NAFTA's Promise and Reality

LESSONS FROM MEXICO FOR THE HEMISPHERE

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CARNEGIE ENDOWMENT *for International Peace*

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For print and electronic copies of the introduction and the full-text report in English and Spanish, visit **www.ceip.org/pubs.**

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Introduction

JOHN J. AUDLEY

…a giant sucking sound…

—ROSS PEROT, 1994

NAFTA fuels economic growth and dynamic trade, stimulates investment while creating productive partnerships, works for small and medium-sized businesses and provides fairness and certainty. NAFTA partners promote environmental protection, and provide greater job opportunities in North America.

—THE GOVERNMENTS OF THE UNITED STATES, MEXICO, AND CANADA, 1999

LATIN AMERICAN AND CARIBBEAN COUNTRIES FACE AN ENORMOUS CHALLENGE: How to grow their national economies, create good jobs, and generate the revenues necessary to provide basic public goods such as human health and environmental protection. Their task is burdened by more than two decades of weak economic performance that has failed to create jobs for a workforce expected to grow by 1.9 percent a year from 2001–2010. Nearly one person in ten is out of work. Current per capita income stands at a meager US$3,580, and according to the Inter-American Development Bank, approximately 150 million people—one out of every three people living in Latin America and the Caribbean—earn less than US$2 a day. To compound the problem, governments throughout the region admit that, while they may have enacted sound environmental and public health laws, the laws are rarely enforced, especially in rural areas.

Hoping to avoid another "lost decade" similar to the 1980s, thirty-four governments from the Western Hemisphere met in 1994 to outline an ambitious agenda to advance prosperity, democratic values and institutions, and security throughout the hemisphere. Negotiating a Free Trade Area of the Americas (FTAA) was central to their agenda. According to the heads of state attending the 1994 meeting, "Free trade and increased economic integration are key factors for raising standards of living, improving the working conditions of people in the Americas, and better protecting the environment."[1] Many officials and observers in the hemisphere believed that free trade would remedy ailing economies.

In total, Latin American governments are negotiating or have completed seventeen different free-trade agreements with member states of the Organization for Economic Cooperation and Development (OECD). Most recently, in January 2003, the governments of Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and the United States announced the launch of comprehensive trade negotiations, which are scheduled to be completed by the end of 2003, prior to completion of the FTAA. According to the U.S. Trade Representative, Ambassador Robert Zoellick, the U.S.-Central American Free Trade Agreement (CAFTA) negotiations would further the regional integration the Central Americans have themselves begun, and thereby complement efforts to promote the successful conclusion of the FTAA negotiations.

Twenty-five years ago, Mexico faced a similar economic situation, and adopted a similar prescription. Mexico's earlier economic strategy of import substitution and a large role for the public sector had increased jobs and economic output, but it had also left Mexico with a crushing external debt that sparked a major economic crisis in 1982. Mexican president Miguel de la Madrid Hurtado responded by moving Mexico toward an export economy. Despite considerable domestic opposition, in 1986

Mexico joined the General Agreement on Tariffs and Trade (predecessor to the World Trade Organization, or WTO). President Carlos Salinas de Gortari built on de la Madrid's initial steps toward liberalization by reducing the size of the public sector, promoting land ownership reform, and securing a commitment from the United States and Canada in 1991 to negotiate a free-trade agreement.[2] The North American Free Trade Agreement (NAFTA) went into force in 1994, marking the first major trade deal between developed and developing countries.

What has Mexico's experience been after twenty years of trade liberalization and ten years of NAFTA? How have the lives of Mexicans changed? Has the Mexican government developed the capacity to create conditions that put Mexicans to work, protect their health and the environment, and give them real alternatives to migration? In short, what lessons can be learned by other Latin American countries from Mexico's attempt to use trade liberalization with the United States and Canada as its engine for economic development?

OUR OBJECTIVES

This report has two objectives. First, we set out to determine how the quality of life in North America, particularly in Mexico, has fared as a result of trade liberalization in North America. While we touch on the experience of all three countries, we emphasize Mexico's experience since the enactment of NAFTA, as it is more relevant to other developing countries interested in strengthening their economic ties with wealthy countries such as Canada and the United States. Our study is different from those already done by some research institutions, advocacy groups, and intergovernmental organizations because we answer this question about the lessons of NAFTA by analyzing what conventional NAFTA studies pass over. Our analysis focuses on people, their communities, and the choices they make as they attempt to negotiate their social and economic environments. We emphasize changes in household income, paychecks and productivity, rural employment, and agricultural production and land use, and the overall effect of these changes on migration and environmental quality. We then examine how NAFTA's trade rules and institutions played a role in these changes. In short, while most positive analyses focus on the macro level and most negative analyses rely only on losses and not gains, our analysis provides a rigorous and balanced assessment of NAFTA by focusing on its effects on people's lives, livelihoods, and households.

Our second objective is to offer insights to other countries, particularly in Latin America, that are interested in strengthening their bilateral and multilateral economic ties within the region. While not entirely similar, Mexico's economic and cultural history and rich ecosystem are more closely linked to those of its Latin American neighbors than to those of the United States or Canada. These similarities mean that NAFTA's record can offer insights to other countries as they consider the potential costs and benefits of agreements such as CAFTA and FTAA.

OUR CONCLUSIONS

- NAFTA has not helped the Mexican economy keep pace with the growing demand for jobs. Unprecedented growth in trade, increasing productivity, and a surge in both portfolio and foreign direct investment have led to an increase of 500,000 jobs in manufacturing from 1994 to 2002. The agricultural sector, where almost a fifth of Mexicans still work, has lost 1.3 million jobs since 1994.

- Real wages for most Mexicans today are lower than they were when NAFTA took effect. However, this setback in wages was caused by the peso crisis of 1994–1995—not by NAFTA. That said, the productivity growth that has occurred over the last decade has not translated into growth in wages. Despite predictions to the contrary, Mexican wages have not converged with U.S. wages.

- NAFTA has not stemmed the flow of poor Mexicans into the United States in search of jobs; in fact, there has been a dramatic rise in the number of migrants to the United States, despite an unprecedented increase in border control measures. Historical migration patterns, the peso crisis, and the pull of employment opportunities in the United States provide better explanations for the increase in migration than NAFTA itself.

- The fear of a "race to the bottom" in environmental regulation has proved unfounded. At this point some elements of Mexico's economy are dirtier and some are cleaner. The Mexican government estimates that annual pollution damages over the past decade exceeded US$36 billion per year. This damage to the environment is greater than the economic gains from the growth of trade and of the economy as a whole. More specifically, enactment of NAFTA accelerated changes in commercial farming practices that have put Mexico's diverse ecosystem at great risk of contamination from concentrations of nitrogen and other chemicals commonly used in modern farming.

- Mexico's evolution toward a modern, export-oriented agricultural sector has also failed to deliver the anticipated environmental benefits of reduced deforestation and tillage. Rural farmers have replaced lost income caused by the collapse in commodity prices by farming more marginal land, a practice that has resulted in an average deforestation rate of more than 630,000 hectares per year since 1993 in the biologically rich regions of southern Mexico.

Put simply, NAFTA has been neither the disaster its opponents predicted nor the savior hailed by its supporters. But while NAFTA's overall impact may be muddled, for Mexico's rural households the picture is clear—and bleak. NAFTA has accelerated Mexico's transition to a liberalized economy without creating the necessary conditions for the public and private sectors to respond to the economic, social, and environmental shocks of trading with two of the biggest economies in the world. Mexico's most vulnerable citizens have faced a maelstrom of change beyond their capacity, or that of their government, to control.

In response to the growing challenges facing rural Mexico, many households have developed survival strategies to meet basic subsistence needs. These strategies include a mix of increased cultivation of basic crops and off-farm employment, often in the informal sector, and in some cases in maquiladora plants that have relocated away from the northern border into the hinterlands. Many rural workers have nonagricultural activities as their primary occupations, while relying on sporadic agricultural work to supplement their incomes. Mexico's agricultural policies provide commercial farmers with substantial support, but do not benefit subsistence farmers. More than ever, families rely on remittances sent home by those who migrate to the United States, with or without legal status. Finally, to reduce expenses, rural households also fall back on more traditional approaches to heating their homes and feeding their families. The net environmental loss associated with an increase in the farming of marginal land and illegal logging and poaching for fuel and food places some of the most important biological reserves in the hemisphere at risk of irreparable damage.

Trade agreements do not need to result in this kind of hardship for the world's rural poor. Negotiated properly, they can open doors to new markets while providing adequate protections from the stress associated with exposure to global competition and the increased pressure on natural resources. Trade should not be seen as an end in itself; instead, it should be used as a tool to strengthen economies through the operation of comparative advantage. At the same time, governments must respond to economic opening with effective policies, such as the deployment of social safety nets and trade adjustment assistance, and develop and implement

programs that protect labor rights and the environment. As nations consider how best to use trade agreements to foster development, we offer the following insights:

- Developing countries interested in freer trade should negotiate longer and more gradual tariff reduction schedules for agricultural products imported from wealthy countries, and negotiate special safeguards to protect against the dumping of subsidized crops. The need for "shock absorbers" is especially great for the poorest developing countries where agriculture is a principal source of employment. Regional and bilateral trade agreements should not allow developed countries to duck the crucial issue of producer subsidies in agriculture.

- Trade agreements should allow developing countries to adopt policies that maximize employment gains from trade by promoting the development of domestic suppliers and that do not favor imported components. Whether the suppliers are owned by domestic or foreign firms is not relevant; what is relevant is whether the suppliers create jobs.

- Developing countries should bargain for meaningful financial support for transitional trade adjustment assistance, from trading partners and from international donor organizations. Such adjustment assistance should include training for workers and subsistence farmers in new skills and access to credit that allows and encourages small farmers to develop economically and environmentally sound farming practices. Assistance to the rural poor should be aimed at allowing them to transition to livelihoods that are sustainable in the modern global market—and should acknowledge that the process of urbanization will continue.

- Developing countries should adopt and implement policies that help distribute the gains from trade more equitably, through better tax and minimum wage policies and the expansion of freedom of association and collective bargaining rights. They should commit to national action plans that build environmental infrastructure. Because these policies may be valued by their wealthier trading partners, developing countries may win additional advantages in trade agreements by making these commitments.

- To minimize the environmental implications of trade liberalization for agriculture, and the tendency of export growers to adopt chemical-intensive production methods, trade agreements should set standards that allow developing countries to take advantage of the growing demand for organic food products.

- The movement of workers is a powerful social and economic force, and countries at all levels of development have good reason to discuss temporary migration in a variety of contexts, which may include future free-trade negotiations. However, given the political sensitivity of the issue, migration should not be allowed to jeopardize agreements on the movement of goods and capital and on other ways of providing services.

LONG-TERM STRATEGIES

Free-trade agreements should not be thought of as an end in themselves; nor should they be loaded with unrealistic expectations. Instead, they should be viewed as part of a larger effort toward substantive bilateral and regional cooperation toward common goals. Migration, labor, and environmental protection are examples of topics on which deeper cooperation is sorely needed.

Trade liberalization is facing a crisis of legitimacy among people around the world, from rural farmers in Latin America to cotton producers in Africa to manufacturing workers in the United States and Europe. Governments can win back public support for new trade agreements, but they must change their current tactics. First, they must stop making

empty promises that trade liberalization alone will bring new jobs or clean environments, or stem the flow of illegal migration. Second, they must enhance long-term development and avoid unnecessary setbacks by strengthening their domestic economies' capacity to respond to shocks when exposed to the global marketplace. The needs of developing countries must be taken into account in trade negotiations in meaningful ways that create real opportunities for development and growth, so that these countries' citizens can also become consumers in the global economy. That, in the long-term, is how everyone will achieve greater prosperity.

NOTES

1 Ministerial Declaration, First Summit of the Americas, Miami, Fla., 1994, available at www.ftaa-alca.org/ministerials/miami_e.asp.

2 Carlos Salinas de Gortari, *Mexico: The Policy and Politics of Modernization* (Barcelona, Spain: Plaza & Janes, 2002). See especially parts 1 and 2.

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Jobs, Wages, and Household Income

SANDRA POLASKI

EMPLOYMENT IS THE MAIN SOURCE OF HOUSEHOLD INCOME for a large majority of the population in all the countries of North America. Therefore, one of the most basic measures of a trade agreement's impact on the well-being of real people is the number of jobs gained or lost as a result of the agreement, the quality of those jobs, and the wages paid. A second important and closely related measure is the effect of trade liberalization on productivity, or how much workers actually produce in any given work session. If productivity rises, workers can be paid more without driving up inflation or cutting into business profits. Thus, rising wages can be sustained over the long term. Rising productivity that leads to higher wages will expand domestic consumer demand, stimulating further production of goods and services and creating a virtuous circle of growth. A third set of economic issues that must be addressed in measuring the impact of trade on average citizens is how the gains from trade are distributed. There are winners and losers from trade, and it is impossible to assess the effect of trade on societies without knowing which groups gained, which lost, and to what degree they were affected.

Beyond these economic effects of trade on real people, there is also an important political reason to study the employment impact of trade. Political leaders often promote trade in general, and particular trade agreements such as the North American Free Trade Agreement (NAFTA), as job creators. In the United States, for example, then-president Bill Clinton predicted that NAFTA would create 200,000 U.S. jobs in its first two years of existence.[1] Today, President George W. Bush promotes trade pacts on the same basis, promising that they will "generate high-wage jobs for American workers."[2] When trade pacts are sold to the public and to legislators on the basis of their potential to create jobs and raise wages, it is important to revisit those promises, once time has elapsed and data have accumulated, to determine actual results. Such retrospective studies can then be used to guide future trade policy.

As with other effects of NAFTA, it is not a simple or straightforward proposition to tally the impact of the agreement on jobs, wages, and incomes. Still, there are several aspects of NAFTA's effects that can now be estimated with some confidence. In this chapter, I review the impact of NAFTA on jobs, wages, and household income in each North American country. The focus is primarily on Mexico, however, because the impact of NAFTA on employment has been much greater there than in Canada or the United States. I then discuss the policy implications for countries in the hemisphere that are confronting choices on trade that may have similar employment impacts.

(Continued on page 14)

MAIN FINDINGS

JOBS

- NAFTA has produced a disappointingly small net gain in jobs in Mexico. Data limitations preclude an exact tally, but it is clear that jobs created in export manufacturing have barely kept pace with jobs lost in agriculture due to imports. There has also been a decline in domestic manufacturing employment, related in part to import competition and perhaps also to the substitution of foreign inputs in assembly operations. About 30 percent of the jobs that were created in maquiladoras (export assembly plants) in the 1990s have since disappeared. Many of these operations were relocated to lower-wage countries in Asia, particularly China.

- Mexican agriculture has been a net loser in trade with the United States, and employment in the sector has declined sharply. U.S. exports of subsidized crops, such as corn, have depressed agricultural prices in Mexico. The rural poor have borne the brunt of adjustment to NAFTA and have been forced to adapt without adequate government support.

- NAFTA's net effect on jobs in the United States has been minuscule, given the size of the U.S. economy and the importance of other trading partners. The best models to date suggest that NAFTA has caused either no net change in employment or a very small net gain of jobs.

- NAFTA's predecessor, the Canada-United States Free Trade Agreement (CUFTA), took effect in 1989 and at first led to substantial net job losses in Canada's traded sectors. After about five years, the losses stopped and export manufacturing began to grow again. A decade after the enactment of CUFTA, manufacturing employment recovered to the levels seen before the trade pact and has continued to grow modestly since then.

PRODUCTIVITY

- Productivity has increased in all three countries over the last decade. NAFTA and CUFTA likely played a significant role in the observed productivity growth in Mexico and Canada, because both countries cut tariffs deeply and were thereby exposed to competition from their giant neighbor. In the United States, NAFTA probably has played a small or negligible role in productivity growth for two reasons: U.S. tariffs were already low before NAFTA and trade with the rest of the world plays a much larger role.

- The desirable growth in productivity may have had the unwanted side effect of reducing the rate of job growth, since fewer new jobs were created as workers already on payrolls produced more.

WAGES

- Real wages for most Mexicans today are lower than when NAFTA took effect. This stunning setback in wages is mainly attributable to the peso crisis of 1994–1995. However, during the NAFTA period, productivity growth has not translated into wage growth, as it did in earlier periods in Mexico. Mexican wages are also diverging from, rather than converging with, U.S. wages.

- Since the net impact of NAFTA on U.S. employment is small, the impact on overall wages is also minor. But a widening gap between the wages of skilled and unskilled workers is partly attributable to trade, and NAFTA as a factor in U.S. trade is thus likely to account for a portion of the observed growth in wage inequality.

- Overall real wages in Canada were only slightly higher in 2002 than when CUFTA took effect in 1989, but manufacturing earnings fared somewhat better. This suggests that NAFTA and CUFTA did not have a negative impact on wages, since earnings in nontraded sectors increased slower than in manufacturing. As in the case of Mexico, productivity increases in Canada significantly outstripped wage increases.

INCOME DISTRIBUTION

- Income inequality has been on the rise in Mexico since NAFTA took effect, reversing a brief declining trend in the early 1990s. Compared to the period before NAFTA, the top 10 percent of households have increased their share of national income, while the other 90 percent have lost income share or seen no change. Regional inequality within Mexico has also increased, reversing a long-term trend toward convergence in regional incomes.

- Income inequality in the United States increased during the decade before NAFTA and has continued to widen. The growing wage gap between high-skilled and low-skilled workers is one of the causes, and to the extent that trade is a factor in the wage gap, it is also implicated in growing inequality.

- Despite relatively more equal incomes in Canada than in either Mexico or the United States, income inequality has been on a marked upward trend since CUFTA's entry into force in 1989. The richest 20 percent of Canadian households have increased their share of national income during the period, while all others have experienced declines. Only the top 20 percent of households had higher real incomes in 2000 than in 1989. Because manufacturing wages performed better than wages in most other sectors, it seems clear that trade-induced wage changes were not the cause of the observed increase in inequality in Canada. Rather, a reduction in transfer payments from government, which play an important role in the incomes of the bottom 40 percent of households, accounts for most of the change. The possibility that increased trade would weaken the Canadian social safety net was a concern of CUFTA opponents, but there is no clear evidence to support a causal relationship.

WINNERS AND LOSERS

- The experience of each of the NAFTA countries confirms the prediction of trade theory, that there will be winners and losers from trade. The losers may be as numerous as, or even more numerous than, the winners, especially in the short-to-medium term. In Canada, it took a decade for manufacturing employment to recover from the initial displacements caused by CUFTA. In Mexico, farmers are still struggling to adapt to NAFTA-induced changes.

- The short-to-medium term adjustment costs faced by the losers from trade can be severe, and the losers are often those segments of society least able to cope with adjustment, due to insufficient skills, meager savings, and limited mobility. It must also be recognized that there may be permanent losers from trade, due to these limitations.

Mexico

JOBS

Mexico has an abundance of labor. Very high population growth rates through the mid-1970s translated into a demographic bulge in the workforce through the late 1990s, as people born during the earlier high-growth years matured and began to look for work. In addition, during the 1980s and 1990s, women joined the workforce at increasing rates, in part because of the decline in the reproductive rate, but also out of the need to support household incomes during recurrent economic crises. Overall, the Mexican labor force grew from 32.3 million immediately before NAFTA to 40.2 million in 2002, meaning that Mexico needed almost a million jobs a year simply to absorb the growth in labor supply.[3]

Economic theory suggests that opening to trade will increase the demand for labor in a labor-abundant country and therefore will increase the number of jobs, the wages paid, or both. Clearly, that would be a desirable effect for a country with a large and growing workforce such as Mexico. However, in practice, the effect of a trade pact like NAFTA depends on many factors, including which tariffs were reduced or eliminated by each country, at what pace, and in what sequence. It also depends on other negotiated provisions of the pact—and related government policies—that affect decisions about investment, production, and jobs, and on the overall balance of gains and losses from the trade agreement as negotiated.

Thus, it is necessary to look at both the elimination of tariffs on exports from Mexico to its northern neighbors (which could increase exports and therefore increase jobs) and the elimination of Mexican tariffs on U.S. and Canadian goods (which could increase Mexico's imports from the United States and Canada and thereby eliminate jobs in Mexico) to understand the impact of NAFTA's tariff cuts on Mexican jobs. The following discussion focuses on tariff changes between Mexico and the United States, because trade between Mexico and Canada is a very small part of Mexico's total trade.[4]

Under NAFTA, the United States cut tariffs on most Mexican manufactured goods, with the largest cuts on textiles and apparel, followed by more modest but still significant reductions on footwear, chemicals, miscellaneous manufactures, and transportation equipment. The United States also cut agricultural tariffs and increased quotas, although one of Mexico's main agricultural products, sugar, continues to be restricted through tariffs and quotas. Other Mexican crops face seasonal restrictions that are scheduled to end by 2008. Meanwhile, Mexico cut tariffs dramatically on both agricultural and livestock products and virtually all manufactured goods from the United States. Some tariffs will be maintained on sensitive agricultural products such as maize and beans until 2008, but in practice the Mexican government has already allowed substantial above-quota tariff-free imports of corn.

The pattern of trade between the two countries changed in a number of ways as a result of these cuts. From Mexico's standpoint, the cumulative changes resulted in a shift from a net trade deficit with the United States before NAFTA to a substantial net trade surplus in 2002. The overall net surplus masks a growing deficit in agricultural trade with the United States that is more than offset by a surplus in manufactured exports from Mexico. Trade in services shows a small deficit for Mexico (see Figure 1).

Manufacturing Employment. Translating these changes in trade patterns into employment impacts is not easy, but approximate numbers of jobs can be determined with reasonable certainty. With respect to manufacturing, the task is complicated by data availability. The Mexican government tracks manufacturing employment through two separate data series. One survey covers medium-size and large manufacturing establishments that account for about 80 percent of industrial production, but excludes the maquiladora sector.[5] A separate survey covers maquiladoras, which are export assembly plants.

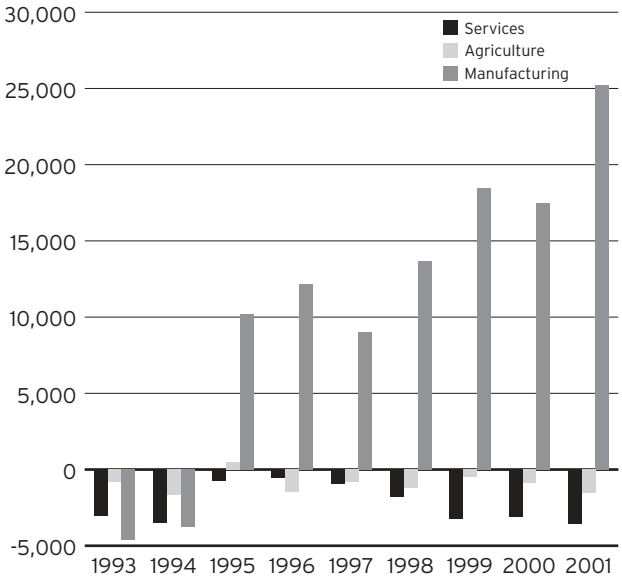
Overall employment in non-maquiladora manufacturing in Mexico was lower in 2003 than in 1994, except in microenterprises, which are mainly in the informal sector.[6] Employment in the non-maquiladora manufacturing sector stood at about 1.4 million in January 1994, declined sharply during the peso crisis, then began a recovery that produced an additional 91,000 jobs at its peak in May 2000 before declining again over the past three years. The recent decline has been caused in significant part by the U.S. recession. As NAFTA has linked Mexico more and more closely to the U.S. economy, the U.S. business cycle has come to play a dominant role in Mexico's economic fortunes. In May 2003 there were 1.3 million jobs in non-maquiladora manufacturing, about 100,000 fewer than when NAFTA took effect (see Figure 2).

The maquiladora program was created by Mexico and the United States in 1965 to allow tariff-free and tax-free imports of materials and components into Mexico for assembly and re-export to the United States. It is concentrated in the auto parts, electronics, and apparel sectors. The growth in maquiladora jobs is not primarily attributable to NAFTA, since the program predates that pact, but NAFTA did provide significant tariff cuts on apparel and as a result stimulated that subsector of the maquiladoras. At the same time, NAFTA began a process of phasing out the unique tax and tariff advantages of the maquiladora program, while granting similar treatment to non-maquiladora manufacturers in Mexico. Many observers expect the maquiladoras' share of Mexico's manufactured exports to continue to decline over time.

Maquiladora assembly plants added about 800,000 jobs between NAFTA's enactment in January 1994 and the sector's peak employment in 2001. They then shed about 250,000 jobs through May 2003. Currently, maquiladoras employ about 550,000 more workers than they did before NAFTA (see Figure 3). Maquiladora plants produce almost entirely for export, so employment in that sector can be attrib-

Figure 1. Mexico's Trade Balance with the United States, by Sector

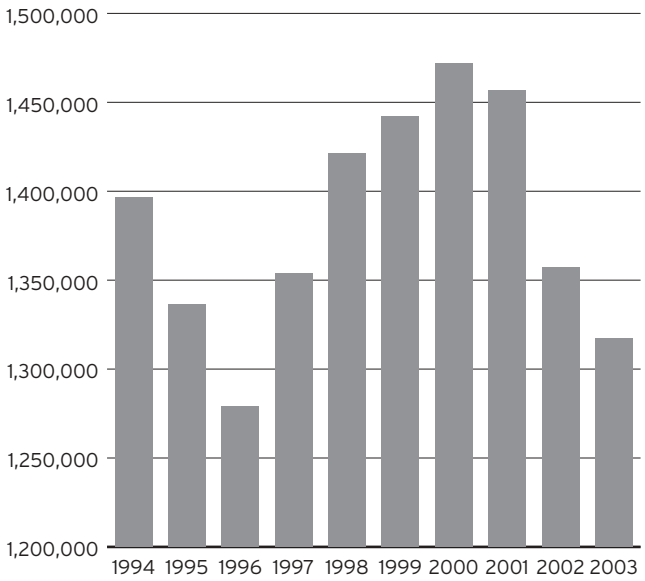
MILLIONS OF DOLLARS



Source: Compiled by the U.S. International Trade Commission from official statistics of the U.S. Department of Commerce, Bureau of the Census.

Figure 2. Non-Maquiladora Manufacturing

TOTAL EMPLOYMENT, JANUARY 1 OF EACH YEAR

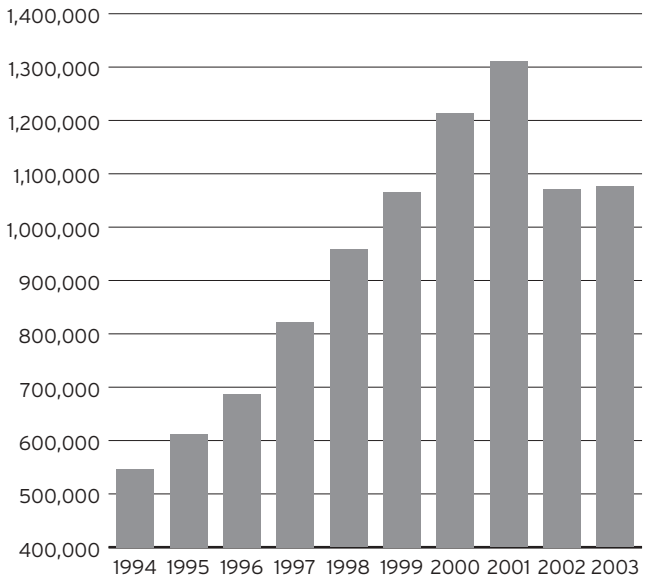


Source: Mexican National Institute of Statistics, Geography, and Informatics (INEGI), Ministry of Employment and Social Insurance (STPS), Monthly Industrial Survey (EIM).

uted largely to trade (although not exclusively to trade resulting from NAFTA). By contrast, the data on non-maquiladora manufacturing employment blend production for export with production for domestic markets; therefore, it is difficult to determine the proportion of employment attributable to exports. One study suggests that the share of non-maquiladora manufacturing employment associated with exports increased by roughly 500,000 jobs between 1994 and 1999, and then declined.[7] Of those jobs, some 450,000 were based on exports to the United States.

Only part of the growth in both maquiladora and non-maquiladora export employment can be attributed to NAFTA. The peso devaluation of 1994–1995 gave a very significant boost to all Mexican exports, as the dollar bought more than twice the value of Mexican goods after the devaluation. A study by the U.S. International Trade Commission (USITC) found that the peso devaluation of 1994–1995 had a larger impact on the growth of Mexican exports of manufactured goods to the United States than all NAFTA-related tariff changes combined.[8] If one uses the USITC's findings on the relative impact of various factors on changes in Mexican exports to the United States, NAFTA tariff cuts likely explain about one-quarter of the total growth in export manufacturing jobs (maquiladora and non-maquiladora), or the addition of about 250,000 jobs, while the peso devaluation, lower transport costs, and other factors account for the rest.[9]

Figure 3. Maquiladora Employment in Mexico
TOTAL EMPLOYMENT, JANUARY 1 OF EACH YEAR



Source: INEGI, Monthly Indicators of the Maquila Industry.

The overall reality during the NAFTA years has been one of strong growth in the volume of manufactured exports but very disappointing growth in manufacturing employment. This unwelcome divergence between manufacturing output and employment growth emerged in Mexico in the mid-1980s but appears to have widened since enactment of NAFTA.[10] A number of explanations for this outcome have been advanced. One obvious explanation is productivity growth, which reduces the amount of job creation for any given level of exports. While productivity did increase in Mexican manufacturing through most of the 1990s, the gains were fairly modest, and alone cannot account for the very slow growth in manufacturing employment.

One factor that likely explains part of the phenomenon is that export manufacturing in Mexico is increasingly based on a production model in which component parts are imported, then processed or assembled, then re-exported. In this model, the spillover effect of such operations on the broader economy is very limited, because only a narrow range of processing or assembly operations benefit the labor market. Forward and backward linkages, such as the stimulation of businesses that supply parts and materials, are not created, limiting the multiplier effect of any growth in exports. This pattern is quite clear in the maquiladora sector, in which 97 percent of components are imported and only 3 percent are produced locally in Mexico. But the non-maquiladora export sector shows similar patterns. The intrafirm production carried out by multinational firms operating in Mexico in sectors

such as the auto and electronics industries depends heavily on imported inputs. It seems probable that Mexican manufacturers that previously supplied inputs to large manufacturing firms have lost a significant share of input production to foreign suppliers, and thus account for part of the weakness in manufacturing employment.[11]

Another important factor in the decline of domestic manufacturing employment is that some Mexican manufactures have been displaced directly by imports. The limited employment growth that has occurred in manufacturing for the domestic market has been mainly in very small firms and in the informal sector, with low pay and usually without benefits.

The export manufacturing model in Mexico has also failed to generate much growth in jobs at the high-skills end of the spectrum, in areas such as research, engineering, design, and accounting. One study of the skills component of manufacturing jobs in Mexico found that in 2000 the proportion of skilled labor in the manufacturing sector was only 9.9 percent.[12] The skilled labor component in manufacturing was actually less than the average share of skilled labor in the overall economy, 13.9 percent.

The limited job creation under the manufacturing model currently prevalent in Mexico is of particular concern when put in the context of other changes that are likely to affect future employment growth in the sector. Mexico enjoyed the advantage of being the first low-wage country to strike a free-trade agreement with the United States. However, as more free-trade agreements are negotiated, unilateral preference programs are expanded, and World Trade Organization (WTO) membership grows, the first-mover advantage is progressively diluted. The accession of China to the WTO, in particular, has meant mounting competition for Mexico's manufactured exports, particularly in labor-intensive sectors such as apparel and electronics. In 2003, China displaced Mexico as the second-largest exporter to the United States (after Japan). It is no accident that Mexico was the last WTO member to agree to the terms for China's accession to the trading organization. The proliferation of free-trade agreements by the United States also means that the value of Mexico's market access advantages will erode as other low-wage countries gain similar access. For example, a proposed free-trade pact with Central America would add a sizable pool of lower-wage labor to the available regional labor supply, undermining Mexico's current advantage.

Agricultural Employment. As noted above, Mexico has had a net trade deficit in agricultural goods with the United States every year since NAFTA took effect, except the peso crisis year of 1995, when the huge devaluation of the peso made most dollar-denominated products too expensive for Mexicans. The agricultural trade deficit existed before NAFTA, but it grew after enactment of the trade pact and was larger in 2002 than in any previous year. Tariffs on the most sensitive crops in both the United States and Mexico have yet to be eliminated, and so the nature of bilateral agricultural trade will continue to evolve. However, the pattern to date challenges the conventional wisdom that agricultural liberalization is good for the developing country in a trade relationship with a developed economy. The one bright spot for Mexico, an increase in exports of fruits and vegetables, has not kept pace with imports of U.S. grains and oilseeds. This may be due in part to greater efficiency among U.S. producers, but it is also partly due to U.S. subsidies. By one estimate, U.S. corn was sold in Mexico from 1999 through 2001 at prices 30 percent or more below the cost of production.[13]

The increasing trade deficit has translated into job losses in agriculture. Agricultural employment in Mexico actually increased somewhat in the late 1980s and early 1990s, employing 8.1 million Mexicans at the end of 1993, just before NAFTA came into force. Employment in the sector then began a downward trend, with 6.8 million employed

(Continued on page 20)

UNDERSTANDING THE PESO CRISIS—WAS IT RELATED TO NAFTA?

The story of the 1994 Mexican peso crisis is basically a story of huge capital inflows from 1991 through early 1994, then abrupt outflows in late 1994 and 1995. As was the case in other developing-country financial crises of the 1990s, the volume and ultimately the direction of capital flows was partly a function of policy choices by the national government and partly the result of factors outside the government's control.

The inflow of capital investment in the early 1990s was a welcome change for Mexico after the lost decade of the 1980s, when the repayment of huge debt from earlier periods suppressed economic growth and living standards. A restructuring of that debt through the U.S.-led Brady plan of 1989, a series of privatizations in the early 1990s, and a rise in oil prices associated with the 1991 Gulf War together helped shake Mexico out of its economic doldrums. Meanwhile, Mexico began negotiations with the United States and Canada on what would become NAFTA, increasing investors' confidence that Mexican products would have access to the huge U.S. market and that investments in Mexico would be protected under an ambitious investment clause included in the new trade agreement. An important additional ingredient in the mix was that Mexico undertook financial liberalization beginning in the late 1980s that eliminated most capital and exchange controls, allowing much greater capital mobility.

