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Trade, Pollution and Environmental Protection

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Introduction: Trade, Pollution and Environmental Quality

In the 1980s and 90s air pollution, acid rain, and global warming became major items on the international agenda, as environmental issues moved beyond domestic policy.[1] This shift reflects growing recognition of the global impact of economic development and the rising problem of international externalities, as hazards spill over national borders and affect the oceans, air, and climate. But just as environmental risks flow through the world's biosphere, so they also flow through the world economy -- and threaten to disrupt it. Environmental risks tend to concentrate in those countries with the least regulation. Some regulatory differences exist among countries at the same stage of development, but in the world as a whole the flow of environmental and health risks runs from the North to the developing nations of the South. The mechanism of this flow is trade.

At the same time, growing consumer concerns about environmental quality and pollution in the North are prompting more attention to environmental hazards from imported products, particularly food. As a result, domestic interests and other producers seeking protection from foreign competition are finding a new source of support in the environmental and consumer movements. Import restrictions, when presented as a public health measure, gain a legitimacy that they might not otherwise enjoy.

These events suggest the new realities created by uneven environmental and health regulation and their links to trade. When nations exchange goods and services, they also trade environmental and health risks. These risks are the opposite of services -- they are environmental and health *disservices* traded across national borders. This trade in disservices is an emerging source of tension in trade negotiations. The United States and other signatories to

the General Agreement on Tariffs and Trade (GATT) are committed to pursuing more open borders in the ongoing Uruguay Round of trade negotiations. But as national health, safety, and environmental regulations grow in importance, different national regulatory priorities pose several related problems for trade and development. These differences have been especially obvious in negotiations over the North American Free Trade Agreement (NAFTA).

In both NAFTA and GATT negotiations, charges have been made that groups in some countries seek to gain competitive advantage over foreign producers by moving production to sites where environmental regulations are less strict. Alternatively, environmental claims have disguised protectionism, as the environment is used as an excuse to keep out imported products. Producers may also try to export products that threaten the health of consumers in foreign countries. All such actions could do unnecessary harm to *both* environmental quality and world trade, unless new international arrangements are devised to resolve the problems.

The Chapter in Review

Five main issues dominate the debate over trade, pollution and the environment, and will serve as the focus of this chapter. The first is how best to capture the interactions of environmental and trade measures from an analytical and modelling standpoint. The second is the potential environmental impact of trade liberalization, both in the regional context of the North American Free Trade Agreement (NAFTA) and in the global trade talks continuing in the General Agreement on Tariffs and Trade (GATT). The third is the possible use of environmental measures as nontariff barriers to trade. The fourth is the relationship between trade agreements under NAFTA and GATT and the variety of international environmental agreements (IEA's), such as the Montreal Protocol agreement to protect atmospheric ozone.

Finally, a variety of institutional issues present themselves as challenges to policymakers.

For professional economists, the first challenge is an analytical one: how to blend the theory of externalities with international trade theory in a way which allows comparisons of both environmental and trade impacts. Currently, approaches to the problem are evolving from partial equilibrium models toward more general equilibrium approaches. Here we will adopt the simpler, but revealing, partial framework.

The second and most politically charged issue is the concern that trade liberalization, whether in NAFTA or under GATT, will lead to increased levels of environmental damages. There are numerous facets of this concern, which has been expressed strongly by a variety of environmental groups and members of Congress. One is the role of trade in allocating economic activities among countries, some of which are polluting; some of which are not. Overall, trade promotes specialization and efficiency, but may also create incentives to export pollution itself. Many environmental concerns also derive from the fact that as trade expands, "scale effects" may cause added pollution. Scale effects are the result of increases in the quantity of goods and services moving within countries and across borders, due to the fact that increases in trade lead to greater transportation needs, higher levels of manufacturing output, and general increases in the demand for raw and processed products which can impose greater wear and tear on natural ecosystems. Among these possible scale effects are increasing consumption of non-renewable natural resources including fossil fuels, minerals, and old-growth forests, and increasing levels of air and water pollution. A particularly striking example often cited by environmental groups is the pollution found in the rapidly growing border region between Mexico and the U.S. (Golden, 1993). It has also been suggested that differences in environmental standards,

especially between North and South, will create "pollution havens" for firms and industries seeking less regulatory oversight, as the composition of goods and services changes. Trade also affects the technologies employed in various countries. Finally, trade may induce policy shifts, either in favor of improved environmental quality, or in the opposite direction.

In contrast to the environmental community's concern over the impacts of more liberal trade, those most directly involved in trade have tended to focus on a third main issue, the potential for protectionism disguised as environmental action. This can occur when a country or trading bloc protects internal markets in the name of environmental health or safety, such as the European Community's decision to ban the import of beef from cattle treated with certain growth hormones. It can also occur when higher levels of environmental standards are used to bar market access to goods and services produced under lower levels of regulation, especially by developing countries. The fundamental issue concerns the ability to distinguish legitimate environmental measures, which may well distort trade, from those which are not only trade distorting but have little basis from an environmental standpoint. Developing such criteria involves complex legal, scientific and institutional issues.

The fourth issue involves the relationship between trade agreements and international environmental agreements (IEAs). In the last decade, a variety of new international agreements have been negotiated in response to global environmental challenges such as ozone depletion, species extinction, protection of Antarctica, and international management of the oceans. The Rio Conference on Environment and Development, held in June, 1992, resulted in a broad new mandate for environmental action, Agenda 21, together with the creation of a new U.N. Commission on Sustainable Development. Some of these agreements call on their signatories to

refrain from trade in certain goods or processes. In the recent NAFTA negotiations, for example, a tri-national commission was created with apparent authority over trade with damaging environmental effects. This commission has authority apart from the GATT, and the existing GATT dispute resolution process. The question is: how are international environmental accords to be balanced with existing or new trade obligations? What body of international law, and which international institutions, should exercise authority over the intersection between multilateral environmental and trade policy?

Finally are a variety of institutional challenges for policymakers. The increasingly competitive trade relations between the United States, the European Community, and Japan are one axis along which institutional issues arise. In some respects, the high income countries of the North are increasingly alike in placing relatively greater value on environmental quality. But these economies are also locked in a high stakes game of competition for global markets, and their governments face domestic pressures to loosen regulatory oversight. Even given their similarities, differences exist in the North not only in scientific and environmental standards, but in culture and social norms, which will continually confront efforts to harmonize environmental regulations. The gap between the environmental regulations along the North/South axis is even wider, accentuating problems of harmonization. The NAFTA negotiations reflect these differences in microcosm, with Mexico attempting rapidly to upgrade its environmental regulations in order to satisfy fears in the U.S. and Canada. How global institutions and domestic policies are altered to deal with these problems will determine how effectively trade and environmental issues will be confronted in the years ahead.

