The Trade and Environment Debate: Relevant for Southern Agriculture?

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Abstract

This paper introduces and briefly discusses the economics of two important trade and environment policy issues--international harmonization of environmental standards and the use of trade measures for environmental purposes. Both issues are likely to generate lively international debate among environmentalists, industry representatives, and trade negotiators over the next few years. As the international community seeks new multilateral rules in these areas, agricultural producers will want to know how they will be affected. Thus, this paper also examines the potential impacts of environmental policy on the competitiveness of commodities unique to the Southern region of the United States.

Key Words: Trade, Environment, Agriculture, Southern region

The Uruguay Round of the General Agreement on Tariffs and Trade (GATT) came to a close in December 1993, after more than six years of negotiations. Some predict that the next round of global trade talks will soon be launched and that the round will be called the "Green Round" because of its emphasis on global environmental issues and their relationship to GATT's guidelines for conducting international trade. Trade and environment issues are already the focus of working group meetings at both the GATT and the Organization for Economic Cooperation and Development (OECD), and they were also discussed by negotiators of the North American Free Trade Agreement (NAFTA). Those concerned with agricultural and food product trade, as well as those interested in environmental policy in the agriculture and food sectors, will want to take note of this 'internationalization' of environmental policy.

The increasing attention in international policy circles to the trade and environment interface is motivated by the interests of both environmental and industry groups. Some environmental interest groups have begun to see the international flow of goods and direct investment as antithetical to environmental improvement. Environmental groups have expressed the following concerns: that trade and trade agreements bring pressures to reduce national environmental standards to a lowest

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common international denominator; that differences among national standards produce 'pollution havens'; that freer trade worsens pollution by stimulating economic activity of 'dirty' industries; and that trade agreements interfere with national sovereignty over environmental protection goals and legislation (*The Economist*, February 27, 1993). Thus, institutions like GATT that have historically fostered global economic growth through trade and economic integration, must now address environmentalists' concerns in order to sustain broad support.

Environmental groups were concerned by Uruguay Round discussions on food safety regulations and the possible move toward global acceptance of food safety requirements as established by an international entity, the United Nation's Codex Alimentarius Commission. They were also disturbed by a GATT panel's decision to side with Mexico against the United States on the issue of a U.S. embargo of Mexican tuna. The U.S. embargo was designed to protect dolphins from the hazards of Mexico's tuna fishing practices and was in accordance with the U.S. Marine Mammal Protection Act (U.S. Congress, Congressional Research Service). And, during the NAFTA negotiations, U.S. environmental groups were concerned with the impacts of freer bilateral trade and investment regimes on pollution along the U.S.-Mexico border.

Some sectorial interest groups have been equally interested in the trade and environment discussions. For example, some industry representatives see national environmental policy, along with other forms of government regulation, as a major factor affecting their sectors' performance in international markets, particularly if other countries regulate less or set lower environmental performance standards. Some business interests may like to see international trade policy, including the use of tariffs and other trade measures, become a means of 'levelling the global playing field' on which companies and products compete. Thus, international institutions such as the GATT, which have had remarkable success in lowering barriers to trade, must now address a new rationale for protection.

This paper introduces and briefly discusses the economics of two important trade and environment policy issues--international harmonization of environmental standards and the use of trade measures for environmental purposes. Both issues are likely to generate lively international debate among environmentalists, industry representatives, and trade negotiators over the next few years. As the international community seeks new multilateral rules in these areas, agricultural producers will want to know how they will be affected. Thus, this paper also examines the potential impacts of environmental policy on the competitiveness of commodities unique to the Southern region of the United States.

Harmonization of Environmental Standards

Robertson (1992) defines harmonization as the "coordination of policies and instruments to reduce international differences and to facilitate international competition" (page 5). With traditional trade barriers having been lowered significantly over the past few decades, attention may well now turn to the impacts of other government actions on the flow of goods and services among nations. Environmental groups, as mentioned above, raise concerns that trade agreements will harmonize downward the differences among national environmental standards and policies. Business groups may sometimes favor harmonization as a means of facilitating trade across national (or other jurisdictional) boundaries, but at times disfavor it, depending on the likely economic benefits to their individual firms or industries. International discussions can benefit from an understanding of the broader economic benefits and costs of harmonization.

Agricultural economists may have many opportunities to contribute to international policy discussions surrounding harmonization. Many of the issues raised will be pertinent for agricultural production, food processing, and food and agricultural product trade. Agricultural economists can contribute guidelines based on economic principles regarding when and what types of harmonization make economic sense. For example, economists can identify types of harmonization that can improve international market performance by lowering transactions costs and improving the quality of consumer information. Agricultural economists can also contribute to empirical analyses of the impacts of harmonization on trade and trade patterns.

A Harmonization Taxonomy

The concept of harmonization may be applied to a range of trade and environment issues. Table 1 offers a grouping of these issues based on a taxonomy that divides harmonization of environmental standards into three types: harmonization of product standards; harmonization of production and processing methods (PPM's) and harmonization of environmental performance standards. The table also offers examples of each type of harmonization.

The harmonization of product standards (column one) has received attention already in international forums. The basis for setting food safety requirements, for example, was a component of Uruguay Round negotiations over sanitary and phytosanitary measures. Recent OECD meetings have taken up the issue of product packaging and labelling requirements, and guidelines for applying domestic packaging and labelling requirements to imported products, in addition to their publications on agriculture and the environment (OECD, 1993 and 1989). Packaging regulations may pertain to the materials used or the handling of the materials used in shipping. They might, for example, require packaging be recyclable or, if not, returned to the country of origin. Labelling requirements might mandate the provision of certain nutritional or other consumer information, including, possibly, environmental content. "Dolphin safe" labels on tuna cans is an example of eco-labelling. Other product-related standards might pertain to the registration or testing requirements that must be met before a new product, such as a bioengineered product, can be introduced to the market.

Harmonization of (or differences among) production and processing methods (PPM's) (column two) has the potential to be a particularly contentious trade and environment topic. Some commentators perceive any international efforts to regulate or coordinate PPM's to be infringements of national sovereignty (Charnovitz). The GATT seems to have taken this position so far. For example, a GATT panel saw the U.S. embargo on Mexican tuna as an inappropriate attempt to regulate Mexico's tuna harvesting methods and would have approved the U.S. action only if the Mexican tuna itself posed a hazard to the health of the U.S. environment or its consumers (U.S. Congress, Congressional Research Service). Environmental groups, however, often focus their attentions on the environmental effects of the ways in which products are produced (for example, on the effects of low-input versus chemical-intensive farming). At the same time, industry interests are probably well aware of how national regulations of PPM's differ and affect their cost structures relative to their competitors in other countries (for example, requiring the use of certain environmental control technologies).

Harmonization of environmental performance standards (column three) has also been the subject of multinational talks, particularly when the environmental amenity is shared across national boundaries or globally (such as protection of the atmosphere). A multitude of International Environmental Agreements (IEA's) provide for cooperative approaches to addressing global or transnational environmental problems, and the most ambitious aim to establish quantitative performance goals. Existing global IEA's address protection of endangered species, habitat, oceans and atmosphere, and hazardous waste disposal. For example, The Protocol on Substances That Deplete the Ozone Layer, signed in Montreal in 1987 and known as the Montreal Protocol, requires nations to cut consumption of five chlorofluorocarbons and three halons by 20 percent of their 1986 level by 1994 and by 50 percent of their 1986 level by 1999, with allowance for increases in consumption by developing countries (World Resources Institute).

