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LESSONS FROM NAFTA

for Latin America and the Caribbean Countries:

A Summary of Research Findings

ADVANCE EDITION

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Lessons from NAFTA for Latin American and Caribbean (LAC) Countries: A Summary of Research Findings

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Introduction

The Free Trade Area of the Americas (FTAA) is closer to becoming a reality, with potentially major effects on the flows of goods and capital across the Western Hemisphere and significant consequences for growth and development in the region. In Central America, the advent of the Central America-U.S. Free Trade Agreement (CAFTA) is imminent, and Chile already has an agreement with the U. S. This article is a summary of a broader report that aims to provide guidance to these countries on what they can expect from this type of trade agreement, and to identify policies—both in terms of measures that countries can take unilaterally and those that could be negotiated with FTA partners—that can help them derive the maximum benefits from trade integration in the Americas.

Mexico's performance under NAFTA provides the most directly relevant experiment from which other LAC countries can learn about the likely contents and economic effects of a trade agreement with the U.S. For this reason, the report draws extensively from the NAFTA experience. However, attempting to draw lessons from NAFTA for the FTAA poses several difficulties. First, only a short time has elapsed since implementation of the agreement, and Mexico's post-NAFTA years started with the dramatic setback of the Tequila crisis in 1995, making it hard to disentangle the effects of the treaty on the Mexican economy. Second, an FTAA or CAFTA might differ from NAFTA, and thus their results could also be different in important dimensions. Third, there is considerable diversity in the initial conditions of LAC countries hoping to join the FTAA, and hence the key priorities, necessary preparatory measures and likely effects of accession also differ considerably across countries.

In these respects, the report summarized in this article is selective rather than exhaustive. While it devotes attention to a few key issues regarding possible content changes between NAFTA and the FTAA, and considers how specific characteristics of FTAA prospective members may shape its impact, it does not attempt to cover the full range of alternatives of FTAA design and/or member countries' initial conditions. Nor does it intend to identify the particular set of policies best suited for each individual country in Latin America and the Caribbean; instead, it underscores those reform areas where the experience of NAFTA suggests that policy action in preparation of, or conjunction with, the FTAA will have the biggest payoff in terms of growth and development. A companion report on "Deepening NAFTA" draws policy lessons for Mexico.

The report's main conclusion regarding NAFTA is that the treaty has helped Mexico get closer to the levels of development of its NAFTA partners. The research suggests, for example, that Mexico's global exports would have been about 25% lower without NAFTA, and foreign direct investment (FDI) would have been about 40% less without NAFTA. Also, the amount of time required for Mexican manufacturers to adopt U. S. technological innovations was cut in half. Trade can probably take some credit for moderate declines in poverty, and has likely had positive impacts on the number and quality of

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[1] This is a summary of a broad research project sponsored by the Regional Studies program of the Office of the Chief Economist for Latin America and the Caribbean, The World Bank. The authors are indebted to numerous colleagues and friends who wrote background working papers and portions of the Report. Please see "Lessons from NAFTA" in www.worldbank.org/laceconomist. Guillermo Perry provided overall leadership for this project.

jobs. However, NAFTA is not enough to ensure economic convergence among North American countries and regions. This reflects both limitations of NAFTA's design and, more importantly, pending domestic reforms.

An FTAA designed along the lines of NAFTA will offer new opportunities for growth and development in LAC, particularly if improvement is achieved on some aspects of NAFTA—such as the distorting rules of origin and the anti-dumping and countervailing duties. However, significant policy and institutional reforms will be necessary in most countries to seize those opportunities. In particular, the reforms will need to focus on reducing macroeconomic instability, improving the investment climate and the institutional framework, and putting in place an education and innovation system capable of fostering technological advancement and productivity growth. In addition, regional trade integration will have to be accompanied by unilateral, bilateral and multilateral actions on other trade fronts to maximize the gains from trade liberalization and reduce the possible costs from trade diversion caused by the FTAA.

These conclusions follow from careful analysis of a comprehensive, although not exhaustive, set of issues associated with the implementation of NAFTA and the upcoming FTAA. To identify the effects of NAFTA on Mexico and other countries—especially the neighboring countries of Central America and the Caribbean—the analytical work reviewed policies and trends prior to and after NAFTA implementation, using in many cases a broader international perspective and drawing lessons from the experience of other FTAs, notably the EEC / EU.

The report consists of seven chapters. Chapter 1 examines the evidence concerning economic convergence in North America by assessing how NAFTA has affected Mexico's per capita income relative to the U.S. Chapter 2 studies the evolution of macroeconomic synchronization across NAFTA member countries, sectors and regions, and draws the relevant implications for macroeconomic policy design. Chapter 3 provides a critical evaluation of NAFTA's remaining trade barriers by focusing on the impact of rules of origin on trade in manufactures, especially textiles and apparel, agricultural policies, and anti-dumping and countervailing duties. Chapter 4 focuses on the integration of factor markets, namely capital and labor. Chapter 5 provides a comprehensive diagnosis of Mexico's innovation system. Chapter 6 examines the consequences of NAFTA for the trade flows of third countries, and Chapter 7 does the same with FDI flows to countries excluded from NAFTA. Both chapters pay particular attention to NAFTA's neighbors in Central America and the Caribbean. This summary discusses the report's main findings and policy recommendations.

1. The analytical challenge – Identifying the impact of NAFTA

Table 1 and Figure 1 contain facts about Mexican economic performance since 1980. This evidence explains why the debate over the impact of NAFTA on the Mexican economy remains controversial. On the one hand, trade and FDI as a share of GDP were higher in the post-NAFTA period than in the previous years. However, these rising trends were also evident in the period of unilateral trade reforms of the late 1980s. Moreover, as discussed below, world trade was growing quickly, and FDI was rising in many other emerging markets that did not benefit from NAFTA. On the other hand, the performance of the economy in terms of growth of GDP per capita and real wages was not that remarkable after NAFTA. Real wages in manufacturing activities improved relative to their depressed levels after the 1982-1984 crisis and rapidly after their collapse in 1995. Existing estimates of the national poverty rate seem to closely follow the evolution of real wages, as shown in Figure 1. Of course, an important reason why growth and wages did not perform more favorably after 1994 was the macroeconomic and financial crisis triggered by the devaluation of December 1994. Indeed, below we discuss evidence showing that trade and FDI cannot be blamed for the lackluster performance of wages. We believe that firm policy conclusions cannot be extracted from this type of simplistic analysis. The

Table 1. Mexico: Selected Indicators

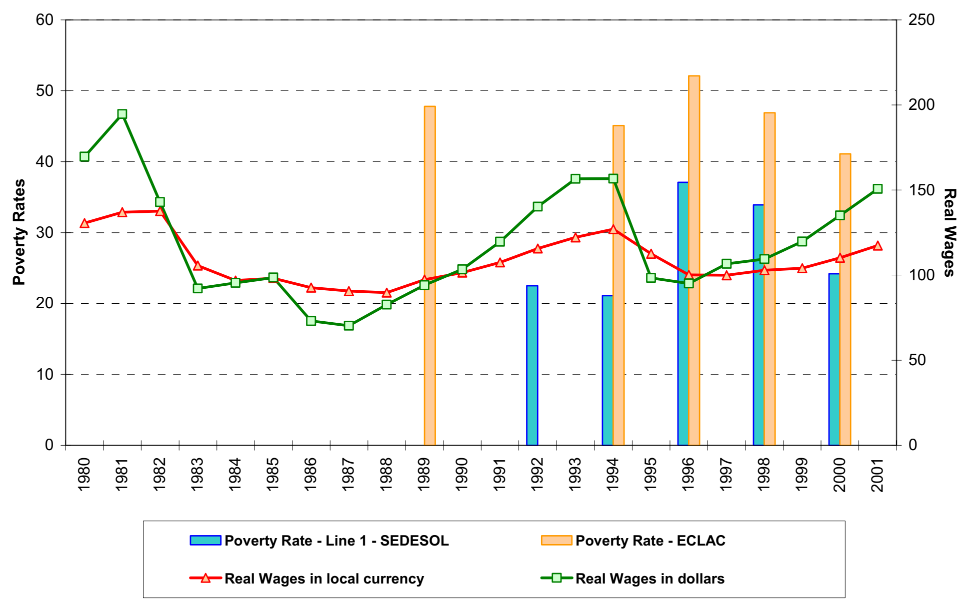
	1980-85	1985-93	1994-2001
Trade over GDP	28.1%	37.0%	75.7%
FDI net of Privatizations over GDP	1.1%	1.2%	2.9% (1)
FDI over GDP	1.1%	1.2%	3.0%
Real GDP Growth per capita in local currency	-0.2%	1.1%	1.2%
Real Wages in local currency	-4.8%	3.5%	-1.0%
Real Wages in dollars	-9.0%	9.5%	-0.5%
Poverty Rate - SEDESOL*	n/a	22.5% (2)	24.2% (3)
Poverty Rate - ECLAC	n/a	47.8% (4)	41.1% (3)

Notes:
* Poverty line #1 - individuals. See Figure 1.
(1) 1994-1999
(2) 1992
(3) 2000
(4) 1989

reason is that there were many other factors, besides the implementation of NAFTA, that can explain both the continuity of certain trends and the disappointment of others.

This Report thus faced the analytical challenge of attempting to identify the impact of NAFTA on the Mexican economy. For this purpose we commissioned and conducted a series of analyses that applied various identification strategies. Some rely on the historical or time-series behavior of Mexican economic indicators, others use inter-sector, inter-regional, and international comparisons to assess the extent to which different factors affected economic outcomes. The main findings of these analyses are summarized below.

Figure 1. Mexico: Real Manufacturing Wages and Poverty



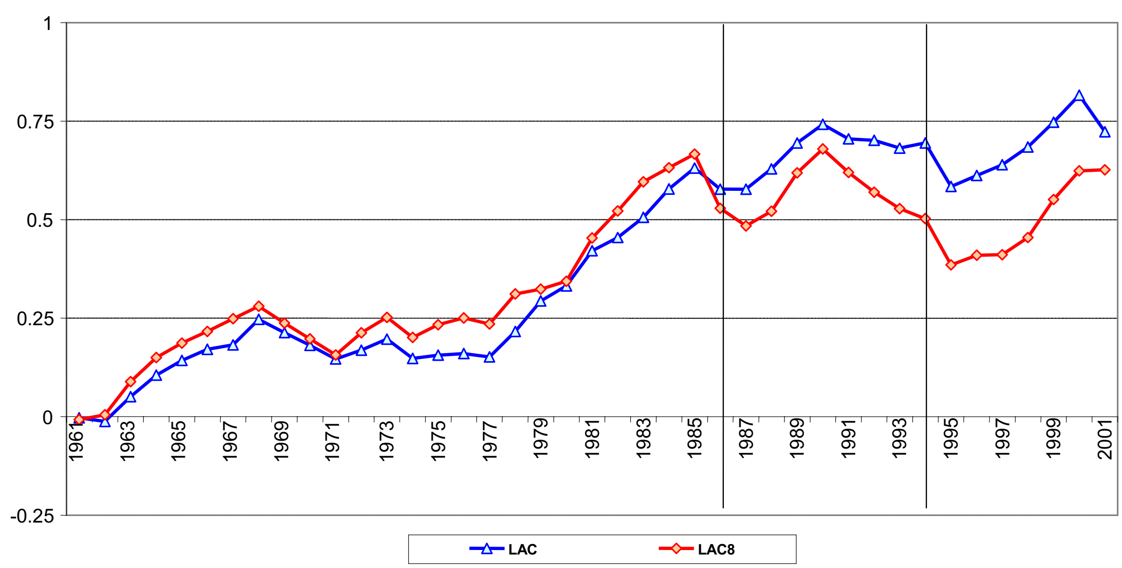
2. The FTAA and economic convergence in the light of NAFTA

NAFTA has brought significant economic and social benefits to the Mexican economy. Trade, FDI and growth outcomes improved as a consequence of NAFTA and Mexico's earlier unilateral reforms initiated in the mid 1980s. Real wages have recovered rapidly from the 1995 collapse, and the poverty rate has followed a similar path.

Yet one key conclusion from careful evaluation of the impact of NAFTA is that the treaty does not suffice to ensure economic convergence in North America. Mexico still suffers from important gaps that constrain its ability to catch up with its Northern neighbors. The statistical evidence (Chapter 1) shows that unilateral trade reforms and NAFTA helped Mexico enter into a process of economic convergence with respect to the U.S., and after 1995 the gap between its Gross Domestic Product (GDP) per capita and that of the U.S. has evolved more favorably than in other Latin American and Caribbean economies (Figure 2).

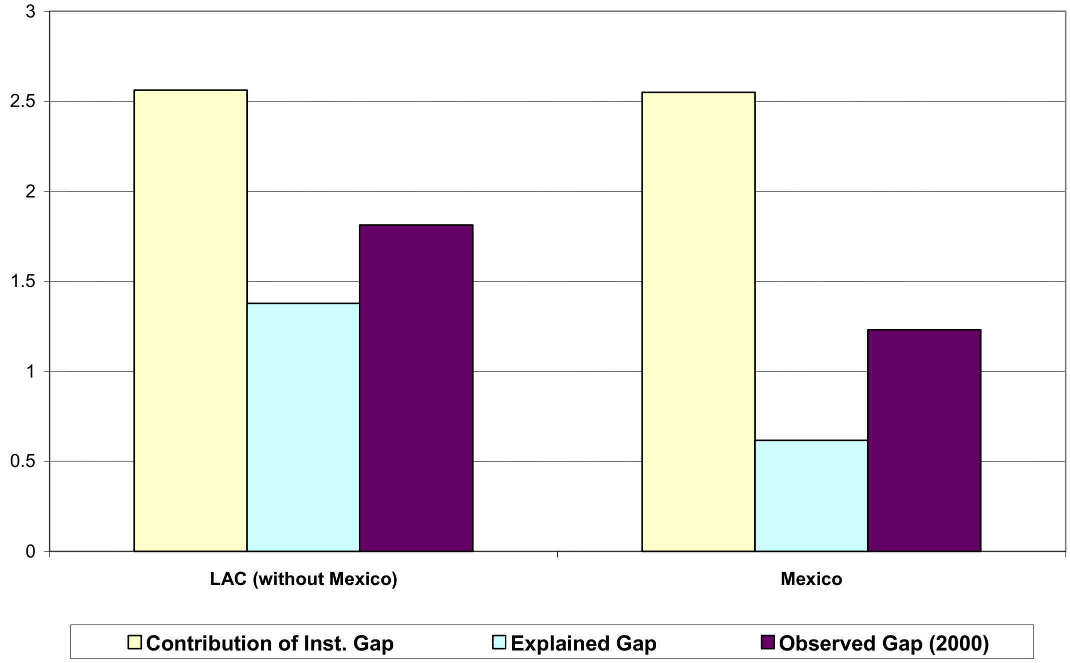
However, the process of convergence faces significant constraints that drive a wedge between per capita GDP in Mexico and the U.S. even in the long run. The report concludes that the key constraints result from institutional gaps (Chapter 1) and deficiencies in education and innovation policies (Chapter 5). In fact, the gap in the quality of the institutional framework is the biggest single factor behind the income gap between the two countries (Figure 3). While the per capita income differential is also affected by a number of other factors, taken together they actually contribute to offset in part the large income gap attributable to Mexico's institutional weaknesses relative to its partners. Moreover, for the rest of Latin America and the Caribbean the situation is very similar: the institutional gap emerges as the biggest obstacle to the region's income convergence with the U.S., a conclusion that puts in perspective the benefits to be expected from the FTAA.

Figure 2. Mexico's Catch-Up to the U.S. Was More Visible after 1995 Than in the Average LAC Country: Annual Effects Relative to the Rest of Latin America, 1961–2001



Note: The dependent variable is the log of the GDP per capita (ppp adjusted) over the U.S. GDP per capita. Each annual effect is the difference between a Mexico year effect and the average LAC year effect. The comparator groups were the following: LAC 8 = Argentina, Brazil, Chile, Colombia, Costa Rica, Peru, Uruguay, and Venezuela. LAC = 22 Latin American and Caribbean countries. The omitted year was 1960.

Figure 3. Mexico: Estinmated Impact of the Institutional Gap on the per capita GDP Gap



Institutional reforms, especially those aimed to improve the rule of law and fight corruption, will be critical for the future economic development of the Region. They will help narrow the current institutional gaps with respect to the U.S., which for many LAC countries (with Chile as the main exception) remain substantial, in spite of the fact that most of them, including Mexico, and especially Chile and Central America, did make some progress in the 1990s regarding the quality of their institutions (Table 2).

The experience of Mexico also indicates that institutional improvements should not be expected to be automatic byproducts of North-South free trade agreements. Substantial unilateral efforts will be required to revamp Latin American and Caribbean institutions and speed up income convergence in the Americas. The role of education and innovation policies is discussed further below.

Table 2. Mexico and Latin America: Institutional Changes

Country / Group	Before-NAFTA 1984-1993	After-NAFTA 1994-2001	Change After-Before
Mexico	-1.80	-1.46	0.34
Argentina	-1.49	-1.05	0.43
Brazil	-1.00	-1.57	-0.57
Chile	-1.55	-0.73	0.82
Colombia	-1.80	-1.91	-0.11
South America	-1.68	-1.59	0.09
Central America	-2.51	-1.61	0.90
Andine Countries	-1.98	-1.60	0.39
Latin American Countries	-1.83	-1.53	0.30

Note: These are the gaps relative to US in terms of the ICRG composite index.

3. Macroeconomic synchronization and policy coordination

In addition to long-run effects on per capita income and wages, trade agreements also have potentially major implications for aggregate fluctuations in member countries and therefore for the design of their macroeconomic policies. Through increased economic integration, the macroeconomic cycles of partner countries may become more closely synchronized—although this is need not be invariably the case, especially if the countries involved are very dissimilar. A thorough review of the evidence shows that in the post-NAFTA years aggregate fluctuations in Mexico have become increasingly synchronized with those of its partners in the treaty (Chapter 2). Although the post-NAFTA period is still too brief to allow firm conclusions, this suggests that the nature of macroeconomic volatility in Mexico is changing, with developments in the U.S. accounting for an increasingly large fraction of the variation in Mexico's GDP growth. We may expect that the same will occur, to varying extents, to other countries after joining the FTAA.

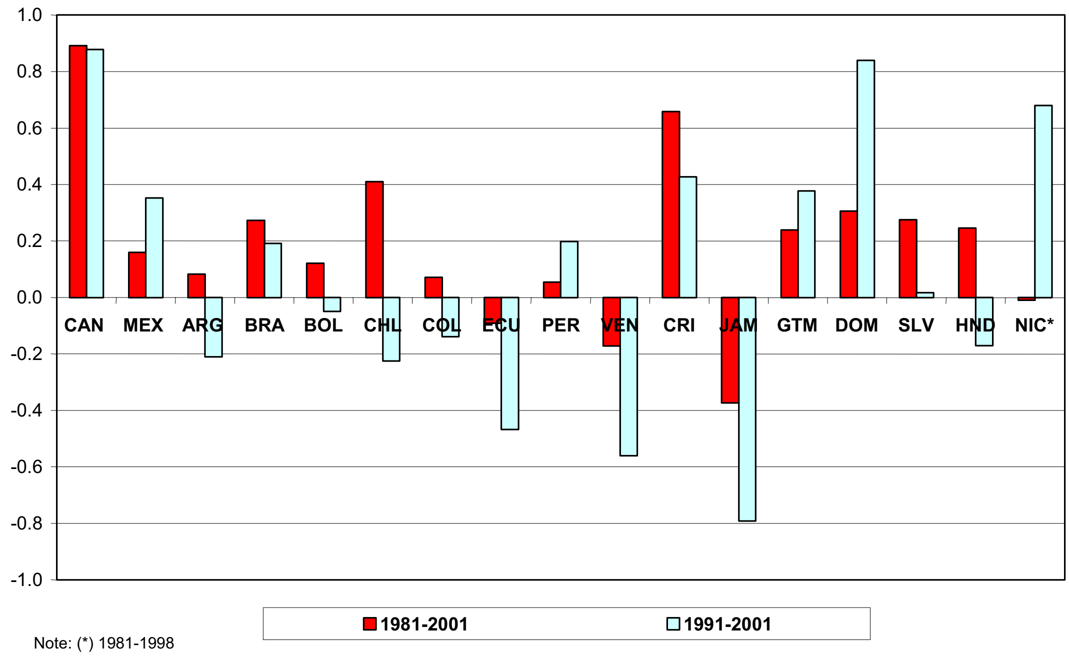
This raises the issue of the desirability of policy coordination. There is little ground for coordination among LAC countries alone, given their generally low degree of trade integration, the dominant role of idiosyncratic shocks in their macroeconomic fluctuations, and the absence of an obvious anchor country in the region whose policy credibility could enhance that of client countries. However, the prospect of an FTAA places the issue under a new light. Aggregate instability remains high in most LAC countries in spite of having fallen in the 1990s, and is a potential obstacle to the achievement of the full benefits of an FTAA in terms of resource reallocation and trade expansion—particularly so in the case of real exchange rate volatility. This poses the question of whether tight policy coordination with the U.S.—including options such as monetary unification with the U.S. through a currency union or unilateral dollarization—could help enhance macroeconomic stability and deepen integration.

At present, however, for most countries in the region the answer is likely to be negative. Their degree of trade integration with the U.S. is generally low, and the scope for asymmetric shocks correspondingly large (Figure 4). Although the latter may decline over time with deeper integration, as in the case of Mexico with NAFTA, the cost derived from the loss of policy autonomy that a monetary unification with the U.S. would entail likely outweighs any potential benefits in terms of increased credibility. Moreover, the prospects for a formal currency union with the U.S.—i.e., one including arrangements for seigniorage sharing, lender-of-last-resort functions and joint determination of monetary policy—seem remote. As a result, the only viable form of monetary unification would be unilateral dollarization, which is even less appealing due to the added cost from leaving those three issues unresolved.

Looser forms of monetary coordination short of unification, while possible, are unlikely to be credible or effective in the absence of central institutions to oversee and enforce them. The same applies to fiscal policy coordination. While the external commitment imposed by common fiscal rules might help national governments push forward fiscal reform and consolidation, the absence of enforcement mechanisms and institutions is likely to render the rules largely inoperative. The very limited success of previous attempts at policy coordination in several LAC subregions also points in this direction.

Central America may provide the exception to the above considerations. Most of the countries in the area are highly open and integrated with the U.S. In addition, some of them suffer from low credibility and exhibit a high degree of *de facto* dollarization. On the whole, this would make them the most suitable candidates for monetary unification with the U.S. El Salvador has already taken this step, although more time is needed to assess its experience with dollarization.

Figure 4. Latin America: Correlation in Annual Growth of Real GDP with the U.S.



In contrast, most of the larger economies in South America are likely to benefit from independent monetary policy, and several of them have already made progress with the implementation of flexible exchange rate regimes guided by inflation targets. For them the challenge is to establish a track record of monetary stability and low inflation to strengthen the credibility of the inflation-targeting regime.

On the fiscal front, the ability of most LAC countries to conduct countercyclical policy is severely limited by poor credibility, following from a tradition of large fiscal imbalances, and by the weak operation of automatic fiscal stabilizers, reflecting narrow tax bases and, in several cases, the large weight of volatile resource revenues in total fiscal collection. In a context of deficient fiscal institutions, the result has often been a procyclical fiscal stance, which augments aggregate volatility instead of reducing it.

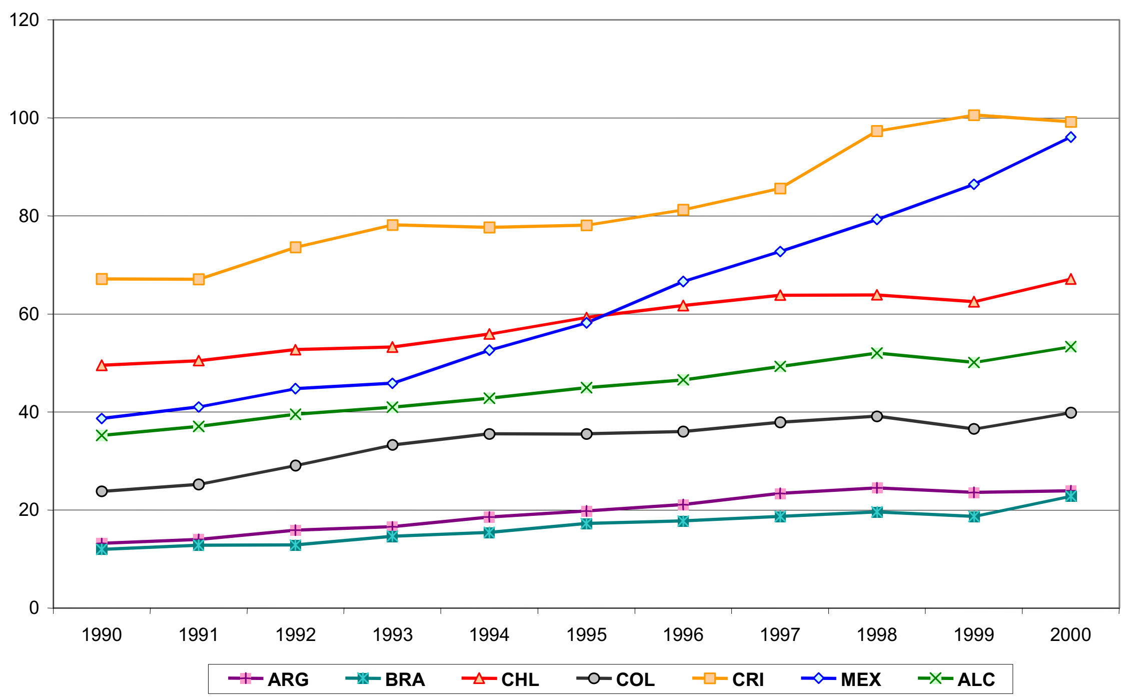
A solid fiscal position will require in many countries a tax reform to expand the revenue base—and, in some countries, also to offset the income loss from declining tariff collection derived from the FTAA. Maintenance of a firm fiscal position will reinforce credibility over time. But the credibility buildup could also be aided by explicit adoption of (and adherence to) contingent fiscal targets formulated in cyclically-adjusted terms, along the lines of Chile's recent 'structural surplus' rule. These entail the achievement of fiscal surpluses in periods of expansion to provide room for deficits in times of recession. The creation of strong fiscal institutions allowing policy makers to implement these rules and abide by them is an essential ingredient of this process.

4. Trade integration

Mexico's trade liberalization under NAFTA followed closely the unilateral reforms begun on 1986, after the country joined the General Agreement on Tariffs and Trade (GATT). Trade negotiations between Mexico, Canada and the U.S. began informally in 1990, and more formally in 1991 after the U.S. administration obtained "fast track" authority from its legislature. Thus, it is difficult to separate the effects of NAFTA on Mexico's volume and composition of trade from those of the unilateral reforms, especially given that the mere announcement of NAFTA talks could have had an impact on economic outcomes. Nevertheless, it is clear that during the 1990s Mexico became one of the region's economies with highest volume of trade relative to GDP. Indeed, Mexico caught up with Chile in this indicator of economic integration, and is fast approaching the high trade shares typically found among smaller economies such as Costa Rica (Figure 5).

The rapid expansion of Mexico's trade began prior to NAFTA, approximately in 1993, and was accompanied by a marked change in its composition, through which Mexico became a net exporter of machinery in 1992-93. Thus, substantial changes happened prior to actual implementation of the free trade agreement, perhaps reflecting lagged effects of the unilateral reforms and/or their enhanced credibility due to anticipated passage of NAFTA. Other studies by U.S. and Mexican researchers reviewed in this Report (Chapter 6) suggest that the behavior of aggregate Mexican exports and imports did not change significantly with the advent of NAFTA. Rather, this evidence indicates that the agreement ensured the continuation of these positive trends. Moreover, results from detailed statistical analyses (Chapter 6) support the argument that NAFTA did not cause significant trade diversion in the aggregate, but it might have diverted trade against Asian imports of textiles and apparel. The Report also identifies a few key areas where the agreement has failed to establish free trade. In particular, the main areas for future improvements are related to rules of origin (ROOs) in manufacturing trade, agriculture, and anti-dumping and counter-vailing duties (AD/CVDs).

Figure 5. Latin America: Imports plus Exports over GDP



4.1 Rules of origin

The study shows that NAFTA's rules of origin, which like in other free trade agreements are used to identify products eligible for preferential treatment in order to prevent trade deflection from non members, can result in countries importing the structure of protection from their partners. Rules of origin impose a cost on exporters wishing to use FTA preferences for their exports. The cost can be so high as to make it more profitable for exporters to export subject to duties, rather than using the preferences, and thus avoid the requirements imposed by the rules.

An extreme case is that of the textile and apparel industries, where Mexico probably has imported the U.S. structure of protection. This occurred because the U.S. seems to be NAFTA's low-cost source of textiles used in the manufacture of apparel. Since NAFTA offered substantial preferential treatment to Mexican exports of apparel that use textiles and yarns from NAFTA countries (mainly the U.S.), the decision whether to export to the U.S. apparel market depends only on the U.S. apparel and textile prices as determined by its import barriers. The evidence shows that Mexico has become a net exporter of apparel to the U.S., but not to the rest of the world, while being a major importer of U.S. textiles.

But a large share of Mexican apparel exports does not enter the U.S. taking advantage of NAFTA preferences. In fact, the use of those preferences by Mexican exporters is similar to the use of CBI/CBERA preferences by exporters in Central America and the Caribbean, even though the latter impose stricter rules of origin demanding that the textiles used in apparel manufacture be entirely from the U.S. (Table 3). The recently-approved Andean Trade Preferences Act (ATPA) imposes similarly strict rules of origin to apparel exports to the U.S. from the beneficiary countries.

Thus, for other LCR countries expecting their apparel and textile industries to benefit from a NAFTA-type deal, it is important to keep in mind that the relevant rules of origin might limit the magnitude of the desirable market access effect. For countries possessing a competitive textile industry, moving from CBERA (or ATPA) to NAFTA rules of origin might make a big difference. Using estimates of net exports of textiles and apparel, the Report argues that this will be the case for countries such as El Salvador or Colombia. But for other countries that will not be the source of low-cost textile and yarn inputs used in apparel, the change might not be very beneficial. Hence, for most countries in the region it may be preferable to amend NAFTA's rules of origin in this sector. One alternative would be to use regional value content rules, rather than the existing change of chapter rule, which in effect implies that all of the textile and yarn inputs in apparel need to be of regional origin. Yet for countries that use low-cost inputs from other regions, NAFTA rules of origin might be more harmful than what was observed for Mexico.

Table 3. Mexico and Selected Countries: NAFTA and CBI Apparel Preferences Utilization Rates

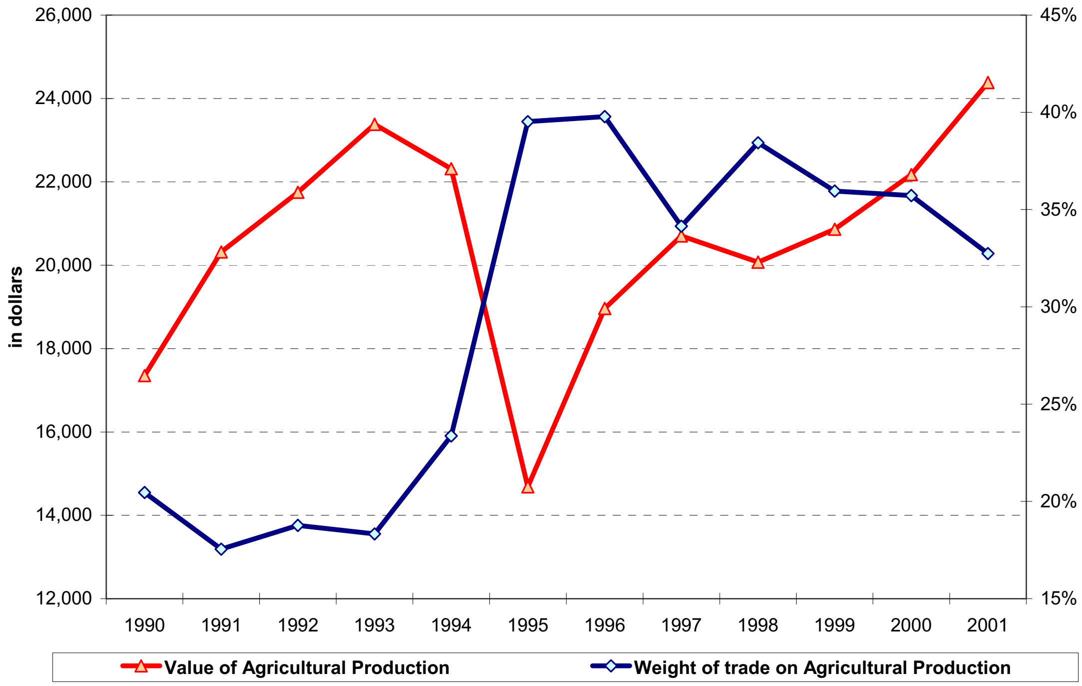
	2001	Jan-Nov 2002
Mexico (NAFTA)	68%	74%
Costa Rica (CBI)	53%	65%
El Salvador (CBI)	57%	63%
Honduras (CBI)	62%	73%
Nicaragua (CBI)	21%	29%
Jamaica (CBI)	59%	88%
Dominican Rep (CBI)	68%	83%

Source: Authors' calculations based on data from the U.S. ITC.

4.2 Agriculture

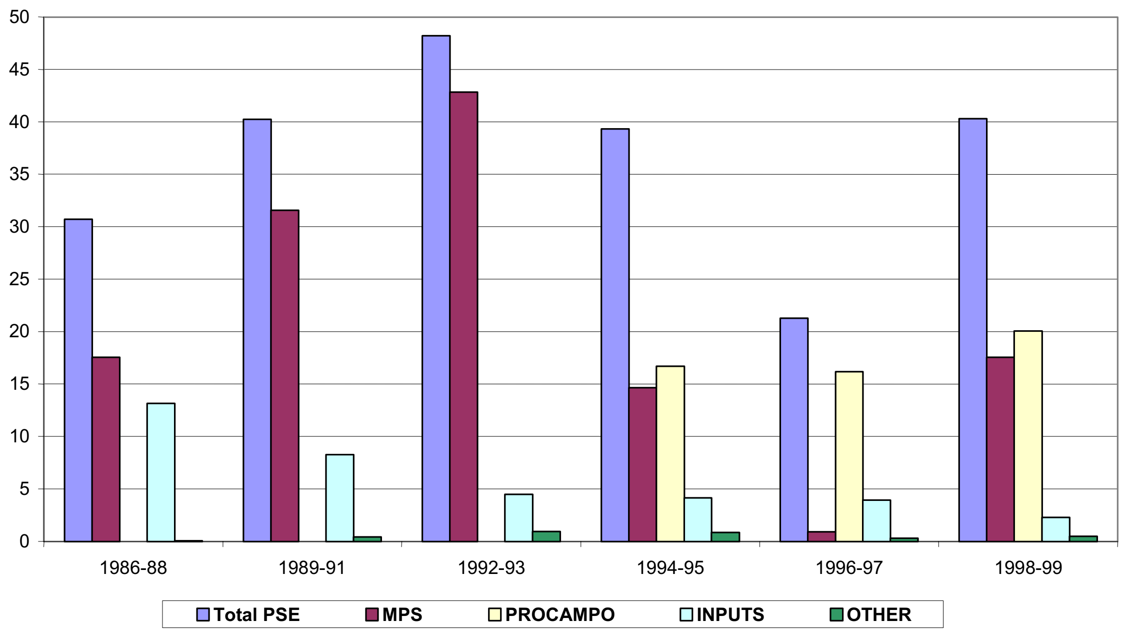
Contrary to some predictions, NAFTA has not had a devastating effect on Mexico's agriculture. In fact, both domestic production and trade in agricultural goods rose during the NAFTA years (Figure 6). The more challenging question is why NAFTA did not have the expected negative consequences. We offer three arguments. First, aggregate demand in the U.S. and Mexico grew in the latter half of the 1990s, thus allowing for simultaneous increases in Mexican production and imports. Second, some segments of Mexican agriculture experienced increases in land productivity. This was the case for irrigated lands, but

Figure 6. Mexico: Agriculture Production (mns of USD) and Trade, 1990–2001



not for rain-fed lands. Third, whereas the total amount of subsidies and income supports for traditional agriculture did not rise during the NAFTA period, Mexico's unilateral reforms did entail an improvement in the efficiency of such subsidies. In particular, the PROCAMPO program, which de-linked the amount of public support from current and future production decisions, became the main source of support for farmers that had historically produced traditional crops such as maize and other grains (Figure 7).

Figure 7. Mexico: Production Support Equivalents (PSE) by Type



Note: Traditional crops: maize, rice, soy, wheat, barley and sorghum.
Source: OECD (2000)

The Report briefly discusses some key program design issues that should be considered when implementing de-linked agricultural support programs, based on the Mexican and U.S. experiences. In particular, the efficiency gains from the PROCAMPO program suggest that other countries liberalizing trade should also consider agricultural support schemes that provide incentives for productive transformation of the sector, rather than maintain incentives similar to those provided by protectionist policies that inhibit agriculture's transformation.

4.3 Anti-dumping and countervailing duties (AD/CVDs)

Regarding AD/CVD activity, the report finds two contrasting results. On the one hand, NAFTA's Chapter 19, which provides a panel review mechanism for assessing whether AD/CVD decisions by the competent national agencies have been properly applied, has had no significant impact on U.S. AD/CVD activity against Mexico or Canada. The post-NAFTA period has conformed to tradition in that U.S. AD/CVD actions against Mexico and Canada have continued to be infrequent (Table 4).

On the other hand, there is some evidence suggesting that Mexico's AD activity against the U.S. and Canada has been significantly lower after the implementation of NAFTA. However, the U.S. has traditionally been a major focus of Mexican AD cases. It is also notable that Chile rejected the U.S. proposed language on AD/CVDs in its recently finalized FTA.

For the upcoming FTAA, AD/CVD activity poses a key policy challenge. One option is to harmonize the antitrust regime among Latin American and Caribbean countries and the U.S. However, given the fact that AD/CVD laws in each country were designed with the explicit purpose of protecting domestic producers from "unfair" foreign competition, it is unlikely that such a process of regulatory convergence can be achieved in the forthcoming trade negotiations with the U.S. Another alternative is for each country to use its own AD/CVD laws to retaliate against any abuses by the U.S. or other countries—at the risk of trade wars and more rather than less protectionism. The third, preferred alternative could be to reach an agreement with the U.S. that would allow the use of safeguards for regional trade relief rather than AD/CVD procedures. This would entail a regional negotiation of a new

Table 4. Average Annual U.S. Antidumping and Countervailing Duty Filings

	Pre-CUSFTA Pre-NAFTA **1980-1988**	Post-CUSFTA Pre-NAFTA **1989-1993**	Post-CUSFTA Post-NAFTA **1994-2000**
Against NAFTA partners			
Canada	**3.9**	**4.3**	**1.6**
Mexico	**1.1**	**3.8**	**1.7**
Against Other countries/regions			
Japan	**7.6**	**6.3**	**3.33**
European Union	**32.7**	**20.3**	**8.3**
Latin America	**10.8**	**11.3**	**4**
Asia	**13.8**	**22.3**	**14.6**
Rest of the World	**14.1**	**11.5**	**9.1**

Sources: U.S. Antidumping Database available from the National Bureau of Economic Research webpage: http://www.nber.org/antidump, and official sources of the U.S. Department of Commerce and U.S. International Trade Commission safeguards chapter stating clearly that regional import surges should be dealt primarily through this mechanism. This alternative is attractive in the short run because, in contrast to U.S. AD/CVDs, safeguard duties are temporary and require the action of the executive branch, in contrast with duties without sunset clauses supported by a supposedly technical and independent, but often unfair, trade machinery.

4.4 Trade diversion from NAFTA

When NAFTA was being negotiated in the early 1990s, many third countries voiced concern that their exports to the U.S. (and, to a lesser extent, to Canada and Mexico) would be displaced by NAFTA exports, even though in many products and industries those countries could be more competitive than NAFTA producers. From the viewpoint of Mexico, this trade diversion is also important because it would entail a loss of fiscal revenues from replacing imports from third countries subject to tariffs with duty-free imports from the U.S. or Canada.

From a thorough analysis of trends in aggregate trade flows, controlling for their basic determinants, the report (Chapter 6) finds little evidence of trade diversion at the aggregate level, a conclusion that agrees with previous studies of NAFTA. Indeed, such result is also suggested by the fact that Mexico's export share in non-NAFTA markets rose as much as, or even more than, its share in NAFTA markets (Figure 8).

The report also examines the trends in apparel trade to assess if NAFTA's neighboring countries were hurt by trade diversion in this sector, as some studies have suggested. On the whole, there is not solid evidence that neighboring countries lost apparel market share due to NAFTA preferences. While all countries in Central America and the Caribbean faced the same change in U.S. preferences relative to those enjoyed by Mexico, their post-NAFTA performances showed considerable diversity. Most Central American countries managed to raise their export share in NAFTA markets, while Caribbean economies fared less well. This suggests that factors other than NAFTA preferences are responsible for much of this diverse post-NAFTA performance (Table 5).

Figure 8. Share of Mexico's Non-Fuel Exports in NAFTA and Non-NAFTA Markets (percent)

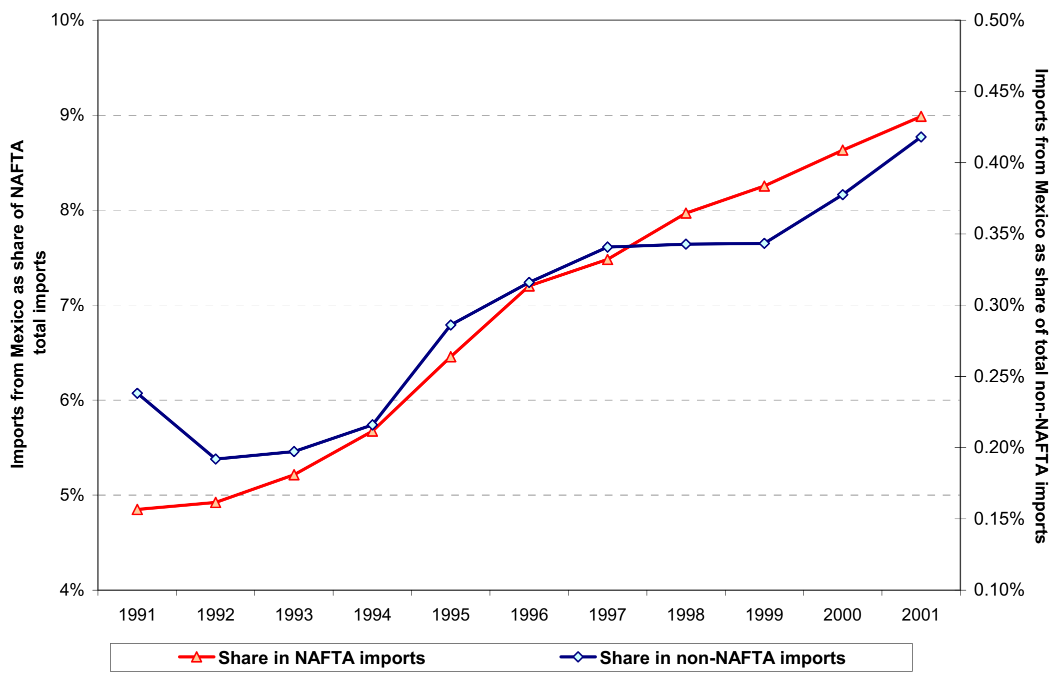


Table 5. Shares in NAFTA's Total Apparel Imports

	1991-94	1995-2001
Mexico	3.74%	10.76%
Costa Rica	1.79%	1.50%
Guatemala	1.48%	2.04%
Honduras	1.27%	3.28%
Nicaragua	0.03%	0.41%
El Salvador	0.67%	2.06%
Central America	**5.24%**	**9.29%**
Dominican Republic	3.76%	3.91%
Jamaica	1.05%	0.77%
CARICOM	**5.00%**	**4.78%**
Bangladesh	2.21%	2.88%
China	15.44%	11.71%
Hong Kong	14.54%	8.82%
Indonesia	2.82%	3.31%
India	3.24%	3.29%
Korea	6.67%	3.81%
Thailand	2.48%	2.82%
Taiwan	7.48%	3.84%
Asia	**54.89%**	**40.47%**

Source: UN-COMTRADE, Apparel HS 61, 62

Among such factors, export incentives granted by a number of countries in the context of Export Processing Zones (EPZs) may have played an important role. It is thus possible—although hard to verify—that the upward trend in the region's apparel export shares might have been achieved at significant costs derived from EPZ concessions, such as foregone fiscal revenues and other potential distortions. Looking to the future, WTO rules imply that EPZs incentives in their current form will have to be phased out, so that a new export- and investment-friendly framework will have to be developed by the countries involved.

4.5 Future trade negotiations for LCR countries: The multiple fronts

The likely benefits for LAC countries of an FTA with the U.S. and Canada go beyond the reduction of barriers to their mutual trade. On the one hand, an FTA implies a firm guarantee of market access, in contrast with preferences granted unilaterally by the U.S. (such as those under CBI/CBTPA and ATPA), which are offered on a temporary basis and subject to unilateral revocation at any time. Furthermore, unilateral concessions typically leave the resolution of trade disputes to the discretion of U.S. authorities.

On the other hand, an FTA can help "lock-in" progress made on unilateral trade liberalization, making it immune to protectionist pressures that might arise in the future. It may also have a broader positive impact on credibility by offering investors, domestic and foreign, a more stable and predictable framework preventing backtracking not only in the rules governing international trade, but possibly in the reforms on other fronts as well. These lock-in and credibility effects, however, may vary considerably across FTAA prospective members. They are likely to be most important for countries at an early stage of trade opening whose reforms still suffer from poor credibility. For other countries which already possess low barriers to trade and a strong constituency in favor of trade openness, the credibility dividend will largely depend on the extent to which FTAA accession prompts improvement and strengthening of policies and institutions.

However, an FTAA also entails costs and policy challenges—negotiation costs, especially significant for small countries; fiscal costs derived from the elimination of tariffs against other FTA members, which for some countries will imply a sizeable shock requiring fiscal reform; and hidden costs such as the distortions imposed by ROOs under NAFTA, which, if not properly tackled in the negotiation process, can detract substantially from FTAA benefits.

Moreover, the anticipation of gains to be made from an FTAA does not reduce the need for continued progress with unilateral trade reforms and multilateral negotiations under the aegis of the WTO. Some key issues, such as those surrounding agricultural trade, are unlikely to be resolved in the context of an FTAA, as experience has shown that the U.S. is not prepared to deal with its own agricultural supports in the context of FTAs. The same is true for AD/CVD activity, although it is yet unclear whether the U.S. would be able to change its relevant laws even under a WTO-brokered deal. Finally, for some countries, especially in South America, trade agreements with Europe and the Doha Trade round are likely to be quite important for market access, perhaps to a greater extent in some areas than the proposed FTAA.

LAC countries should remain actively engaged in the Doha trade round. Argentina and Brazil are likely to be important players in the agricultural debate as two of the seventeen members of the Cairns Group of agricultural exporters, which also includes Canada and Australia, to push for important reforms in agricultural policies around the world. In this area, success of the WTO round in providing incentives for all countries to de-link their subsidies from production decisions—as previously attempted by the European Union, and implemented by the U.S. and Mexico—would be a significant improvement over the current situation, where only 5% of the average OECD agricultural support is based on historical harvests. If one excludes the U.S. (20%) and Canada (9%), the average of the rest of the OECD is even lower. Since the process of EU enlargement is already bringing to the fore the sustainability of Europe's Common Agricultural Policy (CAP), it is likely that in the future there will be room for compromise on agricultural subsidies.

Regarding unilateral liberalization, the analysis in the report suggests that much of the gain in export market share achieved by Mexico in recent years reflects its unilateral trade liberalization since the late 1980s. The implication for third countries is that trade-friendly policies, even if unilateral, can yield large dividends in terms of export market expansion. Moreover, there is no convincing evidence that higher initial tariffs can help developing countries attain better market access to industrialized countries in trade negotiations, as some have suggested. On the contrary, developing countries with weak credibility may need to lower tariffs in order to signal their willingness to implement further trade reforms as mandated by potential trade agreements. It is not a coincidence that the U.S. negotiated NAFTA after Mexico had unilaterally reformed, and that Chile was the next country in line, closely followed by Central America, which as a whole is among the most open economies of the region. Thus, the report concludes that LAC countries should pursue unilateral and multilateral reforms, while simultaneously negotiating FTAs with the U.S. and other countries. In fact, this has been the Chilean model for some time.

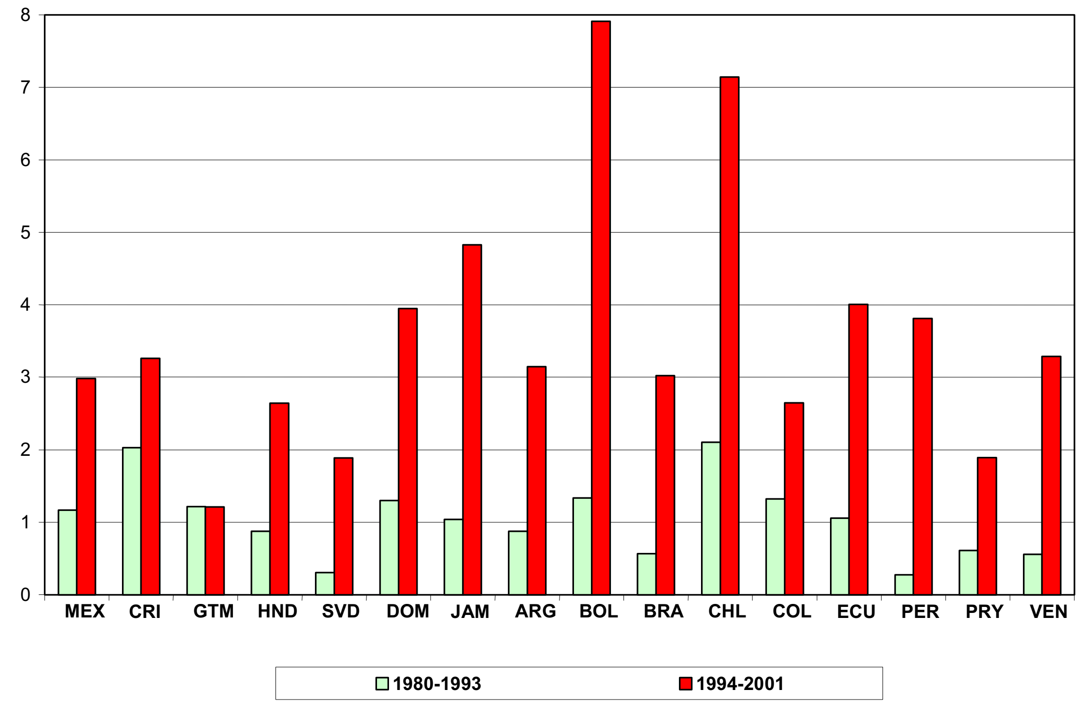
5. Factor markets

While Free Trade Agreements are about trade by definition, they also have potentially major consequences for the allocation as well as the retribution of labor and capital, for several reasons. First, theory suggests that trade should lead to greater convergence of the returns to capital and wages among the trading partners, reflecting increased efficiency in the allocation of factors. Second, FTAs may include explicit provisions removing barriers to international movements of capital (like in NAFTA) and/or labor (like in the EU). Finally, but not less importantly, FTAs may reduce the perceived risk from investing in member countries, by providing a guarantee of access to the extended market defined by the agreement, and by locking-in the trade and other policies of participating countries.

5.1 Capital

Through the above channels, an FTA may deepen the degree of financial integration—in addition to trade integration - of its member countries. In particular, it may prompt a substantial rise in foreign investment inflows to FTA newcomers. Indeed, the anticipation of higher FDI is probably one of the main benefits that prospective members expect from the upcoming FTAA. The experience with NAFTA appears to validate these expectations: aggregate FDI flows to Mexico did rise significantly in the period following NAFTA, and econometric analysis suggests that the trade agreement played an instrumental role in the rise (Chapter 4). On the whole, however, Mexico's FDI performance in the post-NAFTA period was not significantly above the Latin American norm, except in the years immediately following passage of the treaty (Figure 9). Nor is there much evidence that increased investment in Mexico came at the expense of other countries in the region—i.e., that NAFTA led to investment diversion. The neighboring countries of Central America and the Caribbean, which stood to lose the most from a redirection of FDI flows to Mexico, did not show a generally worsened performance as investment hosts after NAFTA (Chapter 7).

Figure 9. Latin America: Net FDI Inflows as Percentage of GDP
(annual averages by period)



Taken together, this evidence indicates that while an FTAA is likely to encourage FDI to LAC member countries, it is neither necessary nor sufficient for such result. Chile has experienced persistently large FDI in the absence of an FTA, while Greece derived no immediate FDI benefits at the time of its EEC accession. In other words, an FTAA is a complement, rather than a substitute, for an investment-friendly policy and institutional environment, and it cannot make up for macroeconomic instability and weak institutions. Thus, countries hoping to benefit from FTAA-induced investment creation need push forward with reforms aimed at improving investment fundamentals: economic and policy stability, productivity, institutions and governance. While there is considerable diversity in the region, along most of these dimensions LAC countries still lag behind other developing regions such as East Asia.

This strategy centered on improving the investment climate for both domestic and foreign investors should replace the export-based FDI incentives that have been at the core of FDI-attracting efforts in a number of countries, notably Central America and the Caribbean. As already noted, such incentives will soon cease to be feasible under WTO rules. Tax concessions and other incentives are less important than FDI fundamentals for investment location decisions, although they do have some impact when the choice is among hosts with similar fundamentals. However, incentives can also be distorting and wasteful if the investments they attract do not involve significant positive externalities. To minimize their costs, incentives should be rules-based, and available on equal terms to all investors irrespective of nationality.

The key concern for host countries is not the volume of FDI they may receive, but the benefits that it brings to the economy. Reforms in anticipation of an FTAA have to focus also on the key determinants of those benefits, even if they do not directly affect the volume of FDI inflows. In particular, for the domestic economy to absorb any technological spillovers arising from FDI, sufficient levels of human capital and an adequate knowledge and innovation system need to be in place (Chapter 5).

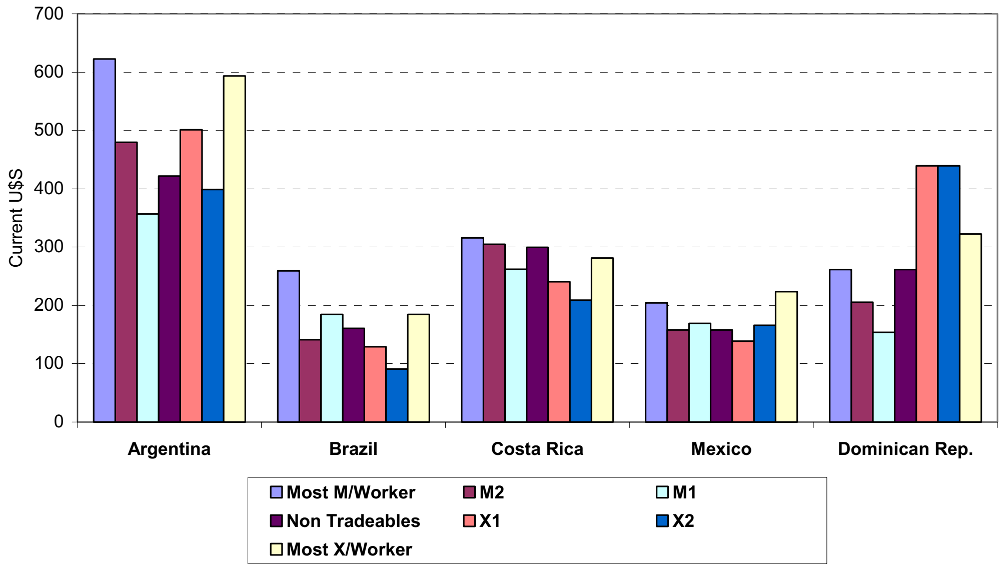
However, increased FDI and international financial integration do not guarantee that firms will be able to take full advantage of the new opportunities offered by the FTAA and speed up income convergence in the Americas. The vast majority of firms in LAC—especially smaller and new ones—cannot resort to foreign financial markets, and their access to domestic finance is constrained by the deficiencies of local financial markets. To a large extent, the small size and illiquidity of these markets reflect legal and institutional shortcomings regarding the protection of creditor and shareholder rights, which in most Latin American countries is far weaker than in industrial countries and East Asia (Chapter 4). Thus, legal and regulatory measures to strengthen investor protection should rank high in the reform agenda.