Together, these policy choices accounted for one side of the attraction that Mexico began to hold for foreign investment and domestic flight capital. The other side was that the same period saw an economic recession in most of the developed world, beginning with contractions in Europe and Japan in 1990 and a downturn in the United States in 1991. Monetary authorities in those countries cut interest rates to try to revive their domestic economies, making higher returns in countries such as Mexico even more attractive to investors on a relative basis.

During the period leading up to the crisis, Mexico maintained a relatively fixed exchange rate regime, known as a *crawling parity band,* through which the peso was pegged to the U.S. dollar.[14] Investors viewed this type of arrangement positively at the time. To the extent the government's monetary policies were seen as credible, the fixed regime created predictability about the exchange rate and relieved investors of exchange rate risk.

The renewed inflows of capital were dominated by portfolio capital, that is, investment in government bonds and corporate stocks and bonds rather than direct investment in plants and equipment. About 60 percent of the portfolio investment was in bonds. As Table 1 shows, portfolio investment accounted for 63 percent, 76 percent, and 85 percent of capital inflows in 1991, 1992, and 1993, respectively. It was only in 1994, when NAFTA took effect, that foreign direct investment (in factories, equipment, farms, and other businesses) surpassed the shorter-term portfolio investments.[15] Portfolio investment is much more mobile or "footloose" than foreign direct investment, as the latter entails activities such as actual construction of factories and acquisition of equipment that may be hard to resell. Investments in Mexican government bonds were particularly short range investments, as most of the bonds were issued for three-month terms.

Table 1. External Portfolio and Foreign Direct Investment in Mexico
MILLIONS OF U.S. DOLLARS

Year	External Portfolio Investment	Foreign Direct Investment
1990	3,369	2,549
1991	12,741	4,742
1992	18,041	4,393
1993	28,919	4,389
1994	8,185	10,972
1995	-10,140	6,963

Source: International Monetary Fund, International Financial Statistics, October 1996.

In February 1994, the U.S. Federal Reserve Board raised interest rates for the first time since the recession of the early 1990s, in what was to be a series of rate increases as the United States experienced a strong economic recovery. With the interest rate spread between the United States and Mexico narrowing, portfolio capital flows to Mexico contracted sharply during the next three months, to less than one-fifth of their previous level. At the same time, new political turbulence emerged in Mexico, including the uprising of an indigenous group in Chiapas and the assassination of the presidential candidate of the ruling party. The Mexican government had to roll over existing debt (the three-month bonds, called *CETES)* in this difficult environment. At this point, the government made two fateful decisions. First, it shifted the public debt out of pesos into dollar-based securities (called *tesobonos*) as the three-month bonds came due. It thereby agreed to assume the exchange rate risk (which investors had previously borne) if the peso's rate of exchange with the dollar became unsustainable. The second decision was to continue to "sterilize" funds from international exchange transactions—that is, keep them out of the domestic money supply. Just as some funds had been kept out of the domestic monetary base as they flowed into Mexico in the early 1990s (and held as foreign exchange reserves), so now the outflow was covered by those reserves, allowing the Bank of Mexico to intervene to maintain the peso in its parity band for most of 1994. This allowed the government to prevent a collapse of the peso and an economic contraction during the first three quarters of 1994, the period leading up to the Mexican presidential election.

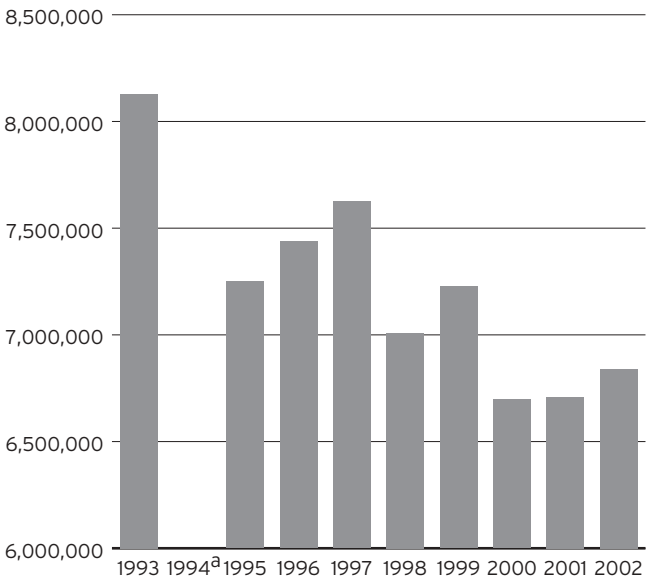
However, by the end of 1994 these reserves were almost exhausted. The government did not publish data that would allow the exact situation to be known, but investors and speculators began to expect that the government would run out of reserves and be forced to devalue the peso. To beat that eventuality, investors scrambled to shift out of Mexican investments and to trade pesos for dollars in order to do so. In response to the growing demand for dollars and shrinking foreign reserves, the Bank of Mexico widened the parity band in which the peso could move from about 2 percent to 15 percent. This was contrary to investor expectations (and, indeed, government indications) that there would be no devaluation. Coming on top of the other pressures that had been building, there was a run on the peso. The Bank of Mexico suffered large reserve losses over the next two days and on December 22, 1994, announced that the peso would be allowed to float. Within ten days the peso had depreciated 55 percent. Continuing to fall, it hit a low of 7.64 to the dollar by the end of 1995.

In evaluating the policy choices of the Mexican government with hindsight, it is useful to remember that until 1994 Mexico was often held up as a model of economic development by U.S. and multilateral financial institutions. But significant aspects of Mexico's apparent success in attracting international capital were built on a factor—low world interest rates—over which Mexico had no control. Mexico compounded this vulnerability by relaxing all controls over capital flows through its aggressive financial liberalization policies, so that it had no levers under its control when investor sentiment changed. The capital inflows were huge compared to the size of the economy, inflating it like a bubble. The "shock" of the capital outflows was therefore also very large. The peso crisis became the first financial crisis of globalization, with others to follow. In light of the Mexican experience, it seems clear that very large capital flows, especially flows of footloose portfolio capital, can be destabilizing to any macroeconomic policy regime in developing countries.

The United States has recently adopted the position that trade partners must eliminate all existing capital controls as part of any free-trade agreement. But Mexico's experience with financial liberalization, which predates NAFTA, clearly demonstrates that this is not a prudent policy for a developing country interacting with much larger global financial forces. Developing countries would be wise to resist demands that they eliminate capital controls as part of free-trade agreements.

at the end of 2002, a loss of 1.3 million jobs.[16] While not all of that reduction can be attributed to NAFTA, other forces that affected trade, such as the sharp devaluation of the peso during 1994–1995, pushed in the opposite direction, toward greater growth of Mexican exports over imports. In fact, 1995 was the one post-NAFTA year in which Mexico had a surplus in its agricultural trade with the United States, and agricultural employment did improve modestly for a short period thereafter. However, once the peso stabilized, the agricultural trade balance again turned against Mexico and agricultural employment resumed its decline. During this period, Mexico was also liberalizing trade with other partners, so the entire impact cannot be ascribed to NAFTA. But the WTO has determined that Mexico reduced its agricultural tariffs much more for the United States than for other trading partners.[17] Thus, agricultural trade liberalization linked to NAFTA is the single most significant factor in the loss of agricultural jobs in Mexico (see Figure 4).

Figure 4. Mexican Employment in Agriculture
EMPLOYEES



Source: INEGI/STPS, National Employment Survey (ENE).
Note: Agriculture actually refers to the primary sector, which also includes fishing, forestry, and trapping.
a. Data for 1994 not available.

The release of labor from the agricultural sector largely offset the employment gains in the export manufacturing sector that occurred after NAFTA took effect. As noted earlier, it is impossible to establish precisely what proportion of the 1.3 million gain in export manufacturing jobs (at the peak of employment in 2000) and the 1.3 million loss in agricultural jobs between 1994 and 2002 was directly attributable to NAFTA. However, it is clear that the sum of the effects of the trade pact to date has not been a strong net gain in overall employment and may have been a small net loss of jobs for Mexico. Further, the long-term effects are still uncertain, as most manufacturing tariffs have now been eliminated, while the most sensitive agricultural tariffs have yet to come down.

While the evolution of trade-related employment since enactment of NAFTA is disappointing, the substitution of manufacturing jobs for agricultural jobs is generally considered positive for development, representing a move up the production ladder. However, as noted above, there are some reasons for concern about the Mexican manufacturing sector. These include the limited development of forward and backward manufacturing linkages that would multiply job creation, the erosion of Mexico's first-mover advantage, and the decline in jobs in manufacturing for domestic consumption.

Service Sector Employment. NAFTA has had little direct effect on employment in the service sector, because most services are not traded and those that are, such as financial and telecommunications services, are not very labor intensive. Mexico has had a small trade deficit in services with the United States, so any impact on employment is likely to be negative, although not large. Nevertheless, the service sector is key to an overall understanding of the Mexican employment situation, because it is here that most Mexicans find employment. It is also the epicenter of the growth in the so-called informal sector. The share of total employment found in the service sector increased from 51 percent immediately before NAFTA

(Continued on page 24)

HOW RURAL HOUSEHOLDS SURVIVE[18]

The rural economy in Mexico has changed dramatically over the past decade, as a result of NAFTA, other trade pacts, and changing government policy. These factors have thrust the rural population into a maelstrom of change beyond its capacity to control. While some medium- and large-scale farmers have adapted to new market opportunities—often with the support of the Mexican government or foreign investment—much larger numbers of subsistence farmers have fared poorly. Rural households already suffering from low standards of living are under increasingly severe strain, while alternative economic activities are often unavailable or unpalatable.

In response, many rural households have adopted complex survival strategies that involve a mix of increased cultivation of basic crops, some diversification of agricultural production, increased day labor, and increased off-farm employment, often in the informal sector and in some cases in maquiladora plants that have relocated away from the northern border and into the hinterlands. It seems clear that these strategies also involve increased migration to other parts of Mexico as well as migration to the United States, although reliable data on either type of migration are not available. Despite the dispersal of work, sometimes to faraway locations, the families and communities involved maintain some cohesion as social and economic units. For example, rural households increasingly depend on remittances from household members who migrate, whether to other parts of Mexico or to the United States. Remittances from the United States have set records each of the last few years, amounting to US$9.8 billion in 2002 and on course to reach at least US$12 billion in 2003 at current rates.[19]

Rural Mexicans' diverse survival strategies help to explain some surprising developments that run counter to economic predictions but are well documented in Mexican statistics. For example, production of maize on irrigated lands (mainly larger commercial farms) has declined since cheaper, subsidized U.S. corn was allowed into Mexico and subsidies for water use were reduced. However, maize production on nonirrigated, rain-fed land (overwhelmingly small subsistence plots) increased when household incomes contracted sharply during the severe recession that followed the peso crisis in 1995. Production has continued at similar levels, despite imports of cheaper U.S. corn (see Figures 5–8. Data for 2001 and 2002 are preliminary).

Subsistence farmers produced primarily for their own consumption, although some of the increase was also destined for local markets. Either the cheaper imported corn did not reach markets in remote areas due to poor roads and other factors, or the lack of cash income influenced the "grow or buy" decision. An additional factor appears to be the preference for native varieties of maize over imported corn, among both rural and low-income urban families, which has helped to sustain the market for traditional maize and for value-added food products using maize as an input, such as *tamales, posole,* and *sopes.*

It also appears that as more rural workers have moved into nonagricultural activities as their primary occupations, a substantial number continue to perform some work in agriculture. Mexico's main statistical agency, the National Institute of Statistics, Geography, and Informatics (INEGI), began to include a special series of questions in its household survey in less urbanized areas in the 1990s, designed to elicit more information on rural economic behavior.[20] The survey showed that about 7 million people were involved in agricultural activities in 2000.[21] However, when questioned further about their activities during the previous six months, an additional 1.5 million people who reported their principal employment as nonagricultural indicated that they had in fact worked in the agricultural sector at some time during that period.[22] This represents an augmentation of the agricultural workforce by

Figure 5. Maize Imports to Mexico
THOUSANDS OF METRIC TONS

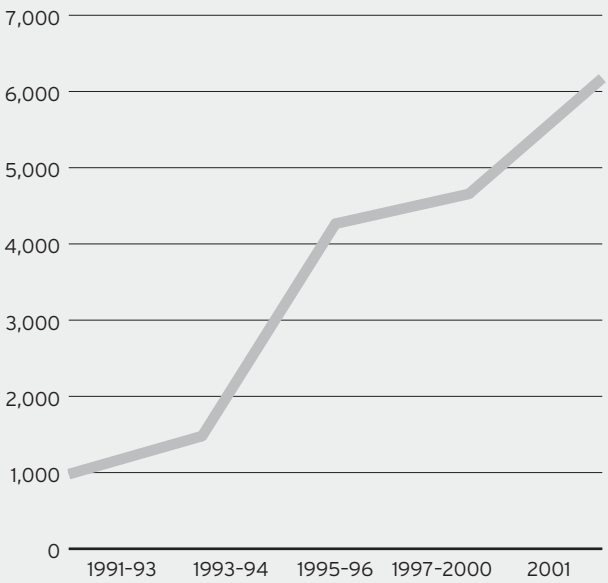


Figure 6. Total Maize Production in Mexico
THOUSANDS OF METRIC TONS

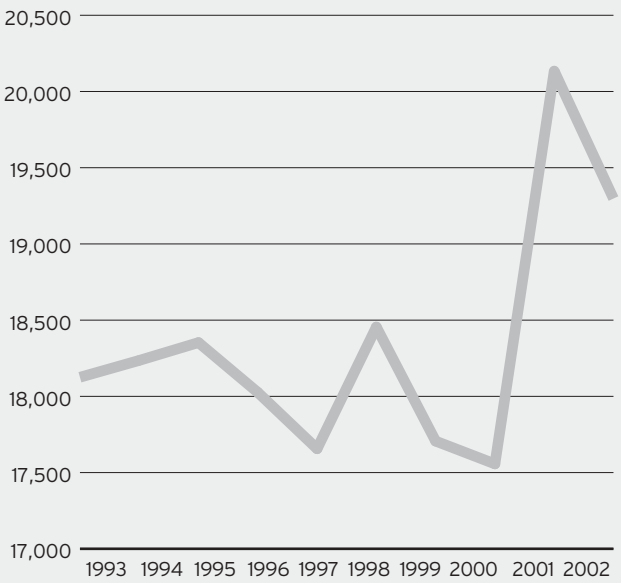


Figure 7. Total Irrigated Maize Production in Mexico
THOUSANDS OF METRIC TONS

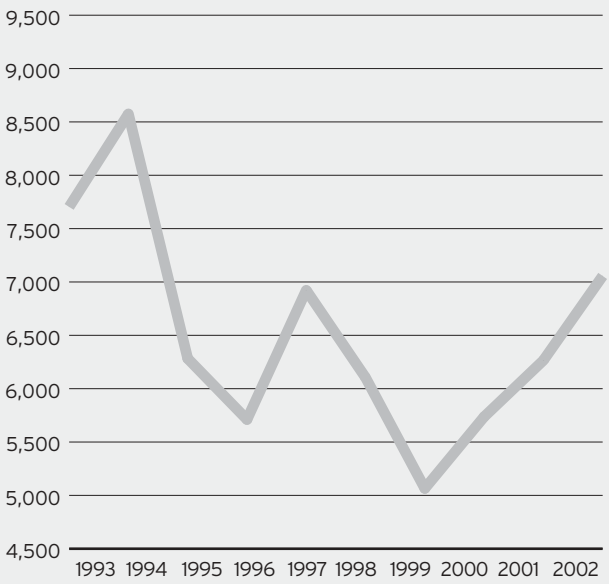
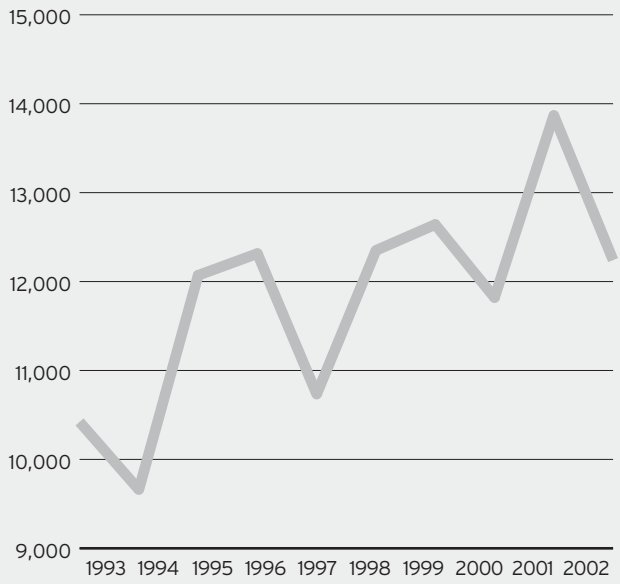


Figure 8. Total Rain-Fed Maize Production in Mexico
THOUSANDS OF METRIC TONS



Source: Mexican Secretary of Agriculture, Livestock, Rural Development, Fisheries, and Nutrition (SIAP-SAGARPA), available at www.siap.sagarpa.gob.mx.

about 20 percent for some parts of the year, presumably those times requiring the greatest labor, such as the times of sowing and harvesting. This part-time agricultural activity by workers employed elsewhere helps to explain how agricultural production on small farms has been maintained despite the sharp decline in overall agricultural employment that appears in the main employment data.

Day laborers, somewhat surprisingly, were more likely to work for small landowners (40 percent of day laborers) than for larger commercial agriculture or ranching operations (30 percent). The remaining workers were hired by *ejidos*, the communities of small-scale farms comprising the poorest segment of agricultural property owners.

A small proportion of rural households and communities have succeeded in establishing market niches for resources such as environmental services and ecotourism, and for products that can be certified as "organic," "sustainable," or "artisan," all of which command more favorable prices in international marketing schemes (see chapter 3 for further discussion of these niche activities).

As already noted, remittances from household members who have migrated have become an increasingly important factor in the overall survival of rural households and the surprising staying power of rural communities. In addition to international flows, domestic remittances (transfers from within Mexico) are also an important factor in cash income for rural households. The remittances are used partly for consumption, but are also used for production purposes. For example, they allow subsistence farmers to surmount credit constraints to purchase agricultural inputs that ordinarily would be financed through borrowing. This is particularly important in light of the collapse of rural credit in recent years.

The portrait that emerges from these varied economic activities is of a population that combines nonagricultural activities and urban jobs (in Mexico and abroad) with continued agricultural production and remittances. The evident goal is to sustain the life of rural communities as both an alternative to and insurance against the precariousness of the informal economy, urban shantytowns, and illegal migration, which loom as the main alternatives for poor rural households.

took effect to 57 percent in 1997. Most of this growth was due to absorption of labor from the agricultural sector, which decreased from 25.7 percent of employment in 1993 to 17.3 percent in 2002 (see Figure 9).[23]

As discussed above, displacement of subsistence farmers, in part because of increased agricultural imports from the United States as a result of NAFTA tariff cuts, led rural households to struggle to maintain adequate income levels. Mexico has no unemployment insurance program, and so displaced workers must find alternative employment. Due to sluggish employment growth in manufacturing, as well as the limited skills of many agricultural workers, employment was found (or created) mainly in low-pay, low-productivity jobs in the service sector such as domestic work, street vending, and personal services and repairs. Much of this was in the informal sector, which comprises self-employment, employment in microenterprises, and other forms of employment that do not provide benefits such as health care and pensions.[24] Overall, the informal sector grew during most of the 1990s, with employment in informal jobs approaching 50 percent of all employment in Mexico in 1995 and 1996, following the peso crisis and the subsequent economic contraction. After economic growth resumed in the late 1990s, the informal sector shrank somewhat, but still accounts for about 46 percent of Mexican jobs.[25] This reservoir of low-wage, low-productivity workers shows no sign of being absorbed by Mexico's export sector in the foreseeable future.

WAGES AND PRODUCTIVITY

Real wages in Mexico are lower today than when NAFTA took effect. This stunning setback in wages cannot be attributed primarily to NAFTA, however. Indeed, wages today are below their 1980 levels. Most of the decrease in real wages observed over the last twenty years can be traced to two periods of sharp wage declines. The first was during the debt crisis of the early 1980s, when a devaluation of the peso and contractionary policies designed to achieve macroeconomic stability and meet the terms demanded by international holders of Mexico's debt led to a sharp drop in wages. The second decline occurred as a result of the peso crisis of 1994–1995. When the peso was sharply devalued in each crisis, the cost of imported goods and the rate of inflation both shot up, while wages were constrained by the government's monetary and wage-setting policies. Wages gradually recovered after each of those macroeconomic shocks. However, they did not grow enough in either recovery period to return to previous levels. This pattern is true of both traded and nontraded sectors of the economy, as well as for employees of small, medium, and large firms.[26]

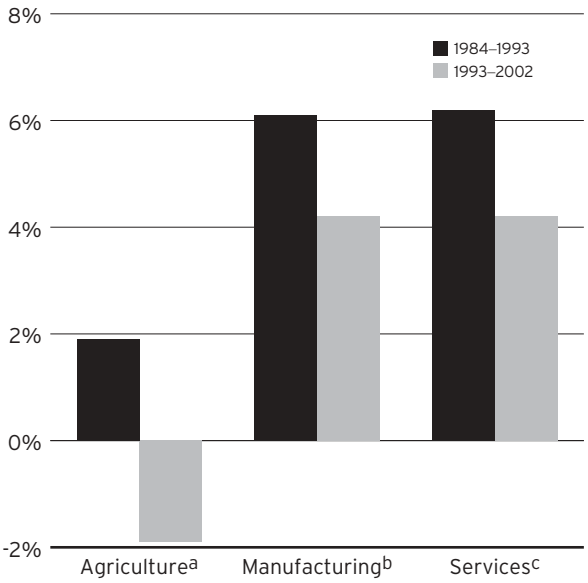
While NAFTA is not the cause of the two major setbacks in Mexican wages, it is striking that a free-trade agreement that dramatically increased exports and foreign direct investment has not done more to increase wages and living standards for average Mexican workers—or even for workers in most export firms—relative to pre-NAFTA levels. Trade theory suggests that a country with an abundance of low-skill labor (such as Mexico) that opens to trade will experience increasing returns (wages) to its low-skilled workers. However, wages for production workers in both maquiladora and non-maquiladora manufacturing are still below pre-NAFTA levels. Some analysts have suggested that, for a variety of reasons, trade increased the demand for highly skilled labor in Mexico relative to the demand for less skilled workers.[27] But even for highly educated workers in the manufacturing sector (such as professional, technical, and administrative staff), real wages in the late 1990s were below those in 1993, with the only exceptions occurring in a few regions along the U.S. border.[28] This same pattern holds for other sectors of the economy. Workers with university degrees and even postgraduate study received lower real wages in 2000 than in 1993.[29] The disappointing wage performance has occurred despite the fact that Mexican workers' productivity has increased since NAFTA took effect (see Figure 10).

Increasing productivity is a necessary condition for sustainable increases in wages, since over time an

economy can only afford to consume what it produces. But increased productivity is not sufficient to guarantee wage increases. Wage outcomes will depend in part on supply and demand in labor markets, and in part on the quality (and any bias) of institutions that have been established to determine how the gains from productivity are distributed. At present, labor market supply continues to exceed demand in most categories of labor in Mexico, contributing at least a partial explanation for poor wage results. In addition, the increasing integration of global production as a result of liberalized trade and improved protections for foreign investors has meant that, for many categories of unskilled and semi-skilled labor, competition is found not only in national labor markets but also internationally, as firms make production and sourcing decisions based in part on labor costs in various countries. The accession of China and other low-wage countries to the WTO has increased the supply of labor that firms can tap while still being guaranteed access for their output to the world's rich markets, including the United States. Differences in tariffs and transportation costs may not offset larger differences in unit labor costs. (Unit labor costs reflect the combination of wages and productivity).

While labor market supply, demand and footloose global production undoubtedly contribute to the decoupling of wages from productivity seen in Mexico, it is also the case that Mexican institutions have been biased against wage increases. For example, it has been government policy to hold down the minimum wage over most of the last two decades. This has been done both to increase global competitiveness of Mexican labor and exports and to meet structural adjustment goals. The minimum wage determines many other wages in Mexico,

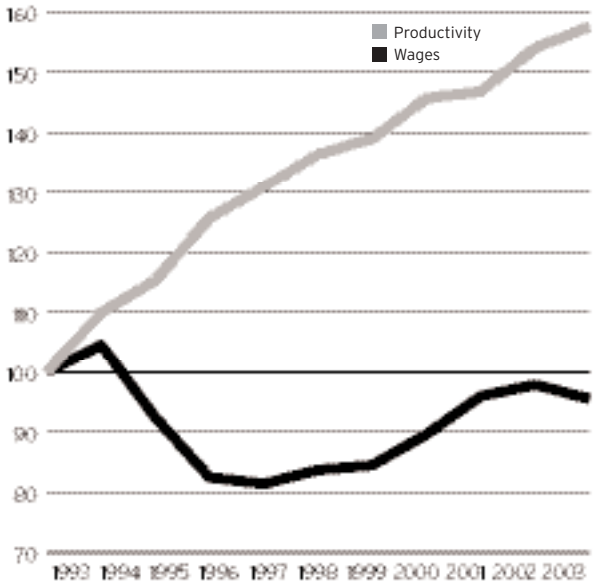
Figure 9. Average Annual Employment Growth by Sector, Before and After NAFTA



Source: INEGI/STPS, National Employment Survey (ENE).
a. Primary sector includes agriculture, fishing, forestry, and trapping.
b. Secondary sector includes mining, manufacturing, and construction.
c. Tertiary sector includes transportation, utilities, communications, trade, financial, and social services. Mexican data are currently under revision by the STPS and INEGI.

Figure 10. Manufacturing Productivity and Real Wages in Mexico

INDEX: 1993=100



Source: INEGI/STPS, Monthly Industrial Survey (EIM), Economic Information Bank (BIE), Indicadores Economicos de Coyuntura
Notes: Productivity and wage data cover both production and non-production workers. The maquiladora sector is not included in this data series. Wages include salaries, bonuses, and benefits. Data for 1993–2002 are annual averages; 2003 is January–September average.

which are set as multiples of the minimum, and so the impact is felt beyond the lowest-paid jobs. Further, unionization and collective bargaining, among the main institutional mechanisms for determining how gains from productivity increases will be distributed between employers and workers, have been repressed in Mexico through weak labor laws. In the maquiladoras, for example, it is a widespread practice for employers to conclude "protection contracts" with corrupt or nonexistent trade unions. Since Mexican labor law allows only one union to hold a contract in a workplace, these contracts preclude efforts by workers or more legitimate unions to bargain for wage increases. There have been numerous substantiated allegations of Mexican labor authorities allowing employers to collude with nonrepresentative unions to avoid vigorous collective bargaining.[30]

INEQUALITY AND POVERTY

Gauging the effects of trade on real people requires an assessment of trade's impact on inequality and poverty, because the gains and losses from trade are not distributed evenly. Inequality in Mexico is high, as it is in much of Latin America. This is a cause for concern because it undermines social stability and political cohesion. Furthermore, societies with highly unequal economies have been shown to reduce poverty less effectively and at slower rates than more equal societies.[31] Some studies have also shown that overall growth is reduced over the long term by highly unequal income distributions, thus constraining the incomes of all.[32]

Income inequality had been declining in Mexico for several decades up to the early 1980s, but it reversed course after the debt crisis of 1982 and the resulting macroeconomic contraction and structural reforms. Inequality then increased for most of the following decade, but began to abate again in the early 1990s, the years immediately before NAFTA. However, since 1994 inequality has again been on the rise. Compared to the period before NAFTA, the top 10 percent of households have increased their share of national income, while the other 90 percent have lost income share or seen no change.[33]

Income inequality in Mexico has a geographic dimension as well. Historically, Mexico's southern states have been poorer, while the regions around the capital and along the U.S. border have been relatively more prosperous. From 1940 to 1980, targeted government policies led to an increasing convergence in per capita income among regions. However, following the macroeconomic crisis of the 1980s, the long trend toward convergence in regional incomes first stopped and then reversed, with regional inequality widening again in the 1990s.[34]

The share of people living in extreme poverty in Mexico has followed a similar pattern, shrinking dramatically during the 1960s and 1970s (from 61 percent to 30 percent) and then increasing after the 1982 debt crisis. Like economic inequality, the incidence of poverty increased through the remainder of the 1980s (reaching 41 percent by 1989) and then began to decline somewhat in the early 1990s, with the extreme poverty rate at 31 percent when NAFTA took effect. Poverty surged again during the peso crisis of 1994–1995, to over 40 percent. Since then, it has again declined, but at 31 percent the proportion of Mexicans living in poverty is still slightly higher than the level seen in the late 1970s.[35]

The United States

JOBS

The impact of NAFTA on the United States' economy, employment, and the welfare of its citizens is significantly less than its impact on Mexico or Canada, for several reasons. The U.S. economy is much larger than that of either of its neighbors; it is less dependent on trade because of its huge (and wealthy) domestic market; and only one-third of its total trade is with its NAFTA partners. Further, U.S. tariffs were substantially lower than those of Mexico and Canada before NAFTA (and its predecessor,

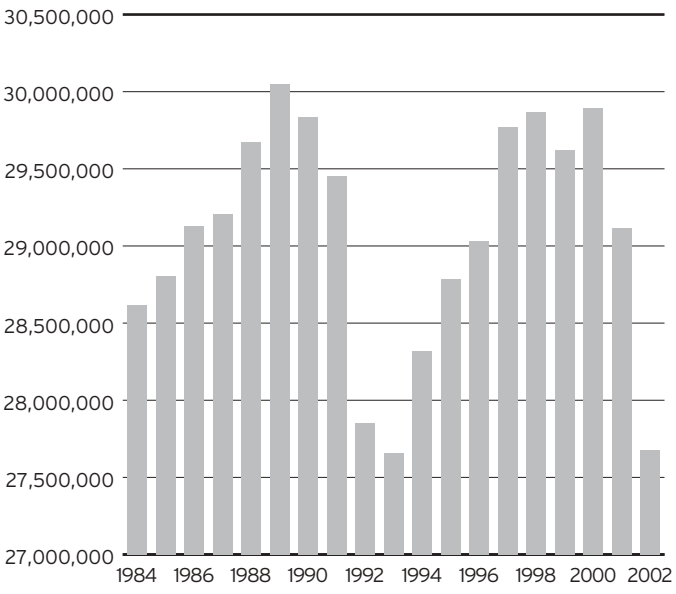
CUFTA), and its tariff reductions were proportionately much smaller than the tariff cuts made by those countries. Since NAFTA has had a much smaller overall impact on the U.S. economy, its impact on jobs, wages, and household incomes in the United States is also much less than in Mexico and Canada.

The actual impact of NAFTA on U.S. employment has been sharply disputed by proponents and critics of the agreement. Widely diverging estimates have been produced. Generally, analysts on both sides of the question have approached the task by estimating the number of manufacturing jobs supported by a given level of exports and then multiplying the growth in exports to Canada and Mexico by that figure to arrive at job gains. Using this methodology, the U.S. Trade Representative estimates that 914,000 jobs have been created due to NAFTA.[36] Critics, on the other hand, apply the multiplier formula to imports, as well, with one study attributing a net loss of 766,000 jobs to NAFTA.[37] Advocates of NAFTA resist applying the multiplier formula to identify jobs lost due to imports, since it is not certain that all imported goods substitute for U.S. goods that would have been produced in the absence of trade.[38] However, it is clear that NAFTA, like all trade agreements, has produced both winners and losers, and so estimates that focus only on jobs created and not those destroyed offer no insight into the agreement's net employment effects. Further, this methodology does not distinguish between changes in trade due to NAFTA and changes caused by other trade agreements, such as that creating the WTO, and does not take into account the impact of exchange rate fluctuations on trade. Due to these limitations, the estimates of the employment impact of NAFTA by both proponents and opponents have been unpersuasive.

The USITC recently developed a model to measure the impact of NAFTA and four other trade agreements on the U.S. economy that represents an advance over earlier studies.[39] The model assumes that there is no net gain or loss of jobs due to NAFTA. This assumption is based on trade theory, which suggests that in full-employment economies, job composition will shift but there will be no net change in total employment. Labor market adjustment will occur by means of rising wages in the sectors that benefit from trade. However, the model can be used to estimate the order of magnitude of job gains or losses by changing the assumption about how labor markets adjust to changes in trade.

The USITC model estimates that the combined effects of NAFTA and CUFTA had a positive impact on total compensation to U.S. workers of approximately $10 billion in 2001, compared to a scenario without the two agreements.[40] As noted, the model assumes that the entire change occurred through changes in wages. If one assumed instead that wages were rigid and that the full adjustment occurred through increases in the number of jobs rather than

Figure 11. U.S. Employment in Manufacturing
EMPLOYEES



Source: United States Bureau of Labor Statistics, Current Population Survey.
Note: Manufacturing also includes mining and construction.

increases in wages, the USITC model would produce a maximum net gain of 270,000 jobs. However, for most of the period since NAFTA took effect, the United States has been at full employment. Under that condition, it is likely that gains from trade have translated into higher wages rather than additional jobs. On the other hand, with U.S. unemployment rising in the last three years, it is reasonable to assume that some of the NAFTA/CUFTA impact would now be seen in increased employment rather than higher wages. Since wages are not rigid and the economy is currently not at full employment, this model suggests that the overall impact of NAFTA on U.S. employment lies somewhere between a net gain of 270,000 jobs and no net change.

An important limitation of the USITC model, which it shares with other methodologies, is that it does not capture the effect of investment decisions to relocate production from the United States to Mexico or Canada. To the extent that those decisions are based purely on market access (tariff and nontariff) considerations, the USITC model will capture them. But NAFTA also included important protections for U.S. investors that had not existed before the agreement, and those investor benefits may also affect decisions on where to produce. Further research and modeling work is needed to assess these effects.