Some IEA's employ trade restrictions to help achieve their goals, which has recently raised concerns about their relationship to the GATT. For example, the Montreal Protocol restricts the import and export of chlorofluorocarbons and other chemicals that deplete the ozone layers, as well as products that contain these substances. The Basel Convention restricts trade to countries that lack regulations for proper disposal of hazardous and toxic wastes. The Convention on International Trade in Endangered Species (CITES) prohibits the trade of endangered and threatened species and

Table 1. Harmonization Taxonomy

Product Standards	Production & Processing Methods (PPM's)	Environmental Performance Standards
Food Safety	Environmental Control Technology	Air Quality Standards
Packaging Content (recyclable)	Harvesting Methods (purse seine nets)	Water Quality Standards
Eco-labelling	Farming Methods (IPM)	Soil Quality Standards
Regulatory Processes (registration of pesticides; product testing requirements)	Certification Requirements (Defining "organic" production methods)	Protection of Species - existence values - genetic diversity

products that originate from them, such as ivory (U.S. Congress, Office of Technology Assessment).

Economic Arguments Regarding Harmonization

Economists tend to balk at the notion of harmonizing environmental standards. The economic case *against harmonization* is based on differing community demands for environmental amenities. In other words, if the production of a good carries with it both a private (or internal) cost and a social (or external) cost--the cost to society of environmental disamenities generated when the good is produced or consumed--some nations assign this social cost a higher value than others. Differing income levels may be an important factor contributing to these differing community demands. Some argue that richer communities have a greater capacity and preparedness than poorer communities to trade off goods consumption for a cleaner or better-preserved environment, although this might not mean that poorer communities 'like' the environment any less (Anderson). Similarly, different communities have different degrees of willingness to assume environmental or health risk, for example, food safety risks.

Another reason for diverging degrees of environmental protection among nations may be that different environments have different "assimilative capacities." An environment's assimilative capacity is measured by its ability to take wastes and convert them back into harmless or ecologically useful products (Pearce and Turner). The steps a nation takes to control soil erosion, for example, may depend on its perception of the ability of the environment to assimilate erosion sediments before commercial fishing, recreation activities, or fish populations are adversely affected.

If demand for, and supply of environmental amenities differs across nations, then the socially optimal level of pollution, or environmental externality, will also differ and harmonization will not make sound economic sense. Figure 1 illustrates this notion, showing that when two countries harmonize the levels of environmental damage they are willing to accept (away from their initial optimal levels), they suffer a joint social welfare loss of the shaded area. In fact, some economists may argue that differing national preferences for private versus public goods consumption is a key factor underlying the international distribution of comparative advantage, and in establishing efficient global patterns of production and trade.

Economic theory may also, however, offer some *support for harmonization,* particularly for the case of certain environment-related product standards. For example, if product standards differ from country to country, firms that export to many countries may face significant transactions costs in acquiring information from many individual sources. And, tailoring product characteristics to meet the unique requirements of many markets may be costly

Figure 1. Social Welfare Loss from Harmonization

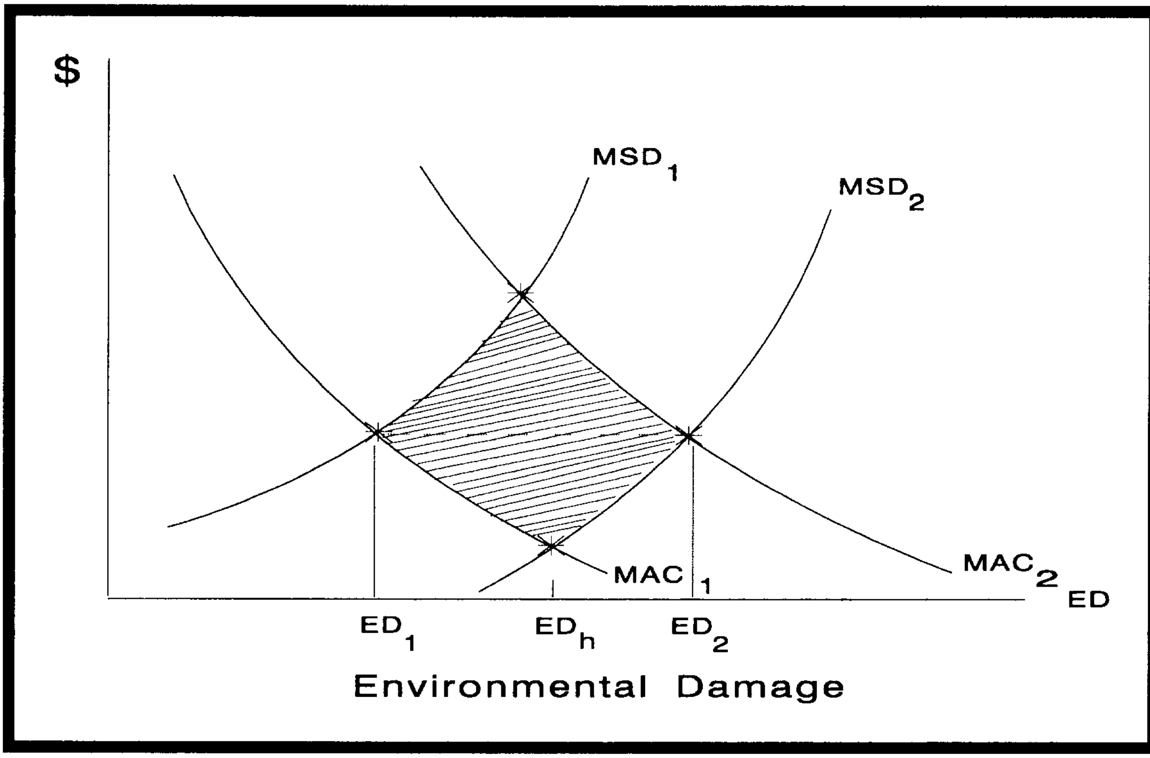


Figure 1 illustrates the social welfare loss due to harmonization. It shows marginal social damage functions (MSD), which are assumed to increase with output and pollution, and marginal abatement cost functions (MAC), which are assumed to decline with pollution, for two hypothetical countries. At first each country chooses its own optimal level of environmental damage (ED)--the level chosen by country 1 is ED_1 and the level chosen by country 2 is ED_2. Country 2 prefers a higher level because of two factors: (1) for any given level of pollution, its abatement costs are higher, and (2) for any given level of environmental damage the social costs are lower. Later, the two countries compromise by harmonizing their standards at environmental damage level ED_h. At this harmonized level country 1 produces an inefficiently large amount of pollution and country 2 produces an inefficiently small level. The total social welfare loss is the shaded area bounded by the two countries' curves.

Source: Baumol and Oates, 1988.

and hinder the ability of such firms to take advantage fully of the economies of scale that international trade can offer. The benefits to the world consumer of some forms of product standards harmonization, such as standardizing requirements for testing bioengineered products or for certifying that a product is environmentally "friendly," may be an empirical question, and an area for fruitful empirical analysis.