Analytical Issues

The analysis of pollution and environmental quality in an international context poses a variety of challenges. The traditional analytical treatment of pollution in a closed economy (absent trade) involves externalities theory in which one agent imposes external costs on others in ways unreflected by market prices. This "wedge" between market prices and a shadow price reflecting the external effect can be corrected through a Pigouvian tax-cum-subsidy scheme. The complexity of doing so depends in turn on the nature of the external effect.[2] Equivalently, property rights may be redefined and assigned (subject to the costs of these transactions) in such a way that the external effect is made attributable to those who are responsible for it, thus internalizing it (as when two firms are merged). Generalizing from the case of an externality imposed on a few agents, any negative effect imposed on a group of others may be modeled as a public "bad," so that the theory of public goods and bads applies (Mishan, 1971). In cases of a "pure" public bad, external costs are imposed in such a way that all agents consume the same amount of the bad (for example, a given level of pollution, such as particulates in the air). The dilemma is that while each agent consumes the same amount, their individual willingness to pay to reduce the negative effect is not the same. This stands in contrast to the pure private good (or bad) in which each agent pays the same amount, but the quantity consumed differs depending on individual preferences (see Samuelson, 1954). It is the capacity to misrepresent ones' willingness to pay in the case of public goods or bads which leads to the classic "free rider" problem. In the case of pollution, an individual may understate or overstate his or her true willingness to pay for cleanup, since the price mechanism does not reveal true preferences

(Sandler, 1992, Chapter 2).

An alternative and analytically convenient formulation is to treat an external effect from the point of view of a producer rather than a consumer, as an input into production (see Antle and Just, 1992). Here, the analytical consequences depend on how pollution affects the production technology of the firm, rather than the consumers' preferences. While the effect of the externality will be valued by the firm at the margin in a (negative) shadow price, this shadow price typically will not correspond to a market price because the market fails to capture its negative impact.

The already complicated situation arising from these market failures is made even more so when the economy is opened to trade. When negative external effects and bads are traded internationally along with goods, or when they enter as negative inputs into international production processes, what has changed analytically is that the effect is "transboundary" in nature (Livingston, et. al., 1993). Its transboundary nature complicates its resolution. A traditional tax-cum-subsidy scheme in a closed economy, for example, presumes that an authority exists which can levy taxes or pay subsidies, or can redefine and reassign property rights. But when one or more nations are involved, and an international authority capable of levying and enforcing such measures is absent, then the national governments must coordinate their actions. This international coordination problem aggravates the tendency of firms or individuals to free ride by shirking responsibility for the external effect or public bad, since costs are borne in part or in whole by foreign individuals and firms, and become the concern of foreign governments. A classic example is the attempt by the U.S. and Canada to develop a coordinated approach to acid rain arising from U.S. emissions of sulfur dioxide (SO_2) (Mohnen,

1988). There are also important terms of trade effects arising from transboundary externalities, so that the trading interests of nations will be affected by actions taken to regulate them (Brown, et. al., 1993). These terms of trade effects arise from both the costs, and benefits, of internalizing the environmental externality.

Given these complexities, the attempt to integrate externalities theory with the neoclassical theory of international trade is relatively recent (Krutilla, 1991; Merrifield, 1988; Antle and Just, 1992; Anderson, 1992). Here we will develop a simple, partial equilibrium approach, following Anderson (1992).[3] Consider a small country facing both market failures and the prospect of trade liberalization, in which its own actions do not affect the rest of the world.[4] The small country produces or consumes a commodity, such as corn, in which an externality results from the failure of the market to account for the impact of corn production or consumption on the natural environment. An example of a production externality might be soil erosion which reduces the productivity of agricultural lands and lowers water quality. An example of a consumption externality might be water pollution from farm chemicals which raises the risk of water-borne disease (Sullivan, et. al., 1992). The result of the externality is to drive a "wedge" between private and social costs of production, reflected in the divergence of S and S′ in Figure 1. These alternative supply curves measure marginal private and social costs, respectively. The demand curve, D, measures marginal private benefits. The price axis refers to the price of corn relative to all other prices in the economy, which remain constant throughout.

In this case, OQ is the level of corn production without either (a) international trade or (b) measures to "internalize" environmental impacts such as erosion. Production occurs at point e, the intersection of <u>private</u> marginal benefits and costs. Net <u>social</u> welfare is given as the sum of

producer and consumer surplus, minus the social costs of the external effect, or abe – ade. Now assume that the country shifts from autarchy (no trade), to open trade. If OP_0 is the prevailing international (border) price, as in Figure 1(a), production would fall to OQ_m, consumption would rise to OC_m and Q_mC_m units of corn would be imported. Net social welfare is now abfg – ahg, and the welfare gain is defgh. This gain from trade is both positive and greater than it would have been if no externality had existed in the form of erosion, by the shaded area degh. In effect, the country benefits because it imports corn more cheaply than it can producer it, and benefits by reducing soil erosion as well. Imports are "substitutes" for erosion.

On the other hand, suppose OP_1 is the prevailing international (border) price, as in Figure 1(b). The country would thus become a net exporter of C_xQ_x units of corn if it moved to open trade. Net social welfare would be abik – amk, so the welfare effect of trade liberalization without any action to internalize the effects of erosion would be eik – edmk, which could be a net gain or net loss, depending on the relative magnitude of the gain from trade versus the loss from increased erosion as production expanded from Q to Q_x.

Several propositions follow from this analysis. The first is that liberalizing trade in a good with adverse environmental impacts which are left uncontrolled improves a small country's welfare if following liberalization it imports the good; but if it exports it, the negative environmental effects are subtracted from the gains from trade, and the welfare effect is ambiguous. By importing the polluting good, a country lets some other country worry about its polluting properties. By exporting it, it continues to face the social cost of these externalities in the home market.

Now suppose that instead of leaving erosion uncontrolled, the small country combined

trade reform with an environmental policy intervention sufficient to internalize the externality. Such an intervention could take the form of a tax, charge, or equivalent regulation or change in property rights.[5] Given such an environmental policy intervention, the gain from trade liberalization is qcf in Figure 1(a) and cij in Figure 1(b), depending on whether corn is imported or exported. In contrast to the situation in which no environmental intervention occurs, this is a net gain in either the importing or exporting case.

