1 Mexico and the Trade and Environment Debates

By autumn 1993, the U.S. government was steeped in heated negotiations over the establishment of the World Trade Organization (WTO), and in supplemental environmental accords to the North American Free Trade Agreement (NAFTA). The potential negative effect of new trade agreements on the environment was among the most contentious issues of these debates. Many environmentalists pointed to the Mexico-U.S. border (a heavily polluted area where U.S. firms have been allowed duty free imports for decades) as an example of what would happen to the rest of Mexico and other developing countries if the WTO and NAFTA came into effect.

As discussion became increasingly polarized, *Scientific American* asked two leading economists to set the record straight. The November 1993 issue of *Scientific American* became an instant classic that is now required reading in many college classrooms. The two experts were Jagdish Bhagwati (a prominent trade economist from Columbia University) and Herman Daly (a well-known environmental economist then working at the World Bank). The two authors were not in agreement. Bhagwati argued that agreements such as NAFTA would raise incomes in developing countries to a point where governments would begin to protect the environment. Daly argued that free trade would provide an incentive for heavily polluting industries in developed countries such as the United States to move their operations to developing countries where

pollution control was more inexpensive and lax. Today, more than 10 years later, the trade and environment debates remain contentiously divided along the lines outlined by these two economists.

The economic transformation of Mexico, from a relatively closed, import-substituting economy before 1985, to a major trading nation today, offers the opportunity to empirically examine the extent to which authors Bhagwati and Daly were correct. Hence, the central research question for this book is: To what extent has economic integration affected levels of environmental degradation in Mexico? The time period under consideration for this analysis is 1985 to 1999. Mexico began integrating itself with the world economy in 1985, and, by 1999, it had become one of the more open economies in the world (1999 was also the most recent year of consistently available data).

Specifically, the analyses presented in this book test the Environmental Kuznets Curve hypothesis and the pollution haven hypothesis. Bhagwati argued the Kuznets curve logic, and Daly argued the pollution haven logic. A case study of criteria air pollutants in Mexican manufacturing examines what are called the scale, composition, and technique effects of economic integration. Manufacturing is examined for two reasons. First, although manufacturing emissions in Mexico form a significant share of total emissions, vehicular emissions have received the most attention. Second, newly available data on criteria air pollution in Mexican manufacturing is used throughout this study. Many studies of Mexico's environment examine either Mexico City or the U.S.-Mexico border region. This study represents the first comprehensive work to examine the Mexican economy as a whole.

To date, the data does not confirm either Bhagwati or Daly's predictions. Despite modestly rising incomes, many environmental problems worsened significantly when Mexico integrated with the world economy. The environment, however, has not worsened due to a mass migration of heavily polluting firms from the United States to Mexico. The percentage of dirty industry in the Mexican economy actually declined. What caused increased levels of environmental degradation was the lack of adequate attention by the government of Mexico, and to a certain extent the United States, to correct the market failures related to environment that arose as a result of the integration process. Such degradation has come at great cost for Mexico. According to the Mexican government, the

economic costs of environmental degradation during this period averaged 10 percent of gross domestic product (GDP) per annum. That figure stands in stark contrast to the annual rise in economic growth, which was only 2.6 percent.

This study underscores the importance of making environmental protection part and parcel of the economic integration process. Developing country governments need not fear that linking environmental protection to trade liberalization will hurt their prospects for economic growth. The fact that Mexico did not serve as a depository for heavily polluting firms from the United States suggests that the costs of compliance with environmental protection are not large enough to affect plant location decisions for the majority of firms. It appears that, if developing countries erect the appropriate environmental standards, they will not scare away foreign investment during the process. Moreover, this study suggests that when firms in developed countries argue that a new or existing environmental regulations may cause them to move overseas they may be bluffing. Thus, there is no reason why environmental standards can't improve in developed countries as well.

This chapter introduces the trade and environment debate and the theoretical lenses through which economists and other analysts have begun to examine it. It also provides an outline of the argument that will be advanced later in the book, as well as a summary of the rest of the book and its findings.