5.2 Labor

Regarding labor, the lessons emerging from Mexico for other countries contemplating the FTAA are necessarily tentative, but the overall evidence suggests that cautious optimism is warranted. There is some evidence of convergence towards U.S. wage levels, but inference is made very difficult by the collapse of Mexican real wages following the Tequila crisis. Though manufacturing wages rose after unilateral liberalization and sharply in the years following NAFTA, there is no strong evidence that this was particularly due to convergence through trade. On the one hand, wages are higher, and have grown faster, in states with more trade, FDI, and presence of maquila. On the other hand, the apparently tighter integration of wages along the border, in traded and non-traded industries alike, suggests an important role for migration in driving the limited convergence seen so far. Perhaps a longer-run view is offered by Chile which, after its very similar version of the Tequila crisis following unilateral liberalization in the early 1980s, generated real wage growth of an impressive 3.2% per year from 1986 to the present, with large declines in rates of poverty.

In spite of popular perception, there is little ground for concerns that NAFTA, or FTAs more generally, are likely to have a detrimental effect on the availability and/or quality of jobs. Consistent with the region-wide evidence, there is little indication of higher unemployment, increased volatility of the labor market, or increased informalization associated with trade liberalization. In fact, Mexican firms, as those of the region more generally, that are more exposed to trade tend to pay higher wages adjusted for skills (Figure 10), are more formal, and invest more in training. The probably temporary widening of the wage gap between skilled and unskilled workers observed throughout the region can be seen as a reflecting a welcome increase in the demand for skilled workers by new and upgrading firms.[2] However, it does imply, as discussed below, that the FTAA will require a more vigorous effort in raising the level of human capital.

Figure 10. Latin America: Wages Adjusted for Skill by Degree of Exposure to Trade



Note: M1 and M2 are progressively the terciles of industry most exposed to imports. X1 and X2 are progressively the terciles with the most exports.

It is more difficult to identify the labor market policies best suited to complement the FTAA. In the short run, an FTA may lead to significant reallocation of jobs from sectors not in a country's comparative advantage to those that are, and such reallocation is essential to take advantage of the gains from trade. Over the longer run, more dynamic economies are likely to require higher turnover of workers as new technologies are adopted and new firms and sectors are created, expand and die. Labor legislation ideally needs to facilitate the transition of workers from dying to expanding industries, while protecting their livelihoods in the process. A more general question is how labor markets adjust to major macro-economic shocks of the kind facing Argentina, Brazil, Colombia and Mexico, for example, during the 1990s. The present evidence from Mexico does not suggest that openness in itself has led to more shocks to the labor force, but the issue is important in order to interpret the evidence from the various experiences in the region.

At the time of NAFTA's signing, the Mexican labor market was reasonably flexible and showed few nominal rigidities. Mexico's low levels of unemployment, with the exception of the Tequila aftermath, reveal the economy's ability to carry out necessary sectoral reallocations without major adverse labor market outcomes. Even during the crisis, Mexico engineered sharp falls in the real wage by allowing inflation to erode pact-guided wages and thereby avoided very high rates of unemployment. Arguably, this is the critical difference with countries such as Argentina and Colombia, whose macro-economic crises during the 1990s in a framework of relatively rigid real wages have led to high and sustained unemployment. What Mexico's experience suggests is that neither prolonged spells of unemployment nor degradation of the quality of jobs are inevitable, or even likely, results of an FTAA.

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[2] The region-wide trends in the quality and availability of jobs, as well as skill premium and its determinants, are amply documented in LAC's recent flagship reports "From Natural Resources to the Knowledge Economy" (2001) and "Closing the Gap in Education and Technology"(2002).

A greater concern for all countries considering FTAAs is the inability of firms to make adjustments to their labor force at moderate and predictable cost, and the lack of safety nets for workers where such adjustments are possible. Mexico is very representative of South and Central America (although not the Caribbean) in prohibiting worker layoffs for economic reasons and imposing costs for dismissals roughly double the advanced-country average. In fact, Brazil, with the lowest separation costs in Latin America, is only slightly above the advanced-country average while Bolivia at the high end shows costs that almost triple those of industrial countries. The lack of an orderly system of separations for economic reasons leads to highly litigious dismissals that raise transaction costs for firms and uncertainty for both parties about the final compensation. The system discourages the ongoing reallocation of workers to better job matches, impeding the gains in labor productivity that are a hoped-for by product of the FTAA. It also represents a very poor form of protection for workers. Absent individual accounts such as those implemented in Colombia or Chile, or an unemployment insurance program such as that of Brazil, their source of income in case of a firm collapse is the ailing firm itself, exactly the wrong agent to bear the risk. In sum, Mexico's labor code, like many of those of those in countries considering the FTAA, probably serves neither workers nor employers well, and is likely to become more of an impediment in the context of more open, competitive economies following regional trade liberalization.

6. Innovation

The deficiencies in the educational and innovation systems of most Latin American and Caribbean countries pose a critical constraint on their ability to catch up with the U.S. As described in the recent World Bank LAC flagship report on "Closing the Gaps in Education and Technology in Latin America and the Caribbean," these deficiencies affect virtually every country in the region. The corresponding policy issues are discussed in more detail in that report as well.

The main *educational gaps* in Latin America and the Caribbean are those related to the coverage of secondary enrollment and the poor quality of the education provided to its citizens. Attainment along these dimensions in Mexico, as well as in most of the countries in the region, is below the international norm for countries with similar levels of income.

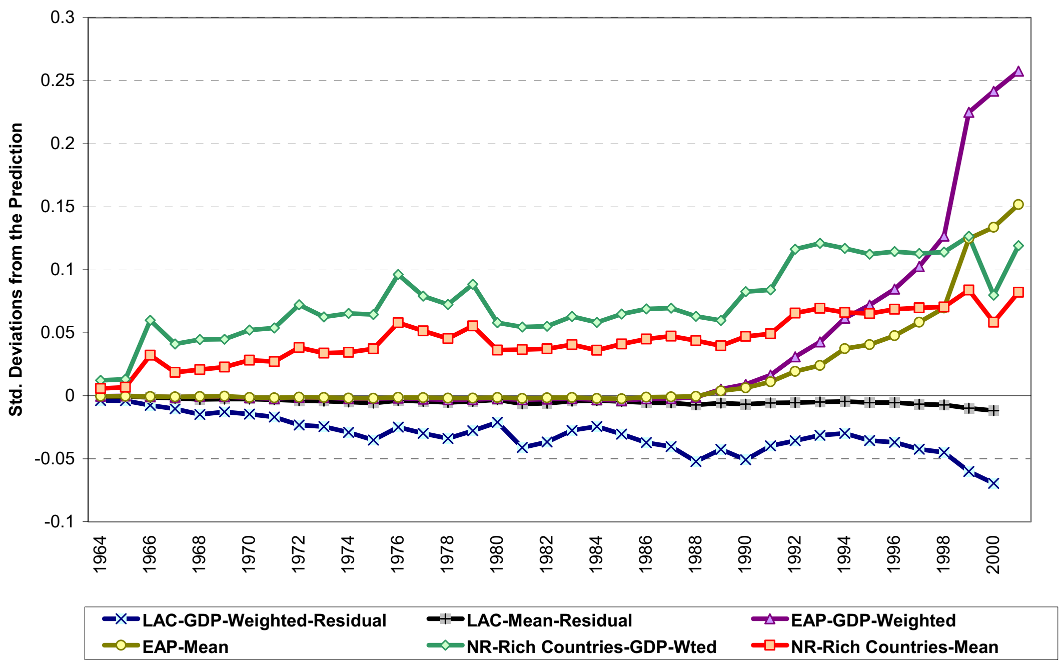
The region as a whole also lags the international norm in *total R&D effort* as well as in the efficiency of such effort. Total R&D effort and patenting activity fall short of the levels typically found in countries with similar characteristics. The international evidence suggests that the region's R&D investment effort should be about 2.5 times its current level, which during the late 1990s was approximately 0.4% of GDP in Argentina, 0.6% in Mexico, 0.8% of GDP in Brazil, compared to over 2.5% in the U.S. and Korea. NAFTA's main contribution to Mexico's innovation effort might have been its Chapter 17 on Intellectual Property Rights, since our analysis suggests that stronger protection is associated with higher levels of R&D spending relative to GDP.

The *inefficiency of the region's innovation systems* is reflected in a level of patents received for each dollar invested in R&D that is significantly below the OECD average, which itself is substantially below those of Korea, Taiwan, Sweden and Finland. Of all the countries in LAC, only Costa Rica and Venezuela rank among the high-efficiency performers. This regional inefficiency seems to be associated with the lack of linkages between the productive sector and the universities and public think tanks, which in turn do not provide incentives for its researchers to participate in productive R&D efforts. These deficiencies are reflected in the private sector's perceptions concerning the quality of the research conducted in the universities and in the extent of collaborative projects between universities and private firms.

The *region's lag in innovation outcomes* is thus reflected in the fact that the number of U.S. patents granted to regional researchers is significantly below what should be expected on the basis of GDP, labor force, and exports to the U.S. (Figure 11). In contrast, the evidence also identifies a group of high-performing natural-resource rich countries (Australia, Canada, Finland, New Zealand, Sweden, and Norway) which, along with East Asia and the Pacific region, do much better than the international norm.

An adequate innovative capacity is essential to fully exploit the potential of NAFTA and the upcoming FTAA. To develop it, the region needs to intensify its progress in education, both in terms of coverage and quality, and make a strong effort in innovation spending. This can be accomplished by reviewing the public incentives to R&D and overhauling what is, for the most part, a dysfunctional National Innovation System.

Figure 11. LAC's Gap in Patent Counts Relative to the Average and the Patenting Over-Achievers



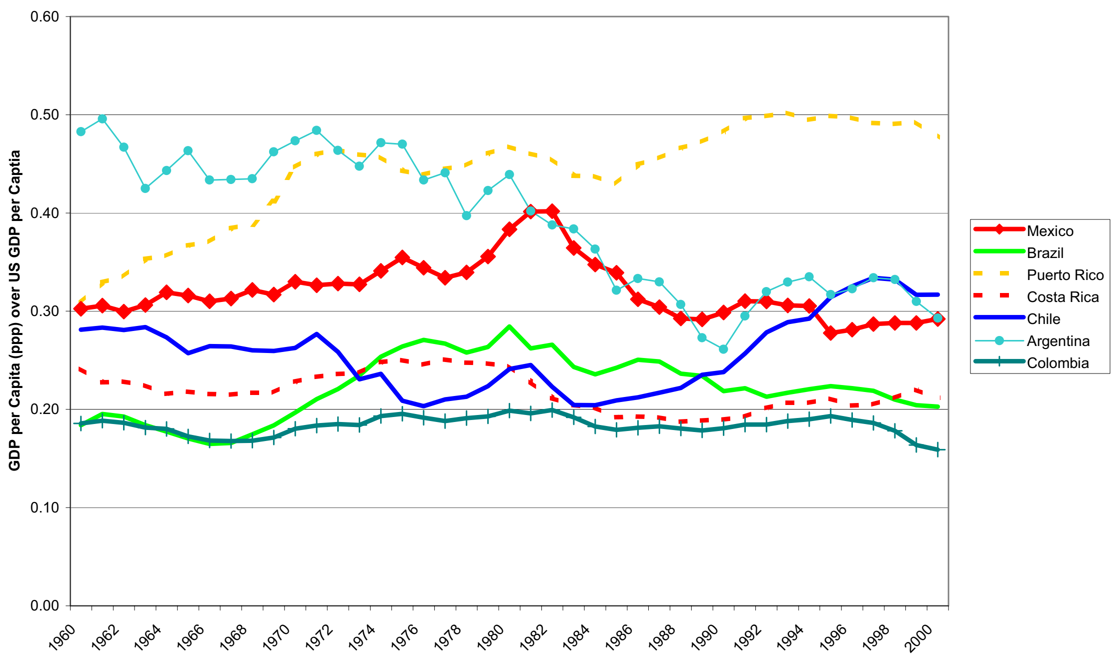
Chapter 1

NAFTA and Convergence in North America: High Expectations, Big Events, Little Time

1.1 Introduction and related literature

The North American Free Trade Agreement (NAFTA) was formally implemented on January 1, 1994 by the United States, Canada, and Mexico. This treaty instantly gained global notoriety since the formal negotiations started in 1991 mainly because the initiative would become not only one of the most comprehensive trade agreements in history, but also because it seemed to be a breakthrough by leading to free trade in goods and services among developed countries and a developing country. The high expectations were that trade liberalization would help Mexico catch-up with its Northern neighbors. As shown in Figure 1, the ratio of Mexican GDP per capita to the U.S. did increase after unilateral trade reforms were implemented in 1986 and also after the implementation of NAFTA in the aftermath of the so-called Tequila crisis. However, it is noteworthy that other Latin American economies also grew faster than the U.S. economy since the mid-1980s, especially Chile and to a lesser extent Costa Rica. Thus it is not obvious that NAFTA was particularly important in helping Mexico catch-up with the United States. Yet the experience of Puerto Rico is also interesting, given that it is an economy that started with a similar level of development as Mexico in the late 1950s, but achieved an unprecedented level of economic and institutional integration with the U.S. in 1952, and subsequently experienced the fastest rates of economic growth in the developing Latin American economies. This paper attempts to assess the extent to which these high expectations seem to be materializing. It examines trends and determinants of income and productivity gaps observed in North America, both across countries as well as within Mexico.

Figure 1. GDP per Capita Relative to the U.S., Selected Economies, 1960-2001



Source: Loayza et al. (2002), World Penn Tables 5.0, and World Development Indicators.

1.1.1 High expectations

The high expectations for NAFTA were supported by neoclassical growth and trade theories. The seminal work of Solow (1956) states that capital-poor countries grow faster than rich countries due to the law of diminishing returns, as long as production technologies, population growth, and preferences are the same across countries. Likewise, the neoclassical Hecksher-Ohlin trade models predict that as the prices of goods and services converge, so will factor prices, including real wages. Hence income levels across borders will also tend to converge as prices converge. A key simplifying assumption of neoclassical economics is that all countries use the same production technologies exhibiting either constant or diminishing returns to scale.

There is a lively debate about the evidence concerning the impact of trade liberalization on income convergence across countries (Slaughter 2001; Ben-David 2001, 1996). There is also an extensive literature about economic convergence within countries including Barro and Xala-I-Martin (1995) and Xala-I-Martin (1996). At least since the publication of Barro (1991), the economics profession has been aware that convergence might be conditioned by convergence in certain fundamentals that are believed to cause economic growth. While there is admittedly much uncertainty about what these fundamentals are (Doppelhofer et al. 2000), the evidence of conditional convergence can be interpreted as evidence in favor of the neoclassical growth model or as evidence that there are fundamental differences that prevent income convergence.

1.1.2 Technology and divergence: The "big" story

For Easterly and Levine (2001) and Pritchett (2000), the "big story" in international income comparisons is that the rich have gotten richer while the poor got poorer. Some studies focusing on cross-country differences in the *levels* of income per capita (or GDP per worker) argue that these differences are largely explained by institutional factors (Hall and Jones 1999; Acemoglu, Johnson, and Robinson 2001). However, there are other factors, besides different fundamentals that might impede economic convergence among geographic areas even if there is free trade.

More recent theories of growth with increasing returns and/or technological differences across regions, such as the pioneering work of Romer (1986, 1990), Lucas (1988), and Grossman and Helpman (1991), predict divergence in income levels and growth rates across regions. Trade flows might help international technology diffusion when technical knowledge is embodied in goods and services, and theories of technology diffusion via trade have been the subject of a fast-growing literature (Eaton and Kortum 1999, Keller 2001). A related literature focuses on the barriers that impede technological adoption, which explain differences in the levels of income per capita (Parente and Prescott 1996). Thus, even when production technologies are different across countries, convergence can be aided through the liberalization of trade. But this would tend to be detected in convergence (divergence) of TFP levels within industries across countries (Bernard and Jones 1996). But even if trade liberalization allows poor countries to import production technologies from advanced countries, if the factor endowments are different, productivity levels might not converge due to the mismatch between labor skills available in poor countries and the sophisticated technologies imported from the rich countries. Hence productivity gaps within industries across countries might persist even if trade facilitates technological convergence (Acemoglu and Zillibotti 2001).

1.1.3 Geography and divergence: The "big" story

The recently resurgent literature on economic geography, transport costs, economies of scale, and knowledge spillovers is less optimistic about the impact of trade liberalization on economic convergence (Krugman 1991; Fujita, Krugman and Venables 1999). For example, transport costs will remain as barriers to trade and economic integration even if all policy distortions are removed (Eaton and Kortum 2002). In addition, if learning and innovation depend on trade, then geography will also be an impediment to convergence via technological diffusion (Keller 2002; Eaton and Kortum 2002). These factors might hamper income convergence across countries (Redding and Venables 2001). Moreover, economies of scale and knowledge spillovers might make some geographic regions more prosperous than others simply because of the cumulative effects of initial conditions such as the density of economic activity (Ciccone and Hall 1996).

1.1.4 Life after NAFTA: Big events, little time

On the day of NAFTA's implementation, the Zapatista rebels took up arms in Mexico's southern state of Chiapas. Later that year, in December 1994, Mexico was forced to float the Peso, which was followed by a deep banking crisis and severe recession. Beginning in late 1995, after a sharp deterioration and subsequent recovery of domestic investment, the Mexican economy was recovering by 1996 (Lederman et al. 2003). These were big events that coincided with the implementation of NAFTA. Moreover, from a long-run perspective, the post-NAFTA period is still short. These big events, combined with little time after NAFTA increase the difficulty of empirically identifying the impact of the agreement on income and productivity gaps in North America. Nevertheless, we try various methodologies to assess how income and productivity differences were affected by NAFTA.

The rest of the paper is organized as follows. Section II uses times series techniques to identify the impact of NAFTA on the income gap between Mexico and the U.S. To deal with the big-events-little-time problem, we apply various time-series methods. First, we follow Harvey (2002) and conduct a structural time series exercise that might be able to separate transitory effects (e.g., the Tequila crisis) from the long-term effects expected from NAFTA. Second, we provide estimates of the impact of NAFTA on the rate of convergence between Mexico's and the U.S. GDP per capita. Third, we follow Fuss (1999) in applying cointegration analysis to see whether there is an observable process of income convergence between the U.S. and Mexico. We do this recursively to test whether there was a structural change in the equilibrium condition between U.S. and Mexican GDP using quarterly data from 1960-2001. We find that the debt crisis in the early 1980s and the Tequila crisis temporarily interrupted a process of economic convergence (perhaps toward absolute convergence), which resumed after 1995. Convergence after Mexico's trade liberalization in the late 1980s and after NAFTA might have been faster than prior to the debt crisis. However, given that other Latin American economies also seem to have grown quickly during this time period, we also provide econometric annual estimates of the differences between Mexico-specific and Latin American income effects. These results indicate that Mexico's performance between 1986 and 1993 was not that different from the average Latin American economy, but it was significantly more positive after NAFTA, with the obvious exception of 1995. The estimates of the rate of convergence suggest that Mexico's GDP per capita by the end of 2002 would have been about 4% lower without NAFTA.

Section III looks at the income per capita differentials across countries in 2000 and estimates the extent to which institutional differences explain observed income differences. This exercise follows Acemoglu, Johnson, and Robinson (2001) in using settlers' mortality rates from colonial times as instruments for currently observed differences in institutional quality, based on data from Kaufmann and Kray (2002a). We find that the income gap between the U.S. and Mexico can be largely explained by the institutional gap plus geographic variables. In addition, we examine the evolution of the institutional gap with respect to the U.S. in Mexico by, again, comparing annual estimates of Mexico effects to the average Latin American effect, and conclude that there is not evidence that Mexico's institutions improved more than others from Latin America in the post NAFTA period. Thus, to accelerate convergence a major effort will be required to improve Mexico's institutions—NAFTA is not enough.

Section IV studies the impact of NAFTA on TFP differentials within manufacturing industries across the U.S. and Mexico. Based on a panel estimation of the rate of convergence across 28 manufacturing industries, we find that the post-NAFTA period was characterized by a substantially faster rate of productivity convergence than in previous years. However, at this time we cannot say whether the productivity-convergence result was due to increased imports of intermediate goods from the U.S. (as argued by Schiff and Wang 2002), due to competitive pressures and preferential access to the U.S. market (as argued by López-Córdova 2002), or by increased Mexican innovation that might have been caused by a variety of factors, including increased domestic R&D efforts and patenting aided by the enhanced protection of intellectual property rights contained in the NAFTA (Lederman and Maloney 2003).

Section V looks at the impact of NAFTA on economic convergence across Mexican states. This issue is of particular interest to many Latin American economies who are looking forward to the proposed Free Trade Area of the Americas (FTAA), because this hemispheric economic integration would theoretically lead to the establishment of free trade, and, in some cases such as in Central America and perhaps Mercosur, to deeper forms of economic integration among countries, which would resemble a single economic entity. Thus different economic performance of Mexican states under NAFTA might be a prelude of differential effects that might be brought by the FTAA or other proposed arrangements, such as the Central America-U.S. Free Trade Agreement (CAFTA). We test the conditional convergence hypothesis across Mexican states, but focus exclusively on initial conditions that might explain why some Mexican states grew faster than others during 1990-2000. We find suggestive evidence that the initial level of skills of the population and telephone density played an important role. We interpret these results as evidence that trade liberalization might indirectly induce divergence within countries, even if it induces convergence across countries. Section V summarizes the main findings and proposes a research agenda focusing mainly on the questions raised by our findings related to TFP convergence in manufacturing.

1.2 Time series evidence

1.2.1 Structural time series modeling

A simple way to gain insight into the convergence process is to separate trends and cycles from the relative output gap between the United States and Mexico, whereby a decreasing trend in the output gap indicates convergence. The Hodrick-Prescott filter can create serious distortions, however, as can the Baxter-King band pass filter.[3] We therefore follow Harvey and Trimbur and, in a later work, Harvey, who argue that trends and cycles are best estimated by structural time series models.[4] We estimate a bivariate structural time series model, in which convergence between two economies is captured through a similar-cycle model that allows the disturbances driving the cycles to be correlated across countries.[5] Harvey provides a direct link between cointegration, common factors, and balanced growth models.[6] He also shows that the balanced growth model results as a special case of the similar-cycle model, when a common trend restriction is imposed.[7]

The analysis in this section is based on quarterly data on real GDP per capita for the US and Mexico over the period 1961:4 to 2002:4. To create a quarterly PPP-adjusted data series, we applied the following procedure. Quarterly GDP data were obtained from the OECD and the population series were constructed as quarterly moving averages of annual figures (from the WDI, The World Bank) spread across four quarters. US GDP data was seasonally adjusted by the provider, Mexican GDP data was seasonally adjusted using X-12-ARIMA. We first converted Mexican data into US dollars using quarterly average nominal exchange rates. Both series were then deflated by US CPI to 1996 US dollars. As PPP adjusted figures are only available on an annual frequency, we apply a two step procedure for the PPP adjustment of our quarterly series. In a first step we estimate the exchange rate bias by regressing the annual PPP adjusted GDP figures from World Penn Tables 6.1 on an annual exchange rate adjusted GDP

[3] On the distortions associated with the Hodrick-Prescott filter and the Baxter-King band pass filter, see references in Harvey (2002).

[4] Harvey and Trimbur (2001); Harvey (2002).

[5] Harvey and Koopman (1997).

[6] Harvey (2002).

[7] Harvey and Carvalho (2002).

series. In a second step, we apply the predicted exchange rate bias to our series of quarterly exchange rate-adjusted per capita GDP figures. [8]

We then fit a similar-cycle bivariate model to the logarithms of quarterly per capita GDP in the United States and Mexico.[9] The individual trends and cycles from these bivariate structural time series models are displayed in figure A1 in the appendix. A model with two cycles appears to describe the data well, and the second cycle appears to capture large movements in Mexico around the 1980s.

Figure 2 shows that the PPP-adjusted gap exhibits convergence until the set-back of the 1980s associated with the debt crisis. Convergence resumed around 1987, coinciding with the unilateral liberalization the Mexican economy implemented in 1986. However, this trend might also reflect the recovery from the recession of 1982-1984. The Tequila crisis also represented a temporary set-back. Abstracting from the adverse impact of the last crisis, the downward slope of the income gap is steeper after 1987 than prior to the 1980s, supporting the hypothesis that convergence between Mexico and the U.S. occurred at a faster rate after trade liberalization.[10]

Figure 2. The U.S.-Mexico GDP per Capita Gap: Similar-Cycle Model with Quarterly PPP Adjusted Data, 1960-2002.

Note: Dotted line is the ratio of the U.S./Mexico trend components of GDP per capita. Solid line is the observed ratio. Source: Authors' calculations—see text.

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[8] To estimate the exchange rate bias, we regressed log-transformed PPP adjusted US-Mexican income gap (g_{PPP}) on log-transformed exchange rate adjusted US-Mexican income gap (g_e). We find that our results are robust to different methods of adjustments. Standard errors are in brackets:

$$g_{PPP} = \underset{(0.099)}{0.6991} + \underset{(0.053)}{0.2484}*g_e, \qquad R^2 = 0.25,$$

[9] Following Harvey (2002).

[10] Since the STAMP algorithm provides only RMSE for the final state vector, we estimate for our quarterly series a structural time series model with three different sample end points: 1987:01, 1994:04 and 2001:03. The resulting final state vectors allow us to gain insight if the different gap estimates are statistically different. This is indeed the case, the respective gaps are as follows: 1987:01: 4.067 (0.226); 1994:04: 3.055 (0.205), 2001:03: 1.951 (0.156), RMSEs are in brackets.

To investigate the speed of convergence further, we estimated the following model:

$$g_t = \zeta_0 + \zeta_{Lib} + \zeta_{Nafta} + \eta_0 g_{t-1} + \eta_{Lib} g_{t-1} * Lib + \eta_{Nafta} g_{t-1} * Nafta + tequila + \eta_{tequila} g_{t-1} * tequila + dum82$$

where g_t is the log of the U.S.-Mexico income gap, *tequila* is a dummy for the 1994 Tequila crisis (1994:4–1995:1), and *Lib**g_{t-1}, *Nafta**g_{t-1} and *tequila**g_{t-1} are dummies for Mexico's unilateral trade liberalization (1986:1–2002:4), NAFTA (1994:1–2002:4) and the Tequila crisis, interacted with the lagged income gap. Dum82 is a dummy for 1982:1. The regression results from various specifications of this model are presented in Table 1.

Table 1. Speed of adjustment between USA and Mexico

	(1)	(2)	(3)	(4)	(5)	(6)
ζ_0	0.092*	0.092*	0.028	0.092*	0.028	0.021
	(0.046)	(0.042)	(0.039)	(0.041)	(0.039)	(0.028)
ζ_{Lib}	-0.102	-0.102	-0.038	-0.102	-0.038	
	(0.082)	(0.075)	(0.069)	(0.075)	(0.068)	
ζ_{Nafta}	0.192*	0.210*	0.210*	0.169*	0.169*	0.138*
	(0.116)	(0.105)	(0.095)	(0.108)	(0.097)	(0.084)
η_0	0.920*	0.920*	0.975*	0.920*	0.975*	0.980*
	(0.040)	(0.036)	(0.034)	(0.036)	(0.034)	(0.024)
η_{Lib}	0.086	0.086	0.030	0.086	0.030	
	(0.069)	(0.063)	(0.058)	(0.063)	(0.057)	
η_{Nafta}	-0.160*	-0.179*	-0.179*	-0.145*	-0.145*	-0.120*
	(0.097)	(0.089)	(0.080)	(0.091)	(0.082)	(0.072)
Tequila		0.085*	0.085*	0.593*	0.593*	0.593*
		(0.015)	(0.013)	(0.312)	(0.282)	(0.280)
$\eta_{Tequila}$				-0.430	-0.430*	-0.430*
				(0.264)	(0.238)	(0.237)
Dum82			0.114*		0.114*	0.115*
			(0.019)		(0.019)	(0.018)
LM(1) (p-value)	0.56	0.85	0.85	0.82	0.88	0.87
LM(4) (p-value)	0.01	0.01	0.43	0.01	0.34	0.38
R^2	0.87	0.92	0.92	0.89	0.92	0.92

Note: * = 10% level of significance.

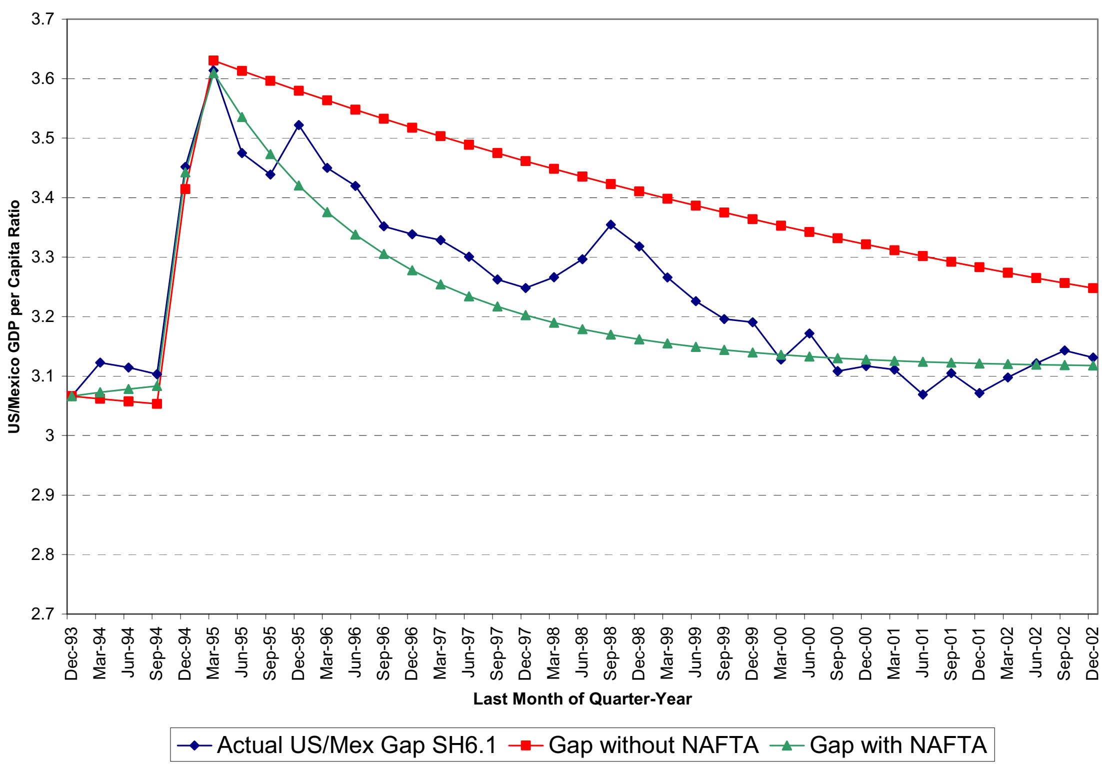
Lagrange multiplier tests for first and fourth order error-serial correlation appear in the bottom rows of Table 1. These tests suggest that the Dum82 variable is required to produce white-noise regression errors. The estimated coefficients of the well behaved specifications are thus listed under columns three, five and six.

The results from the well specified models suggest that NAFTA, but not unilateral trade liberalization, had a significant positive impact on the speed of convergence. With NAFTA, the half-life of a unit shock to the income gap appears to have fallen from about 8.5 to 1.2 years. The fact that unilateral liberalization does not appear to be significant for income convergence is interesting. We find a similar result later in the paper, when analyzing the impact of unilateral liberalization and NAFTA on productivity growth.

However, the NAFTA period was also characterized by significant increase in the average development gap, which is reflected in a statistically significant coefficient of the NAFTA dummy variable. Thus, to get a clear view of the overall impact of NAFTA we need to consider both the acceleration of the speed of convergence during the NAFTA years as well as the increase in the average development gap. Also, the two quarters of the Tequila crisis (1994:4-1995:1) were associated with both a significantly faster speed of convergence and a temporary increase in the US-Mexico development gap, both of which could not have been due to NAFTA since these effects were so short-lived, whereas NAFTA is here to stay for the long-run.

Figure 3 provides an illustration of the gains from NAFTA. It shows the evolution of the observed US-Mexico development gap, the gap predicted by model (6) in Table 1, which considers both effects of NAFTA, and the predicted gap if the NAFTA period had been characterized by the same data-generation process that existed prior to 1994 plus the short-lived impact of the eruption of the Tequila crisis. The overall accumulated effect of NAFTA as of 2002:4 can thus be calculated by the difference between the inverse of the US-Mexico gap predicted by the model with NAFTA's effects on the speed of convergence and the shift in the mean (which is virtually identical to the observed gap in 2002:4) and prediction that assumes that NAFTA's effect was zero. This calculation leads us to conclude that NAFTA had an overall positive effect on Mexico's development. Its GDP per capita at the end of 2002 would have been about 4% lower without NAFTA.

Figure 3. The Gains from NAFTA: Observed and Predicted US/Mexico GDP per Capita Ratio, 1993:4-2002:4



1.2.2 Cointegration analysis

According to Bernard and Durlauf (1995, 1996) long-run convergence between two or more countries exists if the long-run forecasts of output differences approach zero. In other words, two economies are said to have converged if the difference between them, y_t, is stable. Abstracting from initial conditions, stability implies that the difference between two series is stationary. Absolute convergence requires that the mean of y_t is zero, while relative or conditional convergence requires that the difference between the two series has a constant mean. If two series are cointegrated, but with a vector different from [1,-1], the economies are co-moving (i.e. driven by a common trend) but not necessarily converging to identical levels of output. Cointegration between economies alone is therefore a necessary, but not a sufficient condition for absolute convergence. If a constant is introduced into the cointegration space, it is possible to test for absolute and relative convergence by restricting the constant to zero. A zero constant supports absolute convergence.[11] Following Fuss (1999) we intend to interpret evidence of a cointegration vector of the form of [1,-1] at the end of the sample together with a rejection of this vector parameterization in sub-samples as evidence of an ongoing process of convergence.[12]

A cointegration analysis between U.S. and Mexican GDP with a constant and four lags in the cointegration space over the full sample from 1960 to 2002 reveals one significant cointegration vector—see Table 2. As a restriction of the cointegration space according to (1,-1) cannot be rejected ($\theta^2(1) \mid 2.86$, p=0.09) over the full sample, this provides evidence in favor of convergence during 1960-2002[13]:

$$GDP_{us} - GDP_{mx} = 0.835$$

(standard error: 0.060)

The estimate of the constant in the cointegration vector is greater than zero and the standard error for the constant is relatively small. We interpret this as evidence of incomplete convergence in the sense that Mexico is converging towards the U.S. level of income up to a point. That is, the observed process of convergence is unlikely to lead to absolute convergence, but rather to a constant income differential. The estimated constant suggests that Mexico reaches about 40 to 50 percent of the U.S. per capita GDP. Whereas this evidence applies to the whole period, it is possible that this process of conditional convergence holds only for a certain years.

Table 2. Cointegration Analysis for the United States and Mexico, 1960:4 to 2002:4

Eigenvalue	L-max	Trace	H0: r	P – r	L-max90	Trace90
0.1671	30.17*	32.91*	0	2	10.29	17.79
0.0165	2.74	2.74	1	1	7.50	7.50

Source: Authors'calculations.

[11] Further, by introducing a trend into the cointegration space it is possible to distinguish between stochastic and deterministic convergence (see Ericsson and Halket, 2002), where a homogeneity (1,-1) restriction on the GDP coefficients with a trend corresponds to stochastic convergence and homogeneity (1,-1) without a trend to deterministic convergence. As we reject stochastic convergence in favor of deterministic convergence in our data, we only report the findings based on a constant in the cointegration space, which we view as a test of deterministic conditional convergence.

[12] Fuss (1999) postulates that if y and x and cointegrated at the end of the period with: y = a +bx+u, then evidence of:

a=0 and b=1 indicates that the series are converging,

a<>0 and b=1 indicates that the two series are converging up to a constant,

a>0 and b<1 implies that x converges towards y,

a<0 and b>1 implies that y converges towards x,

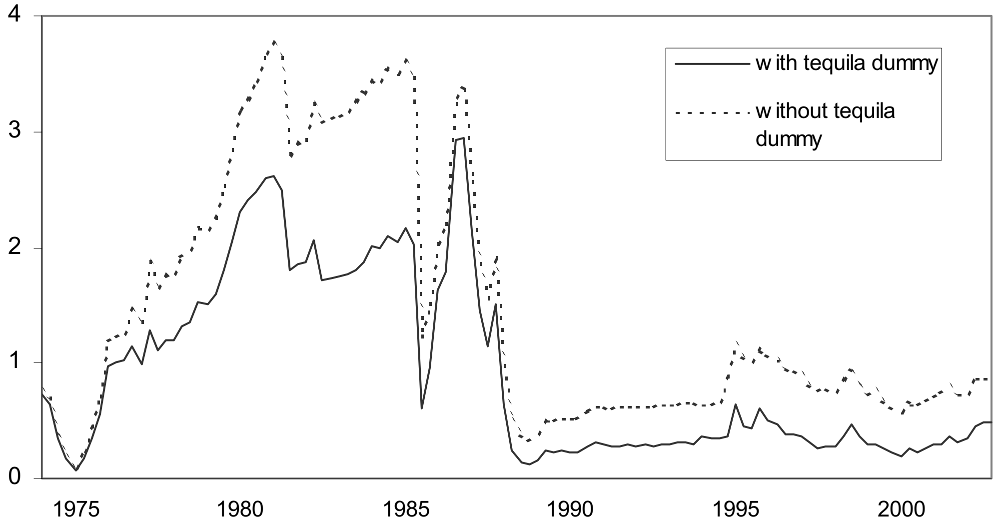
a>0 and b>1 implies divergence (x lags falls y) and

a<0 and b<1 implies divergence (y falls behind z)

[13] A similar result is obtained for annual data: $GDP_{us} - GDP_{mx} = 0.881$.
(standard error: 0.044)

Recursive cointegration analysis reveals that the [1,-1] restriction does not hold in all subsamples (see Figure 4). The graph in figure 4 is scaled in such a way that unity represent the 5% level of significance. As such, a test statistic below one indicates that the hypothesis of convergence cannot be rejected. In particular, we find strong evidence for divergence during the 1980s (debt crisis), in spite of the fact that we estimated the cointegration vector with dummies that properly identify the key first and fourth quarters of 1982.[14]

Figure 4. Trace Tests for Cointegration between U.S. and Mexico (Log) Quarterly GDP, 1960Q4-2002Q4 (recursive estimates)



Source: Authors' calculations—see text.

To assess the impact of the 1994/1995 Tequila crisis on the convergence process, we perform a recursive cointegration analysis with and without a dummy for the Tequila crisis. As can be seen in Figure 3, which plots the cointegration trace test over time, the Tequila crisis had an impact on the convergence process. Once we include a crisis dummy, we find evidence of a resumed convergence process from 1987/88 onwards. Without the Tequila dummy, the convergence hypothesis is rejected around the time of the crisis. This suggests that the Tequila crisis temporarily interrupted an ongoing convergence process which started at the beginning of the 1990s.

The evidence from time series analyses can be summarizes as follows. Structural time series modeling and recursive cointegration analysis both identify periods of convergence and divergence between Mexico and the U.S. during 1960-2002. Both econometric techniques find evidence that the Tequila crisis only temporarily interrupted a convergence process which started in the late 1980s. But this process seems to have a limit. The time series perspective on convergence has allowed us to recover interesting stylized facts about the underlying dynamics of the U.S.-Mexican convergence process, but as highlighted by Figure 1, it is possible that other economies grew just or even faster than Mexico relative to the U.S. since the late 1980s. Therefore, to better identify the Mexico-specific process of convergence towards the U.S. level of development, we now examine Mexico's performance relative to other regional economies.

[14] The relevant model specification tests showed that other dummy variables for the debt crisis tended to bias the estimates of the cointegration rank and coefficient restrictions.

1.2.3 How did Mexico perform relative to other Latin American countries?

In order to know how Mexico performed in closing the income per capita gap relative to the U.S. in comparison to other Latin American countries that did not enjoy the benefits of NAFTA but also reformed their economic policies, we tested whether there was a significant statistical difference between the year effects for a group of Latin American countries and the year effects specific to Mexico. The dependant variable was the (log) ratio of GDP per capita of the countries relative to the United States. The test was conducted with two samples of Latin American countries that include Mexico, one that consisted of 22 countries and another of 9 countries. The list of countries appears in Table 5A in the Appendix.

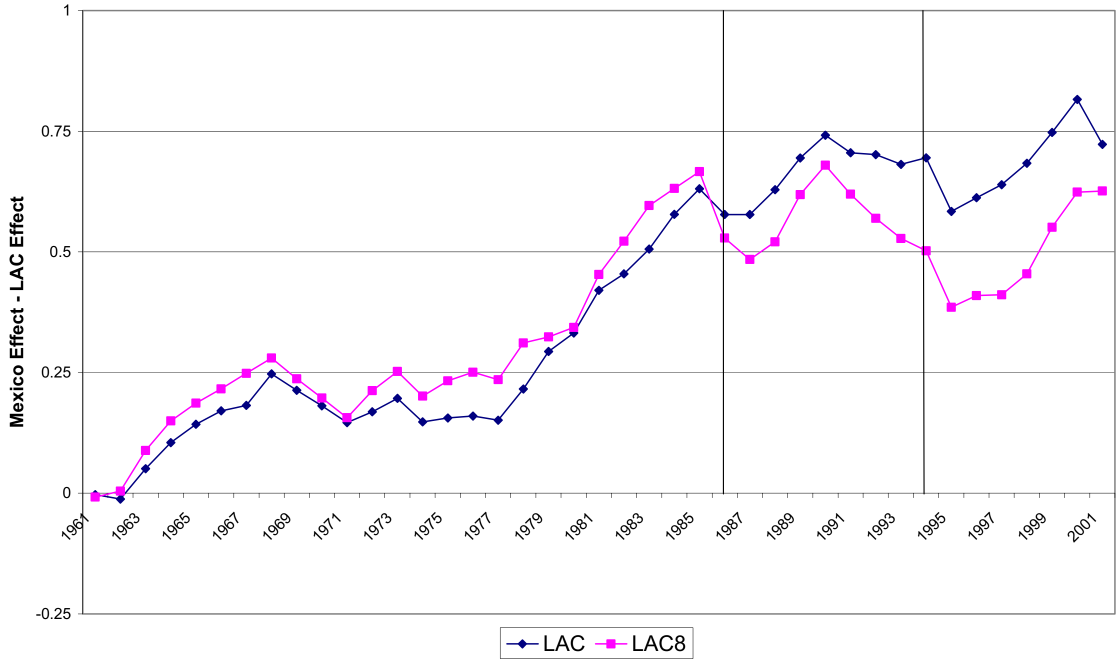
The results are shown in Figure 5.[15] Mexico's year effects are statistically significantly different from the group of 21 countries at a level of 10% of confidence since 1982. In words, the annual observations shown in Figure 4 are significantly different from zero only after 1982. With respect to the smaller comparator group, Mexico's annual effects are also different during 1982-1994 and 1999-2001.[16] However, these differences simply reflect that Mexico tended to be significantly richer than other regional economies during these years. The real question is whether Mexico grew significantly richer than other Latin economies during these years, which should be reflected in upward movements of the country-effects differentials shown in Figure 5. This only occurs after 1995 with respect to both comparator groups. For the larger group of Latin American and Caribbean economies, this might have also occurred during 1986-1993.

The fact that Mexico did not catch-up to the U.S. significantly faster than other middle-income countries (the eight included in the small comparator group) sheds some doubts about the possibility that Mexico's unilateral reforms spurred convergence with respect to the U.S. to a greater extent than reforms in country's such as Chile or Costa Rica. In contrast, the post-NAFTA period is characterized by an declining Mexico-U.S. income gap, which declined faster than for the average Latin economies included in both samples. Following the analysis of the dynamics of convergence process, the next sections try to identify the underlying constraints of the U.S.-Mexico convergence process.

[15] The estimated model was: $y_{c,t} \mid c\ 2\ \eta_t \notin D_t\ 2\ \eta_{t,Mex} D_t \notin D_{Mex}$, where y is the log of the GDP per capita ratio with respect to the U.S., D_t is a year dummy, and D_{Mex} is a Mexico dummy. Figure 4 plots $\eta_{t,Mex}\ 4\ \eta_t$.

[16] Wald tests for significance of the difference between Mexico and average LAC effects are not reported.

Figure 5. Mexico Year Effect Minus LAC Year Effect, Log (GDP pc/U.S. GDP pc)(PPP)



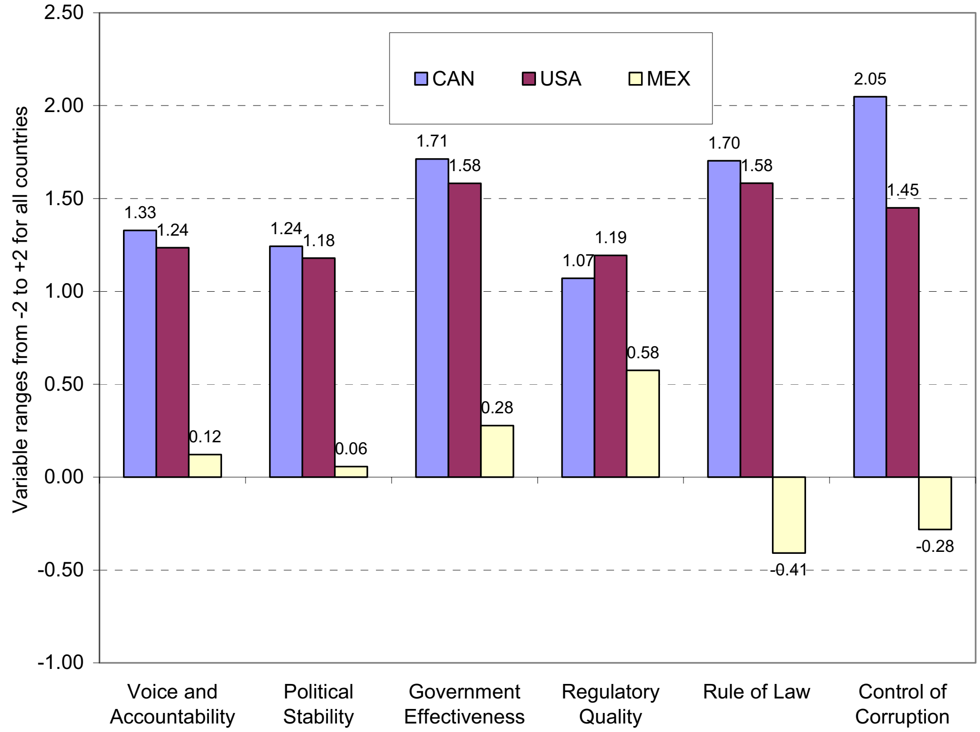
Note: 1960 is the excluded year. Source: Authors' calculations—see text.

1.3 Income gaps and institutional gaps

As discussed in the introduction, there is a substantial literature that highlights the role of institutional differences in producing cross-country differences in income per capita (Hall and Jones 1999, Acemoglu et al. 2001). In spite of trade liberalization and the institutional harmonization requirements imposed by NAFTA (e.g., intellectual property rights, investor protection, environmental standards), there are obvious remaining institutional gaps between the U.S. and Mexico. Based on data from Kaufmann and Kraay (2002a), Figure 6 shows the gaps along six dimensions. It is clear that in 2000/01 Mexico lagged behind its North American partners, in all institutional dimensions, especially in corruption and rule of law. If these institutional differences persist, it is likely that absolute income convergence, as predicted by neoclassical economics, will never materialize even if trade is completely liberalized. These types of impediments to convergence are difficult to identify with time series analyzes, such as those presented in the previous section, mainly because institutional gaps can be rooted in history and tend to vary little over time.

The experience of Puerto Rico (recall Figure 1) can provide a useful medium-term perspective on how institutional convergence might affect convergence. Since Puerto Rico became a Commonwealth Territory of the United States in 1952, it gained not only free trade in goods and factors of production, but also in practice the island gained some of the political and regulatory institutions available in the United States. In addition, firms gained tax incentives for setting up operations in the island. Hence it is not surprising that the income gap between mainland U.S. and Puerto Rico narrowed significantly in the last 50 years, especially when compared to the income gaps with respect to Mexico and other Latin American. In what follows, we attempt to estimate the role of institutional gaps in maintaining long-run income gaps.

Figure 6. Institutional Gaps in North America, 2000/01



Source: Kaufmann and Kraay (2002a).

1.3.1 Data and methodology

To investigate the impact of institutional gaps, we follow the methodology of Acemoglu et al. (2001). In a nutshell, we use a set of exogenous variables related to geographic characteristics (regional dummy variables, landlocked-country dummy, latitude, dummies for oil and commodity exporters), a constructed trade share indicator that takes into consideration countries' size and geographic factors (from Frankel and Romer 1999), an indicator of ethno-linguistic fractionalization, and a composite index of the Kaufmann-Kraay indicators of institutional quality from 2000/01 as explanatory variables of income per capita (US$ on a PPP basis) as of the year 2000.[17] Table A3 contains the summary statistics for our data set. Our methodology is TSLS.

Since the indicators of institutions and the corresponding composite index can be endogenous to the level of development, we need to find instruments for this variable. Also, the institutional variables are measured with error, as explained by Kaufmann and Kraay and Acemoglu et al. A priori, it is difficult to say which effect will predominate, as the endogeneity problem could bias the estimates upwards if income improves institutions, whereas the measurement error problem could produce an attenuation bias.

Acemoglu and his coauthors showed that the (log) mortality rates of settlers can be a good instrument for current institutions. These authors relied on a long historical literature linking the importation of political and economic institutions to the extent to which colonies were settled by their European colonizers, as opposed to becoming sources for the extraction of high-priced commodities. Where Europeans settled, they imported "good" institutions. However, Europeans had incentives not to settle in places where the climate and other historical factors reduced life expectancy. Consequently it

[17] The composite index is the average of the six individual components.

seems logical to use settler mortality rates in the 18th and 19th Centuries as instruments for institutions in the present.

1.3.2 Results

Table 2 contains a set of results. Panel A contains the estimated effects of the key variables on the (log) income per capita on a PPP basis as of 2000. Panel B shows the first stage regressions, where the composite index of institutional quality is the dependent variable. Panel C shows the corresponding OLS regressions, which depend on the assumption that institutions are exogenous.

In the five specifications shown in Table 2, the instrumented composite index of institutions is positively and significantly correlated with income. In fact, across the four models the relevant coefficient is quite stable, ranging from 1.35 to 1.94. The only other "robust" explanatory variable is the dummy for oil exporters, which appears consistently with positive and significant coefficients. Interestingly, the Frankel-Romer trade openness indicator is not a significant determinant of income per capita. Virtually identical results were obtained when we used the Sachs-Warner (Sachs and Warner 1995) policy openness index average for 1965-1990 instead of the Frankel-Romer constructed trade share. These results can be interpreted as an indication that the long-run level of development of countries is mainly determined by the quality of domestic institutions or that the correlation between the instruments used by Frankel and Romer to estimate the exogenous portion of the trade to GDP ratios (the so-called geographic "gravity" variables) and the settlers' mortality rates are so high that it is quite difficult to really identify the marginal effects of institutions and trade separately (Dollar and Kraay 2003).

The results for the first-stage OLS regressions show that the (log) settlers' mortality rates are good predictors of institutional quality in 2000. The mortality variable is always statistically significant and with the expected negative sign. The comparison of the OLS and TSLS estimates of the institutional coefficient shows that the OLS estimates are significantly lower. These results suggest that OLS estimates suffer from attenuation bias due to measurement errors afflicting the institutional variable.

Figure 7 illustrates how these econometric results shed light on the income gap observed between the U.S. and Mexico. The last bar on the right is the income gap (the difference in the log of GDP per capita on a PPP basis) as of 2000, which is approximately 1.2. The penultimate bar shows the model's (column one of Table 3) estimated income gap. The other bars show the marginal effects of the statistically significant variables on the (log of) of the U.S.-Mexico income gap. Mexico's status of a net exporter of oil tends to reduce the income gap by about 0.88. In contrast, the first six bars on the left of the graph show the contribution of each institutional dimension. The sum of the individual institutional contributions is about 2.5, but gaps in rule of law and corruption seem to be a bit more important than the other institutions, although the measurement errors in each category probably make this last observation less meaningful since we cannot be sure that these institutional gaps are significantly different from the others. In any case, the large income gap observed between the U.S. and Mexico is readily explained by institutional features. Moreover, if Mexico were not an oil exporter it would probably be poorer than it actually is. Finally, the full model predicts a log ratio of U.S. over Mexican GDP per capita of about 0.62, which translates into a 0.54 ratio of Mexican GDP per capita over the U.S. GDP per capita. It is perhaps a coincidence that this is more or less the limit to the convergence process estimated with the cointegration analysis discussed in section II above.

So institutional gaps might hamper convergence in North America. However, this does not mean that trade reforms and NAFTA in particular did not have an effect on institutional convergence. We have already seen that time series analyses suggest that convergence was in fact present after NAFTA. Was this due to institutional convergence?