It is important to note, however, that without environmental intervention, the benefits of liberalization for the exporter would be even greater, by cde. Hence, an incentive exists for net exporters to forego environmental interventions because the benefits from trade are reduced somewhat by the production declines resulting from such environmental policy interventions. In this restricted sense, it is accurate to say that environmental interventions reduce an exporting nation's "competitiveness." But the larger loss is in net welfare, in that without such interventions, it is not clear that expanded exports will improve net welfare at all. However, whether a small country is an importer or an exporter, there is a welfare gain from trade provided that a targeted (nearly optimal) environmental policy is introduced.

A third proposition concerns the relative efficacy of trade and environmental policy instruments. Suppose that instead of targeted environmental policy interventions aimed at erosion control, it was proposed to use a trade instrument such as an export tax aimed at the same target. This is shown in Figure 1(b). An export tax could be used equal to js to lower the price producers receive from P_1 to P_1', reducing production and lowering exports form C_xQ_x to $C_x'Q_x'$. This would lower the marginal cost of production to a level equivalent to an environmental intervention, producing a welfare gain of shaded area jmk. But the export tax

causes consumers to pay $P_1'P_1$ below the opportunity cost of OP_1, leading to a deadweight welfare loss due to excess domestic consumption C_xC_x', equal to the shaded area iuv. Hence, using a trade policy instrument reduces environmental degradation as much as an environmental tax set at the same rate, but at higher cost. Trade instruments can thus be used to reduce environmental degradation by a given amount, but they generally will improve welfare less than a more direct intervention at the source of the environmental pollution, and may even worsen welfare.

Moving from the small to the large country case, it is possible that the liberalization and/or environmental policies undertaken will affect world prices, so that the price lines in Figures 1(a) and 1(b) are no longer horizontal. Moreover, the environmental policies and polluting activities of large countries such as the United States or European Community will have global impacts, spilling over and ultimately back into home markets and welfare. Finally, policy changes in large countries may have demonstration or leadership effects on other countries.

In summary, the welfare effects of liberalizing trade are ambiguous if environmental externalities are left uncontrolled; but if they are largely internalized by an appropriately targeted environmental policy, the joint "liberalization effect" and "environmental effect" on welfare is positive. Simple welfare analysis thus offers a rudimentary analytical foundation for issues in trade and the environment. At an empirical level, however, there is still very little understanding of the effects of trade liberalization on the environment, and how different commodities and countries will be affected. Trade liberalization is also unlikely to be total or all inclusive, so that distortions and adverse environmental impacts will remain. This analytical exercise demonstrates an important overriding lesson: environmental externalities influence the

welfare outcomes of trade; and trade influences the way in which externalities are borne and resolved. This interdependence requires further analysis, not only at the level of theory, but in terms of recent experience and empirical research.

The Environmental Impacts of Trade

The impacts of trade on environmental quality have been an important focus of opposition to trade liberalization, especially in the context of the North American Free Trade Agreement (NAFTA) and the Uruguay Round of the General Agreement on Tariffs and Trade (GATT). However, most claims about the negative environmental impacts of trade liberalization have been based on limited evidence. In fact, the impacts of trade on the environment vary greatly in degree and by location. In agriculture, for example, there is evidence that reducing subsidies and trade distortions would often help to reduce environmental damages by lowering fertilizer and pesticide use and increasing the efficiency with which soil and water resources are used (Runge, 1990; Harold and Runge, 1993).

In the industrial border region of Mexico,[6] by contrast, limited investment in wastewater treatment and hazardous waste disposal has created serious environmental damages resulting from foreign investments. These damages reflect a failure to address the environmental externalities of larger scale U.S./Mexico trade. Yet the NAFTA process has also brought these problems to wider attention, stimulating new environmental investments and the enforcement of stricter standards that would be less likely under a situation of no trade. These investments are part of the trade impacts of NAFTA's environmental "side agreement;" stricter standards will be overseen by the North American Commission on Environment (NACE), an institutional by-product of trade liberalization. As trade growth raises incomes, demands for a cleaner

environment also tend to rise, and new regulatory constraints induce technological innovations which are more environmentally benign (Runge, 1987; Grossman and Kreuger, 1991).

Five separate impacts of trade growth on the environment may be distinguished. These effects are (1) on allocative efficiency; (2) on scale; (3) on the composition of output; (4) on technology; (5) on policy. The overall effect of trade on the environment is the sum of these separate impacts, which may be positive or negative, depending on the case examined.

Allocative Efficiency

Since Adam Smith (1776) first analyzed the impact of trade on production, it has been observed that greater allocative efficiency results when countries specialize in producing those things for which they have a natural advantage, and then trade with other nations for other products, rather than attempting to produce all of the products in demand at home. Formalized as the theory of comparative advantage, it predicts that countries will utilize their natural and human resources in such a way that abundant resources will be used more in the production of goods and services than scarce resources, which will be conserved. To the extent that these "factor proportions" rule, trade will promote allocative efficiency by inducing patterns of production which are less wasteful than if every country tried to produce a full range of goods and services itself.

In this sense, more open trade leads to higher levels of economic satisfaction than inward-looking policies closed to trade, and reduces waste of scarce resources. This efficiency in production and exchange means that, for a given endowment of resources, trade will be less wasteful than autarchy, the absence of trade. The best empirical evidence of the wastefulness

arising from closed economies comes from Eastern Europe and the former Soviet Union, where "self-sufficiency" often justified widespread environmental destruction (Boyd, 1993). Less dramatic, but substantial, environmental damage has resulted from the European Community's drive for self-sufficiency in agriculture (Hartmann and Matthews, 1993). However, the exercise of comparative advantage and more open trade is itself not inconsistent with overexploitation of *globally* scarce resources. If country A is endowed with locally abundant resources S and trades them to country B in return for locally abundant resources W, it may still be true that S or W, while locally abundant, are globally scarce, and would be better conserved than traded. The former Soviet Union, to take a recent example, has offered opportunities to Western game hunters to hunt a variety of globally endangered species, at prices driven low by foreign currency scarcity and internal competition (Schapiro, 1993). If these hunting opportunities are traded because of their relative abundance in the Soviet Union, it does not diminish the fact that they deplete globally scarce endangered species.[7] The relative efficiency of comparative advantage and trade is just that: relative.

