not necessarily environmentally friendly. An example of this is the clearing of rain forests for cultivation following the ban on the sale of timber. Finally (a point related to the previous one) a country may process a raw material whose import has been banned. Instead of selling timber the country concerned could start exporting furniture--processing mills in Cote d'Ivoire are estimated to be 30% less efficient than in developed countries.

Given these reasons it is obvious that for the Third World countries to conform to environmental sentiments of the North they have to be adequately compensated. Under the Montreal protocol, for instance, a Global Environment Facility has been set up to compensate developing countries for abstaining from the use of CFCs and other greenhouse gases. Still "...there must at least be an appreciable increase in appropriations for development aid as has been repeatedly promised at international conferences."(Weimann (1993) p.15) Currently OECD countries give about $ 50 billion in official development assistance for all purposes which is about 0.35% of their GNP. Their defense expenditure is about five to six per cent of GNP. There is a lot of scope for

an environmental/peace dividend here.

To prevent trade sanctions from being used for environmental reasons some other cooperative moves have been suggested. One of them could be evironment-related debt relief so that the pollution associated with exports to service debt are kept in check. Obviously this should be conditional on the receiving country taking steps to desist from degrading the environment. A second,possibility is technology transfer from the North to the South.

It goes without saying that the larger is the membership coverage of a treaty the lower the number of non-signatories and the importance of trade sanctions etc., diminishes.

Before leaving this section, let us briefly look at one case which illustrates the conflict between national environmental policies and the GATT. This is the tuna-dolphin case mentioned above.

In the eastern tropical Pacific yellow fin tuna is found. To catch the tuna, however, dolphins also have to be caught, since the tuna congregates under these dolphins. The Americans love to eat tuna but they also adore dolphins. The US has a law called the Marine Mammals Protection Act (MMPA) which forbids it to import tuna from a country whose fleets on average kill dolphins 25% more than the US fleets do i.e. they are (almost) as careful about not killing the dolphins as the Americans. The MMPA to prevent recycling of dolphin-unfriendly tuna catch requires that no tuna be imported from any country buying tuna from a country which does not meet the standards stipulated in the MMPA.

Under pressure from an environmental pressure group in 1991 the US government reluctantly (because it recognized that this would violate the GATT rules) imposed a ban on tuna imports from Mexico, Venezuela and Vanuatu. To prevent "tuna-laundering" Thailand, Japan and the EC were added to the list.

Mexico appealed to a GATT panel which found that the US had violated the

non-discrimination principle. One of the possible exemptions under Article XX of GATT would apply if this ban was to protect a resource if it lay within US territory. This was not the case with the Mexican exports of tuna.

The GATT panel, however, allowed the US to insist on labelling tuna "dolphin-friendly" if they were indeed caught that way. This, the panel felt, was a product information applied without discrimination.

6 *Taxes on carbon emissions*

We now turn to a different issue. If some global agreement was indeed possible on the control of emissions of the greenhouse gases what would would be the distribution of costs and benefits? Three kinds of taxes have been proposed and used in simulations in traditional trade models (see Whalley (1991)). The simulations are based on a target reduction of greenhouse gases by 50%. (1) The first tax proposed is a national-based production tax (i.e., the oil producing countries levy a tax on production). Not surprisingly the gainers here are the oil exporters (their GDP goes up by 10.8%) and the South is the biggest loser (GDP falls by 4.76%). (2) The second tax is a national-based consumption tax (i.e., various governments levy a tax on the consumption of oil by the residents of their countries). This benefits the North the most (their losses are minimized--their GDP falls by 0.63% only) and hurts the oil exporters the most (24.8% decline in GDP).(3) Finally a global tax (on the consunmption of oil with the revenues being redistributed on a per capita basis throughout the world) hurts the North the most because they are the biggest consumers of oil per capita (2.4% of GDP), while the GDP of the South actually rises (by 2.9%). All these taxes imply an overall reduction of world GDP of about 2%.

It is not surprising that while all the taxes imply similar reductions in world GDP the gainers are those who get to keep the revenue. Note the

production-based tax recreates the memories of the 1970's oil price shocks. Also note that a production-based tax increases the welfare of the exporter. Why then cannot nations who have some monopoly power implement this unilaterally? The answer lies in the inability of oil production to move across national boundaries.In general, in a short run trade framework a nation's terms of trade improve following a unilateral tax only if income effects arising from the disbursement of revenues is fairly strong (For details see Table 1 in the Appendix and Winters (1992) for further discussion).

This example although it involves making heroic assumptions serves to highlight the difficulties involved in any negotiations about a cut in the consumption level of green-house gases. This, of course, has been known to international trade theorists for a long time — namely that policies for the same objective could imply very different revenue consequences for different countries.

7 *Trade liberalization and its environmental consequences*

We now turn to a slightly different issue. What would be the environmental consequences of trade liberalization? Two examples are discussed here. The first one is the North American Free Trade Agreement (NAFTA) and the second is as is likely in the light of the recently concluded GATT negotiations a liberalization of world trade in food and coal.

Let us turn to NAFTA first. It raises the usual (i.e., similar to the EC) problems associated with harmonization of standards, dispute resolution mechanism, questions of sovereignty etc.(see Debellevue et. al (1994)). In addition from the perspective of this Chapter we have some possibly interesting projections. Since Mexico, a developing country, is joining an already existing free trade area between two Northern countries, the US and

Canada it may well hold some lessons for the formation of similar blocs elsewhere. The industrial relocation implications of such a union are of concern to both trade unionists in the US and Canada and the policy authorities in Mexico. We shall however confine ourselves to the environmental implications for Mexican agriculture.