Theoretical Approaches to Trade and Environment

In recent decades, the world economy has undergone an unprecedented level of integration. Since the mid-1980s, the value of world trade has more than quadrupled and the value of foreign investment has increased by a factor of 15 (UNCTAD 2002). These flows have been facilitated by a proliferation of global, regional, and bilateral trade and investment agreements. The 1990s alone ushered a new round of global trade negotiations under the General Agreement on Tariffs and Trade (GATT) that resulted in the creation of the World Trade Organization (WTO), the solidification of common markets in Europe and South America, and the NAFTA. This trend has not stopped. A new round of WTO negotiations has been launched (the Doha round), as well as a

proposed Free Trade Area of the Americas (FTAA) that would integrate the economies of the Western Hemisphere. Although many analysts doubt that it is politically possible, both of these negotiations are scheduled for completion in 2005.

Alongside these trends, the environmental ramifications of trade and investment liberalization have become an area of great concern (Esty 1994). Every official meeting on the world economy has been paralleled by large-scale protests where environmental issues loom large in the opposition. Also around these meetings (or at least in reaction to or in preparation for them) is a growing but disparate set of scholars who are trying to address these issues through a more rigorous theoretical and empirical lens. This study uses a number of current theoretical perspectives in order to develop an empirically-based understanding of what has happened in Mexico. The results are sure to have implications for theory, and for future negotiations of economic integration.

Although these discussions are commonly referred to as the trade and environment debates, trade has become a catch-all term that refers to a whole package of policies. This package includes: the liberalization of both trade and investment, the increase in structural adjustment programs for the least developed countries, and the decreasing role of government in developed and developing countries alike. In much of Latin America, such a package is commonly referred to as *neoliberalismo* (neoliberalism). In the United States, this phenomenon is more often called economic integration. Still others lump all these trends together as globalization. Economic integration is the preferred term for this book, but the others may creep in to avoid being redundant. Economic integration fits best because Mexico liberalized trade and investment, privatized state-owned industries, underwent structural adjustment programs, and decreased the role of the government in a series of measures dating back to 1985.

In order to develop an understanding of economic integration's effect on the environment that is both theoretically and empirically based, this study draws on two lines of analysis: first is a body of work on what has come to be called the Environmental Kuznets Curve (EKC), and second is the literature on the pollution haven hypothesis.

The EKC is commonly evoked by free trade proponents. Indeed, it was the EKC that Bhagwati referred to when he argued that trade-led

economic growth would improve environmental quality in developing nations that liberalized their trade regimes. In 1955, Simon Kuznets found an inverted U-shaped curve relationship between income inequality and levels of income. In a landmark article conducted as an attempt to predict the environmental effects of NAFTA, Grossman and Krueger (1993) found a similar relationship between environmental degradation and levels of income. The large body of work that emerged after their article has become known as the EKC literature. According to the EKC, environmental degradation may sharply increase in the early stages of economic development, but a rise in per capita income past a certain turning point, initially thought to fall between $3,000 and $5,000 in 1985 purchasing power parity (PPP) terms, would gradually reduce environmental damage.

The factors that lead to environmental improvements after the turning point is reached fall into three categories: the scale, composition, and technique effects of trade-led economic growth. Scale effects occur when economic integration causes an expansion of economic activity (output). If the amount of pollution per unit of output in the economy as a whole remains unchanged during the period of economic integration and growth, but the scale of output is growing, then pollution and resource depletion will increase as well.

Composition effects occur when changes in trade policy lead nations to specialize in particular sectors, most often those where they enjoy a comparative advantage. If the amount of pollution per unit of output remains unchanged in each industry, and the integration process causes nations to specialize in less pollution-intensive economic activity, shifting away from capital to labor intensive activity for instance, then the composition of that economy will become less pollution-intensive.

If pollution per unit of output in an industry changes during the period of integration and growth such changes are referred to as technique effects. Reductions in pollution per unit of output may occur for a number of reasons. Economic growth may trigger new investment that may bring newer, cleaner technologies. It could also raise incomes to a point where governments would establish stronger environmental problems.

For these reasons, the EKC is often evoked in political negotiations. Indeed, many free trade proponents cited the work of Grossman

and Krueger to argue that NAFTA would accelerate Mexico to the turning point, and that the environmental concerns of many of NAFTA's opponents would soon be alleviated. It was argued that free trade in and of itself would eventually clean the environment. Although EKC is plausible in theory, Chapter 3 shows that there is only limited empirical support for the EKC in the academic literature (Stern 1998).