Scale

Granting the allocative efficiency of trade relative to no trade, there is still little question that the scale of economic activity in a world with no trade would probably be much lower, and in this limited sense would impose less wear and tear on the environment. As a mental experiment, such a world would somewhat resemble turning back the clock three or four hundred years, eliminating rail and road transportation based on hydrocarbon fuels, international air travel and transport, and returning largely to locally-based agricultural subsistence. Obviously, it is not possible to turn back the clock; and eliminating trade in the face of today's

population levels would probably lead to a global economic and ecological catastrophe, as a population many times that of three or four centuries ago attempted unsuccessfully to revert to local subsistence. The role of increased trade in supporting income growth per capita, and thus supporting higher levels of employment for growing populations is clear. In the U.S., for example, it is estimated that without the growth in U.S. exports (which doubled between 1985 and 1992), the 1990-93 recession would have been twice as deep, with 100% higher levels of unemployment than in fact occured. Trade growth has been especially notable with developing countries. U.S. export sales to developing countries, according to the U.S. Department of Commerce, rose to $167 billion in 1992, up 14 percent from 1991, largely offsetting weak demand from Japan and the European Community. Exports to developing countries increased in 1992 to 37 percent of total, up from 32 percent in 1990 (Greenhouse, 1993).

As this trade growth increases GDP per capita, does the scale of economic activity do damage to the environment in the same or similar proportions? The question of *scale* can be thought of in the following sense: as growth in GDP per capita occurs (due in part to trade), does pollution increase at the same, decreasing, or an increasing rate, or does it actually decrease? Grossman and Kreuger (1991) report evidence that when a cross-section of countries was studied over time, pollution measured by particulates and SO_2 increased at a decreasing rate with GDP per capita up to a threshold of about $5,000 U.S. dollars a year, then decreased, although the total began increasing again at higher income levels (Figure 2). This nonlinear relationship between the scale of economic activity and the level of pollution suggests that other forces are at work, influencing how growth due in part to trade affects levels of environmental quality. These include the composition of output, technology, and policy decisions.

Composition of Output

Environmental impacts of trade due to the composition of output can occur when increases in GDP lead to reduced heavy manufactures with large levels of pollution and shifts to higher levels of services with lower levels of pollution. This change in the composition of output may influence total pollution levels, offsetting some of the scale effects of economic growth through trade. The relative growth of the services versus the manufacturing sector in the higher income nations, coupled with their decreasing per capita levels of certain pollutants, suggests that shifts in the composition of output may play a role (see Dean, 1992).

Technology

A fourth way in which trade may affect the environment is through induced technological innovations. As increased value is given to environmental quality with increases in income, markets for "green" technologies may develop and grow. These environmental technologies (such as wastewater treatment or materials recycling) may also be accompanied by changes in traditional technologies (such as shifts toward more energy efficient and less polluting steel production) which lower the overall level of residuals and hazards from manufacturing processes. Some companies have found that new waste reduction technologies are highly profitable. In 1986, for example, Dow Chemical launched its Waste Reduction Always Pays (WRAP) program, credited with saving millions of dollars. Similar efforts are underway at other companies, including Minnesota Mining and Manufacturing (3-M) and Shell Oil (Rice, 1993). These experiences suggest that incentives for environmentally beneficial technological innovation may be greater at larger, more integrated manufacturing firms.

Policy

All of the environmental effects of trade discussed above, whether arising from allocative efficiency, scale, composition of output, or technology, operate in the context of government policies. Indeed, there is reason to believe that without the increasing stringency of environmental regulation, many of the incentives to alter the character and methods of production so as to reduce waste and pollution would be far weaker. While trade may encourage greater allocative efficiency, the negative scale effects of economic growth on the environment are only offset by composition and technology to a degree largely determined by the regulatory framework. It is the political will to impose such discipline on environmental externalities which ensures that trade liberalization is ultimately welfare-enhancing. In the U.S., for example, since 1986 the Environmental Protection Agency (EPA) has required a Toxic Release Inventory (TRI), in which plants of 10,000 U.S. manufacturers report annual releases from their facilities into the air, ground and water of some 317 toxic chemicals. These include asbestos, freon, and PCBs, as well as 20 toxic chemical categories such as lead compounds. As this list continues to grow, companies and the public have an increasing basis to "keep score," utilizing measures such as TRI releases per dollar of sales. Dow Chemical, for example, eliminated practices of injecting hazardous wastes underground before the TRI began, reducing this ratio, while Du Pont chemical failed to do so (Rice, 1993, p. 115). On the one hand, this regulatory framework creates a quantitative basis for reducing emissions. On the other hand, it can create incentives to move production to foreign plants where such oversight is less stringent.

Total Effects

The sum of these effects of trade on the environment may be positive or negative, depending on the industry or pollutant involved. Schematically, we can think of trade as inducing allocative efficiency, which in turn leads to economic growth and increased GDP per capital, with attendant negative scale effects. These scale effects may lead to increases in demands for environment protection and policies to accomplish this protection, inducing changing output composition and production technologies which in turn diminish negative externalities (see Figure 3). However, in many cases this chain of events is broken by failures to develop and enforce regulations leading to the internalization of externalities. Where demands for environmental protection are not expressed or heard, as in many poor developing countries, changes in policy leading to changes in composition and technology may not occur.

This was the situation until relatively recently in Mexico. However, one of the most interesting and potentially beneficial consequences of the NAFTA has been to help induce institutional changes both in Mexico and under the trilateral "side-agreement" to NAFTA. These changes will help to develop more stringent levels of environmental protection and enforcement in Mexico as well as in the U.S. and Canada. This "environmental conditionality" represents an important new chapter in the evolution of institutional responses to the interaction of trade and environment (see Runge, 1994). We turn now to the opposite side of the trade/environment nexus, the impact of domestic environmental regulations on trade, and their role as disguised forms of trade protection.

Environmental Measures and Trade Burdens

When domestic environmental measures lead to claims of trade harm, it is generally because a burden has been imposed on individuals or firms seeking to export or import goods or services in the name of domestic (and sometimes global) environmental protection. The question is whether the environmental measure is justified primarily as a form of necessary environmental protection, or is a disguised restriction to trade, in which harmful trade effects loom proportionately larger than beneficial environmental effects.

The issue of whether a government environmental regulation is a nontariff trade barrier is a question faced domestically in the U.S. by the states under the commerce clause of the U.S. Constitution, and by the 12 member states in the European Community under the Treaty of Rome. Such questions typically break down into two parts: (1) does the measure create a burden on trade? (2) is the burden justified by the environmental benefits of the regulation? From a legal perspective the apparent burden imposed on trade is a "gateway concept." If a burden appears to be present, it opens the way to further inquiry as to its justification, in which its benefits for the environment are weighed against its harm to trade (Hudec and Farber, 1992). If "no burden" is found, then the trade effects of the regulation are not at issue (see Figure 4).