Whether the net impact of NAFTA on employment is a small net positive, as the USITC model suggests, or neutral or weakly negative, as further elaboration, including research on investment impacts, might show, it is known that about a half-million U.S. workers lost jobs as a result of the agreement. While these lost jobs were likely offset by other jobs gained, the impact on losers is an economic and political concern. A useful source of information on NAFTA's impact on job loss can be found in data compiled by the NAFTA Trade Adjustment Assistance (NAFTA-TAA) program. This U.S. government program provides benefits for workers affected by NAFTA beyond those included in a general U.S. trade adjustment assistance program. As of September 2003, a total of 525,094 workers had been certified as having lost employment due to NAFTA under the NAFTA-TAA program. A detailed analysis of earlier NAFTA-TAA data showed that about half of the job losses were due to production shifts to Mexico.[41] The apparel industry produced the greatest number of NAFTA-TAA certified job losers, about 28 percent of those eligible under the program, followed by electronics (13 percent), automobiles and parts (7 percent), and fabricated metals (6 percent). Other industries accounted for 5 percent or less of those certified eligible.

WAGES AND PRODUCTIVITY

Because the net impact of NAFTA on overall employment in the United States is small, the impact on wages is also likely to be minor at the national level. Still, important changes have occurred in the structure of U.S. wages that most studies attribute in part to trade; consequently, NAFTA is likely to account for some of those observed effects. The main structural change is the widening gap between the wages of skilled and unskilled workers that has been observed for the last three decades. There is a large literature that attempts to explain this divergence, with most economists identifying technological change as the main driver of this increasing gap. But most analyses find that trade has also played a role. While estimates of the impact of trade on low-skill wage depression vary depending on the methodology of the study, many researchers attribute about 20 percent of increased earnings inequality to trade. One study estimates that 40 percent of the growing wage gap can be attributed to a combination of trade and immigration.[42] This is potentially relevant to a discussion of NAFTA impacts, because immigration from Mexico to the United States has increased since the agreement took effect, contrary to many predictions (see chapter 2 for more discussion). Other studies look not at overall trade but at the growth of global production chains, or outsourcing, which allows U.S. manufacturers to maintain the high-skilled parts of production processes in the United States while sending low-skilled operations abroad.[43]

This would tend to raise skilled wages (or depress unskilled wages) through the operation of supply and demand. To the extent that NAFTA reduced tariff barriers for the cross-border shipment of intermediate goods and provided greater guarantees for investments, it undoubtedly contributed to the observed growth of shared production between the United States and Mexico. However, this trend is also evident with respect to U.S. production chains involving many other low-wage countries.

Since the early 1990s, unit labor costs in U.S. manufacturing have fallen, because productivity has grown faster than wages. This decoupling of productivity from wage increases is seen in all of the NAFTA countries. In Mexico, the decoupling began after enactment of NAFTA, and in Canada it began after CUFTA took effect. In the United States, the trend began in the 1980s, when U.S. manufactured goods faced a serious challenge in the U.S. market from European and Asian imports. While this failure of wages to keep pace with productivity growth cannot be attributed directly to NAFTA or CUFTA, it is clear that increasing economic integration has allowed employers to capture a greater share of productivity gains than had been the case in the three countries during the period when their economies were less open to trade. It is not surprising that the trend in Mexico and Canada is so closely aligned with the advent of NAFTA and CUFTA, respectively, given that the United States is the dominant trading partner of each country. The U.S. economy, on other hand, was more affected by multilateral tariff reductions effected in successive rounds of General Agreement on Tariffs and Trade (GATT) negotiations, because two-thirds of U.S. trade is with partners other than Canada and Mexico. The likely channels through which this phenomenon operates are many, including the integration of global labor markets for certain types of labor through outsourcing and production chains, which increase the available supply of low- and medium-skilled labor relative to demand. It is also likely that the relative bargaining power of labor is reduced by the possibility of outsourcing or plant relocation, even when it does not actually occur.

INEQUALITY

Economic inequality in the United States has been increasing for most of the last two decades. Since the early 1980s, the richest quintile (top 20 percent) of U.S. households has increased its share of national income from 44 percent to over 50 percent.[44] Meanwhile, each of the other four household quintiles has seen its share of national income decrease. The growing wage gap between high-skilled and low-skilled workers is one of the causes, and to the extent that trade is a factor in the wage gap, it is also implicated in growing inequality.

Canada

JOBS

The impact of NAFTA on Canada cannot be understood without combining NAFTA's effects with those of its predecessor, the Canada-United States Free Trade Agreement (CUFTA), which took effect on January 1, 1989. NAFTA incorporated the provisions of CUFTA and also liberalized trade between Canada and Mexico. But trade with Mexico continues to be a small share of Canada's total trade—less than 1 percent of Canadian exports go to Mexico and 3.6 percent of its imports are from that country. Therefore, the main impact of NAFTA/CUFTA on employment in Canada and the Canadian economy in general can be traced to the phasing in of the CUFTA provisions.

A recent study by Daniel Trefler of CUFTA effects on employment advances the level of analysis relative both to earlier studies of the Canadian experience and to studies that examine U.S. and Mexican employment impacts.[45] The carefully constructed model examines the effects of CUFTA on employment, wages, and productivity in manufacturing industries in Canada. It controls

for several other factors, such as the business cycle, that might account for changes. Trefler finds that in those industries that were most affected by Canadian tariff cuts and therefore were most exposed to import competition, employment fell by 12 percent. In the export-oriented industries that experienced the largest U.S. tariff cuts and therefore benefited most from the agreement, there was no increase in employment.[46] Insofar as Canadian tariff cuts under CUFTA were deeper than U.S. tariff cuts, the greater impact on import-competing industries is not surprising; but the lack of any net job creation in export industries is noteworthy. This result runs counter to the findings of earlier studies, which found that employment losses in U.S. and Canadian industries that compete with imports were more than offset by employment gains in export-oriented industries. Those studies suffered from serious methodological flaws, but the direction of the results seemed intuitively logical based on trade theory and they were widely accepted, despite actual observed net job losses. The Trefler study calls into question whether a net positive impact on jobs from trade liberalization can be inferred, at least between two industrialized countries and in the short-to-medium term (see Figure 12).

Trefler did find that both groups of industries experienced fairly strong productivity gains.[47] Over the medium term (in this case, a decade), employment in the Canadian manufacturing sector recovered, and by 1999 achieved levels last seen in 1989.[48] Growth continued in 2000 and 2001, with manufacturing employment hitting a peak in 2001 of 3.4 million jobs, about 250,000 more than pre-CUFTA levels, before declining again in the recession that began that year. In addition, the manufacturing sector constitutes a slightly larger share of the Canadian economy (22.4 percent in 2002) than its counterpart in the United States (20.6 percent the same year), which suggests that the productivity gains may have helped the long-term survival of Canadian manufacturing, although exchange rate movements undoubtedly played a role as well. The industries that showed positive employment trends by the late 1990s included automobiles and auto parts, electronics, plastics, and, somewhat surprisingly, apparel.[49] That industry underwent significant restructuring, with higher-skilled operations becoming a larger share of employment than sewing and other lower-skilled jobs.

WAGES

Overall real wages in Canada were only slightly higher in 2002 than in 1989, but manufacturing earnings fared somewhat better.[50] This suggests that NAFTA/CUFTA or trade more generally did not have a negative impact on Canadian wages, since earnings in nontraded sectors increased slower than in manufacturing. As in the case of both Mexico and the United States, productivity increases in Canada significantly outstripped wage increases, in both manufacturing and nonmanufacturing sectors (see Figure 13).

INEQUALITY

Incomes in Canada are relatively more equal than in either Mexico or the United States, but inequality has been on a marked upward trend since 1989.[51] The richest 20 percent of households increased their share of national income, from 40.7 percent of total income that year to 42.8 percent in 2000, while all other households experienced declines in their share. Only the top 20 percent of households had higher real incomes in 2000 than in 1989. The other 80 percent of Canadian households saw real incomes decline from 1989 to 1994 and then recover slightly, but not enough to make up for the earlier decline.

Given the relatively better performance of wages in manufacturing than in most other sectors, it seems clear that trade-induced changes in wage income patterns do not explain the decline in incomes for 80 percent of Canadian households and the increasing economic inequality in Canada over the NAFTA/CUFTA period. However, a significant

factor in household income in Canada is transfer payments from the government, particularly to the bottom 40 percent of households, and these declined due to cuts in government funding for social programs and changed eligibility requirements. For example, since NAFTA/CUFTA took effect, the proportion of unemployed workers receiving unemployment benefits declined from 87 percent to 36 percent. This decline is attributable to a number of factors, including macroeconomic policy. However, a strong concern of NAFTA/CUFTA critics was that trade opening to the United States would put downward competitive pressure on Canada's social safety net, which in most cases was superior to that of the United States. It cannot be ruled out that liberalization of trade was a factor in the downward pressure on unemployment insurance and other social benefits in Canada, or the cause of widening gaps in disposable household income. Further studies are needed.

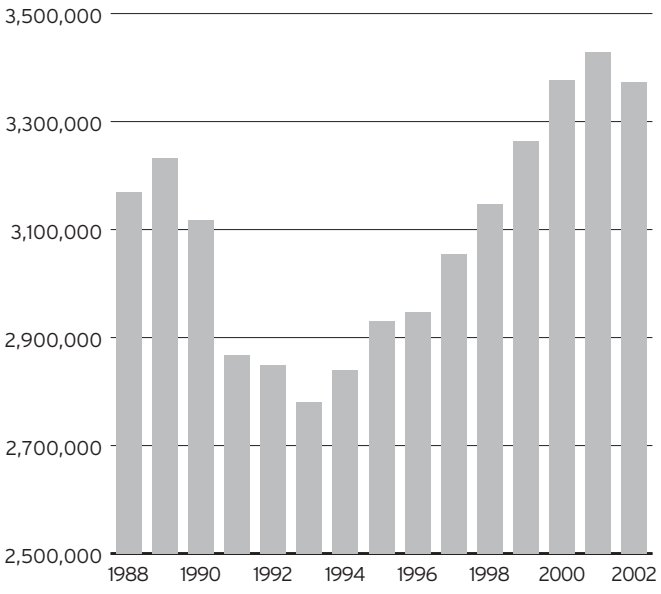
Learning from the NAFTA Experience

At ten years, the long-term effects of NAFTA on employment, wages, and incomes in the countries of North America cannot yet be judged.[52] However, short- and medium-term impacts can now be assessed on the basis of substantial, accumulating data.

EMPLOYMENT

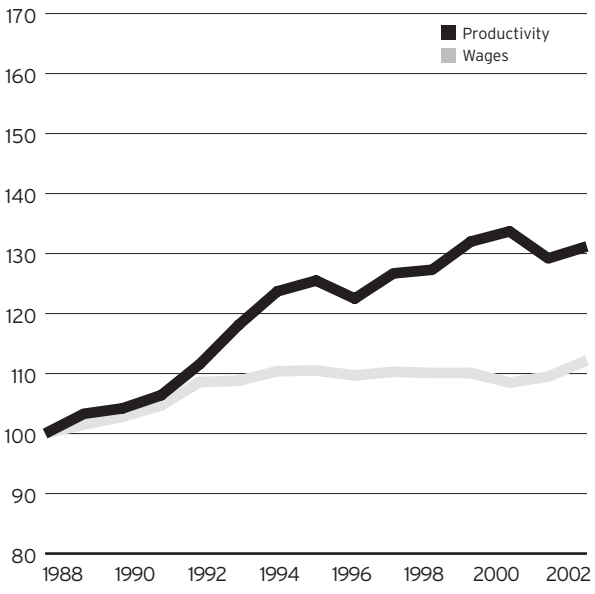
The most important result of the NAFTA experience, and the most surprising when compared with predictions of political advocates and opponents, is that the trade agreement has produced disappointingly small net gains in employment in the countries of North America. In Mexico, employment destruction in domestic manufacturing and agricul-

Figure 12. Canadian Employment in Manufacturing
EMPLOYEES



Source: Statistics Canada, Labour Force Survey.
Note: Manufacturing also includes mining and construction.

Figure 13. Manufacturing Productivity and Real Wages in Canada
INDEX: 1988=100



Source: Statistics Canada, Canadian Productivity Measures.

ture has all but swamped job creation in export manufacturing. In the United States, NAFTA has had either a neutral or very small net positive effect on employment. Meanwhile, in Canada, CUFTA led first to a significant net decrease in jobs in traded sectors, followed by a slow recovery of employment to pre-CUFTA levels after ten years, then a continued increase in subsequent years. The political and rhetorical claims for trade as an engine of net job growth are not borne out by experience, at least in the medium term.

Such claims have always been at odds with the predictions of trade theory. In theory, if an economy is at full employment before opening to trade, the shifting of resources into different productive activities based on comparative advantage will not result in a net gain or loss of jobs, but rather in a different mix of industries and employment. The gains from trade in a full-employment economy would be seen in rising wages and incomes, according to basic trade theory. The United States and, arguably, Canada have been at full employment during most of the NAFTA period. Thus, the lack of any significant job growth due to NAFTA in Canada and the United States is not at odds with the predictions of economic theory, although it certainly contradicts the claims of NAFTA boosters. What is surprising, even from the perspective of economic theory, is the weak job creation in Mexico, which is far from full employment.[53] As noted earlier, it is impossible to determine with certainty the precise share of agricultural job losses and manufacturing job gains in Mexico that resulted directly from NAFTA. However, the trade pact has been the most important factor in Mexico's changing pattern of trade, and the overall growth of jobs in all traded sectors since 1993 has been very weak. It is thus evident that NAFTA has not been a robust job creator, even for the low-wage, labor-abundant trading partner.

The experience of Mexico also suggests that a developing country with a high proportion of its labor force in low-productivity agriculture should negotiate very long transition periods for the phaseout of tariffs on basic crops. The negative situation currently faced by Mexico also demonstrates that a developing country must use that transition time aggressively to prepare the rural population for the wrenching adjustment it will face. Policies should be adopted to shift farmers to competitive

employment

LEARNING FROM NAFTA

- The experience of NAFTA shows that trade pacts will shift the composition of jobs, with some winners and some losers, but cannot be expected to create a net gain in jobs in economies that are at full employment, such as the United States and Canada. In developing economies with surplus labor, such as Mexico, the NAFTA experience demonstrates that trade pacts cannot be counted on to produce much, if any, net employment growth in the absence of other targeted policies. Policies to maximize employment gains from trade would include measures to promote supplier and support industries as well as terms in the trade agreement that reward rather than discourage the use of domestic inputs in the production of exported goods.
- In agriculture, the transition times negotiated by Mexico were too short, and the government did not adopt sufficiently vigorous rural adjustment policies to help subsistence farmers adapt to the new trade conditions. Developing countries with significant employment in subsistence agriculture should carefully consider the sequencing of liberalization, to allow the absorption of rural workers into other sectors that expand due to liberalized access to foreign markets, before basic crops are liberalized.
- In negotiations over agricultural trade, developing countries should also insist on terms, including special safeguards, that will prevent a wealthier trading partner from dumping or distorting trade through domestic or export subsidies.

crops, to develop alternative sources of employment in rural areas, and to invest heavily in education to prepare the population for more modern occupations. Another important factor for Mexico was that some of its most important basic crops, such as maize, were exposed to competition from subsidized U.S. crops that are sold at artificially low prices, sometimes below the cost of production. Further, U.S. policy on agricultural subsidies changed significantly in ways that were not foreseen during the NAFTA negotiations, most notably in the passage of a farm bill in 2002 that increased subsidies. Successful competition will be impossible for the developing country under such circumstances.

PRODUCTIVITY

The one employment area where a clear positive impact has been seen during the NAFTA period is the growth of productivity in all three North American countries. At least in Mexico and Canada, which cut tariffs deeply and were exposed to competition from their giant neighbor, NAFTA likely played a significant role in the observed productivity growth. In Canada, increased productivity may have contributed to a medium-term revival and perhaps even long-term survival of the manufacturing sector.

However, the strong productivity growth in the United States and somewhat weaker growth in Mexico and Canada may have had the unwelcome side effect of reducing the pace of job creation in the three countries, as workers produced more and fewer new jobs were created.

Throughout North America, there has been a decoupling of productivity growth from wage growth over the last decade.

WAGES

Real wages for most Mexicans are lower today than when NAFTA took effect. This stunning setback in wages is mainly attributable to the peso crisis of 1994–1995. However, during the NAFTA period, productivity growth has not translated into wage growth, as it did in earlier periods in Mexico. Mexican wages are also diverging from, rather than converging toward, U.S. wages, as trade theory would suggest.

■ **Increased productivity appears to be a likely gain from trade, based on the North American experience. However, if such productivity gains are to be shared with workers as rising wages, the institutions and public policies that affect wage outcomes should be strengthened. Countries with weak laws and institutions related to freedom of association and collective bargaining should address these problems in conjunction with trade liberalization. Minimum wage policies may need to be reconsidered; dispute resolution mechanisms, such as arbitration, could also be strengthened.**

Wages

Because the net impact of NAFTA on U.S. employment is small, the impact on overall wages is also likely to be small. But a widening gap between the wages of skilled and unskilled workers is partly attributable to trade, and NAFTA as a factor in U.S. trade probably accounts for a portion of the observed growth in wage disparity within the United States.

Overall real wages in Canada were only slightly higher in 2002 than when CUFTA took effect in 1989, but manufacturing earnings fared somewhat better. This suggests that NAFTA/CUFTA did not have a negative impact on wages, since earnings in nontraded sectors increased slower than in manufacturing. As in the case of Mexico, productivity increases in Canada significantly outstripped wage increases.

In all three countries, the evolution of wages and household incomes since NAFTA took effect has been toward greater inequality, with most gains going to the upper 20 percent of households and higher-skilled workers. While this trend is clearly compounded of many factors, more open trade appears to be implicated as one element—along with continental and global competition over the location of production—that restrains wage growth.

Whether productivity gains lead to higher wages also depends on the nature and quality of the institutions that determine the distribution of productivity gains within a society between the return to workers as higher wages and the return to investors as higher profits. Institutions that govern the ability of workers to organize unions and bargain collectively over wages are important determinants of distribution, as are government mechanisms such as minimum wage policies.

INCOME DISTRIBUTION

Income inequality has been on the rise in Mexico since NAFTA took effect, reversing a brief downward trend in the early 1990s. Compared to the period before NAFTA, the top 10 percent of households have increased their share of national income, while the other 90 percent have lost income share or seen no change. Regional inequality within Mexico has also increased, reversing a long-term trend toward convergence in regional incomes.

In a trend that predates NAFTA, income inequality in the United States has been increasing for most of the last two decades. The growing wage gap between high-skilled and low-skilled workers is one of the causes, and to the extent that trade is a factor in the

income distribution

LEARNING FROM NAFTA

- If the gains from trade are to be shared widely throughout a country, the institutional mechanisms that govern how costs and benefits of economic change are distributed may need to be strengthened. Government measures that affect income distribution, such as tax and transfer mechanisms, should be reviewed and fortified to deal with the impact of trade opening.
- Countries opening to trade should first strengthen social safety nets to assist those who lose as a result of trade-induced economic restructuring. Developing countries negotiating with wealthier trading partners should seek financial assistance from these countries, as part of the trade package, for transitional adjustment programs. Developed countries should strengthen their trade adjustment or general social safety net programs with a view to addressing the uneven consequences, for citizens, of opening to trade.

wage gap, it is also implicated in growing inequality. Incomes in Canada are relatively more equal than in either Mexico or the United States, but inequality has been on a marked upward trend since CUFTA's entry into force in 1989. Because manufacturing wages have performed better than wages in most other sectors, it seems clear that trade-induced wage changes are not the cause of the observed increase in inequality. Rather, a reduction in transfer payments from the government, which play an important role in the incomes of the bottom 40 percent of households, accounts for most of the change. The weakening of the Canadian social safety net, which generates these transfer payments, was a concern of CUFTA opponents, but there is currently no clear evidence to support a causal relationship.

The experience of each of the NAFTA countries confirms the prediction of trade theory that there will always be winners and losers from trade. The number of losers may equal or even surpass the number of winners, especially in the short-to-medium term. In Canada, it took a decade for manufacturing employment to recover from the initial displacements caused by CUFTA. In Mexico, rural farmers are still struggling to adapt to NAFTA-induced changes. The short-to-medium term adjustment costs faced by the losers from trade can be severe, and the losers are often those segments of society least able to cope with adjustment, due to low skills, meager savings, and limited mobility. It must also be recognized that there may be permanent losers from trade, due to limitations of education, skills, geographic isolation, and other factors.

Because the impacts of trade are uneven, governments should establish mechanisms that help offset the losses suffered by those in declining sectors. Trade adjustment assistance should provide income support to workers and small farmers during transitional periods, as well as funds for training for new occupations. Such policies are highly desirable complements to trade pacts. A trade adjustment assistance program exists in the United States, and a broad social safety net in Canada serves many of the same ends, although both countries' plans have critical gaps that should be addressed and both plans need financial strengthening. In Mexico, budget constraints and policy choices have precluded the establishment of even the most basic unemployment insurance. The harsh impact of agricultural trade liberalization on Mexican subsistence farmers has not been offset by appropriate government policies.

NOTES

1 William J. Clinton, Remarks at the Signing Ceremony for the Supplemental Agreements to the North American Free Trade Agreement, September 14, 1993. *Public Papers of the Presidents of the United States,* vol. 2, 1993 (Washington, D.C.: U.S. Government Printing Office, 1993).

2 Remarks by the President at the Signing Ceremony for Chile and Singapore Free Trade Agreements, September 3, 2003, available at www.whitehouse.gov.

3 Maria Elena Vicario, Sandra Polaski, and Dalil Maschino, *North American Labor Markets: A Comparative Profile* (Washington, D.C.: Secretariat of the North American Commission for Labor Cooperation, forthcoming). The authors' calculations are based on data from the Mexican National Institute of Statistics, Geography, and Informatics (INEGI) and the Ministry of Employment and Social Insurance (STPS).

4 In 2002, 89 percent of total Mexican exports went to the United States, while 1.7 percent went to Canada; 63 percent of total Mexican imports were from the United States and 4.2 percent were from Canada. (The data for Canada are from Statistics Canada, National Income and Expenditure Accounts; for Mexico, from INEGI, System of National Accounts; and for the United States, from the Bureau of Economic Analysis, National Income and Product Accounts.)

5 INEGI, Monthly Industrial Survey (EIM). This survey also excludes microenterprises (small businesses with fewer than five employees that operate in the informal sector).

6 Ibid.

7 Enrique Dussel Peters, "Industrial Policy, Regional Trends and Structural Change in Mexico's Manufacturing Sector," in Kevin J. Middlebrook and Eduardo Zepeda, eds., *Confronting Development: Assessing Mexico's Economic and Social Policy Challenges* (Palo Alto, Calif.: Stanford University Press, 2003).

8 *The Impact of Trade Agreements: Effect of the Tokyo Round, U.S.-Israel FTA, U.S.-Canada FTA, NAFTA, and the Uruguay Round on the U.S. Economy,* publication no. 3621 (Washington, D.C.: U.S. International Trade Commission, August 2003), available at www.usitc.gov.

9 Ibid.

10 Rogelio Ramirez De La O, "What Has Changed in the Performance of Employment and Wages in Mexico after NAFTA?" paper prepared for the Third Seminar on Income and Productivity of the North American Commission on Labor Cooperation (February 2000), available at www.naalc.org/english/publications.

11 This effect could be amplified by a tendency in Mexican monetary policy to overvalue the peso as a means of controlling inflation. This disadvantages Mexican producers when they try to export, while imposing less of a burden on U.S. multinationals using Mexico as an assembly platform, since the movement of components into Mexico and of finished products out will largely cancel out or at least smooth out the exchange rate effects.

12 These figures are for overall manufacturing. The definition of *unskilled* here is possession of up to twelve years of formal education, while *skilled* is defined as possession of thirteen years or more. José Romero and Alicia Puyana, *The Mexican Economy after Two Decades of Trade Liberalization,* 2002. Paper on file with the author.

13 *United States Dumping on World Agricultural Markets,* Cancun Series Paper no. 1 (Minneapolis: Institute for Agriculture and Trade Policy, 2003), available at www.iatp.org.

14 Very gradual downward adjustments in the peso were allowed through this crawling parity band in which the peso was allowed to depreciate against the dollar at a very small preannounced rate, which was 0.00040 pesos per dollar for most of the period. This regime resulted in an exchange rate of 2.9 pesos to the dollar in 1990, depreciating to 3.4 pesos to the dollar in early 1994.

15 *International Financial Statistics* (Washington, D.C.: International Monetary Fund, October 1996).

16 *North American Labor Markets* (see note 3), based on INEGI National Income and Expenditure Survey (ENIGH) and STPS/INEGI National Employment Survey (ENE).

17 *World Trade Report* 2003 (Geneva: World Trade Organization, August 2003), available at www.wto.org.

18 This section draws on two papers commissioned for this report: David Barkin and Edith Pacheco, *The Changing Meaning of Work in Rural Latin America,* July 2003; and Antonio Yúnez-Naude and Fernando Barceinas Paredes, *The Agriculture of Mexico after Ten Years of NAFTA Implementation,* July 2003 (see acknowledgments).

19 John Authers, "Mexicans Send More Than $1 Billion Back Home in July," *Financial Times,* September 19, 2003, based on data from the Bank of Mexico. Remittances from the United States provide more foreign funds than either foreign direct investment or tourism.

20 INEGI, ENIGH, special "module" with questions on agricultural activity during the preceding semester of the survey. The survey, conducted during the second trimester of every odd-numbered year during the 1990s, was designed to improve understanding of rural labor patterns by inquiring about agricultural employment for those people whose principal occupation was nonagricultural. Data prepared by Edith Pacheco and David Barkin.

21 Differences between agricultural employment data discussed here and elsewhere in this paper arise because this series includes the economically active population aged twelve years and older, whereas the main employment data is for the economically active population aged fifteen years and older.

22 ENIGH special module for rural households (see note 20).

23 *North American Labor Markets* (see note 3).

24 There are a variety of definitions of the informal sector. The definition used here was developed for STPS by Clara Jusidman in 1993. It takes into account establishment size, the position held, and the industry involved.

25 *North American Labor Markets* (see note 3).

26 Carlos Salas and Eduardo Zepeda, "Employment and Wages: Enduring the Costs of Liberalization and Economic Reform," in Kevin J. Middlebrook and Eduardo Zepeda, eds., *Confronting Development: Assessing Mexico's Economic and Social Policy Challenges* (Palo Alto, Calif.: Stanford University Press, 2003).

27 See, for example, Raymond Robertson, "Trade Liberalisation and Wage Inequality: Lessons from the Mexican Experience," *World Economy,* vol. 23, no. 6 (June 2000), pp. 827–49.

28 Carlos Salas and Eduardo Zepeda, *Wages and Productivity in Mexico: Theoretical and Empirical Issues,* July 2003, paper commissioned for this report, on file with the author.

29 *The Mexican Economy* (see note 12), based on data from the Ministry of Labor and Social Welfare National Employment Survey.

30 The labor side-agreement to NAFTA includes provisions for public petitions to any of the member governments if labor rights violations occur in any of the other NAFTA countries. Several petitions have been filed alleging interference with freedom of association and collective bargaining rights in Mexico. The petitions were filed with the U.S. National Administrative Office, the body that administers the agreement for the United States. While expressing its findings in diplomatic terms, the National Administrative Office found significant shortcomings in this area in many cases (see www.dol.gov/ilab/programs/nao).

31 See, for example, Martin Ravallion, "Can High-Inequality Developing Countries Escape Absolute Poverty?" World Bank Policy Research Working Paper no. 1775 (Washington, D.C.: World Bank, 1997). The World Bank web site provides a useful summary of research on this topic at www.worldbank.org/poverty/inequal/abstracts/index.htm.

32 Dani Rodrik, *Where Did All the Growth Go? External Shocks, Social Conflict and Growth Collapses* (Cambridge, Mass.: Kennedy School of Government, Harvard University, 1997) provides a political-economic model. Other models are cataloged at the World Bank web site (www.worldbank.org/poverty/inequal/abstracts/index.htm).

33 *North American Labor Markets* (see note 3). Data based on INEGI, ENIGH, and *The Mexican Economy* (see note 12).

34 Gerardo Esquivel, *Sources of Regional (Non) Convergence in Mexico* (Washington, D.C.: World Bank, 2002), available at www.worldbank.org.

35 Diana Alarcon and Eduardo Zepeda, "Economic Reform or Social Development? The Challenges of a Period of Reform in Latin America," *Journal of Development Studies,* forthcoming.

36 U.S. Trade Representative, *NAFTA at Eight,* May 2002, available at www.ustr.gov.

37 Economic Policy Institute, *NAFTA at Seven,* April 2001, available at www.epinet.org.

38 Apparel imports, for example, come from many countries because of the quota system that exists under the global Agreement on Textiles and Clothing. Apparel imports from Mexico may have displaced imports from other countries rather than U.S. production.

39 *The Impact of Trade Agreements* (see note 8). The USITC model is based on a computable general equilibrium model but uses actual trade flows and other macroeconomic and microeconomic data from the U.S. economy for the period 1978–2001. It controls for such factors as exchange rate shocks to isolate the effects of NAFTA tariff changes. It also takes into account the phased-in nature of the agreement and the growing share of trade in the U.S. economy.

40 In *The Impact of Trade Agreements* (see note 8), the USITC estimates that U.S. labor income would have been $40 billion less if not for the effects of five trade agreements, including the Tokyo and Uruguay rounds of the General Agreement on Tariffs and Trade (GATT), NAFTA, CUFTA, and the United States-Israel Free Trade Agreement (p. 339). Separately, the study finds that 25 percent of the total impacts attributable to all five agreements were contributed by NAFTA and CUFTA (pp. 332–33).

41 Mary Jane Bolle, *NAFTA: Estimated U.S. Job "Gains" and "Losses" by State over 5 1/2 Years* (Washington, D.C.: Congressional Research Service, February 2, 2000).

42 George J. Borjas, Richard B. Freeman, and Lawrence F. Katz, "How Much Do Immigration and Trade Affect Labor Market Outcomes?" *Brookings Papers on Economic Activity,* vol. 1 (1997), pp. 1–67.

43 Robert C. Feenstra and Gordon H. Hanson, *Global Production Sharing and Rising Inequality: A Survey of Trade and Wages* (University of California, San Diego, and National Bureau of Economic Research, 2001).

44 *North American Labor Markets* (see note 3). Data derived from the Current Population Survey, U.S. Bureau of the Census.

45 Daniel Trefler, *The Long and Short of the Canada-U.S. Free Trade Agreement* (University of Toronto, Canadian Institute for Advanced Research, and National Bureau of Economic Research, December 3, 2002), available at www.chass.utoronto.ca/~trefler/fta.pdf.

46 The study actually showed a 3 percent employment loss in the export industries, but it was statistically insignificant.

47 However, the average annual productivity gains during this period were significantly less than those observed in the 1960s and 1970s.

48 *North American Labor Markets* (see note 3). Data based on Labour Force Survey, Statistics Canada.

49 Ibid.

50 Ibid. Data based on Survey of Employment, Payrolls, and Hours, Statistics Canada.

51 Ibid. Data based on Survey of Consumer Finances, Statistics Canada.

52 For CUFTA, fourteen years of experience and data are available.

53 The basic trade model assumes that capital and labor are immobile. In the real world of capital mobility, international investors may shift production of labor-intensive products to a labor-abundant country such as Mexico if they are assured of access to a rich market such as the United States. Additional labor would be employed, creating net employment growth.

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The Shifting Expectations of Free Trade and Migration

DEMETRIOS G. PAPADEMETRIOU

THE POLITICAL PASSIONS SURROUNDING THE UNITED STATES' RATIFICATION of the North American Free Trade Agreement (NAFTA), and the exaggerated claims about the trade agreement's effects, in many ways confused, rather than informed, the discussion about NAFTA's aim. The U.S. debate's progression from the understandable hyperbole that accompanies the "selling" of politically contentious policies to dire "if NAFTA ratification fails" scenarios was particularly unfortunate. Such rhetoric virtually guaranteed that any subsequent assessment of the agreement's value would be burdened by unrealistic expectations in areas that were strictly secondary to NAFTA's goal of promoting trade and cross-border investment by reducing tariffs and other barriers.

Migration may well be one of these areas—although it could hardly be of greater consequence for the Mexican public and, in some ways, the U.S. public. Indeed, an evaluation of NAFTA through the lens of migration is fraught with immense difficulties. Concurrent major economic events in both Mexico and the United States since NAFTA came into effect—ranging from the Mexican economic crisis of the mid-1990s and the peso's devaluation to remarkably strong U.S. economic growth later in that decade—as well as migration's deep and structural roots in the two countries' historical relationship, confound the process of isolating and accurately measuring NAFTA's precise effects on migration from Mexico to the United States. Such an evaluation must nonetheless be attempted, if for no other reason than the fact that free trade and migration are so intimately linked in the public's mind. My evaluation will assess whether NAFTA lived up to predictions of the trade treaty's effect on migration, and explore what can be learned from NAFTA when migration is under consideration in future trade negotiations.

A Review of Key Findings and Observations

Ten years ago, both U.S. and Mexican officials argued passionately that NAFTA, by encouraging job growth in Mexico, would reduce illegal immigration from Mexico to the United States. So far, these hopes seem dashed. Although Mexican job opportunities in the export sector increased (mostly in manufacturing), net job gains have been modest at best, and, depending on the timing of the measurement, even flat. Furthermore, average wages in the two countries have hardly begun to converge. In part because of these factors, but also because of robust U.S. demand for low-wage labor and other structural forces, illegal immigration from Mexico has risen sharply since 1994 despite increasingly

vigorous border enforcement efforts that commenced at roughly the same time as NAFTA. Indeed, by most estimates, the population of unauthorized Mexican immigrants in the United States more than doubled between 1990 and 2000 (with most of that growth after 1994), and has continued to grow strongly in the new century.