Table 3. Regressions of Log GDP per Capita 2000 (robust standard errors in parentheses)

	(1)	(2)	(3)	(4)	(5)
Panel A: Two-Stage Least Squares					
Institutional Index	1.94 (0.53) ***	1.35 (0.19)***	1.39 (0.20)***	1.40 (0.20)***	1.37 (0.25)***
Net Oil Exporters	0.87 (0.30) ***	0.69 (0.18)***	0.72 (0.21)***	0.73 (0.20)***	0.71 (0.21)***
Net Commodity Exporters	-0.22 (0.18)	-0.16 (0.13)	-0.16 (0.16)	-0.16 (0.16)	-0.16 (0.16)
Africa	0.22 (0.59)	-0.21 (0.35)	-0.12 (0.38)	-0.10 (0.38)	-0.14 (0.42)
South Asia	0.98 (0.73)	0.45 (0.38)	0.59 (0.43)	0.60 (0.43)	0.55 (0.48)
East Asia & the Pacific	0.70 (0.53)	0.53 (0.30)*	0.61 (0.33)*	0.62 (0.33)*	0.59 (0.38)
Americas	0.43 (0.43)	0.26 (0.24)	0.27 (0.27)	0.28 (0.27)	0.26 (0.30)
Log Constructed Trade Share (Frankel-Romer)	-0.04 (0.12)	0.02 (0.09)	0.00 (0.10)		
Eth-Ling Fractionalization			0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Landlocked	0.26 (0.39)				-0.05 (0.28)
Latitude	-0.02 (0.01)				
R squared	0.72	0.84	0.84	0.83	0.84
Panel B: First Stage Regression for Institutional Index					
Log Mortality	-0.17 (0.07)**	-0.17 (0.07)**	-0.18 (0.08)**	-0.18 (0.08)**	-0.18 (0.08)**
Oil Production Dummy	-0.37 (0.18)**	-0.37 (0.18)**	-0.42 (0.20)**	-0.45 (0.18)**	-0.45 (0.18)**
Commodity Dummy	0.04 (0.16)	0.04 (0.16)	0.03 (0.20)	0.00 (0.18)	0.00 (0.18)
Africa	-0.65 (0.30)**	-0.65 (0.30)**	-0.69 (0.34)**	-0.69 (0.34)**	-0.69 (0.34)**
South Asia	-1.00 (0.34)***	-1.00 (0.34)***	-1.07 (0.41)**	-1.12 (0.39)***	-1.12 (0.39)***
East Asia & the Pacific	-0.52 (0.33)	-0.52 (0.33)	-0.45 (0.45)	-0.48 (0.44)	-0.48 (0.44)
Americas	-0.35 (0.24)	-0.35 (0.24)	-0.35 (0.26)	-0.36 (0.26)	-0.36 (0.26)
Log Constructed Trade Share (Frankel-Romer)	0.04 (0.11)	0.04 (0.11)	0.05 (0.12)		
Eth-Ling Fractionalization			0.00 (0.00)		0.00 (0.00)
Landlock	-0.43 (0.20)**	-0.43 (0.20)**	-0.43 (0.22)*	-0.45 (0.22)**	-0.45 (0.22)**
Latitude	0.02 (0.01)**	0.02 (0.01)**	0.02 (0.01)**	0.02 (0.01)**	0.02 (0.01)**
R squared	0.62	0.62	0.63	0.63	0.63

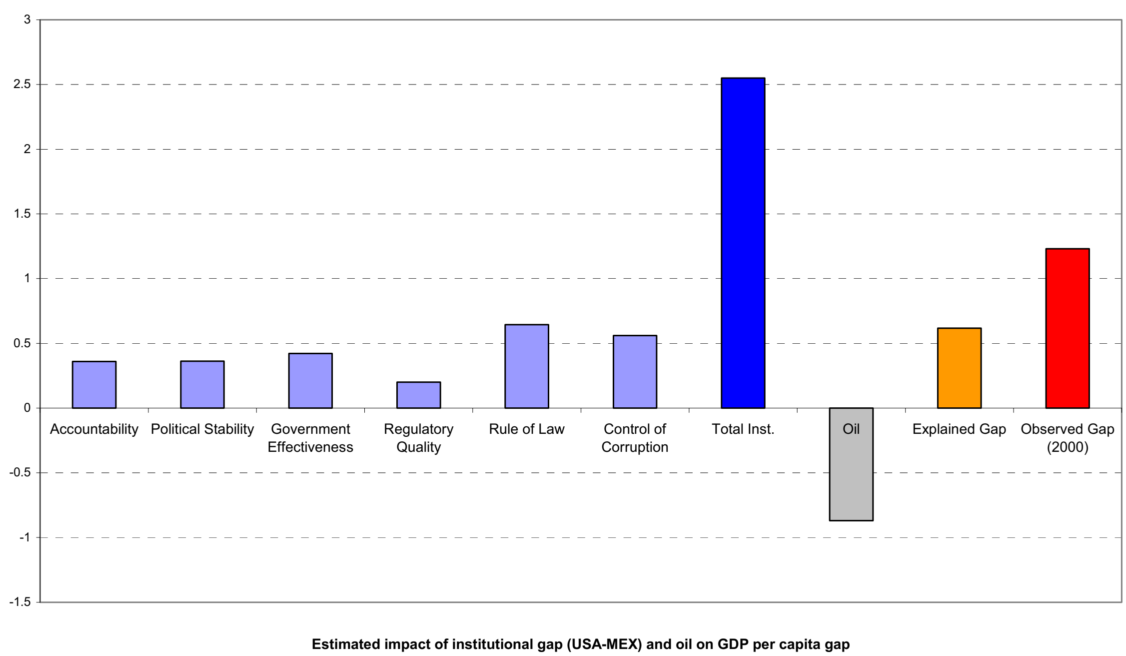
Table 3 *(continued)*

Panel C: OLS Estimates					
Institutional Index	1.10 (0.11)***	1.11 (0.11)***	1.11 (0.11)***	1.11 (0.11)***	1.08 (0.11)***
Oil Production Dummy	0.51 (0.16)***	0.58 (0.16)***	0.59 (0.20)***	0.60 (0.17)***	0.57 (0.17)***
Commodity Dummy	-0.17 (0.13)	-0.15 (0.13)	-0.14 (0.16)	-0.14 (0.16)	-0.12 (0.15)
Africa	-0.65 (0.29)**	-0.57 (0.28)**	-0.56 (0.29)*	-0.56 (0.30)*	-0.57 (0.30)*
South Asia	0.00 (0.33)	0.12 (0.32)	0.18 (0.38)	0.19 (0.36)	0.12 (0.36)
East Asia & the Pacific	0.16 (0.24)	0.25 (0.22)	0.29 (0.24)	0.29 (0.24)	0.24 (0.24)
Americas	-0.02 (0.20)	0.05 (0.21)	0.03 (0.22)	0.02 (0.22)	0.01 (0.22)
Log Constructed Trade Share (Frankel-Romer)	-0.03 (0.09)	0.01 (0.09)	-0.01 (0.10)		
Eth-Ling Fractionalization			0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Landlock	-0.18 (0.17)				-0.20 (0.19)
Latitude	-0.01 (0.00)				
Observations	68	68	61	61	61

*** =significant at 1%, **=5%, *=10%.

Source: Authors' calculations—see text.

Figure 7. The Contribution of Institutional Gaps to the U.S.-Mexico Income Gap



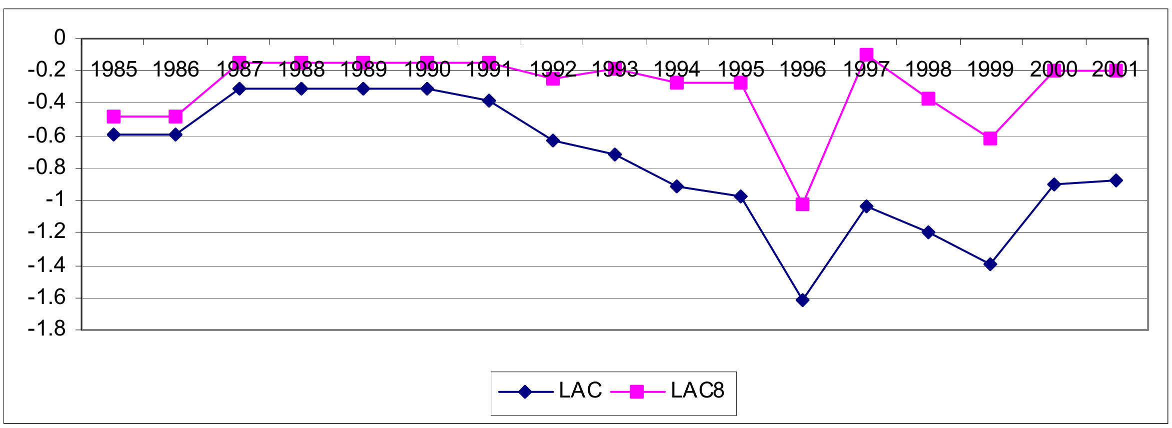
Source: Authors' calculations—see text.

1.3.3 *Institutional performance in Mexico versus the rest of Latin America and the Caribbean*

Since NAFTA was implemented, it was expected that the agreement would put direct and indirect pressures on Mexico to improve its institutions. The direct pressures came from specific elements of the trade agreements, including those related to investor protection, intellectual property rights, and the labor and environmental trade side-agreements, which explicitly focus on Mexico's enforcement of its own laws. The indirect pressure could have emanated from the political debate in the U.S. regarding Mexico's ability to implement its commitments.

In order to test whether this has happened we estimated regressions similar to those concerning the income gaps presented in Figure 4 above. The dependant variable was the difference between the country's composite institutional indicator composed of three indexes of institutional quality provided by the International Country Risk Guide (ICRG) and the U.S. value of this index. The index was constructed using factor analysis of ICRG's absence of corruption, law and order, and bureaucratic quality variables. These data cover 1984-2001. Again, for the comparisons we used two samples consisting of 23 and 9 comparator countries (see Table 5A in the Appendix). Figure 8 shows the results. With respect to the first group of Latin American countries, Mexico's year effects were not statistically different, but they were statistically different from the average for the group of 22 countries since 1994, but Mexico seems to have under-performed relative to the regional average during this period, which is reflected a declining or stable negative difference between the Mexico and the average LAC effects.

Figure 8. Mexico Year Effects relative to LAC Year Effects, Institutional Index (ICRG)



Note: 1984 is the excluded year. Source: Authors' calculations—see text.

However, even though Mexico has improved its institutions relative to the United States in the post NAFTA period, the results in Figure 8 are due to the fact that other countries from the region also improved their institutions without benefiting from NAFTA. Table 4 shows the changes in the gap with respect to the U.S. of the composite institutional index before and after 1994. The countries that improved their institutional gap the most after 1994 were Chile and Central America, whereas Mexico's improvement was rather the norm for the whole region. Moreover, Mexico's big improvement took place after 1999 and thus it was probably related to the political transition, as was the case in Chile and Central America. These data are consistent with the findings of Lederman, Loayza, and Soares (2002) who find that political democratization has a positive effect in terms of reducing corruption in a large sample of countries. Thus NAFTA alone is unlikely to contribute to the institutional development of Mexico outside the specific areas covered by the agreement. Consequently, Mexico's policy efforts to combat corruption and improve general institutions need to be pursued further.

Table 4. Institutional Changes in Latin America

	BEFORE-NAFTA	AFTER-NAFTA	CHANGE
COUNTRY / GROUP	1984-93	1994-2001	AFTER minus BEFORE
MEXICO	-1.80	-1.46	0.34
ARGENTINA	-1.49	-1.05	0.43
BRAZIL	-1.00	-1.57	-0.57
CHILE	-1.55	-0.73	0.82
COLOMBIA	-1.80	-1.91	-0.11
SOUTH AMERICA	-1.68	-1.59	0.09
CENTRAL AMERICA	-2.51	-1.61	0.90
ANDINE COUNTRIES	-1.98	-1.60	0.39
LATIN AMERICAN COUNTRIES	-1.83	-1.53	0.30

Source: Authors' calculations, based on data from ICRG—see text.

1.4 Productivity gaps within industries, across the U.S. and Mexico

We have already mentioned that if NAFTA trade liberalization helped technological adoption and modernization in Mexico we should observe an acceleration in the rate of TFP convergence between the U.S. and Mexico within industries. To examine this channel of convergence we calculated TFP differentials between the U.S. and Mexico in manufacturing sectors. The following paragraphs discuss the data, methodologies, and econometric results concerning the impact of NAFTA on TFP convergence.

1.4.1 Data and TFP estimates

To measure differences in total factor productivity (TFP) we follow the approach suggested by Caves et al. (1982), which has been utilized in the cross-country context by Keller (2002). They calculate a multilateral (bilateral in our present case) and flexible TFP index of the following form:

$$(1) \qquad \ln TFP_{cit} = (\ln Y_{cit} - \overline{\ln Y_{it}}) - \overline{\omega}_{cit}(\ln L_{cit} - \overline{\ln L_{it}}) - (1 - \overline{\omega}_{cit})(\ln K_{cit} - \overline{\ln K_{it}}) \ ,$$

where c is the country index (Mexico and the U.S.), i represents industries, and t is time. Y is total output, L is labor, and K is capital stock. ω is the cost-based labor share of output. The Caves et al. approach entails de-meaning of the log output, labor and capital series, using the geometric averages of both countries. The resulting TFP index in each country and industry is based on a vector of outputs and inputs that are common to both countries. Intuitively, this index tells us what is the productivity level in each country and industry if they had the same outputs and inputs.

Data on production and factor shares come from the OECD and UNIDO and cover 28 manufacturing industries at the 3-digit ISIC code.[18] The output data were deflated using the U.S. industry deflators from Bartelsman et al. (2000), because there is not existing series of PPP-adjusted sectoral output data for Mexico. The capital stock data were constructed using the permanent inventory method, assuming a 5% depreciation rate per year, based on fixed investment, and were deflated using the PPP

[18] We got our data from UNIDO but they received the Mexico and U.S. data directly from the OECD.

investment price levels from the Penn World Tables 6.0.[19] The Appendix contains summary statistics for the industry-level data for the U.S. and Mexico.

1.4.2 Estimation strategy

To assess how the rate of (log)TFP convergence changed after the implementation of NAFTA, we estimated an autoregressive model with structural change in the autoregressive coefficient with industry fixed effects:

$$(2) \qquad y_{i,t} = \zeta_i + \eta y_{i,t-1} + \varsigma D_{FTA} y_{i,t-1} + \iota D_{FTA} + \kappa_{i,t}\,,\ i = 1,2,...,N\,;\ t = 1,2,...,T$$

As mentioned, the number of industries N=28, and the maximum number of years is T=25. In the context of the fixed-effects (FE) estimator, designed to control for industry-specific effects, ζ_i, by de-meaning both the left- and right-hand side variables, the estimated coefficients could be biased due to the correlation between the lagged mean of y and the contemporaneous error, $\kappa_{i,t}$. The bias is inversely proportional to T (Anderson and Hsiao 1981). Also, as mentioned, there is no good data on Mexico's PPP-adjusted unit prices for industry-level output, and thus the use of the U.S. deflator might have introduced a measurement error that is endogenous to (i.e., it is affected by) the trade liberalization efforts. This is a concern because trade reforms reduced the output price differences between the U.S. and Mexico and thus the TFP estimates for Mexico could be systematically biased after liberalization. Finally, it is possible that trade reforms themselves (including the sector-specific tariff phase out periods) were implemented when industrial productivity was rising, thus producing another source of biases in our proposed exercise. For these reasons, we used the Arellano-Bond (1991) differences estimator to estimate model (2). This estimator helps reduce the influence of the endogeneity biases discussed above by using lagged levels of the TFP differentials to instrument the changes in these differentials. Hence we also control for unobserved industry-specific effects.

In (2), the AR coefficient, η, provides an indication of the speed of convergence. When this coefficient is less than 1, it can be interpreted as evidence of convergence in TFP levels between the U.S. and Mexico. If NAFTA was associated with an acceleration of TFP convergence, then the estimated coefficient of the corresponding interactive variable should be negative, which entails an increase in the speed with which productivity improvements in the U.S. are diffused into Mexican manufacturing.

1.4.3 Results

Table 5 reports the results from the Arellano-Bond differences estimator applied to the model suggested by equation 2 plus additional controls for the potential effect that Mexico's unilateral liberalization (from 1985) might have had on TFP convergence. The second model focuses on the gap in labor productivity for comparisons, since these data are not affected by the lack of a Mexican fixed investment deflator for the twenty-eight manufacturing industries. In both cases, the models pass the specification tests, indicating that the instrument set is adequate and there is no serial correlation. This suggests that the coefficients are not biased owing to measurement error in the output series. Also, in both cases, NAFTA was associated with a faster rate of manufacturing productivity convergence, as indicated by the highly significant and negative coefficients of the NAFTA dummy variable interacted with the lagged productivity differential. The TFP results (column 1, table 4) imply that the half life of a unit shock

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[19] Output and capital inputs were expressed in constant prices of 1987. The investment PPP deflator series from the Penn World Tables and the industry deflators from Bartelsman et al (2000) end in 1996. We applied the average growth rate of the investment PPP deflator for the available years to the rest of our sample ending in 2000.

to the TFP gap fell from 1.6 prior to NAFTA to 0.7 years afterwards. The corresponding change for labor productivity (column 2, table 6) was from 2.5 to 1.7 years. These results are consistent with the estimates of the change in the degree of persistence of the U.S.-Mexico income gap discussed above.

In sum, the econometric results strongly suggest that the NAFTA period was associated with a significantly faster convergence in manufacturing TFP levels. Hence we are tempted to postulate that the trade agreement had an important positive effect on Mexican manufacturing TFP. These results are

Table 5. Did NAFTA Accelerate Manufacturing TFP Convergence? Arellano-Bond GMM Differences Regression Results for data from 1980-2000

Dependent Variable	**Log TFP Differential (U.S.-Mex)**	**Log Output per Worker Differential (U.S.-Mex)**
Explanatory Variables	**(1)**	**(2)**
Log Productivity Diff (t-1)	0.65***	0.76***
NAFTA x Log Productivity Diff (t-1)	–0.28***	–0.09***
Lib x Log Productivity Diff (t-1)	–0.03	0.04
Obs/Industries	462/28	482/28
Sargan over-id test (p-value)	0.25	0.39
2nd Order serial correlation test (p-values)	0.32	0.87

Notes: These are the first-step estimates. ** = significant at 1% level. Year dummies not reported
Source: Authors'calculations.

consistent with firm-level evidence provided by López-Córdova (2002) and industry-level data presented by Schiff and Wang (2002). However, the former study argues that this effect was related to preferential market access to the U.S. and import competition, but not due to imports of intermediate goods. In contrast, the study by Schiff and Wang argued Mexico benefited from imported intermediate goods from the U.S., depending on the extent of R&D effort in the U.S. Our results seem to indicate that NAFTA brought something to the table that was not necessarily accomplished by unilateral liberalization, but we have not speculated about the exact channels of influence. In our view, this issue remains an open question for future research.

Having reviewed the times-series evidence concerning income convergence and the panel evidence concerning TFP convergence between the U.S. and Mexico, we now turn to the impact of NAFTA within Mexico. If geography and initial conditions play an important role in economic convergence, then NAFTA might have had a notable impact on income differentials across Mexican states.

1.5 Initial conditions and divergence within Mexico[20]

It is standard practice in the analytical work on economic growth to examine potential determinants of growth in a set of geographic entities using econometric techniques (see the textbook by Barro and Sala-I-Martin 1995). This approach was previously applied to the case of Mexico by Esquivel (1999) and Messmacher (2000). Here we use the same standard approach but we attempt to focus on a small set of policy-related variables that determined initial conditions in each Mexican state. In the following paragraphs we describe the data and methods used to address these questions.

1.5.1 Data and methodologies

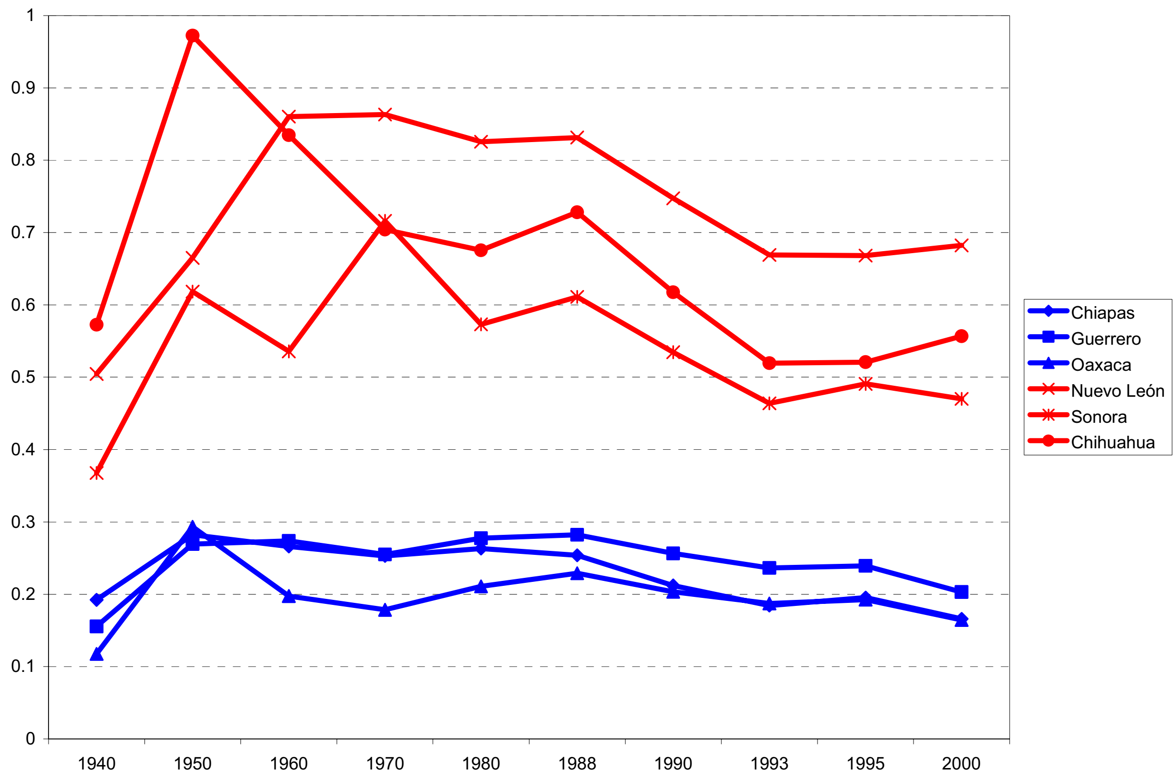
Hence we want to explain the rate of growth of state GDP per capita during 1990-2000 (at constant prices of 1993).[21] As mentioned, this is the period when trade liberalization and NAFTA must have been felt. Also, it is a period that is sufficiently long so that the cumulative growth rate during this

[20] This section is based on Esquivel et al. (2002).

[21] The data were graciously provided by Gerardo Esquivel from El Colegio de México, Mexico City. The GDP series were adjusted for the allocation of oil revenues, which in the original series (from INEGI, the national statistical agency) had been periodically allocated to different states, although in practice they are probably allocated according to population shares.

whole period could reflect medium-term phenomena, rather than just short-lived conditions such as the economic crisis of 1995. Figure 9 shows the evolution of the ratio of GDP per capita in a selection of Northern and Southern states relative to the Distrito Federal (D.F.), the capital of the Republic, since 1940. The big story is, again, that the D.F. was richer and stayed richer for the last 60 years or so. In fact, it is difficult to argue that any of these states managed to significantly catch up in absolute terms, in spite of the fact that free trade within Mexico has existed for a long time. Also, it looks like the 1990s were characterized by a slight catch-up by the Northern states and continuing divergence of the Southern states relative to the D.F.

Figure 9. Ratio of State GDP per Capita Relative to the Distrito Federal, 1940-2000



What are some factors that might help explain why some states grew more than others? Given the issues raised by the literature concerning the role of geography and transport or coordination costs in hampering convergence, one set of key explanatory variables are indicators of transport and communications infrastructure, which we measured by the kilometers of paved highways per worker and telephone density.[22] We also used the distance from the U.S. border as an additional explanation of economic growth to assess the argument that being far from the U.S. was an impediment to growth.[23]

It is conventional wisdom that the level of education of the adult population might be related to the rate of growth. Hence we also examine the impact of educational attainment in the year 1990 as an

[22] The coverage of paved roads could be measured with respect to the surface area of each state. However, this measure might also be imprecise due to the fact that we would need to know the surface area of economically meaningful territory. In any case, when we used the ratio of paved roads or highways over surface area of each state, the results are virtually identical to the ones discussed herein.

[23] The distance from the U.S. border was measured in two alternative ways: (1) by the distance from the major city in each state to the closest major city near the border, plus the distance of the latter to the border itself; and (2) by the geographic distance from the capital city of each state to the closest major U.S. city.

explanation of growth rates during the subsequent period 1990-2000. In this way we can be sure that growth did not cause the level of education. We also experimented with literacy rates of the adult population instead of the years of schooling.

It is often argued that poor states grow slower because they receive insufficient public resources to finance their growth. It could be argued, for example, that private capital markets do not provide sufficient financing for the development of lagging regions due to various types of obstacles to private financing related to insufficient information about the capacity to payback loans by firms operating in those areas. However, it is also possible that large public sectors can be a drain on economic growth by distorting the local labor markets (e.g., raising wages above what private enterprises can pay) or by raising the costs of capital that would otherwise have gone to the private sector (i.e., the so-called "crowding-out" effect of public expenditures). To assess these alternative arguments we look at the impact of the size of the public sector, measured as the share of public employment in total employment, on the growth rates of Mexican states.

In order to assess whether the really poor states—Guerrero, Oaxaca, and Chiapas (GOC)—had other characteristics that hampered their prospects for development, we also included a dummy variable that identifies these states. Finally, we included the initial level of GDP per capita to test the conditional convergence hypothesis.

1.5.2 Results

Table 6 reports some of our results, based on standard statistical techniques. The first two columns report results based on Ordinary Least Squares (OLS), and the third and fourth columns report results from an alternative technique, Median Regressions, which are less sensitive to "outliers". It shows evidence of conditional convergence; the initial GDP per capita has a negative and statistically significant coefficient in the four exercises. Hence it seems that poor states do grow faster if they have similar policies to the rich states.

The other explanatory variables, except the variable that identifies the Southern States (Chiapas, Oaxaca, and Guerrero), also seem to be important for growth, and are generally statistically significant. As expected, telephone density has a positive effect on growth. However, estimates using paved roads and paved roads with two lanes per worker (or over surface area) revealed that these variables were negatively correlated with growth during the period.[24] Hence there is no evidence suggesting that building more roads will lead to higher growth in the future. This result might be due to the existence of economically unnecessary infrastructure that does not serve a useful purpose for existing economic activity.

The results concerning the role of distance from the U.S. border (not reported here) indicate that this variable was not a statistically significant impediment to economic growth in most exercises, although the coefficient is always negative.[25] However, when the distance variables were introduced, the

[24] These OLS results did not change when the Distrito Federal, which has low paved roads per worker due to high population density and had relatively high rates of growth, was removed from the sample.

[25] We estimated four models with the two distance variables discussed above in footnote 8. Two regressions were estimated via OLS and two via Median Regressions. In only one of these four models the distance variable was significant at the 10% level. However, several of the other explanatory variables were also not significant in these specifications. These results are due to the correlation between the distance variables and the other explanatory variables.

Table 6. Potential Determinants of Growth of GSP per Capita, 1990-2000

Explanatory variables	Estimated impact: The effect of 1% increase in the corresponding variable on the cumulative GSP growth rate per capita, 1990-2000			
	(1) OLS	**(2) OLS**	**(3) Median Reg.**	**(4) Median Reg.**
Initial GDP per Capita, 1990 (in natural logarithm)	-0.15** (-2.35)	-0.15** (-2.32)	-0.14** (-3.95)	-0.12** (-2.09)
Initial education (years of schooling of population over 15 years of age), 1990	0.24 (1.38)	0.22 (1.09)	0.27** (3.40)	0.27* (1.86)
Telephone density, 1990	0.08* (1.93)	0.08* (1.91)	0.05** (2.86)	0.05 (1.39)
Public employment (log of share of total employment), 1990	-0.12** (-2.13)	-0.12* (-1.98)	-0.07* (-1.97)	-0.09 (-1.54)
States of Oaxaca, Guerrero, and Chiapas (dummy variable)	Not included	-0.01 (-0.02)	Not included	-0.021 (-0.33)
Number of observations	32	32	32	32
Adjusted R-squared (OLS) / Pseudo R-squared (Median Reg)	0.31	0.28	0.21	0.21

** = significant at 5%; * significant at 10%. T-statistics in parentheses.

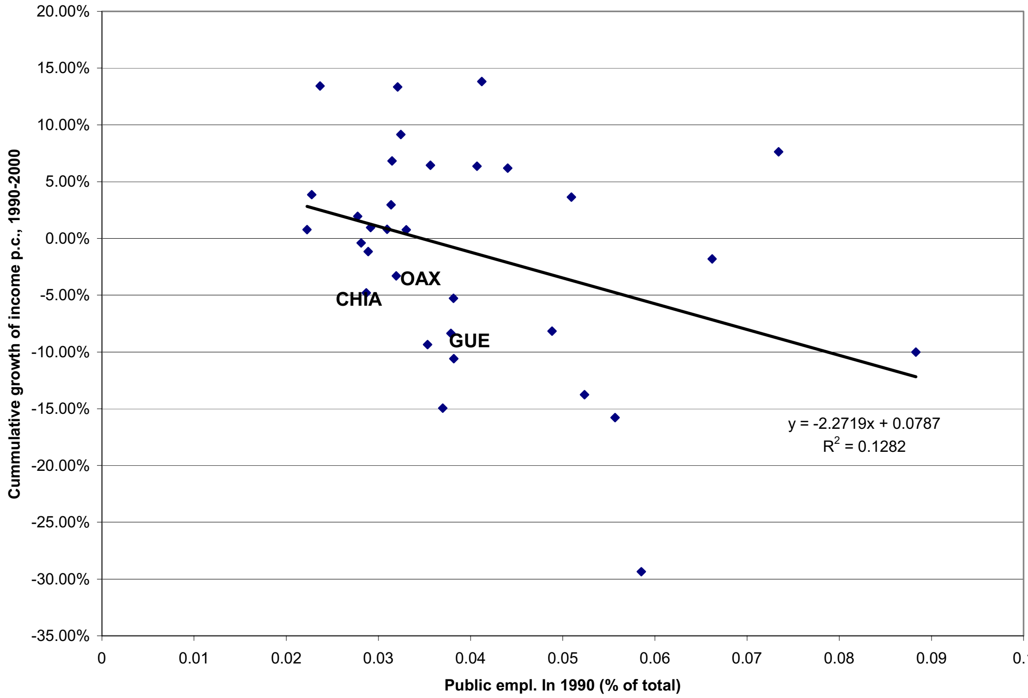
Note: A constant was also included in the regressions, but its coefficients are not reported. Numerous additional specifications in OLS and Median Regressions were estimated using the following explanatory variables: (a) literacy rates instead of years of education; (b) two alternative measures of distance from the United States instead of and in addition to the GOC dummy; (c) paved roads and double-lane highways over surface area or per worker instead of telephone density; (d) with the share of manufacturing GDP over total GDP in 1988; and (e) with urbanization rates. Please see text for a discussion of the alternative results.

statistical significance (but not the direction of the estimated effects) of the other explanatory variables were driven down. This evidence indicates that the states located farther from the United States also suffer from low levels of education and telephone density, which hamper their growth prospects.

The level of education at the beginning of the period has no statistically important impact on growth in the OLS estimates. This result might be due to the fact that human capital can migrate to dynamic regions, and thus this variable does not have any discernable impact on the State in which they were calculated in 1990. However, when literacy rates were used instead of educational attainment, the estimated coefficient was positive and statistically significant. Moreover, the estimates based on Median Regressions forcefully show that educational attainment does matter. It is also possible that the correlation between telephone density, initial GDP per capita, and initial education makes the identification of the impact of education rather difficult.

An interesting result is that the share of public employment had a negative effect on economic activity. Figure 10 shows the simple correlation between these two variables—it is negative. It seems that this negative correlation might be due to some observations that appear to the lower right of the chart. However, the estimates that are less likely to be disproportionately influenced by strange observations, the Median regressions, also show that this variable had a negative effect on economic growth although it not statistically significant in the fourth column of Table 4, after controlling for other unobserved characteristics of the Southern States.

Figure 10. Relationship between Growth (1990s) and Public Employment in Mexican States: More is not necessarily better.



To be sure that the aforementioned explanations of the observed differences of growth rates across Mexican states are not misleading, we conducted additional exercises in which we controlled for the share of manufacturing production over total state GDP in 1990. As discussed in Esquivel et al. (2002), the Southern States have never had a high share of manufacturing production, and for the country as a whole some manufacturing industries (and some services) grew quite rapidly during the decade of the 1990s. The performance of manufacturing relative to natural resource or agricultural industries could have been due to changes in relative prices. For example, the international price of coffee began to decline in the late 1980s. In any case, our statistical analyses indicated that the qualitative nature of the OLS results presented in Table 5 are not affected by the inclusion of the manufacturing share of production. However, in the relevant Median Regressions, the inclusion of the share of manufacturing production affected the sign of the education and public employment variables, although none of them were statistically significant. This influence of manufacturing production on the estimated effect of education and public employment could be due to a positive correlation between education and manufacturing production (which is 0.5), and negative correlation with the share of public employment (which is, coincidentally, -0.5). In other words, manufacturing production seems to be concentrated in states with either high levels of education and/or low levels of public employment. It is likely that the high mobility of new capital combined with the relative irreversibility of past investment make capital-intensive activities particularly sensitive to the initial economic environment in a state, and thus manufacturing is implicitly capturing things such as the rule of law, instability, crime or excessive intervention by the state.

Thus far we presented suggestive evidence indicating that hope for the Southern States is not lost; there is some evidence of conditional convergence and some key policy-sensitive variables help explain the patterns of economic growth observed across Mexican states during 1990-2000. In particular, communications infrastructure (measured by telephone density) is more likely to have been positively associated with economic activity than paved roads or highways. Also, there is no evidence in support of the idea that increasing the size of the public sector can be a force for economic convergence. However, the big story remains: initial conditions seem to have had important effects on economic growth within Mexico during the 1990s, and thus states that were initially better prepared to reap the benefits of NAFTA grew faster during this period, while the poor states of the South fell further behind.

1.6 Conclusions and final remarks

This paper analyzed the dynamics and sources of convergence between Mexico and the U.S. Time series analyses of the convergence process produced interesting stylized facts about the U.S.-Mexican convergence process and identified periods of convergence and divergence. While convergence suffered a major set-back in the 1980s due to the debt crisis, we find that the Tequila crisis only temporarily interrupted a convergence process which started in the late 1980s when Mexico opened its economy. However, we only found evidence of incomplete convergence in the sense that the constant in the cointegration space was greater than zero, indicating that Mexico is converging towards a constant income differential of about 50% of the U.S. GDP per capita. In contrast, the comparison between annual Mexican relative income effects and average Latin American effects indicated that Mexico's convergence towards the U.S. was especially important after 1995. Finally, our estimates of the change in the autoregressive coefficient of the Mexico-U.S. income per capita gap suggest that Mexico's GDP per capita would have been about 4-5% lower by the end of 2002 if NAFTA had not been implemented.

The cross-country evidence showed that differences in institutional features inherited from history play an important role in producing income gaps. Consistent with previous studies (Acemoglu et al. 2001; Kaufmann and Kray 2002b), the TSLS estimates produced much larger estimated effects of institutions on incomes than OLS estimates, thus indicating that measurement error is an important source of attenuation bias in these relationship. The use of historical instruments for current institutional quality is also interesting on its own since it reflects that institutions tend to persist over time and thus might remain a source of income divergence for a long time. However, future research could yield additional practical insights if it focuses on the determinants of institutional quality. In particular, further understanding about the role of political institutions in determining the quality of governance and economic policy could help us understand what types of reforms may help overcome the weight of history. Recent research along these lines has already proven fruitful (Persson 2002; Lederman et al. 2002). Yet our understanding remains quite thin regarding how accountability mechanisms can help improve national institutions. In the case of North America, international economic convergence in the long-run might depend on Mexico's capacity to catch-up to the standards of its neighbors. In fact, the econometric analyses indicated that the model with institutions, geography, and trade predict an income gap of the Mexico-U.S. GDP per capita ratio of about 54%, which is coincidentally similar to the incomplete convergence estimated using cointegration analysis. Furthermore, the quality of Mexican institutions did not improve significantly more than in other Latin American countries during the post-NAFTA period.

The analysis of TFP convergence within manufacturing industries produced more optimistic results concerning the impact of NAFTA. The evidence indicates that NAFTA was associated with improvements in the rate of TFP convergence between the U.S. and Mexico. While these results are broadly consistent with other studies (López-Córdova 2002, Schiff and Wang 2002), the latter contradict each other in terms of the channels through which NAFTA is thought to have improved Mexican manufacturing TFP. Namely, López-Córdova argues that it was preferential access to the U.S. market (e.g., the tariffs faced by Mexican exporters to the U.S.) and import penetration, but not imports of inputs from the U.S. Schiff and Wang argue that TFP improvements were due to the R&D content of imported inputs. In addition, we can think of other alternative hypotheses.

One possibility is that NAFTA, either through its demanded improvement in the protection of intellectual property rights and/or through increased international competition (for import-competing and exporting industries) provided incentives for improvements in private research and development (R&D) effort and patenting. Meza and Mora (2002) and Chapter 5 in this report found that in fact the post-NAFTA period was characterized by significant increases in R&D expenditures. Yet the existing literature remains silent about this particular force towards convergence. An examination of these issues would require empirical work about the determinants of patenting across countries, with a special focus on the impact of trade policies and innovation policies. Much work remains to be done in this area, although there is an emerging literature (Furman et al. 2002). Lederman and Maloney (2003b)—see Chapter 5—show that in fact IPR protection tends to increase R&D effort relative to GDP in a broad panel of countries and that these expenditures are cyclical in the sense that they tend to rise with improvements in short-term growth. Thus it is very likely that NAFTA helped Mexico improve its innovation through its IPR regime and by helping Mexico recover after the Tequila crisis. On the other hand, Chapter 5 shows that the emerging manufacturing sectors under NAFTA (road vehicles, telecommunications equipment, and appliances) are not yet characterized by significant improvements in patenting activity, thus suggesting that there are significant efficiency problems related to the lack of linkages between R&D performed by the public and higher-education sectors and the productive sector.

The study of growth patterns within Mexico during 1990-2000 showed that initial conditions determined which Mexican states grew faster. We interpret this evidence as showing that trade liberalization might be associated with economic divergence within countries due to differences in initial conditions. In the Mexican case, it seems that telecommunications infrastructure and human capital were especially important. In addition, it is commonly understood that the poor states also suffer from poor public institutions and political instability (Esquivel et al. 2002). If the poor states had been adequately prepared to reap the benefits of free trade, it is possible that they might have grown faster during this period. Thus economic convergence in North America might not materialize under free trade or under any trade regime as long as fundamental differences in initial conditions persist over time. Fortunately, some of these fundamentals should be sensitive to policy changes.

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Annex

Figure A1. Quarterly Data Used for Time Series Analyses

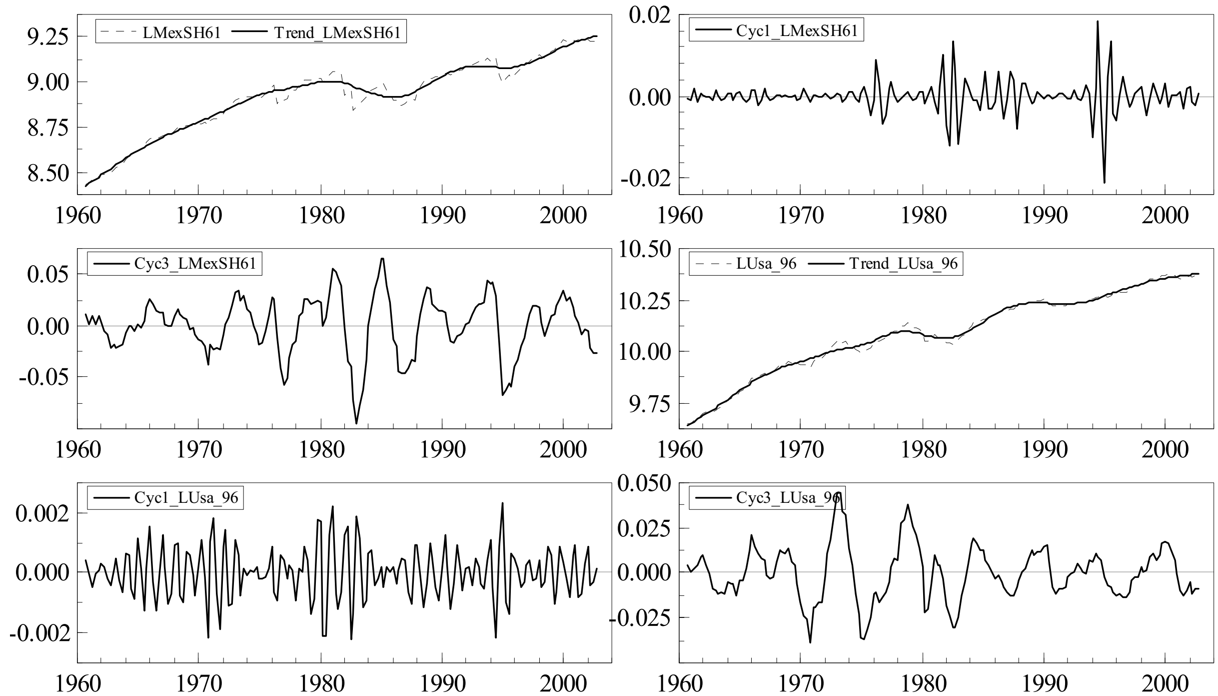


Table A1. List of Codes and Industries Used in TFP Convergence Analysis

ISIC Code	Industry
311	Food products
313	Beverages
314	Tobacco
321	Textiles
322	Wearing apparel, except footwear
323	Leather products
324	Footwear, except rubber or plastic
331	Wood products, except furniture
332	Furniture, except metal
341	Paper and products
342	Printing and publishing
351	Industrial chemicals
352	Other Chemicals
353	Petroleum refineries
354	Miscellaneous petroleum and coal products
355	Rubber products
356	Plastic products
361	Pottery, china, earthenware
362	Glass and products
369	Other non-metallic mineral products
371	Iron and steel
372	Non-ferrous metals
381	Fabricated metal products
382	Machinery, except electrical
383	Machinery electric
384	Transport equipment
385	Professional & Scientific equipment
390	Other manufactured products

Table A2. Summary Statistics of Variables and Data Used for TFP Convergence Analysis, by Country and Industry (standard deviations in parentheses)

United States								
Industry Code	(Log)Output	Obs	(Log)Labor	Obs	(Log)Capital	Obs	Labor Share	Obs
311	19.47 (0.11)	25	17.06 (0.13)	25	18.08 (0.33)	25	0.09 (0.00)	25
313	17.50 (0.15)	25	15.19 (0.06)	25	16.74 (0.22)	25	0.10 (0.02)	25
314	16.85 (0.11)	25	14.03 (0.24)	25	15.37 (0.42)	25	0.06 (0.02)	25
321	18.14 (0.1)	25	16.45 (0.07)	25	17.21 (0.25)	25	0.18 (0.01)	25
322	17.64 (0.04)	25	16.12 (0.14)	25	15.86 (0.13)	25	0.22 (0.03)	25
323	15.35 (0.14)	25	13.66 (0.22)	25	14.11 (0.04)	25	0.19 (0.02)	25
324	15.32 (0.33)	25	13.81 (0.42)	25	14.72 (0.22)	25	0.22 (0.02)	25
331	17.64 (0.13)	25	15.92 (0.07)	25	16.79 (0.2)	25	0.18 (0.02)	25
332	17.27 (0.32)	25	15.86 (0.26)	25	15.61 (0.49)	25	0.24 (0.02)	25
341	18.46 (0.11)	25	16.58 (0.06)	25	18.15 (0.31)	25	0.15 (0.01)	25
342	18.57 (0.18)	25	17.21 (0.14)	21	17.47 (0.54)	25	0.26 (0.02)	21
351	18.67 (0.13)	25	16.36 (0.06)	25	18.54 (0.18)	25	0.10 (0.01)	25
352	18.46 (0.29)	25	16.37 (0.2)	25	17.34 (0.58)	25	0.12 (0.01)	25
353	18.62 (0.06)	25	14.86 (0.22)	25	17.90 (0.16)	25	0.02 (0.01)	25
354	16.58 (0.92)	25	13.88 (0.12)	21	15.12 (0.27)	25	0.10 (0.01)	21
355	16.99 (0.11)	25	15.45 (0.09)	25	16.20 (0.25)	25	0.21 (0.01)	25
356	17.95 (0.46)	25	16.32 (0.42)	25	16.93 (0.64)	25	0.19 (0.01)	25
361	14.72 (0.14)	25	13.56 (0.09)	25	14.03 (0.23)	25	0.32 (0.02)	25
362	16.64 (0.13)	25	15.14 (0.06)	25	16.15 (0.29)	25	0.23 (0.02)	25
369	17.62 (0.16)	25	15.97 (0.1)	25	16.92 (0.24)	25	0.19 (0.01)	25
371	18.09 (0.19)	25	16.43 (0.25)	25	18.15 (0.06)	25	0.19 (0.02)	25
372	17.73 (0.1)	25	15.69 (0.07)	25	16.97 (0.2)	25	0.13 (0.01)	25
381	18.73 (0.13)	25	17.25 (0.15)	25	17.62 (0.3)	25	0.23 (0.01)	25
382	19.31 (0.3)	25	17.78 (0.19)	25	18.21 (0.43)	25	0.22 (0.03)	25
383	19.15 (0.33)	25	17.60 (0.18)	25	18.07 (0.64)	25	0.22 (0.04)	25
384	19.66 (0.18)	25	17.88 (0.07)	25	18.43 (0.45)	25	0.17 (0.02)	25
385	18.21 (0.38)	25	16.80 (0.38)	25	16.98 (0.64)	25	0.25 (0.01)	25
390	17.25 (0.15)	25	15.71 (0.13)	25	16.10 (0.23)	25	0.21 (0.01)	25

Mexico								
Industry Code	(Log)Output	Obs	(Log)Labor	Obs	(Log)Capital	Obs	Labor Share	Obs
311	15.77 (0.60)	25	12.98 (0.63)	25	13.87 (0.71)	25	0.06 (0.01)	25
313	15.07 (0.44)	25	12.72 (0.35)	25	13.68 (0.5)	25	0.10 (0.03)	25
314	13.65 (0.22)	25	10.36 (0.30	25	11.50 (0.46)	25	0.04 (0.01)	25
321	14.35 (0.36)	25	12.50 (0.28)	25	13.42 (0.44)	25	0.16 (0.03)	25
322	13.11 (0.31)	17	11.33 (0.24)	17	11.44 (0.41)	17	0.17 (0.04)	17
323	12.52 (0.15)	7	10.01 (0.22)	7	10.87 (0.40)	7	0.08 (0.01)	7
324	12.86 (0.24)	17	11.19 (0.23)	17	11.70 (0.13)	17	0.19 (0.02)	17
331	11.91 (0.45)	25	9.85 (0.31)	25	11.77 (0.14)	25	0.13 (0.03)	25
332	12.43 (0.70)	17	10.49 (0.70)	17	10.55 (0.77)	17	0.14 (0.02)	17
341	14.61 (0.34)	25	12.08 (0.29)	25	14.35 (0.16)	25	0.08 (0.03)	25
342	13.29 (0.75)	17	11.38 (0.79)	17	11.67 (0.87)	17	0.15 (0.02)	17
351	14.98 (0.59)	25	12.48 (0.34)	25	14.16 (0.49)	25	0.09 (0.03)	25
352	15.09 (0.60)	25	12.89 (0.50)	25	13.49 (0.73)	25	0.11 (0.03)	25
353	13.23 (0.13)	7	10.49 (0.25)	7	11.94 (0.10)	7	0.07 (0.01)	7
354	12.72 (0.37)	25	9.84 (0.38)	25	12.44 (0.16)	25	0.06 (0.01)	25
355	13.66 (0.22)	25	11.69 (0.23)	25	12.90 (0.11)	25	0.14 (0.02)	25
356	14.00 (0.67)	17	11.83 (0.60)	17	12.70 (0.67)	17	0.12 (0.02)	17
361	12.08 (0.23)	17	10.13 (0.31)	17	9.04 (0.68)	17	0.14 (0.02)	17
362	13.81 (0.34)	25	11.86 (0.32)	25	13.12 (0.42)	25	0.15 (0.04)	25
369	14.41 (0.46)	25	12.05 (0.31)	25	14.36 (0.21)	25	0.10 (0.02)	25
371	15.38 (0.23)	25	12.59 (0.33)	25	14.84 (0.14)	25	0.07 (0.02)	25
372	14.31 (0.37)	25	11.34 (0.24)	25	12.73 (0.65)	25	0.06 (0.02)	25
381	14.24 (0.44)	25	12.08 (0.33)	25	12.58 (0.68)	25	0.12 (0.03)	25
382	14.02 (1.26)	25	11.78 (1.08)	25	11.97 (1.56)	25	0.11 (0.03)	25
383	14.64 (0.47)	25	12.57 (0.40)	25	13.02 (0.61)	25	0.13 (0.02)	25
384	15.95 (0.71)	25	13.15 (0.45)	25	14.22 (0.77)	25	0.07 (0.02)	25
385	12.15 (0.49)	17	9.76 (0.52)	17	10.19 (0.92)	17	0.10 (0.04)	17
390	12.21 (0.37)	17	10.34 (0.40)	17	10.86 (0.51)	17	0.16 (0.02)	17

Source: UNIDO.

Table A3. Summary Statistics for Data Used for Analysis of Institutional Gaps and Income Gaps

Variable	Obs	Mean	Std. Dev.	Min	Max
Landlock	68	0.1323529	0.3413936	0	1
Openness (Sachs & Warner 95)	63	0.2252768	0.3423797	0	1
Log Constructed Trade Share (Frankel-Romer)	68	2.721456	0.7672238	0.94	4.586
Latitude	68	6.318064	19.69103	-41.81407	61.06258
Eth-Ling Fractionalization	61	46.37705	29.43024	1	90
Africa	68	0.3382353	0.4766266	0	1
South Asia	68	0.0588235	0.2370435	0	1
East Asia & the Pacific	68	0.0735294	0.2629441	0	1
Americas	68	0.3970588	0.4929263	0	1
Oil Production Dummy	68	0.2647059	0.4444566	0	1
Commodity Dummy	68	0.6764706	0.471301	0	1
Institutional Index	68	-0.1134657	0.7704978	-1.978333	1.585833
Log Mortality	68	4.588946	1.255075	2.145931	7.986165
Log GDP per Capita	68	7.794468	1.109153	5.252923	10.0311

Table A4. Summary Statistics for Data Used for Econometric Results Presented in Figures 4 and 7 on Institutional Gaps and Income Gaps

Sample	Variable	Obs	Mean	Std. Dev.	Min	Max
Latin America (including Mexico plus 22 others). Cuba is not in the GDP sample.	Weighted average of Kraay & Kaufman variables (Corruption, Law & Order, and Bureaucratic Quality)	414	-0.4069638	0.558766	-1.75361	0.6972296
	Log(country's GDP pc/USA GDP pc)	923	-1.715673	0.579324	-3.65967	-0.3095284
Mexico, Brazil, Argentina, Chile, Colombia, Venezuela, Peru, Costa Rica, and Uruguay	Weighted average of ICRG (Corruption, Law & Order, and Bureaucratic Quality)	162	-0.1312372	0.4356544	-1.00386	0.6972296
	Log(country's GDP pc/USA GDP pc, ppp)	378	-1.328616	0.3673385	-2.19757	-0.3095284

Table A5. Groups of countries used to calculate GDP and institutional gaps in Figures 4 and 7

Group 1		Group 2
ARGENTINA	HAITI	ARGENTINA
BOLIVIA	HONDURAS	BRAZIL
BRAZIL	JAMAICA	CHILE
CHILE	MEXICO	COLOMBIA
COLOMBIA	NICARAGUA	COSTA RICA
COSTA RICA	PANAMA	MEXICO
CUBA*	PARAGUAY	PERU
DOMINICAN REPL.	PERU	URUGUAY
ECUADOR	TRINIDAD/TOBAGO	VENEZUELA
EL SALVADOR	URUGUAY	
GUATEMALA	VENEZUELA	
GUYANA		

* Cuba was not included in the sample to calculate Log of GDP differentials with respect to the USA

Table A6. Data Used for Analysis of Convergence Across Mexican States during 1990-2000 (all variables are in logs, except the poor states dummy)

State	GDP pc 2000	GDP pc 1990	Literacy	Yrs. Educ	Pub. Emp.	Manuf. Share	Tel. Dens.	Dist. To U.S. 1	Dist. to U.S. 2	High-ways	Poor States
Aguascalientes	2.78	2.75	4.53	1.90	-2.98	3.25	2.42	6.51	7.16	6.66	0
Baja California	2.86	2.97	4.56	2.01	-3.27	2.93	2.52	5.13	6.91	7.95	0
Baja California Sur	2.86	2.97	4.55	2.00	-2.43	1.53	2.98	6.80	7.17	7.29	0
Campeche	3.07	3.24	4.44	1.76	-2.89	0.37	1.75	6.89	7.33	7.44	0
Chiapas	1.81	1.86	4.25	1.44	-3.55	2.22	1.14	7.01	7.34	7.97	1
Chihuahua	2.98	2.92	4.54	1.92	-3.46	3.20	2.62	5.84	7.11	8.32	0
Coahuila de Zaragoza	2.96	2.83	4.55	1.99	-3.44	3.51	2.64	5.78	7.08	8.12	0
Colima	2.68	2.70	4.51	1.89	-2.71	1.53	2.67	6.86	7.27	6.67	0
Distrito Federal	3.59	3.51	4.56	2.17	-2.61	3.11	3.59	6.59	7.22	5.08	0
Durango	2.54	2.41	4.53	1.82	-3.19	3.18	2.02	6.44	7.18	7.85	0
Guanajuato	2.28	2.28	4.42	1.65	-3.81	3.27	1.97	6.46	7.20	7.76	0
Guerrero	2.02	2.11	4.29	1.61	-3.27	1.70	1.78	6.84	7.27	7.87	1
Hidalgo	2.21	2.22	4.37	1.70	-3.54	3.36	1.62	6.43	7.19	7.68	0
Jalisco	2.66	2.66	4.51	1.87	-3.57	3.22	2.69	6.72	7.20	8.42	0
Mexico	2.41	2.50	4.51	1.96	-3.02	3.62	1.99	6.61	7.22	8.38	0
Michoacan	2.16	2.03	4.42	1.65	-3.74	2.73	1.91	6.66	7.25	8.27	0
Morelos	2.50	2.67	4.48	1.92	-3.30	3.25	2.48	6.69	7.23	7.24	0
Nayarit	2.17	2.22	4.49	1.81	-3.27	2.41	1.95	6.75	7.24	6.97	0
Nuevo Leon	3.20	3.17	4.56	2.08	-3.46	3.54	2.97	5.44	7.04	8.19	0
Oaxaca	1.82	1.85	4.28	1.50	-3.44	2.86	1.10	6.86	7.28	8.01	1
Puebla	2.24	2.20	4.39	1.72	-3.78	3.25	2.05	6.59	7.22	7.76	0
Querétaro de Arteaga	2.82	2.74	4.44	1.81	-3.43	3.59	2.00	6.48	7.19	7.19	0
Quintana Roo	3.06	3.40	4.47	1.84	-2.84	1.39	1.96	7.05	7.36	7.47	0
San Luis Potosí	2.33	2.32	4.44	1.76	-3.54	3.39	2.03	6.23	7.12	7.94	0
Sinaloa	2.40	2.50	4.50	1.90	-3.34	2.13	2.35	6.66	7.22	7.99	0
Sonora	2.87	2.81	4.55	1.99	-3.12	2.78	2.68	5.86	7.06	8.60	0
Tabasco	2.14	2.29	4.47	1.77	-2.95	1.79	1.79	6.92	7.31	7.79	0
Tamaulipas	2.72	2.66	4.53	1.95	-3.20	3.02	2.53	5.68	7.07	8.13	0
Tlaxcala	2.05	2.04	4.49	1.87	-3.48	3.51	0.70	6.57	7.22	7.22	0
Veracruz-Llave	2.15	2.14	4.40	1.70	-3.58	3.22	2.04	6.55	7.22	8.42	0
Yucatán	2.41	2.40	4.43	1.74	-3.41	2.82	2.34	6.89	7.34	8.25	0
Zacatecas	2.09	2.03	4.50	1.69	-3.33	1.25	1.41	6.42	7.14	7.66	0

Chapter 2

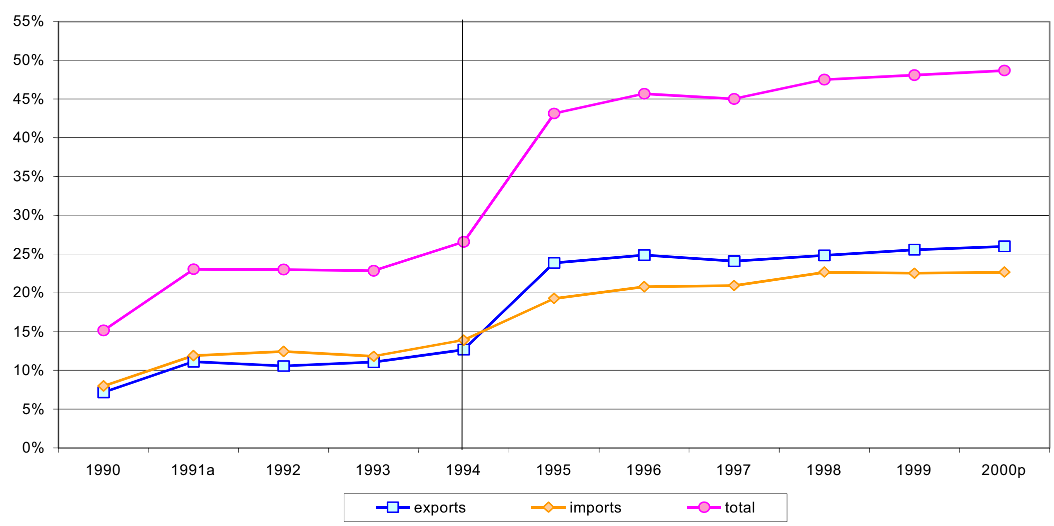
Macroeconomic Dynamics after NAFTA: Synchronization, Volatility and Macroeconomic Policy Coordination

2.1 Introduction

What are the consequences of NAFTA for the conduct of macroeconomic policy in Mexico? The agreement contained no explicit provisions in this regard, but its implementation may have had a significant effect on Mexico's macroeconomic dynamics. This is so because Mexico's trade (as well as financial) integration with its NAFTA partners could have led to an increased similarity among their respective business cycles, and this in turn could have changed the desirability of alternative fiscal and monetary policies for Mexico.