While nearly all environmental regulations impose some differential burdens on commercial transactions, to be trade-related this differential must exist between some foreign producers and their domestic competition. This differential may be relatively easy to see, as when foreign products are subjected to obviously different standards compared with domestic products. Under Section 337 of the 1930 Trade Act, for example, certain trade cases for foreign violators are heard before the International Trade Commission (ITC), while cases against U.S.

firms charged with similar violations are sent to U.S. courts. In general, going before the ITC is regarded as more burdensome to the defendant. Not every differential rule clearly constitutes a burden, however, even though domestic and foreign products are treated differently. Auto safety glass inspected at U.S. auto manufacturers' factories is different from inspections of foreign vehicles' windshields at the border, but the border inspections do not appear to create a differential burden.

Less obvious are standards which appear neutral on their face, but have a differential impact on foreign and domestic products. Provisions of the 1985 Farm Bill sought to apply sanitary processing and inspection standards to chicken from outside the U.S. that were "the same" as those standards used domestically ("the same" standards were substituted for previous language by members of Congress from Arkansas). The previous language had called for foreign standards "at least equal to" those used domestically. In a case brought before the federal court for the Southern District of Mississippi, the language calling for "the same" standard was upheld, despite warnings from the Department of Agriculture that "such a definitional finding would augur dire foreign trade implications...".[8]

Overall, balancing legal and economic judgements must be made in order to extend the regulation of environmental risk into the international arena. Where trade measures lead to environmental risks, these risks can be remedied through regulations. However many such risks are not subject to regulations in the home market, and may require negotiations with other countries, whether bilaterally or trilaterally as in NAFTA, or multilaterally, through international agreements. Where environmental actions lead to trade distortion, then the burden on trade must be assessed in relation to the environmental benefits, to determine if the trade burden is justified.

Again, the decision that a trade-distorting environmental regulation is justified cannot be wholly unilateral. Consultation and agreement with other countries is likely to be necessary.

Environment-Trade Interactions: The Montreal Protocol

As the number of international environmental agreements (IEAs) has grown in recent years, new questions have arisen concerning the relationship between these agreements and existing or future trade obligations in GATT (see Wirth, 1992). First, there is the question of whether countries are parties or non-parties to the treaties, such as the Montreal Protocol affecting chlorofluorocarbon and halon emissions damaging to atmospheric ozone. The Montreal Protocol, signed in 1987 and amended by the London Amendments in 1990, commits the signatory parties to study the feasibility of a ban applied to nonmember countries against imports of products made with a process that uses the ozone-depleting chemicals, as well as various other actions affecting trade in these products. In January, 1993, for example, signatories were scheduled to ban the export of these substances to non-parties.[9] However, fewer than 20 countries were signatories by 1992, whereas over 100 countries are signatories to the GATT Articles. If countries are parties to GATT, with all of the trade obligations that this implies; and are also parties to the Montreal Protocol, with all of the environmental obligations this implies, then what if these obligations conflict? Alternatively, what if countries who have signed the Montreal Protocol take trade actions to ban imports from countries who have not signed the Protocol? Clearly, principles must be established to determine matters of priority and consistency.

In addition to the question of obligations under various treaties to which countries are pledged, there is the question of "extrajurisdictionality", or whether countries have rights to

impose trade measures in response to the environmental policies of other countries. This issue has come to the forefront with the U.S./Mexico dispute over whether the U.S. can, under GATT, ban imports of tuna caught with fishing methods which kill dolphins in the process, even if these actions are taken outside the territorial jurisdiction of the United States.

A third question, related to the first two, is the legal standing of IEAs versus GATT obligations. While the Vienna Convention on the Law of Treaties provides general rules on the relationship of successive treaties, notably that the treaty "later in time" prevails,[10] the rule applies only where the two treaties address the same subject matter. In the case of a party to both the Montreal Protocol and GATT, for example, the section of the Protocol banning imports of substances produced with ozone depleting chemicals would prevail over any inconsistent provisions of GATT (assuming the GATT Articles are considered a treaty). While the "later in time" rule of the Vienna Convention allows subsequent environmental agreements to "trump" trade obligations, some feel it may make it too easy to override trade rules in the name of these objectives (Housman, 1992, p. 3). In cases in which a country is not a party to the IEA, the Vienna Convention (Article 34) states that an IEA that is later in time cannot bind non-party states without their consent, unless the treaty rules becomes customary international law (see Jackson, 1992).

In response to this lack of definition and clarity, some leading authorities have proposed a "waiver" for IEAs, at least temporarily, until better definitions and understanding can be worked out. A waiver limited to say, five years, could include specific current IEAs and provide for future ones as well. In addition to the Montreal Protocol, such a waiver might initially include two other major environmental agreements, the Convention on International Trade in

Endangered Species of Wild Flora and Fauna,[11] and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal.[12]

In summary, there is currently no consensus on the complicated intermeshing of trade obligations and IEAs. The critical questions include treatment of parties and non-parties, the reach of extraterritorial actions to protect the environment, the standing of IEAs versus GATT obligations, and the issue of a waiver for IEAs until some of these questions can be answered more clearly and definitively.

Institutional Issues

As the 20th Century draws to a close, two global trends are converging. The first, and most powerful, is the increasing integration of the world economy, and the resulting interdependence of domestic and international policies affecting trade in goods and services. This trend creates both greater trade frictions, and greater opportunities to develop mutually beneficial trading relationships. It also tests the rules of trade developed under the auspices of the GATT and regional trading arrangements such as the EC and the NAFTA.

The second global trend is the increasing value placed on protection of the environment, and the need for national and international policies of environmental preservation to minimize the bads and disservices that trade can bring. Despite differences in the emphasis given to environment in the North versus the South, there is little doubt that environmental issues will continue to dominate international discussion, including North-South dialogues, in the year ahead, especially given the transformation and diminished security threats posed by East-West relations.

These two global trends are now intertwining in complex ways. These complexities have been the subject of this paper. Yet despite the many technical issues involved, an important and simple complementarity also exists (Repetto, 1993). In much the same way that international trade rules have evolved in and outside of GATT in response to global economic interdependence, so new international environmental rules are now evolving in response to global environmental interdependence. Out of this mutual evolution an opportunity arises to link the objectives of market integration with environmental protection. Curiously, because the gap between environmental standards in the North and South is so great, it is precisely along the North/South axis that the opportunity for such linkage is also greatest.