Is NAFTA, then, responsible for this increase in migration, as some of its critics had predicted? I do not believe so. The analysis points instead to a picture in which the financial crises and restructuring in Mexico that both preceded and followed the trade agreement's enactment, the continuing inability of Mexican job creation efforts to keep up with the million or more new workers entering the Mexican labor force annually, the booming U.S. economy, and the strong migration networks tying the two countries have had a far more powerful effect on migration than NAFTA.

The overarching lesson from the analysis is clear: NAFTA-like free trade and investment agreements neither neutralize nor cause the forces that drive people to migrate. NAFTA has neither rescued nor gutted the Mexican economy, and net changes in employment during a short but eventful ten years have not been significant enough to offset the pressures and incentives for migration. Policy makers, then, should not expect free-trade agreements to "solve" migration problems. The economic and social realities that drive migration will endure through and behave independently of such agreements. In the end, acknowledging these realities and engaging in the sensible and coordinated—even joint—management of migration may be the only viable option.

Migration management cannot be focused exclusively on controls, however. Managing the migration spigot more effectively implies recognition and regulation of the demand for more permanent immigration and temporary work visas in both countries—in other words, it requires the more thoughtful expansion of legal migration channels and taking joint responsibility for the immigration process itself. This is the only way to do better in the migration area at least until the economic growth that trade agreements and other policy initiatives can deliver in the longer run can modulate the demand on both sides of the migration divide.

On NAFTA's tenth anniversary, however, one additional question is still relevant. Are free-trade negotiations and agreements a valid forum for addressing migration per se? The NAFTA negotiators' answer was a very timid "maybe." The agreement completely ignored the larger issue of low-skill labor migration while allowing professionals in sixty-three occupational categories to accept employment anywhere within the NAFTA space. But such "largesse" was apparently just a short-lived occurrence. In subsequent U.S. free-trade agreements with Chile, Jordan, and Singapore, as well a Canadian agreement with Costa Rica, the United States and Canada have retreated from this approach. This clearly indicates how difficult the negotiations on the movement of "natural persons" for the purpose of employment are likely to be in negotiations over the Free Trade Agreement of the Americas (FTAA), the Central American Free Trade Agreement (CAFTA), and the World Trade Organization (WTO).

I argue that the only viable solution to fundamental disagreements over migration in the foreseeable future lies in bilateral and, gradually, regional cooperation. To the extent that NAFTA-like exercises make such cooperation more viable—as NAFTA has done in many ways—free-trade agreements can become down payments on the long-term investment in "habits of cooperation." Indeed, trade agreements should not be seen as the last word on either bilateral or regional relationships, but as part of an ongoing process of engagement. To borrow loosely from Winston Churchill's views about the promise of a united Europe, broad relationships between and among neighbors are living things that grow and adapt in response to shifting on-the-ground conditions. NAFTA-like agreements can thus make important contributions to the growth

of more successful "living things," which can in turn set the stage for further cooperation on migration and other deeply divisive issues.

A final observation may still be of value as the Western Hemisphere's leaders attempt to conclude the Free Trade Area of the Americas' negotiations by the 2005 deadline. The failure to stem illegal immigration across the U.S.-Mexican border aptly demonstrates that people will continue to capitalize on the economic promise of migration whether or not their government approves. In the case of NAFTA, sharp growth in the movement of goods and capital has proven to be no substitute for the movement of people. When the NAFTA partners decide to focus more squarely on workable approaches to managing migration, and look for additional bargaining chips in trade or other negotiations, smarter policies that work with, rather than against, both the market mechanism *and* human nature need to be an important guidepost to any serious effort.

NAFTA's Mobility Provisions: Political Climate and Outcome

NAFTA put in place a common set of rules of conduct on trade, commerce, and investment for three countries already engaged in the exchange of large amounts of goods and the movement of significant numbers of people. In fact, citizens of each party to the treaty have long made important contributions to the economic lives of the other two countries, from the labor of Mexican workers dating back more than a century in the United States (and beginning much more recently in Canadian agriculture) to the exchange of executives and specialists of multinational corporations, as well as students and professionals of all types.

It was not clear at first how open the three parties would be with regard to the movement of people. The Office of the U.S. Trade Representative was at best noncommittal on the issue, while many of its negotiators viewed openings in migration as an acceptable price to pay for openings in the trade and investment environment that their principal constituent—the U.S. business community—demanded. Arrayed against that position were the principal domestic agencies that led the actual negotiations on mobility, as well as the U.S. State Department's Bureau of Consular Affairs. These agencies brought to the negotiating table not only the technical expertise necessary to conduct the negotiations but also the sense, reinforced through frequent consultations, that the U.S. Congress would not support too great a widening of mobility.

Complicating the issue further were two additional facts. Canada and the United States already had agreed, under the Canada-United States Free Trade Agreement of 1988 (CUFTA), to make provision for the movement of business persons, investors, and about sixty classes of professionals. These individuals could cross the border without visas for often unspecified periods of time and were encumbered by only a few procedures—a fact grounded in part in the special treatment of each other's citizens that goes back to the middle of the nineteenth century. In many ways, CUFTA's mobility provisions were thus an evolutionary step forward in a relentlessly integrating bilateral economic bloc, as well as the product of a United States that was more confident and "open" than at any time since. The fact that Canada already had in place a mature and well-administered immigration system, that in many ways paralleled that of the United States, also created a climate of confidence in the Canadians' ability to deliver on their obligations.

In contrast, bringing Mexico on board by matching the mobility provisions of CUFTA was in many ways revolutionary, in that Mexico had little in the way of an immigration "system" and it was not clear how quickly or efficiently it could meet any of its obligations in this regard. The reality that the visa refusal rates of Mexicans attempting to enter the United States exceeded 30 percent of applications,

almost exclusively on grounds that the applicant would seek unauthorized employment in the United States, was an additional complication.

Mexico's initial position on labor mobility was quite different from the views of its northern neighbors. Mexico was interested in opening a broad dialogue on all forms of migration between itself and its two prospective partners. However, Mexico also made it clear that it was not willing to jeopardize the broader economic relationship by insisting on this position. "Migration" was swiftly taken off of the negotiating table by the United States when the administration of President George H. Bush concluded that proceeding with any substantial migration provisions could sink the overall agreement in the U.S. Congress. Mexico proved compliant and the issue became moot when Mexico removed parts of the Mexican petroleum sector from the negotiating table.[1]

With the United States and Mexico having thus agreed to protect their most politically sensitive "sectors," U.S. negotiators still faced a political dilemma on mobility. The CUFTA mobility provisions had created the "TC" visa, which essentially had tracked the U.S. immigration legislation of the time (the "H" nonimmigrant visa as it stood at the time). The H visa category, however, had been reconfigured dramatically in new legislation in 1990. Although the CUFTA provisions were grandfathered in, extending these provisions to Mexico would modify U.S. law in an area where the U.S. Congress guards its primacy with considerable zeal.

In the end, NAFTA adopted a slightly refined set of the CUFTA mobility provisions, with one major exception: Mexico accepted inferior treatment for its professionals relative to that granted to the professionals of the two other parties to the agreement. Canadian and U.S. businesspersons, investors, and professionals were provided a rules-based system and predictable access to the entire NAFTA space by means of the harmonization of standards, procedures, and most licensing and certification requirements. Mexicans, however, would still be required to obtain a visa prior to U.S. entry (but not for entry into Canada). More significantly, in another bow to U.S. congressional sensitivities, Mexican professionals would have to meet certain additional procedural requirements, and the total number of visas available to them could not exceed 5,500 in any year until 2004.

Mexico has come nowhere near that number of entries at any time during the last ten years, for two major reasons. First, the temporary employment of Mexican professionals under the resulting one-year, but nominally renewable without limit, "NAFTA" or "TN" visa entails a significant amount of paperwork. As a result, many U.S. immigration attorneys of Mexican TN visa applicants advise them to make the extra effort (and pay the additional fees required) to obtain the H-1B visa, which "guarantees" them a six-year residence. The H-1B visa holds another distinct advantage over the TN visa: It does not require its holders to demonstrate to the U.S. immigration authorities that they do not intend to abandon their Mexican residence, that is, that they do not intend to become U.S. "immigrants"—a requirement that becomes more problematic the longer the worker remains in the U.S. Second, there is no evidence to indicate that the Mexican government has sought to publicize widely the availability of the TN visa or argue strongly (that is, engage the issue at the higher political levels) for removing some or all of its unequal provisions. The best explanation for this passivity is Mexican official ambivalence about the TN visa's possible acceleration of the already substantial "flight" of talented Mexican professionals to the United States under other visas: a variant of the "brain drain" set of concerns.[2]

A brief analysis of temporary worker flows among the three NAFTA partners shows a significant increase in both NAFTA and non-NAFTA workers. Most striking is the growth of temporary Canadian and U.S. professional workers in Mexico. With NAFTA, the Mexican government established for the first time a formal process for admitting foreign

professionals, thus allowing both domestic and foreign companies to tap the United States' and Canada's formidable comparative advantage in high-skill services (see Tables 1–3).

Notably, there was hardly any discussion about NAFTA's modest openings in the authorized movement of certain types of professionals in the NAFTA ratification debates in the United States. Instead, a substantial part of that debate focused on whether NAFTA would lead to a significant decrease in the unauthorized movement of people across the U.S.-Mexican border. United States and Mexican government officials echoed each other in their claims that, by promoting economic growth in Mexico through increased trade and foreign investment, NAFTA would reduce the pressure for illegal immigration across the United States' southern border. Mexican president Carlos Salinas Gortari repeatedly expressed the hope that Mexico would export goods, not people.[3] The U.S. attorney general at the time, Janet Reno, argued:

We will not reduce the flow of illegal immigrants until these immigrants find decent jobs, at decent wages, in Mexico. Our best chance to reduce illegal immigration is sustained, robust Mexican economic growth. NAFTA will create jobs in Mexico—jobs for Mexican workers who might otherwise cross illegally into America.[4]

The logic underlying these arguments was not new. The idea that free trade and foreign investment can act as development catalysts, and thus as at least partial substitutes for migration, had given birth to bilateral public policy cooperation as early as 1965,

Table 1. Flow of Temporary Workers[a] and NAFTA Professionals to the United States from Canada and Mexico, Fiscal Years 1994 and 2001

Type of Entry (Visa Category)	FY1994		FY2001	
	Canada	Mexico	Canada	Mexico
Non-NAFTA Workers[b]	23,992	24,885	61,437	113,586
Treaty Traders and Investors (E1/E2)	3,123	278	3,704	3,354
Workers with Specialty Occupations (H1B)	3,527	3,256	16,454	14,423
Intracompany Transferees (L1)	6,482	2,632	22,838	15,723
NAFTA Professionals (TN)	24,826	11	92,915	2,571

Source: *The Yearbook of Immigration Statistics,* Bureau of Citizenship and Immigration Services, various years.
a. Numbers include trainees, visitors for whom employment is incidental to the purpose of their visit, spouses and children. They reflect admissions, not individuals. In some cases, an individual may enter the country several times.
b. Includes the following temporary worker visa categories: E-1, E-2, H-1A, H-1B, H-2A, H-2B, H-3, J-1, L-1, O-1, O-2, P-1, P-2, P-3, Q-1, and R-1.

Table 2. Flow of Temporary Workers and NAFTA Professionals to Canada from the United States and Mexico, Fiscal Years 1994 and 2001

Type of Entry	FY1994		FY2001	
	United States	Mexico	United States	Mexico
Non-NAFTA Workers	16,791	5,207	15,613	11,011
Management	1,053	4	592	11
Professional	8,058	104	7,895	162
Skilled and Technical	4,896	28	4,879	83
Intermediate and Clerical	856	4,848	658	10,465
Elementary and Laborers	396	13	332	35
Not Stated	1,532	210	1,257	255
NAFTA Professionals	6,385	34	8,236	101

Source: Unpublished data provided by Citizenship and Immigration Canada.
Note: Numbers reflect individuals granted work authorization.

Table 3. Flow of Temporary Workers and NAFTA Professionals to Mexico from the United States and Canada, Fiscal Years 1994 and 2001

Type of Entry	FY1994[a]		FY2001	
	United States	Canada	United States	Canada
Non-NAFTA Workers	1,173	49	8,743	3,029
Investors	341	22	7,342	2,333
Intracompany Transferees	832	27	1,401	696
NAFTA Professionals	2,628	240	46,335	3,890

Source: Mexican National Institute of Migration (Instituto Nacional de Migración, INM).
Note: Numbers reflect work authorizations.
a. 1994 data collection began in April.

with the establishment of the Border Industrialization Program (BIP).[5] BIP factories along the Mexican side of the border were allowed to import inputs tariff-free for assembly in Mexico and then re-export finished products to the United States, also without tariffs, beginning the maquiladora phenomenon that would become so significant by the beginning of the NAFTA era. BIP was not, as it turned out, an effective substitute for migration, and some analysts argue that it may in fact have fueled unauthorized migration to the United States.

NAFTA's effect on trade and foreign direct investment (FDI) vastly exceeded that of BIP. Over the eight-year period from 1994 to 2001, FDI from the United States increased about 220 percent, from US$5 billion to US$16 billion (see Table 4).[6]

Yet, like BIP, NAFTA did not bring about a decrease in migration from Mexico; in fact, there is no indication that such migration may even be cresting. The explanation for this phenomenon is that NAFTA's effects on migration to date have been caught up in the crosscurrents of several much larger trends and forces. The first is the extensive history of migration between the two countries, which has bound Mexican workers to low-wage, low-value-added labor markets in the United States. The second is a demographic surge of new entrants into Mexico's labor market, which is only now beginning to show signs of exhausting itself. The third is the fact that NAFTA is only one part of a two-decade restructuring of the Mexican economy that, so far, has served only to promote migration.

Migration Networks and the Inertia of Migration

Migration from Mexico to the United States—as it increased throughout the twentieth century—grew geographically dispersed and, as a social and economic force, more permanent in nature. The recruitment and social networks tying the two countries are by now so deeply embedded that migration is an entrenched part of both countries' economies and societies. By the 1940s, well after most other immigration flows to the United States had begun to include large numbers of women, migration from Mexico continued to involve largely the circular movement of male Mexican laborers from the rural states of central Mexico to the U.S. Southwest. In the mid-1950s, at the peak of the special Mexico-United States agricultural labor arrangement known as the bracero program (which lasted from about the early 1940s to 1964), more than a half-million Mexican workers were migrating per year to the United States. Yet enough workers were migrating outside the program's parameters that the United States deported more than 3 million Mexicans between 1950 and 1955 without seriously impeding the ability of U.S. farmers to employ Mexican labor.

Permanent Mexican immigration to the United States, relative to the more typical pattern of repeated short trips northward for seasonal work, was still relatively uncommon in the mid-twentieth century despite the fact that the United States' admissions system for permanent immigrants in some ways

Table 4. Foreign Direct Investment in Mexico, 1994–2001
THOUSANDS OF DOLLARS

	1994	1995	1996	1997	1998	1999	2000	2001[a]
United States	4,954	5,394	5,178	7,281	5,106	6,747	10,622	15,989
Non-Maquiladora	4,127	4,203	3,959	5,878	3,196	4,303	8,039	14,585
Maquiladora	827	1,191	1,219	1,403	1,910	2,444	2,583	1,404
Other Countries	5,678	2,833	2,511	4,645	2,677	5,418	3,042	2,914
Non-Maquiladora	5,610	2,657	2,314	4,368	2,477	5,084	2,642	2,677
Maquiladora	68	175	197	278	200	334	400	237

Source: Secretariat of the Economy, Mexico (Secretaría de Economía).
a. January–September.

favored Mexico (and Canada). Specifically, the First Quota Act of 1921 established a national origin-based quota system for the Eastern Hemisphere, while the Western Hemisphere remained unaffected. It was not until the 1965 amendment to the Immigration and Nationality Act that a ceiling of 120,000 annual slots, effective from 1968 to 1978, was designated for the Western Hemisphere, with Mexico and Canada the de facto beneficiaries. Permanent admissions from Mexico yet averaged only some 45,000 per year through the 1960s, in large part due to the preference of Mexican workers for circular migration and rather strict procedural U.S. rules, most notably a labor certification requirement.[7] Thus, in 1960 Mexicans accounted for only 6 percent of the total foreign-born population in the United States.[8]

Over time, these temporary and permanent movements built intricate and durable networks that generated increasing migration flows from Mexico to the United States. In the 1950s and early 1960s, some bracero workers "leaked" out of the agricultural sector and into permanent employment. Each permanent immigrant multiplied the potential immigration from Mexico by enabling family reunification, by arranging jobs for family members and friends, and, in some instances, by financing the unauthorized migration of other migrants and by providing a temporary social safety net for them.[9] By the late 1970s, these networks had matured and had begun to spread. They no longer connected only agricultural areas, but attracted migrants from other parts of Mexico, including some urban areas, and sent them to major cities in the United States, particularly in the Southwest, but also in the Chicago and New York metropolitan areas. Mexican migrants filled an increasingly broad range of jobs, moving from the agricultural sector into food processing, low-value-added manufacturing, and personal services. With the capping of certain permanent immigrant admissions from the Western Hemisphere in 1978, demand for family immigrant visas began to exceed supply. Legal permanent immigration from Mexico continued to grow through the 1980s, averaging 65,500 admissions per year from 1980 through 1986. With opportunities for legal admissions remaining grossly inadequate to meet demand, illegal immigration from Mexico continued to grow.

In 1986, the U.S. Congress passed the Immigration Reform and Control Act (IRCA). Among other things, IRCA provided for the legalization of unauthorized immigrants who could show they had been resident in the United States since January 1, 1982, or had worked in U.S. agriculture for a specified time. IRCA also created a system of graduated sanctions for employers who hired undocumented immigrants "knowingly." From 1989 to 1994, almost 2.5 million Mexicans received permanent residency, 2 million of these thanks to IRCA's legalization provisions.[10] The law led to an initial decrease in the stock of unauthorized immigrants, but one of its net effects was to lay the foundation for increased immigration in the future. With IRCA's border control provisions essentially unfunded until the mid-1990s and its controversial employer sanction provisions deeply underenforced, illegal immigration resumed. Compounding the problem was IRCA's failure

to make provisions to address continuing labor demand by widening legal migration channels. Further, the large number of now-legal Mexican immigrants provided the foundation for increased legal family reunification, but many also likely facilitated the illegal immigration of friends and family.

The integration of Mexican workers into expanding segments of the U.S. labor market had been steadily increasing for well over fifty years prior to NAFTA. In contrast, NAFTA's provisions to integrate the goods-and-services markets of the two countries have been in effect for only ten years. Thus, it is no surprise that free trade has had little effect on the twin pillars of Mexican migration to the United States: intricate networks of social ties and labor market interdependence.

Rapid Demographic Change

Throughout the 1980s and leading up to NAFTA's implementation, Mexico's demographic changes were putting increasing pressure on the sputtering Mexican labor market. While the rates of Mexican infant mortality and mortality in general steadily decreased, birthrates continued to rise, peaking in 1963. They did not begin to decline significantly until after 1974, when the Mexican government began aggressive family-planning initiatives. Through the 1980s and early 1990s, this demographic momentum translated into a need to absorb an ever-increasing number of new entrants into the workforce each year. In 1988, the annual increase in the population between ages fifteen and sixty-five years reached 1.4 million, and growth in the working-age population plateaued at that figure through 2001.[11]

However, this growth will gradually slow: The population of school-age children has begun to decrease and will continue to do so through at least 2010. Mexico's National Population Council (Consejo Nacional de Población) estimates that the growth in the population of economically active people—those who are working or looking for work—has peaked: The active workforce grew by 6.7 million people between 1995 and 2000, but is expected to grow by only 5.9 million between 2000 and 2005, and 5.4 million between 2005 and 2010.[12] An ever-larger working-age cohort has meant that even during periods of steady growth, Mexico's economy has faced an uphill battle in generating jobs (and wages) sufficient to maintain the standard of living of its people. Only now are the cohorts of young people entering the labor market becoming smaller, giving the economy a chance to catch up.

To demonstrate the power of this demographic momentum during the NAFTA era, consider that when Mexico's real gross domestic product (GDP) was growing at an enviable annual rate of 6.6 percent in 2000, it was only adding about 525,000 jobs in the formal sector; it added about 700,000 in 1999, also a good year for the national economy. However, Mexico's working-age population grew by more than twice as many people in those same two years. Although estimates of the annual growth of the actual workforce vary, it is clear that even in its best years, the Mexican economy left hundreds of thousand of new entrants to the labor force (as well as their unemployed and underemployed predecessors) to choose between the informal sector and, if they had the wherewithal, migration.[13]

Also relevant to Mexico-United States migration is Mexico's continuing process of rural out-migration. Mexico, like many developing and middle-income countries, is experiencing a relentless process of rural out-migration and urbanization—a process that most economists and historians consider a natural part of economic development.[14] In 1970, 41.3 percent of the Mexican population lived in rural areas. By 1990, this figure had dropped to 28.7 percent, and urbanization continued in the 1990s, with the rural population accounting for 26.5 percent of the total population in 1995 and 25.4 percent in 2000.[15] Agricultural employment grew briefly in the late 1980s and early 1990s before

resuming its downward trend. In some cases, individuals migrated directly to the United States; others chose migration to metropolitan areas in Mexico instead. In the latter case, however, when Mexico's cities could not generate sufficient opportunities for these migrants, many of them wound up undertaking another migration—this time to the United States. Both of these processes—the demographic transition and urbanization—thus provide further reason why it would have been unrealistic to expect NAFTA to have reduced migration pressures in only its first ten years of existence.

Economic Crises, Structural Change, and Emigration

The year 1982 marked a watershed in Mexico's economic history, and thus also in its migration behavior. That year's economic crisis and the two decades of economic restructuring that have followed it increased migration to the United States substantially.

The decision to emigrate—and to return—involves a complex array of factors. Most obvious is the availability of jobs and relative wages in Mexico and the United States—in the latter case, as determined both by the wages themselves and by the exchange rate. For example, Taylor and Yúnez-Naude found that a 10 percent devaluation of the peso increased migration by 15 percent in a traditional migrant-sending village in Mexico.[16] Thus, the devaluation of the peso and the attendant collapse of Mexican employment and wages brought about a sudden, significant change in the migration "equilibrium" between the two countries. Just as important, the crisis, and the slow recovery that followed, shook confidence in the Mexican economy, leading many Mexicans to conclude that migration to the United States represented their best chance of survival and progress.

Of course, an individual's decision to migrate is not just shaped by his or her own earning prospects, but also by family needs and priorities, among other factors. The resources sent home by migrants can serve as a form of insurance, by diversifying a family's sources of income, and as a source of financial capital for families who have no access to credit. These two functions of migration were particularly important as Mexico transitioned from a policy of heavily protected, state-led import substitution industrialization (ISI) to an open, free-market economy.[17] This process of structural change, almost by definition, requires *and rewards* risktaking and new investment. As people lost jobs in sectors that had previously been sheltered or subsidized by the state—many of them moved or were forced into the informal sector—the insurance and capital functions of migration became even more important. More and more families drew on the social networks that tied them to the United States for assistance with sending a family member northward.

The result of the 1982 crash and the restructuring that followed led to a clear increase in illegal immigration. Apprehensions of would-be unauthorized migrants along the border spiked immediately after the 1982 crash, both in absolute terms and per officer hours (see Figures 1 and 2). They declined only in 1987. That drop was in large part caused by two factors: (1) IRCA's legalization provisions—especially its requirement that the applicant's presence in the United States be continuous—resulted in a decrease in circular border crossings; (2) IRCA's employer sanctions created enough initial uncertainty as to whether unauthorized immigrants would be able to find jobs as to deter, temporarily, potential crossers. After IRCA's effects subsided, apprehensions (and, it is believed, illegal entries) rebounded and continued their rising trend.

The economic changes of the 1980s and early 1990s also brought about a change in migration patterns within Mexico. Although rural-to-urban migration continued, Mexico City and the area around it was no longer the nation's chief magnet for internal migrants. As the ISI-supported industries around the capital disappeared and the middle class they

had supported receded in importance in the new economic environment, as the medium-size cities of Mexico's northern border states and the maquiladora assembly factories located in those cities became more attractive. Nevertheless, the jobs that migrants found in the border states were not always substitutes for the jobs once found around Mexico City. The maquiladoras employed mostly women, paid poorly compared with many other manufacturing employers,[18] and had extremely high worker turnover. For energetic young men looking for a steady job and a way up, the maquiladoras proved no substitute for heading north.

NAFTA was clearly just another step—albeit a huge one—in the course toward economic (and political) liberalization that Mexico set for itself in the early 1980s. It was hoped that NAFTA would be the missing piece to complete Mexico's new economic puzzle, delivering employment opportunities and consistent wage growth to Mexican workers and curbing emigration. Many observers warned, however, that change could not be accomplished overnight, that NAFTA would likely be just another step in Mexico's necessary, but painful, restructuring. Since restructuring had delivered only more migration up to that point, skeptics cautioned that it was unrealistic to expect NAFTA to reduce international migration in the short-to-medium term.

NAFTA's Effect on Migration

As it turned out, the skeptics were right. By most measures, illegal immigration to the United States continued to increase after NAFTA came into effect. Apprehensions along the U.S. southwestern border also continued to increase, from about 700,000 in 1994 to more than 1,300,000 at their peak in 2001.[19] The population of unauthorized Mexican immigrants grew as well: The Immigration and Naturalization Service (INS, which since March 2003 became part of the Department of Homeland Security, DHS) estimated that the

Figure 1. Southwest Border Officer Hours, Fiscal Years 1977–2003

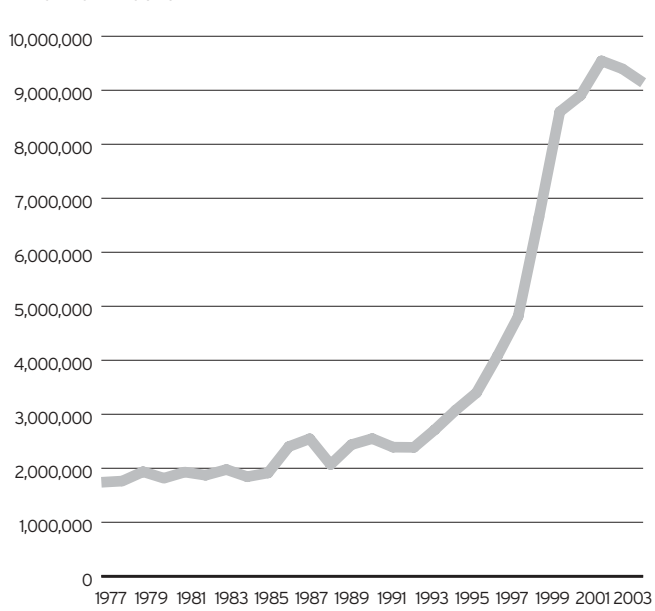
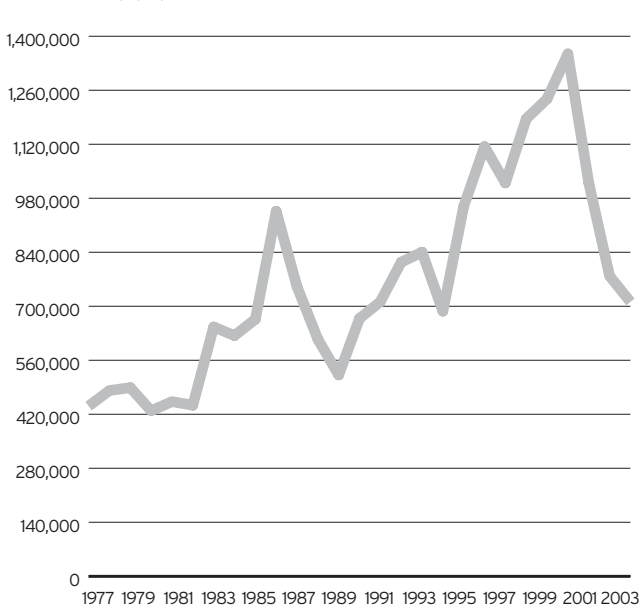


Figure 2. Southwest Border Apprehensions, Fiscal Years 1977–2003



Source: Office of Immigration Statistics, Department of Homeland Security, provided in Frank Bean and B. Lindsay Lowell, *Unauthorized Mexican Immigration into the United States: IRCA, NAFTA, and Their Migration Implications.* Paper commissioned for this report, on file with the author, 2003.

number of Mexicans present in the United States without authorization rose from 2 million in 1990 to 4.8 million in 2000, increasing from 58.3 percent to 68.7 percent of the estimated total unauthorized population in the United States.[20] According to these estimates, 79 percent of the growth in the total unauthorized population between 1990 and 2000 was due to Mexican immigrants. It is not surprising then that the average growth of the total unauthorized population during the decade was higher in the years after NAFTA went into effect than in the years before. Demographer Jeffrey Passel obtained similar findings using different methods, estimating that there were 4.7 million unauthorized Mexican immigrants in the United States in 2000.[21]

Meanwhile, the trend toward geographic and economic dispersion of Mexican-born individuals in the United States continued. The 2000 Mexican census revealed that several states that did not have a tradition of northward migration had begun sending large numbers of migrants to the United States, among them Oaxaca, Guerrero, Puebla, Hildalgo, Veracruz, Morelos, and the state of Mexico, as well as the capital district itself. An increasing proportion of migrants were from urban areas.[22] Mexican migrants also spread to nontraditional destinations in the United States: States such as North Carolina, Kentucky, Minnesota, and Arkansas saw increases of their Mexican-born populations of more than 1,000 percent between 1990 and 2000.[23]

The characteristics of migrants also appeared to have changed. Nonrandom surveys of Mexican migrants taken at popular border crossing points suggested that from 1993 to 1997, migrants became less likely to have had a job in Mexico, less likely to have migrated before, and more likely to be undocumented. The average length of intended stay increased as well.[24] Additionally, by the 1990s, only a minority of Mexican migrants surveyed worked in agriculture—in either Mexico or the United States. (Figures 3 and 4 illustrate the recent growth of the Mexican-born population in the United States.)

Figure 3. Growth of the Mexican-Born Population in the United States

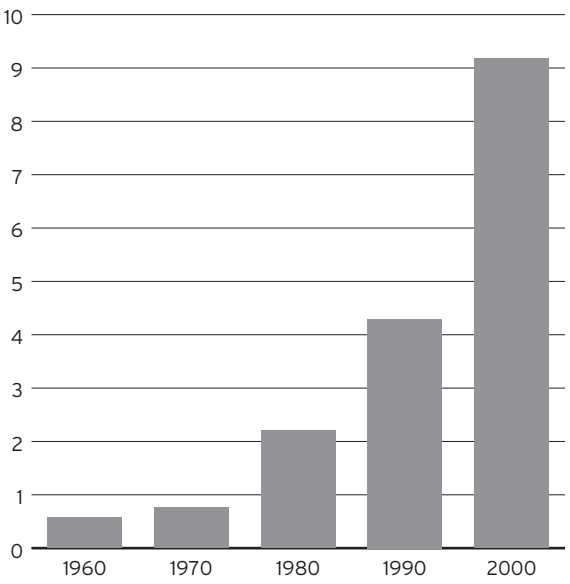
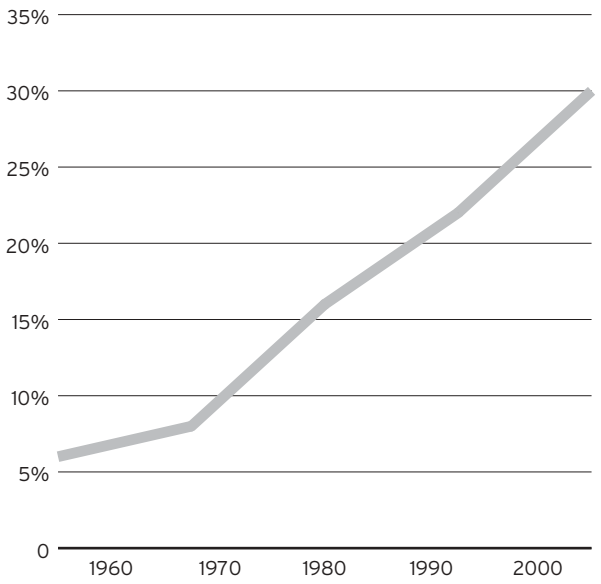


Figure 4. Percentage of Growth of the Mexican-Born Population in the United States



Source: Migration Policy Institute analysis of 2000 Census Bureau data and Campbell Gibson and Emily Lennon, *Historical Census Statistics on the Foreign-Born Population of the United States: 1850–1990* (Washington, D.C.: U.S. Census Bureau, 1999).

Free Trade and Migration Forces

THE PESO CRISIS AND RECOVERY

NAFTA's entry into force was quickly overshadowed by the "peso crisis" of 1994. The results of the crisis were an immediate devaluation of the peso by more than 50 percent, a 1996 GDP that shrank 6.2 percent from the previous year, an increase in outright urban unemployment from 3.6 percent in 1994 to 6.3 percent in 1995,[25] and a large movement of workers into informal-sector employment. The effects were not unlike those of the 1982 crisis: Large numbers of formal-sector jobs were lost, real wages in Mexico dropped severely relative to those in the United States, and confidence in the Mexican economy was badly shaken. In one public opinion poll taken during the thick of the crisis, in March 1995, only 35 percent of those polled said they thought that economic conditions would improve in the next year.[26]

The response of many Mexicans was similar to that shown in the 1982 crisis: Few jobs in Mexico, high relative wages in the United States, and uncertain prospects for the future added up to good reason to head up the well-trod path northward. Apprehensions along the border jumped in 1995, and continued to increase in 1996.

Similarly, while the NAFTA negotiations probably promoted some of the exuberant investment in Mexico that led up to the peso crisis, the crisis itself cannot be attributed to the trade agreement. Further, the political ties developed in the course of the NAFTA negotiations and the thickening economic linkages secured by NAFTA clearly played a strong role in encouraging the United States to engage in the unprecedented bailout that mitigated the crisis. If it had any effect, NAFTA likely dampened the effects of the economic crisis.