An economic case for harmonization of environmental performance standards can also be made when consumers of the environmental amenity are distributed across national boundaries, and the actions of one nation affects consumption of the amenity in other nations. For example, the benefits of protection of the ozone layer and of genetic diversity are broadly shared, although countries' abilities and willingness to contribute to a global effort may vary markedly. Water quality is another issue amenable to multinationally determined standards because waterways and sources are so often shared by two or more countries. It makes economic sense for performance standards to be determined cooperatively in these instances because the community involved is a multinational one. Nonetheless, negotiations are likely to be long and difficult. Differing preferences and financial resources across countries suggest a role for financial transfers from richer to poorer countries; and differing production technologies across countries suggest a role for flexible approaches to realizing jointly set goals.

The harmonization of production and processing methods is the class of harmonization least likely to generate support based on economic concepts. Differences in production and processing technologies occur for important reasons, such as the relative abundance or scarcity of the factors of production, and can significantly enhance the efficiency of global production. Livestock, for example, is raised in intensive operations where land is relatively scarce and extensively where it is abundant. Coordinating environmental goals does not necessarily imply reducing differences in production technologies because environmental impacts depend on the vulnerability of the local environment to the particular production technology employed. For example, sharply reducing agricultural chemical use may be an effective means of improving water quality in some areas where soils are highly leachable, whereas in another region it may be soil erosion controls that are most water quality improving. Even where transboundary effects are present (for example, water pollution flows from one country to another), environmental agreements that emphasize performance rather than mandate or prohibit particular production techniques are preferred on efficiency grounds. This said, performance (particularly the contributions of individual firms or producers to performance) can be difficult and costly to monitor and measure, particularly where non-point source pollution is involved, making it easier for policy to focus on production techniques.

Use of Trade Actions for Environmental Purposes

A *Washington Post* article cites Micky Kantor, the top U.S. Trade Representative: "To have 'prosperity here at home, build jobs and serve the American people,' this country will have to insist 'that its trading partners follow the same standards, including worker standards and environmental rules, that we do" (December 31, 1993). Reciprocity, the *Post* concludes, will be the dominant 'buzzword' for future Clinton administration trade policy. Will trade actions be the tools of this trade policy should it be pursued? If so, will U.S. actions conflict with GATT rules? A key issue in future GATT talks is likely to be the extent to which GATT will allow trade actions used by a country to protect the environment outside of its own borders or to correct for differences in environmental standards.

Employing trade measures for environmental purposes has been generally discouraged by economists. For example, Harry Johnson wrote in 1965 that "...the correction of domestic distortions requires a tax or subsidy on either domestic consumption or domestic production or domestic factor use, not on international trade" (in Bhagwati, 1981). Economists following the trade and environment debate have, however, recently begun to revisit the role of trade policy in addressing environmental concerns (see, for example, Runge, 1994; Panagariya, Palmer, Oates, and Krupnick, 1993; Ludema and Wooton, 1992; Sutton, 1988; and Markusen, 1975). The following sections discuss several cases in which trade measures might be used in the interest of environmental purposes and explores them briefly.

Trade Measures to Control Pollution Due to the Production Activities of a Trading Partner

Tariffs or other trade actions may be considered when one country wishes to control transboundary externalities flowing from the production of goods in another country and it cannot directly influence the set of domestic taxes, subsidies or regulations in the polluting country. Factories producing export goods spewing emissions across the border into the importing country is an example (such as may be the case along the U.S.-Mexico border). An agricultural example might occur if an 'upstream' agricultural country pollutes the water of a 'downstream' country by failing to control sedimentary runoff or chemical leaching. Figure 2 shows that a tariff imposed by a (large) importing country on the exporter's polluting good can result in a welfare improvement in the importing country, under certain conditions.

Despite the theoretical possibilities for welfare gains in the importing country, the use of trade measures to correct transboundary production externalities raises questions of effectiveness and efficiency of such an approach. For example, if the measure is imposed unilaterally, can it be effective if other markets are available to the exporter, or if there are transshipment opportunities that would conceal the identity of the country-of-origin? When environmental problems are localized in their origins (which is often the case with agriculturally based pollution), can a trade measure be targeted effectively to impact the particular producers or regions of concern? Most importantly, is a cooperative approach possible--such as technical assistance aimed at facilitating the adoption of environmentally preferred technologies--that would both be more efficient and less likely to spawn trade disputes and retaliatory actions?

Trade Measures to Protect the Global Commons

Trade measures might also be used to influence the production levels or methods of another country that are perceived to be degrading the global commons. Examples include trade measures used in the interest of protecting endangered species or to discourage logging of tropical forests. Trade measures to protect animal health and safety, such as bans on tuna caught with driftnets (in order to protect dolphins from becoming entangled in the nets) or on fir caught with steel leg-hold traps (to prevent unnecessary cruelty to fir-bearing animals), might also be grouped here.

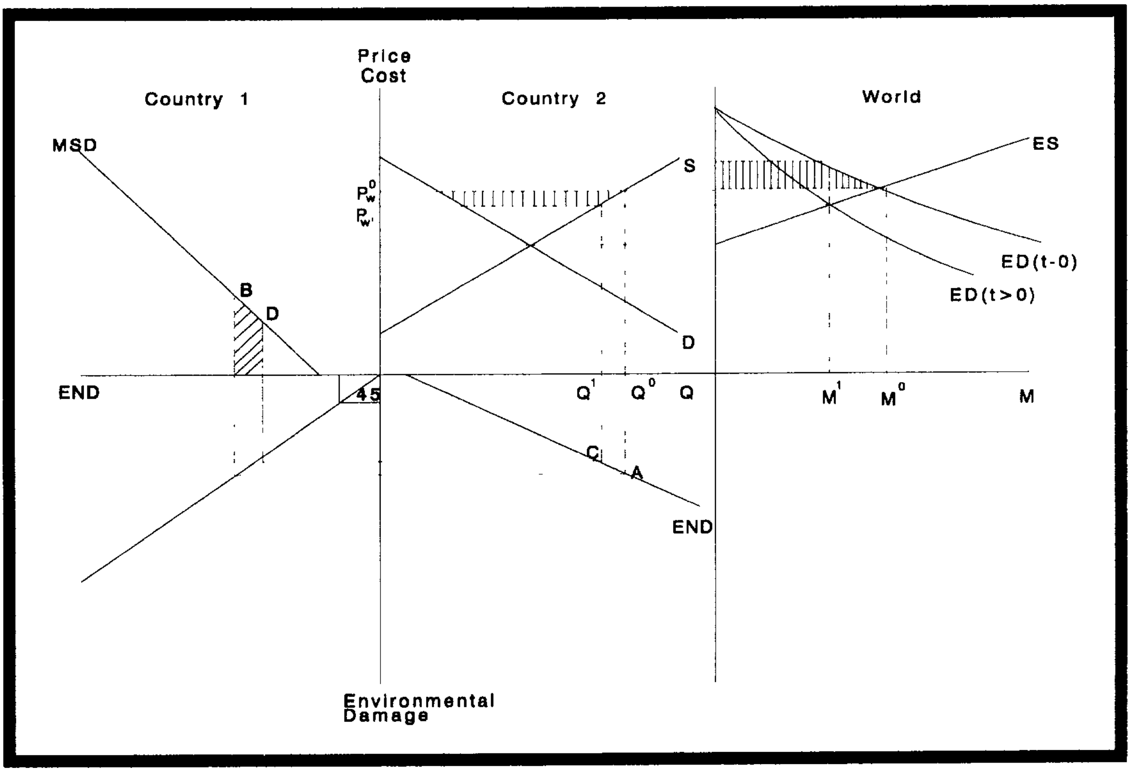
Questions of effectiveness and efficiency surround this case as well. In considering the use of trade measures to protect the global commons, the international community may consider the possibilities for alternative options that more directly address incentives for sound environmental management. In the case of deforestation, for example, do private loggers have incentives to wisely manage their nation's forests? Or are there institutional failures, such as lack of property rights, that are at the root of the problem? The programs of the World Bank and other international development institutions already confront many such environmental problems with global dimensions, suggesting a role for constructive dialogue between such institutions and the GATT's trade and environment working group (World Bank, 1992).