In the same way that differences in resource endowments create gains from trade between dissimilar nations, so differences in levels of development and environmental protection can create complementaries built on incentives to exchange market access to the North in return for commitments to raise environmental standards in the South. The essential bargain in the making is to link one of the primary objectives of the Uruguay Round of GATT (more open market access) with the objective of raised levels of environmental protection. This is precisely what the negotiations over an environmental side-agreement to NAFTA have reflected: a promise of access to the markets of North America in return for a commitment to environmental improvements and enforcement. What the NAFTA experience suggests most clearly, however, is that trade rules alone are inadequate to the task: environmental rules are also required. And where such rules are developed, new institutions will be required to monitor and enforce them.

For more than a decade, the U.S. relinquished its role as a leader in international environmental affairs, while continuing aggressively to pursue both regional and multilateral

trade agreements. The consequence was to open it to criticism that freer trade was being pursued without regard to its environmental consequences. Restoring balance in the relationship between free trade and a protected environment now requires that the U.S. undertake comparable efforts to create new rules for international environmental policy. In many respects, the opportunity to take the lead in this arena fits naturally with the redefinition of international security resulting from the end of the Cold War.

Both trade and the environment have emerged in the Post Cold War era as issues of primary importance, leading to a new sense of international security, defined in economic and ecological terms (Mathews, 1989). Yet until recently ecological security has often been regarded as competitive with economic prosperity, creating an either/or proposition for policymakers. While trade-offs will often be necessary between environmental quality and unrestrained trade, it is increasingly clear that many areas of complementarity exist as well (see Freeman, 1992). In order to exploit this complementarity, it will be necessary to develop rules and incentives for environmental protection at both national and international levels which accomplish their objectives with as few burdens for market forces as is feasible; conversely, market expansion must proceed within constraints which protect nations from the negative externalities of economic activity.

In this process, the U.S. will need to take the lead, as reflected in negotiations over an environmental side-agreement to NAFTA. Despite progress in the European Community on both economic and environmental grounds, the unified Europe and new European leadership promoted early in the decade has not emerged (see Krause, 1991). Japan, clearly a powerful force in trade, and a leader in some areas of environmental control technologies, has not yet fully

embraced the Uruguay Round goals of market access and the Rio Conference objective of global environmental improvement. By contrast, the North American Free Trade Agreement and its side-agreements, if successful, offer in microcosm precisely the sort of complementarity between trade liberalization and environmental protection possible on a global scale.

There is unlikely to be so lasting a set of institutional issues and challenges for this and future governments than to achieve a new balance between trade and environmental interests, both North and South. In contrast to the balance of destructive forces which has dominated negotiations between nations in the post-war era, this new balance is one of welfare improvements from both economic and environmental sources. To achieve such an equilibrium would reward the welfare of this generation, and generations to come, with continued prosperity and improved environmental quality.

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Footnotes

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[1]The material in this section draws on C. Ford Runge, "Environmental Risk and the World Economy." The American Prospect 1(Spring, 1990): 114-118, and C. Ford Runge, et. al., Free Trade, Protected Environment: Balancing Trade Liberalization and Environmental Interests. New York: Council on Foreign Relations, 1994.

[2]Marchand and Russell (1973), following Davis and Whinston (1962), for example, show that if an external effect is not additively separable in its arguments, then a constant Pigouvian tax or subsidy is infeasible: the tax-cum-subsidy must vary at the margin. See J. R. Marchand and K. P. Russell, "Externalities, Liability, Separability and Resource Allocation," American Economic Review 63 (September, 1973): 611-620. O. A. Davis and A. B. Whinston, "Externalities, Welfare, and the Theory of Games," Journal of Political Economy 70(1962): 241-62.

[3]This approach is based in part on K. Anderson. "The Standard Welfare Economics of Policies Affecting Trade and the Environment," in The Greening of World Trade Issues, K. Anderson and R. Blackhurst (eds.), Ann Arbor, MI: The University of Michigan Press, 1992, pp. 25-48.

[4]The assumptions underlying the model include the usual ones of partial equilibrium analysis in a trade setting (see J. P. Houck, The Elements of Agricultural Trade Policies. New York: Macmillan. 1986.), augmented by standard externalities theory. While subject to

criticism by advocates of empirical general equilibrium analysis [see M. Hazilla and R. J. Kopp. "Social Cost of Environmental Quality Regulations: A General Equilibrium Analysis." Journal of Political Economy 98:4 (1990): 853-873; and J. D. Merrifield, "The Impact of Selected Abatement Strategies on Transnational Pollution, the Terms of Trade, and Factor Rewards: A General Equilibrium Approach." Journal of Environmental Economics and Management 15(1988): 259-284], the approach is sufficient for clarifying analytical issues of relevance to public and environmental policy. Among the key underlying assumptions are that (1) transactions costs prevent spontaneous negotiated "internalization" of the external effect, ruling out a "Coasian" solution; that taxes-cum-subsidies are lump sum (nondistorting); that the externality can be accurately measured; that it is a "product" rather than "process" externality; that all curves are linear and that the externality begins with the first unit of production; and that the marginal benefit and cost curves fully incorporate feedback effects from the rest of the economy. See K. Anderson, "The Standard Welfare Economics of Policies Affecting Trade and the Environment," in The Greening of World Trade Issues, K. Anderson and R. Blackhurst (eds.), Ann Arbor, MI: The University of Michigan Press, 1992, pp. 25-48.

[5]See Peter J. Lloyd, "The Problem of Optimal Environmental Policy Choice," in The Greening of World Trade Issues, K. Anderson and R. Blackhurst (eds.), Ann Arbor, MI: The University of Michigan Press, 1992, pp. 49-72, 1992. The "equivalence" of these measures is of course not guaranteed in practice as discussed in W. J. Baumol and W. E. Oates. The Theory of Environmental Policy: Externalities, Public Outlays, and the Quality of Life. Englewood Cliffs, NJ: Prentice Hall, 1975. The effect of such a policy would be to eliminate the "wedge" between S' and S, so that marginal social costs of production would equal marginal social benefits. In

the case of no trade, such intervention would be equivalent to a tax of cn per unit, which would reduce corn production from OQ to OQ_0 in Figure 1(a). The welfare benefit from internalizing the externality would be the shaded area cde, due to the reduced erosion resulting from the production fall. From a welfare perspective, we can thus isolate a welfare improvement due to the "environmental effect," of targeted environmental intervention, assuming no "liberalization effect."