Many free trade opponents evoke the pollution-haven hypothesis. The pollution haven hypothesis blends traditional trade theory with the theory of environmental externalities. The economist David Ricardo (1817) showed that, because countries face different costs to produce the same product, if each country produces (and then exports) the goods for which it has comparatively lower costs, then all parties benefit. The effects of comparative advantage (as Ricardo's notion became called) on factors of production were developed in the Heckscher-Ohlin model. This model assumes that in all countries there is perfect competition, there is the same mix of goods and services, and that factors of production (such as capital and labor) can freely move between industries. Within this rubric, the Stolper-Samuelson theorem adds that international trade can increase the price of products in which a country has a comparative advantage.

According to these trade theories, trade liberalization between two nations could lead to an increased specialization in pollution-intensive economic activity in the country with weaker environmental policies. An efficient (or optimal) environmental policy is one where the marginal social benefits of pollution are equal to the marginal cost of that increase (Baumol and Oates 1998). If a country sets its environmental policies below the efficient level (if it fails to internalize environmental externalities and thus allows market failures), the costs of producing pollution-intensive goods will be lower relative to those of a trading partner who has set optimal environmental policy. This increased ability to specialize in pollution-intensive (or natural resource intensive) industry may provide an economic incentive for pollution intensive firms to relocate to developing countries based on lower comparative costs (Anderson 1992). This phenomena is what Daly evoked in the pages of *Scientific American,* and is commonly referred to as the pollution haven hypothesis. Like the empirical work on the EKC, Chapter 3 shows that there is

limited empirical support for the pollution haven hypothesis in the peer-reviewed literature (Neumayer 2001).

This logic has been extended into the regulatory realm. It has been argued that the fear of losing comparative advantage because of increasing marginal pollution costs would cause a race to the bottom in environmental regulation. Not only would firms flock to areas where pollution control costs are relatively less costly, firms would also exert downward pressure on environmental standards in nations with more optimal environmental policies, all in the name of competition (Esty 1999; Neumayer 2001). From the perspective of the country that lacks optimal environmental policies, there are concerns that such countries could be stuck at the bottom. This result could occur because nations might fear that increasing levels of environmental protections (and therefore costs) would scare away foreign investment. Nations with differing levels of environmental policy face a classic prisoner's dilemma: competitive pressures give individual countries the incentive to pursue lower environmental policy than if they worked collectively, although cooperation between the countries would result in greater welfare for all countries (Zarsky 1997; Porter 1999).

Overview: Environmental Conditions and Economic Integration in Mexico

This book empirically examines each of these theories (the EKC, the pollution haven hypothesis, and the scale, composition, and technique effects) in order to examine the extent to which economic integration has affected levels of criteria air pollution and other environmental conditions in Mexico. Contrary to both EKC and pollution haven predictions, the main empirical results are that, on a national level, a number of environmental conditions worsened in Mexico despite rising incomes, but not because dirty industry in the United States flocked there. Rather, environmental degradation worsened because the Mexican and U.S. governments did not instate effective environmental policies that would have brought the desired benefits from economic integration.

Between 1985 to 1999, Mexico installed a sweeping array of policies in order to integrate itself with the world economy. During this

short period, Mexico joined the GATT, NAFTA, the Organization for Economic Cooperation and Development (OECD), and signed well over 20 bilateral and regional economic integration agreements with other nations around the world. These policies led to an about face in Mexico's trade patterns. Oil exports amounted to 80 percent of total exports in 1985, but dropped to just 10 percent by 2000. During the same period of rapid increases in trade and investment, inflation has also become tamed. However, other results have been less remarkable. For instance, on a per capita basis real gross domestic product (GDP) has grown at a rate of less than one percent annually, and inequality and poverty have worsened considerably (for a good overview of Mexico's profound transformation and its economic effects see (Middlebrook 2003).

Over this period, Chapter 2 examines the EKC hypothesis for Mexico. Mexico reached $5,000 GDP per capita in 1985, the high end of the level of income predicted by early EKC studies to trigger decreases in environmental degradation. Ironically, 1985 is precisely the year Mexico began to integrate itself with the world economy. Since 1985, Mexico has achieved modest growth. Despite this growth, chapter two shows that Mexico is yet to reach an EKC turning point for a number of pollutants, and may not for decades to come. Chapter 2 also estimates that it would take decades of the kind of growth thus far experienced before a number of key pollutants Mexico's environment begin to decrease, if they do at all.