The international community does at times agree to use trade measures to enforce provisions of International Environmental Agreements; thus, a key issue of international law is the relationship of such multilateral agreements to countries' prior GATT commitments to open markets. A related concern is the unilateral use of trade actions, without the sanction of an IEA, in order to implement the provisions of a national environmental law. How will the GATT handle these cases?

Trade Actions Taken Against Imported Products Not Meeting Domestic Standards

Product standards, as discussed above, may differ from country to country for very legitimate reasons although these differences can be the source of significant trade frictions. With traditional trade barriers having been lowered significantly through previous GATT negotiations, attention may well turn to addressing the trade effects of differences in product standards and regulations. Product

Figure 2. Effects of a Tariff on Transboundary Pollution



The use of a tariff to control transboundary pollution is illustrated above. The top middle panel shows country 2's domestic supply (S) and demand (D) schedules for a single product (it could be, for example, a composite of agricultural goods). Based on the distance between S and D, at each potential price above P_d country 2 is willing to supply the good to the world market at levels indicated by the excess supply curve ES. This is shown in the top right-hand panel. The same panel also indicates that country 1 is willing to buy the same product from country 2 along an excess demand schedule ED. (Note that the entire world market for this product is composed of countries 1 and 2). Given these initial world supply and demand schedules, the initial level of imports by country 1 and exports by country 2 is M^0, which occurs at price P_w^0.

The figure also shows that production of the good in country 2 is associated with social damage costs in country 1. This might, for example, be the damage to the fishing industry in country 1 associated with agricultural pollution in country 2. We can trace this effect through by starting in the middle top panel, moving down to the middle bottom panel, then over to the bottom left panel, and ending in the top left panel. Price P_w^0 generates production level Q^0 in country 2; this level of production generates environmental damage END (for example, water pollution) at level A; which translates into a marginal social damage (MSD) cost in country 1 indicated by point B.

The diagram shows what happens to 'world' trade and social damage costs in country 1 when country 1 applies an import tariff on country 2's product. The imposition of the tariff is shown in the top right panel with a leftward shift of country 1's excess demand schedule.[1] In effect, the tariff depresses country 1's demand for country 2's exports, which drives down the price received by country 2. The lower price reduces production in country 2 to Q^1, reduces environmental damage to C, and lowers social costs in country 1 to D.[2] Country 1 is not "better off" however, unless the national benefits of the tariff outweigh the national costs. The benefits are the savings in social costs (the shaded area under the MSD curve) plus the tariff revenues plus the benefits that accrue to domestic producers through the tariff protection. The cost is the loss the country experiences when it limits consumer access to country 2's product. The net of the consumer costs and producer benefits is negative and is shown by the shaded area under ED. For country 1, all the costs and benefits can be weighed and compared. Country 2 unambiguously loses national welfare (measured by the shaded area between the supply and demand curves) when its exports are curtailed.

standards, usually extended to both domestic and imported products, are often imposed to address externalities (like human health risks) associated with consuming the product. Trade actions to correct consumption externalities might include banning imported wines not meeting domestic tolerances for fungicide residues; banning imported food products not meeting domestic labelling or packaging requirements; or taxing imported products (like cigarettes) to reduce their use.

The GATT appears to be relatively accepting of a nation's 'right' to require all products, whether domestically produced or imported, to meet national standards for health and safety of consumers, plants, animals, and the natural environment. This is demonstrated by GATT Article XX, subparagraphs (b) and (g), which allows measures that are "necessary to protect human, animal or plant life or health" and those for "the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption." Nonetheless, some legal and economic issues remain when trade actions are used to force conformity with national product standards. For example, the GATT is concerned with finding a scientific basis for national standards, and (under the terms of Article XX) with establishing the nondiscriminatory treatment of domestic and foreign products. The reasonableness of the product standard may become of increasing interest to the GATT, particularly if the standard gives the domestic product an unfair advantage even indirectly. For example, if a country required both domestic and foreign car manufacturers to take back and recycle old cars, as Germany has considered doing, would this put an unfair and unreasonable burden on foreign manufacturers (*The Economist,* February 27, 1993)?

Economists can contribute to this issue by analyzing the benefits and costs of alternative approaches to mitigating consumption externalities. For example, what are the economic merits of consumer information, such as that provided through labelling requirements, versus outright product bans or other restrictive regulations? What is the least trade-restricting approach to accomplishing the objectives of product standards?

Trade Actions to Level the Playing Field

Kantor's remarks could be interpreted as suggesting that competitiveness alone is justification for a trade policy aimed at levelling differences among environmental standards. Domestic firms and industries (not just in the United States) are sure to seek protection from competition from foreign firms or industries subject to lower environmental control costs. It is possible to imagine, for example, a plea from livestock producers for protection against imports from countries with less demanding requirements for animal waste management. This is likely to be a tremendously challenging area for trade negotiators and a troubling one for economists. Will it be possible to establish legitimate bases for differences in standards that will be acceptable to environmental and business groups? How will 'disguised' protectionism be distinguished from *bona fide* environmental concerns? When a legitimate environmental issue is identified, when does one country have a right to pressure another to accept its environmental goals and, possibly, its methods of achieving them? Regions and producers of agricultural commodities for which exports are an important component of demand will be particularly interested in the answers to these types of questions, thus providing a challenge for agricultural economists.

The Impact of Environmental Standards on Southern Commodities

The remainder of this paper is devoted to analyzing how environmental standards, as described above, affect international competitiveness for the major Southern commodities.[3] To place this topic in context, we acknowledge that others have investigated a variety of trade issues with respect to the Southern region. For example, conferences and symposiums have been conducted by members of both the S-224 regional research committee *International Trade Research on Commodities Important to the Southern Region* as well as the International Trade Task Force, which also developed an information packet entitled *Southern Agriculture in a World Environment* (see Rosson and Harris). Also, the impacts of environmental protection and food safety regulations on U.S.

agriculture, including trade impacts were analyzed by Gardner (1993).

In order to examine trade and the environment for the Southern region, first we identify crops which are unique to the Southern region, next we determine the relative importance of the international market for these crops, then for each Southern crop we identify top importing countries or potential importing countries, as well as our global competitors. Once top import markets are identified, we examine import restrictions by these countries due to product or environmental standards, and their impact on Southern commodities. On the production side, we compare chemical use restrictions in the U.S. to those of our global competitors in order to determine whether or not the South faces a competitive disadvantage due to environmental restrictions.

Identification of Southern Crops and Data Sources

Maps published by the U.S. Department of Commerce, Bureau of the Census highlight crops which are either unique to the Southern region of the United States or of which the South is the major producer. Accordingly, crops chosen for this analysis include cotton, tobacco, rice, citrus, poultry, and peanuts. A 1986 article by Sumner corroborates the use of these crops, as well as a 1993 article by Marchant and Ruppel. Table 2 illustrates the Southern region's production share of these commodities (USDA's *Agricultural Statistics, 1992*). Although the South is not the exclusive producer, because the majority of production of these crops occurs in the Southern region, U.S. export data on these crops are reasonable proxies for Southern exports.