THE BOOMING U.S. ECONOMY

In 1994, real U.S. GDP grew by 4 percent from the previous year, beginning a remarkable period of sustained growth that lasted until 2000.[27] Unemployment stood at 6.1 percent in 1994 and descended to 4.0 percent by 2000, the lowest average rate since 1969.[28] The tight labor market provided ample jobs for low-skilled Mexican immigrants, making them a critical part of the robust growth of many sectors of the U.S. economy and playing a key role in drawing additional migrants to the United States. Of particular note was the increasing importance of Mexican workers in the U.S. personal services sector—a development that provided a strong indicator that the NAFTA-abetted increase in the trade of goods and high-skill, high-value-added services was not going to provide an adequate substitute for migration.

Surprisingly to some, however, the 2000 downturn in the U.S. economy, exacerbated by the attacks of September 11, 2001, did not bring about an observable decrease in Mexican unauthorized immigration to the United States. Not only has the population of Mexican-born individuals in the United States not declined, but other indicators of the size of that population, such as remittances and Current Population Survey-based estimates of the number of Mexicans in the United States, have continued to rise. Furthermore, although apprehensions along the border dropped in 2002, possibly indicating decreased illegal migration inflows, deaths of migrants along the border have remained tragically frequent.

One way to reconcile the increase in the size of the Mexican-born population in the United States with the decrease in apprehensions at the border is to speculate that the decline in the apprehension rate reflects primarily a decline in circular crossings, as migrants already in the United States postpone trips home because they fear challenging the heavily augmented U.S. border security. Also, while the U.S. economy has struggled, the Mexican economy has also been hurt through its close links to the United

States, giving migrants little incentive to return to their home country. According to a recent Pew Hispanic Center study, Mexican-American workers seemed to have suffered the lowest percent growth in unemployment in the United States from September 2000 to October 2001 (13 percent); by comparison, certain other groups in the U.S. labor pool experienced increases as high as 30 percent or more.[29] Employment prospects for Mexicans in the United States have remained robust despite the most recent lapse in the U.S. economy, a fact that may have encouraged immigrants from Mexico to remain.

CHANGES IN BORDER ENFORCEMENT

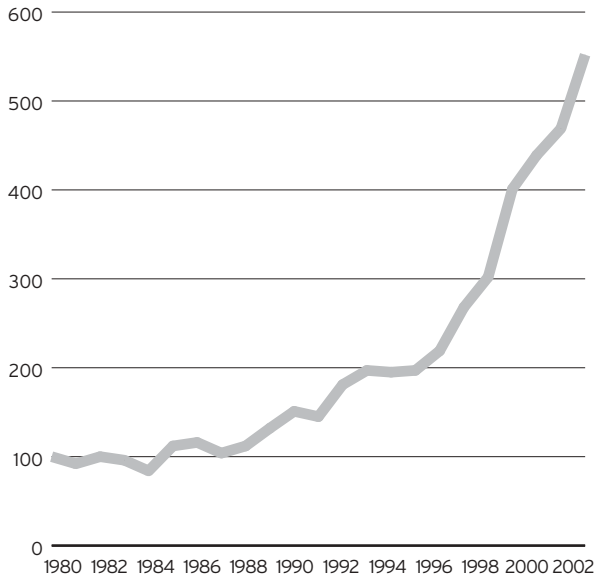
Beginning in 1993, the U.S. Border Patrol began a series of "concentrated border enforcement" exercises. Under this strategy, line patrols were drastically increased in high-traffic crossing areas, most of them in urban settings. The strategy sought to make crossing illegally as difficult and costly as possible by closing off the easiest routes. As noted, it has succeeded in making crossing more difficult, as evidenced by the increased use of "coyotes" (people-smugglers) higher smuggling fees, and the increased deaths of unauthorized migrants in remote areas along the border. However, there is no evidence that illegal immigration from Mexico has slowed as a result of the enhanced enforcement.[30] Instead, border enforcement seems to have reinforced the trend away from circular migration and toward longer stays in the United States, in turn prompting more women and children to migrate to join men working there.

NAFTA, MEXICAN AGRICULTURE, AND RURAL OUT-MIGRATION[31]

The hope that exports of high-value fruits and vegetables would bring more employment to rural Mexico was balanced by the fear that imports from the United States would swamp Mexico's production of grain, particularly maize. Maize is a labor-intensive staple crop in Mexico, but Mexican farmers produce it far less efficiently than their U.S. counterparts. In regard to the Mexican workforce, it was feared that open trade would generate intense labor displacement in the agricultural sector and additional migration from rural areas—with many of those migrants ending up in the United States.

A 2003 study by J. Edward Taylor and George Dyer commissioned for this report, using data from the Mexico National Rural Household Survey, shows that NAFTA did not slow migration from rural areas. Although Mexican exports of fruits and vegetables increased considerably after NAFTA was implemented, generating additional employment, employment in the agricultural sector declined overall. Migration from many rural communities accelerated, and less of that migration went to other rural areas in Mexico. In fact, an increasing proportion of that migration found its way to the United States: Thirty percent of migrants from rural Mexico were in the United States in 2002, versus 19 percent in 1994. From 1980 to 1994, migration from the surveyed rural communities to the United States increased by 95 percent. By 2002, migration to the United States was 452 percent higher than in 1980 (see Figure 5).

Figure 5. Migration from Rural Mexico to the United States, 1980–2002
HOUSEHOLD MEMBERS: 1980=100



Source: Analysis of data from Mexico National Rural Household Survey of 2002, in J. Edward Taylor and George Dyer, NAFTA, Trade, and Migration. Paper commissioned for this report, on file with the author, 2003.

NAFTA does not appear to be the culprit in this acceleration of rural out-migration, however. Taylor and Dyer found no indication that NAFTA created any sort of "break point" in the growth of migration from rural areas.[32] Rather, migration from rural Mexico to the United States had been accelerating well before the onset of NAFTA, and the trend continued afterward. Further, while the expected increase in imports in corn and other grains from the United States occurred, Mexican corn production has not been gutted. In fact, annual corn production averaged about 18.3 million tons from 1995 to 2001, almost exactly what it was in the years immediately prior to NAFTA. Neither has there been an observable shift in production between rain-fed, largely subsistence farms and more commercial, irrigated farms.[33] In fact, even as agricultural prices dropped and Mexico's trade deficit in agricultural goods with the United States widened after NAFTA, Mexico's agricultural GDP increased. That growth, however, was slower than the growth of GDP as a whole with two exceptions: In 1994 and 2001, overall GDP shrank. (Much of the growth in agriculture was in labor-intensive fruit and vegetable crops in the northern and western states of Mexico, where exports of many types of fruits and vegetables more than doubled.)

The gains in the value of Mexican agriculture were accompanied, however, by a seemingly paradoxical decline in employment in the Mexican agricultural sector, from 8.1 million jobs in 1993 to 6.8 million in 2001.[34] A number of factors besides NAFTA were at work, however. The first, and one that is often overlooked, is the natural, perhaps inevitable, process of rural-to-urban movement that all countries experience as their economies advance. The share of agricultural workers as a proportion of Mexico's workforce has declined steadily, from over 50 percent in 1960, to 36 percent in 1980, to less than 25 percent and falling since 1995.[35] The second factor is the continued reform of Mexican agricultural policy. Reforms of the *ejido* system of landownership that began in 1992 have allowed land sales and rentals and have been accompanied by cuts and changes in the structure of agricultural subsidies. Both changes have encouraged increased productivity and production, but not always in ways that have resulted in greater agricultural employment or have encouraged rural people to stay put.

Thus, NAFTA has played only a minor role in the continuing acceleration of rural outmigration during the decade since its enactment. The choice of whether to migrate within Mexico or to the United States, however, has been shaped by the larger and more structural general migration forces outlined in this essay, and by the unavailability and low quality of jobs in Mexico's cities.

URBAN EMPLOYMENT AND NAFTA: THE RISE OF THE MAQUILADORAS AND THE INFORMAL SECTOR

The crises of 1982 and 1994 were characterized by the decimation of salaried jobs in the formal sector and the growth in jobs in the informal sector—self-employment, jobs in small enterprises, and jobs without benefits. Employment in the formal sector has risen and fallen with the Mexican economy. Until 1995, employment in informal-sector jobs grew faster than employment in general. The sustained economic growth of the late 1990s brought about an increase in the proportion of workers in formal jobs, but many of these gains have been lost in the downturn of the past three years.

Significantly, a substantial minority of the formal-sector jobs gained—and lost—following enactment of NAFTA have been in the maquiladora assembly industry.[36] Both informal employment and maquiladora jobs are typically poor substitutes for international migration. Average productivity (and thus wages) in the informal sector is very low. Migrant remittances are an essential source of capital for many small enterprises, meaning that the informal sector and migration are often complements, not substitutes. Likewise, wages in the maquiladoras are low, turnover is high, and workers

tend to be young and, until recently, overwhelmingly female (in 2001, for the first time, the majority of recorded maquiladora workers were men), which means that the energetic and ambitious bypass or do not stay long in maquiladora jobs.

Thanks in part to increases in foreign investment and manufacturing exports brought about by NAFTA, as well as social security reforms, informal-sector employment declined in the initial period following enactment, along with open unemployment. By one indicator, unemployment and informal employment together fell from a high of 53 percent of the workforce in 1995 to a low of 44 percent in 2000, only to climb to 47 percent in 2003.[37] Both rates remain higher than those prior to the 1995 crisis, however.

Although the manufacturing sector in general was hit harder by the 1995 crisis than the maquiladora subsector, employment in non-maquiladora manufacturing recovered strongly on the back of export growth, with employment increasing 20 percent between its 1995 trough and 2000 peak; maquiladora employment roughly doubled in the same period. In the new century, it appears that the maquiladora sector may be in decline. The combination of the economic downturn, competition from China and other low-wage countries, and the loss, due to NAFTA, of some of the maquiladoras' preferential tariff treatment has contributed to a level of employment that, in mid-2003, was down 19 percent from the sector's 2000 peak, in contrast to non-maquiladora manufacturing employment, which was down 12.5 percent.

NAFTA and Migration: Promise and Reality

In terms of its effects on illegal migration, NAFTA has been cruel to both its most vocal critics and its most ardent proponents. It has not decimated Mexican employment, but it has not led to dramatic job and wage growth. If anything, it has shifted the Mexican economy slightly toward greater formal-sector employment, leading one to believe that Mexico's disappointing economic performance in the past ten years may well have been much worse without NAFTA.

Migration from Mexico to the United States, both legal and illegal, has continued to grow. In the ten years that NAFTA has been in effect, vastly expanded investment in Mexico and regional trade in goods has not reduced the movement of people—albeit for reasons that probably have as much to do with conditions in the United States as with those in Mexico. The fairest conclusion may be that, ultimately, NAFTA's economic effects have been dwarfed by much more powerful and enduring forces: robust demand for Mexican workers in the United States, enduring and deeply rooted social networks that promote migration, a demographic boom that is still several steps ahead of the employment creation capabilities of the Mexican economy, and an economy that, like those of many developing countries, has, over the past two decades, suffered repeated grave crises and a painful process of readjustment.

Looking Ahead

The "age" of selling free-trade agreements to skeptical policy makers and mass publics by claiming that they will reduce illegal immigration may have passed. Yet there are cases in which a different model of regional integration has reduced migration pressures enormously. This model, however, goes beyond just free trade. When Greece, Spain, and Portugal joined the European Union (EU), for example, the opening in labor mobility did not bring about a rush of new migration. This nonevent occurred despite a nearly three-decade history of labor migration to the EU from all three countries. However, the process of joining the EU involves much more than opening to free trade. It is both preceded and followed by extensive EU investments in the social and physical infrastructure of candidate and new member states, as well as by massive annual investments in the member states' agricultural sectors. This last investment alone consumes nearly half the European Commission's total budget. Furthermore, the EU integration concept mandates extensive economic and political reforms that enhance the newcomers' stability and prepares them to take better advantage of the benefits of membership.

The EU's model of economic and political integration seems unlikely to be duplicated elsewhere in the near future. In light of the failures of both free trade and unilateral border controls to "solve" the problem of illegal immigration, only one other major option seems open: substituting legal, regulated, safe, and orderly migration for the current system of illegal, unregulated, and disorderly migration. The perversity of the status quo becomes starker when one realizes that in effect the sovereign prerogative of states to make immigration decisions to individual migrants and organized smuggling networks is surrendered. The alternative calls for engaging in a process of using further openings in permanent immigration and substantial numbers of legal temporary work visas to satisfy a much greater proportion of the developed economies' demand for additional foreign labor and the less developed economies' interest in easier access to the labor markets of the more developed world.

In many ways, the political ties the United States and Mexico developed in the course of negotiating NAFTA helped to open a number of dialogues on migration management between the two countries that began soon after the agreement's entry into force. These dialogues dealt with important but often procedural issues at first, but gained in both depth and intensity following the elections of Vicente Fox Quesada and George W. Bush. The momentum dissipated, however, soon after the terrorist attacks of 2001 and the subsequent shift in U.S. political attention and interest. However, the negotiations' central concepts of regularizing the presence of unauthorized immigrants, offering Mexico much broader access to permanent and temporary U.S. visas, and taking joint responsibility for the management of the common border live on in the continued interest of several key U.S. lawmakers who have proposed a variety of new legislative schemes in this area.[38]

In the present climate, significant migration agreements, if they are to happen at all, will most likely happen outside the explicit context of trade accords. Although the mobility of businesspersons and investors under trade accords may no longer be controversial, the *employment* of foreigners at various levels of skill, education, and experience is a very difficult political issue for most developed societies. The "toxicity" of going beyond the narrowest possible areas of mobility has been playing itself out for two years now in the inability of the governing coalition in Germany to pass its immigration reform legislation, and was felt again most recently in the United States. After approving trade pacts with Chile and Singapore that contained labor mobility provisions *far more limited than those in NAFTA,*[39] the U.S. Senate passed a nonbinding resolution stating that "trade agreements are not the appropriate vehicle for enacting immigration-related laws or modifying current immigration policy," and that "future trade agreements to which the United States is a party… should not contain immigration-related provisions."[40]

Canada, for its part, has also been cautious in engaging other countries in mobility agreements similar to the one it negotiated with Mexico under NAFTA. Canada's 1997 free-trade agreement with Chile made NAFTA-like provisions for the temporary employment of professionals, but its 2001 agreement with Costa Rica only provided for the temporary entry of business visitors and for the employment of intracompany transferees. However, Canada has continued a somewhat productive dialogue with Mexico on labor migration: It signed a 2001 letter of intent stating its intention to expand the small agricultural guest worker program it has had with Mexico since 1974.

In sum, both the United States and Canada have mapped generally similar paths on migration since NAFTA. They have made few commitments regarding the ability of foreigners to get access to their respective domestic labor markets through trade agreements, while at the same time running fairly liberal "unilateral" programs for the temporary entry and employment of people from all nations and continuing to engage Mexico on migration matters from time to time.

One could take from this analysis the lesson that migration agreements cannot be naturally accommodated within free trade negotiations. In many ways, this is counter-intuitive. After all, it is during trade negotiations that the negotiating position of many developing states may be the strongest. The collapse of the Cancún WTO ministerial in September 2003 certainly demonstrates this last point. Furthermore, NAFTA's brief history shows that free trade cannot serve as a substitute for labor migration, at least in the short term—and that loading a free-trade agreement with mobility provisions beyond those appearing in NAFTA will make the agreement politically unpalatable to developed countries. The lack of substantial progress so far in the WTO discussion of trade-in-services (which could come to include mobility issues that go well beyond those of NAFTA) points to a trend toward more modest commitments on the mobility of persons.

Regardless of the political moment, there remain compelling reasons why migration and free-trade agreements will continue to be thought of—if not acted on—in tandem. First, from a purely economic perspective, there is little difference between trade in goods and trade in services, and much trade in services requires the movement of significant numbers of people. Furthermore, economists argue that the potential global economic gains from even a modest increase in the movement of workers can be much larger than *any* further increases in the movements of goods.[41] These gains only grow as the spectrum of skills and occupations eligible to move are expanded to allow countries to exploit their comparative advantage in services. More convincingly, perhaps, this potential for economic gains has serious practical effects. As NAFTA aptly demonstrates, the rich countries' voracious demand for workers and the poorer countries' ample supply create powerful transnational linkages between labor markets, both because of and despite official policy. The last ten years clearly demonstrated the durable need for Mexicans in low-value-added manufacturing and low-skill services in the United States, but the role of Indian information technology and communication workers (temporary and otherwise) in the United States in the 1990s provides an equally potent example. Once worker and employer have begun to turn the potential economic gains of migration into a profitable reality, governments face an uphill battle in disentangling them.

Nor is this analysis unique to the NAFTA partnership. Within the FTAA zone, Mexico, Argentina, Brazil, and Chile, among others, are all significant destinations for workers from other countries, as well as regional hubs for business. Often, just as in the case of migration from Mexico to the United States, the driving force is not the government's legal approach to the movement of people, but the demands of the economy and the existence of established migration networks. Regional agreements that set the terms for the ongoing exchange of business visitors and several types of workers among all the countries of a region may thus be worth pursuing on their own merit—independently of, or parallel

to, negotiations on trade and commercial pacts. The United States and Canada already have extensive provisions for the temporary employment of foreign workers outside the context of international agreements. As negotiations continue on CAFTA and FTAA, and in the WTO, as well as depending on the level of the developed world's interest in gaining access to foreign markets, it may make sense for developed countries to use limited and regulated access to their labor markets as a bargaining chip. The bargain can be seemingly simple: Developed countries desire concessions from developing countries in opening their service sectors that parallel the concessions developing countries want from developed countries in regard to the movement of people.

The United States, Britain, and many other developed countries have large surpluses in net exports of high-skill services, reflecting their large comparative advantage in telecommunications, energy, management, and financial services. Yet developing country protectionism, among other factors, holds services to about 20 percent of all world trade. The ability of Indian information technology and communication professionals to work in the United States or of Brazilian construction companies to operate in the United States using a certain proportion of Brazilian workers might thus be exchanged for increased access to the telecommunications or financial services sectors of these countries by U.S. firms. This type of "trade in services" quid pro quo could be tested first in the U.S.-Mexican context: An agreement on temporary movement of low-skill workers from Mexico to the United States and U.S. access to Mexico's petroleum sector were first discussed together in NAFTA negotiations, and both countries remain conscious of these two items' power as bargaining chips.[42] Other, equally sensitive bilateral irritants will also have to be included in any real bargain, particularly ones that involve the taking of joint responsibility for the management of the common border in ways that effectively address each other's concerns about drugs, organized crime, and, first and foremost among U.S. interests at this time, *security*. Such arrangements will have to deal with the inevitable—and valid—concern that permitting increased movement of labor could affect relative wages in sensitive social sectors in developed countries. With stronger social policies and proper regulation and enforcement, however, these fears could go the way of NAFTA's "giant sucking sound" famously evoked in 1994 by Ross Perot. If anything, some of the United States' recent experience shows that temporary worker admissions can function much as one would want them to: Applications by U.S. employers for foreign workers in the high-technology sector climbed dramatically in the late 1990s, when there was enormous demand for such workers, but have declined sharply since the 2000 downturn. In other words, the use of temporary foreign employees responded to market forces, and foreign workers employed properly by U.S. employers did not undercut U.S. workers as the demand for technical skills ebbed.[43]

Still left unanswered is the question of how to negotiate agreements on the movement of workers. In the case of the EU, the nearly completely free movement of people takes place in the context of very deep regional political-economic integration. Another approach, now slowly taking shape in the Caribbean Community, uses the regional trade agreements' existing commitments on the mobility of business visitors and high-skill professionals as a starting point from which to extend mobility to other labor market sectors by gradually eliminating administrative barriers and making less-skilled workers eligible to move. This, in effect, was also the approach proposed by India in the WTO's Doha Development Round, to a tepid reception.

A final approach would not tie migration measures directly to trade agreements. Rather, it would use the resulting regional or subregional economic integration and cooperative spirit as the context within which to negotiate subsequent mobility agreements. Similarly, a successfully concluded trade pact could be used as a political forum for a regional discourse that concluded with an understanding on migration. The countries of the South American customs union Mercosur, which experience significant levels

of intraregional illegal migration, has used the ties built though their trading bloc to negotiate the regularization of unauthorized immigrants.

The most reasonable thing to assume at this time, however, is that neither the FTAA nor CAFTA negotiations, when completed, will look much different on mobility issues from the precedent set by the U.S. agreements with Chile and Singapore. Moreover, absent a sharp turnaround in the U.S. economy, U.S. negotiators may even seek to eliminate any reference to professional entries under the resulting accords. The direction the United States might wish to follow, however, is not likely to be as easily "imposed" on the other parties as it was on Singapore or Chile. The stated intent of Brazil to obtain larger concessions from the United States in FTAA negotiations, and the tough stance taken by developing countries in general at the September 2003 WTO negotiations in Cancún, are indications that there may yet be new developments in the mobility of people associated with trade in services.[44]

Epilogue

This brief evaluation of "NAFTA at Ten" allows us to bury some false ideas and suggest some new possibilities. The idea that free trade by itself can bring about changes that can control existing migration flows in the short-to-medium term is clearly wrong. Equally erroneous is the fear that trade agreements will spur massive movements of people.

International trade is only one of many economic forces affecting migration, and migration itself has deep roots in society. Migration and economic integration have not met for the last time, however. The movement of people is an economic force with a power potentially far exceeding that of the movement of goods or capital, and trade agreements will continue to be a forum for discussing—if not concluding—cooperative agreements on the management of migration.

NOTES

1 More information on Mexican expectations leading up to NAFTA is provided in Francisco Alba, *Elusive and Changing Mexican Expectations Regarding NAFTA's Implications on Migration.* Paper commissioned for this report, on file with the author, 2003.

2 A vivid example of Mexican officials' ambivalence toward the TN visa is the cases of actuaries and plant pathologists. Canadians and Americans in the NAFTA Mobility Working Group have waited for several years for Mexican representatives to approve expanding the TN occupational list to include these two categories.

3 Demetrios G. Papademetriou, "New Directions for Managing U.S.-Mexican Migration," *Migration, Free Trade and Regional Integration in North America* (Paris: OECD, 1998).

4 "Attorney General Reno Sees NAFTA Benefits in Creating Jobs, Stopping Drugs and Illegal Immigration from Mexico" (press release). The White House, Washington, D.C., October 12, 1993, available at www.ibiblio.org/pub/archives/whitehouse-papers/1993/Oct/NAFTA-Notes-1993-10-12.

5 The BIP was created partially in response to the end of the United States' bracero program, which had allowed Mexicans to work seasonally on U.S. farms and had promoted the recruitment of Mexican workers by U.S. employers.

6 Interestingly, however, FDI from all other countries fell by almost 50 percent in 1995 and has never fully recovered, perhaps an indication that the United States' NAFTA advantage displaced capital from other countries. The special relationship between the United States and Mexico may be diluted, though, through Mexico's signing of free-trade agreements with multistate groupings elsewhere in Latin America, the European Union, the European Free Trade Association states, and Israel; Mexico even has an agreement pending with Japan. Correspondingly, Mexico's advantageous access to U.S. markets is also being diluted, by the United States' ongoing free-trade agreement negotiations and by China's accession to the WTO.

7 In most instances, U.S. employers must obtain labor certification for those employment-based immigrants and other foreign workers they wish to hire. This process requires an employer to demonstrate that the foreigner's presence will not adversely affect U.S. workers.

8 "Ten Source Countries with the Largest Populations in the United States as Percentages of the Total Foreign-Born Population: 1960" (graph). (Washington D.C.: Migration Information Source, Migration Policy Institute), available at www.migrationinformation.org.

9 For more information on these topics, see *Binational Study on Migration, Binational Study on Migration between Mexico and the United States* (Mexico City, Mexico: Binational Study on Migration, 1997); Douglas Massey, Jorge Durand, Nolan Malone, and Alfred Buch, *Beyond Smoke and Mirrors: Mexican Immigration in an Era of Economic Integration* (New York: Russell Sage Foundation, 2002); Douglas Massey, Joaquín Arango, Graeme Hugo, Ali Kouaouci, Adela Pellegrino, and J. Edward Taylor, *Worlds in Motion,* (Oxford, England:

Clarendon Press, 1998); Douglas Massey, Rafael Alarcón, Jorge Durand, and Humberto González, *Return to Atzlan: The Social Process of International Migration from Western México* (Berkeley, Calif.: University of California Press, 1987).

10 Bureau of Citizenship and Immigration Services, *The Yearbook of Immigration Statistics* (Washington, D.C.: U.S. Department of Homeland Security, various years).

11 Consejo Nacional de Población, *La Población de México en el Nuevo Siglo* (Mexico City, Mexico: Consejo Nacional de Población, 2001). See also U.S.-Mexico Migration Panel, *Mexico-U.S. Migration: A Shared Responsibility* (Washington, D.C.: Carnegie Endowment, 2001).

12 Consejo Nacional de Población, *Situación Demográfica de México, 2000* (Mexico City, Mexico: Consejo Nacional de Población, 2000).

13 Employment figures for formal employment are for temporary and permanent workers covered by the national social security agency, as reported by the National Institute of Statistics, Geography, and Informatics (Instituto Nacional de Estadística Geografía e Informática, INEGI).

14 For further discussion see J. Edward Taylor and George Dyer, NAFTA, Trade, and Migration. Paper commissioned for this report, on file with the author, 2003.

15 INEGI, "Porcentaje de Población por Tamaño de Localidad, 1950-2000" (table). (Mexico City, Mexico: INEGI).

16 J. Edward Taylor, and Antonio Yúnez-Naude, "Agricultural Policy and the Village Economy: A Computable General Equilibrium Analysis," in Roger Rose, Carolyn Tanner, and Margot A. Bellamy, eds., Issues in Agricultural Competitiveness (Aldershot, England: Dartmouth, 1997), pp. 298–304.

17 Using an ISI policy, Mexico sought to develop local "infant" industries by protecting them from competition from imports through tariffs, import quotas, exchange rate controls, subsidies, and preferential treatment of capital imports. Mexico's intense policy of ISI began soon after World War II and delivered fairly steady growth, but it began to falter in the mid-1970s, when mounting debt, inflation, and capital flight forced the devaluation of the peso from the peg it had held with the dollar since 1954. However, rising oil prices sustained ISI in Mexico through 1982, when, following a drop in oil prices, the Mexican economy went into full-blown financial crisis.

18 Carlos Salas and Eduardo Zepeda, *Wages and Productivity in Mexico: Theoretical and Empirical Issues,* (Table 1). Paper commissioned for this report, on file with the author, 2003.

19 This period also saw a simultaneous reduction in the number of apprehensions per officer hour of border enforcement, a measure that is often used to account for changes in apprehension statistics, themselves caused by changes in resources dedicated to enforcement rather than flows across the border. This indicator should not be interpreted as a reliable sign that the entry of undocumented immigrants into the United States was decreasing, or that the pressure to migrate had decreased. Beginning in 1993, officer hours were greatly increased in certain high-traffic urban areas under the Immigration and Naturalization Service's "Enhanced Border Enforcement Strategy." The program yielded an initial upsurge both in apprehensions per officer hour and in the probability of being intercepted, but this effect soon subsided. It appears that migrants adapted by using less transited, albeit more dangerous, entry routes and by turning more systematically to "coyotes" (immigrant smugglers). Additional reading on this topic is provided in Frank Bean and B. Lindsay Lowell, *Unauthorized Mexican Migration into the United States: IRCA, NAFTA, and Their Migration Implications.* Paper commissioned for this report, on file with the author, 2003.

20 Office of Policy and Planning, *Estimates of the Unauthorized Immigrant Population Residing in the U.S.: 1990 to 2000* (Washington, D.C.: Bureau of Citizenship and Immigration Services, 2003).

21 Jeffrey Passel, *New Estimates of the Undocumented Population in the United States* (Washington, D.C.: Migration Information Source, Migration Policy Institute, 2002), available at www.migrationinformation.org.

22 *La Población de México en el Nuevo Siglo* (see note 10).

23 Migration Information Source, "States and Regions Ranked by Percent Change of the Foreign Born: 1990 and 2000" (table). (Washington, D.C.: Migration Policy Institute, n.d.), available at www.migrationinformation.org.

24 Results from the Northern Border Migration Survey presented in *Situación Demográfica de México* (see note 11).

25 For observers used to interpreting unemployment figures from developed countries, Mexican unemployment figures will appear to underestimate unemployment by a large margin. This is in part because outright unemployment is a luxury unaffordable to Mexico's poor, who take refuge in informal employment when formal-sector jobs are not available. Additional reading on the effects of the peso crisis on the Mexican economy and population is provided in J. Edward Taylor and George Dyer, NAFTA, Trade, and Migration. Paper commissioned for this report, on file with the author, 2003. See also Sebastian Edwards and Moisés Naím. *Mexico 1994: Anatomy of an Emerging-Market Crash* (Washington, D.C.: Carnegie Endowment for International Peace, 1997).

26 Peter H. Smith, "Political Dimensions of the Peso Crisis," in Sebastian Edwards and Moisés Naím, eds., *Mexico 1994: Anatomy of an Emerging-Market Crash* (Washington, D.C.: Carnegie Endowment for International Peace, 1997), pp. 31–53.

27 Bureau of Economic Analysis, "Gross Domestic Product: Percent Change from Preceding Period" (table). (Washington, D.C.: U.S. Department of Commerce, 2003), available at www.bea.doc.gov/bea/dn/gdpchg.xls.

28 Bureau of Labor Statistics, "Employment Status of the Civilian Noninstitutional Population, 1940 to Date" (table), in Bureau of Labor Statistics, *Household Data Annual Averages* (Washington, D.C.: U.S. Department of Labor, 2003), available at www.bls.gov/cps/cpsaat1.pdf.

29 Arturo Gonzalez, *The Impact of the 2001/2002 Economic Recession on Hispanic Workers: A Cross-Sectional Comparison of Three Generations* (Washington, D.C.: Pew Hispanic Center, 2002).

30 *Unauthorized Mexican Migration into the United States* (see note 18).

31 The analysis in this section draws heavily on *NAFTA, Trade, and Migration* (see note 13).

32 Cuts in agricultural tariffs under NAFTA were to be phased in over a fourteen-year period. However, on many commodities, including maize, the Mexican government has exceeded its commitments and declined to exercise the option to impose "tariff rate quotas."

33 Historical series data provided by Mexico's Servicio de Información Estadística Agroalimentaria y Pesqueria (SIAP, Statistical Information Service of Food, Agriculture, and Fisheries) of the Secretaria de Agricultura, Ganaderia, Desarrollo Rural, Pesqueria, y Alimentación (SAGARPA, Secretary of Agriculture, Livestock, Rural Development, Fisheries, and Nutrition).

34 Unrevised and unpublished data provided by the Mexican National Institute of Statistics, Geography, and Informatics (Instituto Nacional de y Estadística, Geografia, e Informática, INEGI).

35 Michele Veeman, Terence Veeman, and Ryan Hoskins, "NAFTA and Agriculture: Challenges for Trade and Policy," in Edward J. Chambers and Peter H. Smith, eds., *NAFTA in the New Millennium* (La Jolla, Calif.: Center for U.S.-Mexican Studies, University of California, San Diego, 2002), pp. 305–29.

36 NAFTA did not directly benefit the maquiladora sector. Maquiladoras exporting to the United States were exempt from tariffs prior to NAFTA, while some of the privileges accorded to the sector were dismantled by NAFTA by the late 1990s, contributing to the sector's woes.

37 Percentage of workers openly unemployed plus those employed but not receiving a wage or salary. The author's calculations are derived from data from Banco de Información Económica, "Otros Indicadores de Empleo y Desempleo Trimestral" (table). (Mexico City, Mexico: INEGI, n.d.).

38 For more information on bilateral migration negotiations, see Francisco Alba, *Elusive and Changing Mexican Expectations Regarding NAFTA's Implications on Migration.* Paper commissioned for this report, on file with the author, 2003.

39 Chilean and Singaporean professionals can be employed in the United States only under existing U.S. law and administrative procedures (the H-1B visa). No new visa categories were created in the trade agreements with Chile and Singapore, as had been done under NAFTA, and no administrative requirements were waived. The only notable (but otherwise inconsequential) U.S. concession in this area was simply to carve out a very small number of H-1B visas for each of these two countries.

40 Senate Resolution 211, 108th Congress, introduced July 31, 2003 by Senator Sessions. Daily Digest, Government Printing Office, July 31, 2003.

41 According to one economic modeling exercise, if in each year developed countries allowed the temporary entry of a quota of foreign workers equivalent to 3 percent of their workforce, the world economy would gain US$156 billion per year. These gains are about the size of the annual GDP of Indonesia or Denmark, and are greater than those that would result from dropping all remaining tariffs on the trade of goods in the same model. Other models suggest that world production could more than double in the hypothetical case of completely "free" movement of workers. Significantly, the bulk of these potential gains comes from the movement of low-skilled workers. To put the first figure in perspective, in 2002 admissions of new temporary workers (not including workers staying on multiyear permits issued in previous years) into the United States were equivalent to about 0.5 percent of the U.S. labor force, while new permanent admissions equaled about 0.7 percent of the workforce. The estimated stock of unauthorized immigrants in the United States in 2000 was equivalent to about 5 percent of the U.S. workforce, with about two-thirds of these immigrants being Mexican. For details see L. Alan Winters, Terrie L. Walmsley, Zhen Kun Wang, and Roman Grynberg, "Negotiating the Liberalisation of the Temporary Movement of Natural Persons," Discussion Paper in Economics no. 87 (Brighton, England: Commonwealth Secretariat, Sussex University at Brighton, 2002), available at www.sussex.ac.uk/Units/economics/dp/Wintersetal87.pdf.

42 In 2003, the U.S. House of Representative's Committee on International Relations passed a nonbinding amendment to H.R. 1950 stating, "It is the sense of the Congress… that any accord on migration issues between the United States and Mexico should also include an accord to open Petroleos Mexicanos (Pemex) to investment by U.S. oil companies and specific steps to reform Pemex's operations to make them more transparent and efficient." The implied proposal was quickly rejected by the administration of President Fox. As of this writing, the bill is in the Senate.

43 In October 2000, the U.S. Congress passed the American Competitiveness in the Twenty-First Century Act ("AC21"). The counting methodology for H-1Bs, however, has since changed. Certain H-1B employees are now exempt from numerical limitations, including those employed by institutions of higher education related or affiliated nonprofit entities, or nonprofit or government research organizations.