[6]This area is often referred to as the "maquiladora sector." A maquiladora is a foreign-owned plant in Mexico subject to duty free import of raw materials, in which finished products are exported duty free except for value added in Mexico. See Malissa H. McKeith, "The Environment and Free Trade: Meeting Halfway at the Mexican Border." Pacific Basin Law Journal 10:1(1991): 183-211.

[7]Valentin Ilyachenko, chief of the International Department of Conventions and Licenses in the Russian Ministry of Ecology in Moscow, noted competition such "that the prices for foreign hunters are actually going down. You can pay the equivalent of a VCR in the West for a Russian brown bear." He continues, "we have the same problem with animal trophies as we have with our rare religious icons being sold on the streets of Moscow and St. Petersburg. As the prices for a hunt get lower and lower, we are trading off our natural resources for next to nothing" (Schapiro, 1993, p. 24).

[8]International Trade Reporter. May 27, 1992. (*Mississippi Poultry Association Inc. v. Madigan*, No. J91-0086(W), DC SMiss 4/23/92).

[9]The Montreal Protocol on Substances that Deplete the Ozone Layer, adopted and opened for signature Sept. 16, 1987, reprinted in 26 I.L.M. 1541 (1987) (entered into force January 1, 1989). See U.S. Congress, Office of Technology Assessment, Chapter 3, pp. 42-46.

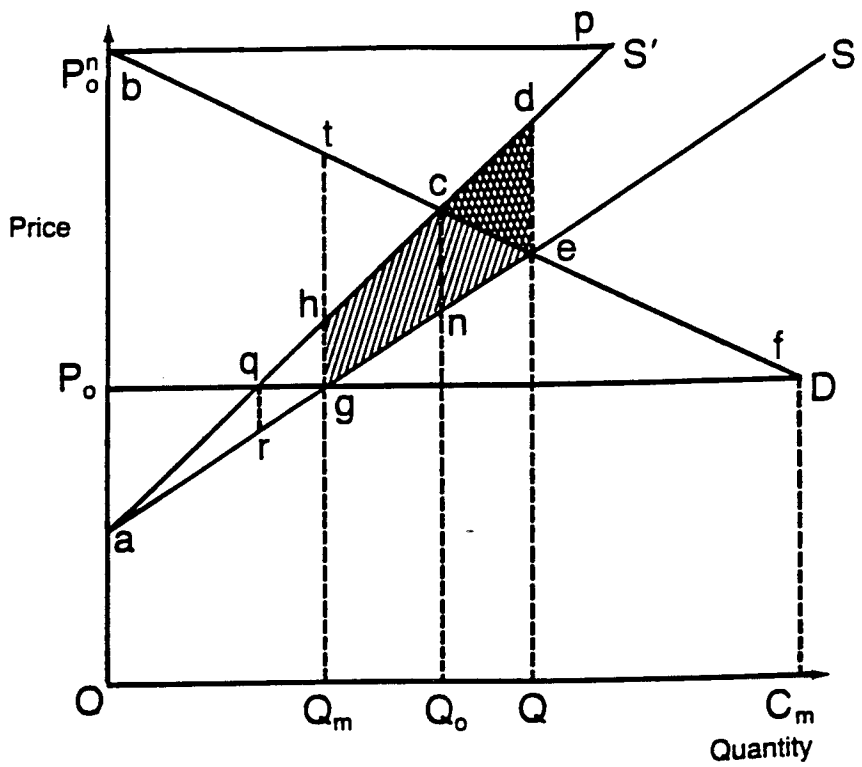
[10]Vienna Convention on the Law of Treaties, opened for signature May 23, 1969, UN Doc. A/COIF. 39/27, 8 I.L.M. 679, Article 30, 8 I.L.M. at 691. For a general discussion, see Robert F. Housman and D. Zaelke, "Trade, Environment and Sustainable Development: A Primer." Hastings International and Comparative Law Review, Vol. 15 (Summer, 1992): 535-612.

[11]The Convention on International Trade in Endangered Species of Wild Flora and Fauna, March 3, 1973, 27 U.S.T. 1087, T.I.A.S. No. 8249, 993 U.N.T.S. 243.

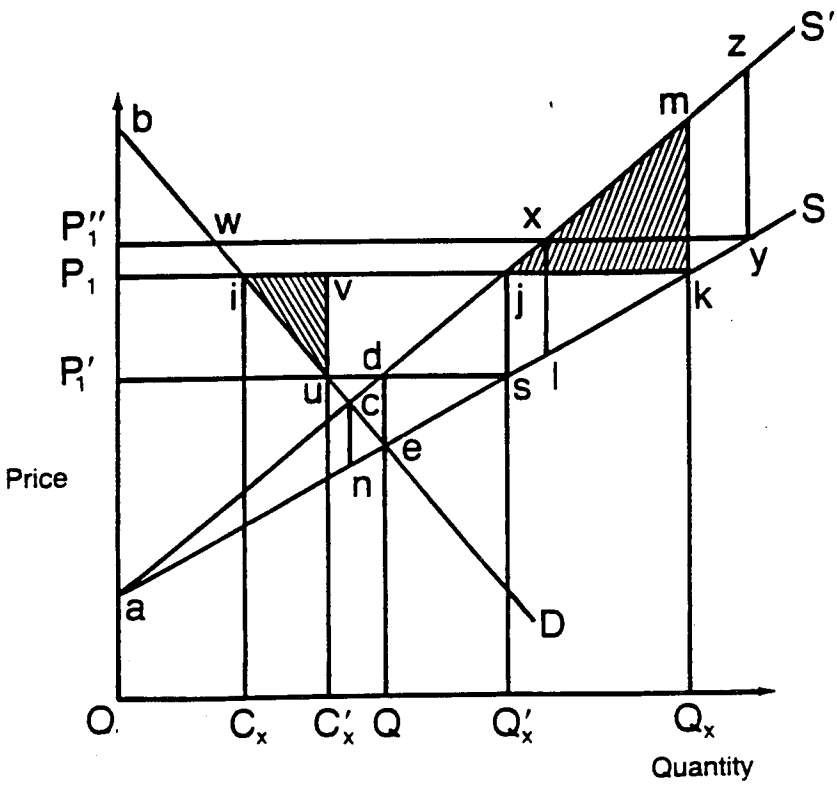
[12]The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, adopted and opened for signature March 22, 1989, reprinted in UNEP/I.G. 80/3, 28 I.L.M. 649 (1989) (entered into force May, 1992).