Five primary sources of international trade data were used to examine the impact of environmental standards on competitiveness of Southern commodities. To determine the importance of the international market of Southern crops, USDA's *Agricultural Statistics, 1992* compared export data to production data. In analyzing actual and potential U.S. export markets as well as global competitors for these commodities, our primary data sources were the *Foreign Agricultural Trade of the United States (FATUS)* published by USDA/Economic Research Service (ERS); USDA/ERS's *PS&D VIEW* data base program developed by Webb and Gudmunds; USDA's *Agricultural Statistics, 1992*, *U.S. Export Sales* on selected commodities published by USDA/Foreign Agricultural Service (FAS); and the *FAO Trade Yearbooks* (United Nations/Food and Agriculture Organization).

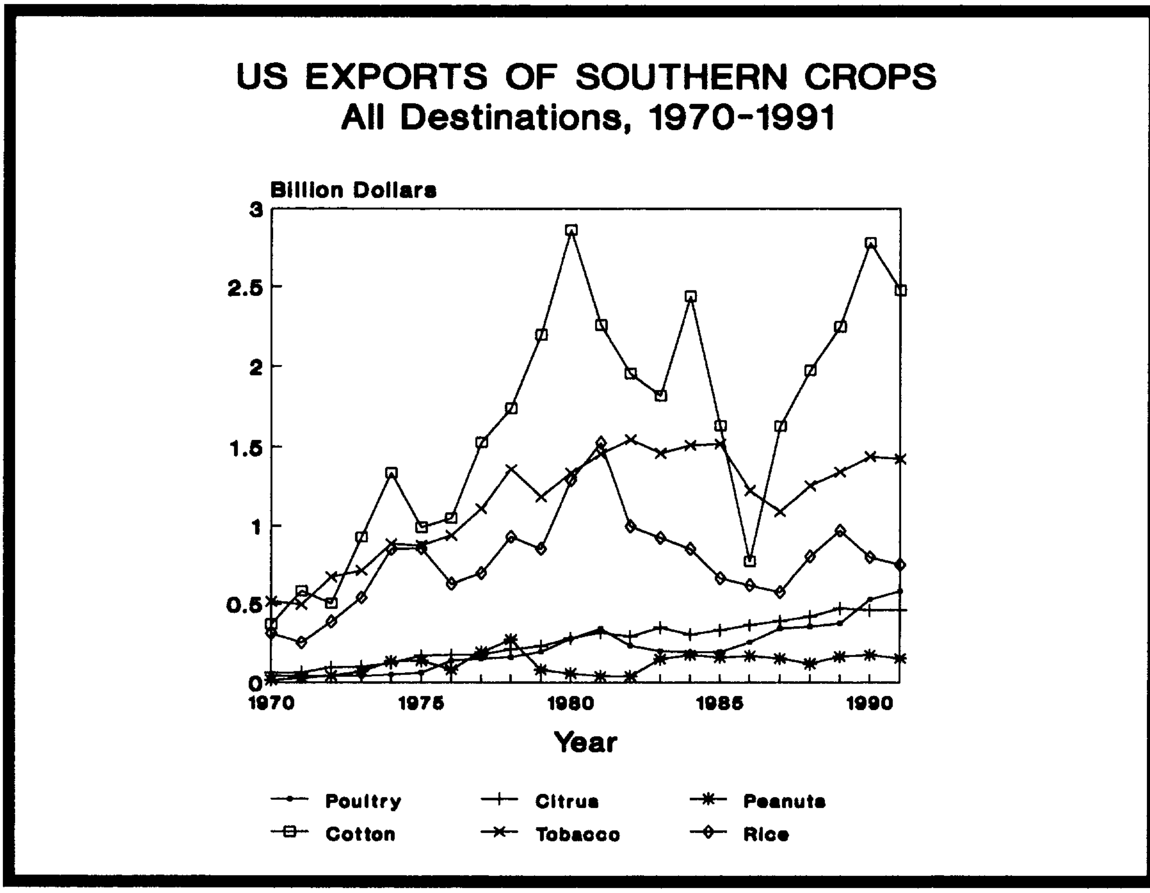
Importance of Export Markets for Southern Commodities

In order to rank these six Southern commodities in terms of relative importance to trade, their total U.S. export value from 1970 to 1991 is plotted in figure 3 (*FATUS*). In terms of overall export value, cotton has been the most important Southern export crop, followed in order by tobacco, rice, citrus, poultry and peanuts. Cotton's total export value has approached three billion dollars on a number of occasions, peaking in 1980 at $2.86 billion. In addition, cotton's export market share was 50 percent in 1990 (total exports relative to total production) making the export

Table 2. Southern Commodities

Commodity	Southern Region's 1991 Share of U.S. Production (Percent)
Cotton	77%
Tobacco	94%
Rice	81%
Oranges	67%
Grapefruit	77%
Poultry	76%
Peanuts	99%

Figure 3.



Source: U.S. Department of Agriculture, *Foreign Agricultural Trade of the United States (FATUS).*

market a very important outlet for cotton (*Agricultural Statistics, 1992*). Cotton has led all other Southern commodities in virtually every year since the early 1970s.

Tobacco has been the second leading Southern export commodity since the mid-1970s, except in 1981 when rice exports were unusually high. For tobacco, the export market share approached 40 percent in 1990 (*Agricultural Statistics, 1992*). Tobacco's export value averaged nearly $1.4 billion during the 1980s, while rice exports have dropped off to an average value of $800 million since 1982. The export market share for rice was 45 percent in 1990 *(Agricultural Statistics, 1992)*. Poultry (chicken) exports have risen substantially since 1985, overtaking citrus in 1990. Both poultry and orange exports are now in the half-billion dollars per year range, and peanut exports are about one-third of this level.

Do Environmental Standards Hinder Global Competitiveness for the Southern Region?

In order to gain an understanding of the environmental standards affecting production and exports of Southern crops, experts in each Southern commodity were interviewed. Key questions asked included. Questions asked included

(1) Are you aware of environmental regulations in the United States that affect your commodity including product standards, regulations on production processes, and environmental performance standards? In other countries? Do such regulations differ across countries?

(2) How do environmental standards of the U.S. or other countries affect trade of your commodity? What is the impact on the "competitiveness" of your commodity?

To examine both "potential" as well as "actual" import markets for Southern region crops, top importing regions and countries are identified on a global basis *(PS&D View)* in conjunction with top importers of U.S. exports (*FATUS, Agricultural Statistics, 1992*, and USDA\FAS's *U.S. Export Sales* for selected commodities). This is one step toward determining if the United States is actually exporting to all potential top markets and, if not, if environmental standards may be constraining market expansion. Import barriers by selected countries were ascertained from the interviews as well as the U.S. Trade Representative's publication entitled *Foreign Trade Barriers*.