Figure 1 illustrates the high degree of trade integration with NAFTA partners that Mexico has reached in recent years. By the end of the 1990s, total trade with the U.S. and Canada represented almost 50 percent of Mexico's GDP, and over 80 percent of its total trade. Exports to NAFTA partners accounted for more than one-fourth of its GDP and 90 percent of total exports. One would expect that this rising degree of trade intensity should lead to Mexico's economy marching in step with those of its NAFTA partners. Yet trade is not the only factor affecting macroeconomic synchronization, and other ingredients—such as the similarity of production structure, financial integration and policy coordination—also matter. Moreover, synchronization is not an automatic byproduct of trade integration—indeed, there are theoretical arguments that trade and/or financial integration among dissimilar countries could actually result in reduced, not increased, macroeconomic synchronization, through specialization of the countries involved that would leave them more exposed to asymmetric shocks.

Figure 1. Mexico: Trade with NAFTA countries (percent of GDP)



Macroeconomic synchronization is important because it provides an indicator of the necessity of independent fiscal and monetary policies. If Mexico's business cycles become more similar to those of the U.S. and Canada, and its macroeconomic variability is dominated by shocks common with its FTA partners, then Mexico would benefit from the stabilization policies followed by them and, indeed, its own desired policy adjustments would be similar to those desired by the other two countries. In the limit, Mexico could benefit from a common macroeconomic policy with NAFTA members—perhaps even in terms of a currency union. Indeed, the theory of optimal currency areas (OCA for short) implies that the benefits from a currency union rise with the volume of trade among member countries, while the costs increase with the degree of asymmetry of their business cycles.[26]

On the contrary, if business cycles in NAFTA countries are not becoming more synchronized, and Mexico's macroeconomic variability is dictated primarily by idiosyncratic shocks, then policy synchronization and coordination would be less likely to help reduce macroeconomic volatility in Mexico, which would instead require the authorities to implement policies potentially very different from those followed by the U.S. and Canada.

The proper design of Mexico's policies to reduce its macroeconomic volatility is an important issue in the post-NAFTA context. Macroeconomic volatility is a potential obstacle for the country to reap the full benefits from trade integration. The reason is that those benefits accrue primarily through trade and investment flows, and volatility—traditionally high in Mexico, like in the rest of Latin America—represents a powerful deterrent to both trade and investment.

It is also useful to assess the degree to which synchronization is changing, because it can shed light on the likelihood of a further deepening of the economic integration process. If business cycles are becoming highly symmetric, FTA members will be more likely than otherwise to consider further steps to enhance economic integration, including measures such as policy coordination.

In this chapter we assess the changes in macroeconomic synchronization between Mexico and the U.S. and Canada after NAFTA, and draw their implications for macroeconomic policy.[27] We consider three different aspects of synchronization. The first issue is whether the economies of the NAFTA countries tend to co-move more closely together (i.e. in the same direction at the same time) than before implementation of the trade agreement. The second issue is whether the Mexican economy has become more sensitive to developments in its NAFTA partners, i.e. whether business cycle fluctuations in Canada or the U.S. generate a larger response in the Mexican economy than before. The third issue is whether shocks to growth in Canada or the U.S. have become a more important source of volatility for Mexico relative to other types of shocks, i.e. whether the business cycle in these countries has become more important for the Mexican economy than other shocks such as terms of trade, financial contagion from other emerging markets or domestic aggregate demand shocks.

These three dimensions are related but distinct. A rise in the observed sensitivity of the Mexican economy to contemporaneous developments in its NAFTA partners could reflect either increased co-movement or higher volatility in Mexico without any change in the degree of co-movement. In the latter case, the contribution of idiosyncratic shocks to Mexico's overall volatility need not have declined after NAFTA. Conversely, a lower contribution of idiosyncratic factors to Mexico's macroeconomic volatility, in the absence of any increase in sensitivity to developments in the U.S. and Canada, might just reflect a more limited incidence of idiosyncratic shocks over the post-NAFTA period, which might not persist in the future. Of course, as we shall discuss later, it is also possible that NAFTA itself may have affected the frequency and magnitude of idiosyncratic shocks to the Mexican economy.

Therefore, to conclude with some confidence that greater economic integration between Mexico and its partners has contributed to greater macroeconomic synchronization in the region, we should find that, first, there has been an increase in the degree of business cycle co-movement among the NAFTA countries in recent years; second, that the sensitivity of the Mexican economy to developments in the U.S.

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[26] See Mundell (1961) and McKinnon (1963). In a stylized model, Alesina and Barro (2002) show that the key issue is the variance of asymmetric shocks, both nominal and real. See also Alesina et al (2002) for a recent empirical application to a large country sample, including Mexico.

[27] The chapter draws from the background paper by Cuevas et al (2002).

and Canada has increased and, third, that shocks to growth in the U.S. and Canada have become a larger source of Mexico's growth volatility.

Even in that case, however, we have to keep in mind that the results from the analysis below are tentative, given the short time elapsed since the implementation of NAFTA. Most importantly, the results are conditional on the pattern of shocks actually observed in the post-NAFTA years. There is no assurance that such pattern, and specifically the relative frequency and magnitude of common versus idiosyncratic shocks observed in those years, will persist in the future. For these reasons, the findings of this chapter have to be taken with caution.

2.2 Trade integration and macroeconomic synchronization

2.2.1 Theory

Trade integration is an important determinant of macroeconomic co-movement. In theory, however, the impact of the former on the latter may go either way, depending on several ingredients: the relative importance of sector-specific vs. global shocks in macroeconomic dynamics, the similarity between countries' production patterns, and the degree of commonality of aggregate shocks.

If business cycles are driven mostly by sector-specific shocks, the impact of greater economic integration on business cycle synchronization depends on the trade and specialization patterns of the countries under consideration. The more similar their specialization patterns, the more likely that increased trade will result in increased synchronization.

Thus, business cycle synchronization could actually fall following a free trade agreement if the latter leads countries to higher specialization, and this is more likely to happen if the participating countries engage mostly in *horizontal inter-industry* trade.[28] If instead the pattern of trade among participating countries is mainly of *intra-industry* type, then greater economic integration is likely to lead to a higher synchronization of their business cycles. This result is also likely to arise if total trade involves significant vertical *inter-industry* trade, i.e., if the economies specialize in different stages of a common production process, for example through outsourcing, in which case trade integration effectively links the various stages of production across countries.[29]

This means that the effects of trade agreements on business cycle correlation depend on the intrinsic characteristics of participating countries and on the nature of their trade relationships. Even if trade intensity and business cycle correlation are positively related in a sample of industrialized countries, whose trade is mainly of intra-industry type, such result could be driven by the similarity of their factor endowments and the limited scope for further specialization from trade. On these grounds, one would expect to find less of a positive effect of integration on synchronization in an FTA involving both industrial and developing economies like NAFTA, whose members differ substantially in terms of factor endowments, unless trade among them is mostly intra-industry (or vertical inter-industry) in character.[30]

On the other hand, if business cycles are dominated by aggregate shocks, the deciding factor is the impact of trade integration on the correlation of shocks across countries. In most scenarios the impact is likely to be positive, as increased trade will facilitate the transmission of aggregate disturbances across economies, and thus we would expect to observe a more synchronized business cycle as a result of greater

[28] See Eichengreen (1992), Kenen (1969), and Krugman (1993).

[29] See Feenstra and Hanson (1996) and Kose and Yi (2001).

[30] This was apparently the case for Mexico-U.S. trade even before NAFTA. See Esquivel (1992).

economic integration.[31] Assume, for example, that aggregate disturbances reflect mostly demand shocks. In such case, a positive (negative) shock in one country will increase (decrease) demand for goods produced in other countries, so that the shock will spill over to other countries. The magnitude of such spillover will obviously depend on the intensity of trade among the participating countries.

In addition to demand spillovers, there are other possible channels through which greater economic integration may increase business cycle correlation. For example, the process of trade integration could lead to faster diffusion and transmission of productivity, knowledge and technological shocks, as well as to stronger foreign direct investment links across countries.[32] All of these elements should enhance business cycles synchronization among the countries involved in the process of integration.

These factors contribute to raise synchronization by reducing the idiosyncratic component of shocks. Thus, other forces that likewise increase the commonality of shocks across countries tend to have the same effect. For example, policy shocks are a significant source of cyclical fluctuations, and therefore the increase in synchronization will be even larger if the process of trade integration is accompanied by a greater degree of macroeconomic policy coordination among countries.

So far we have focused on trade integration, but financial integration also matters for business cycle co-movement. Like with trade integration, however, its effects are not clear cut and depend on the role of idiosyncratic vs. common shocks. In theory, capital market integration should facilitate risk sharing and hence encourage higher specialization across countries by insuring them against asymmetric shocks (Kalemli-Ozcan, Sorensen and Yosha 2001). A higher degree of specialization would in turn leave countries more exposed to idiosyncratic shocks and reduce the co-movement of production across economies—but increase that of income and consumption as countries would tend to hold similarly diversified asset portfolios.

On the other hand, financial integration facilitates international transmission of aggregate financial shocks. Increased openness to capital flows makes local interest rates and financial asset prices more responsive to world financial conditions, as the extensive literature on ‘contagion’ has argued. The likely consequence is an increase in aggregate co-movement across countries.

2.2.2 International evidence

The empirical literature on the impact of trade integration on macroeconomic synchronization includes both studies of the relationship between trade intensity and business cycle correlation and case studies that analyze the effect of specific trade agreements or economic integration processes on business cycle synchronization.

The evidence from industrial countries is mostly supportive of a positive effect of integration on macroeconomic synchronization. For example, Frankel and Rose (1998), using a sample of twenty industrialized countries over thirty years, find strong evidence that greater trade links increase business cycle correlation. A number of other studies using a similar methodology find in most cases the same results, in some cases highlighting the contribution of intra-industry trade to the positive integration - synchronization link.[33] However, Imbs (1999, 2000) finds that cycle synchronization is more responsive

[31] See Frankel and Rose (1998).

[32] Some of these aspects have been emphasized by, among others, Coe and Helpman (1995).

[33] Artis and Zhang (1995) find that European economies were highly correlated with the U.S. from 1961-1979 but more with Germany since joining the ERM. Fidrmuc (2001) uses a sample that includes Central and Eastern European countries, and adds the level of intra-industry trade as an explanatory variable, finding that it has a

to similarities in the structure of production than to trade intensity, suggesting that sector-specific shocks are an important part of the story.

Another group of studies sheds light on the experiences of Ireland, Portugal and Spain from accession to the EEC/ EU (see Box 1). They suggest that the main force behind the observed increase in the correlation of the business cycles of these countries with the rest of the EU was deeper trade integration rather than common policies such as the ERM. Synchronization increased first in the tradable goods sector, and only later in the rest of the economy.

As already noted, however, these findings from industrial countries do not carry over automatically to developing countries, for a variety of reasons. Among industrial countries, intra-industry trade accounts for a larger fraction of total trade than in developing countries, production structures are more similar, and common and/or global shocks likely play a bigger role. In fact, the empirical evidence on the effects of trade integration between industrial and developing countries, or among the latter, points to smaller effects on business cycle correlation. The most comprehensive study is that of Calderón et al. (2002),who explore the issue in a sample of 147 countries during the period 1960-1999. For the case of trade relationships between developing and developed countries, they find that higher trade intensity is associated with higher business cycle correlation, although the magnitude of the effect is about one-third of that found in the case of industrialized countries. The effect of trade intensity on business cycle correlation among developing countries is even smaller.[34]

2.3 NAFTA and macroeconomic synchronization

We turn to assessing the changes in the degree of macroeconomic synchronization between Mexico and its NAFTA partners. We first assess if the contemporaneous correlation of key macroeconomic variables among NAFTA countries has increased in recent years relative to historical levels, and then we look for significant changes in the sensitivity of Mexican variables with respect to their U.S. counterparts in the past few years. We also provide a rough assessment of changes in the role of U.S. shocks in Mexico's output performance. For reasons of space, here we just summarize the main results; additional experiments are described in Cuevas et al (2002).

2.3.1 Methodological approach

We work with annual growth rates of the variables of interest (derived from quarterly or monthly frequency data) at various levels of aggregation (national, sector, and regional). We use two basic methods. First, we compare the contemporaneous correlations between the different variables computed over the longest possible time period, depending on data availability, with those computed over a shorter time period meant to capture the effect of NAFTA. This allows us to observe: i) in the case of

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positive and significant effect on the correlation of business cycles. Fontagné and Freudenberg (1999) find the same results as FR looking at more disaggregated trade data for the European Union. Anderson, Kwark and Vahid (1999) again find similar results using more sophisticated measures of co movement. Finally, Gruben, Koo and Mills (2002), who separate out effects of specialization and intra-industry trade, also find similar results, although the positive effect of trade intensity on business cycle correlation is slightly lower than previous estimates.

[34] Evidence from case studies is even more mixed For example, Achy and Milgram (2001) argue that a free trade agreement between Morocco and the European Union is very likely to lead to higher specialization in Morocco and, therefore, to a less-synchronized business cycle between them. Ahumada and Martirena-Mantel (2001) replicate the Frankel-Rose analysis for a sample of Mercosur countries plus Chile. They find suggestive evidence that higher trade has led to higher co movement, but their results are largely driven by the change in correlation between Argentina and Brazil from 1987-1992 to 1993-1999. The correlations Argentina-Uruguay, Brazil-Uruguay, Argentina-Chile, Brazil-Chile and Chile-Uruguay change little between both periods and in some cases fall in the second period.

international comparisons, if the correlation between the Mexican and U.S. variables has increased more than that between other countries and the U.S.; and ii) when using sector-wise (or regional) information, if the correlation between Mexican and U.S. sectors (regions) has increased more in those cases where we would expect a larger effect from NAFTA. [35]

The second method involves basic regression analysis. We regress the annual growth rate of the Mexican variable of interest against its lagged value and current and lagged values of its U.S. counterpart. The general form of the regressions is:

$$\Delta x_{it} = \zeta_i + \eta_i \Delta x_{it-1} + \nu_i \Delta x_{USt} + \sigma_i dT + \varsigma_i dT \cdot \Delta x_{it-1} + \iota_i dT \cdot \Delta x_{USt} + \kappa_{it} \qquad (1)$$

where Δx_{it} is the annual growth rate of variable x in country, region or sector i, Δx_{USt} is the annual growth rate of the same variable in the U.S. (or the partner country under consideration), and *dT* is a time dummy to capture changes in the sensitivity of the variable to developments in the U.S. after year T.[36] While the equation as written allows only for one lag of the dependent variable, a number of longer lag structures were also explored; however, unlike the first lag of the dependent variable, which was virtually always highly significant, additional lags of the dependent and independent variables proved generally insignificant.

There are two options for the dummy variable *dT*. The first option sets it equal to one from 1994 to the end of the sample, and zero for previous periods. The second sets it at one from 1997 on. The logic of the latter specification is that, although NAFTA was implemented in 1994, the large balance of payments crisis that took place in Mexico in 1995 and the fast subsequent recovery in 1996 are large shocks, presumably unrelated to NAFTA, which might make it more difficult to find any significant effects from the trade agreement. Below we will report results using both specifications.[37]

From these simple regressions we can assess two facts. The first is how sensitive the dependent variable is to developments in the U.S. (as given by ν). The second is how this sensitivity has changed after time T (when it is given by $\nu+\iota$), and if such change is statistically significant.

In addition, however, we also need a measure of the contribution of U.S. (or partner-country) shocks to the variation in the dependent variable. This is of independent interest because even if the responsiveness of the latter to developments in the U.S. (i.e., ν) is large, if shocks from the U.S. are sufficiently small their contribution to the total variation could be just marginal.[38] In this regard, neither

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[35] In addition, time-varying contemporaneous correlations were also computed, along with cross-correlations at various leads and lags to verify if the timing of co-movement between the variables of interest has changed; see Cuevas et al. (2002). Finally, factor analysis was also used to tackle the same questions. Because the methodology is slightly more complex, and because the results are consistent with those obtained with the other two methodologies, we omit the presentation of this analysis. However, it is important to emphasize that the factor analysis results tend to support the conclusions based on the correlations and basic regression analyses.

[36] Note that we also allow for changes in the constant and the degree of inertia of the dependent variable, so that the dummy really allows for general structural change in the equation. This methodology is very similar to that used by Frankel, Schmukler and Serven (2003) to assess how responsive are interest rates under different currency regimes to changes in rates abroad.

[37] As discussed in Cuevas et al (2002), many other specifications were used, and the results obtained were qualitatively similar. Seasonal time dummies were also included, but they were seldom significant and their inclusion did not affect the estimated values of the parameters or their significance.

[38] To be specific, let $\Delta x_{it} = \zeta_i + \nu_i \Delta x_{USt} + \kappa_t$, and let ω^2_{US} and ω^2_κ denote respectively the variance of the U.S. variable and the residual error term. Define $\chi = \omega_\kappa / \omega_{US}$, which captures the relative importance of idiosyncratic relative to U.S. shocks. Then it follows that $R^2 = \frac{\eta^2}{\eta^2 + Z^2}$, and therefore the variance ratio χ and the sensitivity coefficient η affect R^2 in opposite directions.

the simple correlation coefficient between the dependent and the U.S. variable, nor the R^2 of a dynamic regression such as (1), offer the right measure. The simple correlation only captures the contribution of changes in the independent variable to contemporaneous changes in the dependent variable,[39] while the R^2 from equation (1) is likely to be dominated by the explanatory power of the lagged dependent variable.

If we are interested in the contribution of current *and* past changes in the U.S. variable to the variation in the dependent variable, then a better measure is obtained by solving the dynamic equation (1) to express the current value of the dependent variable in terms of current and past random errors and the entire history of the explanatory variable. The fraction of the variation in the dependent variable attributable to such history is what we take as our measure of the total contribution of U.S. shocks to the observed variation of the left-hand side variable. We gauge the change in this contribution over time by comparing such measure as calculated in a regression covering the pre-NAFTA years with that obtained from another regression estimated on the post-NAFTA sample.[40]

2.3.2 NAFTA and macroeconomic synchronization: aggregate output

We first measure the degree of output synchronization among the economies of Mexico, the U.S. and Canada, and compare it to that observed between them and other countries in Europe and Latin America.[41] Figure 2 shows the correlation of annual GDP growth of various countries with that of the U.S. during the periods 1981Q1-2001Q2 and 1994Q1-2001Q2. In the longer sample, the correlation coefficient between Canada and the U.S. is by far the highest, followed by those of the United Kingdom, Chile and Italy. Mexico's correlation is positive, but much lower. However, in the shorter, more recent time period, Mexico and Canada share the top spot, with a correlation coefficient with the U.S. of 0.66,[42] much higher than the values for the other industrial countries shown in the table.

It is also interesting to note that the correlation between Canada and Mexico in the shorter period is substantially higher than for the whole sample (Figure 3). However, Canada's correlation with several European countries is higher than that with Mexico. Other results (not shown in the figure) also reveal an increase in the correlation of Mexico's output with most European economies in the sample, though the increase is much smaller than for the correlation with the U.S. This phenomenon is consistent with the general opening up to trade followed by Mexico since the mid-eighties.

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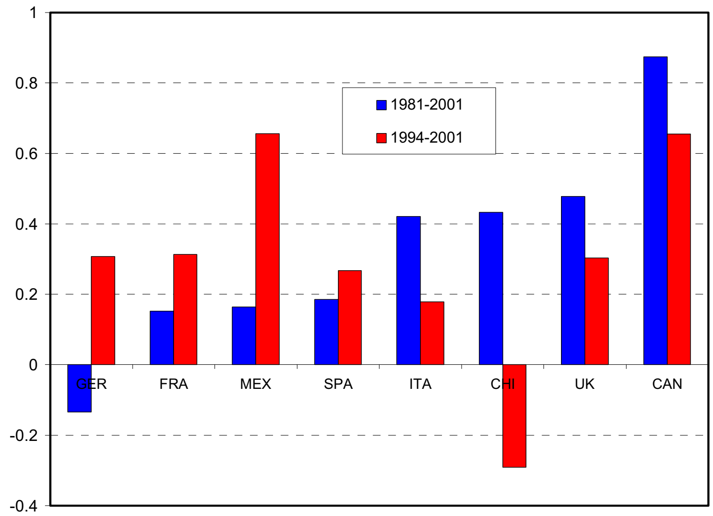
[39] Note that the contemporaneous correlation coefficient equals the square root of the unadjusted R^2 from a simple static regression with no dummies, such as that in the preceding footnote.

[40] Formally, let L denote the lag operator and, assuming dT = 0 for simplicity, rewrite equation (1) as $\div x_{it}(1 4\ \eta_i L)\,|_2\,\zeta_i\ 2\ \nu_i \div x_{USt}\ 2\ \kappa_t$. Then we can use the final form of the equation to compute $Var[\div x_{it}]|^2\ \nu_i^2\ Var[(1 4\ \eta_i L)^{41} \div x_{USt}]\ 2\ (1 4\ \eta_i^{2})^{41}\omega_\kappa^2$, and the measure proposed in the text is just given by $1 4\ (1 4\ \eta_i^{2})^{41} Var[\div x_{it}]^{41}\omega_\kappa^2$. Note that if the past histories of the independent variable and the disturbances are not orthogonal, in effect we are attributing their correlation to the former. Note also that if there is no persistence at all (so that η = 0 and $\div x_{US}$ is serially uncorrelated), this expression reduces to the square of the contemporaneous correlation coefficient. Except in this case, however, the two statistics differ. Finally, to adjust for varying sample size between the pre- and post-NAFTA years, we apply to this measure the standard degrees-of-freedom correction used to compute adjusted R^2.

[41] The data employed are annual rates of growth of GDP (at quarterly frequency) and of industrial production (at monthly frequency). The source of the data for all countries is the IMF, with the exception of the industrial production of Chile, which proceeds from domestic sources.

[42] These turn out to be also the highest correlation coefficients of these two countries with any other country in the sample; see Cuevas et al (2002). In turn, the somewhat surprising negative correlation between the U.S. and Chile in the recent sample is discussed by Morandé and Schmidt-Hebbel (2000).

Figure 2. Correlation of Annual GDP Growth with the U.S.



Results using industrial production growth broadly confirm those based on GDP growth. Figure 4 shows the correlation coefficients of industrial production growth in various countries with that of the U.S. during the periods 1987–2001, 1995–2001 and 1997–2001. The countries showing the largest correlation with the U.S. during the longer sample period are Canada and the United Kingdom. At the other extreme are Chile, Mexico and Germany, all with correlation coefficients below 0.2. The differences between these results and those for the period 1995-2001 are generally small, with the correlation falling for some countries and increasing for others but in most cases by a relatively small magnitude. However, the differences between the full-sample results and those for the 1997-2001 sample are more striking. Most importantly, Mexico's industrial output correlation with the U.S. increases to a level similar to Canada's. Like with GDP, the correlation with the U.S. rises for several countries, but Mexico's increase

Figure 3. Correlation of Annual GDP Growth with Canada

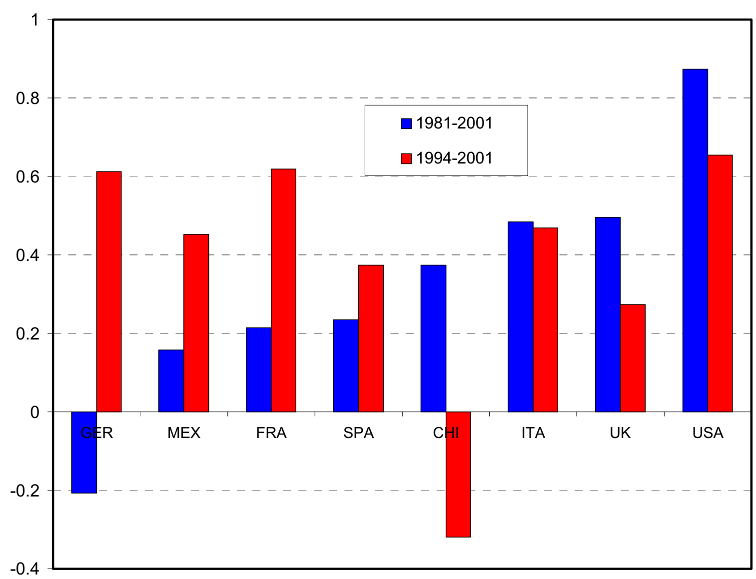
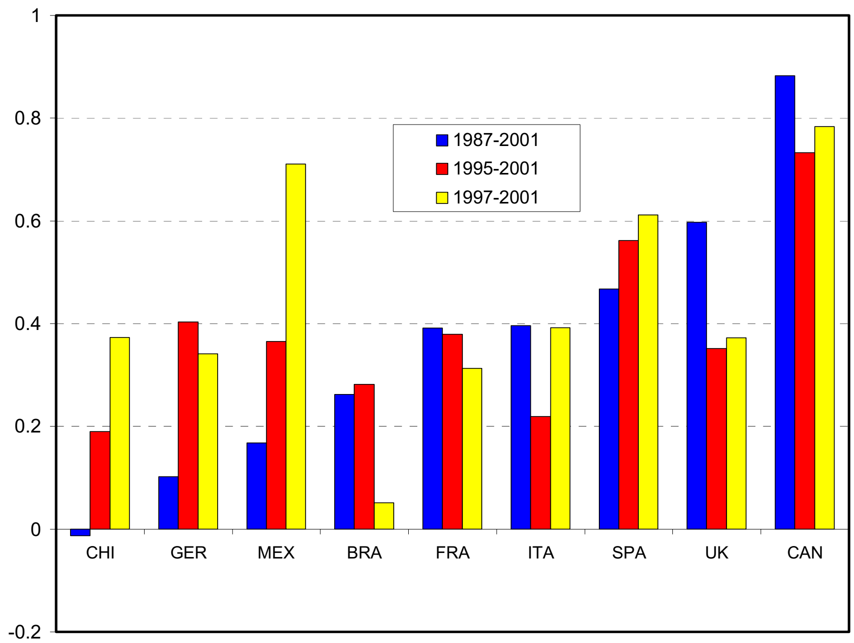


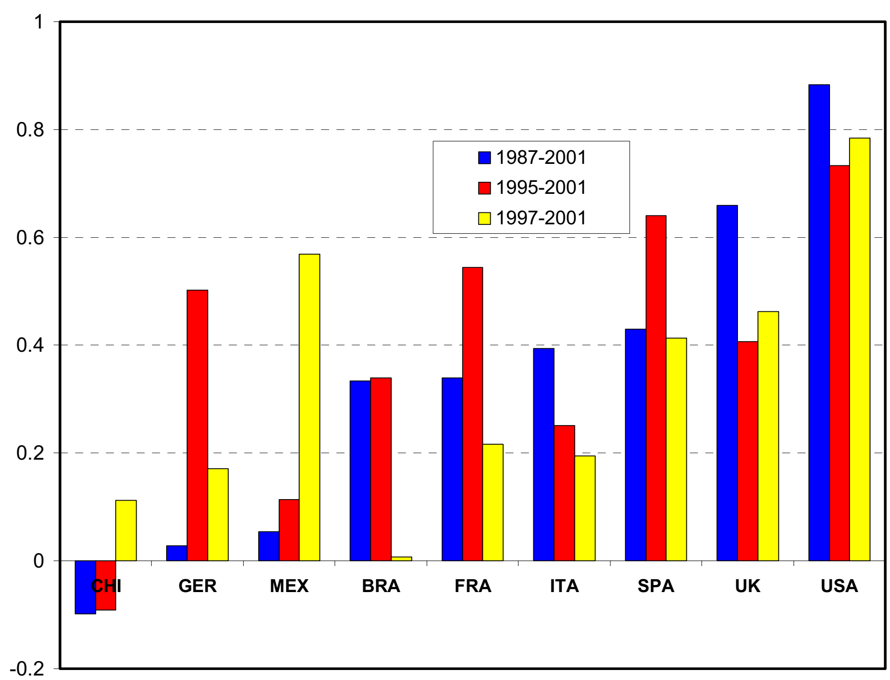
Figure 4. Correlation of Industrial Production Growth with the U.S.



is clearly the largest. Further, Figure 5 shows that Mexico's industrial production has also become much more tightly correlated with that of Canada in the recent period, a phenomenon unique among the countries shown in the figure.

So far these results indicate that in the post-NAFTA period output in Mexico and its NAFTA partners have tended to move in the same direction and at the same time to a greater extent than in the pre-NAFTA years. In principle, this could reflect the occurrence of larger common shocks, relative to

Figure 5. Correlation of Industrial Production Growth with Canada



idiosyncratic shocks to these countries, without any increase in the Mexico's sensitivity to developments in its NAFTA partners, or an increased sensitivity without changes in the structure of shocks, or both at the same time.

To assess the changes in the sensitivity of Mexican variables to developments in the U.S., we turn to the simple regressions described in equation (1) above.[43] Table 1 shows estimates of the sensitivity parameters ν and ι from equation (1) using GDP growth data, for the two choices of post-NAFTA period (starting in 1994 and 1997, respectively). As explained above, ν indicates the sensitivity to changes in the U.S. variable before the break date, whereas $\nu+\iota$ represents the sensitivity after that date.

Table 1. Annual Growth Rate of GDP

Sensitivity Coefficients Before and After NAFTA

a. Dummy 1994

					Fraction explained by U.S. shocks		
Country	**ν**	**ι**	**ν2ι**	**Adj R2**	**Before 1994**	**After 1994**	**Difference**
Canada	**0.65**	-0.13	**0.52**	0.89	0.85	0.72	-0.13
Mexico	**0.28**	**1.35**	**1.63**	0.66	-0.03	0.48	0.50
Brazil	**-1.03**	**1.63**	0.60	0.32	0.01	-0.10	-0.11
Chile	**0.56**	-0.63	-0.07	0.75	0.39	-0.05	-0.44
France	0.04	**0.24**	**0.29**	0.75	0.13	0.16	0.03
Germany	-0.04	0.37	0.33	0.71	-0.01	0.05	0.05
Italy	**0.10**	0.23	**0.32**	0.64	0.37	-0.23	-0.59
Spain	-0.02	**0.34**	**0.31**	0.81	-0.06	0.01	0.06
UK	0.05	0.13	0.17	0.80	0.47	0.06	-0.42

b. Dummy 1997

					Fraction explained by U.S. shocks		
Country	**ν**	**ι**	**ν2ι**	**Adj R2**	**Before 1997**	**After 1997**	**Difference**
Canada	**0.63**	-0.19	**0.44**	0.89	0.84	0.74	-0.10
Mexico	**0.31**	0.71	**1.03**	0.64	-0.01	0.36	0.37
Brazil	-0.09	0.19	0.09	0.09	-0.08	-0.11	-0.03
Chile	**0.53**	-0.37	0.16	0.75	0.37	-0.15	-0.52
France	0.07	0.06	0.13	0.73	0.18	0.47	0.30
Germany	-0.03	0.44	0.41	0.71	0.03	-0.26	-0.29
Italy	**0.10**	**0.33**	**0.43**	0.65	0.33	0.08	-0.25
Spain	-0.01	0.08	0.07	0.85	0.29	-0.14	-0.44
UK	0.06	0.09	0.14	0.81	0.49	0.01	-0.48

Note: The parameter estimates correspond to the empirical specification given by equation (1) in the text. Coefficients in **bold** are significantly different from 0 at the 10 percent level or better. The parameter □ represents the sensitivity coefficient to developments in the U.S. before period T (either 1994 or 1997) and the sum of □ plus □ indicates the sensitivity coefficient after period T. The measures of the contribution of U.S. shocks are described in the text. They are obtained from separate regressions on the sub samples before and after T, and are adjusted for degrees of freedom.

A variety of lag specifications were tried, and seasonal dummies were also included, with little change in the qualitative results. The coefficient estimates in the table show considerable diversity across

[43] The regressions were estimated using annual growth rates of GDP and industrial production for each country. For those countries where the data allows it, the regressions cover the period 1981-2001 in the case of GDP and 1987-2001 for industrial production. For countries with shorter data series, the sample starts with the first available observation.

countries. In both specifications shown, all countries except Canada and Chile exhibit increases in their sensitivity coefficients, although few of them are statistically significant. Mexico's coefficient rises substantially in the post-NAFTA period, although the increase is significant only when 1994 is taken as the break year. Mexico is also the country exhibiting the largest post-NAFTA sensitivity coefficient, which in both specifications is greater than 1. Canada's coefficient, the second largest, is less than half that of Mexico. Thus, not only is Mexico's GDP becoming more sensitive to variations in U.S. output, but it also responds more than proportionately to changes in the latter.

The R^2 from these regressions are in general quite high, with the exception of Brazil's. Yet they reflect to a large extent the action of lagged growth, and to gauge the contribution of U.S. growth to the observed variation in growth in the other countries we turn to the last three columns of the table. These report the estimated contribution of U.S. growth over the pre- and post-break sample periods, as measured by the R^2-like statistic described earlier.

Table 2. Annual Growth Rate of Industrial Production

Sensitivity Coefficients Before and After NAFTA

a. Dummy 1994

					Fraction explained by U.S. shocks		
Country	**ν**	**ι**	**ν2ι**	**Adj R2**	**Before 1994**	**After 1994**	**Difference**
Canada	**0.37**	0.04	**0.41**	0.91	0.93	0.68	-0.25
Mexico	0.00	0.15	0.14	0.59	-0.01	0.08	0.09
Brazil	0.08	0.28	0.36	0.42	-0.02	0.09	0.12
Chile	0.02	0.08	0.10	0.71	-0.01	0.05	0.06
France	0.07	0.10	**0.17**	0.73	0.04	0.22	0.19
Germany	0.02	**0.36**	**0.38**	0.69	-0.03	0.21	0.24
Italy	**0.27**	0.17	**0.45**	0.49	0.14	0.19	0.05
Spain	0.06	0.12	**0.19**	0.81	0.01	0.30	0.29
UK	**0.41**	**-0.33**	0.08	0.77	0.64	0.33	-0.31

b. Dummy 1997

					Fraction explained by U.S. shocks		
Country	**ν**	**ι**	**ν2ι**	**Adj R2**	**Before 1997**	**After 1997**	**Difference**
Canada	**0.32**	**0.24**	**0.56**	0.91	0.82	0.76	-0.06
Mexico	-0.01	**1.15**	**1.14**	0.59	-0.01	0.61	0.61
Brazil	0.37	-0.24	0.13	0.41	0.05	-0.02	-0.07
Chile	0.03	0.03	0.06	0.72	-0.01	0.07	0.07
France	**0.11**	-0.01	0.10	0.73	0.13	0.20	0.07
Germany	0.03	0.31	**0.34**	0.69	-0.01	0.12	0.13
Italy	**0.23**	0.24	**0.47**	0.48	0.12	0.25	0.13
Spain	0.09	0.20	**0.29**	0.81	0.16	0.37	0.20
UK	**0.27**	-0.08	**0.19**	0.76	0.57	0.51	-0.06

Note: The parameter estimates correspond to the empirical specification given by equation (1) in the text. Coefficients in **bold** are significantly different from 0 at the 10 percent level or better. The parameter □ represents the sensitivity coefficient to developments in the U.S. before period T (either 1994 or 1997) and the sum of □ plus □ indicates the sensitivity coefficient after period T. The measures of the contribution of U.S. shocks are described in the text. They are obtained from separate regressions on the sub samples before and after T, and are adjusted for degrees of freedom.

By this measure, both specifications yield fairly similar conclusions regarding the role of U.S. shocks. These account for the bulk of the variation in growth in Canada, and for a fair share in the U.K. and Chile in the early part of the sample as well. In these two countries, however, the contribution of U.S.

shocks declines sharply in the later years. In contrast, U.S. shocks appear wholly unimportant for Germany and Brazil in all samples and specifications. Importantly, Mexico is the country exhibiting the largest increase in the role of U.S. shocks under both specifications shown. In the later sample, U.S. growth accounts for between one-third and one-half of the variance of Mexico's growth. Only Canada (as well as France when the sample is broken in 1997) shows a larger figure.

Table 2 shows similar regressions of the annual growth rate of industrial production, using monthly data for 1987-2001. Like with GDP, most countries exhibit increasing sensitivity coefficients, but few of the changes are significant. Mexico shows a large jump when the break year is 1997; in such specification, it again exhibits the largest post-NAFTA sensitivity coefficient, as before exceeding 1. The last three columns in the table show that the explanatory power of U.S. industrial production rises in all countries, except for Canada and the U.K. As before, the explanatory power is greatest for Canada. In the early samples U.S. shocks appear to play a very marginal role in the observed variation in Mexico's growth, but in the post-1997 sample they become a major factor—they account for 61 percent of the variation, a figure that exceeds even that of the U.K., and is second only to Canada's.

2.4 NAFTA and output synchronization: The disaggregated view

There are two potentially important dimensions of synchronization that may be masked in the aggregate data. The first one is the geographic one. Have all regions of Mexico experienced a similar increase in the importance of U.S. developments as a source of growth variation? To answer this question, we explored regional employment growth data. The results from this analysis, described in detail in Box 2, show that the Southern states of Mexico have been a clear exception to the general trend. The other dimension refers to the economic sector level. If increased synchronization is indeed a result of deepening trade integration, we should expect a more marked increase in the degree of synchronization of tradable goods sectors than in other sectors. We investigate this hypothesis using quarterly GDP measures for Canada and Mexico and national gross income data for the U.S., at the 1-digit sector level, as well as monthly industrial production at the 2-digit level for Mexico and the U.S.[44]

Table 3 shows correlation coefficients of sector-wise growth rates in Mexico and Canada with the corresponding U.S. sector, for the periods 1988-2001, 1994-2001 and 1997-2001. In the full sample, the correlation between U.S. and Canadian sectors is generally larger than that between the U.S. and Mexican sectors, with Transport and Communications as the only exception. Indeed, the correlations of U.S. sectors with Mexican sectors are relatively low during the whole period 1988-2001. However, a more detailed look at the period after NAFTA, and specially after the 1995-96 balance of payments crisis, shows that the correlation between Mexican and U.S. sectors increased significantly in several cases, in some of them to reach (or even exceed) the levels observed for Canada. In particular, the correlation increased quite noticeably for manufacturing, transport and communications, and general services. In contrast, it remains quite low for agriculture, construction and financial services.

Comparing the full-sample correlation coefficients between Mexican and U.S. sectors with those obtained in the more recent periods, it can be seen that the latter are larger than the former in every instance, and in all cases but one they are larger in the latest part of the period (1997-2001). In contrast, U.S.-Canada correlation coefficients fall in some cases during the latter part of the sample. In fact, the pattern of correlation coefficients across Mexican sectors does not seem to support the view that these

[44] Comparable industrial production data were unavailable for Canada. The sources for the data are: INEGI, CANSIM and BEA for Mexico, Canada, and the USA, respectively. The sample period used for the quarterly data is 1988Q1–2001Q2, while that for the monthly data is 1980M1–2001M11. Both sample periods are determined by the availability of data.

Table 3. Growth correlation between Canada, Mexico and the U.S. by sector of economic activity

	1988-2001		1994-2001		1997-2001	
	Canada	Mexico	Canada	Mexico	Canada	Mexico
Agriculture	0.135	-0.005	0.167	0.086	0.409	0.265
Mining	0.589	0.392	0.645	0.451	0.753	0.489
Manufactures	0.657	0.112	0.779	0.169	0.890	0.867
Construction	0.604	0.031	0.125	0.489	-0.542	0.137
Transportation and Communications	-0.031	0.240	0.296	0.399	0.150	0.619
Electricity, Gas and Water	0.241	0.024	0.575	0.184	0.705	0.387
Financial Services	-0.155	-0.189	-0.120	-0.118	0.332	0.186
Social, Communal and Personal Services	0.322	-0.056	0.513	0.423	0.145	0.635

should rise more sharply for traded sectors, since the second largest increase, as well as the second largest coefficient in the 1997-2001 period, correspond to the Services sector.

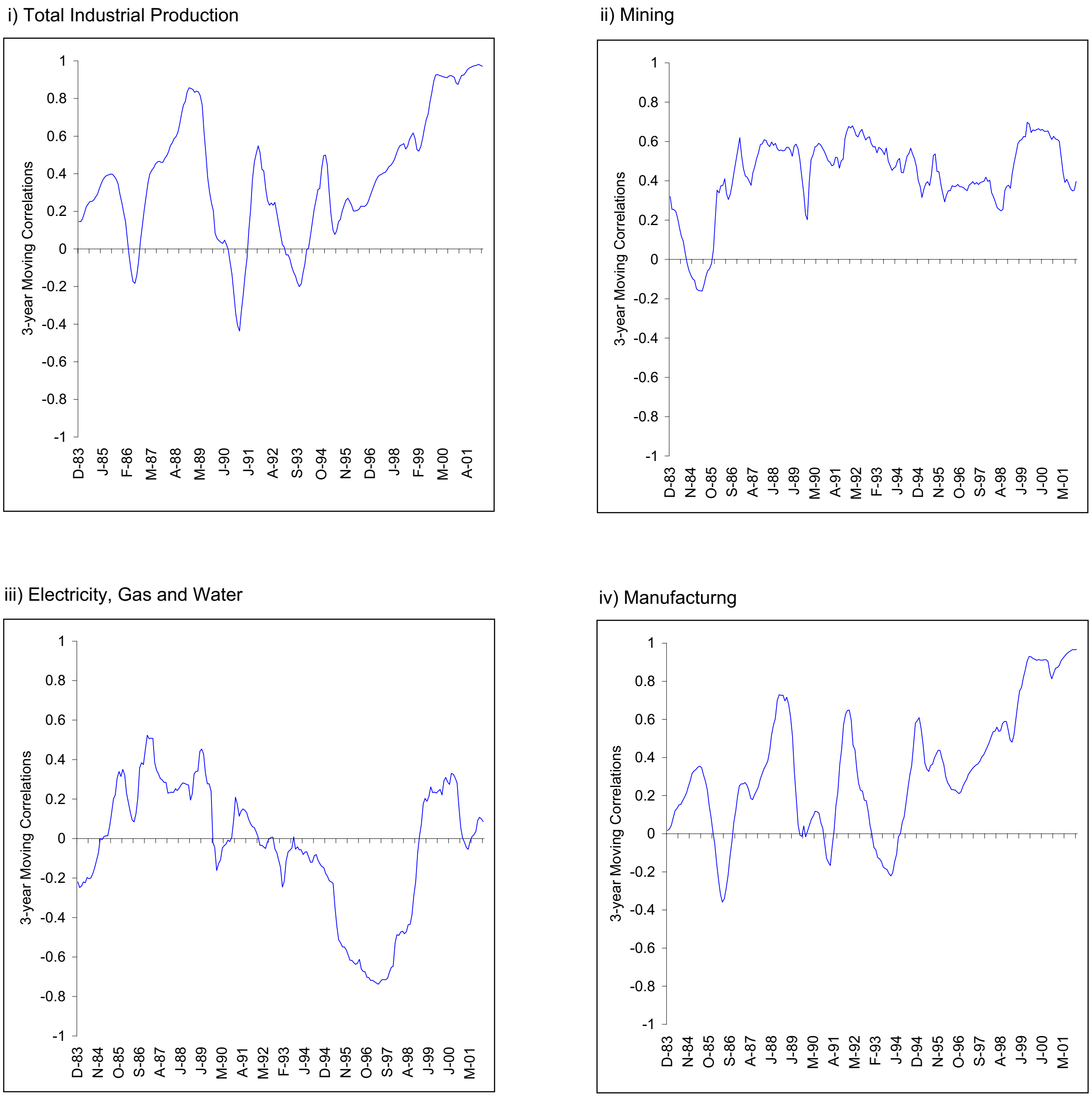
We can dig one level deeper by examining the patterns of growth correlation by industrial sector. This is done in Table 4, which shows the correlation of industrial production growth and its components between Mexico and the U.S. for the whole sample period 1981-2001 and for the sub-periods 1994-2001 and 1997-2001. The table shows a significant increase in the correlation of total industrial production, driven mostly by manufacturing. Within manufacturing, the increase in correlation is particularly large for paper and editorials, chemical products, mineral based products, textiles and machinery. However, except for the latter sector (plus perhaps textiles), none of these was particularly export-oriented in the pre-NAFTA years.

Table 4. Growth correlation between Canada, Mexico and the U.S. by industrial sector

	Correlation between Mexico and USA		
	1981-2001	1994-2001	1997-2001
Total	0.316	0.519	0.968
Mining	0.366	0.368	0.432
Electricity, Gas and Water	-0.141	-0.179	0.054
Manufacturing	0.284	0.619	0.970
Food and Beverages	0.014	0.100	0.328
Textiles	-0.039	0.371	0.790
Wood industries	0.020	0.316	0.344
Paper and Editorials	0.083	0.511	0.748
Chemical Products	0.098	0.572	0.691
Minerals	0.071	0.499	0.636
Basic Metals	0.561	0.520	0.766
Machinery	0.396	0.501	0.832
Other Manufacturing Industries	0.166	0.199	0.504

Figure 6 shows three-year moving correlation coefficients between the growth rate of industrial production components in Mexico and the U.S.. In the case of total industrial production, the correlation during the first part of the sample fluctuates until 1994, when it begins a steady increase that lasts through the end of the sample period. Manufacturing shows the same pattern. In turn, mining exhibits a

Figure 6. Three year moving correlation coefficients between growth rates of components of industrial production in Mexico and the U.S.



moderately positive correlation coefficient throughout the whole period, whereas in utilities (electricity, gas and water), a nontradable sector, the correlation fluctuates without a clear pattern.

Like with the aggregate data, the correlation analysis was complemented with simple regressions of sector-wise GDP growth in Mexico against the corresponding U.S. variable, using a variety of specifications. The results from this exercise[45] show that the sensitivity of Mexico's growth at the 1-digit level to growth in the same sector in the U.S. increased substantially in the past few years, in some cases to exceed the corresponding sensitivity estimates for Canada. Like in the correlation analysis, the sectors

[45] Full details are given in Cuevas et al (2002).

exhibiting the highest sensitivity in recent years are Manufacturing, Transport and Communications and Social Services. However, the contribution of U.S. shocks to the variance of growth remains modest even in these sectors, again suggesting that idiosyncratic shocks continue to play a significant role in Mexico in recent years.

Similar exercises were performed for industrial production growth at the 2-digit level of disaggregation. The results are shown in Table 5. The coefficients capturing the post-NAFTA change in sensitivity are positive in most cases, and in every one when the break year is 1997. A number of them are also statistically significant. This occurs in the case of Total Industrial Production, Total Manufacturing, Textiles, Wood Products, Paper and Editorials, Chemical Products, and Minerals. It is also interesting to note that several of the sensitivity coefficients are larger than one, suggesting that industrial output in Mexico reacts more than proportionately to changes in the same sub-sector in the U.S.

Table 5. Annual Growth Rate of Industrial Production by Sector

Sensitivity Coefficients Before and After NAFTA

a. Dummy 1994

					Fraction explained by U.S. shocks		
Country	ν	ι	$\nu 2\iota$	**Adj R2**	**Before 1994**	**After 1994**	**Difference**
Total	**0.17**	**-0.16**	0.01	0.92	0.30	-0.12	-0.42
Mining	**0.13**	0.20	**0.33**	0.51	0.17	0.12	-0.05
Elec, Gas & Water	0.03	-0.02	0.02	0.56	-0.04	-0.05	-0.01
Manufacturing	**0.13**	-0.07	0.06	0.88	0.05	0.21	0.15
Food & Bev	-0.11	0.16	0.05	0.15	-0.02	-0.02	0.00
Textiles	**-0.32**	**0.53**	0.21	0.36	0.08	0.09	0.01
Wood	-0.08	**0.54**	**0.46**	0.15	-0.01	0.08	0.09
Paper	-0.20	**0.79**	**0.59**	0.23	0.00	0.24	0.24
Chemical	0.02	**0.75**	**0.77**	0.36	0.00	0.31	0.32
Minerals	0.06	0.27	**0.33**	0.70	-0.04	0.29	0.33
Basic Metals	**0.19**	-0.12	0.07	0.66	0.38	0.11	-0.27
Machinery	**0.26**	-0.10	**0.16**	0.75	0.16	0.23	0.07
Other	**0.39**	-0.09	0.30	0.29	0.04	0.01	-0.03

b. Dummy 1997

					Fraction explained by U.S. shocks		
Country	ν	ι	$\nu 2\iota$	**Adj R2**	**Before 1997**	**After 1997**	**Difference**
Total	**0.14**	**0.50**	**0.64**	0.92	0.18	0.93	0.75
Mining	**0.15**	0.09	0.24	0.50	0.14	0.20	0.06
Elec, Gas & Water	0.02	0.07	0.08	0.56	-0.03	0.01	0.04
Manufacturing	**0.11**	**0.60**	**0.72**	0.88	0.03	0.94	0.91
Food & Bev	-0.08	0.38	0.30	0.16	-0.01	0.09	0.11
Textiles	**-0.21**	**1.46**	**1.24**	0.36	0.04	0.61	0.57
Wood	-0.03	0.43	0.40	0.14	-0.01	0.10	0.12
Paper	-0.07	**0.87**	**0.80**	0.23	-0.01	0.57	0.58
Chemical	0.02	**1.18**	**1.20**	0.39	0.00	0.47	0.47
Minerals	0.08	**0.45**	**0.53**	0.70	-0.03	0.41	0.44
Basic Metals	**0.17**	0.19	**0.35**	0.66	0.33	0.57	0.24
Machinery	**0.21**	0.27	**0.48**	0.76	0.12	0.69	0.57
Other	**0.36**	**0.96**	**1.32**	0.32	0.04	0.24	0.20

Note: The parameter estimates correspond to the empirical specification given by equation (1) in the text. Coefficients in bold are significantly different from 0 at the 10 percent level or better. The parameter □ represents the sensitivity coefficient to developments in the U.S. before period T (either 1994 or 1997) and the sum of □ plus □ indicates the sensitivity coefficient after period T. The measures of the contribution of U.S. shocks are described in the text. They are obtained from separate regressions on the sub samples before and after T, and are adjusted for degrees of freedom.

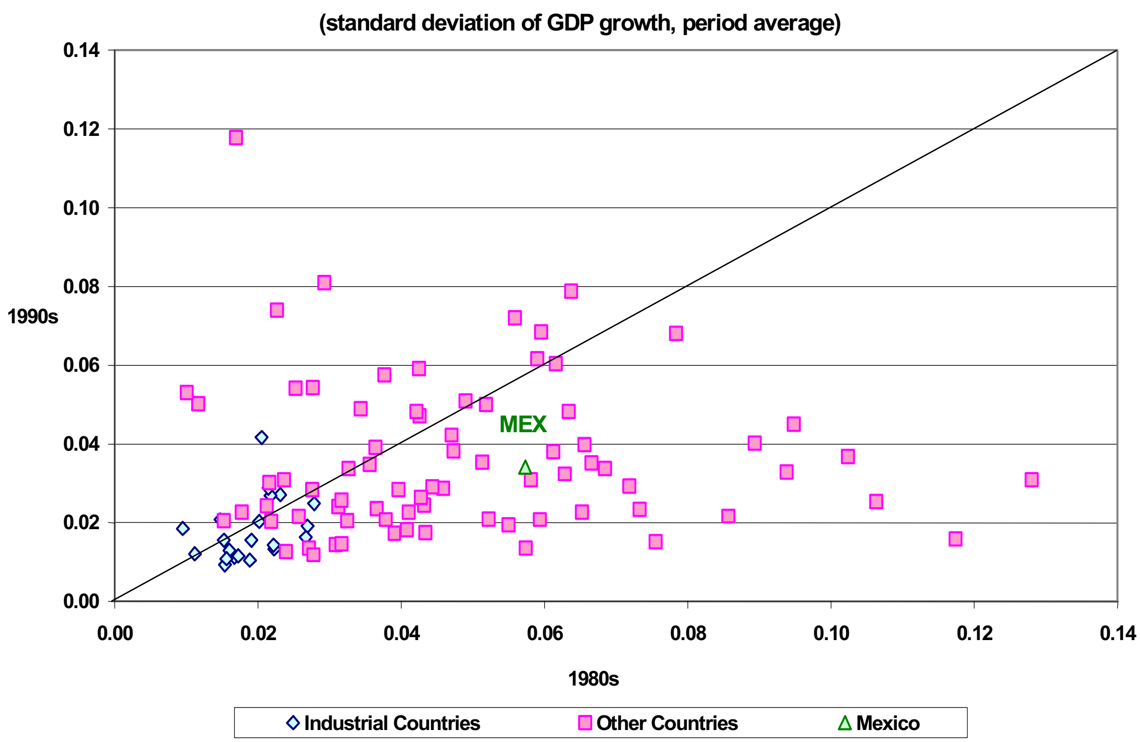
In most sectors we also observe an increase in the explanatory power of U.S. growth; indeed, this is the case for every sector in the post-1996 sample. In the latter case, the U.S. accounts for the bulk of the growth variation in Total Industry and Total Manufacturing. In Textiles, Machinery, Paper and Chemicals, U.S. shocks account for around one half of the total variation. In contrast, U.S. factors remain marginal for Mining, utilities, Food and Beverages and Wood Products.

The role of common factors with the U.S. in the variation of industrial output was also explored using factor analysis. Specifically, we compared the patterns of factor loadings between 1988-2001 and 1997-2001. The results were in broad agreement with those reported above.[46] In the former period, there was virtually no instance in which the same sectors in Mexico and the U.S. shared a common factor. In contrast, in the latter period there is strong evidence that most manufacturing sectors in both countries are significantly driven by common shocks.

2.5 NAFTA and macroeconomic volatility

Related to macroeconomic synchronization, another important dimension in which NAFTA also has potentially major implications for Mexico is that of macroeconomic volatility. On the one hand, the nature and extent of volatility in Mexico may change as a result of NAFTA—as suggested by the preceding analysis. On the other hand, macroeconomic volatility itself acquires renewed importance, because it may detract from the benefits of economic integration by holding back the rise in foreign trade and investment flows through which the gains should accrue. This underscores the need for suitable macroeconomic policies to foster macroeconomic stability.

Figure 7. GDP Growth Volatility in the 1980s and 1990s



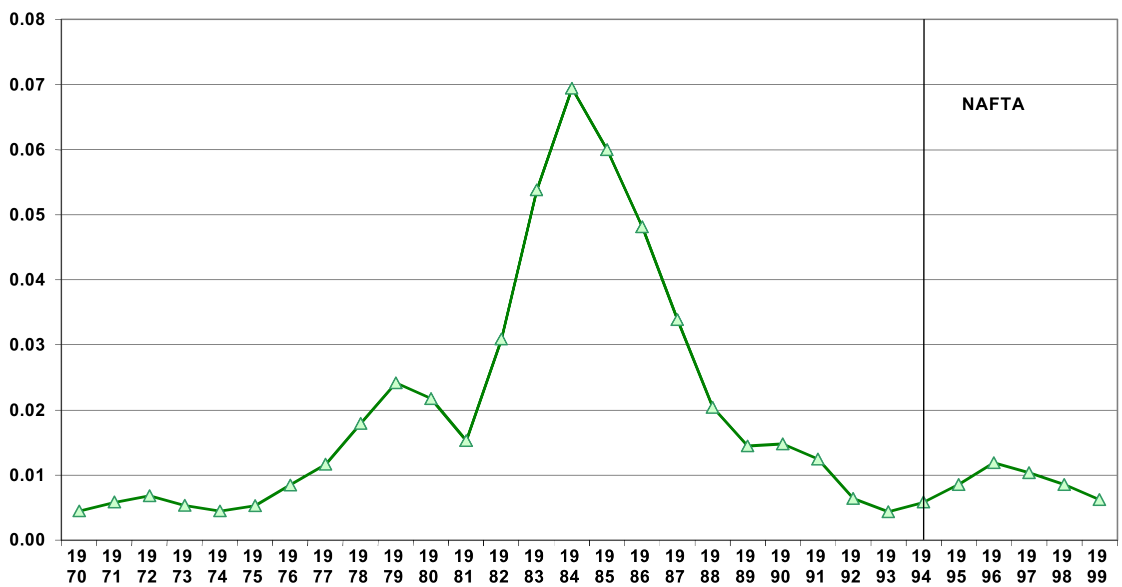
[46] See Cuevas et al (2002) for the details.