44 NAFTA's mobility provisions, modest as they are, are nonetheless noteworthy for their influence on other negotiations. The WTO's 1994 General Agreement on Trade in Services (GATS) provided a multilateral framework for addressing the movement of business visitors and professionals via its "Mode 4" of service delivery (the delivery of services through the presence of the nationals of one country in the territory of another). NAFTA, as the most prominent free-trade agreement being developed at the time, was an important influence on the architecture and language of GATS, and the influence of both of these agreements is still very much evident in the discussion of services in trade agreements being negotiated today, such as CAFTA and FTAA. See Julia Nielson, "Current Regimes for the Temporary Movement of Service Providers: Labour Mobility in Regional Trade Agreements." Paper presented at the 2002 Joint WTO-World Bank Symposium on the Movement of Natural Persons (Mode 4) under the GATS (Geneva: April 11–12, 2002), available at www.wto.org/english/tratop_e/serv_e/symp_apr_02_nielson1_e.doc.

three

The Greenest Trade Agreement Ever?

MEASURING THE ENVIRONMENTAL IMPACTS OF AGRICULTURAL LIBERALIZATION

SCOTT VAUGHAN

IN 1993, THE CLINTON ADMINISTRATION hailed the North American Free Trade Agreement (NAFTA) as the "greenest" trade agreement ever completed.[1] Despite this promise, NAFTA and its parallel environmental accord remain the source of intense debate. A decade after the agreement entered into force, disagreements continue around the basic facts of NAFTA, as well as whether it has kept its pledge of promoting sustainable development, preserving the environment, and ensuring that environmental laws guarantee high levels of environmental protection.[2] In 2001, Public Citizen dismissed the environmental provisions of NAFTA as "meaningless."[3]

Measuring the environmental impact of trade remains complex, despite advances that have been made in assessment methods, underlying data, and empirical evidence. Environmental quality is subject to change, often unexpectedly and from a myriad of sources. Since free trade affects the economy indirectly and often weakly, the impact of trade on environmental quality also tends to be indirect and weak.[4]

Despite methodological challenges in identifying causal links, studies confirm that trade exerts two types of pressure on the environment. First, trade can affect environmental quality through scale impacts. There is rarely, if ever, a linear relationship between economic scale and environmental impacts, since the former tends to be offset by more efficient technologies, compositional changes (for instance, from agriculture to the manufacturing or services sector) or the harmonization of standards among trading partners, all associated with trade liberalization.[5] Second, trade rules can influence environmental policy directly, by affecting policy on food safety, the environment, conservation, and other areas of domestic concern. This second area has remained at the center of the trade and environment agenda for more than a decade. Despite predictions that the trading system would become overwhelmed with trade-environment cases, this has not occurred either under NAFTA or the World Trade Organization (WTO). A limited number of precedent-setting environmentally related disputes have occurred involving NAFTA Chapter 11 investor-state disputes.

Environmental reviews of trade liberalization continue to focus on the economic sectors that are most affected by NAFTA liberalization schedules, and which are environmentally sensitive. These sectors include pollution-intensive industrial and manufacturing sectors, as well as resource-based sectors, such as cement, and renewable resource sectors, such as fisheries and forestry.

During the past decade, somewhat less attention has focused on the environmental impacts of

NAFTA's agricultural provisions. Understanding agricultural liberalization (or the failure to liberalize farm trade) is important from an environmental perspective. No other sector exhibits such a close, symbiotic relationship as that of terrestrial farming and the environment.

I examine some changes in U.S.-Mexican farm trade, and focuses on three principal environmental issues: (a) the rise in the overapplication of nitrogen, phosphorus, and other agrochemical inputs; (b) the depletion of groundwater due to increased crop irrigation; and (c) the vicious circle of poverty and income divergence, subsistence farming, and high rates of deforestation and changes in land use (this third issue being the leading cause of habitat degradation and loss of biological diversity in southern Mexico).

To assess the effects that NAFTA has had on nitrogen pollution, water scarcity, and biological diversity losses, I examine changes in Mexico-U.S. trade in three crop groupings—wheat, maize, and fresh vegetables and fruit. Trade in each group has been strongly affected by NAFTA-specific liberalization disciplines (in contrast to what has occurred under the WTO Agreement on Agriculture), shifting demand patterns as a function of rising income in some urban areas, fluctuations in drought conditions and severity, and other factors.

Wheat. U.S. exports of wheat to Mexico have increased by 182 percent since 1992. This export increase has in turn contributed to an 80 percent compositional shift in the production of wheat varieties within Mexico's breadbasket region, from bread wheat to durum wheat. The production of both varieties in the semiarid regions of northern Mexico is heavily reliant on irrigation drawn primarily from groundwater. Over the past decade, groundwater tables have declined by approximately 50 percent in the breadbasket area of the Yaqui Valley. Durum wheat requires greater total amounts of fertilizer inputs in semiarid regions, compared to bread wheat. Although Mexico's aggregate consumption of fertilizers has remained roughly constant since NAFTA, following the end of state-supported fertilizer subsidies, fertilizer use has become more concentrated in larger-scale, export-oriented farms. During the past decade, increases in nitrogen and other chemical loading from agrochemicals have been recorded in groundwater in Sonora and other commercial farming regions.

Nitrogen runoff is the largest pollution source in Mexico, the United States, and Canada. It is also the leading cause of eutrophication and algae blooms affecting Mexico's rivers and lakes, the Sea of Cortez, and the Gulf of Mexico. The ecological effects of nitrogen pollution tend to be greater in Mexico than in the United States, given Mexico's warmer waters—which can accelerate algae blooms—and much larger concentration of freshwater and coastal marine biological diversity. The compositional change from bread wheat to durum wheat can be explained largely by structural changes consisting of vertical integration of durum wheat with upstream food processing. Durum wheat is used for the production of pasta. Since enactment of NAFTA, pasta processing has been among the largest recipients of foreign direct investment (FDI) inflows in Mexico, aside from the manufacturing and services sector. Mexico's exports of all pasta types to the United States have increased by approximately 50 percent since NAFTA took effect.

Maize/Corn. U.S. maize exports to Mexico have increased by 240 percent since 1992. Increased U.S. imports may pose an environmental risk to traditional Mexican maize varieties. Laboratory tests conducted in 2002 confirmed that genetically modified corn has been introgressed in Oaxaca and elsewhere. This introduction has occurred despite the import ban imposed by Mexico on biotechnology corn seed in 1998. Given that Mexico is a center of origin for more than forty maize varieties, the risk posed by the genetic contamination of traditional varieties in biologically rich areas, such as Oaxaca, may be of global concern. A large proportion of U.S. maize imports to Mexico are used as

grain-feed inputs for that country's quickly expanding livestock sector, as well as in the syrup industry. While most livestock production in Mexico meets rising domestic demand (reflecting a change in diet in middle-income households from grains to meat and processed foods), exports to the United States of calves and cattle have also increased since NAFTA. NAFTA has accelerated structural changes in the maize sector by way of deepening vertical integration with livestock operations and the sugar industry. Environmental pressures associated with the concentration of large-scale confined-animal feedlot operations in Mexico appear to resemble environmental pressures recorded in the United States and Canada, albeit at a lower level. Finally, a marginal increase in maize production in the United States to serve the Mexican market is the cause of increased environmental pressures in the United States. Increased maize exports from the United States result in an increase of 77,000 tons of nitrogen, phosphorus, and potassium-based loadings to U.S. waterways, with emissions concentrated in the already heavily polluted Mississippi River Delta.

Fresh Vegetables and Fruit. Since enactment of NAFTA, Mexican exports of all fresh vegetables have increased by 80 percent, and exports of fresh fruit have increased by 90 percent. Structural changes in Mexico's horticulture sector have been especially pronounced since NAFTA took effect, although structural changes commenced with liberalization reforms introduced in Mexico in the 1980s. On average, export-intensive horticulture farms are larger, rely on standardized capital inputs such as fertilizers and pesticides, specialize in single crops, and have a far greater propensity toward irrigation, compared to smaller farms serving the domestic market in Mexico. Field data suggest that larger, export-oriented farms are less sensitive to smaller, *ejido* farm holdings, and use greater amounts of groundwater irrigation per yield, compared to smaller farms. Mexico is one of the most water-stressed countries in the Western Hemisphere, and its expansion of exports of fresh fruits and vegetables is the main anthropogenic cause of this water stress. The export of horticulture products to the United States represents the transfer of millions of gallons of freshwater equivalent each year. For example, the export of tomatoes from Mexico to the United States accounts for the equivalent transfer of approximately 162 million gallons of freshwater equivalent to the United States each year since 1993.

Based on these limited examples, I draw the following three conclusions. First, there is little evidence that the environmental safeguards in NAFTA have directly improved environmental quality in the farm sector. To date, none of the environmental safeguards inserted in NAFTA or its environmental side accord—the North American Agreement for Environmental Cooperation—have been used in any disputes involving agricultural liberalization. At the same time, the accelerated NAFTA liberalization schedule adopted by Mexico to phase out tariff-rate quotas for maize has opened the maize market too quickly to imports and related price and employment shocks. During this turbulent transitional period, this market has increased ecological risk in Mexico, as well as environmental damage in the United States. Finally, the absence in NAFTA of disciplines that can constrain farm subsidies for maize, wheat, and other crops has led to an increase in total subsidy payments in the United States, with the amended 2002 Farm Act, as well as increased subsidy payments in Mexico. Increased farm subsidy payments have increased pricing and market failures, resulting in the overproduction of some crops, as well as the excessive application of fertilizers and other capital inputs, which further magnifies environmental degradation. In addition, the pattern of subsidy payments appears to favor large farms over smaller ones, thereby contributing to the expansion of subsistence farming in marginalized areas in the southern regions of Mexico.

My second conclusion is that NAFTA has accelerated the structural shift toward large-scale, commercially viable, export-oriented farms. Clearly, this restructuring began well before

NAFTA, with the introduction of liberalization reforms in the late 1980s in Mexico. However, recalling the argument of Jeffrey Sachs and Andrew Warner that the opening of the economy through trade liberalization is the "*sine qua non* of the overall reform process," it is reasonable to assume that NAFTA has both accelerated and significantly deepened structural changes in Mexico.[6] In addition, the distribution of subsidy payments has accelerated structural changes in the grains and horticulture sector so as to favor large-scale, export-oriented, vertically and horizontally integrated farms. The structural shift appears to have increased the concentrations of nitrogen and phosphorus, water-polluting agrochemicals used as inputs in larger-scale farms. Export-oriented farms also appear to use greater amounts of irrigated water inputs per yield, compared to producers of similar products destined for domestic markets. Since farming is the largest consumer of freshwater by a very wide margin, this structural shift has magnified water scarcity in Mexico.

My third conclusion is that commercially oriented farms have not delivered environmental benefits associated with intensive farming. Those environmental benefits typically derive from land-saving effects associated with an increase in production efficiency. The main reason for this failure to deliver environmental benefits appears to be the structure and extent of poverty and the pattern of income divergence in southern Mexico. While commercial cultivation of some crops has expanded, downward price premiums on staples, such as maize, has increased poverty in this region. The average deforestation rate in the biologically rich southern regions of Mexico has exceeded 630,000 hectares per year since 1993. The leading cause of deforestation in Mexico remains poverty, with slash-and-burn clearing and tree felling by poor households in need of fuel remaining the leading causes of forest clearing. In addition, small-scale, rain-fed maize production has increased by 18 percent in marginalized areas, as poor farmers respond to falling prices.

The environmental costs of deforestation and changes in land use in Mexico are staggering. That country is one of the planet's leading centers of "megadiversity," home to 10 percent of all known species, of which 30 to 50 percent are endemic. Mexico has the world's second-highest number of reptile species, and ranks fourth for amphibians and fifth for mammalian diversity in the world.[7] However, the geography of this biological diversity coincides exactly with Mexico's geography of extreme poverty.

Trade theory scarcely hides the unhappy fact that there are winners and losers from trade liberalization. However, people—especially indigenous peoples in the poorest regions of southern Mexico—maintain an enduring allegiance to their ancestral homes, community ties, and traditional knowledge, which date back 6,000 years. Given that these ties reach deeper than economically rational decision making, millions of poor farmers who are clearly losers on the ledgers of free trade remain committed to their lands, despite structural changes in the farm sector that increasingly lock them out of commercially viable markets.

The most important environmental challenge arising from NAFTA is to build a bridge between aspects of the dual farm economy in Mexico—a divide characterized by larger, commercial farms in the northern and central regions and subsistence, *ejido*, and small-family holdings. Although commercial farming has not taken hold in Mexico to the extent it has in the United States or other industrialized countries, this stylized distinction between large and small is nevertheless useful in showing the trajectory of structural changes in the agricultural sector. Although standard economic theory says that unprofitable farm production should relocate, there is nowhere for millions of poor farmers to go, since the contraction in Mexico's agriculture has not been accompanied by an expansion in other sectors.

Economic shocks experienced during the adjustment period of liberalization often appear to be

intractable. However, innovative solutions that re-engage public institutions and policy, that build partnerships with private agriculture and other sectors, and that are intent on nurturing the commercial viability of farms are needed for environmental reasons alone (aside from compelling social equity and poverty alleviation objectives), as a means to slow rates of deforestation and habitat loss, as well as protect Mexico's biological diversity. One solution can be protected areas. Real spending on nature reserves has increased significantly since 1993, to US$6.5 billion a year. However, competition among indigenous groups, communities, and illegal squatters in these reserves remains strong, while trust in collective solutions remains fragile at best. Moreover, protected areas have never been a lasting solution to broader, in situ biological diversity protection.

A second solution involves nurturing new commercial opportunities in the poorest regions to generate higher revenue returns to farmers, relative to subsistence farming underway in marginal areas. Viable commercial alternatives that can close part of the poverty gap do exist in specific market niches, those that center on ecofriendly products or anticipate new revenue streams from emerging environmental markets. Examples include ecotourism, carbon sequestration, and organic and sustainable farming. As in other markets, information failures and structural rigidities continue to constrain Mexico's full participation in these quickly growing global markets, in part because of liberalization and mergers in the country's banking system. With the dramatic consolidation of the banking sector, private credit channels assume that only large-scale farms are creditworthy, an assumption that leads to the disappearance of almost all small-scale farm credit. For example, the leading reason why small-scale farmers abandon their operations and rent their lands to commercial interests in the Sonora region is credit scarcity. Solutions to redress this working capital bottleneck now include the creation of the Sustainable Coffee Fund, which is supported by the North American Commission for Environmental Cooperation (NACEC), Banamex, the largest commercial bank in Mexico, the government of Mexico, and other partners. These efforts should be expanded, with the active participation of large-scale, U.S.-based produce buyers, whereby a proportion of seasonal contract farming arrangements are channeled toward funding sustainable agricultural markets.

NAFTA and the Environment: A Difficult Relationship

The economic gains from NAFTA are typically measured by the kind of statistics cited in chapter 1. These economic gains are traditionally calculated by estimating gross savings, which is gross national product (GNP) minus public and private consumption. However, in the last decade, efforts have been made to measure, quantify, and internalize environmental costs in standard economic measurements, and some progress has been made in "greening" national income accounts. This process includes calculating relatively explicit costs, such as resource extraction, as well as making depletion calculations from the loss of forestry resources, pollution damages, and other factors. Some methods of green accounting rely on standardized proxies of environmental damage values, such as the US$20 per metric ton of carbon emitted that is used to calculate the marginal global damage of climate change. Other factors, such as soil degradation, the loss of tropical forests, or the loss of fisheries stocks, are considerable, but extremely difficult to quantify except through site-specific field studies to impute environmental values, based on people's willingness to pay for their conservation.[8]

In 2002, the government of Mexico—one of the world's leaders in environmental valuation and green accounting—estimated that the total value of environmental damages exceeded US$36 billion per annum since 1990.[9] If these environmental damages were included in GNP and gross domestic product (GDP) estimates, then Mexico would have run an ecological deficit the equivalent of US$9 billion per

year.[10] Clearly, NAFTA has not been responsible for most, or even a significant portion, of these total environmental damages. However, they underline the fact that economic growth generates considerable pressures on the environment through scale effects.

A decade ago, surprisingly little attention was focused on the scale effects of trade-led economic growth. Since NAFTA is the first trade accord to include explicit environmental provisions and safeguards, it remains the subject of debate among pro- and anti-globalization activists generally. This debate still hinges on two regulatory, as opposed to scale, effects:[11]

- The free-trade accord would begin a "race-to-the bottom," as states would lower environmental standards to attract investment.

- If environmental standards remained intact despite the competitive pressures of free trade, then companies would move production to "pollution havens," places where regulations did not exist or did not matter.

A decade, later, the environmental record of NAFTA remains mixed. Neither the great benefits claimed by proponents nor the overwhelming damages predicted by critics have come to pass. In the manufacturing sector, which due to its pollution intensity has been subject to closet scrutiny, NAFTA has contributed directly to an increase of between 1 and 2 percent in annual gross emissions of carbon monoxide and sulfur dioxide, due to changes in the petroleum, base metals, and transportation equipment sectors.[12] NAFTA has also contributed directly to air pollution spikes in the Canadian-U.S. and U.S.-Mexican border regions, as 80 percent of total NAFTA trade is transported via truck-transport passing through increasingly congested border points.[13] NAFTA Chapter 6 energy provisions have contributed to an increase in carbon dioxide emissions arising from increased U.S.-Canadian trade in electricity, as well as increased Mexican exports of electricity to the United States.[14]

In other cases—notably in the production of cement, steel, and nonferrous metal industries—the environmental performance of Mexican companies since the enactment of NAFTA has been superior to that of their U.S.-based counterparts.[15] This improvement is partly explained by increased FDI inflows that accelerate the turnover of capital stocks in these sectors, leading to the adoption of more efficient and less polluting process technologies. The improvement is also explained by increased environmental awareness within Mexico—as in other countries—since the late 1980s. Regulations introduced in the early 1990s strengthened Mexico's environmental statues and institutional capabilities. U.S.-Mexican cooperative action on a number of fronts—notably in tackling environmental pressures along the border—has reduced some, but hardly all, environmental pressures. Trilateral cooperation through NACEC has supported the international benchmarking of some environmental norms, such as the harmonization of toxic release data and the development of criteria for air pollutants among the three North American countries. The harmonization of environmental data is an important step toward comparing the environmental performance of Canada, Mexico, and the United States.[16] Environmental awareness has catalyzed other more systemic reforms within Mexico, notably in improving access to information and codifying public participation.[17]

The good news that NAFTA has not created pollution havens hardly means that NAFTA is environmentally benign. In addition to the two anti-NAFTA assertions—the race to the bottom and the pollution haven—a third assertion from the NAFTA debates is that trade is somehow self-cleansing. That is, as incomes rise as a result of free trade, the rate of environmental degradation decelerates and gradually improves.[18] Unfortunately, real-world evidence shows that only a few pollution indexes decline with economic growth, and mostly at the subregional level. Most important, pollution reductions take place as a result of tightly enforced environmental regulations combined with the replacement of

capital stock by more resource-conserving technologies.[19] While some benefits do occur, evidence suggests that other environmental quality indexes rise almost continuously with income growth, notably greenhouse gas emissions.

The most debated relationship between environmental laws and NAFTA rules is in the area of investment. Under NAFTA, private investors are given new opportunities to seek compensation for regulatory action taken by NAFTA parties that is tantamount to expropriation. By 2003, ten of NAFTA's Chapter 11 cases involving allegations of expropriation associated with changes in domestic environmental regulations had taken place. One dispute compelled the Canadian government to modify its import ban on methylcyclopentadienyl manganese tricarbonyl (MMT), and pay damages to a U.S. firm totaling US$13 million. Three other cases have resulted in paid damages totaling US$10 million. In response to these cases, in July 2001 the NAFTA parties negotiated a clarification of their intentions regarding investment rules, designed to minimize national governments' exposure to expropriation cases.[20]

Notwithstanding the NAFTA Chapter 11 cases, the greatest environmental pressure associated with NAFTA is transmitted through the scale effects of economic growth, to which trade liberalization contributes. In the manufacturing sector, environmental regulations—as strong as they were on paper with the passage of NAFTA—did not keep pace with rates of economic growth. Mexico's manufacturing sector has grown by 4 percent per annum since enactment of NAFTA, but real spending on pollution monitoring and on-site inspections has fallen by 45 percent over the same period. Overall, air pollution has increased 10 percent per year in the manufacturing sector of Mexico since NAFTA took effect.[21]

Clearly, NAFTA has been solely responsible for neither increased pollution emissions nor the weakening of environmental enforcement. All North American countries have experienced some weakening of domestic environmental regulations that has coincided with NAFTA, such as the recent delay of some U.S. Clean Air Act–mandated schedules for emission reductions with the introduction of the Bush administration's Clear Skies initiative. However, a case cannot be made that the Clear Skies initiative is linked to NAFTA.

Measuring Environmental Effects and Mexico's Farm Sector

Changes in the manufacturing sector provide one important insight into trade-environment relationships. However, for many countries, the most significant interaction between trade liberalization and environmental quality is transmitted within the agricultural sector. This is especially true for developing countries, whose primary exports are agricultural products. There are three main reasons why it is vital to examine the environmental impacts of agricultural liberalization in general, and its impact on Mexico's farm sector in particular.

Pollution. Farming is the leading source of pollution in Canada, Mexico, and the United States. The excessive application of nitrogen—an important element in fertilizers—contributes to high soil salinity and the presence of air-polluting ground-level ozone, disrupts forest processes, acidifies lakes and rivers, and degrades coastal waters and ecosystems through algae blooms and groundwater pollution.[22] Since 1993, Mexico's total consumption of nitrogenous fertilizers has remained roughly constant (see Figure 1). However, with the withdrawal of state subsidy support for fertilizers in the mid-1990s, the pattern of fertilizer consumption has shifted away from small-scale, undercapitalized farms and increasingly toward larger-scale operations. This shift in fertilizer purchases has magnified a pattern of concentration of fertilizer inputs in those areas in which more intensive farming is

underway. In addition, imports of nitrogenous fertilizers into Mexico have increased sharply since enactment of NAFTA (see Figure 2).

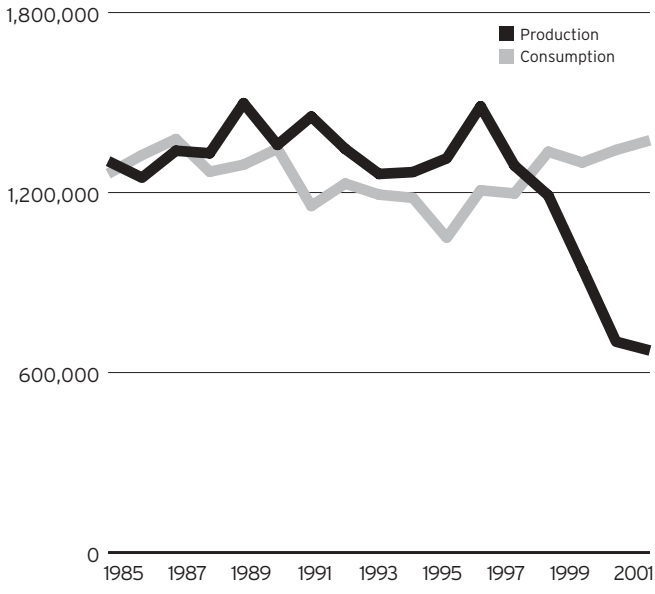
A similar trend of increased pesticide imports into Mexico from the United States also occurred during the first decade of NAFTA (see Figure 3).

As a nonpoint pollution source, nitrogen pollution is significantly more difficult to monitor and regulate, compared to point-source industrial pollutants.[23] (It is uncertain whether the 45 percent decrease in spending for environmental monitoring and enforcement affected, one way or the other, scale effects of rising pollution levels in the agricultural sector. That is, even if on-site inspections were unaffected by budget rollbacks—which seems extremely unlikely—inspectors lack the capability to monitor and regulate most nonpoint pollution sources, with the exception of the livestock sector and perhaps the cotton production sector.)

Freshwater. Agriculture is by a wide margin the largest consumer of freshwater (see Figure 4) in Mexico. More than 80 percent of Mexico's annual water draws are consumed in farming.[24] Water scarcity is not only the most urgent environmental and developmental problem facing Mexico, it has increasingly become the subject of political and diplomatic tension between the United States and Mexico. In 2002, Presidents George W. Bush and Vicente Fox Quesada jointly promised to resolve Mexico's 450 billion gallon water deficit with the United States, under provisions of a 1944 treaty setting out shared water management quotas between the two countries for the Rio Grande.

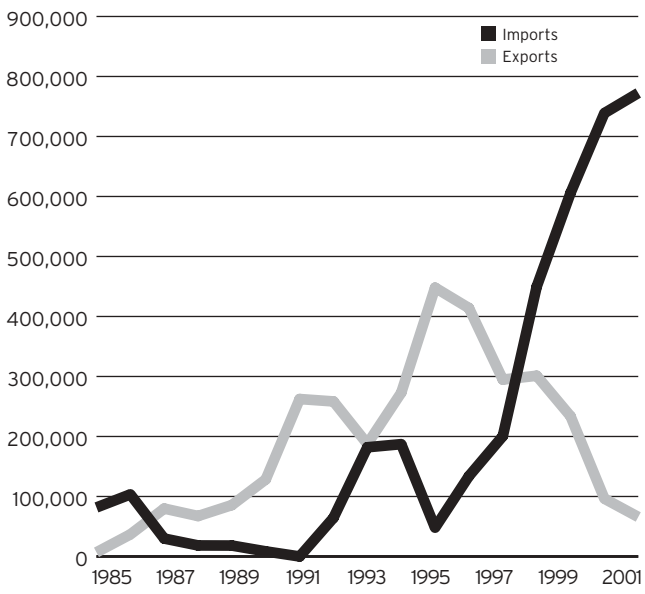
Biological Diversity. Agriculture is the leading cause of changes in land use, such as the deforestation that brings with it habitat destruction. In turn, these changes in land use are the leading cause of the destruction of ecologically rich habitats and biological and agricultural diversity in Mexico. The loss of biological diversity is of global environmental

Figure 1. Mexico's Consumption of Nitrogenous Fertilizers
MEGATONS



Source: Food and Agriculture Organization of the United Nations (FAO), FAOSTAT online statistical service, www.fao.org (FAO, Rome, 1999).

Figure 2. Mexico's Imports and Exports of Nitrogenous Fertilizers
MEGATONS



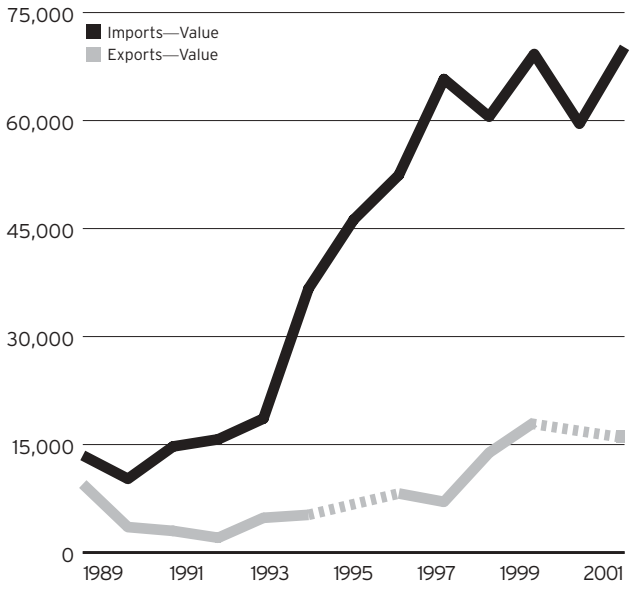
Source: Food and Agriculture Organization of the United Nations (FAO), FAOSTAT online statistical service, www.fao.org (FAO, Rome, 1999).

significance, since Mexico houses some of the richest and most important endowments of biological diversity on the planet, concentrated in its southern tropical forests (as well as in its coral reefs). Mexico is home to 10 percent of all known species, of which 30 to 50 percent are endemic. Mexico has the world's second-highest number of reptile species, and ranks fourth for amphibians and fifth for mammalian diversity in the world. Mexico also has one of the highest deforestation rates in the Western Hemisphere. Since 1993, about 7.8 million hectares of forest have disappeared. While rates have decelerated in recent years, more than 631,000 hectares of forests have been cleared on average every year since 1990. Poverty remains the leading cause of deforestation, and thus, the extinction of flora and fauna.[25] Specifically, the expansion of subsistence farm areas into marginal lands to increase yields to compensate for price declines in staple crops such as maize remains the leading cause of forest clearing, followed by the felling of trees for poor-income household fuel use. Therefore, there is a strong link between poverty and biodiversity loss in southern Mexico. The issues I address below are the effect that NAFTA has had on this poverty-environmental degradation nexus, as well as the risk of genetic erosion affecting traditional maize varieties.

Environmental Impacts of NAFTA-Induced Trade in Agriculture

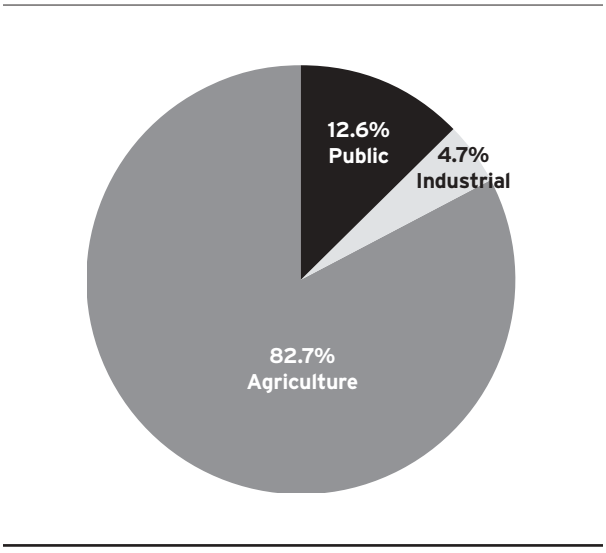
Given the robust relationship between agricultural land use and environmental quality, I begin my discussion of the contribution NAFTA has made to changing environmental conditions by examining the total changes in U.S.-Mexican agricultural trade volumes. Table 1[26] summarizes some of the major changes in Mexico's domestic farm production and in net agricultural imports, which overwhelmingly originate in the United States.

Figure 3. U.S. Insecticide Trade with Mexico
U.S. DOLLARS



Source: Food and Agriculture Organization of the United Nations (FAO), FAOSTAT online statistical service, www.fao.org (FAO, Rome, 1999).
Note: Dotted lines indicate missing data from 1995 and 2000.

Figure 4. Distribution of Mexican Water Use



Source: Compendio Básico del Agua en México, 2002, Plan Nacional de Desarrollo (PND), Comisión Nacional del Agua (CAN), Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT).

The value and volume of North American farm trade has grown more rapidly than has North America's trade with the rest of the world. Exports from Mexico to the United States have more than doubled in value, from US$2.5 billion to US$5.1 billion, since enactment of NAFTA, while U.S. exports to Mexico have almost quadrupled, to US$6.8 billion. Clearly, NAFTA has successfully strengthened agricultural ties throughout North America, particularly between the United States and Mexico.

Working from the data on these overall changes, I examine the proportion of U.S.-Mexican trade that has solely, or significantly, been affected by NAFTA (as opposed to the liberalizing effects of WTO agreements, as well as important nontrade variables such as climatic fluctuations and drought, market proximity and shrinking transport costs, and changes in consumer food preferences).[27] On an aggregate basis, the impact of NAFTA-specific liberalization on U.S.-Mexican agricultural trade has been minor; for decades, the U.S. and Mexican agricultural economies have been moving toward deeper integration. However, for a typical basket of agricultural goods, NAFTA has had a significant impact on U.S.-Mexican agricultural trade.

U.S. exports to Mexico that fall into this category include maize/corn, rice, sorghum, cotton, processed potatoes, fresh apples, and pears. Mexican exports to the United States that have been strongly affected by NAFTA-only schedules include wheat, cattle and calves, sugar, fresh tomatoes, and cantaloupe.[28] Since it is impossible to weigh the environmental impacts of production, consumption, and export changes for all commodities involved in trade, I focus only on some environmental consequences associated with wheat, maize, and fresh fruit and vegetables, all of which have been significantly affected by NAFTA.[29]

MAIZE

Mexico is a center of origin for *Zea mays,* the ancestral precursor of modern corn. Approximately 3 million farmers in Mexico, mostly from small-scale farms, are involved in maize production. Indirectly, some 18 million people depend on maize for their livelihood. Traditional maize is not only a staple food of Mexican diet; it also provides a symbolic lifeline connecting traditional and indigenous cultures dating back approximately 6,000 years—since the time that maize was first cultivated—with the modern Mexico of today.[30]

Table 1. Changes in Mexico's Domestic Farm Production and Agricultural Imports
THOUSANDS OF MEGATONS

	Average Production 1990–93	Average Production 1999–2002	Average Net Imports 1990–93	Average Net Imports 1999–2002
Wheat	3,799	3,277	917	2,592
Maize	15,965	18,891	1,691	5,751
Barley	418	709	171	145
Sorghum	4,556	5,888	3,547	5,005
Rice	257	308	332	660
Soybeans	273	308	1,747	4,205
Sugar	3,577	4,798	393	-337
Beef	1,202	1,422	-21	191
Pork	803	1,061	47	169
Poultry	908	1,854	70	249
Tomatoes	1,173	2,186	-361	-691

Source: Organization for Economic Cooperation and Development, *Agricultural Policies in OECD Countries: Monitoring and Evaluation* (Paris: OECD, 2003), available at www.oecd.org.

Although estimates remain difficult to obtain, approximately 35–40 percent of U.S. corn is derived from genetically modified (GM) varieties. A debate over the benefits and costs of GM crops has been underway ever since biotechnology was approved for some commercial crops in the United States, Canada, and elsewhere in the mid-1990s.[31] One response to the potential risk of GM crops, was the introduction of a Mexican ban on the import of genetically modified corn seeds in 1998.[32] Despite this ban, in 2001 *Nature* magazine published a peer-reviewed article demonstrating that GM corn had been found growing in Mexican fields.[33] This sparked scientific concern, as well as a highly visible public debate, about the risks of genetic contamination as well as mutation.[34] Subsequent independent laboratory tests conducted by the Mexican government have confirmed that contamination by biotechnology corn has occurred in Oaxaca—a global center of megadiversity—and elsewhere in Mexico. Neither the pathways of that contamination, nor the ecological implications that could arise from it, are clearly understood at this time.