Cotton

Import and export restrictions based on environmental standards appear to have little impact on U.S. cotton. The United States is the world's leading cotton exporting nation, with approximately a 30 percent market share during the 1980s. In general, the U.S. export market share, relative to global competitors', has risen since 1985. The next largest cotton exporters are Pakistan, China and Australia *(PS&D View)*. World trade in cotton averaged 5.3 million metric ton (MMT) between 1986 and 1990, or approximately 30 percent of global production during this period compared to 27 percent of production during the early 1980s. Much of the increase in global cotton trade during the decade of the 1980s was due to China's entry into world cotton markets.

Over the past five years, top importers of United States cotton include Japan, Korea, Taiwan, Thailand, Indonesia, Italy, Egypt, and Mexico *(U.S. Export Sales)*. Prior to the 1992/93 marketing year, both China and Hong Kong were ranked in the top 10 U.S. export markets. These countries coincide with the top importing countries of cotton on a global basis; thus, it appears that the United States is in fact exporting cotton to top importing countries.

For cotton exports from the U.S., some importing countries do maintain barriers to trade based on phytosanitary requirements. The few countries that do impose restrictions, Egypt, Mexico, Australia, and Indonesia, are also producers of cotton and do not want disease or pests, such as the boll weevil, to spread to their domestically produced crop. Egypt imposes strict requirements on cotton imports--they must be treated with methyl bromide, shipped directly to Egypt with no en route transhipment stops, packaged in sealed containers, and processed only in Egyptian mills located outside of Egypt's cotton producing area. Egyptian concerns over the boll weevil and import requirements restrict U.S. exports to Egypt to only

California-Arizona varieties, where processing facilities exist to meet these requirements (USDA/FAS, 1993 Cotton Annual Report). The Southern region currently does not meet Egyptian concerns and requirements, and thus cannot export cotton to Egypt. Contrary to other Southern commodities discussed below, Japan does not require cotton imports to be treated with methyl bromide.

Packaging restrictions also affect U.S. cotton exports. Some importing countries do not want cotton bales wrapped in polypropylene plastic because bagging fragments can mix with the cotton and create abnormalities in the fiber during spinning. Some countries also have problems disposing of the used bagging. This restriction is easily met by wrapping bales with cotton, but this is more expensive.

Residues of chemicals applied during production and processing are generally not a constraint to cotton trade. The Breman Cotton Exchange initiated a study to determine the amount of chemical residue (herbicide, insecticide, and fungicide) on raw cotton from a spectrum of producing countries for 228 substances. Results showed that the highest residue values found in any of the samples tested were well below the maximum permitted levels, and tests of U.S. cotton indicated only barely detectable trace residue levels. Stemming from consumer demands, a niche market is developing in the United States for "organic" cotton, which is cotton grown and processed without use of synthetic chemicals. Internationally, "organic" cotton is also finding niche markets in Japan and Europe (JTN The International Text, 1993).

A dramatic change has occurred over the past 15-20 years regarding chemical applications to cotton during the production process (Carter). No longer are DDT and its chemical relatives applied. Instead, cotton growers largely apply synthetic pyrethroids, based on a naturally occurring insecticide with a short-lived residual and a high toxicity toward insects but low toxicity toward warm blooded animals. The switch to using these chemicals is a success story, with much lower application rates (1/10 of a pound per acre compared to 5.0 pounds per acre for DDT) and greater pest control. A revolution has occurred in cotton in regards to the control of boll weevil, one of the major pests for cotton. Working with the USDA Animal and Plant Health Inspection Service (APHIS), growers have sought to eradicate the boll weevil in many Southern states as well as the Imperial Valley of California and Arizona using pheromone traps, cultural controls, and judicious use of chemical treatments. As an example of the success of this program, Georgia has reduced the application of pyrethroid chemicals from 10 to 3 applications per season. This program is on going and is jointly funded by growers (70%) and USDA-APHIS (30%). Due to Environmental Protection Agency (EPA) bans, the cotton industry has lost use of some chemical products used during the production process, for example, arsenic acid, which is used as a defoliant in Texas. Alternatives do exist but are more costly and require twice the amount of application. Other minor chemicals used in cotton may not be re-registered.

For cotton imports into the United States, the key policy is the import quota, which will be enlarged at present duty rates to meet minimum access requirements under the recent GATT agreement and beyond that amount, will be replaced with tariff-equivalent protection. Very small amounts of cotton enter the United States, e.g., the largest amount in recent years was in 1985/86 when 33,000 bales were imported. Only 1,000 bales are projected to be imported by the United States for the 1993/94 marketing year. Thus, the key constraint on U.S. imports has been the quota, not phytosanitary standards.

Tobacco

The United States has been the world's leading tobacco exporting nation, with about a one-sixth market share, although the U.S. share has been declining since the late 1970s, while market share for the European Community[4] has been on the rise *(PS&D View)*. Export market competitors for the United States include Brazil, Zimbabwe, Malawi, Italy, Greece, and Turkey. In recent years, exports from sub-Saharan Africa have surpassed U.S. exports *(PS&D View)*.

Top import markets on a global basis include the European Community (E.C.), with

Germany, the United Kingdom (U.K.) and the Netherlands as key importing nations within the E.C.; the United States; less developed countries (LDCs), with Taiwan, Hong Kong and Thailand as key importing LDC nations; and Japan. On an individual country basis, top importing countries include the United States, Germany, the U.K., the Netherlands and Japan. For U.S. tobacco, top importers over the past five years include Germany, Japan, the Netherlands, and Taiwan. Thus, the United States is currently exporting tobacco to top importing countries.

A few European countries impose restrictions on the amount of maleic hydrazide (MH) residue in the final tobacco product, e.g., 80 parts per million (ppm) in cigarettes in general. This is more of a problem for flue-cured tobacco than burley. This standard does not, however, pose much of a problem for U.S. tobacco exports since the final product is "blended" from different tobacco sources. For example, tobacco from Zimbabwe does not contain any MH and, when blended with U.S. tobacco, the concentration of MH is further diluted. Thus, environmental standards appear to have little impact on tobacco.

One interesting sidenote, in the late 1980s Japan turned back shipments of U.S. tobacco containing the chemical dicamba. Within one year, U.S. producers dramatically reduced their use of dicamba, in order to meet the needs of the Japanese market (Palmer). Thus, in this particular case, consumers' environmental concerns--whether based on scientific evidence or perception--encouraged growers to quickly alter production practices in order to avoid losing an important export market.

For tobacco, two pesticides applied during production are of key concern--methyl bromide (a fumigant) and maleic hydrazide (a sucker control chemical applied within weeks of harvest). If the EPA classifies methyl bromide as a Class I ozone depleter, it will be restricted in the United States by the year 2000 and its use will be taxed during the interim period. Methyl bromide is applied in the early stages of the production process so residues on final products are not an issue (Palmer and Gooden, 1990; and Gooden and Palmer, 1990). Thus, the impact of its restriction will primarily affect the production process. Alternative fumigants do exist (e.g., Vapam, Basamide, and Busan) with similar costs, but the application process is more difficult and may encourage alternative growing practices for seedlings. Tobacco growers are increasingly adopting the "float" plant growing system for seedlings, which does not require fumigants. A 1994 study by USDA/ERS quantifies the economic effects of banning methyl bromide. For tobacco, production costs are estimated to increase by about $5.2 million and total production would be reduced by an estimated 34,264 tons of tobacco, reflecting a 10% loss of production in Georgia and North Carolina (Ferguson and Padula, 1994).