Agricultural income is distributed in a very skewed manner in Mexico. Twelve per cent of Mexican farmers receive 54% of the total output. To ease a land shortage the government encourages migration to the tropical forest areas. It is estimated that in the 1980's a quarter of a million acres of forest land was lost as a consequence. But rain forests cannot support agricultural activity for more than five years at a time. Therefore when productivity of these lands falls, people move again. Such land is often converted into cattle ranches, though land is often directly cleared for raising cattle. It is estimated that about two million hectares of land were cleared every year in the 1980's for conversion into cattle pastures. Mexican cattle-raising is much more profitable compared to its US counterpart. It is expected that NAFTA will give a fillip to Mexico's ranching sector thereby accelerating the process of deforestation. Currently only about 10% of land is used for agriculture, while about 45% is used for cattle-raising.

Another important by-product of NAFTA is the expected increase in monoculture agriculture with the attendant increase in the use of pesticides. US appearance quality standards are very high and this increases the amount of pesticides sprayed. Over the last two decades orgonochlorine pesticides e.g., DDT which were found to be detrimental to the environment have been replaced by organophosphorous, carbamates, and piretrine products.There is a trade-off involved in this switch. It reduces the risk to the consumers but the newer pesticides are more toxic and so increase the risk to the farmers. With NAFTA in place this risk to the Mexican farmer is

expected to increase unless some major breakthrough is made on the technological side (see DeBellevue et. al. (1994), p 58).

Overall, at least according to one study, Mexico's economic fortunes after joining NAFTA will not witness a major turnaround. Mexico's trade balance is seen to be deteriorating by about 10%, while its GNP will fall by 0.04%. Its unemployment rate will fall by 0.6%. From an environmental perspective this implies that it is unlikely that Mexico is going to see its economic condition improve so much that it will be in a position to implement tighter environmental standards (DeBellevue et. al. (1994), p 56).

Turning now to the other example of trade liberalization which has major implications for world welfare, the pattern of trade and the environment. The question we ask is: what would be the effect of a liberalization of some of the markets where the North has hitherto adopted a very aggressive protectionist stance? Food is a good example. Another good which is important from an environmental perspective is coal.

Anderson (1992) looks at the world food market in a partial equilibrium framework. His model suggests an inrease in world food prices of the order of 25 per cent if only the advanced countries liberalized. This would lead to the food-producing developing countries gaining $ 17 billion annually, in addition to the liberalizing countries gaining $ 47 billion annually. World grain production is expected to fall and resources would move into meat and dairy products.

What would be the environmental consequences of such a relocation? Chemical fertilizer and pesticide use is positively related to the producer price. One would expect the use of these to fall in the North but increase in the South. Labour migration out of agriculture would fall as a consequence of rising incomes, which should also reduce deforestation for fuel. Liberalization of world coal trade would raise the price of coal and thus

contribute to a switch to other less carbon-intensive fuels. In so far as protected Northern coal has a high sulphur content a reduction in its production is desrable.

8.*Conclusions*

In an attempt to answer the question " What would be the implications of a tighter environmental regulation in the North on the distribution of production and trade in the world ?", we first looked at the problem in an explicitly intertemporal setting and tried to argue that a more equitable distribution of world resources is conducive to the preservation of the environment globally and that the problem encompasses a lot of items which come under the heading of development economics e.g., population control, unemployment. All these contribute directly to a worsening of the environment. It is, however, true that to determine the intertemporal trade-offs we need much better data on the likely effects of pollution than we have at the moment.

We then briefly reviewed the pattern of growth of North-South trade since the Second World War. Here we sawe that notwithstanding the secular deterioration of the South's terms of trade and its debt problem, the South's exports to the North have over time increasingly taken the form of manufactured goods. This trend would only be reinforced by an environment-based relocation of Northern industry.

We then reviewed (some of) the issues invoved in the growth process of developing countries, the trading pattern and the implication of these for the environment. It seems likely that higher growth would cause a deterioration in the global environment under the historically known paths of growth.

This then lead us to try and understand what institutions, if any, exist to ensure orderly growth of trade without environmental degradation.The answer

here seems to be that the GATT has to be modified drastically if such a requirement is to be fulfilled.

In the context of the emissions of green-house gases we looked at the alternative taxes proposed. Given the different effects on different sections of the world's population it seems unlikely that an agreement would be reached soon.

Finally we looked at two types of trade liberalizations and the implications for the environment. The first of these is the formation of NAFTA. This would bring some elements of the North and the South together. Here we saw that Mexico is unlikely to benefit much either in terms of its macroeconomic indicators or in terms of the quality of its environment. The second scenario discussed was that relating to a liberalization of world trade in a few goods and its implication for the environment. Here it seems that a liberalization by the North of its market for food and coal would both raise welfare and improve the environment quality in most parts of the world.

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APPENDIX

TABLE 1

WELFARE EFFECTS OF CARBON TAXES ON VARIOUS REGIONS OF THE WORLD

Average tax rate	Producer Tax	Consumer Tax	Global Tax
($/ton of carbon)	448	448	448
Welfare Change (Equivalent Variation %)			
EC (12)	-4.0	-1.0	-3.8
USA and Canada	-4.3	-3.6	-9.8
Japan	-3.7	0.5	0.9
Oil Exporters	4.5	-18.7	-13.0
Rest of the World	-7.1	-6.8	1.8
World	-4.4	-4.4	-4.2

(Source: Whalley and Wigle (1991))

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