A scientific consensus exists that the risks to human health from GM foods are low or nonexistent.[35] In the United States, biotechnology foods are embedded throughout processed foods that contain soybeans and corn. In the area of food safety, the potential risks that biotechnology crops pose to the environment differ from those normally raised in regard to human health, and include the possible impact of GM crops on soil ecology, farmland diversity, and even gene flow change.[36] A recent study by the European Environment Agency has found that maize poses a medium to high risk of pollen-mediated gene transfers from crop to crop, concluding that "evidence suggests that GM maize plants would cross-pollinate non-GM maize plants up to and beyond the recommended isolation distance of 200 meters."[37]

In addition to recorded cases of GM maize pollination, similar cases in which gene stacking involving genetically modified canola have been recorded since 1991 in the Canadian prairies. Affected canola crops in western Canada appear to be more resistant to herbicides than conventional (non-biotechnology) crops.

In early 2004, NACEC will finalize an independent analysis that examines the environmental and conservation risks that science associates with the possible contamination by biotechnology crops of traditional crop varieties such as Mexican maize. Given the implications of this case for the Biosafety Protocol of the UN Convention on Biological Diversity,[38] as well as for the application of the precautionary principle to international trade, the NACEC report will be the most important and controversial ever issued in the ten-year history of that NAFTA-related organization.

The increase in U.S. corn imports also risks weakening in situ conservation involving some or all of the forty races of maize that are grown in Mexico, with some varieties dating their origin back 6,000 years. While there has been an absolute contraction in maize production in Mexico since the enactment of NAFTA, led by a free fall in commercially harvested crops, production of rain-fed maize has remained stable. To date, there is little evidence that NAFTA has undermined in situ conservation of maize. However, the price difference of approximately 27 percent between U.S. corn and Mexican varieties suggests that over time the price wedge may result in U.S. imports crowding out rain-fed varieties. This substitution will eventually present small-scale farmers with three choices: exit farming altogether; diversify the composition of crop output; or concentrate on fledgling but potentially high-growth market niches that award a price premium for traditional, organic, and sustainable produce such as traditional maize. Each presents formidable obstacles to small-scale farmers. As noted in chapter 1, there are few economic and employment alternatives for millions of farmers in Mexico. At the same time, the quality of soil in marginal lands makes crop switching very unlikely. Finally, even if market niches for sustainable produce expand dramatically, this will not alleviate

all pressures on in situ conservation. Therefore, the long-term erosion of the knowledge base on which traditional maize growing is based is one of the greatest conservation threats directly posed by NAFTA.

In addition to the explanations for the persistence of rain-fed maize identified by Sandra Polaski in chapter 1, a further reason why rain-fed varieties have remained stable or increased slightly may be traced to the large proportion of corn imports that are used as grain feed for Mexico's quickly expanding livestock sector.[39] Structural changes associated with the horizontal integration of maize as an input to confined animal feedlot operations and slaughterhouses have been dramatic in Mexico.[40] These structural changes result in a series of interlocking environmental pressures that very-large-scale feedlot and slaughter operations pose to environmental regulators.

Environmental pressures from intensive livestock operations include large volumes of nitrogen, phosphorus, hydrogen sulfide gases, and atrazine pesticide, leading to soils that are overenriched with nutrients while posing threats to local watersheds with runoff that can cause algae blooms, loss of habitat, changes in aquatic biological diversity, and depletion of dissolved oxygen.[41] These wastes can also contain pathogens, antibiotics, and hormones.

Recently, episodes of neurological disorders affecting individuals living close to these industrial farms have also been reported.[42] Although data from Mexico delineating different sources of nitrogen pollution are far from complete, the data that exist point to some convergence in environmental pressures arising from livestock operations in Mexico with those that exist in the United States and Canada. This is hardly surprising, given the strong consolidation of the North American livestock sector fueled by mergers and acquisitions during the 1990s. Today, four firms control 81 percent of the U.S. and Canadian cattle and beef market, and a similar pattern of market consolidation is underway in Mexico, although at a slower pace. In the same way that turnkey industrial plant investments incorporate uniform capital stock and management policies, livestock operations in any one location of North America are increasingly similar to operations elsewhere.

The main focus of environmental attention has been on potential risks within Mexico because of U.S. corn imports. At the same time, environmental pressures have increased within the United States itself, because of the production increase to serve the Mexican market. The 240 percent rise in U.S. corn exports has resulted in a doubling of the proportion of total U.S. production that is destined for Mexico, from 1 to 2.1 percent of total domestic production. I assume that the entire 1 percent production increase is attributed to NAFTA, and conclude that expanded production of corn in the United States destined for Mexico generates an additional 77,000 tons of nitrogen-, phosphorus-, and potassium-based pollution per year.[43] This increase in pollution is concentrated in the Mississippi River Delta, already the most polluted region of the United States because of nitrogen runoff and related ecological stress. In addition, increased corn production is exacerbating water scarcity in those states that have high irrigation intensities for corn production, notably Nebraska, Kansas, and Texas.[44]

WHEAT

Since enactment of NAFTA, U.S. exports of wheat to Mexico have increased by 182 percent, resulting in a 1 percent increase in U.S. wheat production. In general, economic models anticipate that trade liberalization will bring about a shift in the location of grain production, with production contracting in industrialized countries and increasing in developing ones.[45] However, for wheat and corn production, the opposite pattern took place: U.S. exports to Mexico increased, while commercial production in Mexico contracted.

In contrast to maize output, Mexico's output of wheat has not altered significantly since enactment

of NAFTA. Instead, wheat production in the Yaqui Valley—the birthplace of the green revolution for wheat and the breadbasket of Mexico today—remains the region's leading agricultural activity (accounting for roughly 85 percent of total planted crop area).[46] However, the composition of wheat production in the region has changed dramatically since 1993. Then, bread wheat made up the bulk of total wheat output. By 2002, bread wheat output in the region had declined from roughly 80 percent of total production to 15 to 20 percent. In bread wheat's place, durum wheat—which constituted a small percentage of total production in 1993—now accounts for more than 80 percent of the total wheat output in the Yaqui Valley.

The change from bread wheat to durum wheat has not altered the region's severe water scarcity. Through a combination of drought and surface conditions in the area, the levels of groundwater—the main source of irrigation for wheat production—have declined by half since 1991.[47] At the same time, the production shift from bread to durum has directly led to an increase in nitrogen pollution in the region. In arid and semiarid regions such as the Yaqui Valley, durum wheat requires as much as 20 percent more fertilizer inputs within irrigated systems than other wheat crops. This compositional production shift has directly led to increased fertilizer inputs, and increased nitrogen pollution and nitrogen runoff associated with eutrophication in nearby rivers and lakes. Estimates suggest that the application of nitrogen per hectare in the Yaqui Valley exceeds 250 kilograms, making this region among the heaviest users of fertilizers on a per hectare basis in the world.

In Sonora, Sinaloa, and other states where intensive farming occurs, ecological pressures from nitrogen pollution have risen dramatically. The main source of nitrogen pollution in the Sea of Cortez originates from commercial agricultural production in Sonora. Nitrogen pollution is increasing in the Tacana River Basin and the Rio Lerma. Eutrophication has significantly lowered the inflow time of the Rio Lerma to Lake Chapala—the largest freshwater body in Mexico and a center of rich biological diversity. Uncontrolled blooms of water weeds have increased since the late 1980s, and now cover more than 10 percent of Lake Chapala's surface area.[48] Although nitrogen pollution in Mexico is less than in the Mississippi River Delta or Chesapeake Bay, its effect is more ecologically destructive in the warmer waters of Mexico. For example, eutrophication in the Sea of Cortez is a main source of stress on coral reefs—which have a higher concentration of biological diversity than most tropical forests—and coastal plankton.[49]

Durum wheat is used to produce dry pasta and pasta products. The food processing sector has been among the largest recipients of FDI inflows to Mexico since NAFTA investment liberalization disciplines were set out in Chapter 11. FDI inflows have more than doubled in Mexico's food processing sector, to more than US$5.3 billion, concentrating on a narrow set of value-added food processing activities, led by pasta (and followed by confectionery products, for which corn syrup is increasingly used as an input).[50] As Mexico's domestic production capacity for pasta foods has increased, so too have its exports to the United States. Since NAFTA, Mexican exports of all kinds of pasta have grown relatively constantly, from 20 million kilograms in 1995 to more than 31 million kilograms in 2001 (see Figure 5).

FRESH VEGETABLES AND FRUIT

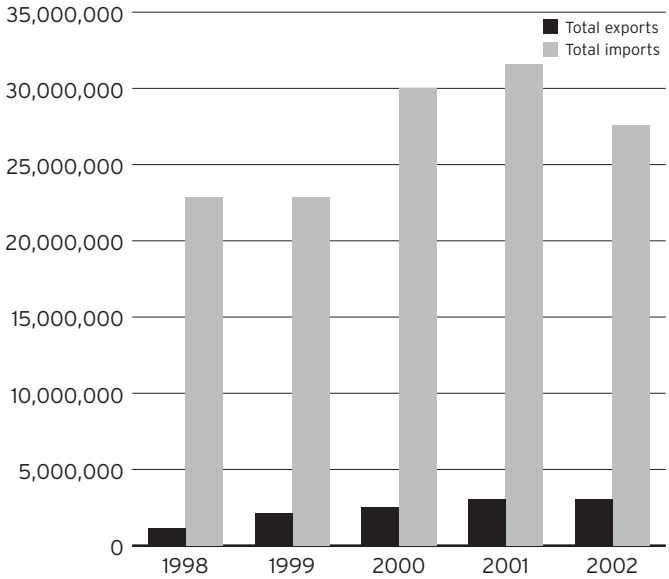
Horticulture has seen its export earnings roughly triple since NAFTA took effect, up to US$3.5 billion in 2000. Since enactment, the volume of fresh vegetable exports has increased by 80 percent, and of fresh fruit, by 90 percent. This production and export growth has resulted in an increase in the total area of cropland dedicated to vegetables and fruit.[51]

The most pronounced structural change in Mexico's agricultural sector due to NAFTA has occurred in the fresh vegetables and fruit sector.[52] The most important aspect of this structural change is the

expansion in the average farm size among export-led producers in the grains and horticultural sector, and a decline in the number of individual farms engaged in export markets. In the north, northwest, and central plateau areas, a smaller number of larger farms are owned either by wealthy families or by commercial interests.[53] Typically, these farms have strong links with external markets, through contract farming (see page 78) and ready access to domestic and external credit sources. Larger farms specialize in a limited number of monoculture commercial crops. This specialization entails replacing on-farm inputs such as organic pest control and local fodder and composting with pesticides, commercial animal feeds, and fertilizers. Specialization also entails higher rates of irrigation per hectare, and the replacement of traditional seed varieties with hybrid, purchased seeds (as well as biotechnology seeds for cotton crops).[54]

By contrast, in the southern and southeastern regions of Mexico, there are a larger number of smaller farms, with an average size between 2 and 5 hectares. Farms are either owned by single families or compose part of *ejido* (community) holdings. Smaller farms produce heterogeneous crops for on-farm consumption, barter as well as some limited farm-gate exchange, tend to use few inputs such as pesticides or fertilizers, and rely little on irrigation. High obstacles are one reason for this low level of capital intensity that small farmers face in getting access to all credit sources in Mexico. As a consequence of this credit squeeze, up to 70 percent of *ejido* farmers in some regions (for example, Sonora) have decided to abandon farming altogether. (This figure is probably much higher than in other regions, since less land appears to have been transferred out of common property than originally feared. For those who remain on the farm, barely 18 percent of household income for *ejido* farms in some regions is generated through on-farm crop cultivation and animal husbandry.)

Figure 5. Total U.S. Pasta Trade with Mexico
KILOGRAMS



Source: U.S. Census Bureau, Foreign Trade Division (www.census.gov)

As noted in chapter 1, income divergence within Mexico has increased over the past decade, measured by any number of indicators. Nowhere is this divergence more dramatic than in the farm sector. From an environmental perspective, poverty in Mexico is concentrated in regions—particularly in Oaxaca and Chiapas—that house some of the world's richest abundance of biological diversity.

The production of commercial fruits and vegetables in the northern region leads to nitrogen pollution similar to that generated in the maize and wheat sectors. However, the most significant environmental stress that arises from this sector is water scarcity. On average, one-third of Mexico's total cropland is irrigated, one of the highest concentrations of irrigated farmland in the world.[55] There has been a slight increase in the total amount of irrigated land in Mexico since NAFTA, as the most dramatic rise in irrigation occurred during the previous decade (see Figure 6).

Research shows that irrigated groundwater for water-intensive crops such as tomatoes, pecans, and

alfalfa is applied on average more intensively for export crops than for crops bound for the domestic market. Evidence from Sonora demonstrates that export crops in the fresh fruit and vegetable category consume 20 to 30 percent more groundwater irrigation than crops intended for domestic consumption.

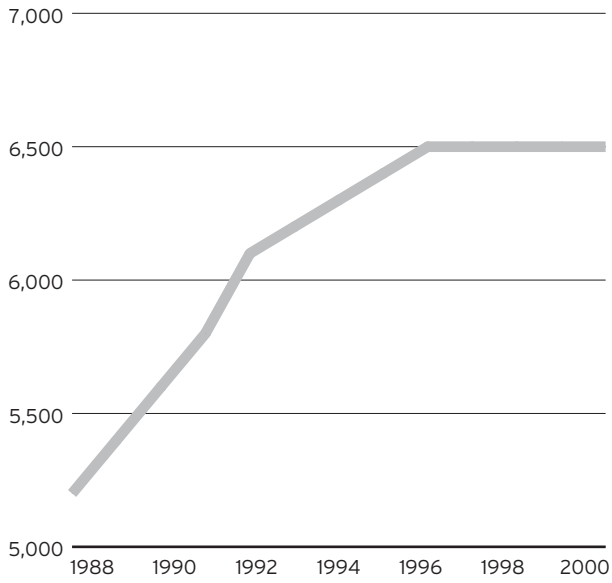
Larger farms use significantly greater amounts of irrigated water per yield than single-family or *ejido* farms. A number of factors explain this correlation between farm size and irrigation intensity, beginning with the degree of technological specialization that generally can be associated with larger farms, as well as the water abundance of the southern regions. Nevertheless, larger farms use irrigation more intensely in Mexico, suggesting a convergence between intensity of irrigation and farm size like that observed in the United States. (In the United States, larger farms have a tendency to use irrigation systems more than smaller farms, and a tendency to use irrigation system more efficiently and accurately. Irrigated farms in the United States also generate twice the income of their rain-fed counterparts.)[56] However, the inverse correlation of farm size and irrigation intensity is more dramatic in Mexico, where a full 80 percent of *ejido* and single-family farms in some regions do not use irrigation of any kind.[57] The most plausible explanation for this absence of irrigation intensity can be traced directly to the virtual disappearance of rural credit in the past decade. As noted, 70 percent of *ejido* farmers in some regions have abandoned farming altogether, and rented their right of access to groundwater wells and irrigation systems to larger private or corporate farm interests.

This pattern of larger farms using greater amounts of irrigated groundwater for export crops is exacerbated by the structure of *ejido* ownership, which constrains the amount of groundwater extraction so as to ensure an equitable sharing of resources among eight to twelve owners. By contrast, larger farms are not constrained by any equitable sharing considerations, which suggests that they are less sensitive to water scarcity and water stress signals than are *ejidos.*[58] In addition, the pattern of water irrigation subsidy payments is slanted—as subsidy payments generally are—in favor of larger, commercial farms. As noted below, subsidy payments generally further cloud scarcity signals, and lead to resource stress and environmental pressures.

As a result primarily of water consumption from the farm sector, water scarcity has become so acute a problem in Mexico that bulk water transfers—prohibited in Canada because of their negative environmental impacts—have compensated for regional water deficits. In total, agricultural irrigation is responsible for approximately 65 percent of total groundwater draws in Mexico. Of the 459 aquifers in the country, more than 80 face high rates of depletion. The greatest concentration of depleted groundwater sources is in the northern agricultural regions and in the Lerma-Balsas Basin.[59]

Irrigation inputs for export crops have been linked to the U.S.-Mexican dispute over water flows and quotas of the Rio Grande. The United States and

Figure 6. Irrigated Land in Mexico
THOUSANDS OF HECTARES

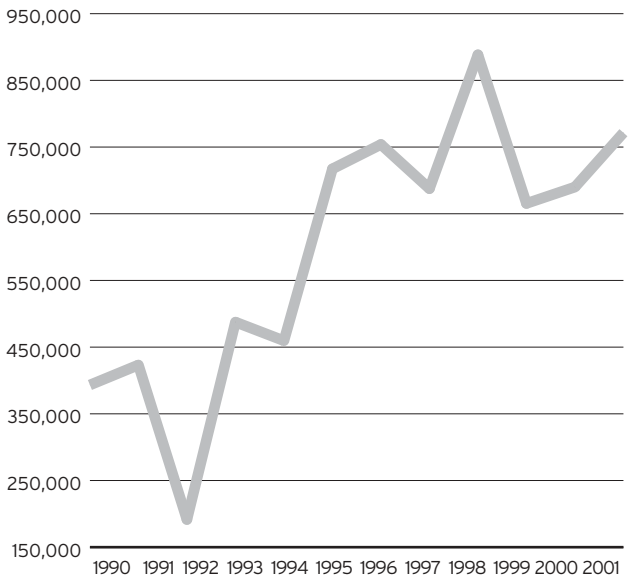


Source: Food and Agriculture Organization of the United Nations (FAO), FAOSTAT online statistical service, www.fao.org (FAO, Rome, 1999).

Mexico have established water-sharing quotas for that river, under a 1944 treaty administered by the International Boundary and Water Commission. Since 1992, Mexico has run a deficit with the United States that now exceeds 450 billion gallons of water. Mexican authorities blame severe drought conditions for their decision to withhold northward water flows from Mexico into Texas. In turn, farmers in Texas have faced acute water shortages, leading to a 15 percent decline in crop output in some regions. Some of these farmers, and state and other officials in the United States, allege that some of the 450 billion gallon deficit has been diverted to water-intensive agricultural production in Mexico, with exports destined for the United States.[60] (In early September 2003, the two countries announced a timetable for Mexico to begin paying down the water deficit.)

When one considers this water deficit with the United States, and mounting water scarcity within the export centers of northern Mexico, it is also worth noting that Mexico's horticultural exports are the equivalent of transferring millions of gallons of freshwater each year to the United States. While it is impossible to calculate this net transfer in water equivalents for all agricultural trade, I will consider here the example of a single crop, tomatoes. Figure 7 illustrates the expansion of tomato exports from Mexico to the United States since 1990. As noted, exports of tomatoes increased by 90 percent since 1993, with trade growth strongly affected by NAFTA. Water makes up approximately 90 percent of tomatoes by weight. A proxy estimate of the water transfers from Mexico to the United States alone through tomato exports is roughly 162 million gallons of freshwater per year since 1993.[61]

Figure 7. Tomato Exports from Mexico to the United States
METRIC TONS



Source: Food and Agriculture Organization of the United Nations (FAO), FAOSTAT online statistical service, www.fao.org (FAO, Rome, 1999).

LAND-SAVING BENEFITS AND INTENSIVE FARMING

NAFTA is neither the sole cause, nor, in most cases, the primary cause of growing environmental pressures associated with Mexico's agricultural sector. Mexico's changing agricultural patterns date back to the 1980s, when the government encouraged export-oriented agricultural production by facilitating large-scale farming through land law reforms. That said, NAFTA liberalization in maize, wheat, and fruits and vegetables has accelerated and deepened this trend toward export-oriented, chemical-intensive production.[62] The key question is whether this shift toward intensive farming has, on a net basis, delivered environmental benefits, as well as the obvious environmental costs associated with pollution and water stress.

One tenet of the green revolution is that, despite localized increases in pollution, environmental benefits can accrue based on large-scale, intensive farming. These benefits arise from land-saving and land-offsetting effects of intensive farm production.[63] With the increased reliance on capital inputs such as fertilizers, pesticides, and bioengineered seeds, production efficiency increases on average, either by reducing the total amount of land needed for comparable yields or by increasing the yield per hectare of existing land use. This increase in produc-

tion efficiency reduces pressure on farms to convert additional lands, including marginal lands or forests, to meet the rising demand for food. A stylized image of this hypothesis is that of a seesaw: The more that specialization and intensive farming goes up in one region, the more that land-use pressures associated with extensive farming recede elsewhere.

Although the extent of potential benefits is specific to the region under consideration, Pedro Sanchez and others have argued that, as a rule of thumb, for every hectare of land that is converted into intensive farming, between 5 and 10 hectares of tropical forests will be conserved elsewhere.[64] In the United States, for example, intensive farming has been estimated to "save" 90 million hectares of forests that otherwise would have been cleared for farming.

In areas with smaller, low-productivity, unprofitable farms, the lack of access to working capital means that environmental problems associated with fertilizers and pesticides are almost entirely absent. However, more serious from an environmental perspective is the strong link between impoverished southern rural areas and changes in land use, deforestation, and habitat destruction and fragmentation.[65] Rural poverty is the leading cause of environmental degradation in the Lacandon jungle—among the richest habitats on the planet. Poor farmers continue to clear tropical forests to plant crops. However, since the nutrient composition of tropical forests is concentrated in the biomass of trees above, and not in the soil found below, farmers usually get only one crop per season before soils are exhausted of nutrients, and they are forced to move elsewhere to clear additional forests for more cropland or grazing areas.

However, evidence from Mexico and elsewhere now shows that land-saving benefits that could arise from intensive farming are neither automatic nor of the magnitude observed in industrialized countries such as the United States. One reason for this failure to deliver automatic land-saving benefits may be that the returns of the green revolution began to bottom out some years ago.[66] For example, soil degradation arising from high levels of salinity has reduced crop output in many commercial farming regions.

Diminishing returns of intensification may partially explain why the expansion of commercial farms in the northern and central regions has not resulted in forest-saving benefits in the southern regions. However, the most plausible explanation for the failure of land-saving benefits to occur is the structural bifurcation of Mexico's farm economy. Productivity gains occurring in the northern and central regions have little or no impact on subsistence farming and associated land clearing in the poorest, southern regions of Mexico. The simplest explanation is that the seesaw does not work, because it has become unhinged in the middle. NAFTA accelerated and deepened the structural divide between large-scale, vertically integrated, export-oriented farms and small-scale, subsistence farms to the extent that no market signals are transmitted between the two. (Even in well-functioning markets, increased economic opportunities can also lead to an expansion of crop areas.)

In well-functioning markets, as the total amount of available land shrinks, farmers will increase capital inputs as the principal means of increasing yields. The single most important catalyst of more intensive farming is land scarcity. In Mexico, one potential cause of land scarcity—particularly in the southern regions—is the nature reserves throughout Mexico, with a total land coverage of priority biosphere reserves. In the past, these reserves were little more than "paper parks"—lines on a map with little or no budget for enforcement. However, with the support of the U.S. Agency for International Development, the Global Environment Facility, Pro Natura, and other groups, the newly established Mexican Fund for Conservation of Nature has a total funding base for all protected areas of US$6.5 billion per year.[67]

Despite increased spending, some of which can be attributed to more general environmental cooperation

that NAFTA has supported, nature reserves in Mexico remain chronically underfunded and underenforced, which leaves them vulnerable to illegal land use, animal husbandry, and competition among indigenous groups and others.[68] Since, by definition, setting aside protected areas creates losers in the immediate regions in which reserves are created, neighboring residents have a high propensity to cheat, by way of illegal logging, land clearing, and corruption and nonenforcement among park officials.[69] Therefore, potential land-scarcity signals that could originate from reserves, which would in well-functioning markets lead to land savings through intensive farming, are probably not affecting land-use decisions in Mexico.

Other, nontrade factors clearly contribute to the deterioration of pricing and other signals linking commercial and small-scale farms. Four are noted below.

Farm Subsidies. As in other countries, the pattern of subsidy payments in Mexico supports large-scale farms over small ones.[70] Although farm-sector lobbyists argue that farm subsidies generally are needed to support farm income, payments are not being channeled into the most impoverished areas of southern Mexico. At the aggregate level, only one-quarter of total farm subsidies support farm income. By contrast, 75 percent are directed to offset capital costs of various production inputs—such as fertilizers, herbicides, machinery, and farm fuels, as well as to change the market value of farmland. Since extensive farms by definition do not specialize in capital inputs, most farm subsidies are directed toward larger, intensive farming operations. For example, the structure of water irrigation subsidies disproportionately favors large-scale farms over small ones, while the pattern of payments under the PROCAMPO and ASERCA programs also appears to benefit large-scale farmers.[71] Moreover, PROCAMPO payments are intended to bolster land saving by supporting liberalized, intensive farming. However, they have had the opposite impact in the Yucatan Peninsula, where rates of deforestation have accelerated by as much as 34 percent, largely because PROCAMPO increased land values, which had the effect of accelerating land clearing rather than intensification on existing lands (see Figure 8).[72]

The environmental impacts of production subsidies are well documented,[73] and include overproduction and excessive application of agrochemicals, irrigation, and other production inputs. Although NAFTA was hailed as an environmental agreement, its failure to include strict disciplines that constrain farm subsidy payments has rendered various environmental safeguards (with the possible exception of food safety standards) powerless to minimize environmentally damaging subsidy payments. NAFTA has therefore been no more successful than the WTO in constraining subsidy payments in North America, most recently seen in the United States in the increase in total farm payments under the 2002 Farm Act. This increase in subsidy payments in the United States is closely related to an increase in some subsidy payments in Mexico.[74]

Contract Farming. The bias of subsidy payments toward commercial farms is reinforced by the increased reliance on contract farming as a primary avenue of Mexican agricultural exports to the United States, especially for fresh vegetables and fruit. Contract farming is hardly unique to Mexico, nor can it be attributed to NAFTA.[75] The main environmental effect of contract farming is the imposition of production criteria by suppliers on growers. Typically, these criteria cover not only price, quantity, and quality, but some production specifications, including the mandated use of fertilizers, pesticides, and other technical specifications that only larger farms can afford.[76] Field research in Guanajuato shows that contract buyers exclusively engage in business with large-scale growers. This is done to reduce transaction costs. Average farm size in Guanajuato for farms under contract is 31 hectares, more than ten times the average size of an *ejido*.[77] For tomato farms in the region, the average farm size is 1,000 to 2,000 hectares. Supply contracts explicitly set out requirements for pesticides,

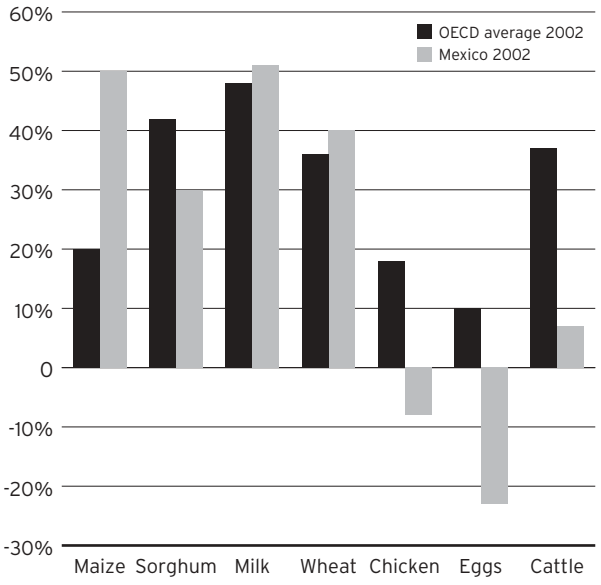
fertilizer, and other production inputs (for example, plastic sheet covers for tomato farms).

Narrowly speaking, NAFTA has had no bearing on how private commercial contracts between exporters and buyers are negotiated and implemented. However, the structure and pattern of export growth in the horticultural sector has been strongly affected by NAFTA. This expansion has led to structural changes favoring larger farms, which in turn are strongly favored by large-scale buyers entering into contract farm arrangements. The structure of these arrangements suggests at the very least a tension among NAFTA liberalization of some barriers (notably tariffs and tariff-rate quotas), the diminished role of spot markets, and their replacement with consolidated markets serving large-scale, oligopolistic buyers.

Disappearing Rural Credit. The pattern of larger, export-oriented farms supported by subsidies and commercially engaged through contract farming is magnified by the dramatic retreat of all commercial credit from smaller farming operations. With the consolidation of Mexico's banking sector during the 1990s[78] (see Figure 9), credit policy and risk management procedures have become more homogeneous, and have explicitly turned away from the financing of smaller-scale businesses of all kinds. Banks in Mexico have complained to the World Bank about the lack of "creditworthy" clients, and credit is increasingly directed to larger corporations and government agencies.[79]

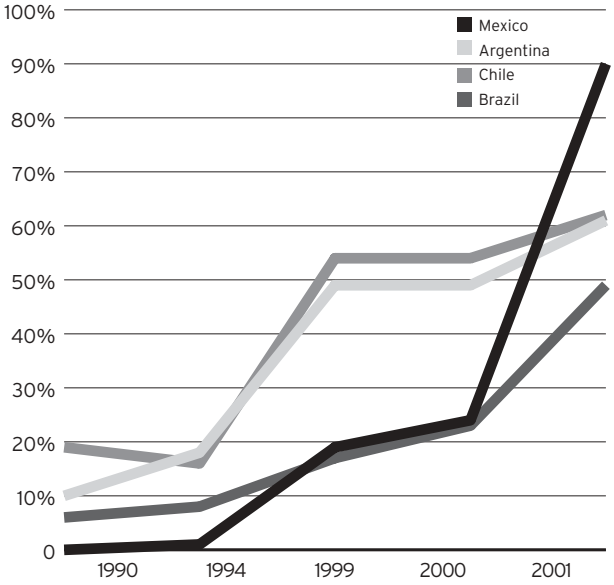
As commercial credit evaporated for all small enterprises, Banrural, the public development agency for rural credit, was until 2003 the sole credit source for small farms in Mexico. However, immediately upon its creation, Banrural shrank the number of outstanding loans by half.[80] Even with this rationalization of credit policy, the performance of Banrural has been miserable by any standard. In 2002, 40 percent of its portfolio was nonperforming. The collapse and dismantling of public agencies and credit institutions coincided with the dramatic consolidation of private-sector capital that was clearly unwilling to fill the

Figure 8. Producer Subsidy Equivalent: Mexico



Source: Organization for Economic Cooperation and Development, PSE/CSE database, 2002 (www.oecd.org).

Figure 9. Foreign Share of Banking Assets



Source: Economic Commission for Latin America and the Caribbean (ECLAC), "Foreign Investment in Latin America and the Caribbean," 2002, www.eclac.org.

void left by public microfinance policy in full retreat. (In May 2003, the World Bank announced a US$505 million loan to liquidate Banrural and begin again, with a new rural credit agency devoted to low- and middle-income farmers.)[81]

The scarcity of farm credit has profoundly affected land-use decisions. As noted above, the leading reason why single-family farms and *ejido* farmers in some commercial regions rent their lands to private commercial interests is the absence of rural credit.[82] Evidence also suggests that whatever farm credit which is extended tends to favor intensive farming. That is, farms that receive credit usually defer decisions about fertilizer dose amounts to the recommendations of credit authorities, who recommend an "excessive" use of fertilizers.[83] In addition, financing extended through contract farming appears more plentiful, and much cheaper. U.S.-denominated farm loans to support exports in the Yaqui Valley have interest rates of 13 to 18 percent, while peso-denominated farm credit—if it is available—is between 25 and 30 percent. (Black market rates can exceed these levels per month.)[84]

The Cost of the Dual Economy on Biological Diversity

It is impossible to quantify the total value of Mexico's tropical and other forests, environmental services derived from wetlands and other habitats, and biological diversity. One of the few global estimates, by Constanza et al. (1997), suggests that the total annual value of the world's ecosystem functions is approximately US$36 trillion.[85] Although this study is useful in suggesting the order of magnitude of environmental values, it has come under criticism on various fronts, largely on methodological grounds.

At the same time, it is clear that most environmental values—but particularly those values associated with biological diversity—remain uncounted, undervalued, and external to market prices. In one small step to redress this externalization problem, numerous environmental valuation field studies have been conducted in Mexico. The combined economic values suggested by these studies are impossible to aggregate, since they rely on different methodologies and baselines, generally consist of decentralized research (unlike the climate change agenda, which is conducted under the UN Intergovernmental Panel on Climate Change), and tend to concentrate on very small areas, such as lagoons or specific parts of tropical forests or coral reefs.[86]

Despite the difficulties in valuing Mexico's forests and biological diversity, we know with certainty that those values are substantial, conservatively running into billions of dollars for direct values such as ecotourism. Other values are more difficult to quantify. For instance, the value of a single wild-grass perennial grass variety related to maize is estimated to be US$6.8 billion per year.[87] Potential revenues from carbon sequestration are in the range of US$31.5 million to US$126 million for Mexico's forestry sector alone, depending on the price per ton of carbon equivalent in world markets.[88] The value of possible carbon sinks from low-till farming, as well as grasslands and commercial and other forestation projects outside tropical regions, is much higher. Rather than attempt to quantify the full value of Mexico's biological diversity that has been put at risk because of the cycle of rural poverty and changes in land use from slash-and-burn clearing, one could take the more practical approach of identifying practical and achievable policy options as a means of gauging the transfer of benefits associated with conservation of Mexico's biological diversity. Some of these benefit transfers are noted below. They include ecotourism and shade-grown and organic produce, both of which gain their market and revenue value precisely because of the worth consumers place on biological diversity.