Figure 1. Effects of opening up a small economy to trade in a product whose production is pollutive

(a) Importable

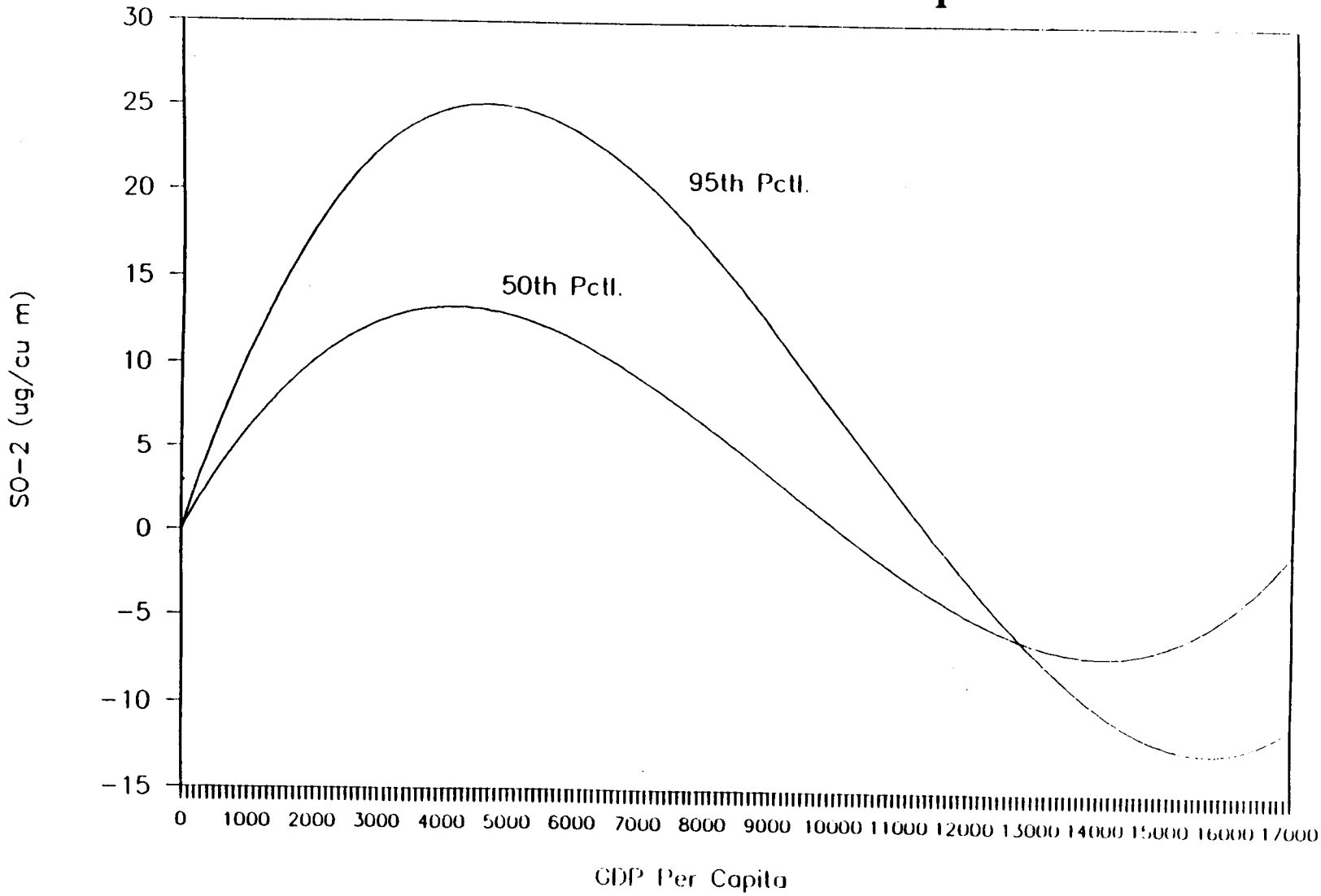


(b) Exportable



Source:
K. Anderson (1992), p. 28.

Figure 2
SO-2 vs. GDP Per Capita



Source: G. M. Grossman and A. B. Krueger, 1991, p. 42.

Figure 3

Trade Impacts on the Environment

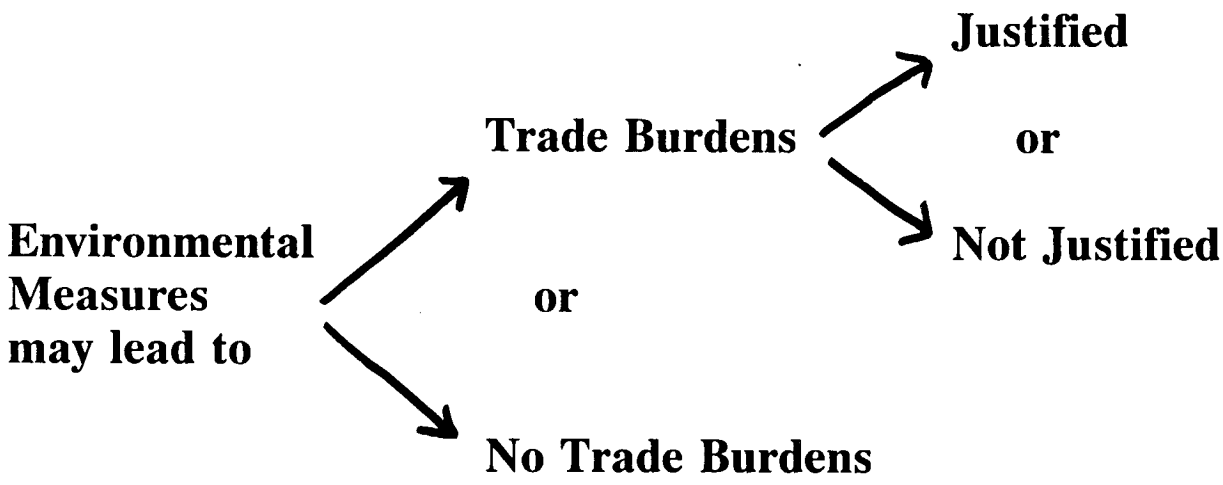
Trade → Allocative Efficiency (+) → Growth in GDP/capita

→ Scale effects (–) → Demand for Environmental Protection →

Change in Policy → Change in Composition (+) → Change in Technology (+).

(+ denotes positive and – negative environmental impacts)

Figure 4.


Environmental Measures may lead to
Trade Burdens
or
No Trade Burdens
Justified
or
Not Justified