The United States does impose chemical residue restrictions on imports for chemicals banned in the United States (U.S. Congress, *Federal Register,* 1989). Very few violations occur, approximately one per year (Stevens), suggesting that these import restrictions have virtually no effect. This may stem from the U.S. tobacco companies' involvement in the production process within other countries. Since these companies are concerned with selling the final product on the international market, it is in their best interest not to jeopardize sales by using banned chemicals in the production process.

Rice

Rice is one of the most "thinly traded" of the major commodities with typically less than five percent of total world production exported. Thailand has been the world's leading rice exporter for the past decade, typically supplying one-third or more of total global rice exports *(PS&D View).* Thailand's exports during the late 1980s were 50 to 100 percent greater than those of the United States, the world's second leading exporter. Vietnam and Pakistan are next with combined export volumes during 1988-90 almost equal U.S. rice exports. Vietnam became a major rice exporter in late 1980s. China, Australia, Italy, India, Burma and Uruguay were also recent top exporters.

Top global rice importers include Iran, Saudi Arabia, Iraq, Hong Kong and the Caribbean nations. Prior to 1991, other key importing countries included China, the Philippines, Brazil and India *(PS&D View).* Import markets vary over time depending on domestic production, e.g. India may be a net exporter one year and a net importer another depending on weather conditions. As with the global import market, top importers of U.S. rice have varied over the past five years. The current 1992/93 top importers of U.S. rice include Mexico, the Netherlands, Saudi Arabia, Turkey, Iran, the Caribbean countries, South Africa, and Canada (*U.S. Export Sales*). Brazil and the Philippines have also been top importers of U.S. rice and, prior to the Gulf war, Iraq was also a top market. Thus, it appears that the United States is exporting to many top importing countries.

Rice is still a highly protected commodity. The primary barriers to U.S. rice exports are import bans, quotas, tariffs, and state trading. In general, phytosanitary standards do not pose a problem for U.S. exports; however, one notable exception is Japan's insistence that food imports be treated with methyl bromide (see the above discussion concerning pending constraints on methyl bromide). A key trade issue for rice is the potential for markets to expand after trade liberalization.

The Rice Council (1993) analyzed the potential increase in U.S. rice exports if import restrictions were removed on a country-by-country basis. Large potential import markets include Japan, South Korea, Taiwan, and the European Community. For example, the Council estimates an increase in the value of U.S. rice exports ranging between $720 and $810 million if Japan liberalized its rice market. Currently, Japan uses state trading and an import ban in conjunction with supporting domestic prices at levels 8-10 times the world price. The removal of Japan's import ban is estimated to increase imports by 3.4 - 4.8 million metric tons (MMT). The United States is uniquely positioned to supply high quality rice demanded by Japanese consumers and would emerge as a main supplier, increasing exports by 1.6 - 1.8 MMT. Under GATT's minimum access requirements of 8%, U.S. exports to Japan could increase by 25% in the short term.

Restrictions on chemicals used in the production of U.S. rice are forthcoming. The Environmental Protection Agency has notified the Arkansas Farm Bureau that it will not allow two herbicides (Grandstand and Buctril) to be used on its current "emergency use" (section 18) basis. The EPA's letter acknowledged the lack of alternative herbicides but pointed out that the emergency use status has been going on for seven years and that "...it is time for rice farmers to find an alternative to the section 18 process to address their weed control needs" (Washington RiceLetter).

Citrus

Florida citrus includes both oranges and grapefruit. For oranges, about 95% of the crop is processed into juice with the remainder sold on the fresh domestic market. In strong contrast, only about 50% of Florida grapefruit are processed into juice and the remaining 50% is sold on the fresh market, split equally between domestic and export markets. Thus, the export market is more important for grapefruit than oranges, with Japan and the European Community as principal importers. Florida growers are expecting production to increase, as they rebound from the 1980s freezes. Future export markets, in addition to Japan and the E.C., include the Pacific Rim countries of Taiwan, Korea, Hong Kong and Thailand.

As with other Southern crops, the impending ban on the fumigant methyl bromide (MB) would also affect Florida citrus, since Japan imposes strict restrictions on imports and requires imports to be treated with MB. According to the USDA/ERS study estimating the economic effects of banning methyl bromide, the total loss for citrus producers and consumers is estimated at $25 million (Ferguson and Padula, 1994). This report also examines a crop-by-crop phaseout of methyl bromide by first banning MB only where its use is greatest and benefits least (tomatoes, grapes, strawberries, and melons). For citrus, less than one percent of the total U.S. applications of methyl bromide is used. As an alternative to methyl bromide, Florida has been experimenting with cold storage. Environmental restrictions on U.S. production, which may not apply to global competitors such as Brazil and Mexico, include the ban on E.D.B. In addition, Florida citrus growers face other resource use restrictions; for example, some growers must set aside a portion of their land for wetlands and endangered species. Ground water use restrictions also apply but labor costs are the primary factor that places Florida growers at a comparative disadvantage vis-a-vis other global competitors.

A 1993 study funded by the American Farm Bureau, *Economic Impacts of Reduced Pesticide Use on Fruits and Vegetables,* examined impacts of reducing pesticides (by 50 and 100 percent) on yields and costs for selected crops, including oranges.[5] Yields were predicted to fall by an estimated 63 percent and costs per pound to increase 92 percent with no pesticides, while yields would decrease 25 percent and costs would rise 9 percent if pesticide applications were cut in half. Yields would fall 0 percent, 17 percent and 8 percent if herbicides, fungicides, and insecticides were, respectively, reduced by 50 percent. In conjunction, costs would rise slightly by 1 percent, 7 percent and 1 percent, respectively. Yields would fall 0 percent, 50 percent and 16 percent if herbicides, fungicides, and insecticides were, respectively, eliminated, while costs would rise 18 percent, 34 percent and 2 percent, respectively. As pesticide usage decreases, so does the quality of oranges. Estimates in this study are believed by the authors to be highly conservative because they do not take into account the cumulative impact in subsequent years of insect and disease problems, including the possibility of further decreases in productivity and the death of trees.

Florida citrus growers face other nonenvironmental regulations, which may be of equal concern, such as weight limitations on shipments of fresh grapefruit being transported from packing houses (located near growers) to the shipping port. The packing house loads produce into cargo containers, which are then transported by truck to the port and loaded directly onto ships. These cargo containers exceed highway weight limitations. Exemptions, granted in the past, have been extended for one year but may no longer be granted.

Poultry

World poultry exports are small compared to total production. Only about seven percent of global production is traded internationally. The United States was the largest exporter of poultry in 1992, followed by France, Brazil, Hungary, Thailand, China, and Hong Kong *(PS&D View).* Top importing countries include Germany, Japan, Hong Kong, Saudi Arabia, the Netherlands, China, the U.K. and Mexico. The Netherlands, Hong Kong, and China are both top importers and exporters of poultry products. Part of the explanation is that different types and cuts of poultry may be imported and exported. Over the past five years, top importers of U.S. poultry include Canada, Japan, Mexico, and Hong Kong *(FATUS).* Thus, it appears that the United States is exporting poultry to nearby markets--Canada and Mexico--along with other top importing markets, Japan and Hong Kong. The U.S. export market has been limited by E.C. trade restrictions, which should change under new GATT provisions. Consumers in Saudi Arabia prefer the type of broilers produced by the French and Brazil, and the United States is just beginning to export poultry to China.