Lessons and Recommendations

Structural changes under way in Mexico's agricultural sector did not begin with NAFTA, nor has NAFTA been the sole cause of these changes. However, structural changes influenced largely by NAFTA in the horticultural and grains sectors reinforce and magnify changes that are further influenced by other, non-NAFTA forces, such as the liberalization of the financial services sector and consolidation of export farms through subsidy payments and contract farming. Moreover, NAFTA has prompted action among rural communities to reopen the trade agreement to take into account the vulnerability of communities to trade, including the adoption of the National Rural Accord by communities in the spring of 2002.[89]

NAFTA has reduced some pricing distortions, by lowering or eliminating tariffs and tariff rate quotas. At the same time, NAFTA has failed to constrain the use of farm subsidies, which have deepened pricing and market failures and accelerated environmental degradation through overcapacity. Structural changes linked with trade growth have introduced new forms of market failure, in particular the replacement of spot markets for fruit and vegetables with concentrated markets patronized by oligopoly buyers exerting high levels of buying power through contract farming. A similar oligopoly in the private banking sector helps explain the virtual disappearance of private credit for small and mid-sized enterprises, in particular small-scale farms.

Those worst affected by structural changes associated with trade liberalization and trade growth are Mexico's poor farmers. Alan Winters observes that the poor in developing countries are disproportionately affected by trade liberalization: Adjustment periods for the poor are long and very costly. Winters concludes that the industrialized countries can offer little guidance to developing countries in addressing the problems of the poor who have been adversely affected by free trade.[90]

The most important challenge from an environmental perspective alone is to address the plight of small-scale farms in Mexico, by identifying commercially viable revenue sources that are equal to or greater than the subsistence income derived from subsistence farming on marginal lands.[91] Given the strong pull that southern farmers, indigenous peoples, and communities in the region feel toward their land, providing grants for employment training and relocation—even if financing were available—would not break the circle of poverty and environmental degradation.

One source of hope may originate in markets that are taking shape because of environmental considerations. The global market for environmental goods and services remains fragile and incoherent. However, evidence suggests that small-scale, undercapitalized farms can gain a comparative advantage in several environmental market niches such as organic goods, precisely because they cannot afford fertilizers, herbicides, pesticides, and GM seedlings. Consumers in Europe, Japan, the United States, and Canada are showing an increased preference for produce that is *not* grown with pesticides or other input. For example, the global market for organic foods alone exceeds roughly US$20 billion a year, and remains the fastest-growing segment of the food industry, recording sales volume increases of 20 to 30 percent per year. The North American market for certified, shade-grown, sustainable coffee is US$152 million on the retail side, while the global market value (including noncertified coffees that are marketed as sustainable, bird-friendly, organic, or under other labels), is US$565 million per year in retail sales.[92]

Mexico is the world leader in shade-grown organic coffee; similar opportunities exist for other crops, including traditional maize varieties, cocoa, spices, honey, and palm. The environmental benefits of these kinds of products are well documented in some cases. For example, coffee grown under tree canopies typically has 90 percent more on-site bird life, compared to sun-grown coffee raised on plan-

tations that clear forests.[93] Similar markets for ecotourism and eventually carbon sequestration are likely to channel new revenues into southern Mexico.[94]

Although these markets are small, they require capital to overcome market failures, as well as to differentiate their products in the market through labeling, certification, and the use of geographic indicators, and to arrange transportation and overcome intermediary market barriers. One of NACEC's outstanding contributions is to create a special fund to support small-scale, community, or cooperative-based shade-grown coffee certification and export promotion in Oaxaca, Chiapas, and other regions of southern Mexico. Among the supporters of the fund are Banamex and the government of Mexico. This fund is building one bridge between the two farm economies of Mexico. Working with the reconfigured coffee subsidy payments can make it possible that Mexico's poverty circle can be broken thanks to new markets that value environmental attributes.

This chapter has described a series of issues that, taken together, continue to affect agriculture in Mexico. These include trade liberalization prompted by NAFTA, the liberalization and consolidation of the financial services sector, the concentration of vertically integrated sectors within Mexico's farm economy, the effect of agricultural subsidies, and the increasingly important pull that contract farming is exerting on the production decisions of farmers. NAFTA is not the cause of these issues' emergence, but it remains the focal point of most liberalization reforms undertaken in Mexico since 1993. From an environmental perspective, these liberalization issues are linked together by a chain of poverty affecting poor farmers, indigenous peoples, and communities in southern Mexico. Initiatives that support sustainable niche markets will not break this chain of poverty and environmental degradation. However, evidence from market analysis and sales shows signs of hope that new income sources from green markets can bolster environmental protection by opening new revenue sources to the poor.

Neighboring countries in Central and South America have different histories, economic and environmental endowments, social traditions, and levels of economic reform. At the same time, many of these countries share a common environmental heritage, from the Meso-American biological diversity corridor to rich ecosystems of coastal marine and tropical forestry areas in South America. There is no one-size-fits-all formula for how to anticipate the environmental effects of trade liberalization. However, we do know that the poverty-environment nexus in the agricultural sector will be affected in similar ways, as in Mexico during the 1990s. Anticipatory policies include ensuring that working capital is available to small farms when it is most urgently needed during the transitional period of liberalization; that liberalization schedules do not open vulnerable markets too quickly; that discrete environmental markets are supported; and that environmental monitoring and data are focused from the outset, to track and offset scale impacts of free trade.

NOTES

1 In September 1993, President Bill Clinton declared that NAFTA would "lead to improvements in the environment and increased investment on the Mexican side of the border in environmental cleanup." Carol Browner, the administrator of the U.S. Environmental Protection Agency, went further, stating that NAFTA was the "the most environmentally sensitive trade agreement in history."

2 NAFTA Preamble, CEC Article 3, BECC/NADBank, Article 1, Section 1.

3 Public Citizen, *NAFTA Chapter 11 Investor-State Cases: Bankrupting Democracy,* September 2001, www.citizen.org.

4 Evidence showing a robust, linear relationship between trade liberalization and economic growth is weak and uneven, with that relationship generally inferred by measuring the relative openness of an economy. A strong empirical case exists showing that open economies grow quicker than do closed ones. Measures of economic openness vary, but include indicators of trade liberalization such as tariff and subsidy levels. See, for instance, Robert J. Barro, *Determinants of Economic Growth: A Cross-Country Empirical Study* (Cambridge, Mass.: MIT Press, 1999); and Michael Ferrantino, *The Dynamic Effects of Trade Liberalization: An Empirical Analysis* (Washington, D.C.: U.S. International Trade Commission, 1997).

5 The literature on environmental review methodologies is extensive. See, for example, Dale Andrew, ed., *Assessing the Environmental Effects of Trade Liberalization Agreements: Methodologies* (Paris: Organization for Economic Cooperation and Development, 1999); and Sarah Richardson, ed., *Assessing the Environmental Effects of the North American Free Trade Agreement: An Analytical Framework (Phase II) and Issues Studies* (Montreal, Canada: North American Commission for Environmental Cooperation, 1999).

6 Jeffrey D. Sachs and Andrew Warner, "Economic Reform and the Process of Global Integration," *Brookings Papers on Economic Activity* (Washington, D.C.: Brookings Institution, 1995).

7 Estrategia nacional sobre biodiversidad de México (Comisión Nacional para el Conocimiento y Uso de la Biodiversidad [CONABIO]: 2000), www.conabio.gob.mx/institucion/conabio_espanol/doctos/catalogo.html.

8 See Kirk Hamilton and Michael Clemens, "Are We Saving Enough for the Future?" in *Expanding the Measure of Wealth* (Washington, D.C.: World Bank, 1997). See also Robert Repetto et al. *Wasting Assets: Natural Resources in the National Accounts* (Washington, D.C.: World Resources Institute, 1989).

9 In the Mexican study, measurement of environmental damages relied largely on pollution indicators, notably air pollution indicators such as carbon dioxide, sulfur dioxide, nitrogen oxides, ground-level ozone, and airborne dioxins, with damages focusing on indicators such as increased mortality and morbidity impacts associated with air pollution; increased cancer risk from long-term, low-dose exposure to toxic substances; increased gastrointestinal illnesses from polluted drinking water; and damages to human health or more direct cleanup costs from hazardous wastes.

10 Kevin Gallagher, *Economic Integration, Environment, and Development: Assessing the Mexican Experience,* forthcoming.

11 For a summary of NAFTA's environmental provisions, see Daniel Magraw, ed., *NAFTA and the Environment: Substance and Process* (Washington, D.C.: American Bar Association, 1995). For a discussion of the politics of environment in NAFTA, see John Audley, *Green Politics and Global Trade* (Washington, D.C.: Georgetown University Press, 1997).

12 Kenneth Reinert and David Roland-Holst, "The Industrial Pollution Impacts of NAFTA: Some Preliminary Results," in Scott Vaughan, ed., *The Environmental Effects of Free Trade* (Montreal, Canada: North American Commission for Environmental Cooperation, 2002).

13 Rachel Poynter and Sheila Holbrook-White, "NAFTA Transportation Corridors: Approaches to Assessing Environmental Impacts and Alternatives," in Scott Vaughan, ed., *The Environmental Effects of Free Trade* (Montreal, Canada: North American Commission for Environmental Cooperation, 2002).

14 North American Commission for Environmental Cooperation, *Challenges and Opportunities in North America's Evolving Electricity Market* (Montreal, Canada: North American Commission for Environmental Cooperation, 2002).

15 *Economic Integration, Environment, and Development* (see note 10). See also Marisa Jacott, Cyrus Reed, Amy Taylor, and Mark Winfield, "Energy Use in the Cement Industry in North America," paper presented at the Second Symposium on Assessing the Environmental Effects of Trade, North American Commission for Environmental Cooperation (Mexico City, Mexico, March 2003), available at www.cec.org.

16 See North American Commission for Environmental Cooperation, *Taking Stock* (Montreal, Canada: North American Commission for Environmental Cooperation, 2003). For an overview of the mandate and work of the commission, see Gary Hufbauer et al., *NAFTA and the Environment: Seven Years Later* (Washington, D.C.: Institute for International Economics, 1997); Carolyn Deere and Daniel Esty, eds., *Greening the Americas: NAFTA's Lessons for Hemispheric Trade* (Cambridge, Mass.: MIT Press, 2002); and Jan Gilbreath, *Environment and Development in Mexico* (Washington, D.C.: Center for Strategic and International Studies, 2003).

17 Among the first public meetings ever held between the federal government of Mexico and members of nongovernmental organizations took place in the early 1990s, when environmental issues related to the proposed construction of a wharf in Cozumel were discussed. Since then, public consultations have become a regular feature of government in Mexico, extending to a range of public issues. For an account of some of these public consultation practices, see Timothy Whitehouse, ed., *Public Access to Government-Held Environmental Information: Report on North American Law,* 2d ed. (Montreal, Canada: North American Commission for Environmental Cooperation, 2003).

18 In the midst of the NAFTA debate in 1992, two economists—Grossman and Krueger—demonstrated that some indexes of pollution increase at the early stages of economic development, but then begin to decrease after a certain level of income is reached. The income turning point changed with the particular pollutant, but was in the range of US$5,000–$8,000 per capita GDP. The theory, known as the Environmental Kuznets Curve, was adapted from the work of Simon Kuznets, for his work in showing the relationship between level and inequality of income. The Grossman-Krueger hypothesis has sparked a very lively debate in the literature. See, for example, D. Stern, "Progress on the Environmental Kuznets Curve?" E*nvironment and Development Economics,* vol. 3 (1998), pp. 173–96; Theodore Panayotou, "Demystifying the Environmental Kuznets Curve: Turning a Black Box into a Policy Tool," *Environment and Development Economics* (special issue: The Environmental Kuznets Curve), vol. 2, no. 4 (1997), pp. 465–84; and K. G. Maler, "Environment, Poverty, and Economic Growth," in B. Pleskovic and J. Stiglitz, eds., *Annual World Bank Conference on Development Economics* (Washington, D.C.: World Bank, 1997).

19 See Susmita Dasgupta, Hemamala Hettige, and David Wheeler, *What Improves Environmental Performance? Evidence from Mexican Industry* (Washington, D.C.: World Bank, 1997).

20 See Howard Mann, *Private Rights, Public Problems: A Guide to NAFTA's Controversial Chapter on Investor Rights* (Winnipeg, Canada: International Institute for Sustainable Development and World Wildlife Fund, 2001). After numerous attempts to reach settlement, on July 31, 2001, the governments of Mexico, Canada, and the United States issued a clarification regarding NAFTA's Chapter 11. The statement addresses three issues: First, it makes clear that Chapter 11 does not preclude the parties from providing public access to documents submitted to or issued by a dispute panel. Second, it attempts to limit the scope of the legal terms "minimum standard of treatment" and "full protection and security" by restating a principle in customary international law regarding minimum standard of treatment. Finally, it limits efforts by investors seeking damages under NAFTA only to infractions that may arise under Chapter 11 disciplines, not other elements of the agreement. The full text of this statement can be found at the U.S. Trade Representative's web site, www.ustr.gov/regions/whemisphere/nafta-chapter11.pdf.

21 *Economic Integration, Environment, and Development* (see note 10).

22 Charles Driscoll et al., "Nitrogen Pollution: Sources and Consequences in the U.S. Northeast," *Environment,* vol. 45, no. 7 (September 2003).

23 R. Ford Runge, "Positive Incentives for Pollution Control in North Carolina: A Policy Analysis," in D. Huisingh and V. Bailey, eds., *Making Pollution Prevention Pay* (New York: Pergamon Press, 1982).

24 Sistema Unificado de Informacion Básica del Agua (2003), *Agua en México,* Secretaria de Medio Ambiente y Recursos Naturales (SEMARNAT) and Comisión Nacional del Agua, Mexico City.

25 Food and Agriculture Organization of the United Nations, "Forestry Data" (Rome: Food and Agriculture Organization of the United Nations, 1999), available at FAOStat, www.fao.org.

26 Organization for Economic Cooperation and Development, *Agricultural Policies in OECD Countries: Monitoring and Evaluation* (Paris: Organization for Economic Cooperation and Development, 2003), available at www.oecd.org.

27 Mexico's food consumption has changed as GDP per capita has risen on average. Consumption is moving away from unprocessed bulk commodities and toward higher-value foods such as meat, fresh fruits, dairy products, and processed foods. At the same time, rates of malnutrition and hunger have also increased.

28 Steven Zahniser and John Link, eds., *Effects of NAFTA on Agriculture and the Rural Economy* (Washington, D.C.: U.S. Department of Agriculture, July 2002), available at http://ers.usda.gov/publications/wrs0201/.

29 There are more than 200 different agricultural products traded among the NAFTA countries, each with different environmental characteristics depending not only on the specific crop but on the climate, soil, water, and other factors affecting how that crop is cultivated (or in the case of aquaculture and livestock, produced). Unlike in the electric power generating sector, there are no standardized or uniform emissions factors for these agricultural goods, with the possible exception of cotton. Given important differences in the environmental characteristics of different crops, it is not feasible to extrapolate more general or net environmental impact stemming from NAFTA liberalization from the three examples discussed in this chapter. Even if these differences were not so pronounced among crops, environmental quality indicators are generally disaggregated, making it difficult to compare changes in pollution with changes in water scarcity or biological diversity.

30 Alejandro Nadal, "Maize in Mexico: Some Environmental Implications of NAFTA," in Sarah Richardson, ed., *Assessing the Environmental Effects of NAFTA: An Analytical Framework* (Montreal, Canada: North American Commission for Environmental Cooperation, 1999).

31 The debate over the risks to health and the environment from GM foods and crops is far from settled. For example, there is now a scientific consensus that the risk to human health from consuming the current range of GM foods is low or nonexistent. A recent scientific panel report of the government of the United Kingdom concluded that *"on balance...the risks to human health for GM crops currently on the market are very low. But depending on the crops developed GM food may present greater challenges in risk management in the future"* (UK Government Science Panel Report, July 2003), available at www.gmsciencedebate.org.uk.

32 Chantal Line Carpentier and Hans Herrman, *Maize and Biodiversity: The Effects of Transgenic Maize in Mexico: Issues Summary* (Montreal, Canada: North American Commission for Environmental Cooperation, 2002).

33 D. Quist and I. H. Chapala, "Transgenic DNA Integressed into Traditional Maize Landscapes in Oaxaca, Mexico," *Nature,* vol. 414 (2001), pp. 541–43.

34 After attacks led by the biotechnology industry and others, *Nature* retracted the article in mid-2002, which in turn fueled an international scandal around the risks of GM

contamination to the environment. Editorial Note, *Nature,* vol. 416 (April 11, 2002) p. 600.

35 The July 2003 UK Government Science Panel Report (see note 31) found that it was "very unlikely [that GM crops] would invade the country-side and become problematic plants." However, the panel recommended that more research be conducted on the environmental effects of gene flow and on herbicide tolerance of GM crops.

36 Ibid.

37 Katie Eastham and Jeremy Sweet, *Genetically Modified Organisms: The Significance of Gene Flow Through Pollen Transfer* (Copenhagen, Denmark: European Environment Agency, 2003).

38 The Biosafety Protocol of the UN Convention on Biological Diversity entered into force in mid-2003. The objective of the Biosafety Protocol is to protect biological diversity from potential risks posed by living modified organisms resulting from biotechnology. The Protocol establishes an advanced information agreement to ensure that countries importing living modified organisms are able to make informed decisions prior to that importation taking place. Since the focus of the Protocol is on trade in living modified organisms, it is unclear if it would have any bearing on unintentional or accidental contamination. While Mexico has signed and ratified the Protocol, neither Canada nor the United States has done so.

39 For an insightful discussion of the relationship among trade liberalization, structural changes in markets, and vertical integration, see David Hummels, Jun Ishii, and Kei-Mu Yi, "The Nature and Growth of Vertical Integration in World Trade," *Journal of International Economics,* vol. 54, no. 1 (June 2001), pp. 75–96.

40 Rosamond Naylor, Walter Falcon, and Arthur Puente-Gonzalez, "Policy Reforms and Mexican Agriculture: Views from the Yaqui Valley," Economics Program Paper no. 01–01 (Mexico City: CIMMYT, 2001).

41 C. Ford Runge, "Feedlot Production of Cattle in the United States and Canada," in Sarah Richardson, ed., *Assessing Environmental Effects of the North American Free Trade Agreement: An Analytical Framework* (Montreal, Canada: North American Commission for Environmental Cooperation, 1999). See also Jerry Speir, Marie-Ann Bowden, David Ervin, Jim McElfish, and Rosario Perez Espejo, *Comparative Standards for Intensive Livestock Operations in Canada, Mexico, and the U.S.* (Montreal, Canada: North American Commission for Environmental Cooperation, 2002).

42 Jennifer Lee, "Neighbors of Vast Hog Farms Say Foul Air Endangers Their Health" *New York Times,* May 11, 2003, p. 1.

43 See Frank Ackerman, Timothy Wise, Kevin Gallagher, Luke Ney, and Regina Flores, "Free Trade, Corn and the Environment: Environmental Impacts of U.S.-Mexico Corn Trade under NAFTA," working paper no. 03-06 (Medford, Mass: Global Development and Environment Institute), June 2003. See also Chantal Line Carpentier, *Trade Liberalization Impacts on Agriculture: Predicted versus Realized"* (Montreal, Canada: North American Commission for Environmental Cooperation, December 2001).

44 Corn production in the United States is not only the biggest user of farmland, but also the greatest consumer of commercial nitrogen and phosphate fertilizers, making up 45 percent of total U.S. sales. In addition, U.S. corn production is a significant user of pesticides. The highest concentration of nitrogen pollution is found in the Mississippi River Delta—where more than half of total U.S. farm production is concentrated—where it moves over long distances and into the Gulf of Mexico. In recent years, incidences of hypoxic zones have increased in occurrence and severity. The main herbicide used in corn production is atrazine, which has been found extensively in groundwater wells. For a comprehensive review of the environmental effects of corn production, see C. Ford Runge, *King Corn: The History, Trade and Environmental Consequences of Corn (Maize) Production in the United States* (Washington, D.C.: World Wildlife Fund, 2002).

45 See, for example, Kym Anderson and J. Drake Brockman, *Trade and Environment Policy Issues: Implications for the Asia-Pacific Region* (Canberra, Australia: Australian Pacific Economic Cooperation Committee, 1995). Reprinted in abridged form in the *Business Council Bulletin,* vol. 118 (April 1995), pp. 46–53.

46 B. L. Turner et al., *Illustrating the Coupled Human-Environment System to Vulnerability Analysis: Three Case Studies* (Palo Alto, Calif.: Stanford University, 2003), available at www.pnas.org.

47 Enrique Aguilar, *Pricing of Irrigation Water in Mexico,* paper presented at the Irrigation Water Policies: Micro and Macro Considerations, World Bank, Agadir Morrocco, June 15–17, 2002, available at http://Inweb18.worldbank.org/ESSD/ardext.nsf/18ByDocName/eventsagadirconference2002.

48 Jose de Anda, Sergio Quinones-Cisneros, Richard French, and Manuel Guzman, "Hydrologic Balance of Lake Chapala," *Journal of the American Water Resources Association,* vol. 34, no. 6 (1998).

49 North American Commission for Environmental Cooperation, *The North American Mosaic* (Montreal, Canada: North American Commission for Environmental Cooperation, 2001).

50 Jorge Mattar, Juan-Carlos Moreno-Brid, and Wilson Peres, "Foreign Investment in Mexico After Economic Integration," (Mexico City: CEPAL-ECLAC, July 2002), www.networkideas.org/featart/sep2002mexico.pdf.

51 Antonio Yúnez-Naude and Fernando Barceinas Paredes, *The Agricultural of Mexico after Ten Years of NAFTA Implementation* (Washington, D.C.: Carnegie Endowment for International Peace, 2003), available at www.ceip.org.

52 A variable used by Yúnez-Naude and Paredes (see note 51) to estimate structural change in the fresh fruit and vegetable sector measures the value of agricultural monthly exports and imports (totals and per crop) in constant pesos using real exchange rate indexes for 1990. The discussion above also refers to structural changes outside this definition, including Schumpeterian definitions of market structure transformation and innovation, including vertical and horizontal integration.

53 The shift to intensive farming in the grains and horticulture sector may be much greater than the overall shift in the agricultural sector. Some studies suggest that the contribution that modern farms make to Mexico's GDP has remained roughly constant at between 27 and 35 percent since the early 1980s.

54 Dennis Henderson, "Between the Farm Gate and the Dinner

Plate: Motivations for Industrial Change in the Processed Food Sector," *The Future of Food* (Paris: Organization for Economic Cooperation and Development, 1999).

55 Favia Echanove Hacuja, "Working under Contract for the Vegetable Agro-Industry in Mexico," *Culture and Agriculture,* vol. 23, no. 3 (Fall 2001).

56 Lee Christensen, *Soil Nutrient and Water Management Systems in U.S. Corn Production* (Washington, D.C.: U.S. Department of Agriculture, April 2002).

57 See note 47.

58 Ibid.

59 Jose Maria Martinez, *Aquifers and Agro-Chemicals in a Border Region: NAFTA Challenges and Opportunities for Mexican Agriculture* (Montreal, Canada: North American Commission for Environmental Cooperation, 2003).

60 Travis Phillips, "Behind the U.S.-Mexico Water Treaty Dispute," report no. 77-7 (Austin, Texas: House Research Organization: Texas House of Representatives, April 30, 2002).

61 This does not include a net account of total water transfers in tomatoes, since the United States also exported tomatoes to Mexico, although at a much smaller level. As indicated in Figure 7, about 6.1 million metric tons of tomatoes were exported from Mexico to the United States from 1993 to 2001, or approximately 680,000 pounds per year. One metric ton of water is the equivalent of 265.617 gallons of water, making the average equivalent of exported water 180,656,632 gallons per year. Approximately 90 percent of all Mexican tomato exports on average are bound for the United States. A conservative, or lower bound, estimate therefore suggests that roughly 162 million gallons of freshwater equivalents are contained in these exports.

62 NAFTA and trade liberalization generally have affected farm size in Mexico in much the same way they have affected average farm sizes in the United States and Canada. According to the International Trade Commission, average farm size in the United States increased from 449 acres to 487 acres from 1978 to 1997, while the number of farms declined from 2.3 million to 1.9 million; U.S. International Trade Commission, "The Impact of Trade Agreements: Effect of the Tokyo Round, U.S.-Israel FTA, U.S.-Canada FTA, NAFTA and the Uruguay Round on the U.S. Economy," August, publication no. 3621 (Washington, D.C.: U.S. International Trade Commission, August 2003). See also *Trade and Environment Policy Issues,* note 45.

63 P. A. Matson, W. J. Parton, A. G. Power, and M. J. Swift, "Agricultural Intensification and Ecosystem Properties," *Science,* vol. 277, no. 25 (July 1997).

64 P. A. Sanchez, *Properties and Management of Soils in the Tropics* (New York: John Wiley & Sons, 1976).

65 Patricia Bouillon, Ariana Legovini, and Nora Lustig, *Rising Inequality in Mexico: Household Characteristics and Regional Effects* (Washington, D.C.: World Bank, September 2001). These authors show that the Gini coefficient increased from 49.14 to 54.91 between 1984 and 1994, and the mean-log deviation grew by 26 percent during the same period.

66 David Lee, Paul Ferrara, and Christopher Barrett, "Changing Perspectives on Agricultural Intensification, Economic Development and the Environment," in David R. Lee and Christopher B. Barrett, eds., *Tradeoffs or Synergies? Agricultural Intensification, Economic Development and the Environment* (New York: CABI Publishing, 2001), pp. 1–16.

67 *The North American Mosaic* (see note 49).

68 An insightful analysis of the history of public participation in Mexico's protected areas is provided in Martha Rosas, *Participatory Environmental Policy Processes: The Case of Advisory Councils in Protected Areas in Mexico,* unpublished thesis (England: University of Sussex, 2003).

69 David Pearce, *How Valuable Are the Tropical Forests* (paper presented at the Séminaire Développement Durable et Économie de l'Environmement, Paris, December 2001), available at www.iddri.org/iddri/telecharge/mardis/pearce.pdf.

70 One exception is payments for production of coffee, the largest export crop in Mexico. In 2002, annual payments through the Mexican Coffee Council of approximately US$100 million in coffee subsidies extended higher payments to all organic farms (the majority of which are small-scale), as well as higher payments for coffee grown in mountain regions. It is too early to tell if this subsidy structure is sufficient to reverse the effects of decades of payments that favored large coffee plantations.

71 ASERCA (Support Services for Agricultural Marketing) was created in 1991 and originally designed to provide support for farmers to pay for marketing expenses, such as storage and transportation. PROCAMPO (Farmers Direct Support Program) was created in 1994 and provides direct payments (decoupled income transfers) to farmers based on the size of their holdings. In response to criticism that they favor large-scale farms, reforms have been announced in July 2003 for ASERCA programs so that payments will cover all states, with varying farm sizes within states, for ten crops: maize, wheat, sorghum, sunflowers, canola, cotton, rice, soy, and two other crops used as grain feed for cattle.

72 B. L. Turner, J. Geoghegan, J. Eastman, D. Lawrence, and H. Vester, *Land Cover and Land-Change in the Southern Yucatan Peninsular Region: Refining Models and Projections of Deforestation with Application to the Carbon Cycle, Biotic Diversity, and Regeneration Capacity, Sustainability and Vulnerability,* available from the National Aeronautics and Space Administration at http://lcluc.gsfc.nasa.gov/products/pdfs/2003AnPrgRp/AnPrgRp_TurnerBL2003.doc.

73 See, for example, David Ervin, C. Ford Runge, E. Graffy, W. Anthony, S. Batie, P. Faeth, T. Penny, and T. Warman, "Agriculture and the Environment: A New Strategic Vision," *Environment,* vol. 40, no. 6 (July/August 1998), pp. 8–15, 35–40; Hakan Nordstom and Scott Vaughan, *Trade and Environment: Special Study* (Geneva, Switzerland: World Trade Organization, 1999).

74 See Karel Maynard, Stephanie Dionne, Marc Paquin, and Isaack Pageot-Lebel, *The Economic and Environmental Impacts of Agricultural Subsidies: An Assessment of the 2002 U.S. Farm Bill and the Doha Round* (Montreal, Canada: North American Commission for Environmental Cooperation, 2003); and Joseph Cooper et al., *Some Domestic Environmental Effects of U.S. Agricultural Adjustments under Liberalized Trade: A Preliminary Analysis* (Montreal, Canada: North American

Commission for Environmental Cooperation, 2003), both available at www.cec.org.

75 Campbell's began contract farming arrangements in Mexico in 1960, followed by Del Monte in 1962. Today, there are several frozen-food companies operating in Mexico, including Green Giant and Birdseye. See M. A. Barron and E. Rello, "The Impact of the Tomato Agro-Industry on the Rural Poor in Mexico," *Agricultural Economics,* vol. 23 (2000), pp. 283–97.

76 Between 1978 and 2001, U.S. growers received an increasingly smaller percentage of retail value for their produce, while the consolidation of the retail sector has meant that a higher share of retail value has gone to distributors and marketers. See *The Impact of Trade Agreements: Effect of the Tokyo Round, U.S.-Israel FTA, U.S.-Canada FTA, NAFTA, and the Uruguay Round on the U.S. Economy,* publication no. 3621 (Washington, D.C.: U.S. International Trade Commission, August 2003), available at www.usitc.gov.

77 Of the eighteen frozen-food companies operating in Mexico, 75 percent have their operations in Guanajuato. Roughly 10 percent of all vegetables grown in Mexico are from Guanajuato, which generates one-quarter of total agricultural revenues. Leading fresh crops are broccoli and cauliflower. In that state, approximately 18,000 hectares, on 580 farms, are cultivated under contract. Buyers with purchase contract arrangements include Green Giant and Birdseye. See "The Impact of the Tomato Agro-industry on the Rural Poor in Mexico," note 75.

78 Under the 1993 Foreign Investment Law, foreign ownership of banks was limited to 30 percent, increasing to 49 percent in 1996. In 1999, amendments allowed for full majority ownership by foreign interests. Similar reforms have been enacted by other Latin American countries, notably Colombia in 1979, Bolivia and Brazil in 1989, and Costa Rica in 1995. However, the changes in Mexico's laws have been the deepest.

79 World Bank, "Product Document for a Proposed Rural Finance Development Structural Adjustment Loan in the Amount of $505.6 million," report no. 25858 (Washington, D.C.: World Bank, May 16, 2003), available at www.worldbank.org. See also Emmanuel Baldacci, Luiz de Mello, and Gabriela Inchaute, "Financial Crisis, Poverty and Income Distribution," working paper no. WP/02/04 (Washington, D.C.: International Monetary Fund, 2002).

80 B. L. Turner et al., *Illustrating the Coupled Human-Environment Systems for Vulnerability Analysis: Three Case Studies,* March 2003, available at www.pnas.org.

81 World Bank, "World Bank Approves $505 Million Loan to Reform Banking Sector in Mexico," press release (Washington, D.C.: World Bank, June 13, 2003).

82 During 1991–1992, 55 percent (by area) of the production of wheat—the main crop in the Sonora region—was under *ejido* control, compared with 37 percent owned privately, and 8 percent rented by *ejidos* to private interests. By 1997–1998, 29 percent of wheat production was controlled by *ejidos;* 46 percent was controlled by the private sector and 25 percent was rented to private farming interests.

83 Rosamond Naylor, Walter Falcon, and Ivan Ortiz-Monasterio, "Policy Reforms and Mexican Agriculture: Views from the Yaqui Valley," CIMMYT Economic Program Paper no. 01-01 (Palo Alto, Calif.: Stanford University, 2001), available at http://yaquivalley.stanford.edu/publications.

84 Ibid.

85 R. Constanza, D. Arge, R. de Groot, S. Faber, M. Grasse, B. Hannon, K. Limburgh, S. Naeen, and R. O'Neil, "The Value of the World's Ecosystem Services and Natural Capital," *Nature,* vol. 387 (1997), pp. 253–60.

86 The three general approaches to economic valuation are (a) estimates of averted behavior; (b) hedonic pricing estimates, using changes in real estate-type prices as a proxy; and (c) contingent valuation, based on questionnaires of the willingness-to-pay (WTP) type. Approaches generally give some proxy of the total economic value (TEV) of the environmental resource being valued, based on the following stylized estimate: TEV = direct use value + indirect use value + option value + existence value.

87 A. C. Fisher and W. M. Hanemann, *Option Value and the Extinction of Species* (Berkeley, Calif.: California Agriculture Experiment Station, 1985).

88 Scott Vaughan, Chantal Line Carpentier, and Zachary Patterson, *Mexico and Emerging Carbon Markets: Investment Opportunities for Small and Medium-Sized Companies* (Montreal, Canada: North American Commission for Environmental Cooperation, 2000).

89 The main demands of the farmers included a moratorium on all agricultural provisions of NAFTA, emergency and long-term agricultural development programs, viable rural credit institutions, government investment in rural infrastructure and communities, food safety and quality for consumers, and recognition of the rights of indigenous peoples.

90 Alan Winters, "Trade Liberalization and Poverty: What Do We Know?" *GTAP Working Papers,* (West Lafayette, Ind.: Purdue University, June 2003), available at www.gtap.org. See also William Easterly, *The Elusive Quest for Growth* (Cambridge, Mass.: MIT Press, 2002); and World Bank, *Globalization, Growth and Poverty: Building an Inclusive World Economy* (policy research report) (Washington, D.C.: World Bank, 2002).

91 The author is grateful to Dan Biller, World Bank Institute, for this insight regarding benefits transfers.

92 Daniele Giovannucci, *Sustainable Coffee Survey of the North American Specialty Coffee Industry* (report prepared for the Nature Conservancy, the Summit Foundation, the NACEC, the Specialty Coffee Association, and the World Bank, July 2003), available at www.cec.org.

93 A. Brezinski and Scott Vaughan, *Measuring Consumer Interest in Shade-Grown Coffee: An Assessment of the Canadian, Mexican and U.S. Markets* (Montreal, Canada: North American Commission for Environmental Cooperation, 1999).

94 A long-standing challenge for developing-country exporters attempting to differentiate products in the marketplace involves the cost of often multiple certification and labeling schemes to convey to consumers some environmental characteristics of sustainable products. Mexico's biological diversity research and policy group (CONABIO) recently has explored highly innovative ways of using geographic indicators to distinguish, for consumers, different sustainable products being produced in rich ecosystem areas such as Chiapas.

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