Like most other Latin American economies, Mexico has long been characterized by high macroeconomic volatility, much above the levels observed in industrial countries and successful East Asian economies. Figure 7 presents a comparative perspective on macroeconomic volatility, as measured by the standard deviation of real GDP growth, over the 1980s and 1990s. Three facts emerge from the graph.[47] First, there is a great degree of diversity across countries, but as a rule industrial economies are much less volatile than most developing countries. Second, in the 1990s growth volatility declined in many developing countries relative to the (exceedingly high) levels of the 1980s—most of the data points locate below the 45-degree line. Third, Mexico has shown a considerable improvement: its growth volatility has declined almost by half relative to the previous decade, although it still remains higher than in industrial and East-Asian countries.

The decline in macroeconomic instability in Mexico is further illustrated in Figure 8.[48] The figure shows that growth volatility rose sharply in the early 1980s, at the time of the debt crisis, and then declined until1994-96, when the Tequila crisis hit. After 1996, volatility has remained low, but still above the levels of the early 1970s.

Figure 8. Mexico: GDP Growth Volatility over Time

(5-year interquartile range, moving average)



In broad terms, macroeconomic volatility reflects both the action of external shocks—real and financial—and the poor functioning of key shock absorbers, namely inadequate macroeconomic policies and underdeveloped financial systems. Terms-of-trade shocks are more severe for economies whose external trade is heavily concentrated on a few commodities (typically natural resources), and impact more strongly on economies that are very open. Weak financial systems are unable to fulfill their risk-diversification role, and instead tend to amplify shocks, or even generate them.[49] Finally, macroeconomic

[47] The stylized facts regarding macroeconomic volatility are discussed at length in De Ferranti et al (2000).

[48] To limit the effect of extreme annual observations, which lead to large jumps in conventional volatility measures, the figure depicts a 3-period centered moving average of the interquartile range computed over 5 years.

[49] De Ferranti et al (2000) find that external shocks, poor policies and weak financial systems roughly account for one-third each of Latin America's "excess volatility" vis-à-vis industrial and East Asian economies over the last

policy has often played a destabilizing role in Latin America, as monetary policy has been devoted in many countries to inflationary finance of unsustainable fiscal deficits, and fiscal policy has followed a pro-cyclical stance, expanding in booms and contracting in recessions.[50] Indeed, the decline in volatility in Mexico after 1996 surely reflects, among other factors, improved fiscal and monetary policies in recent years.

There is ample evidence that volatility deters economic growth, by discouraging both investment and productivity.[51] In the presence of higher macroeconomic volatility, economic agents face greater uncertainty, and this deters them from undertaking fixed investment decisions, because in many cases those decisions cannot be reversed (at least without major costs). Volatility also hampers agents' ability to allocate economic resources in an efficient manner, as the informative content of relative price and profitability signals may be drowned by aggregate instability.

For Mexico, the process of trade opening and the passage of NAFTA may have also direct consequences for macroeconomic volatility. While increased openness could in principle have raised the country's exposure to terms of trade changes, in practice it has been accompanied by an impressive increase in export diversification, which in effect has probably led to reduced terms of trade risk.[52] Much of this diversification has been the result of the trade liberalization process initiated in the late 1980s and the passage of NAFTA in the 1990s. As for the implications for volatility of the increased degree of cyclical synchronization between Mexico and its NAFTA partners described earlier, they are not entirely clear. In principle, greater synchronization with FTA partners does not necessarily imply reduced amplitude of Mexico's cyclical fluctuations. Indeed, some of the empirical results reported earlier appear to suggest that Mexico shows "excess sensitivity" to contemporaneous developments in the U.S. Finally, while volatility has declined in Mexico in recent years, it still remains above that of its NAFTA partners.

Over the medium term, deeper integration with two large stable economies should be expected to lead to reduced instability for Mexico. In fact, it may be argued that the prospect of declining instability as a result of FTA accession is precisely one of the primary reasons why countries join them in the first place, in the hope of locking-in policy reforms in trade and other areas, securing market access, and generally offering a more stable environment for investors.[53]

Do FTAs fulfill these expectations of enhanced stability? The international evidence suggests that they might. A simple comparison of volatility measures in a large time-series cross-country sample,[54] controlling for unobservable country-specific effects, shows that annual GDP growth volatility is over 1 percent lower for those observations (country-years) corresponding to FTA membership than for the rest, and the difference is significant at the 1 percent level. But whether this result can be interpreted as reflecting causation from FTA membership to stability is debatable. For example, it is possible that FTAs

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quarter century. See also Caballero (2000) for an analysis attributing much of Latin America's macroeconomic instability to weak domestic and foreign financial links.

[50] The procyclicality of fiscal policy in most developing countries is documented by Talvi and Vegh (2000).

[51] On the negative impact of volatility on growth, see Ramey and Ramey (1995) and Fatás (2000). The adverse impact on investment is amply documented in Servén (1998). Lederman *et al* (2003) provide evidence of this negative effect for the case of Mexico.

[52] De Ferranti et al (2002) show that by the late 1990s Mexico had achieved one of the most diversified export baskets in Latin America.

[53] Indeed, NAFTA has very likely changed investors' perceptions about the risk of investing in Mexico, prompting increased investment flows even for a given degree of observed macroeconomic instability. We will return to this issue in Chapter 4 below.

[54] The sample includes 44 countries and 880 observations. The data and the FTAs included are described in detail in Chapter 4.

happen more often among countries having achieved more stable macroeconomic conditions, in which case this result could reflect reverse causation from stability to FTA membership.

Regardless of whether volatility can be expected to decline in the long run as a result of NAFTA, the treaty makes it an especially pressing concern for Mexico. Much of the gain that the country can achieve from trade integration relies on new foreign investment taking place and on the expansion of external trade. However, macroeconomic volatility may prevent NAFTA from delivering its full benefits—or delay them—through trade and investment. Indeed, there is compelling international evidence that high volatility discourages foreign investment (and external financing in general), as the appeal of profitable investment opportunities is weakened by high risk derived from the possibility of large swings in relative prices, real exchange rates and other major macroeconomic variables.[55] Likewise, macroeconomic volatility, and specifically real exchange rate variability, deter also foreign trade, as a number of empirical studies have confirmed.[56] Higher real exchange rate uncertainty increases the riskiness of foreign transactions, leading traders to demand higher profits in order to undertake them and thus reducing the volume of trade (Brodsky 1984).[57] Real exchange rate uncertainty also affects the political economy of the integration process, as abrupt swings in real exchange rates may trigger protectionist pressures. [58] Even if the existence of an FTA rules out protectionist measures against partner countries, they may be applied to nonmember countries, leading to trade diversion and reduced gains from trade.

In summary, to enhance the speed and scope of the gains from NAFTA, Mexico's macroeconomic stability is of paramount importance, and macroeconomic policies need to ensure that the declining volatility trend of the late 1990s is maintained. Against this background, the next section turns to the role of policy coordination.

2.6 The role of policy coordination

The increased macroeconomic synchronization between Mexico and its NAFTA partners in recent years raises two policy questions. First, is rising synchronization simply a result of the fact that the Mexican authorities have been following policies similar to those of Mexico's NAFTA partners, rather than (or in addition to) an increased incidence of common (non-policy) shocks? Second, looking forward, does Mexico stand to gain from increased policy coordination with its NAFTA partners?

Have Mexico's fiscal and monetary policies become more similar to those of the U.S.? Table 6 reports the correlation between key fiscal and monetary policy indicators of the U.S. and Mexico. In the case of the fiscal and primary balances, the correlation turns from positive in the whole period to negative in the post-NAFTA sample. In terms of government current expenditures to GDP, the correlation is close to zero for any of the periods.

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[55] This is empirically confirmed by Calderón, Loayza and Servén (2002) for the case of overall capital flows, and Albuquerque, Loayza and Servén (2003) for FDI. These studies include as measures of volatility the variability of GDP growth, the real exchange rate, the terms of trade and the inflation rate.

[56] For example, Caballero and Corbo (1989) showed that higher volatility of the real exchange rate reduces exports in a large group of developing countries. More recent empirical studies by Arize et al. (2000) and Dell'Ariccia (1999) find strong evidence of a negative impact of exchange rate volatility on trade flows. These recent studies take specifically into account the endogeneity problems that afflicts most previous literature. Esquivel and Larraín (2002) show that third-party exchange rate volatility, as represented by the volatility of the G-3 currencies, also reduces trade flows of developing countries.

[57] Real exchange rate volatility is also a major deterrent for domestic investment., both in Mexico (Lederman *et al* 2003) and in developing countries in general (Servén 2003).

[58] Recall, for example, the protectionist pressures that arose in Mercosur following Brazil's 1999 devaluation.

Regarding the monetary indicators, the real growth rate of M2 shows a zero correlation for the whole period, which becomes modestly positive in the post-NAFTA subsampl. However, to the extent that real money balances are driven by money demand, this could turn out to be just a reflection of the increasing output correlation between the two countries. As for real interest rates, their cross-country correlation is slightly positive for the whole period, and negative after 1997. In any case, the magnitude of the coefficient is very low. In the case of the nominal growth rate of the monetary base, the correlation is positive but of small magnitude, and shows little change over time. Finally, nominal interest rates display a positive correlation—which is somewhat surprising given the relatively high volatility of inflation in Mexico—but if anything it declines over time.

On the whole, this provides little indication that policy synchronization has risen, which is hardly surprising. Regarding, for example, monetary policy in the post-NAFTA years, in the U.S. it was dictated by local growth forecasts, while in Mexico it was conditioned by the disinflation processes, the 1995 balance of payments crisis, and external financial shocks associated with the Russian and Brazilian crises. Instead, the implication is that synchronization has risen in spite of dissimilar policies.

Table 6. Correlation between Mexico and U.S. policy variables

i) Fiscal variables

	Financial Balance	Primary Balance	Government Current Expenditure
1980:1 - 2001:4	0.282	0.038	-0.044
1994:1 - 2001:4	-0.514	-0.274	0.005
1997:1 - 2001:4	-0.497	-0.287	-0.087

ii) Monetary variables

	Growth in Real Money Balances*	Real Interest Rate (accurate expectations)*	Monetary Base	Short-term Nominal Interest Rate
Whole period	0.066	0.174	0.168	0.522
1994:01 - 2001:12	0.328	0.034	0.136	0.413
1997:01 - 2001:12	0.401	-0.110	0.230	0.324

* The whole period is 1986:12-2001:12 for real money balances and monetary base, 1985:12-2001:12 for the real interest rate, and 1987:12-2001:12 for the short term nominal interest rate.

Source: Cuevas et al (2002)

Is more policy coordination needed for Mexico? The question arises in view of the increasing role of developments in the U.S. and Canada for Mexico's macroeconomic performance. By "policy coordination" here we mean the formal adoption of a set of common policies, or policy rules, to be followed by all the countries involved—such as a common currency, fiscal redistribution agreements, and/or fiscal rules like those established in the European Union's Stability Pact. Looser or informal coordination—which countries would obey in their own interest—is of course possible, but its desirability is not directly related to the degree of macroeconomic synchronization.[59] More importantly, loose

[59] An example of looser coordination would be implicit or explicit agreements between economic authorities about their separate responses to specific shocks, with the respective responses defined only by domestic considerations and hence dictated only by self-interest. Even in the absence of any agreement policymakers could simply take into account the effects of their actions on other countries—e.g., the U.S. could relax monetary policy not because of a deceleration of growth in its own economy, but because of a strong negative idiosyncratic shock to Mexico.

coordination without binding agreements to which the authorities can be held accountable—and institutions to enforce them—is unlikely to be credible or effective (Eichengreen 2002).

The case for coordination is predicated on two types of arguments, mutually related but conceptually distinct. The first type is economic: when cyclical fluctuations are transmitted across economies, uncoordinated policies may result in insufficient or excessive stabilization. In such conditions, coordinated stabilization policies can deliver higher welfare.[60] Furthermore, coordination with an anchor country enjoying strong reputation may enhance the credibility of domestic policies.

An extreme form of coordination which has attracted considerable attention is monetary unification between the countries involved, be it in the form of a currency union as in EMU, or through unilateral adoption by one country of the other country's currency, with the U.S. dollar as the obvious candidate in the case of NAFTA. Of course, unification is only one possible form of monetary coordination. Other alternatives, such as exchange rate target zones, harmonized inflation or money targets, are also possible, but they are subject to the enforcement problems already mentioned. The gains from monetary unification stem from the reduction in transaction costs involved in goods and assets trade with the anchor country (and other countries using the same currency) and from its potential role as an expeditious shortcut through which countries with poor policy credibility can acquire the higher credibility of the anchor country.

Against these benefits, the loss of monetary independence also involves costs. Their magnitude is determined by two main factors highlighted in the Optimal Currency Area (OCA) literature. The first one is the degree of similarity between the business cycles of the anchor and client countries. The second is the extent to which in the absence of independent monetary policy the client country can adjust to asymmetric shocks through alternative mechanisms—such as wage and price flexibility, international labor mobility and/or redistributive fiscal policy agreements with the anchor.

Importantly, what matters is the degree of business cycle asymmetry, and the functioning of the alternative mechanisms mentioned, *after* unification, which may differ from that prevailing prior to it. For example, monetary unification itself may raise macroeconomic synchronization by encouraging trade. Also, if asymmetry is largely a result of divergent policies, unification will obviously reduce asymmetry. In other words, OCA criteria are partly endogenous—although the precise extent of this endogeneity remains controversial. [61]

In addition, unilateral monetary unification also entails other costs, such as the loss of seigniorage revenues and lender-of-last-resort functions, and the lack of voice of the client countries in the choice of monetary policy by the anchor. These additional costs make it a clearly inferior strategy vis-à-vis a symmetric currency union.[62]

So far we have focused on the economic argument for policy coordination. The second argument for policy coordination is political: tighter coordination of policies helps further the cause of integration. The adoption of common policies makes sense as part of a long-run process of deepening integration, such as that followed by the EU. Policy convergence among its members (as imposed by the Maastritch treaty) was a logical step on the way to a monetary union, itself another step in the European process of political and institutional integration, which was primarily driven by non-economic factors. In contrast,

[60] See Andersen and Spange (2002).

[61] Frankel and Rose (1998) find a positive impact of currency unions on trade among members, but its magnitude appears implausibly large. See Artis (2002) for a discussion of endogeneity of OCA criteria..

[62] Buiter (1999).

from a political perspective the need for common policies is much less clear if the process of integration is not expected to advance much beyond an FTA.

2.6.1 Policy coordination in Mexico

How do these considerations apply to Mexico? In principle, the increased macroeconomic synchronization with NAFTA partners could make a common policy more likely to fit Mexico. But in practice the absence of institutional mechanisms for joint design and enforcement of policies, and the sheer disparities in economic size among partners offer little room for true coordination, short of Mexico adopting the monetary and/or fiscal policies of the U.S.

Would Mexico benefit from adopting the monetary policy of the U.S.? Though developments in the U.S. account for an increasing fraction of the variability of Mexican macroeconomic variables, the scope for asymmetric shocks, and their role in Mexico's GDP growth variation, are still considerable. Nominal price and wage flexibility are lacking in Mexico, and NAFTA does not provide unrestricted labor mobility nor mechanisms of fiscal redistribution to facilitate Mexico's adjustment to shocks in the absence of independent stabilization policy.[63] These facts suggest that Mexico does not meet conventional criteria for an OCA with the U.S. or the U.S. and Canada.[64]

A second problem is the high sensitivity of Mexican variables to their U.S. counterparts in recent years, which often makes the magnitude of the response larger than that of the shock. As shown above, the Mexican economy appears to react more than one-to-one to developments in the U.S. This means that, even in response to common shocks, common policies would not be able to deal properly with Mexico's output and employment fluctuations. Instead, common shocks would demand policies of the same sign, but different intensity, than those of the partner countries.[65]

Furthermore, there are good reasons to expect the impact of policies to differ across NAFTA economies. Regarding monetary policy, Mexico's lower level of financial development and domestic credit to the private sector implies that the interest rate and credit channels are likely to be weaker than in the U.S. and Canada. In turn, since foreign trade as a ratio to GDP is much higher in Canada and Mexico than the U.S., the exchange rate channel is likely to be more important for the first two countries. Finally, even though we do not have direct evidence on the channels through which fiscal policy works in the three countries, the fact that liquidity constraints are more likely to bind in Mexico than in the other NAFTA countries suggests that the effect of counter-cyclical fiscal policies could be much stronger in the former than in the latter economies, as Ricardian offsetting of public deficits by private surpluses is less likely to occur in the Mexican case.

A different issue is whether Mexico can effectively carry out independent counter-cyclical policies. Regarding monetary policy, it has been argued that emerging market floating exchange rate regimes such as Mexico's do not really grant monetary independence, and local interest rates end up tracking closely international rates (up to a risk premium) due to 'fear of floating' on the part of the

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[63] This is particularly the case for Mexico's Southern states, which as shown above have not witnessed any increase in macro synchronization with the rest of NAFTA.

[64] Oil price and international financial shocks (such as the East Asia and Russia crises) are examples of disturbances having a clearly asymmetric effect on Mexico and the U.S., and thus pointing towards the need for stabilization policies of different sign in the two countries. The scope for asymmetric shocks has also been offered as an argument against a monetary union between Canada and the U.S (Murray 1999). In the case of Mexico, formal empirical tests show that Mexico and the U.S. (or Mexico and its two NAFTA partners) do not constitute an optimal currency area, mainly because their cyclical co-movement is not sufficiently high. See Del Negro and Ponce (1999) and Alesina et al (2002).

[65] Alesina and Barro (2002) also underscore this point in the context of currency unions.

authorities in the face of lack of credibility and/or significant currency mismatches in the balance sheets of bank and nonbank private agents (Calvo and Reinhart 2002). In this view, there would be little loss of policy autonomy from monetary unification.

However, recent empirical studies draw a distinction between short- and long-term monetary independence. The evidence confirms that in the long run virtually all countries' domestic interest rates, regardless of exchange rate regime, move one-for-one with the interest rates of major currencies. In the short term, however, floating exchange rate regimes do allow a degree of monetary autonomy significantly greater than that of pegged regimes.[66] In this regard, the adoption of a flexible exchange rate anchored by inflation targets has increased Mexico's ability to carry out an independent monetary policy, as has clearly been the case during the current disinflationary episode. Such ability will presumably grow further over time as the credibility of the inflation targeting regime is strengthened and a track record of monetary stability and low inflation is established.

In turn, the scope for counter cyclical fiscal policies is also limited by weak credibility. Mexico's past tradition of large fiscal deficits and balance of payments crises has led financial markets to regard with suspicion the use of fiscal stabilizers in recessions, because they could signal permanent deficit increases and a deterioration of the public sector's solvency, rather than just a temporary counter-cyclical adjustment.

Credibility will be reinforced over time by the maintenance of prudent fiscal policies. A solid fiscal position will create more scope for countercyclical fiscal policy, which could be guided by the explicit adoption of (and adherence to) contingent fiscal targets formulated in cyclically-adjusted terms, along the lines of Chile's recent 'structural surplus' rule. These would entail the achievement of fiscal surpluses in periods of expansion to provide room for deficits in times of recession. The creation of suitable fiscal institutions allowing policy makers to implement these or similar rules, and abide by them, could be a major step forward.

The room for fiscal maneuver is further constrained by the large weight of oil-related income in Mexico's total fiscal revenues—and, correspondingly, the small size of non-oil tax collection—which makes government income highly sensitive to volatile oil prices and weakens its automatic stabilizer properties. Hence, strengthening Mexico's ability to carry out counter-cyclical fiscal policy also requires a fiscal reform that reduces the vulnerability of fiscal revenues to fluctuations in the price of oil.

In summary, the evidence of higher macroeconomic synchronization suggests that Mexico's optimal macroeconomic policies are likely to be more similar now than in the past to those followed by its NAFTA partners. At present, however, Mexico is still subject to significant idiosyncratic shocks, and thus needs to be able to conduct independent monetary and fiscal policies to reduce macroeconomic volatility. The immediate challenge is to strengthen monetary and fiscal institutions in order to build up credibility and enhance the ability of the authorities to pursue counter-cyclical policies.

2.6.2 Policy coordination for other LAC countries

What about policy coordination in the case of other Latin American countries? On the whole, there seems to be little ground for coordination among LAC countries alone. With few exceptions—such as Nicaragua and Paraguay—their degree of trade integration is low (Table 7), and their macroeconomic

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[66] See Frankel, Schmukler and Servén (2003), who estimate that the mean lag of local interest rate adjustment to foreign rates lies in the 4-8 month range for floating regimes, and barely above two weeks in hard pegs.

fluctuations are dominated by idiosyncratic shocks.[67] Moreover, there is no obvious anchor country in the region whose policy credibility could enhance that of client countries.

As for coordination with the U.S., Table 7 reveals a contrast between Central American countries, on the one hand, and South America on the other. In general, the former are much more open than the latter, and trade intensity with the U.S. is also considerably higher among Central American and Caribbean countries than South American ones. In Central America, the degree of trade integration of the group as a whole with the U.S. is also quite high: in three Central American economies (Honduras, Nicaragua and Costa Rica) the combined GDP share of trade with the U.S. and intra-group trade equals or exceeds the comparable figure for Mexico. This would make the group taken together a potential candidate for monetary unification with the U.S. Two economies in this region, Panama and El Salvador, have already adopted the U.S. dollar.[68]

Aside from trade, however, two other ingredients deserve mention regarding the issue of monetary unification with the U.S. The first one is the flow of workers' remittances. Table 8 shows that for several Central American and Caribbean economies (notably El Salvador, Nicaragua and Jamaica) remittance inflows, the bulk of which originate in the U.S., are quite considerable. In El Salvador their magnitude relative to GDP even exceeds that of trade with NAFTA. In contrast, the figures are much smaller for Mexico and South America, with Ecuador as the only exception. Remittances matter just like goods trade from the viewpoint of international integration, and for the purposes of monetary unification remittances from the anchor country play a role similar to that of international fiscal transfers—they facilitate adjustment to asymmetric shocks in the client countries.

The other ingredient is *de facto* financial dollarization, which, as Table 8 also shows, is generally high in Central American economies, as well as in Andean and Mercosur countries—but not in Mexico or Chile.[69] Extensive financial dollarization hampers the conduct of independent monetary policy. *De facto* dollarization itself is often a reflection of lack of confidence in monetary policy.

In summary, when all factors (real and financial) are taken together, Central America appears as a good candidate, even better than Mexico, for monetary unification with the U.S. in the long run. This conclusion is reinforced by the high degree of *de facto* dollarization, given the difficulty it poses to independent monetary policy, and the still weak credibility of monetary institutions in several of these economies.[70] Indeed, El Salvador recently followed Panama in taking this step, although more time is needed to assess its experience with dollarization.

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[67] Loayza, Lopez and Ubide (2001) report a detailed analysis of co-movement using an error components model comparing the results from three blocks of countries: Latin America, East Asia and Europe. They find that common shocks explain a substantial part of the variation in growth rates in East Asia and Europe, but idiosyncratic shocks are clearly dominant for Latin America. Karras (2000) uses a similar methodology when considering if the Americas are an optimal currency area and finds similar results. Hall, Monge and Robles (1999) find a similar preponderance of idiosyncratic shocks in an analysis for Central American countries and Mexico.

[68] Guatemala also allows use of the U.S. dollar as legal tender.

[69] The figures for Guatemala and the Dominican Republic are underestimated due to the unavailability of information on offshore deposits, which are quite large for these countries. The table thus refers only to onshore deposits. Also, the figures for Uruguay and Argentina reflect the situation prior to the collapse of Argentina's Convertibility system.

[70] Perry, Lederman and Suescun (2002) and Berg, Boresnztein and Mauro (2002) discuss this point.

Table 7. Trade interdependence in Latin America (2001)

	Imports plus exports (percent of GDP) with:				
		NAFTA			
	Rest of Trading Group*	United States	Total	European Union	World
Andean Community					
Bolivia	6.85	5.91	6.42	3.77	38.43
Colombia	4.98	11.72	12.30	4.69	30.09
Ecuador	9.67	20.40	21.40	9.07	61.66
Peru	2.61	7.66	8.13	6.37	27.26
Venezuela	2.43	14.89	15.64	3.70	33.13
Central America					
Costa Rica	7.06	34.39	38.86	15.82	82.69
El Salvador	10.22	11.12	13.84	2.98	36.38
Guatemala	7.06	22.11	26.39	4.01	51.24
Honduras	9.83	88.23	93.04	7.68	139.89
Nicaragua	26.92	27.21	34.74	8.02	96.59
Panama	3.10	13.54	15.16	4.07	37.10
Dominican Republic	1.82	48.42	50.89	5.80	70.70
Jamaica	1.07	25.68	30.54	11.49	60.89
Mercosur					
Argentina	4.97	2.49	2.99	3.44	17.46
Brazil	2.80	5.72	6.55	6.21	23.75
Paraguay	29.32	6.77	7.09	6.53	55.42
Uruguay	13.20	3.66	5.32	6.07	33.67
NAFTA					
Canada	58.85	57.34	58.85	5.77	75.36
Mexico	44.22	42.96	44.22	3.74	55.63
United States	6.08		6.08	3.79	18.79
<u>Memorandum item:</u>					
Chile	9.75	9.91	13.12	11.95	57.26

Sources: Direction of Trade Statistics.

* In the case of Chile, trade with MERCOSUR.

Table 8. Further measures of interdependence (2001)

	Workers Remittances to GDP Ratio	Financial Dollarization (*)
Andean Community		
Bolivia	1.34	91.50
Colombia	2.13	..
Ecuador	7.87	53.70
Peru	1.32	66.00
Venezuela	0.11	0.30
Central America		
Costa Rica	1.03	43.80
El Salvador	13.91	81.40 **
Guatemala	2.93	5.10
Honduras	8.36	33.10
Nicaragua	13.13	71.00
Dominican Republic	8.52	17.30 **
Jamaica	12.07	23.30
MERCOSUR		
Argentina	..	73.60
Brazil	0.23	..
Paraguay	1.94	66.90
Uruguay	..	84.60
NAFTA		
Mexico	1.44	10.40
Memorandum item:		
Chile	..	10.70

Sources:
World Development indicators - World Bank;
International Financial Statistics - International Monetary Fund.
Consejo Monetario Centroamericano
Notes: (*) Rates of Dollarization is the ratio of Foreign Currency Deposits to Total Deposits.
(**) Share of foreign currency-denominated quasi-money in M2

In contrast, lower real integration with the U.S. and a potentially large scope for asymmetric shocks (partly on account of the key role of commodities such as oil or copper) make most South American countries much less suitable candidates for monetary unification with the U.S. Indeed, some of them (e.g., Mercosur) trade more with the EU than the U.S., Although the scope for asymmetric shocks may decline over time with deeper integration, for these countries the cost of the loss of policy autonomy from monetary unification with the U.S seems much larger.

Instead, most of these economies are likely to benefit from independent monetary policy, and several of them (Brazil, Chile, Colombia, Peru) have already made progress with the implementation of flexible exchange rate regimes guided by inflation targets. Like for Mexico, for them the challenge is to establish a track record of monetary stability and low inflation to strengthen the credibility of the inflation targeting regime.

On the fiscal front, most LAC countries face, to varying degrees, the same problems as Mexico. Poor credibility and inadequate tax collection (which in some cases is dominated by volatile resource revenues) limit their ability to conduct countercyclical policy. In a context of deficient fiscal institutions, the result has often been a procyclical fiscal stance, which augments aggregate volatility instead of reducing it. Achievement of a solid fiscal position will require in many countries a tax reform to expand the revenue base, and also to offset the income loss from declining tariff collection derived from the FTAA, which will be significant for countries trading intensely with the U.S. Like with Mexico, a substantial strengthening of fiscal institutions will also be needed to create room for countercyclical policy.

2.7 Concluding remarks

This chapter has shown that despite the important differences between Mexico and its NAFTA partners, the period after the free trade agreement has been characterized higher business cycle synchronization, the same result that has been observed in the case of trade agreements among industrialized countries. This has potentially important implications for future trade agreements between high-income and developing countries, as it indicates that even with the significant differences in factor endowments that characterize Mexico and its NAFTA partners higher synchronization is likely to follow from closer trade.

Mexico already had important linkages with the U.S. before NAFTA, as can be inferred from the fact that some sectors of manufacturing and a few Mexican regions exhibited a high sensitivity to developments in the U.S. even then. NAFTA seems to have reinforced the relationship extending the link to other economic sectors and regions by way of a stronger trade bond through which shocks are also transmitted. Thus, even non-tradable pro-cyclical sectors have developed a stronger relationship with developments in the U.S.

Macroeconomic volatility is a potential obstacle for Mexico to reap the full benefits of trade integration, and the increased synchronization between Mexico and the U.S. raises new questions on the appropriate design of macroeconomic policies to deal with volatility, specifically whether Mexico would benefit from sharing a common monetary and/or fiscal policy with its partners.

However, while the higher degree of synchronization implies that the optimal counter-cyclical policies of Mexico and its NAFTA partners will likely be qualitatively more similar in the future, there still remains a substantial amount of idiosyncratic volatility in Mexico. Furthermore, in spite of the decline in Mexico's macroeconomic volatility in recent years, volatility still remains higher than in the U. S. and Canada. Finally, the effectiveness of policies is also likely to differ between Mexico and its partners. Thus, while in the long run deepening integration might open the door to deep forms of coordination—even monetary unification—over the near future management of macroeconomic volatility in Mexico may continue to require different fiscal and monetary policy stances than those followed in Canada and the U.S. The immediate challenge ahead is to build a solid fiscal position and strengthen monetary and fiscal institutions to enlarge the scope for counter cyclical macroeconomic policy. Adoption of a set of contingent rules for fiscal policy could be a major step in this direction.

For other countries intending to join the upcoming FTAA the key concern is to reduce macroeconomic volatility. As noted earlier, economic volatility can curtail the benefits from trade integration severely curtailed. However, the fiscal and monetary regimes most adequate to achieve this end may differ considerable from one country to another. Central American economies seem close to meeting the conditions for an OCA with the U.S.[71] In contrast, this is not the case for the majority of countries in South America. Progress in the development of fiscal and monetary institutions allowing countercyclical policy also varies greatly across countries. Thus, while there is a common objective of reducing volatility, the means to achieve it will depend considerably on the economic and institutional characteristics of each country.

One final point worth stressing, which applies to Mexico as well as to other Latin American economies, is that there is no conflict between the long-term strategies that lead to strong national currencies and to a monetary union. To a large extent, the preconditions are similar: a solid fiscal position, flexible labor markets, and strong prudential regulation and supervision of the financial system. Thus, irrespective of the final decision regarding the degree of policy coordination and monetary unification, the policy agenda is very much the same.[72]

Box 1. Macroeconomic synchronization in the European Union

Like Mexico, Ireland, Spain and Portugal were relatively small open economies that joined a larger and richer area, the EEC/EU. It is important to keep in mind that integration has been gradually increasing in the EU and has reached a much higher level than in the case of NAFTA, since it has involved not only free trade but also labor migration agreements and a common monetary policy (as well as fiscal policy rules) for EMU members. Furthermore, the difference in levels of development between these three countries and the rest of the EU was smaller than that between Mexico and its NAFTA partners.

A number of studies have examined the evolution of macroeconomic synchronization between these three countries and the rest of the FTA. Artis and Zhang (1995, 1997) assess the effect on synchronization of monetary and exchange rate policy, particularly the establishment of the EMS and the Exchange Rate Mechanism (ERM) in 1979. They find a very sharp increase in the correlation of Portuguese and Spanish business cycles with those of Germany, while no increase is observed with respect to U.S. fluctuations. However, much of this increase is likely due to these countries' entry into the European Union in 1986, rather than to policy convergence.

Several other studies have followed the research by Artis and Zhang using longer time periods and different methodologies. Angeloni and Dedola (1999), for example, look at the correlation between GDP and industrial production of Ireland, Spain and Portugal and that of the EU, breaking the sample into four different sub-periods (pre-ERM, soft ERM, hard ERM, and pre- EMU; the total time period covered is 1965-1997). They find that for both variables the correlation was higher for Portugal and Spain since the hard ERM period. In contrast, there seems to be no such increase in correlation for Ireland. They also find that the increase in output correlation was more gradual than that of industrial production, suggesting that the rising correlation reflects in part cycles in tradable goods and not only common policies.

In another study, Belo (2000) calculates industrial production correlations and cyclical coherence for several countries and the Euro zone in the period 1960-1999, splitting the sample in 1979 coinciding with the ERM. The results are similar to those found in the other studies, though in the case of Ireland the initial association is weaker, and therefore it is found to have risen over time. Nonetheless, such increase is still the smallest across countries in the sample.[73]

Boone (1997) uses a vector auto regression analysis to identify demand and supply shocks for the countries in the European Union (and some other countries as controls), using a methodology similar to that used by Bayoumi and Eichengreen (1996). He analyzes the degree of correlation between demand and supply shocks of each country with Germany. In the case of supply shocks, he finds that their correlation is fairly constant for Ireland and Spain in the period 1974-1990, but it increases in the 1991-1994 period. In the case of Portugal, the correlation of supply shocks is already quite high in the period 1980-1990 but becomes higher as well in 1991-1994. As for demand shocks, the correlation in the three countries either remains constant or diminishes in the period 1991-1994. Like with previous studies, this evidence seems more consistent with gradually increasing trade integration than with common policies. Indeed, the increase in correlation of supply shocks is precisely what could be expected from greater trade integration.

Finally, a recent study by Ramos *et al* (2003) examines the role of aggregate and sector-specific shocks in the observed performance of manufacturing industries across European countries. They find that aggregate shocks have become a less important source of variability in recent years, especially in the EU's peripheral countries as well as among EMU members. They view this finding as reflective of the increased coordination of macroeconomic policies, although they do not examine the role that increased trade integration may have played to achieve this result.

Thus, with some exceptions, most of the empirical studies on business cycle synchronization in Ireland, Portugal and Spain with the rest of the European Union suggest that the main force behind the increasing synchronization was deeper trade integration rather than common policies such as the ERM. The evidence also suggests that synchronization increases first in the tradable goods sector, and only later in the rest of the economy.

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[71] Indeed, the analysis of Alesina et al (2002) suggests that they are much closer than Mexico to meeting the conditions for an OCA with the U.S.

[72] Hochreiter, Schmidt-Hebbel and Winckler (2002) underscore this point.

[73] Borodo, González and Rodríguez (1998) find similar results looking at five year moving correlations.

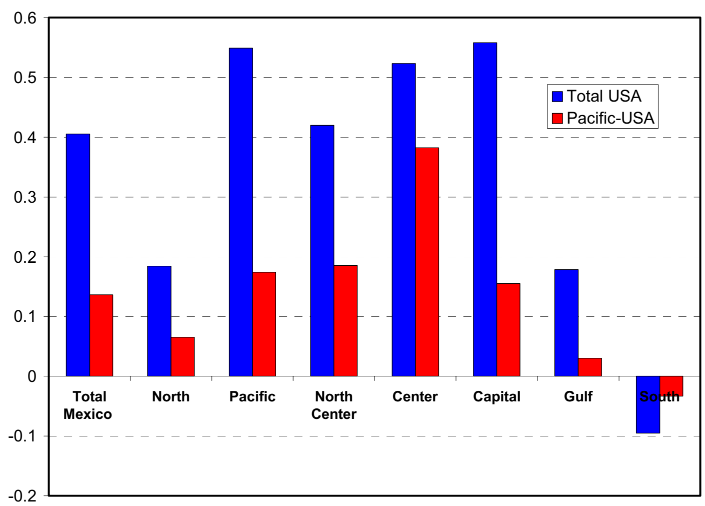
Box 2. Macroeconomic synchronization at the regional level

Has NAFTA had different effects across Mexico's regions on the degree of macroeconomic synchronization with the U.S.? In principle, we would expect to see higher synchronization with the U.S. in the northern states of Mexico, given their lower transport costs to access the U.S. market, and in those regions producing tradable goods. But the northern regions were already relatively integrated with the U.S., and for them the marginal change may be modest. In that case, we could find a larger increase for other regions that were less integrated but produce tradable goods. To explore this question, we used monthly employment data by region.[74] Box Table 1 shows the correlation of employment growth between Mexican regions and the U.S. (both at the national level and for the Pacific region) over 1992-2001 and 1997-2001. Over the longer period, the North and the Gulf regions of Mexico exhibited the largest correlation (0.37 and 0.28, respectively) with U.S. employment growth. However, most of Mexico's regions were highly synchronized in terms of employment growth with the U.S. Pacific region. The correlation coefficients are between 0.53 and 0.82. The last two columns in the table show that for 1997-2001 the correlation coefficients rose for all Mexican regions, with the exception of the South.[75] The change in the correlation coefficients across periods is depicted in Box Figure 1.

Box Table 1. Correlation coefficients between annual employment growth rates in Mexico and the U.S., by region

	1992-2001		1997-2001	
	Total USA	Pacific-USA	Total USA	Pacific-USA
Total Mexico	0.22	0.80	0.63	0.93
North	0.37	0.82	0.55	0.88
Pacific	0.14	0.69	0.69	0.86
North Center	0.21	0.70	0.63	0.89
Center	0.07	0.53	0.59	0.91
Capital	0.12	0.70	0.68	0.86
Gulf	0.28	0.76	0.46	0.79
South	0.12	0.55	0.02	0.52

Box Figure 1. Change in the correlation of employment growth between Mexican and U.S. regions



Regression estimates, as well as factor analysis, of regional employment growth confirm that most Mexican regions have become more sensitive to U.S. developments in the post-NAFTA period. The exception is again the South region. Thus, in addition to the well-documented income gap, another gap appears to have opened between the South and the rest of Mexico in terms of macroeconomic synchronization with the U.S.

74 The required production data are not available. The employment data come from the Mexican Social Security Institute (IMSS) and the U.S. BLS.

75 This latter result is not surprising, since this region also has the lowest correlation with any other Mexican region.

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Chapter 3

NAFTA's Remaining Trade Barriers

3.1 Introduction

When the North American Free Trade Agreement (NAFTA) was being negotiated in the early 1990s it created controversy due to the expected liberalization of commerce among its member countries. To some extent, the positive effects that NAFTA has had on the Mexican economy, which are discussed in chapters 1-3 of this report, are due to the substantial liberalization of trade. In fact, the extent of liberalization probably helped Mexico catch up with the level of income and wages observed in the United States by increasing the efficiency of the allocation of factors of production across and within industries.

Although the previous chapters and the following chapter five stress the national and international policy agenda needed to complement and deepen NAFTA so that Mexico (and its partners) can prosper at an accelerated pace is substantial, an important liberalization agenda still remains. The removal of the remaining barriers can improve the efficiency of resource allocation within the Mexican economy, improve the efficiency of its innovation system (see chapter five), and thus raise aggregate productivity. This liberalization agenda is the subject of this chapter.

More specifically, the following sections cover market access issues that might require further negotiations among the NAFTA partners and selected complementary policies to support additional adjustments of certain sectors. In the case of manufactures, one of the key issues that was raised in the early 1990s when NAFTA was negotiated is the impact of rules of origin (ROOs), which determine the criteria for exporting Mexican products to the U.S. under the preferential NAFTA treatment. This topic is analyzed in Section II. We conclude that ROOs have been particularly burdensome in the textile and apparel sectors, which has inhibited Mexican exports from taking full advantage of the NAFTA preferences. However, these preferences will become less important over time due to the phasing out of the Multi-Fiber Arrangement under the rules negotiated in the Uruguay Round of global trade negotiations in 1995. Hence the challenge for Mexico in the future will be not so much to re-negotiate less restrictive ROOs for its apparel exports, but to develop innovation capacity in order to allow its firms to compete in the U.S. market based on upgrading of its technological capacity. Thus, besides focusing on ROOs, the policy discussions in the relevant chapter on innovation are important as well.

Section III deals with the impact of NAFTA on Mexico's agricultural sector and examines the extent to which this sector has been liberalized since the early 1990s. The main findings are that liberalization of agricultural trade has been notable in spite of the fact that there are remaining barriers that have not yet been phased out and in spite of the substantial subsidies offered to farmers in all three NAFTA countries. In terms of economic performance of the sector, Mexican crop agriculture has not been devastated by this liberalization, as was expected prior to NAFTA implementation. This positive sectoral result was probably due to a combination of factors, including the growth of the U.S. and Mexican economies during 1996-2000, the productivity improvements in Mexican agriculture based on irrigated land, and possibly due to the existing income support subsidies under PROCAMPO and the Alianza para el Campo programs. Moreover, the poorest farmers have not been negatively affected by NAFTA primarily because these small farmers produce maize and other crops for subsistence and thus do not sell their products in the market. In fact, they might have benefited from falling prices of food staples, since these poor farmers are net consumers of food.

Section IV analyses how the NAFTA affected the use of anti-dumping (AD) and counter-vailing duties (CVD) by the United States against its NAFTA partners. The statistical evidence discussed herein is somewhat pessimistic. It shows that NAFTA's panel review mechanism has had an insignificant effect in terms of shielding Mexico from U.S. AD and CVD activity. Yet there is some evidence that Canada has been a bit more successful, partly because they have a longer history in terms of reviewing U.S. AC/CVD decisions under the previously negotiated U.S.-Canada Free Trade Agreement of 1988 (CFTA). However, this is an area that remains a concern for Mexico and for any other country wishing to implement free trade agreements with the U.S. In the future, the only real solution to this problem is to harmonize competition policies across the NAFTA countries and allowing competition policy to regulate anti-competitive behavior by firms. If this is not a viable short-term solution, then Mexican negotiators should first evaluate why the panel review mechanism under NAFTA is functioning particularly slow for Mexican cases. On the other hand, Mexico itself seems to have used AD/CVD investigations in a highly discretionary fashion. Thus a negotiated solution to this problem of barriers imposed by these administrative mechanisms is one that should aim to restrict its use by all three NAFTA members, perhaps by agreeing to rely more on safeguard duties when sectors experience sudden surges of imports.

3.2 Trade barriers and rules of origin in NAFTA

3.2.1 Basic economics of rules of origin

Even prior to the formal implementation of the NAFTA, Krueger (1993) had already noted that ROOs play an important role in FTAs, which is not present in Customs Unions. Under FTAs each partner is allowed to maintain its own import restrictions affecting the rest of the world, and thus ROOs are criteria for identifying products that are eligible for preferential treatment within the member countries. The main objective of these ROOs is to prevent trade "delfection" through which imports from non-member countries could be introduced into the FTA region through the country with the lowest import barriers, and in turn these imports could be re-exported to the country with the highest levels of import protection.

An economic challenge posed by these ROOs is that they can become a vehicle for the exportation of protectionism from the most protectionist FTA member to the more open members. For example, if tariffs and non-tariff barriers to the importation of textiles are more restrictive in the U.S. than in Mexico, then the NAFTA rule of origin for apparel and clothing can indirectly impose U.S. textile barriers on Mexican producers of clothing who wish to export apparel to the U.S. market.

The protectionist effects of rules of origin have been widely studied in the scientific literature (see, among others, Rodríguez 2001; Ju and Krishna 1998; Krueger 1997; Krishna and Krueger 1995; Krueger 1993) and are not disputed. To illustrate how ROOs can transfer the protectionist structure from the U.S. to Mexico, Box 1 presents Krueger's (1993) arithmetic of how profits of a Mexican firm that wishes to export clothing to the U.S. market are affected by U.S. trade policies. The basic set-up presented in Box 1 indicates that if the U.S. is NAFTA's low-cost producer of textiles, the main input in the apparel manufacturing, then the hypothetical Mexican apparel firm will decide whether to export to the U.S. based on the yarn-forward ROO specified in the NAFTA text, and the only relevant variables will be the tariffs on imports of apparel and textiles in the U.S.

The framework in Box 1 can also be used to assess the extent to which a reduction of import tariffs for textiles in the U.S. or a relaxation of the ROOs will affect Mexican incentives to export apparel to the U.S. market. Elementary calculations show that apparel firms in Mexico would be indifferent between a unilateral move by the U.S. to eliminate its import restrictions (tariffs) on textiles by driving t_T^{US} to zero or re-negotiating the ROOs so that Mexico can use textiles from the rest of the world for the production of apparel for export to the U.S. But this framework can be used to understand why certain Mexican exports to the U.S. have not made full use of the NAFTA preferences offered by the agreement. This is the topic of the next section.

Box 1. Rules of Origin and the Export of Protection among NAFTA Partners: The Basic Analytical Framework

This note aims to clarify how rules of origin (ROOs) can act as protectionist devices whereby the structure of production of one of the NAFTA partners determines the profitability of exporting firms. The framework was provided by Krueger (1993).

Consider a Mexican firm deciding whether to export apparel products to the U.S. under the NAFTA preferences. Its expected profits can be formally written as follows:

(1) $\pi_A^{Mex} = P_A^{US} - P_T^{US} \cdot \zeta \cdot q - P_T^{W}(1-\zeta) \cdot q$

where pi represents the expected profits for this firm. If it sells the product in the U.S. market, it will receive revenues per unit of apparel equal to the U.S. price (P_A^{US}) for that article. On the cost side, the firm will have to pay the U.S. price for the necessary textile inputs. This cost has three components: the unit price of textiles in the U.S. (P_T^{US}) if the firm decides to use U.S. components (which is likely due to the low cost source within NAFTA for textiles); the resulting unit cost is the product of this price times the cost share of U.S. textile inputs (ζ) times the textile cost share relative to the value of apparel that is determined by the production technology (*q*); minus the cost of using textile inputs from other sources that might be cheaper than U.S. parts ($P_T^{W}(1-\zeta) \cdot q$).

The relevant U.S. prices, world prices, and the technological parameter can be defined as follows:

(2) $P_A^{US} = (1 + t_A^{US}) P_A^{W}$

$P_T^{US} = (1 + t_T^{US}) P_T^{W}$

$q \leq 1$

where t_A^{US} is the ad-valorem U.S. import tariff (equivalent) on apparel and t_T^{US} is the corresponding U.S. tax on textile imports. To simplify, let world prices of apparel and textile inputs be equal to unity:

(3) $P_T^{W} = 1; P_A^{W} = 1$

Then,

(3) $\pi_A^{Mex} = (1 + t_A^{US}) - q[(1 + t_T^{US})\zeta + (1-\zeta)]$

The ROO determines ζ, which is the share of textile inputs that must come from regional sources in order for the export of apparel to be eligible for NAFTA preferential treatment. In the specific case of textile and apparel products, the NAFTA ROO implies ζ = 1 due to the yarn-forward rule, which says that apparel must be made from yarn originating in NAFTA countries. Thus, the profits for Mexican firms wishing to penetrate the U.S. market under the NAFTA preferences can be re-written as follows:

(4) $\pi_A^{Mex} = (1 + t_A^{US}) - q \cdot (1 + t_T^{US})$

This formula shows that for exports under NAFTA preferences, Mexican firms' profits will be determined exclusively by U.S. tariffs on apparel and textiles and the technological parameter, which we can safely assume is constant in this case because it is unlikely that technological change in the apparel industry can reduce the amount of cloth used per unit of apparel. The fact that Mexican apparel profits are determined by U.S. tariff structure is the key result from Krueger (1993).

Alternatively, firms can choose not to use the NAFTA preferences. In this case, firms face the following profit condition:

(5) $\pi_A^{Mex} = 1 - q \cdot (1 + t_T^{Mex})$

In words, the firm that decides not to use the NAFTA preferences for apparel exports will receive the world price minus the costs of textile inputs, which in this case depend solely on Mexico's textile import tariffs (and implicitly on the world price of textiles, which we have set equal to zero). Hence the decision to actually use the NAFTA preferences will depend on whether profits from using the preferences as defined in (4) are greater or at least equal to the profits from not relying on the preferences as defined in (5).

Thus it is easy to show that the apparel preferential margin, which equals the U.S. tariff when all intra-NAFTA trade enters duty free, needs to be greater or equal to the product of the textile cost share in production times the difference between the U.S. and Mexican textile tariffs:

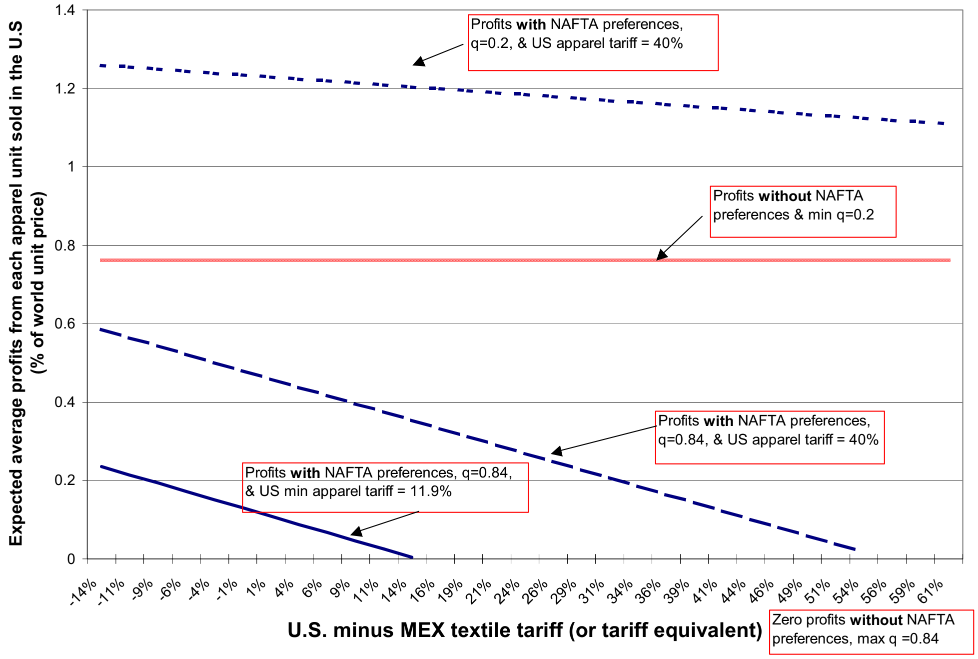
(6) $t_A^{US} \geq q \cdot (t_T^{US} + t_T^{Mex})$

The analysis presented in the main text of this chapter discusses possible explanations of why the utilization of the NAFTA preferences in apparel exports from Mexico to the U.S. is relatively low given that the extent of the preferential treatment under NAFTA has been quite high. The framework presented here indicates that there are three key parameters, which are those in equation (6).

3.2.2 *NAFTA preferences, utilization rates, and rules of origin*[76]

Box 1 showed that there are some specific conditions under which Mexican exporters will voluntarily decide to export to the U.S. without utilizing the NAFTA preferences. This occurs when the profits from exporting without preferences are greater than those from using them. More specifically, this is more common in industries where tariff preference is smaller than the cost differential from exporting to the U.S. by satisfying the rule of origin minus the costs from importing inputs of production from other sources. This is stated in equation (6) in Box 1 for the case of apparel exports.

Figure 1. How NAFTA Utilization Rates Vary with Tariff Structure: The Case of the Yarn-Forward Rule for Apparel Exports



Source: Authors' calculations—see Box 1 and text for details.

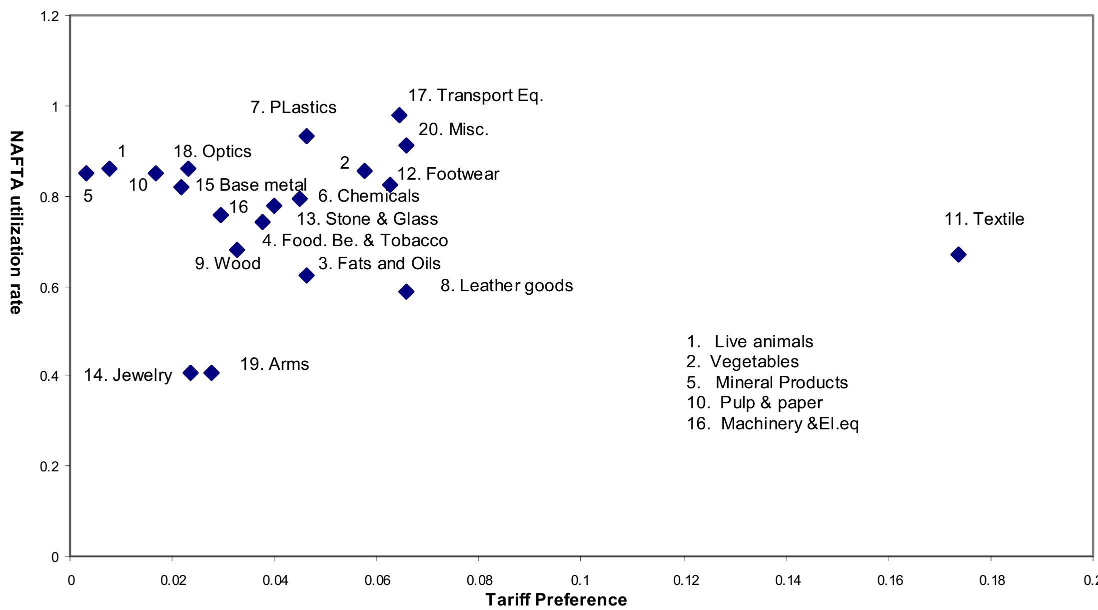
To illustrate how ROOs and the structure of protection in FTA members can affect the extent to which exporters use the FTA preferences, Figure 1 shows profit schedules for firms wishing to use FTA preferences. We continue to use the example of textile and apparel goods. The downward sloping lines corresponds to the expected profit schedules for three different hypothetical apparel products. The expected profits of exporting to the U.S. under FTA preferences decline with the textile tariff differential (or tariff equivalent rate of protection). The graph shows three different products: the top dotted line shows the expected profits for a firm that produces apparel with a rather low share of textile inputs (q=0.2) and facing an MFN (non-preferential tariff) of 40%. The corresponding expected profits from not using the preference is portrayed by the horizontal line, which simply shows that the profits for non-preferential exports do not depend on differences between U.S. and Mexican textile tariffs, and thus it is flat or horizontal. Exporters facing these conditions would probably choose to make full use of the FTA preferences, since for a reasonable range of textile tariff differentials, the FTA profit line is above the non-preferential profits. In contrast, the two other downward sloping profit lines cross their corresponding non-preferential profit line, which we set equal to zero, at different points of the horizontal axis (or at two

[76] This section borrows heavily from Cadot et al. (2002).

different levels of textile tariffs in the U.S. relative to the Mexican tariff of 18.9% as of 2001).[77] This implies that for products where the U.S. apparel tariff is close to 12% (the U.S. MFN average tariff without considering the impact of quotas) and a maximum textile cost share of 84% (q=0.84) using NAFTA preferences becomes unprofitable at low levels of U.S. textile tariffs. In fact, this would occur when the U.S. textile tariff is about 14 percentage points higher than Mexico's 19% tariff. This break-even point occurs a higher levels of the U.S. textile tariff when the U.S. apparel tariff is 40%, which makes selling that apparel product in the U.S. market more profitable. Thus it is clear that the decision to take advantage of NAFTA preferences will vary across firms and products, depending on some key parameter, namely U.S. apparel and textile tariffs and the cost share of textile inputs in the production of apparel goods. This statement is generally applicable to any product and ROO.