Mexico's environment did not primarily worsen because Mexico became a pollution haven for U.S. companies. Although the share of dirty industries in the United States (as measured by marginal pollution abatements costs) did decrease between 1988 and 1998, the share of dirty industries in Mexico also declined, and more so than in the United States.

The statistical analysis performed in Chapter 3 examines the pollution haven hypothesis from a variety of perspectives. The results of this chapter suggest that the marginal costs of pollution abatement in the United States are such a relatively small expense that they are not major factors when the majority of firms are making decisions regarding their location.

Chapters 4 and 5 comprise a case study of industrial air pollution in Mexico. In these chapters the scale, composition, and technique effects

of economic integration on industrial criteria air pollution are examined. Chapter 4 looks at the scale and composition effects. I find that the composition of industry became less pollution-intensive. Such declines were outstripped by the scale effect. Although the share of pollution intensive industry in the Mexican economy declined over this period, the pace of economic growth in manufacturing (which was over 4 percent per annum) was such that total criteria air pollution in manufacturing still almost doubled.

To estimate the technique effect, Chapter 5 creates a Harmonization Index that compares the criteria air pollution intensity of Mexican and U.S. manufacturing. The chapter also performs a number of simple econometric exercises that examine the extent to which energy technology and fuel use explain the relative levels of criteria air pollution intensity in the two countries. There are a handful of industries in Mexico that are cleaner than their U.S. counterparts: notably, steel and cement. Chapter 5 shows that those industries that are cleaner in Mexico than the United States tend to be those where pollution is a function of plant vintage and fuel use. Those industries that are dirtier in Mexico use more polluting fuels, and pollution is more a function of end-of-pipe technologies. While the steel and cement stories are clear successes, the share of those industries in Mexico that are cleaner than their U.S. counterparts has been shrinking by every measure.

Chapter 6 describes how Mexico has fallen short of installing effective environmental policies to address the market failures in its changing economy. Over the past 20 years, Mexico has developed a fairly elaborate set of environmental laws, institutions, and human resources. As the World Bank and others have pointed out, Mexico has not equipped its environmental regime with adequate resources to create optimal environmental policies. Since 1993, the year after NAFTA was signed, real spending and plant-level environmental inspections have both fallen by 45 percent. On an international level, the environmental side accords of NAFTA, with some exceptions, have done little to fill this gap.

Chapter 7 summarizes the key findings of this research and answers the research questions posed in this chapter. Chapter 7 also outlines the theoretical implications of the study, in addition to a number of policy parameters for Mexico and future negotiations on economic integration.

Implications for Theory and Policy

The empirical findings in this volume have profound implications for both theory and policy. The fact that this study is consistent with the peer-reviewed literature that finds limited evidence for an EKC or pollution havens reiterates the need to address environmental externalities in an optimal manner. From both theoretical and policy perspectives, Chapter 7 outlines three main lessons that can be drawn from this study:

1. **Without the proper environmental policies in place, economic integration can exacerbate environmental problems.** This book underscores the need to couple economic integration with necessary environmental policy. Developing nations fall short of establishing social and environmental policies in the face of economic integration for two reasons: because they are often in economic (and thus fiscal) crises that make few funds for social policy available; and that developing nations fear new social policies (especially environmental ones) may scare away foreign investment and domestic industry. Kym Anderson (1992) has shown that if environmental externalities are optimally internalized developing nations need not grow at the expense of the environment.
2. **Enacting environmental policies will not scare away investment.** The fact that this study, like so many others, finds no support for the pollution-haven hypothesis is good news for developed and developing countries alike. The marginal costs of pollution abatement are not significant enough to trigger firms to re-locate (or change expansion plans) from one geographical region to another. Developed and developing countries are free to pursue environmental policies of the magnitude now in effect in developed countries without putting up barriers to economic growth. Given that environmental regulations in the U.S. don't encourage dirty firms to move to Mexico, there is room for improving environmental in this country as well.

3. **There is a clear role for industrialized nations to assist less-developing countries in meeting their environmental goals.** Dani Rodrik (2001) has shown how social policy can be crowded out by integration policy in developing countries with limited fiscal capacities. This study implies that such was the case in Mexico. Although the economy and public expenditures grew, spending on the environment plummeted and the international institutions created to help Mexico meet its environmental goals was not sufficient to come to the rescue. Chapter 7 ends by making the case that developed country trading partners should make technical and financial commitments to help developing countries meet their environmental goals.