In general, environmental constraints for poultry production are greater in other countries, particularly the E.C., where manure disposal and ground water contamination from leeching is a major concern. For instance, producers in the Netherlands are exporting manure to other countries. Other countries that are limited in space, e.g., Hong Kong and Singapore, also place restrictions on poultry production resulting in diminished production levels. With respect to product standards applied to imports, the Japanese have strict residue restrictions, which the United States generally meets.

Peanuts

The E.C. is the number one market for U.S. peanut exports. Other key U.S. export markets include Canada and Japan. Major competitors include China and Argentina. U.S. peanuts receive a price premium in the E.C., due to higher quality peanuts and their reliable supply.

Standards for aflatoxin are a key concern for peanuts. Aflatoxin is produced by a naturally occurring mycotoxin (aspergillus flaxus fungus). Currently, the U.S. standard is 15 parts per billion (ppb) for edible peanuts. In the European Community it is less than 10 ppb, where some nations impose more stringent standards. The United Nation's Codex Alimentarius Commission seeks to develop a globally harmonized standard for aflatoxin. The committee proposed a 10 ppb standard, but agreement could not be reached and the proposal was tabled.

On the production side, several pesticides and fungicides are either restricted in the United States or may be restricted in the near future, but may not be restricted in other countries. For example, Kylar (a growth regulator which restricts vine growth and is similar to Alar), was used in the United States but is now illegal. Several fumigants are either restricted (e.g., DDB) or not registered in the United States (e.g., Folicur). Folicur is used by competing Argentine producers. Methyl bromide may be restricted in the United States by the year 2000 (see above), and this could impose problems for peanut exports, since Japan currently refuses to accept imports that have not been fumigated with methyl bromide. Some alternatives do exist to these chemicals, but alternatives are generally more costly and incur lower yields. Thus, the United States meets the standards of importers, but U.S. competitiveness may in the future be hindered by restrictions imposed on the production process within the United States.

Prior to the Uruguay Round agreement, the United States imposed an import quota of 775 metric tons for shelled edible raw peanuts entering the United States under the terms of section 22 of the Agricultural Adjustment Act. Under new GATT provisions, minimum access for raw peanuts will become 3 percent of domestic consumption in the base years (1986-1988) or 33,770 metric tons (MT) in the first year of GATT. In the sixth year of GATT, minimum access will be 56,283 MT. A tariff will be imposed on any imports above minimum access levels. Similar polices will be imposed on peanut butter/paste. Additionally, the enabling legislation of NAFTA requires that U.S. peanut imports meet the same standards as domestically produced peanuts as specified by Marketing Agreement #146 (30FR9402).

Discussion and Conclusions

For Southern crops, reoccurring themes emerge. For many Southern crops, the key restriction to trade has been traditional trade barriers, rather than environmental constraints, generally in the form of import bans, as in the case of rice to Japan, or import quotas and tariffs or variable levies, as in the case of virtually all U.S. exports of Southern crops to the E.C. Under GATT's minimum access requirements these barriers will begin to fall.

For many of the Southern crops, e.g., peanuts, tobacco, and citrus, the impending limitation of methyl bromide may impact future trade competitiveness (Table 3), since Japan requires imports to be treated with this fumigant. Similarly, for cotton, shipments to Egypt must be treated with methyl bromide. Methyl bromide is a prime example of the disparity between domestic and international standards. The U.S. Clean Air Act may impose stricter limitations by banning methyl bromide by the year 2000, while the Montreal Protocol, the international environmental agreement on ozone depleting chemicals, does not seek a ban but rather a reduction of usage. This disparity may require future negotiations with Japan, for example fumigants could be applied at the port-of-entry (Japan) rather than the port-of-exit (the United States). Alternatively, the United States and Japan may consider alternative fumigation practices or treatments.

For rice and peanuts, the restriction of chemicals used in the production process may reduce yields if alternatives are not found, which ultimately impacts global competitiveness. And for citrus, the long term consequences of reducing or eliminating pesticides include insect and disease problems, as well as the possibility of trees becoming nonproductive. Environmental constraints on poultry production, such as manure disposal requirements, are more severe in other countries than in the United States. For tobacco, it's interesting to note that tobacco companies, which sell cigarettes on the *international market,* specify in their contracts with foreign producers that banned chemicals not be used. Since these companies are concerned with selling the final product, it is in their best interest not to jeopardize sales by using banned chemicals in the production process. For cotton, a virtual revolution has occurred as growers incorporate integrated pest management (IPM) production practices to eradicate the boll weevil. Thus, the bottom line of this analysis is that although current environmental standards do not appear to hinder the competitiveness of Southern commodities, pending limitations on methyl bromide as well as other chemicals used in the production process may do so.

Table 3. Summary of Current and Pending Environmental Standards on Southern Commodities

CROP	CONSTRAINTS ON PRODUCTION METHODS	TRADE CONSTRAINTS DUE TO PRODUCT STANDARDS
Cotton	--Few-- Note: Move toward Integrated Pest Management (IPM) Practices	Shipping/Packaging Methyl Bromide
Tobacco	Methyl Bromide Maleic Hydrazide (MH)	Methyl Bromide Maleic Hydrazide
Rice	Herbicides	No Substantial Restrictions
Citrus	Methyl Bromide & Other Restricted/Non-registered Chemicals	Methyl Bromide
Poultry	No Substantial Restrictions Note: Waste Management Restrictions are More Stringent in Other Countries	Residues
Peanuts	Restricted/Non-Registered Chemicals	Aflatoxin and Methyl Bromide

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Endnotes

1. See McCalla and Josling for a detailed graphical presentation of the impacts of tariffs and other trade measures on trade and economic welfare.

2. Note that if country 1's production of the good also generates an environmental externality internal to country 1, then country 1's imposition of the tariff will reduce damage done by the foreign producers but increase damage done by the domestic producers.

3. The Southern region includes the following states: Texas, Oklahoma, Louisiana, Arkansas, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, Virginia, Tennessee,West Virginia, and Kentucky.

Information on *cotton* was obtained from personal interviews with Priscilla Joseph, Cotton Analyst, Tobacco, Cotton and Seed, Foreign Agricultural Service, USDA; Terry Townsend, Statistician, International Cotton Advisory Committee; Frank Carter, Manager, Pest Management, National Cotton Council, and David Collins, Assistant Director, Cotton Council International. Information on *tobacco* was obtained from interviews with Dan Stevens, Group Leader, Tobacco, Cotton and Seed, Foreign Agricultural Service, USDA, William Snell, Assistant Extension Professor, Dept. of Agricultural Economics, University of Kentucky (UK) and Gary Palmer, Associate Extension Professor, Dept. of Agronomy, UK. Information on *rice* was obtained from interviews with Eric Wailes, and Gail Cramer, Dept. of Agricultural Economics, University of Arkansas. Information on *citrus* was obtained from interviews with Mark Brown, Research Economist, Research Scientist, Florida Department of Citrus, and Gary Fairchild, Professor, Dept. of Food and Resource Economics, University of Florida. Information on *poultry* was obtained from an interview with Larry Witucki, Agricultural Economist, Poultry Section, Commodity Economics Division, ERS USDA. Information on *peanuts* was obtained from interviews with Stanley Fletcher, Professor, Dept. of Agriculture and Applied Economics, University of Georgia.

4. As of November 1, 1993, the European Community was renamed the European Union.

5. Scientists who contributed to this study for Florida oranges included Gary Fairchild, economist, and Joe Knapp, horticulturist, University of Florida.