An important empirical question is what Mexican exports are utilizing NAFTA preferences and which ones are not. Figure 2, provided by Cadot et al. (2002), shows the relationship between NAFTA utilization rates in various sectors (measured along the vertical axis) and the tariff preferential margin offered by the agreement (measured along the horizontal axis). The textile and apparel sector is a clear outlier: it enjoys the highest preferential treatment, yet the utilization rate was quite low in 2000. The evidence indicates that only about 62% of Mexican exports of textile and apparel enters under the NAFTA preferences. Hence it seems that there is something peculiar about this sector in terms of how the rules of origin affect decisions by Mexican firms. We now turn to a more detailed empirical analysis of the impact of tariff preferences and ROOs on Mexican exports to the U.S.

Figure 2. The Empirical Relationship between NAFTA Preferences Utilization Rates versus Tariff Preferences, 2000: Textile and Apparel – The Obvious Outlier



Source: Cadot et al. (2002) based on data from the U.S. ITC.

Given that there is substantial variation in NAFTA's tariff preference across industries, in the absence of offsetting administrative or ROO costs one would expect Mexico's trade flows to be affected

[77] This zero-profit condition can be readily calculated from equation (5) in Box 1, by setting Mexico's MFN textile tariff equal to their actual reported tariff of 18.84% and setting the cost share of textile inputs at the maximum possible ratio so that profits equal zero. This is the tariff reported by the FTAA Hemishperic Database maintained by the Tripartite Commission composed by the IDB, OAS, and ECLAC.

by NAFTA's rate of preference. As discussed in Box 1 and illustrated in Figure 1, items with larger preferential treatment under NAFTA (e.g., higher U.S. MFN tariffs) should be associated with a higher percentage of Mexican firms choosing to export to the U.S. under NAFTA preferences. Hence higher tariff preferences should be positively correlated with higher utilization rates (the % of exports entering the U.S. market with NAFTA preferential treatment). However, if the cost of complying with NAFTA's ROO and other administrative hassles offset the benefit of the preferences, one would expect the composition of Mexico's trade flows to be less affected by NAFTA preferences. That is, under the latter hypothesis and provided that the pattern of U.S. MFN tariffs does not differ too strongly from the pattern of MFN tariffs applied by Mexico's other trading partners, one should not be able to trace large differences between the pattern of Mexican exports to the U.S. relative to the rest of the world. Thus, comparing Mexico's exports to the U.S. and to the world provides a further check on the hypothesis that NAFTA involved a switch of protection instrument from tariffs or quotas to ROOs rather than an overall reduction in the level of protection.

Cadot et al. (2002) explored this question by estimating the following model using WLS with Mexican exports as weights at the six-digit level of industry disaggregation in the Harmonized Tariff Schedule (HTS) for the year 2000:

(1) $XUS_i = \zeta_0 + \zeta_1 * XROW_i + \zeta_2 * \ln PREF_i + \zeta_3 * \ln ROO_i + \Sigma_k \zeta_k * D_{ki}$.

XUS_i stands for Mexico's exports to the U.S. in tariff line i, $XROW_i$ is Mexico's exports to the rest of the world, $PREF_i$ stands for the rate of tariff preference under NAFTA, ROO_i is Estevadeordal's (1999) ROO-restriction index, and D_{ki} is a vector of dummy variables by HTS chapters.

Cadot et al. (2002) estimated a variant of (1) in which Estevadeordal's (1999) ROO-restriction index was replaced by a vector of dummies for specific types of ROOs used in the NAFTA. More specifically these analysts used the following set of dummy variables to identify products subject to the following types of ROOs:

CHAP = 1 when the ROO requires a change in tariff chapter (as in the case of apparel)
HEAD = 1 when the ROO requires a change in tariff heading
SUBHEAD = 1 when it requires a change in tariff sub-heading
ITEM = 1 when it requires a change in tariff item
EXC = 1 when there is one or more exceptions
RVC = 1 when the ROO specifies a minimum regional value content.

In addition, the analysis included an interaction between the *CHAP* variable and the dummies identifying food and textiles (where most ROOs take the form of a change of chapter). The estimated equation was:

$$(2)\ XUS_i = \zeta_0 + \zeta_1 * XROW_i + \zeta_2 * PREF_i + \zeta_3 * R_i + \zeta_4 * CHAP * FOOD \\ + \zeta_5 * CHAP * TEXTILE + \Sigma_k \zeta_k * D_{ki}$$

where ζ_2 is the vector of coefficients on the various types of ROOs mentioned above.

As explained by Cadot et al. (2002) there two potential technical complications in estimating models (1) and (2) that merit some attention. First, if *PREF* and *ROO* are substitutes, there may be collinearity (in a weak sense) between the two. However regressing *ROO* on *PREF* gives a positive and significant parameter estimate (consistent with substitutability) but an R^2 of only 10%, suggesting that the association is not sufficiently close as to be a problem in the estimation of (1). Second, it can be argued that *ROO* and *PREF* are endogenous to Mexican exports if tariff and ROO protection are used to restrict

Mexican access to the U.S. market. However ROOs determined in the course of negotiations held in the early 1990s and finalized in 1992 can hardly be endogenous to Mexico's 2000 export pattern.[78] As for *PREF*, GATT Article XXIV implies that intra-bloc tariffs have to go to zero, so steady-state tariff preferences are equal to MFN tariffs which are also predetermined (see footnote 2 supra). Estimation results are shown in Table 1.

Table 1. Regression Results for (1) and (2) Dependent variable: XUS

	(1)		(2)	
	Estimate	**t-stat**	**Estimate**	**t-stat**
Constant	1882.19	3.01	785.43	1.42
XROW	3.99	103.70	3.63	97.60
Ln PREF	25.04	15.01	26.09	15.31
Ln ROO	-628.48	-12.34		
ITEM			-2197.41	-3.04
SUBHEAD			-308.36	-2.18
HEAD			-658.84	-6.00
CHAP * FOOD			-387.68	-1.05
CHAP * TEXTILE			-533.09	-1.02
EXC			230.67	3.84
RVC			-985.41	-19.70
R^2 adjusted	0.94		0.95	
Number of observations	3616		3389	

Source: Cadot et al. (2002, Table 3).

The results from (1) are as expected. The relationship between exports to the U.S. and exports to the rest of the world is proportional with a factor between three and four, but tariff preferences have a positive influence on Mexico's exports to the U.S.. ROOs have the opposite effect, and both are highly significant.

The results of (2), in which Estevadeordal's (1999) ROO-restriction index is decomposed into dummy variables for various types of ROOs, are also interesting. Changes of tariff classification have negative and significant effects, whereas exceptions have positive effects. This suggest that the bulk of exceptions to ROOs make them *less* constraining rather than more, unlike the oft-cited restriction on tomato paste according to which ketchup is deemed originating if it results from a transformation of ingredients satisfying a change-of-chapter rule, but not if it results from the transformation of tomato paste (see Krueger 1999). Regional value content rules appear particularly significant and have large marginal effects.

In order to estimate the quantitative effects of each instrument on the direction of Mexican trade flows, Cadot et al. (2002) performed the following exercise. On the basis of the parameter estimates in (1) and (2), they compared the predicted values of Mexican exports to the U.S. in three cases: (i) with actual values of the PREF and ROO variables (NAFTA as it is, i.e. the benchmark case); (ii) with no tariff

[78] Technically, the ROO variable can be considered as predetermined to the dependent variable, which implies that there is no correlation between the regressors and the equation's error term, hence that OLS and WLS estimates are unbiased. An equation determining ROOs on the basis of contemporaneous variables can be found in Estevadeordal (1999), but simultaneous estimation of these two in a recursive system would not alter the point estimates of (1).

preferences and no rules of origin,[79] which we interpret as "no NAFTA"; and (iii) with NAFTA tariff preferences but no ROOs (a hypothetical NAFTA without rules of origin). The difference between case (i) and case (ii) gives an estimate of the direct effect of NAFTA's package (tariff preference and ROOs) on Mexican trade flows. Results are presented as percentage deviations from the relevant baseline predicted value for Mexico's exports to the U.S., namely $152.3 billion using the results for (1) and $133.4 billion with (2). The results are shown in Table 2.

Table 2. Simulation Results for (1) and (2): Effects of ROO relaxation, simulated (% deviation from baseline)

Constrained ROO values	No NAFTA	NAFTA without ROO
Using Estevadeordal's index (equation 1)		
ROO=1	-3.1	76.6
ROO=2	-11.7	35.3
ROO=3	-22.6	17.8
Using dummies (equation 2)		
RVC=0		15.8
ITEM=0		1.5
SUBHEAD=0		9.0
HEAD=0		63.2
CHAP=0		35.3
RVC=0 AND EXC=0		4.5
RVC=0, ITEM=0 AND EXC=0		5.3
RVC=0,ITEM=0,SUBHEAD=0,EXC=0		11.3
RVC=0,ITEM=0,SUBHEAD=0,HEAD=0,EXC=0		85.0
All dummies at zero (no ROO)	-9.0	108.3

Source: Cadot et al. (2002, Table 4).

Consider the first part of Table 2, based on (1). If "No NAFTA" is interpreted as setting ROOs at their lowest level, then the combined effect of tariff preferences and ROOs (NAFTA's package) raises Mexican exports, on average, by only 3.1%. As "No NAFTA" is interpreted as elimination of tariff preference but ROOs set at higher levels, NAFTA's effect appears more favorable. With this caveat in mind, it is fair to say that the marginal effects of tariff preferences and ROOs as they are in NAFTA's present form seem to produce limited positive net effects (+11.7% with ROO=2 taken as the "No NAFTA" value). The second column shows that if tariff preferences were maintained but ROOs eliminated the positive effects on Mexico's exports would be considerable (+35.3% if ROOs were set across the board at a level corresponding to ROO=2). This finding has important policy implications, since they show that loosening NAFTA ROOs could bring substantial gains in terms of Mexico's ability to take advantage of the preferences offered by NAFTA.

The second part of the table provides some guidance about which ROOs in particular could have the biggest impacts if they were to be relaxed. Regarding required changes of tariff classification, the

[79] The exercise we perform is as follows. In case (i), we use actual values of the PREF and ROO variables to predict the value of Mexico's exports to the U.S.. In case (ii), we set PREF equal to 10E-13 across the board and ROO to a 'low' value across the board. The first part of Table 2 reports results for three values of ROO: 1, 2 or 3. The reason for not setting the ROO variable to zero is that, under NAFTA, there is no tariff line with ROO equal to zero, so that predicting the value of XUS (the dependent variable) so far out of the sample with non-linear forms gives unreasonable results. Results based on setting ROO equal to higher values are more conservative but arguably less prone to prediction errors. If anything, the bias that this introduces reinforces the point we are making, since setting ROOs at a lower level would generate larger negative effects.

most common type of ROOs, note that relaxing ITEM (changes of tariff item), which has the largest marginal effects in (1), produces only a minor effect on trade flows as this type of ROO affects only low-volume tariff lines. Conversely, relaxing CHAP which has a low and imprecisely-estimated marginal effect produces a large change on textile and food exports. Relaxing HEAD (change of tariff heading) also produces a dramatic effect on Mexican trade flows.

Several caveats are in point. First, the exercise cannot measure non-trade effects of NAFTA (e.g. on the credibility of reforms) and should therefore be taken as a lower bound on NAFTA's real-world effect. Second, these results are based on effects measured on a cross-sectional data set and cannot give a full picture of NAFTA's effects since effects that cut across all sectors effects are subsumed in the constant. Thus, at least one important question remains unanswered: namely, whether the recent expansion of Mexico's exports to the U.S. is indeed attributable to NAFTA but to effects that are only indirectly related to tariff preferences, or whether it is attributable instead to exchange-rate or macroeconomic and credibility effects discussed elsewhere in this report.

With these caveats in mind, the provisional conclusion here is that, at least at first sight, Mexico's export pattern seems to have been affected positively but in a quantitatively small way by the combined effect of NAFTA's tariff preferences and ROOs, because the negative effect of the latter partly offset the positive effect of the former. This has two policy implications. First, it supports the view that the gains from tariff liberalization under FTAs can be offset by non-tariff compliance costs related with ROOs. In this case FTAs involve a substitution of instruments rather than the simple elimination of one of them. Second, the extent of the substitutability between tariff and ROO protection varied across industries, depending on the type of ROO. Although the point estimates of the impact of the chapter-change ROO requirement, such as the rules that apply to textile and apparel trade under NAFTA, were imprecise, the magnitude of the negative effect are economically large. The imprecision is probably due to the fact that the same rule literally applies to textiles and apparel, although we suspect that in Mexico's case the yarn-forward rule has hampered mainly the profitability of Mexican apparel exports, since this country is a net importer of textile from the U.S. The following section takes a closer look at these and other issues related to the apparel industry.

3.2.3 NAFTA and textile and apparel trade in North America

As shown in Figure 2, textile and apparel trade under NAFTA is characterized by two features: very high preferential treatment for Mexican exporters relative to the MFN tariffs and a rather low level of utilization of these preferences by Mexican exporters. We have already explained and demonstrated that relaxing the relevant ROOs might have economically important consequences for Mexican exporters of apparel. However, here we aim to consider additional factors affecting this sector: NAFTA preferences for Mexico have been diluted by unilateral actions taken by the U.S. First, the Caribbean Basin Economic Recovery Act allowed in 2000 exports of apparel from Caribbean and Central American countries to enter duty-free into the U.S. market as long as the yarn used for these manufactures originates in the U.S. As of late 2002, this is also true for apparel exports from Colombia and other Andean countries, because the U.S Congress approved the Andean Trade Preferences Act in September 2002, which offered preferential treatment to apparel made with U.S. yarns and textiles. Hence to some extent the NAFTA preferential margin in apparel became less important.[80] Furthermore, the initiation of negotiations between Central America and the U.S. towards a NAFTA-type FTA will probably level the playing field in terms of the ROOs affecting apparel exports from these countries relative to Mexico.

[80] The Africa Growth and Opportunity Act (AGOA) also offered preferential treatment in the U.S. for textile and apparel imports from African countries. This is another reason why NAFTA textile and apparel preferences have been diluted.

We can use these facts to compare the CBI and NAFTA utilization rates to better understand how the textile-apparel ROOs affect different types of countries. In principle, the move from the CBI ROO to a NAFTA ROO (which allows apparel to enter the U.S. with preferential treatment even when the yarn is produced domestically, rather than exclusively in the U.S.) should be more beneficial for countries that have a domestic internationally competitive textile industry.

To assess the extent to which various CBI and NAFTA countries have a comparative advantage in textiles, the main input for producing apparel, we look at the pattern of net exports per worker relative to the U.S. for CBI countries and relative to NAFTA for Mexico, and relative to the rest of the world for both sets of countries. In addition, we also examine the latest data concerning the CBI and NAFTA utilization rates in apparel.

Figures 3a-f show the net exports of textiles for Mexico and the five Central American countries, both relative to the U.S. (U.S. plus Canada for Mexico). Only El Salvador seems to have a comparative advantage in textiles, since it is the only country that has systematically had postive net exports of textiles to the whole world since the early 1980s. Hence this country is likely to benefit substantially from shifting from the CBERA apparel ROOs to the NAFTA-type ROOs. Mexico on the other hand has become a large net importer of textiles, most of them coming from its NAFTA partners. This finding is consistent with our previous discussion that the NAFTA ROOs have resulted in the export of U.S. protectionism to Mexico in this sectors. That is, the large decline in the net exports of textiles in Mexico has been related to rising imports of textiles from the U.S., which are required for its apparel producers to export to the U.S. under NAFTA preferences. This fact also explains why the econometric estimates of the impact of the ROOs affecting textiles and apparel is imprecise; it is because the same rule affects textiles where Mexico is not the low-cost producer of North America (the U.S. is) and apparel, where Mexico is the NAFTA low-cost producer.[81]

[Figures 3a-f appear at the end of this chapter]

Table 3 shows the latest available data concerning the CBI and NAFTA utilization rates in 2001 and 2002. El Salvador and Mexico have similar utilization rates. We interpret this as evidence that El Salvador has not benefited as much as other CBI beneficiaries in this sector partly because the U.S. is not its low-cost source of textile and yarn inputs used for apparel manufacturing. This is also the case for Mexico. The difference, however, is that El Salvador's own textile industry might be the potential source of textile inputs (since it has a revealed comparative advantage for textiles relative to the whole world), and thus for this country NAFTA-type ROOs might be more beneficial than they were for Mexico or could be for Costa Rica, for example, under a NAFTA-type agreement. Although we have not shown the corresponding graphs for Colombia, a country that is also beginning to consider and FTA with the U.S., this is another country similar to El Salvador in that it does have a significant domestic textile industry, and thus could benefit more than Mexico from NAFTA-type ROOs.[82]

[81] It should be noted that the U.S. is a net exporter of textiles within NAFTA but not for the rest of the world.

[82] Historically, Colombia has been a net exporter of textiles to the world. This situation changed slightly in the mid-1990s, but it was not a significant net importer of textiles by the late 1990s. In other words, Colombia is on the fringe between a net exporter and net importer of textiles. Shifting from ATPA to NAFTA-type ROOs in this sector might thus make this economy recover its relative position in textile and apparel exports.

Table 3. NAFTA and CBI Apparel Preferences Utilization Rates, Selected Countries

	2001	Jan-Nov 2002
Mexico (NAFTA)	68%	74%
Costa Rica (CBI)	53%	65%
El Salvador (CBI)	57%	63%
Honduras (CBI)	62%	73%
Nicaragua (CBI)	21%	29%
Jamaica (CBI)	59%	88%
Dominican Rep (CBI)	68%	83%

Source: Authors' calculations based on data from the U.S. ITC.

From Mexico's viewpoint, we have already suggested that an important policy implication of this analysis is that it could benefit from negotiating a relaxation of the ROOs, especially those affecting apparel exports. However, there is one additional important consideration for the future. In January 2005, the U.S. will eliminate its textile and apparel quotas as a result of its commitments under the Uruguay Round agreement signed in 1995. Consequently, the NAFTA preferential margins will be further diluted at that time. Whereas it is unlikely that the U.S. will fully liberalize its import tariffs on textile and apparel imports from the rest of the world, it is likely that the resulting preferential margins will be lower after 2005. This has two important policy implications. First, the renegotiation of the ROOs should be done very soon so that the new rules can be implemented prior to 2005. Second, in the medium to long run, the profitability of Mexico's apparel industry will depend less on NAFTA preferences and more on its capacity to innovate and take advantage of Mexico's enviable geographic location. To accomplish this successfully, domestic complementary policies are required. The innovation issues are discussed in chapter five of this report, whereas the other policies concern domestic and border infrastructure and customs procedures.

3.3 Agriculture[83]

The impact of NAFTA on Mexican agriculture received a lot of rather pessimistic attention prior to the implementation of the agreement (Levy and van Wijnbergen 1994, Burshifer et al. 1992, Baffes 1998). It has also become the subject of political controversy in recent months as a consequence of the liberalization of certain sensitive products for Mexico, which was implemented in January 2003. In part, this attention is due to the perception that poor farmers dedicated to traditional crops, such as maize, have been hurt by the liberalization agricultural trade mandated by NAFTA. This section examines the economic trends of Mexico's crop agriculture before and after NAFTA and analyzes the extent of liberalization that has actually taken place.

Our main conclusion is that liberalization of agricultural trade under NAFTA has already been substantial. However, this liberalization has not had the devastating effects on Mexican agriculture as a whole and has not had the negative effects on poor subsistence farmers in particular. The challenging questions are, first, why did NAFTA not have a negative effect on Mexican farms, and second, what are the main policy challenges for the Mexican government in medium term? These questions are addressed in the subsequent paragraphs. Given the sensitive nature of the subject matter, we pay detailed attention to both the policies pursued by Mexico before and after NAFTA as well as the economic effects of these policies. We begin with a brief historical review of Mexico's agricultural policies.

[83] This section borrows heavily from Yúnez-Naude (2002).

3.3.1 *Agricultural policy reforms in Mexico before or without NAFTA*

Government intervention in agriculture was a major component of Mexico's development policies from the mid 1930s until the beginning of the eighties. In the sixties, 1970s and up the end of the oil boom and the debt crisis of 1982/3, state intervention in agriculture included: crop price supports to staple producers; subsidies to agricultural inputs (credit and insurance); and government participation in the processing of grains, oils and powder milk. The Mexican state had also retail shops to sell basic foods to the rural and urban poor; was involved in the production of fertilizer and improved seeds and in granting consumption food subsidies to the poor.

After the macroeconomic crisis of 1982, the de la Madrid administration (1983-1988) began to adopt policy reforms. During the eighties, producer price supports of five out of the twelve traditional crops were eliminated (copra, cotton, suflower, sunflower and sesame seeds), and CONASUPO (the National Company of Popular Subsistence, Mexico's major state enterprise involved in agriculture, in charge of price supports) was subject to an administrative reorganization in order to reduce its administrative costs (see CONASUPO 1986, 1988 and 1989). During its first two years of government, the Salinas administration (1989-1994) reduced CONASUPO's participation in the oilseeds markets, eliminated the generalized consumer subsidies for wheat bread and changed the subsidies given to maize "tortillas" (Yañez-Zazueta 1997). In addition, all State enterprises began to be privatized or eliminated.

In sum, whereas Mexico became a full member of the General Agreement on Tariffs and Trade (GATT) in 1986, the Mexican government undertook no major changes in the structure of protection of agricultural products until 1990. Up to that time, all products in whose markets CONASUPO intervened through producers' price supports were also subject to import licenses. It was until the beginning of the 1990s when domestic reforms and trade liberalization began to include the most important crops of Mexican agriculture. Between 1990 and 1991 import controls and government direct price supports to the producer of nine of the eleven traditional crops were abolished,[84] and subsidies granted to agricultural inputs, credit and insurance were drastically reduced

It is widely recognized that the most important domestic agricultural policy reform was the elimination of price supports to the producers of traditional crops and the elimination of CONASUPO. This company was a major player in government intervention in agriculture until the eighties. Up to 1989 the company bought a considerable part of the domestic production of eleven crops at support or guaranteed prices (maize, beans, wheat, barley, rice, sorghum, soybeans, suflower, copra, sunflower and sesame).[85] During 1990, CONASUPO reduced its market interventions to maize and beans, and producers' price supports were abolished for all of the remaining basic crops.

In 1991 the Agricultural Marketing Board (ASERCA) was created to substitute the traditional direct interventions that the government did through CONASUPO for sorghum and wheat.[86] Since its creation, ASERCA has followed a scheme of "indifference prices" for these two crops. It is regional-specific and consists in fixing a "concentrated price" for the crop in question before the cropping season, taking as a reference the international prices, together with transport costs. The producers sell their crop to

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[84] Copra, cotton seed, grain barley, rice, soy, sorghum, suflower, sunflower and wheat (sesame seed guaranteed prices were eliminated before). The exceptions were maize and beans.

[85] The contribution of these crops to the value of domestic agricultural gross domestic production has been over 30% since the seventies. Amongst these crops, maize is by far the most important one: its weight on the value of domestic production of the eleven traditional crops has been greater than 50% (details in Yuñez-Naude and Barceinas 2000).

[86] However, cotton, rice, and soy producers of selected regions have been included in ASERCA's programs during some years, and from 1997 to 2000 marketing support for maize producers was added to the subsidy mix. For example, notwithstanding that the price of rice was fully liberalized in 1990, supports for rice producers were granted in 1996 because of a drop in its real price (ASERCA 1996).

the processors at the international price, and the government transfers to the farmers the difference between it and the concentrated price.[87]

Up to 1994, the Agricultural Council fixed the guaranteed price of maize and beans, which were administered by CONASUPO. In 1995 the peso devaluation allowed the government to transform CONASUPO to be just a "last instance buyer" of these two crops, eliminating domestic price supports for them. During that year CONASUPO did not import maize and, from purchasing in 1994 45 per cent of the domestic production of the grain, in 1995 just bought 20 per cent. However, and due to the decrease of the international price of maize, in 1996 Mexico followed an intermediate scheme of price fixation, by which the domestic price was settled regionally and between the guaranteed price and the international price. The price was called “base price” (ASERCA: May, 1997, pp. 10 and 13-14). During the winter season of 1996-1997, the scheme of price supports for maize changed again. Maize, together with beans, was bought by CONASUPO at “indifference prices” in the production zone. The prices were region-specific and determined by the average of the international price according to the Chicago Commodity Exchange plus the international bases of arrival to Mexican port(s) and the operation costs of storage, transport, financial costs, etc. (SAGAR: July, 97, p. 22). Under this scheme, and until it was abolished in late 1999, CONASUPO became a “last instance” buyer of white maize for human consumption in the sense that it allowed sales to those maize growers that could get a price from the private sector higher than the indifference price.

The evidence on the weight of CONASUPO's purchases on domestic production of maize (mainly white) and beans show that, during the last years of its existence, the Company decreased its participation in the domestic markets of these two crops. During 1993 and 1994 CONASUPO bought around 45 per cent of the domestic supply of maize, whereas its purchases were reduced to 20.3 per cent during 1995, and to 8.8 per cent during 1996, to 19 per cent during 1997 and to 12.5 per cent during 1998. As for maize, CONASUPO's weight on domestic purchases of beans have been reduced: from 30.5 per cent during 1993 to 24.8 per cent in 1994, to 18.3 per cent in 1995, and to around 8 per cent in the following two years (SAGAR data base).

During the last years of CONASUPO, the Company’s sales of maize were to tortilla producers or “nixtamaleros” (they ground the maize and elaborate tortillas). In order to support the subsidy to tortilla consumers, CONASUPO provided the maize to them and sold it at a price that allows “nixtamaleros” a "reasonable" profit for their tortilla sales at a subsidized price. The other processors that received a subsidy were the maize millers. They received a cash subsidy for the maize bought directly in the domestic market (“at prices linked with the international prices”, Zedillo 1997) that allowed them a "reasonable" profit so as to support the consumers' tortilla subsidy program.

Direct income transfers: PROCAMPO

Three years after the creation of ASERCA, a major transitional program called PROCAMPO was initiated in the winter season of 1993-94, a few months before the beginning of NAFTA. PROCAMPO is a decoupled program that substituted previous direct price supports. It consists of income transfers to farmers producing barley, beans, maize, cotton, rice, sorghum, soy, sunflower and wheat. The main purposes of PROCAMPO are to support domestic producers of basic staples to face competition from U.S.A. and Canadian farmers granted by NAFTA, and to help Mexican producers to switch to more competitive crops under a liberalized context. PROCAMPO is planned to last until 2008, when full trade liberalization under NAFTA will be attained, and its beneficiaries have been those producers that

[87] To the scheme of indifference prices, a program of price coverage in the international markets for these crops, plus cotton and maize, was added. For example, during 1996, coverage for 91,920 mts. of wheat and 1.7 millions of maize were placed in the Commodity Exchanges of Chicago and New York (Zedillo 1996).

cultivated (or continue to cultivate) the above-mentioned crops during the three years before its implementation. The transferred amount is per hectare and the same to all farmers, independently of productivity and granted even if the beneficiaries switch to produce other crops. Box 2 reviews recent evidence concerning the income effects of PROCAMPO on its beneficiaries.

Box 2. The Multiplier Effects of PROCAMPO – Evidence of Effectiveness

Evaluations of income support programs, such as PROCAMPO, should consider, among other factors, how such transfers affect total incomes of the beneficiaries. Effective programs should in principle create additional income from other sources so that each dollar spent by the public sector results in more than one dollar of additional income. The study by Sadoulet, de Janvry, and Davis (2001) found that PROCAMPO created large indirect effects. The multiplier for all households is in the range of 1.5 to 2.6. Multipliers are higher for households with medium and large farms, low numbers of adults in the household, nonindigenous backgrounds, and located in the Center and Gulf regions. Large multipliers reflect uncaptured marginal income opportunities due to liquidity constraints that are relaxed by the transfers. Liquidity constraints can be caused by incomplete property rights in the *ejido* sector and by the disarray of financial institutions servicing agriculture following the scaling down of the agricultural development bank. Large multipliers thus reflect sizable gaps between opportunities and constraints. Households with migrants sending remittances and with higher levels of education may thus have lower multipliers because they were able to work around the liquidity constraints more effectively than other households. Households with little land and with ethnic backgrounds may have lower access to liquidity, but also have lower opportunities to invest additional cash received, again resulting in lower multipliers.

Source: Sadoulet, de Janvry, and Davis (2001).

Alliance for the Countryside

In addition to the ASERCA and PROCAMPO the government created Alliance for the Countryside (*Alianza para el Campo*) in 1993. The program's main objective is to increase agricultural productivity and to capitalize farmers by contributing funds for investment and sanitary projects leading to integrate farmers into the commercial food processing industry. A major purpose of Alliance is to promote farming efficiency through crop substitution (mainly from traditional crops to fruits and vegetables) for farmers who have a potential comparative advantage in producing such crops in the context of an open economy. Other important features of Alliance include its decentralized character with state-level control of its programs and contribution to the funding by participating farmers. (www.sagarpa.gob).

Alliance for the Countryside includes PROCAMPO, as well as other programs. The most important amongst these is PRODUCE, which focuses on three main activities: the use of irrigation canals to deliver liquid fertilizer, mechanization, and the improvement of pasture quality for livestock producers. Alliance also includes a phytosanitary program.

Other reforms

Less government intervention in agriculture was accompanied by the abolition of State enterprises involved in the sector. As well as the disappearance of CONASUPO, government companies producing fertilizers, seeds and other inputs, and those involved in the marketing of coffee, sugar and tobacco were eliminated or privatized.

Credit subsidies and official credit coverage for working capital given to farmers by public financial institutions for rural development (the most important being BANRURAL) declined sharply during the nineties. There are several reasons explaining the reduction of government participation in rural credits, ranging from public budget restrictions to a very high default rate among beneficiaries. The gap caused by the decline in governmental rural credit was expected to be filled by private commercial banking. The current government passed the Ley de Capitalización del Campo, which simplified and improved the system for granting credit subsidies through FIRA, in this case, for potentially profitable agricultural activities for the beneficiaries of PROCAMPO. This instrument clearly aims to help the productive transformation of traditional agriculture (a PROCAMPO criteria) in favor of other activities.

Another major reform was the amendment of the Constitution in 1991 that liberalized property rights in the *ejidal* sector. Up to that year, peasants that benefited from land distribution (a result of the Mexican Revolution, and called *ejidatarios*) were, by law, not allowed to associate, rent or sell their land. With the reform this mandate disappeared and land redistribution ended. The ejidal reform was expected to help develop the land market, and to capitalize agricultural activities by allowing farmers to participate in the private credit market and by promoting direct private investment.

The Salinas administration created the Ministry of Social Development, and with it, a social program designed specifically to assist the rural poor (called *Progresa* during the Zedillo government). The concern with the development of poor rural areas has been maintained by the current government under its comprehensive Plan for Rural Development.

3.3.2 Liberalization under NAFTA

Under NAFTA, the structure of border protection for Mexico's agricultural sector was transformed and Mexico gained market access to the Canadian and the U.S. markets, which had not been achieved through its previous liberalization efforts. Two separate agreements between Mexico and Canada and between Mexico and the U.S. were actually negotiated.[88]

Market access granted by Mexico under NAFTA

Some traditional crops were liberalized immediately after the implementation of NAFTA. From January 1994 onwards, sorghum, sesame seeds, and sunflower from Canada and the U.S. entered duty-free. Free trade also applies to seeds for barley, beans, maize, cotton, soy, and sunflower, and since January of 1998 all types of soy also enter duty free to Mexico from its other two North American partners.

NAFTA became the first free trade agreement using tariff rate quotas (TRQs) as a transition mechanism to eliminate quantitative restrictions and to move towards free trade. TRQs were applied to those products that the governments of the three North American countries considered very sensitive. Under NAFTA, no tariffs for those agricultural products that are under in-quota imports are charged. A phase-out period of fifteen years of above-quota tariff reductions and quota increases was defined for the imports of maize and dry beans.[89] TRQs were also established for grain and malt barley, for which free trade was reached in 2003.

Quota levels were established using trade flows between Mexico and its two North American partners from 1989 to 1991. In 1994 the quota for maize was set to 2,500,000 metric tons (mts) for the U.S. and to 1,000 mts for Canada, and the above-quota base or consolidated tariff for both countries was fixed to 215 per cent (or 206.4 U.S.$/mts). In January of 1994, the quota for beans was 50,000 mts for the U.S. and 1,500 for Canada, and the above quota tariff was 139 per cent (480 U.S. $/mts). For both, grain and malt barley, the quota was set in 1994 to 120,000 mts for imports from the U.S. and 30,000 mts for imports from Canada, and the above-quota ad-valorem tariff for grain barley was 128%, and 175% for malt barley.

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[88] The following discussion emphasizes the agricultural agreement between Mexico and the U.S., because, in the short and medium runs, major impacts of NAFTA have been concentrated in Mexico-U.S. trade.

[89] In the agreement between Mexico and the U.S., powdered milk was also included by Mexico under this scheme.

Beginning in 1995, the quotas for barley, beans and maize grew each year and their above quota tariffs were subjected to a yearly process of reductions. This liberalization was designed under NAFTA for beans and maize to reach duty-free treatment by Mexico on December 2007. Full liberalization for barley was achieved in January 2003.

Until the end of 2000, quota assignments were settled by a committee formed by the Ministries of Commerce (SECOFI) and Agriculture (SAGAR), and by representatives of the private sector. The Mexican government has followed four allocation mechanisms for TRQs: direct assignment, auctions, government monopoly and "first come-first served". Maize and barley have been subject to direct allocations, and dry beans to auctions.

Up to 1999, CONASUPO participated indirectly in the allocations of maize quotas since it defined jointly with the Ministry of Agriculture the amount of the crop to be allocated to accomplish what were the company's reduced functions (mainly stock pilling and sales to tortilla producers to sustain the tortilla subsidy program). The rest of the maize quota has been allocated to private cattle feeders (see Shagam and Plunkett 1997).

In practice, however, from the beginning of NAFTA implementation up to 2000, Mexico did not charge above quota tariffs to any of the crops subject to TRQs. This was the result of either quotas that went unfulfilled (the quotas were not binding) or unilateral actions taken by the Mexican government to increase quotaa. Mexico's imports of beans have been lower than the quota, whereas above-quota maize imports were allowed without applying the high over-quota tariff. [90]

In January 1995, Mexico re-structured its protection measures for WTO members following the Uruguay Round Accord. The main differences between Mexico’s commitments under NAFTA and under the WTO are twofold: 1) Greater quota access and lower off-quota tariffs for Canada and the U.S.A. than the rest of the world, and 2) by the year 2003 or 2008, and depending on the commodity, Mexico will abolish all border protection of imports from Canada and the U.S.A., whereas Mexico will maintain the 1995 quota levels and off-quota tariffs for other WTO members and reduced MFN tariffs by an average of 24 percent between 1995 and 2000.

Mexico included a safeguard clause in NAFTA for several agricultural products. Under the agreement, it can be used as a "countervailing mechanism" when an increase of imports represent a "considerable menace" or a "serious damage" to the sector in question. In this case, the measures to be taken are either to suspend the tariff reduction process or to use (to "snap back" to) the base tariff settled in 1994. In the WTO, the Mexican government is allowed to set additional import taxes when "imports rise due to low import prices". Recently, Mexico used this clause to limit imports of poultry parts in January 2003, after their import tariffs of 45% were eliminated and in response to social pressures from farmers’ organizations.

Market access for Mexican exports granted by the U.S. under NAFTA

NAFTA enhanced access for Mexico’s competitive crops—mainly fruits and vegetables—to the U.S. markets. However, trade liberalization was not immediate for those products considered sensitive by the U.S. For these commodities, the process of negotiations with Mexico to phase out trade restrictions was based on the complementary or substitutive character of Mexican exports, meaning that the agreed liberalization of these products was based in the productive annual cycles of vegetables and fruits in both

[90] Imports of beans are low because Mexico has been self-sufficient in the type of beans preferred by its population. This crop was included in the TRQ scheme mainly because the farmers that produce beans have marketing problems and because it is a major component of the Mexican diet.

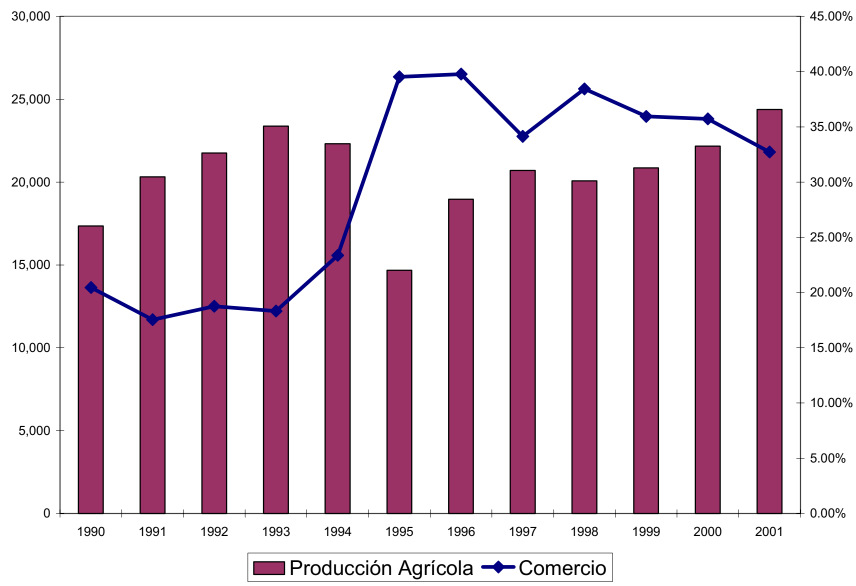
countries. Thus, trade restrictions of some products exported by Mexico to the U.S. were eliminated in 1994 (grapes, mangoes and pineapples), and for most vegetables and fruits tariffs are charged for some periods of the year until its elimination in 2003 or in 2008. For some of these commodities TRQs are also applied.[91]

3.3.3 Trade and production outcomes

The above discussion indicated that in terms agricultural trade within NAFTA, and more importantly for the ongoing, trade between the U.S. and Mexico was substantially liberalized, at least in paper. We now focus on the evolution of trade and production outcomes for Mexico.

Figure 4 shows total agricultural production in Mexico as well as the ratio of imports plus exports over the value of domestic production during 1990-2001. The dip in production in 1995 as well as the rise of the importance of trade in that year was due to the Tequila crisis, which was generally associated with rising exports, less than proportional declines in imports (and thus the trade to GDP ratio rose), and declining domestic value added (see Lederman et al. 2002 and 2003). Yet after the recovery from the crisis, domestic agricultural production rose quickly while trade was maintained at higher levels than prior to the implementation of NAFTA. Thus it is difficult to argue that NAFTA had a devastating effect on Mexican agriculture, in spite of the fact that trade increased as a consequence of the liberalization scheme implemented under the agreement.

Figure 4. Agricultural Production and Trade in Mexico, 1990-2001: No Apparent Devastating Effects from NAFTA

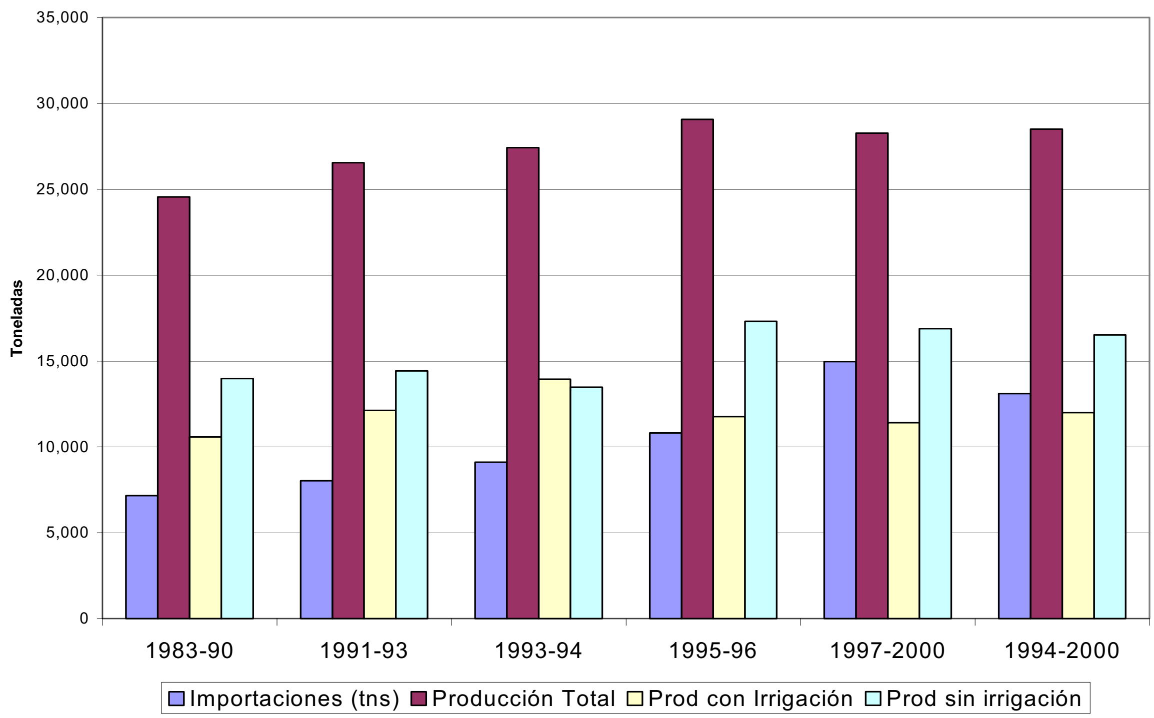


Source: Yúnez-Naude (2002), based on data from SAGARPA.

[91] An example is fresh tomatoes. From January 1994 to December 1998, fresh tomatoes had a tariff of 3.3 U.S. cents per kilogram entering the U.S. between July 15 and Sept. 14. (This tariff was eliminated in January 1999.) The tariff charged by the U.S. on Mexican tomato imports during March 1–July 14 and Sept 15–end February will be eliminated on December 2003. In addition, Mexico's exports of tomatoes to the U.S. have a TRQ of 172.3 thousand mts during November 15 -February 28 or 29, and of 165.5 thousand mts during March 1–June 14. Over-quota imports in the U.S. are charged the lower of the MFN tariff in effect before NAFTA and the MNF rate in effect at the time of the over-quota trade. Details are in ERS (August 1999; March 2000) and SECOFI (1994). Mexico's exports of avocados to the U.S.A. are a special case, since they are subject to phytosanitary restrictions. Partial easing of avocado imports to some regions of the U.S. was implemented in 1997 and amplified in 2001 (Orden 2002).

Regarding the sensitive products from traditional agricultural activities such as maize, beans and other sensitive commodities, Figure 5 shows total production, production by irrigated and non-irrigated lands. The distinction between irrigated and non-irrigated land is interesting because non-irrigated land encompasses the small *ejidatario* farmers that are thought to be poor subsistence farmers, since there is no other systematic data covering this particular sector. The evidence indicates that in spite of the rise in imports during the years after NAFTA (1994-2000), total production was significantly higher than before (1983-1993). This result is driven by a notable increase in the production of maize and is especially true for non-irrigated farming, whereas production of the other traditional crops declined during this period. In fact, the irrigated traditional agriculture had a comparatively lackluster performance when compared to non-irrigated farms. However, this data is due to the fact that irrigation farming was more dynamic in non-traditional agriculture as many farmers managed to substitute non-traditional crops, such as fruits, for the traditional ones. These conclusions seems to be robust to comparisons across various sub-periods, as shown in Figure 5.

Figure 5. Imports and Production of Traditional Crops before and after NAFTA: Irrigated versus Non-Irrigated Production

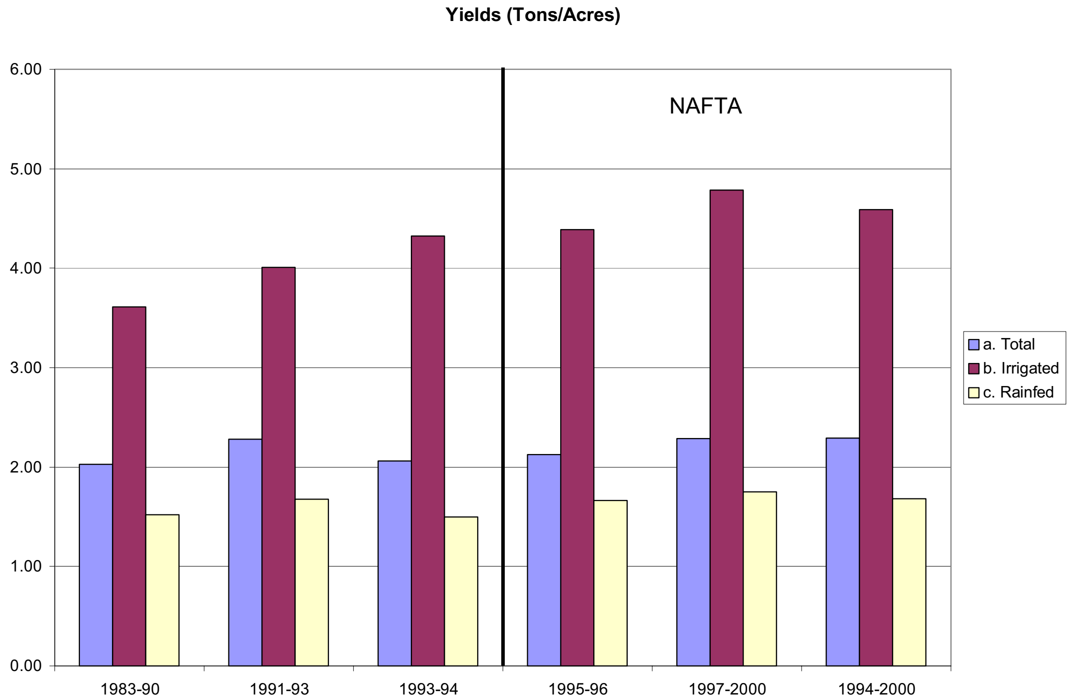


Source: Yúnez-Naude (2002), based on data from SAGARPA.

Figure 6 shows the evolution of land productivity for the whole of irrigated and non-irrigated agriculture. The main conclusion is that irrigated agriculture experienced a substantial productivity improvement after NAFTA, whereas productivity of non-irrigated agriculture stagnated.

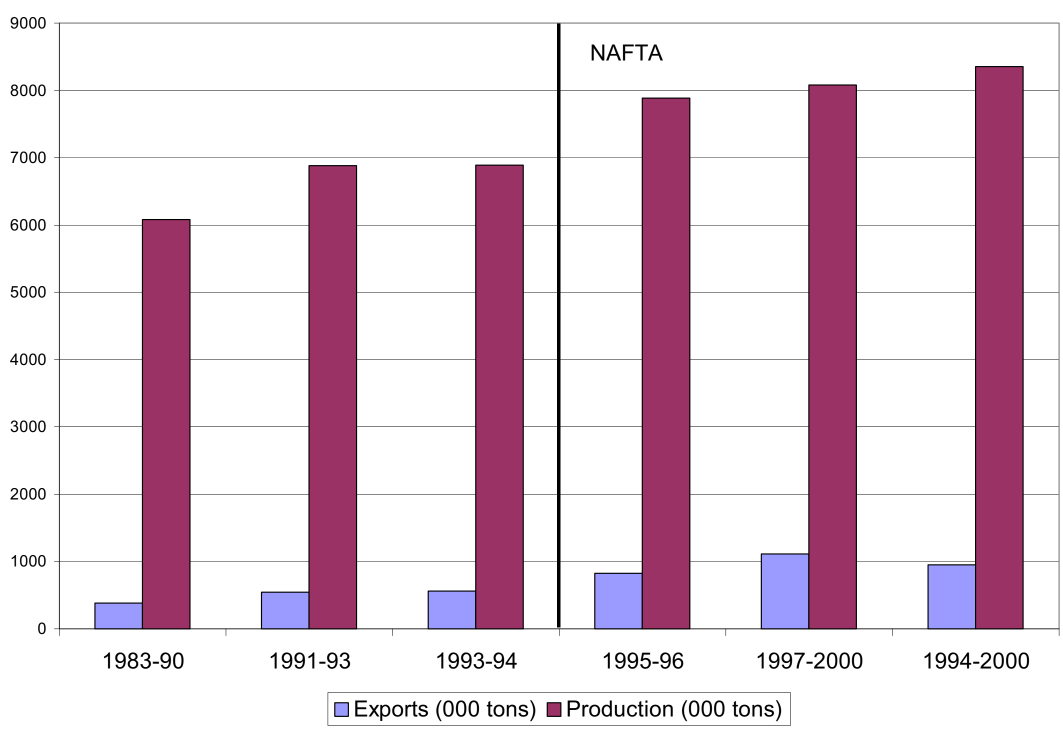
Figure 7 shows trends in exports and production of fruits, as an example of non-traditional agricultural performance. In the post-NAFTA years, both exports and production surged relative to the earlier years. This surge was in part due to the transformation of irrigated traditional agriculture into non-traditional production as well as the aforementioned improvements in land yields. Given the high profile of the state of agriculture in Mexico at this time, it is worth discussing potential explanations of why NAFTA did not result in the expected devastation of traditional and non-traditional agriculture.

Figure 6. Land Productivity: Irrigated and Rainfed Yields, 1983-2000



Source: Yúnez-Naude (2002), based on data from SAGARPA.

Figure 7. Mexico: Exports and Production of Fruits before and after NAFTA



Source: Yúnez-Naude, based on data from SAGARPA.

A word of caution is required for making conclusions about the income effects of NAFTA based on the aforementioned evidence based on the volumes of production. This is so because the relative prices for producers of import-sensitive commodities fell in Mexico during the 1990s. These declines in relative prices imply that agricultural incomes fell for some farmers during this period. However, the relative prices of agricultural commodities in Mexico were falling well before NAFTA, dating back to the early 1980s. For example, between 1987 and 1994, the relative price of maize for Mexican producers fell by almost 50%, according to data provided by Yúnez-Naude and Barceinas (2003). In turn, in the equivalent seven-year period after NAFTA implementation, between 1994 and 2001, this relative price fell by about 43%. Thus, incomes derived from maize production fell during NAFTA, primarily because of the relative price decline. But this decline began well before 1994, and Yúnez-Naude and Barceinas (2003) report econometric results indicating that the behavior of Mexican agricultural prices did not change significantly after 1994. Moreover, Yúnez-Naude (2002, table 5) also reports that the portion of the variation in the relative price of maize due to policy interventions was actually positive, whereas the decline after 1993 was due to the movement in international prices. Thus it is difficult to blame NAFTA for any income losses due to the behavior of the relative price of maize.[92] Chapter four discusses the evolution of agricultural employment, which also experienced a secular decline dating back at least to 1980. Finally, it is worth noting that the Mexican government implemented a series of agricultural support policies during this time period, some of which insulated producers from the price fluctuations. The following section examines this and other potential explanations of the surprising resiliency of Mexican agriculture.

3.3.4 Three plausible explanations for the resilience of Mexican agriculture

The growth of demand in the late 1990s in both Mexico and the U.S. are well known facts (see Lederman et al. 2002, 2003). It is quite possible that Mexican agriculture performed remarkably well during the late 1990s precisely because these economies were growing and thus Mexican production could rise in spite of the increase in imports of traditional agricultural products. Productivity gains concentrated in the irrigated farm sector also contributed to this resilience, as demonstrated above. Last but not least, the income support and subsidy programs maintained by the Mexico after 1994 might have also helped sustain agricultural dynamism during this period.

The domestic support policies merit further attention. As described earlier, agriculture in Mexico had historically enjoyed ample public support, although the programs were quite inefficient in economic terms. With the advent of the agricultural reforms, the quantity and quality of the support programs changed. Figure 8 shows the evolution of the total support for traditional agriculture and its corresponding components relative to gross farm receipts, as reported by the OECD (2000). On the one hand, it is clear that total support was not higher after NAFTA than on the average year prior to the implementation of the agreement. Hence the resilience of the traditional sector was not due to an increase in total support. On the other hand, the composition of this support was changed with the advent of PROCAMPO. Beginning in 1994, about 50% of total support was administered through PROCAMPO, which as explained earlier, the income subsidies provided by this program are de-linked from current and future production decisions. This contrasts notably with the situation prior to 1994, when most domestic support was concentrated in so-called "Market-Price Supports" (MPS) which compensate farmers for low commodity prices, and thus tend to distort production decisions.

Upon comparing the annual averages of total producer support estimates as a whole during 1999-2001 in the U.S. (23%), Canada (18%) and Mexico (18%), we find that Mexico has converged to the

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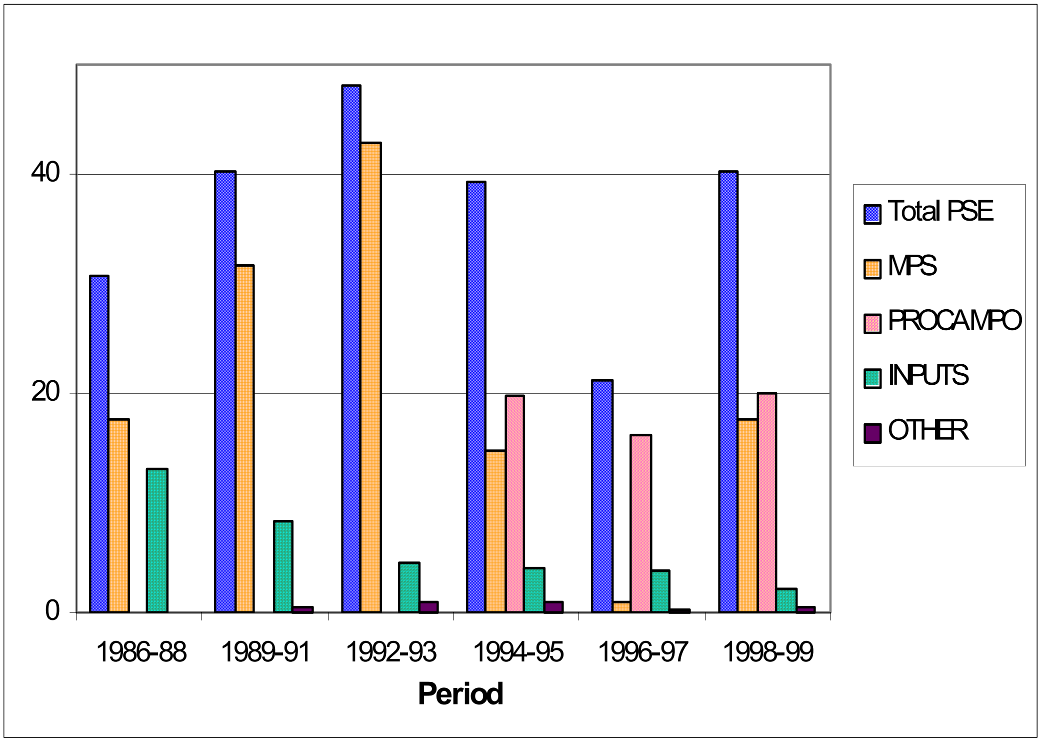
[92] Besides NAFTA, the relative prices of Mexican agricultural commodities fluctuated dramatically during this period due to the wild fluctuations of the real exchange rate and due to international market conditions, such as the severe Asian financial crises of 1997-1998.

Figure 8. México: Production Support Equivalent as a Share of Production: Totals and Components for Traditional Crops*



Source: OECD (2000). * Cebada, maíz, arroz, sorgo, soya y trigo

levels of its NAFTA partners. These shares are still smaller than those benefiting the traditional crops, which reached 40% of production in the late 1990s. The OECD Agricultural database also reports similar shares of the total PSE that are assigned on the basis of historical entitlements (20%). Canada's historical entitlements share is only 9%, which is still higher than the OECD average of 5%. This high share of historical entitlements represent an advantage in the sense that it reflects assistance that might be less likely to affect production decisions. However, in the case of the United States, it is worrisome that Farm Bill of 2002 allowed for updating of the historical criteria (i.e., planted acreage in the past). This type of updating should not be imitated since it raises expectations that future support will rise if planted areas rise before the next "update". A more detailed discussion of issues related to the design of de-linked agricultural support programs in the U.S. and Mexico is presented in Box 3.

In sum, the resilience of Mexican agriculture was due in part to the efficiency improvement achieved through its unilateral agricultural reforms. However, there are significant challenges ahead for Mexican agricultural development.

3.3.5 The challenges ahead: Towards the productive transformation of Mexican agriculture

We have already noted that PROCAMPO entailed a substantial improvement over the pre-NAFTA agricultural support policies. The main reason behind this conclusion is that the subsidies are now de-linked from current and future production decisions and thus it does not necessarily provide incentives for farmers to continue producing traditional agricultural products. In addition, this program is supposed to end in 2008. Hence the challenge is what can be done to aid the productive transformation of Mexican agriculture towards non-traditional crops. The recently implemented agrarian capitalization program mentioned earlier is a step in the right direction, for it offers credit subsidies to PROCAMPO-

Box 3. The Mexican and U.S. Experiences with De-linked Agricultural Income Subsidies

Mexico: The 1994 PROCAMPO Program

In 1994 Mexico introduced a new farm program, PROCAMPO (Programa Nacional de Modernizacion del Campo), to provide income support to grain and oilseed producers—about 90 percent of all Mexican farmers. Under this regime prices of the nine crops in the program have become market-driven or autonomous. Thus production and trade is less distorted. Moreover, PROCAMPO is distributionally more attractive than the earlier guaranteed price support because poor subsistence farmers are eligible for payments and there is a ceiling of 100 hectares on the amount of land that any single farmer can claim to justify payments (see Table 9).

The United States: The 1996 FAIR Act

On April 4, 1996, the Federal Agricultural Improvement and Reform Act (FAIR) became law, after the longest debate on a farm bill in U.S. congressional history (USDA 1996). FAIR removed the link between income support payments and farm prices by providing "production flexibility contract payments" for several crops. Participant producers receive these payments as a function of the amount of land registered for government support payments in earlier years. The payments are independent of current production, and farmers therefore have a more flexible incentive structure regarding planting decisions. The payments are fixed annually at a declining rate but were renovated by the U.S. Farm Bill of 2002 (see Table 9).

Room for Improvement: Efficiency, Equity, and Risk

These programs are less than ideal in that the use of land is not de-linked from them. This requirement probably reflects political considerations, as the payments must be seen to be going to "true" farmers. PROCAMPO holds land in agricultural production but permits a variety of crops to be cultivated. FAIR requires that land be kept in general agricultural use, but **cannot** be switched to fruits and vegetables.

These programs may promote equity when there is a correlation between poverty and subsistence production. Poor subsistence farmers with land are better off because they can consume the previously subsidized commodities and receive cash payments. In Mexico, farmers who owned less than two hectares of land received more than 8 percent of PROCAMPO payments, although they have historically marketed very little and therefore received little support under the old program because the price guarantees applied only to the traded commodities.

By replacing stable support prices or guaranteed prices with direct income transfers exposes producers to the risk of price volatility. Short-term volatility can be alleviated with devices that mitigate market-based risk, either through private initiative or with public assistance. Forward and futures markets are effective tools that can offer both price discovery and hedging not only to producers, but also to merchants or other concerned parties. Government-assisted risk-mitigation devices are another option. In 1997 the U.S. introduced revenue insurance against both crop failure and falling prices. Similarly, Mexico offers a guaranteed minimum price to cotton farmers for a predetermined fee through a government organization, ASERCA. Generally speaking, there are many ways to reduce risk in addition to formal measures. Farmers can grow a variety of crops with different market and climatic risks, but this requires that the income support program be completely decoupled from cropping decisions.

Ideally programs should not restrict land uses, should not cost more than the subsidization programs they replace, and should be transitory. To realize the full benefits of an income support system, the programs should include all crops and substitute for **all** existing price support programs so that farmers do not face production incentives driven by the relative benefits from the various programs. Other supporting factors, such as government credibility, favorable macroeconomic conditions, and property rights are key. Credibility was a problem in Mexico, where the amount of land in crops was first under-reported in many areas (due to fear of government taxation), and then over-reported. Clearly the macroeconomic environment, and particularly the exchange rate, should be adequate and stable to maintain domestic price stability. In some cases eliminating currency overvaluation may make it possible to eliminate protection without fiscal compensation. Another set of problems stems from uncertain land tenure rights since it becomes difficult to allocate subsidies.

Source: Baffes and Meerman (1998).

eligible farmers that present potentially profitable investment projects. The program, administered by FIRA, also demands cost-sharing on the part of the farmer, so that their proposal need to be efficient and carefully thought out. Yet this might not be enough.

There is an important role for macro stability. Yuñez-Naude (2002) shows for the case of Mexico that a substantial share of the variations of domestic agricultural prices during 1980-1999 was due to exchange-rate fluctuations. This was generally the case for most Latin American countries during this period, as reported by Foster and Valdés (2001). Consequently macroeconomic stability should be a key ingredient in any economic program aimed to support long-term investments necessary for the productive transformation of Mexican agriculture.

In the recent social upheaval associated with the next to last phase of agricultural trade liberalization under NAFTA, the government has reacted in part by seeking temporary safeguards for the imports of poultry. This is also a recommendable action in face of the political economy considerations that need to be addressed in the short run. The government also responded by providing further subsidies for agricultural inputs, such as electricity and diesel fuel. Again, these actions are undoubtedly short-term solutions to a mainly political situation. Yet in the medium and long run these are not solutions for the competitiveness of Mexican agriculture. The long run profitability of Mexican producers depends crucially on the their capacity to plant new crops and/or produce processed foods. To support these efforts, the government can take a closer look at its agricultural research and extension support services, which are related to the its national innovation system discussed in chapter 5 of this report. In addition, the public sector needs to evaluate the current infrastructure needs of the agricultural sector, including its roads, ports and irrigation infrastructure. All of these are and should be an integral part of the country's rural development strategy in the context of an open North American economy that supplies one of the most competitive and dynamic agricultural production and consumption centers in the world—the U.S. economy. This does mean that regional (encompassing the U.S., Canada and Mexico) cooperative efforts to support agricultural research and extension services supported by the public sector, as well as infrastructure investments, could be an integral part of Mexico's rural development agenda in the next five years, prior to the disappearance of PROCAMPO. The hope is that by that time, PROCAMPO could be substituted by an even more efficient regional system of agricultural transformation policies, where temporary protection plays only a very limited role.

3.4 NAFTA's antidumping and countervailing duties[93]

With the success of GATT/WTO rounds in reducing traditional forms of trade protection, such as tariffs and quotas, recent focus by economists and policymakers has been on the use of antidumping (AD) and countervailing duty (CVD) laws by WTO-member countries. There is concern that the growing adoption and use of these laws by countries may threaten to roll back the free trade gains negotiated in GATT/WTO rounds since the end of World War II.[94],[95] In recent WTO meetings it has become apparent that traditional users of AD/CVD laws, particularly the United States, have been extremely reluctant to even allow these practices to be subject to future WTO negotiations. (See below, under the section concerning Mexico's AD/CVD system before and after NAFTA for a review of technical criteria used for deciding whether to impose AD/CVD duties. These are quite similar across countries.)

Likewise, treatment of AD/CVD practices has been a contentious issue for recent preferential trading arrangements (PTAs) negotiated by the United States. In negotiations for the Canada-U.S. Free Trade Agreement (CUSFTA) implemented in 1989, Canada originally proposed exemptions for both countries from each other's AD/CVD actions. Given strong U.S. objections to this, a compromise was eventually reached to establish binational panels to review AD/CVD actions between the two countries when requested by an involved party (Gantz 1998).[96] This compromise was codified in Chapter 19 of the CUSFTA. The role of these binational panels is limited to determining whether a country appropriately follows its own national AD/CVD laws in making a particular determination. Thus, national AD/CVD laws were not changed and cannot be questioned by the review panels, which was a crucial issue for the

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[93] This section draws heavily from Blonigen (2002).

[94] See Prusa (2001) for analysis of the recent spread of AD/CD laws and their use across WTO member countries. Blonigen and Prusa (forthcoming) provides an extensive survey of the academic literature on the economics of AD activity.

[95] While AD/CVD activity often involves narrowly-specified import products, the high duties often imposed and other features of the administration of these programs can lead to quite significant welfare impacts. Gallaway, Blonigen and Flynn (1999) estimate that U.S. AD/CVD programs cost the U.S. $4 billion annually using 1993 data. This placed AD/CVD programs as second only to the Multi-Fiber Arrangement in terms of welfare costs to the U.S.

[96] This Chapter 19 review process of AD/CVD actions by binational panels was separate from a more general dispute settlement mechanism for all NAFTA-related issues stipulated in Chapter 20 of CUSFTA and NAFTA.

U.S. On the other hand, the process provides an alternative to having national courts handle appeals of AD/CVD decisions, thus providing the possibility for greater impartiality of the review.[97]

An almost identical Chapter 19 was ultimately adopted in the subsequent NAFTA agreement as well, but not before the U.S. rejected calls by Canada for the NAFTA countries to exempt each other from their AD/CVD actions. In addition, there was substantial concern from both the U.S. and Canada over Mexico's AD/CVD laws and their application, which led to agreements by Mexico to make major procedural changes in their AD/CVD laws before implementation of NAFTA.[98] Likewise, treatment of AD/CVD laws is a major concern in negotiations for a Free Trade Area of the Americas, with the U.S. unlikely to accept any concessions that would restrict their ability to apply U.S. AD/CVD laws.[99]

The role of AD/CVD laws is already an important issue for future trade negotiations over PTAs and in the multilateral arena under the aegis of the WTO. Studying the impact of the change in the appeals process afforded through Chapter 19 of CUSFTA and NAFTA holds to answering a key policy question: Did this change alter incentives sufficiently to impact AD/CVD activity. To date, there has been very little literature examining these issues.[100] The main exception is Jones (2000), which points out that the creation of Chapter 19 binational review panels has the potential to create many more successful appeals by parties becoming subject to AD/CVD duties. This, in turn, would limit the success of domestic groups that file such actions and could lead to diminished AD/CVD activity toward other NAFTA countries. Importantly, the level of activity in the NAFTA dispute settlement process for AD/CVD cases has been substantial, with approximately 75 reviews since CUSFTA began in 1989.

On the other hand, PTAs obviously reduce trade barriers in general and lead to increased trade flows. AD/CVD decisions are supposedly based on whether imports are injuring domestic industries, so that increased import activity from a region may make this injury determination more likely, leading to a greater probability of affirmative decisions. This in turn gives domestic industries greater incentives to file AD/CVD cases, raising the level of AD/CVD filing activity. In summary, the effect of CUSFTA and NAFTA on U.S. AD/CVD activity against NAFTA countries is an open question because of these opposing effects of increased trade and a new binational dispute settlement process.

The following sections empirically examine U.S. AD/CVD actions from 1980 through 2000 to determine the effects, if any, of the CUSFTA and NAFTA on U.S. AD/CVD activity with respect to Canada and Mexico, and Mexican cases against the other two countries.[101] Jones (2000), the only paper to empirically examine this issue, finds that both U.S. AD filings against Canada and Canada's AD filings against the U.S. significantly drop after the CUSFTA agreement. This is attributed by Jones to the new binational dispute settlement process put into place by CUSFTA and NAFTA. However, this is true for all regions of the world as shown in Table 4. Hence understanding the impact of NAFTA's Chapter 19 on Mexico's and Canada's vulnerability to U.S. AD/CVD activity requires more careful analysis presented in

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[97] The national courts of appeals for unfair trade cases are the U.S. Court of International Trade, the Federal Court of Canada, and the Federal Fiscal Tribunal for the U.S., Canada and Mexico, respectively.

[98] See Geisze (1994) for more details on the historical evolution of Mexican AD/CVD laws.

[99] For example, a January 31, 2001, front-page article by *Gazeta Mercantil* reported that AD issues led to a negotiation impasse between Brazil and the U.S. in FTAA negotiations.

[100] A small set of law journal articles and U.S. Government Accounting Office (GAO) reports have observed a number of developments with respect to the operation of the binational review panels stipulated under Chapter 19. Gantz (1998), Pippin (1999), U.S. General Accounting Office (1997), and Vega-Canovas (1997) provide descriptive assessments of how well the binational panel system of Chapter 19 reviews have worked in fulfilling their stipulated goals. These issues will be discussed more below.

[101] The primary focus on U.S. AD/CVD activity is due to data accessibility issues, as well as the fact that the U.S. is the largest market in NAFTA and user of AD/CVD laws.

the following section. We examine the geographic and other trends of Mexican AC/CVD activity later in this chapter.

Table 4. Average Annual U.S. Antidumping and Countervailing Duty Filings by Named Country/Region and by Select Time Periods.

	Pre-CUSFTA Pre-NAFTA 1980-1988	Post-CUSFTA Pre-NAFTA 1989-1993	Post-CUSFTA Post-NAFTA 1994-2000
NAFTA-partners			
Canada	3.9	4.3	1.6
Mexico	1.1	3.8	1.7
Other countries/regions			
Japan	7.6	6.3	3.3
European Union	32.7	20.3	8.3
Latin America	10.8	11.3	4.0
Asia	13.8	22.3	14.6
Rest of the World	14.1	11.5	9.1

Sources: U.S. Antidumping Database available from the National Bureau of Economic Research webpage: http://www.nber.org/antidump/, and official sources of the U.S. Department of Commerce and U.S. International Trade Commission.

3.4.1 U.S. AD/CVD activity towards NAFTA partners: Did Chapter 19 help?

As mentioned, U.S. and Mexico's AD/CVD activity is likely to be affected not only by NAFTA but also by macro (Feinberg 1989; Knetter and Prusa 2000), industrial, and microeconomic conditions (Finger et al. 1982; Feinberg and Hirsch 1989; Blonigen and Prusa 2002) that are known to explain AD/CVD activity in various countries. To examine the impact of NAFTA's Chapter 19 Blonigen (2002) estimated various econometric models of such activity in the U.S. where NAFTA case fillings are only part of the explanation. The results are presented in Table 5. The most notable finding is that neither Canadian nor Mexican Chapter 19 filings against U.S. decisions are significant determinants of U.S. AD/CVD activity. Blonigen (2002) conducts further exercises to test for the robustness of these results. In one set of econometric experiments, Blonigen tests the importance of other aspects of the NAFTA review mechanism. He finds that, in the case of Mexico, the number of remands per year (i.e., the number of cases determined to be wrongfully assessed against Mexico by the NAFTA experts panel), the number of accumulated remands, and the accumulated number of filings by Mexico are all not significant determinants of U.S. AC/CVD activity. In contrast, Canadian cumulative filings and cumulative remands do seem to reduce this country's vulnerability to U.S. AD/CVD investigations. The aforementioned results were unchanged when Blonigen examined only steel-related cases filed by the U.S. (Table 6 contains a statistical summary of CUSFTA and NAFTA filings against U.S. AD/CVD cases.)

Table 5. Negative Binomial Maximum Likelihood Estimates of the Determinants of the Number of U.S. AD and CVD Activity: The Effects of NAFTA Dispute Settlement Filings

Explanatory variables	Total Filings		Affirmative Decisions Only	
	AD and CVD	AD Only	AD and CVD	AD Only
NAFTA Variables				
Canadian NAFTA Dispute Settlement Filings	- 0.073 (-1.29)	- 0.081 (-0.97)	- 0.163 (-1.23)	- 0.154 (-1.18)
Mexican NAFTA Dispute Settlement Filings	0.140 (1.26)	0.195* (1.73)	0.018 (0.10)	0.087 (0.54)
Control Variables				
Import Penetration	4.165 (0.24)	0.160 (0.01)	19.809 (0.77)	- 2.925 (-0.12)
Exchange Rate	0.198 (0.42)	0.860** (2.14)	0.341 (0.71)	0.789 (1.64)
Real GDP Growth	0.045 (1.26)	0.038 (1.08)	0.026 (0.61)	0.004 (0.08)
Unemployment Rate	0.073 (1.26)	- 0.024 (-0.45)	- 0.031 (-0.44)	- 0.130* (-1.69)
Corporate Profitability	- 0.114 (-1.60)	- 0.198*** (-3.21)	- 0.158** (-2.19)	- 0.179*** (-2.82)
Regional Fixed Effects				
Canada	- 1.175*** (-5.17)	- 1.311*** (-5.14)	- 1.269*** (-3.20)	- 1.325*** (-3.47)
México	- 1.939*** (-5.53)	- 1.921*** (-5.81)	- 1.946*** (-4.46)	- 2.018*** (-4.77)
European Union	0.639* (1.90)	0.435 (1.50)	0.109 (0.34)	0.239 (0.76)
Japan	- 0.700*** (-3.57)	- 0.373* (-1.82)	- 0.255 (-0.99)	0.160 (0.62)
Asia	0.286 (1.29)	0.455* (1.83)	0.561* (1.65)	0.914*** (2.59)
Latin America	- 0.345 (-1.37)	- 0.524** (-2.12)	- 0.167 (-0.62)	- 0.469 (-1.62)
Observations	147	147	147	147
Pseudo - R^2	0.11	0.12	0.12	0.15

Notes: Regressor set also includes a constant term (not reported). Omitted regional fixed effect is "Rest of the World" to avoid perfect multicollinearity with the constant. t-statistics are in parentheses with ***, ** and * denoting statistical significance (two-tailed test) at the 1, 5 and 10 percent levels, respectively. Source: Blonigen (2002).

Table 6. CUSFTA and NAFTA Dispute Settlement Petitions and Determinations Against U.S. AD/CVD Actions, 1989-2000.

Year	Canadian Filings Against U.S.				Mexican Filings Against U.S.			
	Filings	Affirm	Remand	Term.	Filings	Affirm	Remand	Term.
1989	11	6	4	1	n.a.	n.a.	n.a.	n.a.
1990	3	0	1	2	n.a.	n.a.	n.a.	n.a.
1991	5	0	2	3	n.a.	n.a.	n.a.	n.a.
1992	6	1	5	0	n.a.	n.a.	n.a.	n.a.
1993	5	2	1	2	n.a.	n.a.	n.a.	n.a.
1994	1	0	1	0	1	1	0	0
1995	1	1	0	0	4	2	2	0
1996	0	0	0	0	1	0	0	1
1997	3	0	1	2	5	1	1	2
1998	2	1	1	0	3	0	0	0
1999	5	0	0	5	2	0	0	0
2000	6	0	0	3	4	0	0	0

Notes: The nine Mexican filings from 1998-2000 and three Canadian filings in 2000 are still active investigations.

Source: Blonigen (2002) based on data from NAFTA Secretariat webpage: http://www.nafta-sec-alena.org/english/index.htm?decisions/decisions.htm

3.4.2 *Mexico's A/CVD system before and after NAFTA*[102]

Having reviewed the performance of the CUSFTA and NAFTA review mechanism with respect to U.S. AD/CVD activity, we now turn to Mexico's AD/CVD system. We start with a brief historical description of the relevant institutions.

Mexico's trade liberalization resulted in a surge in imports. Considering the latter fact, along with the "right thing to do" derived from the political economy of trade integration, the creation of a system that protected the domestic industry through AD/CVD duties was thought to be necessary.[103] In 1985 and 1986 two preliminary laws were created[104], but it was not until 1987 that the system was fully operational, by means of the approval of the GATT's Antidumping Code. In that same year, Mexico's first AD/CVD case was issued. Between 1987 and 1990, the average of AD/CVD investigations was 12 cases per year. However, the import surge that followed between 1991 and 1994 tripled this average, up to 36 cases per year.

In 1993, Mexico's AD/CVD legislation had yet another change, through the approval of the Foreign Trade Law (Ley de Comercio Exterior, LCE in Spanish). Among the law's objectives, the LCE proposed a more specific framework for AD/CVD procedures. Finally, in 1994 the Antidumping Code

[102] This section borrows heavily from Esquivel and Solis (2002).

[103] It is important to remark that the alternatives were limited—or perhaps nonexistent. The use of tariffs and quotas is regulated by the WTO, while other alternatives such as escape clauses represent a high cost in terms of lobbying and political power involved.

[104] The "Ley Reglamentaria del Artículo 131 de la Constitución Política de los Estados Unidos Mexicanos en Materia de Comercio Exterior", and the "Reglamento contra Prácticas Desleales de Comercio Internacional", respectively.

changed as a result of the Uruguay Round and it embodied the WTO criteria.[105] The key organizational innovation of this law was the creation of the International Trade Practices Unit ("Unidad de Practicas Comerciales Internacionales, or UPCI in Spanish).

The UPCI is the government agency accountable for the filing and investigation of AD/CVD practices in Mexico. The UPCI is responsible for the following activities:

- Advise the Minister of Economy about the application and size of AD/CVD duties;
- Serve as the general advisor of the federal government on AD/CVD and escape clause issues;
- Provide assistance on the formulation of LCE reforms, regarding AD/CVD and escape clause issues;
- Explain and defend the Ministry's AD/CVD resolutions in international agencies (local authorities), and
- Offer technical and legal assistance to Mexican firms involved in AD/CVD investigations from other countries.

In order to understand further the types of technical responsibilities held by the UPCI, we must first review the legal definitions of "dumping" and other relevant terms, for they explain to a significant extent why AD/CVD duties in Mexico, the U.S. and around the world can easily become sources for the reversal of trade reforms through these so-called administrative procedures. Indeed, given the lax criteria used for identifying dumping and foreign subsidies of private firms, some analysts have concluded that, at least in the case of the U.S., the real puzzle is not why AD/CVD actions are so popular among private firms and governments, but why they are not used more often (Prusa 1992).

Dumping

The case for dumping or price discrimination is called whenever a firm that exports a particular good does it at a price that is less than the prevailing one at the exporter's market. An important remark is the fact that dumping per se is not forbidden by law; unfair competition holds when the imports cause material damage (or potential damage) to the importing country's industry. There are two key elements on the analysis of an AD investigation. The first is the export price of the good. The second is the price of a similar good on the exporting country's market. The comparison between both prices leads to the dumping margin. Some of the potential motivations for firms to engage in dumping activities are:

- It wishes to improve its competitive position through an increased market share (generally on countries where it has a low participation ratio);
- Seeks to sell excess production;
- As a part of its benefit maximization process (price discrimination on the basis of demand elasticities), and
- Market predation, through the elimination of rival firms.

[105] It should be noted that each country establishes their own AD/CVD policies according to general GATT/WTO principles. Such guidelines, however, are generally vague, thus leaving each country's legislation to interpret them. However, a key criteria is that AD/CVD laws should allow some legal appeals or review mechanism.

CVD duties

The exporting firm may not always be directly responsible for the low prices. In some cases, the government of the exporting firm's country provides subsidies to its companies, therefore reducing the effective export price. In a CVD analysis, there are three basic elements. First, the amount of the subsidy; second, the export price –considering the subsidy; and, third, the export price that would have prevailed had been no subsidy. The comparison between both prices results in the CVD margin. Similar to the AD case, the granting of subsidies is a necessary but not sufficient condition for an affirmative duty resolution. CVD duties can only be applied when the subsidies are responsible for damage (or potential damage) to the domestic industry.[106]

Damage assessment criteria

Mexico's legislation does not allow duty imposition under the sole excuse of dumping or government subsidies; these conditions are a necessary but not sufficient condition. In addition to these conditions, it is required to prove that these actions have caused material damage (or are a potential threat) to the domestic industry, as well as a cause–effect relationship between the AD/CVD activities and the industry's injury. The same is true in the U.S. and Canada.

The methodology designed to test for injury to a domestic industry is composed of five steps: First, the authorities have to ensure that the domestic product under investigation is identical (or similar) to the imported one. The latter obeys the fact that AD/CVD duties can only be applied when both products have similar characteristics, serve the same purposes and functions, and can be commercially interchanged. The second step requires an assessment of the size of the filing firm, relative to the industry. Since the firm can be either a major participant or a small fraction of the entire market, the fact that a firm is being affected by imports does not necessarily mean that the industry as a whole is also being damaged. This analysis allows authorities to determine if the investigation must be done (considering the injuries done to the industry), and to identify which firms must be excluded from the process, either because they are importers of the good, or because they are linked to importers or exporters. The third step requires the study and evaluation of the importing country's market, both on national consumers as well as the distribution channels (on the filing country) of the merchandise, given the fact that the structure and channels of the product's distribution are an important part of the injury analysis.

The fourth requirement, the causality test, is probably the most important step on the determination of injury against a certain industry. First, it is necessary to determine if the surge on imports has caused the national (as well as foreign competitor's) good to be displaced from the market. Also, it must be verified that the imports were sold on the same distribution channels and market niches, as well as the same clients. Second, the authorities need to analyze if the imported goods affected domestic prices, and if the market share of these imports is related to their price level. Third, a cause–effect relationship must be discovered, relating imports and the main variables of the affected industry. And finally, the effect of exogenous variables over the performance of the industry must be isolated, thus giving a clear picture of the causality between imports and industry behavior. While these criteria (and the previous ones concerning the margin of dumping and subsidies) seem reasonable, they can easily satisfied when trading partners experience macroeconomic fluctuations such as exchange-rate changes.

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[106] International legislation classifies such subsidies into three groups. Non-actionable (subsidies that have no effect on international trade, such as health or education transfers—no duty is applied); actionable (subsidies that are specific and either [a] injur the domestic industry of another member [defined the same way as with antidumping duties]; [b] nullify or impair benefits under GATT, or [c] cause serious prejudice to the interests of another member—a duty may be applied), and prohibited (direct transfers granted to increase exports—duties applied).

Generally, the size of the AD/CVD duty is equivalent to the dumping or CVD margin, but this is not always the case. The UPCI can impose a lesser duty,[107] so as to minimize the impact of this action over related productive chains that can be affected because of the price increase. That is, the UPCI can consider the potential impact of such duties on consuming industries. Mexican, as well as U.S. and Canadian laws, do not consider the impact of these duties on non-corporate consumers, which might result in rather large welfare losses (Gallaway, Blonigen and Flyn 1999).

As in the U.S., AD/CVD duties imposed by a final resolution in Mexico are not necessarily permanent; they can be reviewed, in order to determine if the conditions that originally led to their imposition have changed, therefore allowing the duty to be reduced, revoked or confirmed. The LCE states that the revisions can be requested on the monthly anniversary of the resolution; however, the UPCI can start an official revision at any time if it considers that the general circumstances that originated the duties have changed. The new duties will be considered final, and therefore will be subject to new revisions on further years. In Mexico, if the duties have not been reviewed in the past 5 years, they will automatically expire, which is different from the laws in the U.S. where AD/CVD duties do not automatically expire.

- In order to clarify particular situations that may arise from the interpretation of both the LCE and UPCI's rulings, special procedures have been designed:[108]
- Product reach: duties are imposed over tariff lines. However, the same tariff line can include products that are not related to the AD/CVD investigation; in these cases, a special procedure is called upon, in order to exempt (or confirm) duties for the specific good (generally at 4 or 5-digit Standard Industry Classification [SIC]).
- Benefit extension: Mexican legislation states that UPCI's rulings are always extensive to other firms, given that the interested part demands the special procedure and proves that it has the same legal situation as the original firm.
- Isolated market determination: in the cases where AD/CVD injury is determined, it may not be the case that the damage is nationwide. For some special industries, the injured firms can be located in a defined area (for example, in a particular state or region). Using this special procedure, duties are only paid for the imported products that are destined to that specific area.

The mechanisms designed to appeal AD/CVD decisions made by the UPCI and the equivalent authorities worldwide are diverse. Broadly speaking, disputes about the final resolutions dictated by the unit can be solved using a variety of channels (considering that the specific procedure will depend upon the conditions of the FTA between Mexico and the affected country; if no FTA exists, higher authorities must be consulted, like the WTO). Of particular importance to the analysis is the Mexican review system, as well as the aforementioned NAFTA Chapter 19 bilateral panels, both designed to provide an alternative review procedure to the national appeals processes.[109]

According to the LCE, interested parties can request a review of the UPCI's decision, through administrative and judicial procedures. The administrative review process requires that the interested party presents the case to the UPCI within 45 day of the (original) final resolution. The LCE states that the UPCI is required to present a new resolution within 4 months. This new resolution can revoke, modify or confirm the original decision. Once the UPCI states its new resolution, if the interested party is not satisfied with the result, a judicial review process can be requested. In this case, the decision corresponds

[107] This practice is known as *lesser duty rule*.

[108] The following is not an exhaustive listing. For more details, see Unidad de Prácticas Comerciales Internacionales (1997).

[109] For a more detailed description, see Leycegui (1997).

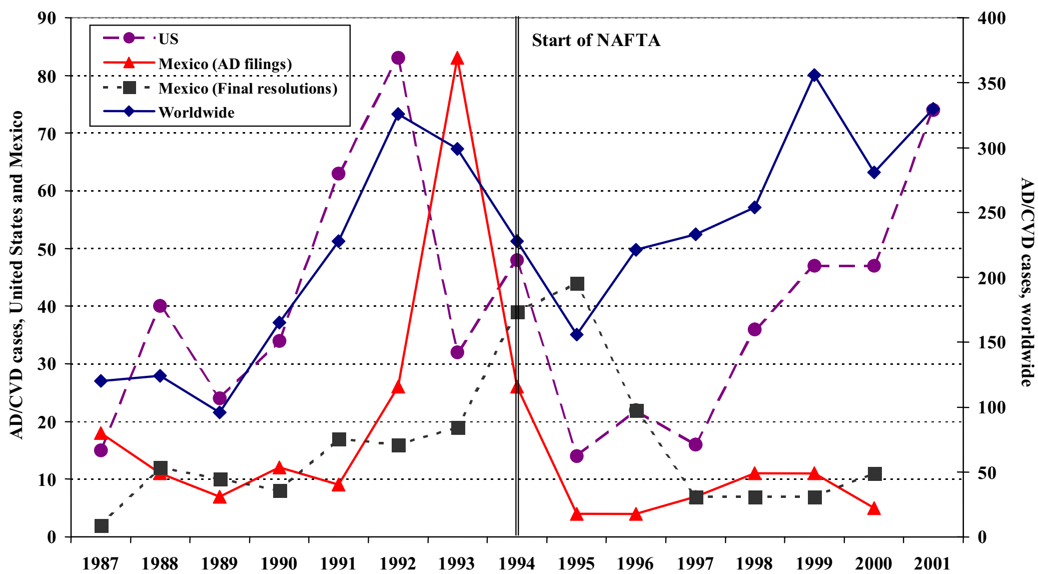
to the Federal Fiscal Tribunal (Tribunal Fiscal de la Federación, TFF in spanish). The TFF can dictate five possible resolutions: (a) take the UPCI's decision as valid; (b) nullify (total or partially) the UPCI's decision; (c) send back the decisions to the UPCI, stating the specific terms for compliance; (d) order the UPCI to renew the administrative review, or (e) reject and discard the review. As a last (and extraordinary) review process, a *juicio de amparo* can be requested. In this judicial procedure—used often in Mexican law—the interested parties can ask for an amendment of the TFF's resolutions. Under the *juicio de amparo*, two types of violations can be presented: procedure errors, and legal errors in the procedure. It is noteworthy that the reviewing authority is limited to an examination of legal topics, determining if the TFF did apply the adequate legislation.

3.4.3 Mexico's AD/CVD activity and NAFTA

We have already reviewed the evidence concerning U.S. AD/CVD activity and concluded that Mexico has not yet benefited from NAFTA's Chapter 19 review mechanism. We have also reviewed Mexico's AD/CVD institutions, which share many features with its NAFTA partners. However, given that the scientific literature accepts the finding that AD/CVD duties are often imposed for political reasons related to macro and microeconomic circumstances that are not necessarily related to firm or government economic practices, it is an empirical question whether Mexico's AD/CVD activity was affected by NAFTA. Esquivel and Solis (2002) provide an empirical exploration of the determinants of Mexico's AD/CVD activity, which is methodologically similar to the exercises presented above and in Blonigen (2002) for the U.S. case.

The evolution of Mexican AD activity is shown in Figure 9. Mexico's filings followed a similar pattern as U.S. AD filings (shown in Figure 9 for comparative purposes). Between 1987 and 1994 investigations in Mexico increased from 18 to 83, and fell back to 5 by 2000. The final resolutions from Mexican authorities follow the total filings trend with a one year lag. From the graph it is clear that both U.S. and Mexico filings fell after NAFTA, while the world total follows an increasing trend after 1995.[110]

Figure 9. Mexico AD Activity, 1987-201



Source: Esquivel and Solis (2002) based on data from Prusa (2001) and UPCI (2001).

[110] While not included in the graph, Canada's filings also decreased after their peak in 1992.

A great deal of information can be obtained with an analysis of the composition of AD/CVD actions by target country. Table 7 shows that—considering all 234 investigations—60 percent is concentrated on the top 5 (United States, China, Brazil, Venezuela, and South Korea), 55 percent on the top 3, and that the United States is solely responsible for nearly 30 percent of the AD/CVD petitions. Nevertheless, the latter can only be accounted for 19 per cent of the duties imposed. In contrast, China, having 17 percent of the AD/CVD requests, accounts for almost 36 percent of the total duties imposed. The United States and Brazil come in second and third places, respectively. Also, the last column on Table 7 calculates the "success rate" (defined as the percentage of filings where a duty is imposed) cases for AD/CVD investigations. In this case, China is the most punished country, having a ratio of 87.2 percent (that is, for every 10 AD/CVD filings, almost 9 end up with a duty). Considering only those countries with more than 5 claims, China is followed by Venezuela (70 percent), Russia (66.7 percent), Taiwan (60 percent), and Brazil (52.2 percent). The average success ratio is 41%.

Table 7. Composition of AD/CVD filings by target country, 1987–2000.

Country	Investigations	Percentage of Investigations	Duties (Still on Operation)	Percentage of Duties	Success Rate
USA	66	28.20	18	18.95	27.3
China	39	16.66	34	35.79	87.2
Brazil	23	9.82	12	11.58	52.2
Venezuela	10	4.27	7	7.37	70.0
South Korea	9	3.84	1	1.05	11.1
Germany	7	3.00	1	1.05	14.3
Russia	6	2.66	4	4.21	66.7
Spain	6	2.66	3	3.16	50.0
Taiwan	5	2.14	3	3.16	60.0
Ukraine	5	2.14	...	...	0.0
Canada	5	2.14	1	1.05	20.0
European Union	4	1.70	2	2.11	50.0
Japan	3	1.29	2	2.11	66.7
Colombia	3	1.29	...	...	0.0
Netherlands	2	0.85	2	2.11	100.0
Hong Kong	2	0.85	1	1.05	50.0
Kazakhstan	2	0.85	1	1.05	50.0
India	2	0.85	1	1.05	50.0
Denmark	2	0.85	1	1.05	50.0
Belarus	2	0.85	...	...	0.0
Uzbekistan	2	0.85	...	...	0.0
Tajikistan	2	0.85	...	...	0.0
Lithuania	2	0.85	...	...	0.0
Chile	2	0.85	...	...	0.0
Estonia	2	0.85	...	...	0.0
Greece	2	0.85	...	...	0.0
Belgium	2	0.85	...	...	0.0
Others[111]	17	7.26	2	2.11	11.8
Total	**234**	**100**	**96**	**100**	**31.7**

Source: Esquivel and Solis (2002) based on data from UPCI (2001).

The main econometric results from Esquivel and Solis (2002) about the macro and micro determinants of Mexican AD filings are presented in Table 8.[112] The basic model considered various

[111] Includes France*, Bulgaria*, Malaysia, Pakistan, Australia, South Africa, Indonesia, Armenia, Azerbaijan, Moldova, Turkmenistan, Kyrgyzstan, Lethonia, Georgia, Argentina, Peru and Turkey. * indicates duty imposed.

explanatory variables as determinants of AD filings by Mexico that might lead private firms to petition the UPCI for AD protection or that might affect the decisions of this organization due to the political consequences of industry-specific economic conditions. The chosen variables were the relevant bilateral real exchange rates and imports over GDP or import penetration (lagged one year), which might lead domestic firms to file AD petitions with UPCI and might lead the UPCI to find AD margins. Second, the authors considered variables that might have had additional direct effects on the UPCI decisions due to their political effects. Among these, the authors included the unemployment rate, value added or GDP performance at the industry level, and other unobserved country effects. Among the latter the analysis included dummies for the U.S. and Canada, as well as effects affecting these two countries on or after 1994.

Table 8. Negative Binomial Maximum Likelihood Estimates of the Determinants of the Number of Mexican AD Cases and AD Duties, 1990-2001

Dependent Variable:	1	2	3	4	5	6
	Number of AD Filings			Number of AD Duties Imposed		
RER	0.0061015 (0.020)	0.0047688 (0.048)	0.0053335 (0.038)	0.0116214 (0.000)	0.0101621 (0.000)	0.018514 (0.000)
Unempl.	0.2242873 (0.144)	0.272863 (0.062)	0.2862045 (0.074)	-0.1273622 (0.555)	-0.0717797 (0.735)	-0.0470322 (0.833)
GDP	-0.0590344 (0.274)	-0.0602689 (0.234)	-0.0580375 (0.288)	-0.1445165 (0.041)	-0.1352548 (0.051)	-0.1321254 (0.067)
Import Penetration	68.1348 (0.011)	-74.99109 (0.249)	79.57851 (0.103)	72.37415 (0.026)	-50.77837 (0.545)	97.42099 (0.107)
Canada		-1.895202 (0.001)			-2.51075 (0.023)	
U.S.		2.041655 (0.041)			1.70415 (0.180)	
Canada94			-1.518103 (0.025)			-2.015274 (0.087)
US94			-0.40218 (0.641)			-0.734402 (0.509)
Log likelihood	-152.54127	-144.81949	-149.80907	-111.20824	-106.23789	-108.99635
Pseudo R^2	0.0578	0.1055	0.0746	0.0826	0.1236	0.1009

Note: The table reports the coefficients from the regression. P-values in parenthesis.
Source: Esquivel and Solis (2002).

The results in Table 5 imply that the real exchange rate and import penetration are important determinants of both the number of filings and of the number of positive findings by the UPCI, as shown across the six columns of Table 8. In contrast, GDP performance and the unemployment rate alternate in significance, depending on the variable under analysis. In the case of AD filings, the relevant variable is the unemployment rate, and GDP is never significant. For the case of AD duties, GDP performance is the key variable. In any case, the inclusion of dummy variables in the model shows a differentiated effect for the United States and Canada, depending on the period under analysis. Canada's effect is negative, while the United States' is positive for the entire period (1990–2000) but zero considering the NAFTA years (1994–2000). We interpret these results as suggesting that NAFTA had a notable effect in reducing the U.S. vulnerability to Mexican AD actions, although the U.S. tends to be more vulnerable than other

[112] Esquivel and Solis (2002) focus on Mexico's AD activity because AD cases completely predominate over CVD and even safeguards cases in Mexico. AD cases accounted for over 90% of total cases during the period under study.

countries to such actions. As mentioned earlier, this is true only for the number of AD filings, but for the number of positive findings, where countries such as China are significantly more vulnerable.

These results are interestingly different from those concerning Mexico's vulnerability with respect to U.S. action, which showed (see above) that NAFTA had not had a significant impact on Mexico's vulnerability, although Mexico has always been less vulnerable than other countries. Thus these are exactly the opposite of the results concerning the U.S. vulnerability to Mexican AD actions.

3.4.4 Policy implications regarding AD/CVD activity under NAFTA

The findings discussed in the previous sections have important implications not only for Mexico but also for other countries from Latin America and the Caribbean who are in line to implement (Chile) or negotiate FTAs with the U.S. (Central America). The results have implications for future FTA and WTO round negotiations, as the Chapter 19 dispute settlement process was likely intended to reign in abuse of these laws by the U.S. In both the CUSFTA and NAFTA, the U.S. clearly tried to thwart any attempt by the partner countries to affect their application of AD/CVD laws. These intentions are now explicitly stated in the 2002 Trade Promotion Authority granted by the U.S. Congress to the Executive branch. The compromise solution of Chapter 19 binational dispute settlement procedures for AD/CVD cases had the potential to affect AD/CVD activity because it allowed for timely dispute settlements by panels representing both countries involved in the case to supercede appeals to national courts. A critical holdover, however, was limiting the Chapter 19 panels (as with the national appeals courts) to only rule on whether a country has appropriately applied its own AD/CVD laws and practices. Given sufficiently ambiguous laws about the practice of determining dumping, subsidization and injury, a whole range of practices can be ruled consistent.

In addition, the panels have no ability to enforce judgments. While government agencies from all three countries have mainly complied with remands from the panel, this process did not resolve the largest trade dispute it has faced, the softwood lumber case with Canada, which led to direct governmental negotiations. Some remands connected with U.S. cases against Canada have led to significant changes in judgments in a handful of cases, which may by why there is some evidence of the effect of cumulative remands with respect to Canada. There are no such "successful" remands concerning initial U.S. AD/CVD cases against Mexico to date. In fact, a worry with the Mexican experience is the long delays in the dispute settlement process, which makes it very unlikely it will affect U.S. behavior in the near future. Thus, while it may make government agencies more vigilant in maintaining consistency in how they apply their laws, Chapter 19 has little power to affect real change in AD/CVD laws and practices. This realization led Chilean negotiators not to accept language similar to NAFTA's Chapter 19 in its recent FTA negotiations with the U.S.

This begs the question of possible avenues that current and future partner countries may have to persuade the U.S. to reform or eliminate its AD/CVD laws. One option is more aggressive retaliatory AD/CVD activity against the U.S. Both Canada and Mexico have substantial enough trade volumes to be able to create effective retaliation. There are a number of reasons why this is not a good strategy. First, estimates reported by Blonigen (2002) showed that U.S. AD/CVD actions do not seem to be affected by AD/CVD activity in the Canada and Mexico against the U.S. Second, such strategies could just as easily lead to a trade war, rather than an agreement to "disarm."

A second option is to make efforts to harmonize competition policies and push for folding antidumping policies into a common competition policy. Were AD/CVD practices subject to the same strong criterion for action as current competition policy (at least in the U.S.), we would likely see almost the complete elimination of successful AD/CVD cases. However, this is exactly the problem. AD/CVD laws are explicitly devised to benefit only domestic producers, even at the expense of competitive markets and the welfare of consumers, which is in direct contradiction with competition policy. Thus, limiting AD/CVD use through harmonization with competition policy is likely a very long and difficult road.

A final alternative may be negotiate a new safeguards agreement with the U.S. and Canada and to agree to use safeguard actions rather than AD/CVD laws. Safeguard protection allows for governments to impose temporary protection for a domestic industry, provided that imports are a significant cause of injury to the domestic industry. The explicit condition that safeguard actions are temporary is a definite improvement over AD/CVD cases, as the U.S. currently still assesses AD/CVD duties from cases as far back as the 1970s. In Mexico, the only applicable "sunset" clause is the one that states the AD/CVD duties can be removed after five years if there have not been any reviews of the cases during that time span. In addition, the injury test for safeguard actions requires a more stringent test that imports are a significant cause of injury, not just a nontrivial one. There is no required finding of dumping or subsidization for safeguard actions, but this criterion is virtually always passed anyway in AD/CVD cases. No calculation of dumping/subsidization also makes it more transparent that the action is political, rather than falling under the guise of promoting "fair trade practices," despite having no economic basis. Finally, since safeguard actions must necessarily involve presidential action, it ensures that only nontrivial trade actions take place. This feature also forces leaders to consider the overall political implications of imposing taxes that hurt voters and other interested parties.

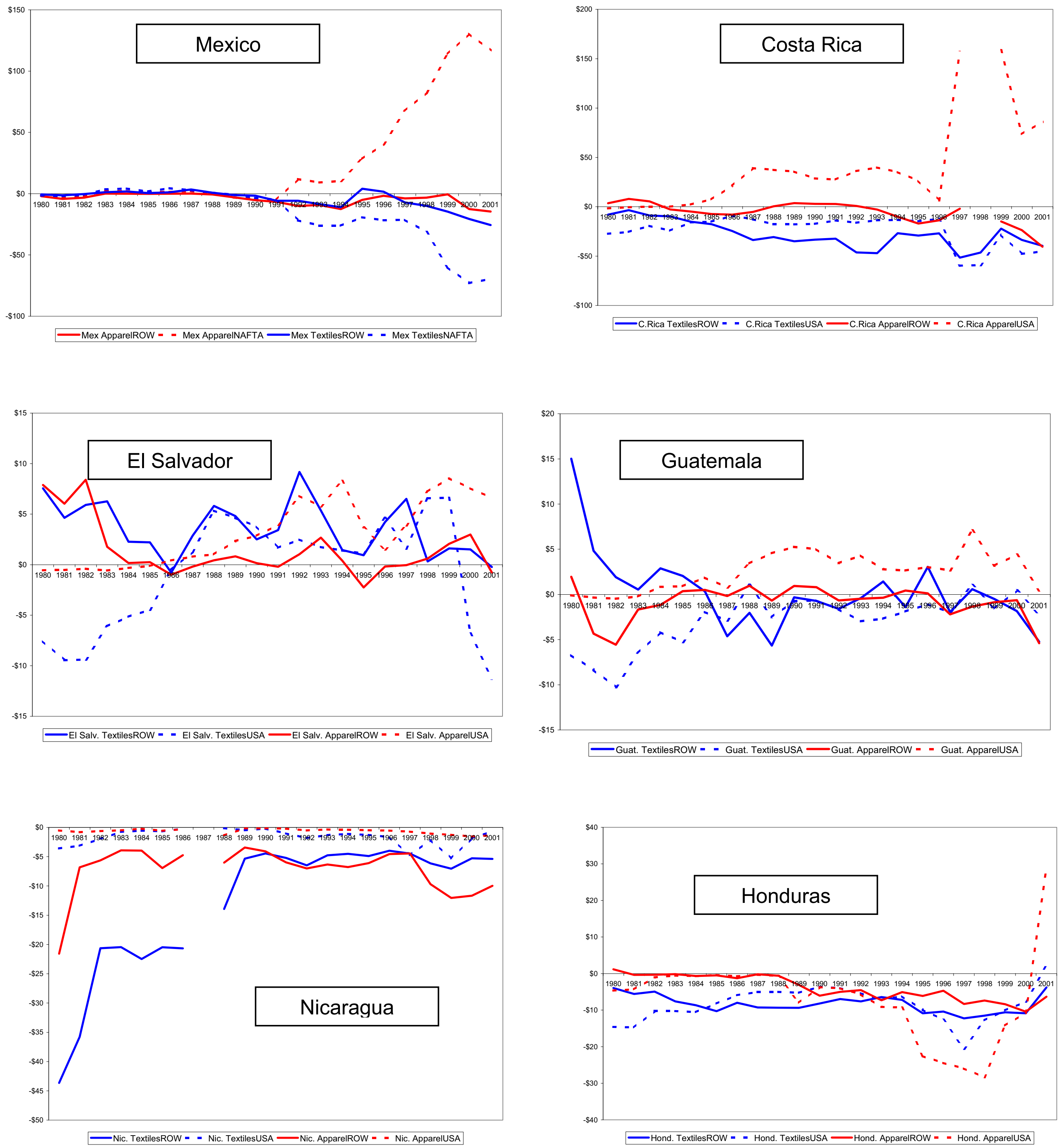
Table 9. Characteristics of Agricultural Support Programs in Mexico and the United States

Characteristic	Mexico: PROCAMPO 1994	U.S.: FAIR implemented 1996
Objective	To compensate producers for the elimination of guarantee prices on support crops	To compensate producers for the elimination of deficiency payments
Payment basis	Average acreage in support crops during 1991-93	Acreage for which deficiency payments were received in any of the past 5 years. Base years were updated in 2002 extension.
Supported products	Wheat, maize, sorghum, barley, rice, cotton, beans, soybean, safflower	Wheat, maize, sorghum, barley, rice, cotton, oats
Time profile	Total of 15 years: first 10 years fixed in real terms; declining in final 5 years	Program lapsed after 7 years but was extended in 2002.
Payment limits	$6,700 per farm	$40,000 per farm
Restrictions on the use of support-crop land	Land should be allocated to support crops but since 1996 land can be allocated to other agricultural uses	Land should be kept in agricultural uses(excluding fruits and vegetables);use must be in compliance with existing conservation plans
Other features	"Negotiated" prices in effect for the first 2 transition years of the program; floor prices are retained for maize and beans	Nonrecourse government guaranteed commodity loans are retained in modified form

Note: The upper limit for PROCAMPO payments is 100 hectares and the per hectare payment is currently 484 Mexican pesos, or approximately US$6,700 (at 7.2 pesos/US$). Following the 1994 devaluation, PROCAMPO payments were not fully adjusted to inflation.

Source: USDA(1996); SARH (no date).

Figures 3a-f. Net Exports per Worker of Apparel and Textiles: Mexico and Central America, 1980-2001



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Chapter 4

Factor Markets

4.1 Introduction

NAFTA, virtually by definition, would seem to be about trade, evoking images of changes in the patterns and volumes of merchandise exchange among countries. Yet both the motivations for the treaty, and much of the heated debate over its possible effects, have focused not on the goods that are traded, but on the factors that produce them, particularly capital and labor.

Theoretical discussions of trade liberalization typically treat the two factors similarly as two internationally immobile algebraic arguments in a production function. The key prediction of the Heckscher Ohlin framework is that liberalizing trade should cause a degree of convergence of the returns to capital and wages in the two countries and, if the countries are not too distinct, their complete equalization—although the conditions required for such result are admittedly stringent. This reflects a more efficient use of factors in both countries. Hence, the degree of integration of not just product markets, but also factor markets, as measured by returns to capital or wages is of interest in understanding the impact of the treaty.

Beyond such basic tests of integration, however, the intrinsic differences in the two factors demand individual approaches that require stepping away from basic trade theory. To begin, part of the motivation for NAFTA was to boost the confidence of foreigners investing in plant and equipment in Mexico, that is, to promote the flow of foreign direct investment (FDI). Partly, this was motivated by the desire to *decrease* the movement of the other factor, labor, across the borders into the U.S.. Thus, the goal of increased flows of goods was from the beginning inextricably bound up with that of altering the flows of factors, although in opposite ways.

A second, and arguably more critical distinction between the two factors lies in the simple fact that labor is human. Convergence of wages toward U.S. levels not only represents greater efficiency, but also implies a higher standard of living for Mexican workers. Alternatively, those less optimistic about the impact of free trade are concerned that NAFTA, or globalization more generally, may have a detrimental effect on the quality of jobs and hence of life that workers enjoy.

Dealing thoroughly with both topics in all their particularities is beyond the scope of one chapter. What we offer here is a selective overview of the evidence available to date, what it suggests we may expect over the near future, and what complementary policies may be required to ensure that NAFTA attains its potential. The first half of the chapter examines the evidence of greater financial integration and the determinants of capital flows, with a particular focus on FDI. The second section explores the impact on labor market integration and trends in the quality of work. It then sketches some aspects of how labor market legislation might be revisited in order to better serve both workers and employers in a more competitive global environment.

4.2 Financial integration: What was, or should have been, expected from NAFTA

Changes in trade patterns resulting from an FTA should be expected to be associated with modifications in the forms, sources, cost and levels of financing. There is a variety of reasons for this. As already noted, conventional trade theory predicts that unrestricted goods mobility should lead to the equalization of the return on capital across countries. At a more mundane level, foreign corporations may desire to use countries belonging to trade agreements as export platforms; domestic firms may find external financing a more appropriate hedge against foreign exchange risk when their exporting activity increases; foreign banks may be more willing to supply such external financing to local firms as their earnings become less dependent on domestic activity; and so on. Further, in the case of NAFTA there are also specific reasons to expect changes in external financing patterns, given that in addition to trade the agreement also contained specific provisions for the liberalization of the rules governing international investment within the region.

On both accounts, NAFTA should be expected to increase Mexico's financial integration with its partners in the trade agreement and the world economy in general. By financial integration here we mean the process through which a country's financial markets become more tightly linked with those abroad. It typically involves the elimination of legal and regulatory barriers to capital flows and foreign participation in domestic firms and financial markets. Its result is an increased volume of cross-border financial flows and financial services, and eventually the equalization of the prices of assets of similar risk and return characteristics located at home and abroad.

Ideally, we would like to measure the degree of financial integration by the yardstick of price equalization. However, the information necessary to do so is largely unavailable, in part because the bulk of assets is often not traded in organized markets (for example, the equity of most firms in the case of Mexico) and also because it is difficult to find significant volumes of assets of similar characteristics to perform comparisons of their prices at home and abroad. The main exception is that of short-term assets such as money market funds and demand deposits, but these are not very informative about the return on long-term assets such as productive capital, which from the perspective of income convergence should be our main concern.[113] For these reasons, in this chapter we shall focus instead on the observed changes in Mexico's external financing flows after NAFTA, paying particular attention to foreign investment.

For many analysts, the 'dynamic effects' of FTAs through their impact on international investment flows are as important as (or even more important than) the static effects on trade of goods and services. Indeed, in the case of Mexico, such impact on investment flows was viewed by many observers as the main purpose of NAFTA. In this view, the objective of NAFTA was not so much liberalizing trade further[114], but rather boosting private sector confidence in Mexico and creating a legal and economic environment hospitable to foreign investors.[115]

How big an impact on FDI should result from NAFTA? The EEC/EU experience offers some lessons in this regard. The EC accession of Spain and Portugal in 1986 was accompanied by an FDI boom. Between 1980-85 and 1986-92, investment inflows rose by a factor of eight in Spain and a factor of six in Portugal.[116] However, the boom was largely temporary: by the mid-1990s, the ratio of FDI to GDP was roughly the same as in the years prior to accession. This time pattern of FDI flows probably reflects a once-and-for-all reallocation of foreign investors' portfolio towards Spain and Portugal. It is important to note, however, that such reallocation was not an automatic result of EU accession. This is shown by the experience of Greece, whose entry into the EU in 1981 was not accompanied by any significant changes in FDI inflows, a fact that has been widely attributed to its poor policy framework in those years (see Box 1).

The lesson from Southern Europe, therefore, was that as long as sound policies prevailed Mexico could expect a boom in foreign investment following its entry into NAFTA, at least for a period of several years. But there are reasons why the FDI rise could be more modest than those witnessed in the Iberian

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[113] Studies of capital mobility often focus on covered short-term interest differentials. In this regard, Kumhoff (2001) shows that covered differentials between the Mexican peso and the U.S. dollar have been negligible since 1996. Whether this is evidence of financial integration is debatable, however; see Dooley and Chinn (1995).

[114] As noted in Chapter 1, trade liberalization had already advanced considerably since the entry of Mexico into GATT in 1986.

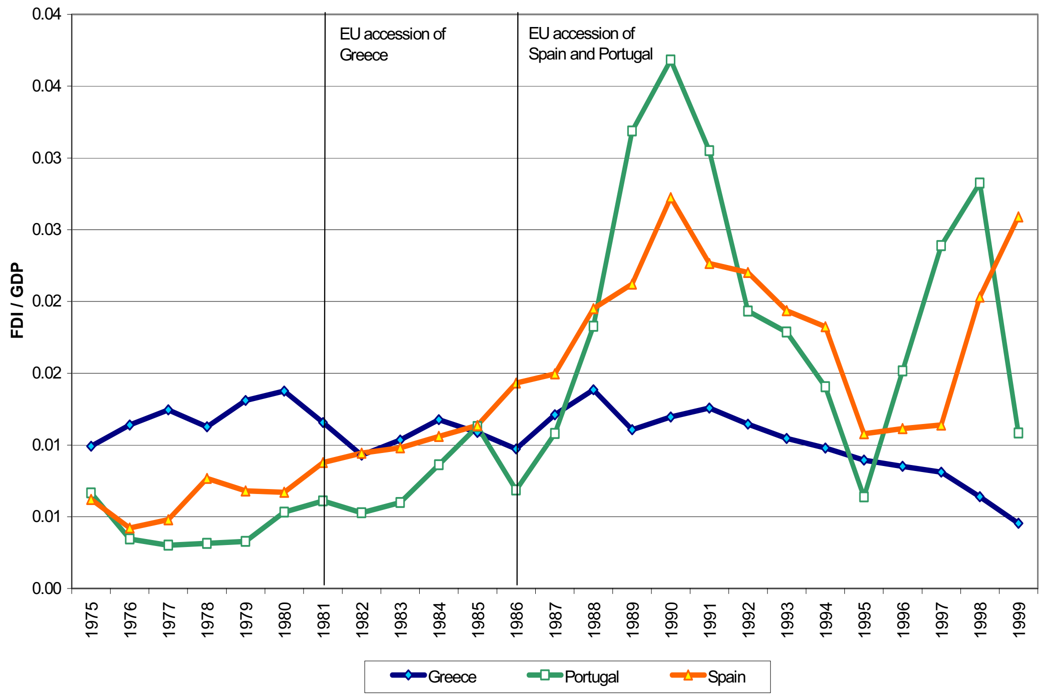
[115] This view is stated for example in Lustig (2001).

[116] Kehoe and Kehoe (1994).

Box 1. The FDI impact of EEC / EU accession

The experience of Southern Europe is suggestive of the potential of an FTA for increased capital inflows. In the cases of Spain and Portugal, entry into the EC in 1986 was accompanied by an FDI boom. Over 1980-85, Spain's FDI inflows averaged around 1.5 percent of GDP; by 1990, the figure was 3 percent. Similarly, FDI to Portugal rose to over 4 percent of GDP (Box Figure 1). Over two thirds of this capital originated in other EC countries.

Box Figue 1. EC Accession and FDI into Spain, Portugal and Greece



Source: World Development Indicators

As Figure 1 shows, however, the boom was not permanent: by the mid-nineties, the ratio of FDI to GDP had returned roughly to the same levels prior to accession. Furthermore, this pattern of rise and fall is not due to global trends in worldwide FDI; indeed, the same pattern is observed if one looks instead at the share of Spain and Portugal in world FDI inflows. This suggests that a stock adjustment took place after these countries joined the EC, with world investors rebalancing their portfolios in favor of Spain and Portugal in a process that lasted several years.

The figure also presents the case of Greece, who joined the EC in 1981. Unlike with Spain and Portugal, FDI inflows showed little change in this case, a fact that has been attributed to Greece's distorted policy environment in the 1980s (Baldwin and Seghezza 1998). This serves as a reminder that membership in a regional integration initiative is no guarantee of increased FDI.

countries.[117] First and foremost, NAFTA, a free-trade area, was from the start more limited in scope than the European Community, which involved a closer integration already in 1986 as a customs union and has continued to evolve toward an even deeper integration since then, including through the unification of labor markets, the coordination of macroeconomic policies, and the adoption of a common currency. In addition, the European Community also had a series of compensatory policies in favor of its poorest members, and these policies (such as those targeting infrastructure) were complementary to private investment.

Moreover, NAFTA contained specific provisions for the liberalization of international investment within the region. The rules governing foreign investment in Mexico, as stipulated in the Foreign Investment Law of 1973, were quite restrictive, with a number of productive sectors closed to foreign investors, and strict limits on foreign participation in most others. The new legislation approved in 1993

[117] See Berzosa (2000) and Oyarzún (2000).

adopted some key principles for the treatment of foreign investment, including in particular national treatment and most-favored-nation privileges for any investor residing in North America, which should encourage the decision to establish production facilities in Mexico by firms headquartered in the U.S. and Canada. The Foreign Investment Law of 1993 effectively opened to foreign investors the majority of economic sectors, with a few significant exceptions (see Box 2).

Box 2. The investment chapters of NAFTA

Foreign investment in Mexico had been significantly restricted under the law of 1973, which was written still under the framework of the import substitution doctrine of the postwar period. The law prohibited or limited foreign investment in a number of key sectors of the economy, which in some cases were reserved for the state (oil, electricity, railroads and telegraphs) and in others for Mexican citizens (air transportation, distribution of gas, forestry, and radio and TV). For the remaining sectors, the 1973 law allowed the government broad discretionary powers to limit foreign ownership to 49 percent of the capital.

In December 1993, a new foreign investment law was passed which took into account the investment framework laid out by NAFTA. The free trade agreement was respectful of the state monopolies established in the Mexican Constitution –emphatically, state control of the oil and electricity industries—but improved significantly the relative standing of foreign investors in Mexico and expanded the areas where they could participate. The key principles incorporated in the free trade agreement were the following (Serra Puche, 1992):

(i) The most favored nation (MFN) principle, which ensured that no investor from outside North America would be granted benefits exceeding those available to North American investors.

(ii) The national treatment principle, guaranteeing that there would be no discrimination among investors from each one of the three members of NAFTA. Combined with the above principle, this means that NAFTA residents are entitled to the best treatment available in each one of the NAFTA countries.

(iii) The absence of trade-related performance requirements for foreign investors.

(iv) The freedom to buy foreign exchange and to transfer funds across countries (royalties, profits, and dividends).

There were exceptions (in some cases temporary) to these principles. For example, the automobile industry in Mexico would continue to be subject, for a period of 10 years, to net export performance requirements. Also, for a period of six years, there would be a limit on foreign ownership of firms producing auto parts and components.[118] The banking sector was also due to remain for six years subject to rules imposing narrow limits on foreign ownership of individual banks and on foreign participation in the banking industry as a whole. Even after that period, safeguards could be invoked to impose new limits on foreign ownership. The original liberalization schedule for this sector, however, had to be accelerated to facilitate the recapitalization of banks after the crisis of 1995. During the following years, a series of legal changes finally resulted in the full liberalization of foreign ownership in the commercial banking system. As a result, entry by international banks injected significant capital into the financial system, culminating with the $ 12.5 billion (over 2 percent of GDP) sale of Banamex in 2001. By the late 1990s foreign banks held a substantial fraction (some 25 percent) of overall banking system assets, over five times more than in 1994.

The new foreign investment law of 1993, though preserving limits on foreign ownership, was more liberal than the 1973 law. It adopted the logic that, unless otherwise determined in the law, foreign investors could participate in any proportion in the ownership of Mexican corporations. As of 2002, the exceptions, besides those corresponding to state monopolies, concern mainly the retail sale of gasoline, passenger land transportation, credit unions, development banking, and radio and TV other than by cable, which are reserved for Mexicans. The law also limits to 49 percent or less the foreign stake in firms operating in the areas of insurance, air transportation, explosives, fishing, and telephony. In other areas, such as private education, sea shipping, and the operation of railroads, airports and maritime ports, foreign investment is allowed to exceed 49 percent with approval by the National Commission for Foreign Investments. To allow a measure of compromise in some of these areas, the 1993 law created the figure of “neutral investment.” Neutral investment is foreign investment in non-voting shares, and it does not count in the computation of the proportion of a firm owned by foreign investors.[119]

The next sections review the changes in Mexico’s pattern of external financing after NAFTA, with particular attention to FDI.[120] Changes in financing can be examined both from an aggregate perspective and from the viewpoint of individual firms. We first document the changes in the broad patterns of aggregate capital flows that coincided with the incorporation of Mexico into the free trade area. Because some of these changes are not particular to the case of Mexico, we present the results of the

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[118] Car makers had to generate 80 percent of the foreign exchange they required for their imports.

[119] E. Dussel (2002) observes that information on neutral investment is difficult to obtain, as it is not reported in official statistics as foreign investment. This has given rise to some pressure to eliminate this form of investment by foreigners.

[120] Much of the material in these sections is based on the background paper by Cuevas *et al* (2002).

statistical analysis of an international data set suggesting that free trade agreements have promoted foreign investments elsewhere too. We then shift the focus to the individual firm level, to examine the new financing opportunities that may have become available to firms following NAFTA. This work is of a more tentative nature because of the scarcity of appropriate firm-level data.

In Chapter 1 we noted the difficulty of identifying the impact of NAFTA on Mexico's economic performance in recent years, due among other things to the short time elapsed since the passage of the treaty and its coincidence in time with the Tequila crisis. In the case of Mexico's financing patterns, the task is even more challenging. The 1990s saw significant events and structural changes in the economies of Mexico and the world with important implications for capital flows. A number of key developments with major financial repercussions took place in Mexico: the restructuring of Mexican sovereign debt under the Brady deal in 1990; the government's privatization program (including the sale of commercial banks); the process of financial liberalization started in the early 1990s; the exchange rate collapse of 1994 and the adoption of a floating exchange rate regime; and the banking crisis of 1995 and its aftermath—which likely prompted Mexican agents to look for alternative financing sources abroad. At the same time, a global trend towards intensified international financial flows was at work, including a generalized movement toward more investment-friendly policies and more open markets in a large number of countries, which must have helped channel foreign funds into countries such as Mexico. In the analysis below we attempt to control for these changing domestic and global factors by taking into consideration the domestic and international contexts and by using a comparative international perspective.

4.3 Trends in Mexico's aggregate external financing in the 1990s

Mexico's capital account and stock market had already been significantly liberalized by the early 1990s. Cross-country studies rank Mexico in the early 1990s among the emerging markets with lower capital account barriers, while liberalization of the stock market took place in 1989.[121] As noted earlier, however, significant barriers remained to foreign direct investment prior to 1993.

The 1990s saw major changes in the pattern of capital flows to Mexico. The volume of net inflows rose significantly relative to the 1980s, especially in the case of flows accruing to the private sector. Furthermore, their composition also changed markedly, with FDI becoming by far the leading source of external financing.

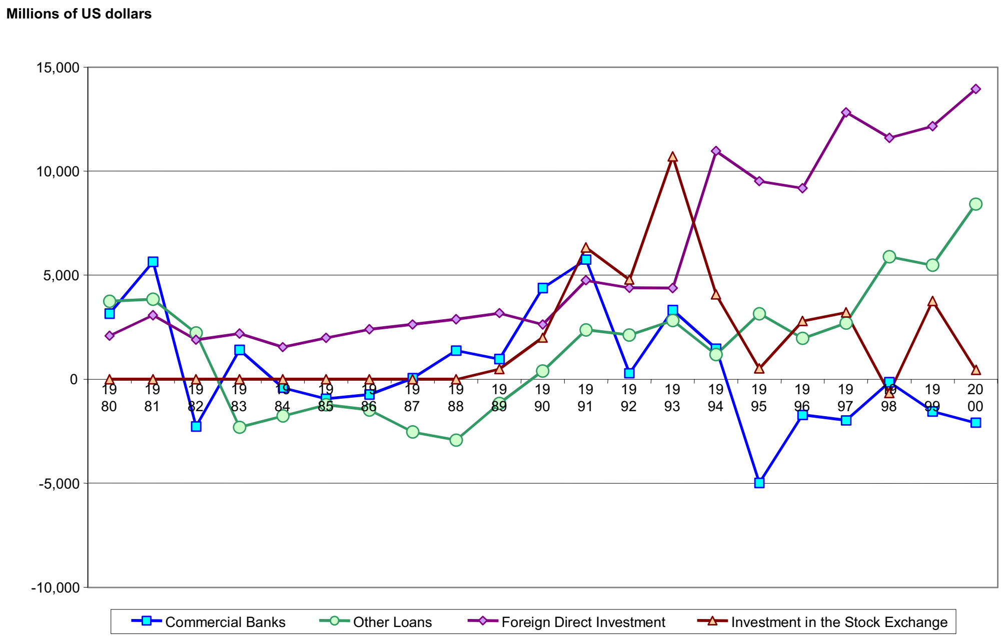
Figure 1 shows the time pattern of major components of private capital flows to Mexico. Total private capital flows to Mexico rose significantly in the 1990s, and especially in 1991-93—reflecting the record-high current account deficit of those years. After dropping sharply at the height of the Tequila crisis of 1995 (during which they nevertheless remained positive), net private flows resumed an upward trend in 1996.[122]

The changing composition of private capital flows is also apparent from Figure 1. The pre-NAFTA years of the 1990s were characterized by booming portfolio equity and FDI flows, and significant borrowing by both bank and non-bank agents. In contrast, the late 1990s saw a collapse of

[121] See Kamisnky and Schmukler (2002) and Bekaert and Harvey (1998)

[122] In contrast, public sector flows, which had been positive in the early 1990s, have remained negative (and relatively small in magnitude) after 1995, and as a consequence the capital account has been dominated by private flows. See Cuevas et al (2002) for further details.

Figure 1. Mexico: Main Components of Capital Flows to the Private Sector



Source: Banco de México

portfolio equity and bank borrowing, while FDI continued to boom and, to a more modest extent, so did other loans.[123]

How do these changes in the patterns of capital flows relate to the anticipation and/or the passage of NAFTA? It is important to observe that similar trends were at work globally.[124] Prior to 1989 no developing country received significant amounts of foreign portfolio investment. But in the first part of the 1990s portfolio investment into many developing economies, particularly in Latin America, grew dramatically, with Mexico as one of the leading host countries.[125] Like in Mexico, however, portfolio equity flows to developing countries then declined sharply in the second half of the 1990s. In turn, loan flows showed a similar pattern of rise and decline over the decade.

Likewise, the steady increase in FDI to Mexico was part of the global rise in FDI flows to developing countries during the 1990s, which again was particularly significant in the case of Latin America.[126] FDI flows to Latin American countries rose from an average of less than U.S. $10 billion in the late 1980s to nearly 100 billion in the late 1990s. While Mexico was one of the prime FDI destinations in Latin America in the 1990s, other countries in the region, such as Brazil and Argentina, attracted similarly large or even larger absolute and/or relative volumes of FDI (Table 1).

However, Mexico appears to have been running ahead of other emerging markets, as its FDI inflows showed a steep increase already in 1994, in contrast with the more gradual increase seen in FDI

[123] This residual item comprises loans to non-bank private agents, some of which are obtained on the basis of an official quasi-guarantee in the form of a supporting contract of the borrower with the government. In this sense, they may not strictly represent loans to private agents.

[124] These global trends are explored at length in World Bank (2001)

[125] See Cuevas *et al* (2002) for a comparison of trends in portfolio equity flows across emerging markets.

[126] To keep things in perspective, it is important to note that FDI to industrial countries grew even faster in the 1990s.

Table 1. Inward Flows of Foreign Direct Investment by Receiving Region

	Average 1990-91	Average 1992-93	Average 1994-95	Average 1996-97	Average 1998-99	2000	Average 1996-2000
In Billions of US Dollars							
World	180.8	188.0	270.3	428.0	884.0	1,271.0	779
Developed countries	141.9	121.7	168.0	245.6	656.5	1,005.2	562
Developing Countries	37.5	61.8	93.3	166.0	205.0	240.0	196
South, East and Southeast Asia	20.3	36.8	59.3	93.5	91.0	137.0	101
China	3.9	19.3	35.6	42.0	42.0	41.0	42
Hong Kong	1.1	1.9	2.1	11.0	20.0	64.0	25
South Korea	1.0	0.7	1.2	2.5	8.0	10.0	6
Other	14.2	15.0	20.5	38.0	21.0	22.0	28
Latin America	12.1	18.6	25.9	58.5	96.5	86.0	79
Argentina	2.1	5.2	2.6	8.1	15.7	11.2	12
Brazil	1.0	1.7	4.0	14.9	30.0	33.5	25
Mexico	3.6	4.4	7.5	11.4	11.8	**13.2**	**12**
Other	5.3	7.3	11.9	24.2	39.1	28.1	31
Other Developing Areas	5.1	6.4	8.1	14.0	17.5	17.0	16
Central and Eastern Europe	1.4	4.6	9.0	16.4	22.5	25.8	21
Shares in FDI Received by Developing Regions							
Developing Countries	100	100	100	100	100	100	100
South, East and Southeast Asia	54.1	59.6	63.6	56.3	44.4	57.1	51.5
China	10.5	31.3	38.2	25.3	20.5	17.1	21.3
Hong Kong	3.0	3.0	2.2	6.6	9.8	26.7	12.8
South Korea	2.6	1.1	1.2	1.5	3.9	4.2	3.2
Other	38.0	24.2	21.9	22.9	10.2	9.2	14.3
Latin America	32.3	30.1	27.8	35.2	47.1	35.8	40.3
Argentina	5.7	8.5	2.7	4.9	7.7	4.7	6.0
Brazil	2.8	2.7	4.2	8.9	14.6	14.0	12.5
Mexico	**9.7**	**7.1**	**8.0**	**6.9**	**5.7**	**5.5**	**6.1**
Other	14.1	11.8	12.8	14.5	19.1	11.7	15.7
Other Developing Areas	13.6	10.3	8.7	8.4	8.5	7.1	8.1

	1995	1996	1997	1998	1999	2000	Average 1995-2000
Estimated Greenfield FDI (FDI Inflows minus M&A Sales, in billions of US dollars)							
World	128	151	173	161	309	127	175
Developed countries	39	31	37	38	149	-52	40
Developing Countries	84	110	122	107	148	170	124
South, East and Southeast Asia	59	78	80	70	68	116	79
China	37	38	42	43	38	39	39
Hong Kong	0	8	4	14	21	59	18
South Korea	1	1	2	1	1	4	2
Other	20	31	32	12	8	14	20
Latin America	18	25	30	19	68	41	34
Argentina	2	3	5	-3	5	6	3
Brazil	3	4	7	-1	22	10	8
Mexico	**6**	**8**	**6**	**9**	**11**	**9**	**8**
Other	7	10	13	14	30	15	15
Other Developing Areas	7	7	12	18	13	14	12
Central and Eastern Europe	6	10	14	16	12	9	11

Source: UNCTAD World Investment Reports 1995, 2000 and 2001 and authors' calculations.

flows going elsewhere in Latin America. Indeed, Mexico's share of global FDI flows to developing countries peaked in the early 1990s, and then fell in the late 1990s (see the middle block of Table 1). This reflects in part the different timing and scope of privatization across the region, which attracted considerable volumes of foreign investment. By 1994, Mexico had completed its main privatization transactions.[127] In contrast, privatization activity remained important in Brazil and Argentina well after that. Furthermore, the scale of the Mexican privatization program, large as it was, was far smaller than those of Brazil and Argentina.

In fact, the relatively limited role of privatization transactions in Mexico's total FDI inflows reflects a more general phenomenon, namely that cross-border mergers and acquisitions (M&A, one of whose components is privatization FDI) played a much more modest role in Mexico than in the rest of Latin America. Cross-border M&A flows to Latin American countries, which were virtually negligible in the 1980s, experienced a spectacular increase in the 1990s, to exceed 50 percent of total FDI inflows in the late 1990s.[128] In the case of Mexico, cross-border M&A accounted for less than one-fourth of FDI inflows. Indeed, if we look at the 'Greenfield' (that is, non-M&A) component of FDI, Mexico's flows were on par, or even above, those received by other major Latin American economies (bottom of Table 1).

The increase in FDI to Mexico after the passage of NAFTA was dominated by North American sources, as reflected in Table 2. Inflows from other regions rose as well, but to a more limited extent.[129] However, the rise in FDI from North America did not involve an enhanced role of Mexico as host for U.S. and Canada-based investors. As Figure 2 shows, Mexico's share in U.S.-based investment remained remarkably constant, over the 1990s, at around 5 percent of the total.[130] In contrast, the share of the rest of Latin America declined sharply. In this regard, NAFTA might have prevented Mexico from joining this downward trend.

Table 2. Mexico: FDI Originating Inside and Outside North America

	1989-1993	1994-Sep 2001
From North America		
In millions of US dollars	13,860	64,764
Annual Average	2,772	8,096
In percent of total	*60.7*	*71.2*
From Other Regions		
In millions of US dollars	8,967	26,228
Annual Average	1,793	3,279
In percent of total	*39.3*	*28.8*

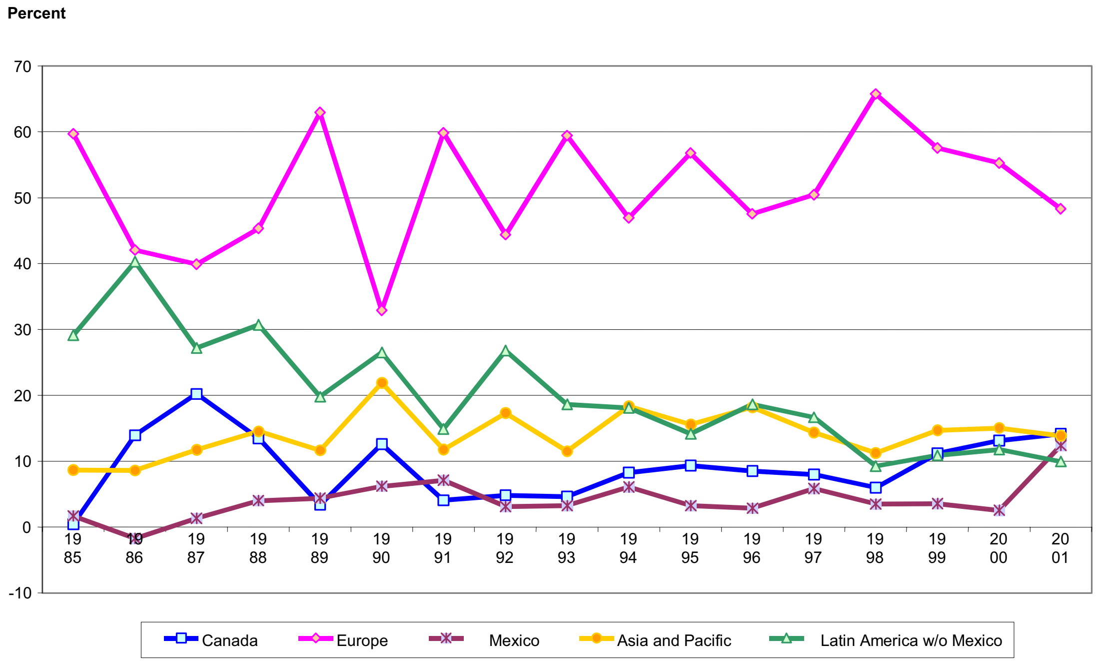
Sources: period 1989-1993, Borja Tamayo 2001, Table 3;
period 1994-2001, Dirección nacional de Inversiones Extranjeras.

[127] Those of the telephone company and the banking system.

[128] This is still far below the corresponding figures for industrial countries, where M&A transactions account for over 80 percent of total FDI inflows. Of the M&A flows to developing countries, privatization accounted for about half of the M&A transactions These figures are presented in Calderón, Loayza and Servén (2002), who also examine possible differences in the economic impact of M&A and Greenfield FDI.

[129] The figures in Table 2 update those reported by Borja Tamayo (2001). The rise in FDI to Mexico from non-NAFTA sources stands in contrast with that author's results for Canada. In that case NAFTA was accompanied by a surge in North American FDI in Canada, but had virtually no effect on FDI originating outside the region. A more detailed analysis of FDI in Mexico by country of origin is presented in Cuevas et al (2002).

Figure 2. U.S. Investment Abroad by Receiving Region



Source: U.S. Department of Commerce

If global trends contribute to explain much of the observed pattern of capital flows to Mexico in the 1990s, local factors played no small role. The most prominent one was the liberalization and eventual collapse of the banking system, which was largely responsible for the changing nature of external borrowing over the decade. As Figure 1 shows, the early 1990s were characterized by large volumes of external borrowing by banks, which were reversed in the late 1990s and replaced by an increasing recourse to external loans by non-bank agents.

This pattern is easy to understand in the light of the main events that affected the banking system in the 1990s. The liberalization of the banking industry in the early 1990s[131] enhanced the role of domestic banks in the private credit market. As part of the process, banks borrowed abroad heavily to lend to the private nonbank sector, including large amounts of dollar-denominated loans to domestic firms with no significant sources of foreign-currency income. While banks' foreign currency liabilities were hedged on paper, they were not in reality, and the collapse of the peso at the end of 1994 generated a major banking crisis as debtors and then their banks became insolvent.

Bank credit to the private sector has yet to recover from the crisis.[132] Commercial banks' assets fell drastically, and credit to the private sector shrank from 25 percent of GDP in 1996 to 6.6 percent in 2000. By mid 2001, virtually half the bank loans in good standing were owed by the public sector, including the government and the deposit insurance agency.[133] Furthermore, the collapse of bank credit prompted private agents to look for new sources of financing, including direct external borrowing and

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[130] The jump in 2001 reflects the purchase of Banamex and therefore represents a one-time event rather than a change in trend.

[131] The liberalization measures included privatization of commercial banks and the elimination of mandatory reserve requirements and directed credit.

[132] The measures adopted by the authorities to confront the crisis are thoroughly described in Banco de Mexico (1996).

[133] See Gonzalez Anaya and Marrufo (2001) and Serrano (2001).

suppliers' loans. Hence, the result was an increase in the demand for external credit by Mexican residents, which undoubtedly contributed to the behavior of external capital flows (especially direct external borrowing) described above. However, it is very difficult to quantify the influence of these demand factors on the evolution of capital inflows.

On the whole, therefore, the changing patterns of capital inflows to Mexico appear to agree fairly well with global trends and major local developments unrelated to NAFTA. This, of course, does not mean that the treaty had no impact. Indeed, the timing of some the major changes in capital flows suggests that they may have been affected by the anticipation, and the passage, of NAFTA. This is especially so in the case of FDI, which shows an early increase in 1991 likely related to expectations of passage of the treaty, and an even larger jump in 1994, coinciding with the actual implementation of the agreement.[134]

4.4 The impact of NAFTA on FDI

What was the contribution of NAFTA to the FDI boom of the 1990s? From an analytical perspective, an FTA affects both the profitability and the risk from investing in member countries. However, the *relative* profitability of alternative investment locations within the FTA is also affected, in a way that depends to a large extent on whether investment flows are horizontally or vertically motivated. Horizontal FDI is aimed at serving the local market of the host country, and is often motivated by trade costs such as transportation and tariffs. Vertical FDI is typically aimed at exporting the production to third countries or back to the source country, and aims to exploit a cost advantage of the host country. In the case of horizontal ("tariff-jumping") FDI, an FTA tends to discourage investment, as the (tariff-inclusive) cost of serving the local market from other locations within the FTA declines. For the same reasons, FTAs encourage vertically-motivated FDI. In the case of Mexico, there is evidence that a major fraction of FDI is vertically motivated.[135]

A specific aspect of NAFTA relevant for investment location decisions was the adoption of rules of origin for the determination of the goods that could benefit from the preferences established by the treaty. These rules, which vary across goods (see Chapter 3), provided new incentives for the location of investments in the NAFTA region in general and Mexico in particular, in those industries where existing levels of regional integration were below the threshold levels determined by the rules.

But the effect of FTAs on the perceived riskiness of investment—the so-called 'credibility effect'—can be even greater than the profitability effect. While the term 'credibility' is somewhat vague, in the present context it encompasses three different things:[136]

(i) the FTA's locking-in effect of trade policies;

(ii) the locking-in effect of broader reforms (ranging from regulation and competition policies to property rights, contract enforcement and macroeconomic stability); and

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[134] At first sight the pre-NAFTA boom in portfolio equity investment might appear as another result of the anticipation of the treaty, to the extent that foreign investors sought to buy into Mexican firms to take advantage of the upcoming strengthening of the relationship with the U.S.. If this anticipation had been an important force, however, one might have expected share prices of firms in tradable (manufacturing) industries to exhibit above-average growth. In reality, manufacturing share prices were the least dynamic of all sectors, which casts doubt on this interpretation.

[135] Venables and Winters (2002).

[136] The various effects that would fall under 'credibility' are spelled out in Whalley (1996) and Fernández and Portes (1998). See also Schiff and Winters (1998).

(iii) the guarantee of access to partners' markets.[137]

Different preferential trade arrangements entail different combinations of (i), (ii) and (iii). For example, EU accession is viewed by a majority of observers as having significant effects in all three dimensions, and particularly in the broader area (ii), as the single market entails a common regulatory framework for all members (leaving aside even broader issues of political unification). In the case of a RIA such as NAFTA, the main effects should in principle accrue through the 'secured access' channel and the locking-in of Mexico's commitment to trade opening initiated in the late 1980s,[138] as the treaty entails fewer automatic repercussions than the EU in the broader policy environment. Nevertheless, many analysts have expressed the view that NAFTA's risk-reducing effect could also be very large.[139]

To gauge the effect of NAFTA on FDI flows, and disentangle it from that of other factors affecting FDI, we turn to an econometric analysis of the influence of FTA membership on direct investment flows. We then use the empirical estimates to quantify the relative contribution of regional integration, globalization, and other factors to the evolution of FDI in Mexico.

The approach is described in detail in Cuevas et al (2002), so here we provide only a brief summary. The analysis focuses on aggregate FDI flows to 45 countries over 1980-2000.[140] This sample includes the same FTAs studied by Frenkel and Wei (1998).[141] Importantly, the framework assumes implicitly that North-North, North-South and South-South FTAs are all the same in terms of FDI effects. This is worth noting because NAFTA is the only North-South FTA in existence so far. The empirical model relates FDI to four sets of variables:

- FTA-related variables comprise a dummy indicating FTA membership of the host country (FTAMEM) and another capturing the anticipation of future membership (EXFTAMEM).[142] In addition, we include a measure of the extended market size of the FTAs to which the host country belongs, given by members' total GDP (FTAGDP). These variables should be expected to carry positive signs if FTAs encourage FDI to member countries. Finally, to explore FTAs' potential investment diversion effects, a measure of the degree of trade integration of other countries (INTEGRATION) is used; this is basically a weighted sum of the GDP of all the sample countries participating in FTAs, with the weight of each country's GDP given by the fraction of worldwide GDP covered by its FTA arrangements.[143]
- Global trends are captured by three variables: world GDP growth, international interest rates (US1YTBILL) and worldwide FDI (FDIWORLD). The latter variable serves to control for the increasingly important globalization forces.

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[137] Note that even though FTAs do not necessarily preclude the imposition of antidumping duties, they nevertheless do offer formal mechanisms for dispute resolution. In this sense, they do provide a guarantee of uninterrupted market access. See Fernandez and Portes (1998).

[138] This locking-in is emphasized by Kehoe and Kehoe (1994).

[139] See for example Leamer et al (1995).

[140] This is in contrast with other recent papers focusing instead on bilateral FDI flows or stocks, which often use empirical models based on gravity variables. See for example Levy-Yeyati, Stein and Daude (2001).

[141] Specifically, ASEAN, EFTA, what today is the EU, NAFTA, the Group of Three, the Andean Group in its recent revival, Mercosur, and COMESA (which in the analysis is included only as an expected FTA).

[142] The results below correspond to the case when FTA membership is anticipated two years ahead of its occurrence. Alternative time horizons were used too, without any substantial changes in results.

[143] Thus, an increase in INTEGRATION holding FTAGDP constant would imply a reduced FDI appeal for the host country in question. Note that this variable has only time-series variation.

- Local factors characterizing the host country comprise its market size (GDP), outward orientation (EXPORTS), level of per capita income relative to the U.S. (RELGNIPH), the rate of GDP growth, inflation and the current account balance. Among these, market size, outward orientation and GDP growth should have a positive effect, while inflation, as a symptom of macro instability, is expected to carry a negative one. In turn, to the extent that relative GDP per capita captures real wage differentials, it should carry a negative sign. Lastly, the sign of the current account balance is uncertain, depending on whether it is viewed as a reflection of macro instability or overall external financing need.
- Finally, institutional variables were added in some specifications to capture the effects of governance on FDI flows. Because of data limitations, this shortens the sample period by four years. The three variables used are indicators of government stability (GOVSTAB), rule of law (LAWORDER) and quality of bureaucracy (BUREAU). They are all expected to carry positive signs.

Table 3 reports empirical estimates of the determinants of FDI obtained from this specification.[144] Four variants are reported, with different combinations of the FTA-related variables and the institutional variables. On the whole, the explanatory power of the empirical equations is quite satisfactory given the samples employed.

The results concerning the variables capturing FTA membership support the notion that joining a trade block leads to higher FDI inflows. The expectation of joining a free trade area (EXFTAMEM) has a positive impact on foreign investment. The coefficient consistently exceeds one-third, indicating that announcement of an imminent entry into a larger regional market raises FDI in that proportion. The fact that the free trade area dummy has a statistically insignificant coefficient reflects the inclusion in the equations of a more direct measure of integration, extended market size (FTAGDP), which is always significant. The elasticity of FDI with respect to this variable is between one tenth and one seventh, implying that if a country joins a free trade area five times as large as the country itself, it should expect FDI inflows to rise by fifty percent or more. In contrast, we find no significant effects of the variable capturing investment diversion (INTEGRATION), perhaps due to the rudimentary nature of this measure.

As for the global variables, world growth carries in all cases a negative coefficient, close to 10 percent significance. This is in agreement with the findings reported by Albuquerque et al (2002) on the role of global factors in FDI flows: other things equal, faster growth in the rest of the world, given the growth rate of the host country, reduces the latter’s appeal to international investors. In turn, the international interest rate is generally insignificant. Finally, world FDI flows are strongly significant and positive, as should be expected.[145]

[144] The dependent variable is net FDI inflow. All variables with a monetary dimension are measured in constant dollars and expressed in logs. Country fixed effects were added in all the regressions. Endogeneity is potentially an issue, especially in the case of GDP growth. However, specification tests could not reject its exogeneity. Additional experiments are reported in Cuevas et al (2002).

[145] The fact that the coefficient on global FDI is less than unity likely reflects the fact that increasingly important FDI recipients are excluded from the sample due to lack of complete data. Our measure of total FDI inflows is not the sum of the inflows into the sample countries, which are obtained from a World Bank database, but a worldwide total reported by UNCTAD’s World Investment Report.

Table 3. Fixed-Effects Regressions of the Log of FDI Against Membership in a Free Trade Area and Other Variables

Variable \ Model	*1*	*2*	*5*	*6*
ftamembr	-0.211		-0.149	
	0.219		*0.249*	
expfta	0.377 *	0.437 **	0.341 *	0.389 **
	0.199	*0.188*	*0.202*	*0.185*
lnglоint	0.158	0.162	0.256	0.253
	0.141	*0.141*	*0.166*	*0.166*
lngdpfta	0.158 **	0.110 **	0.146 *	0.114 *
	0.072	*0.053*	*0.079*	*0.059*
wrldgrwt	-0.072 *	-0.070 *	-0.100	-0.099
	0.041	*0.041*	*0.062*	*0.062*
us1tbill	0.006	0.007	0.045	0.045
	0.020	*0.020*	*0.039*	*0.039*
lnfdiwrl	0.747 **	0.744 **	0.617 **	0.614 **
	0.116	*0.116*	*0.139*	*0.139*
gdpgrwth	0.034 **	0.033 **	0.036 **	0.036 **
	0.012	*0.011*	*0.013*	*0.013*
inflatio	-1.31E-04	-1.47E-04	-3.45E-05	-4.31E-05
	1.22E-04	*1.21E-04*	*1.22E-04*	*1.21E-04*
curracct	-0.040 **	-0.041 **	-0.033 **	-0.033 **
	0.011	*0.011*	*0.013*	*0.013*
relgniph	-2.491 **	-2.297 **	-5.493 **	-5.397 **
	1.179	*1.161*	*1.394*	*1.384*
lnexport	0.748 **	0.719 **	0.638 **	0.620 **
	0.219	*0.217*	*0.270*	*0.268*
lngdp	0.170	0.204	-0.036	-0.006
	0.240	*0.237*	*0.300*	*0.296*
govstab			0.137 **	0.139 **
			0.048	*0.048*
laworder			0.293 **	0.298 **
			0.066	*0.065*
bureau			0.064	0.061
			0.080	*0.079*
constant	-14.806 **	-14.498 **	-11.724 **	-11.518 **
	1.796	*1.767*	*2.142*	*2.113*
R-sq: within	0.4703	0.4696	0.4937	0.4934
total	0.8071	0.8068	0.8250	0.8249
No. Obs	787	787	645	645
No. Countries	45	45	45	45

Note:
Standard errors in italics, below the corresponding coefficient estimate.

Among the local factors, the elasticity of FDI inflows with respect to exports is about 0.7 and significant in all models, suggesting that openness is a major attractor of FDI.[146] Host country growth is also consistently positive and significant, likely reflecting the positive impact of profitability on FDI, and again consistent with Albuquerque et al (2002). Inflation has a generally negative effect on FDI, as expected, but not statistically significant. Likewise, local market size, as measured by GDP, carries a consistently positive but insignificant coefficient. In turn, the negative coefficient on the current account balance in all regressions seems to reflect financing need (likely driven by domestic investment) rather than an unstable macroeconomic environment. Finally, the measure of relative per capita income (RELGNIPH) always carries a significant negative coefficient. If, as already argued, per capita income differentials proxy for relative wages, the result implies that *ceteris paribus* countries with lower labor costs attract larger FDI inflows.[147]

The last two columns in Table 3 add the institutional quality variables. They carry significantly positive signs, as one should expect, with the exception of the quality of the bureaucracy indicator, which fails to be significant. On the whole, the coefficients on the other regressors show only modest changes relative to the previous specifications.

The key result from this analysis is the positive effect of FTAs on FDI inflows to member countries. This agrees with earlier empirical studies of the impact of FTAs based on a variety of methodological frameworks ranging from structural model simulations (e.g., Baldwin, François and Portes 1997) to gravity-based studies of bilateral FDI (Levy-Yeyati, Stein and Daude 2002).

How well does this empirical model account for the trends in FDI to Mexico? The two panels in Figure 3 present the actual and fitted values, as well as the implied residuals, from the regressions in columns (2) and (4) of Table 3. The tracking is fairly good, given the cross-country dimension of the model: the correlation between the actual and fitted values exceeds .85 in both cases. However, there is a clear pattern of overprediction from 1996 on, as the FDI volume predicted by the statistical model exceeds the actually observed values by an increasingly large margin.[148] The pattern is similar for both specifications, although the prediction error is somewhat smaller when the institutional quality indicators are included.

What was the role of NAFTA in the observed increase if FDI to Mexico over the 1990s? If NAFTA is just like any other FTA in the sample, we can use the estimates reported in Table 3 for a rough assessment of its impact. Table 4 shows the estimated contribution of the various FTA-related variables to the change in Mexico's annual FDI inflows between 1984-93 and 1994-99. The change in FDI predicted by the model is broken down into the portions due to each of the four groups of variables included in the regression in column 4 of Table 3—FTA-related, global and local factors, and institutional quality indicators.

It can be seen from Table 4 that the combined changes in the variables included in each of the first three groups contributed positively to the rise in FDI, by roughly similar amounts, while the fourth had, if anything, a slightly negative contribution, resulting from a modest deterioration in the institutional

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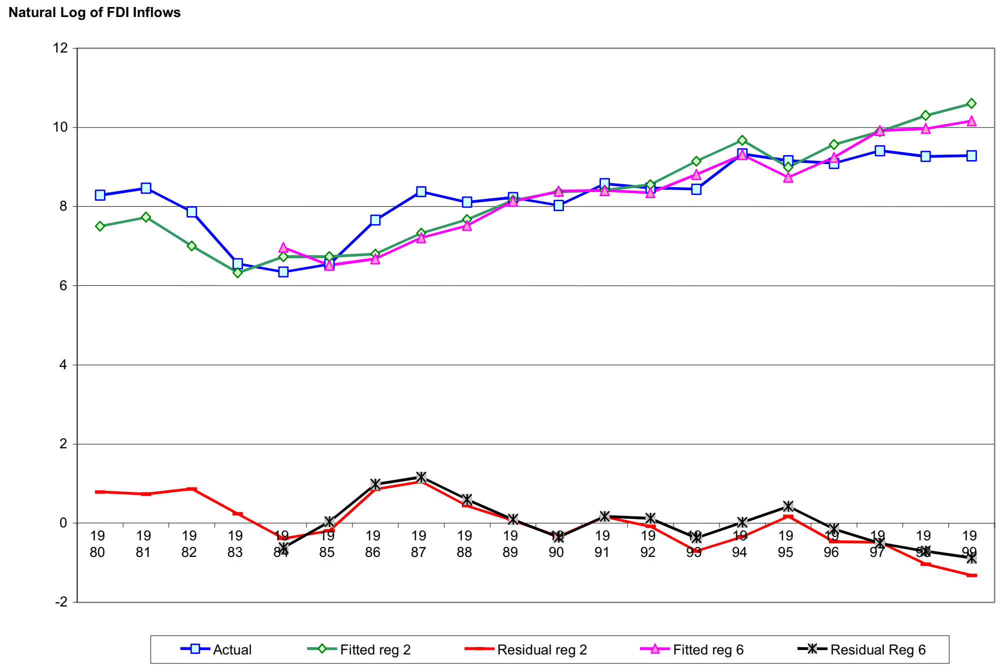
[146] While this result is consistent with expectations and previous results concerning the role of openness, simultaneity is a potential concern, as FDI may target traded sectors and lead to stronger export performance. However, there is likely a long gestation period between new investment and exports, which reduces the risk of simultaneity.

[147] Albuquerque *et al* (2002) report this result using direct measures of real wages for a reduced country sample.

[148] It is important to note that the systematic overprediction found in Mexico in the final years is not encountered in other countries. Mexico's prediction errors are statistically significant in 1998 and 1999 (only in the latter year in the specification including institutional variables).

Figure 3. Actual and Predicted Values of the Log of FDI in Mexico US$)



quality indicators across the two subperiods considered. A deeper look reveals that among the FTA-related variables, the bulk of the positive contribution to FDI was due to the growth in Mexico's extended market, as measured by NAFTA's overall GDP. In turn, the positive effect of the global factors reflects basically the growth in worldwide FDI flows between the two periods. Finally, the positive impact of the

Table 4. Contribution of Various Factors to the Observed Change in FDI to Mexico

(FDI in constant U.S. dollars, 1994-99 vs. 1984-93)a/

Observed change in log FDI	1.38
Explained by:	
FTA-related variables	0.65
Global Factors	0.56
Local factors	0.67
Institutional variables	-0.01
Total predicted change	1.86
Residual (actual - predicted)	-0.48

Note: a/ Projected FDI changes using the coefficients in column 4 of Table 3 local factors was primarily due to expanding exports. However, the substantial overestimation shown in the table, reflected by the large positive residual amounting to one-third of the observed change in FDI, indicates that these calculations should be viewed with great caution and considered mainly illustrative.

Because the estimated equation is expressed in logs, the effects of the various groups of variables are multiplicative, not additive, and hence it is not straightforward to translate these figures into the implied changes in the *level* of FDI. However, a rough approximation indicates that, had the other factors remained unchanged, the FTA-related variables would imply that Mexico's entry into NAFTA led to an increase in annual FDI by around 40 percent.[149] However, the contribution of NAFTA may be understated in the above calculations. Mexico's openness was presumably also increased by the treaty (see Chapter 6), and the regression estimates imply that this in turn had an additional, albeit indirect, favorable impact on FDI inflows. While it is difficult to quantify such impact,—a back-of-the-envelope calculations would suggest that taking it into account could raise the estimated effect of NAFTA on constant-dollar FDI quite significantly[150], to levels closer to that reported by Waldkirch (2001), who uses bilateral FDI data to conclude that NAFTA lead to a 72 percent increase in FDI from Canada and the U.S.[151]

The time pattern of observed and predicted FDI flows to Mexico shown in Figure 4 deserves consideration. At the time of NAFTA accession, FDI rose even beyond the model's predictions. But in the late 1990s FDI has consistently fallen short of the international norm as given by the empirical model, implying that Mexico became relatively less attractive to foreign investors in spite of the growing intensity of global capital flows, Mexico's closer integration with its NAFTA partners and its rebound in GDP and export growth. However, this might be partly an artifact of the sample period, since the available data show that FDI into Mexico rose substantially in 2000 and 2001.

In any case, what lies behind the lagging FDI performance vis-à-vis the international norm in the last few years of the 1990s? Several factors may be at work. First, there was an overall decline in the proportion of FDI going to developing countries during the second half of the nineties, so that Mexico's relatively low levels of FDI might partly reflect this general trend.[152] Second, it might be argued that the relatively limited scope and early conclusion of the Mexican privatization program could also lie behind its underperformance as FDI host in the late 1990s. However, this just tells us which form of FDI Mexico has failed to receive, rather than the reasons why FDI did not materialize. Third, consistent with the experiences of Spain and Portugal described in Box 1, it is also possible that NAFTA led mainly to a stock adjustment which was completed around 1994-95, so that FDI is now settling toward more "normal" levels. Finally, it is also possible that, contrary to the assumption underlying the empirical model, North-South FTAs have different FDI implications than North-North and South-South FTAs due to the greater dissimilarity among their partner economies.[153] Because NAFTA is the only North-South FTA in our sample, there is no simple way to assess this hypothesis.

In addition to these arguments, however, another candidate explanation is that after the initial impulse given by NAFTA, other FDI hosts have outpaced Mexico in terms of investment-friendly reforms—e.g., Hungary, Poland, the Czech Republic, Turkey and Slovakia were all working to upgrade their institutional and policy frameworks with a view to joining the European Union. The fact that the

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[149] See Cuevas et al (2002).

[150] The details of this calculation are offered in Appendix 4 of Cuevas et al (2002).

[151] However, Waldkirch argues that NAFTA did not bring about a significant increase in FDI from outside North America.

[152] This is documented in Cuevas et al (2002).

[153] Blomstrom and Kokko (1997) review some arguments in support of this view. The multi-FTA study of Levy-Yeyati, Stein and Daude (2002) finds some evidence that NAFTA's FDI effects are more modest than those of the other FTAs considered.

institutional quality variables in Table 4 exhibit, if anything, a slight deterioration and thus a negative contribution to Mexico's FDI performance in the late 1990s seems to point in this direction.

4.5 Firm financing after NAFTA

Against the background of these aggregate trends in external financing, we next examine the effects of NAFTA on financing opportunities from the point of view of individual firms. The a priori expectation is that the free trade agreement should open new doors to the private sector, especially to exporters, and that firms would try (and find it easier) to obtain foreign financing to match their increasing openness.

Table 5 presents some basic indicators of financial structure and openness for a sample of firms listed on the Stock Exchange. While the sample is not representative, it is the only relatively large firm sample for which comprehensive financial data are available.[154] As can be seen from the table, the average proportion of these firms' sales accounted for by exports went from single to double digits starting in 1995—likely reflecting both the free trade agreement and the real depreciation of the peso. Overall indebtedness reached a peak in 1995, doubtless influenced in part by the capital losses resulting from the depreciation of the peso, but has not shown in recent years any tendency to return to the pre-1995 levels.

Regarding the composition of firms' liabilities, the two most remarkable developments were, first, the increase in the proportion of foreign debt[155] in the total after 1995, and second, the increasing resort to ADR (American Depositary Receipts) issuance after 1995.

Table 5. Annual Averages of Selected Variables in the Stock Exchange Data Set

Year	Count	Exports Over Sales Percent	Debt to Assets Percent	Foreign Debt Over Debt Percent	Bank Debt Over Debt Percent	Suppliers Over Debt Percent	ADR Issue Percent
1989	109	12.4	34.1	26.6	40.8	16.8	1.8
1990	223	10.0	36.9	27.3	39.4	19.7	0.9
1991	259	8.4	39.9	29.7	40.2	18.2	1.2
1992	260	8.3	41.3	30.4	40.7	17.1	1.5
1993	253	8.0	42.7	32.8	39.7	17.1	4.0
1994	237	9.4	44.1	37.7	41.1	17.1	5.9
1995	224	16.6	49.2	45.0	45.5	16.5	9.8
1996	220	15.8	48.5	44.1	43.9	18.3	13.2
1997	209	15.9	46.5	44.8	42.1	20.3	14.4
1998	186	16.7	45.7	46.1	43.4	22.7	19.9
1999	169	14.6	48.5	43.0	42.0	22.7	17.2
2000	149	17.5	56.5	44.0	33.6	18.5	23.5
Total	0.0	12.3	44.3	37.4	41.2	18.6	8.7

Source: Cuevas et al (2002)

[154] The data set is an unbalanced panel of 367 firms sampled between 1989 and 2000. Of these firms, only 64 are present for the whole sample period. Relative to the universe of Mexican private firms, the firms in the sample are relatively large and modern. Over 1994-2000, they accounted for some 4.5 percent of the formal private sector labor force, their sales amounted to 6 percent of GDP, and their total assets to 36 percent of GDP.

[155] Strictly speaking, the data indicate the currency in which liabilities are denominated. We are equating dollar denominated liabilities with liabilities to foreigners.

The factors behind these changes in the financial structure of Mexican firms are explored empirically by Cuevas et al (2002) in regressions using firm level data and including as controls the export ratio, tariff levels and a number of other control variables (including a dummy for the post-NAFTA period). While these regressions cannot be given a strictly causal interpretation—as simultaneity among the different variables considered is a likely issue—they do nevertheless highlight the key stylized facts.

Those empirical experiments confirm that, after controlling for other factors, there is a significant positive association between the foreign debt ratio and the export ratio,[156] implying that the increased outward orientation of sales and financing are two aspects of the same phenomenon. Furthermore, the results also show that firms' foreign debt ratio not only rose after NAFTA, but is also negatively associated with the level of Mexican tariffs, which brings out the link between trade opening and external financing. However, the same results show that the role of export orientation as predictor of external indebtedness declined in the post-NAFTA era. This suggests that even producers of nontraded goods are taking advantage of more integrated capital markets to borrow abroad, be it from their suppliers or from financial intermediaries. On the other hand, foreign debt ratios are found to be positively associated (after controlling for other factors) with ADR issuance, implying that the two forms of external finance are mutually reinforcing.[157] Finally, foreign debt ratios are also positively associated with firm size.

This leads us to the factors behind the remarkable increase in the resort of Mexican firms to ADR issuance shown in Table 5, a trend similar to that found in other emerging markets (see Moel 2001 and Claessens, Klingebiel and Schmukler 2002). Regressions of ADR issuance reported by Cuevas et al (2002) find results broadly similar to those described above for external debt ratios. ADR issuance is positively related to export ratios and firm size, and negatively to tariff levels. Like with debt, however, the magnitude of the impact of export orientation is found to have declined in the post-NAFTA period. Again this suggests not only that outward orientation and trade liberalization affect ADR issuance positively, but also that even less outward-oriented firms have increased resort to ADRs in the post NAFTA years.

In contrast with the association between export orientation and external financing, export ratios are negatively related to suppliers' credit ratios. Combined with the preceding results on foreign debt ratios, this seems to suggest a taxonomy of firms' responses to the banking crisis: outward-oriented firms reacted in part by increasing their recourse to foreign finance, while inward-oriented ones relied more on domestic supplier financing. It is worth noting also that, once other factors are taken into consideration, firms' resort to suppliers' financing declined in the post-NAFTA period.

4.6 The road ahead: Institutional reform for financial development[158]

To summarize the analysis in the preceding sections, we find that the changes in capital flows to Mexico over the 1990s, and specifically the steep rise in FDI, reflected in part global trends, and possibly also the effects of the banking crisis. However, an econometric analysis of the FDI impact of free trade agreements, using a large cross-country time-series data set, suggests that trade opening and NAFTA accession also helped raise Mexico's FDI, although the foreign investment performance in the late nineties suggests that this effect may have been only temporary.

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[156] It is important to note that the real peso depreciation in 1995 cannot be claimed as an explanation for the continued high proportion of foreign debt *after* 1995, let alone in 2000 (when the real exchange rate was appreciating).

[157] It is also likely that the relative stability of bank debt ratios shown in Table 5, notwithstanding the banking crisis and its adverse effects on bank credit volumes, conceals an increasing patronage of foreign banks by the firms in the sample. Unfortunately, the data does not permit verification of this conjecture.

[158] This section draws extensively from López de Silanes (2002).

The available firm-level evidence is broadly consistent with this aggregate picture. The post-NAFTA period is characterized by increased resort to foreign financing in the form of both equity and debt, especially among export oriented firms, which were better positioned to take advantage of the new environment. The evidence is tentative, however, because it is confined to relatively large firms listed on the stock exchange.

On the whole, therefore, both macro and micro data suggest that NAFTA has represented a significant step towards Mexico's financial integration in the world economy. However, for the vast majority of Mexican firms—especially smaller and new ones—ADR issuance and external borrowing do not represent viable options to secure outside financing. Indeed, their access to financing remains woefully inadequate, posing a major obstacle for Mexico's real convergence towards its NAFTA partners. This reflects the deficiencies of financial markets in Mexico. As already noted, the domestic banking system has yet to fully recover from the 1995 crisis. In turn, the small size, illiquidity and high degree of concentration of Mexico's capital market relative to those of successful emerging economies—such as those in East Asia—have also been amply documented.[159] Of course, these ills affect also other Latin American economies, but in many critical areas—e.g., the ability of new firms to raise capital—Mexico falls significantly short of the Latin American norm as well.[160]

The consequences of this situation are well understood. A large body of research has shown that financial underdevelopment hampers investment, economic efficiency and technological progress. It also amplifies the economy's vulnerability to shocks. As a result, it imposes a major cost in terms of income growth and economic development.[161]

Mexico's inadequate legal and regulatory framework deserves much of the blame for the country's financial underdevelopment.[162] Indeed, international comparisons reveal that Mexico ranks among the countries with weakest protection of creditor and shareholder rights, well below international end even Latin American standards. Table 6 presents synthetic measures of creditor and investor rights, as embedded in the laws, across various groups of countries. The former measure captures the protection offered to creditors by the legal system in situations of reorganization and bankruptcy, while the latter reflects primarily the protection granted to non-controlling shareholders. [163] It can be seen that Mexico lags behind along both dimensions, even relative to other major Latin American economies.

Legal rules are only one of the factors at play; their enforcement is equally or even more important. Two summary indicators of the quality of enforcement of laws, along with a measure of corruption, appear also in Table 6.[164] In all three dimensions, Mexico ranks below the world average. Thus, on balance the evidence indicates that creditors and investors are poorly protected in Mexico by both inadequate laws and weak enforcement.

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[159] The state of Mexican financial markets is documented by González-Anaya and Marrufo (2001). See also De Ferranti *et al* (2000) for a comparative perspective.

[160] López de Silanes (2002).

[161] This has been amply documented by a large number of studies. See for example Beck, Levine and Loayza (2000).

[162] Of course, this is not the only factor at work. Mexico's history of macroeconomic instability has also hampered financial development. However, restoring macro stability will not lead automatically to financial development without accompanying regulatory changes.

[163] Details on the specific components and data underlying each index are given in Lopez de Silanes (2002).

[164] The exact definition of each variable is given in the background paper by Lopez de Silanes (2002).

Table 6. Shareholder Rights, Creditor Rights and Enforcement of Law

	No. of Countries	Shareholder Rights	Creditor Rights	Efficiency of Judicial System	Rule of Law	Absence of Corruption
US		5.00	1.00	10.00	10.00	8.63
UK		5.00	4.00	10.00	8.57	9.10
Industrial countries (average)	21	3.00	1.81	9.02	9.26	8.90
East Asia 7 (average)	7	3.14	3.42	6.78	6.81	6.23
Latin America (average)	9	2.67	1.25	6.47	5.18	5.22
Argentina		4.00	1.00	6.00	5.35	6.02
Brazil		3.00	1.00	5.75	6.32	6.32
Chile		5.00	2.00	7.25	7.02	5.30
Mexico		1.00	0.00	6.00	5.35	4.77
Overall average	49	2.65	2.30	7.67	6.85	6.90

Notes: for each indicator, a higher value is better. The respective ranges are as follows:
Shareholder Rights: from 0 to 6
Creditor Rights: from 0 to 4
Efficiency of Judicial System: from 0 to 10
Rule of Law: from 0 to 10
Absence of Corruption: : from 0 to 10

Source: Lopéz de Silanes (2002)

The international experience shows that the law and its enforcement are very good predictors of financial development, and hence it is difficult to overemphasize the adverse consequences of this situation for Mexico's financial markets. Inadequate protection of shareholder rights leads to small and shallow capital markets with highly concentrated ownership and few new firms entering the market. Likewise, without essential creditor rights debt markets are bound to remain small and the cost of credit high. And even if all firms could access foreign financial markets, they would not be able to avoid the consequences of the weak regulatory framework. ADRs may offer firms an escape from poor securities laws—as the regulations that apply are those of the market where the securities are issued—but in the case of credit the ultimate law is the bankruptcy law of the country where the assets are located.[165] This means that it is virtually impossible to escape a poor bankruptcy law and a poor court enforcement of such law.

What can Mexican policy makers do to foster better investor protection? There are several types of corporate governance reforms at work in many countries, and the evidence shows that some of them have had major positive effects on investor protection and the financing of firms. Some mechanisms found in other countries might be appropriate for Mexico, though others might not work given the current enforcement environment.

There is no universal checklist of what needs to be done, but the available evidence indicates that reforms to foster financial markets in Mexico should follow a two-track approach. Because legal reform is slow and complicated, complementary market-based mechanisms should be adopted to temporarily substitute or complement the reform of laws and regulations. As Box 3 details, these mechanisms could include an improved Code of Best Practices, the possible creation of an alternative market with higher standards for new entrants, enforcement of corporate governance standards for institutional investors, and an exemplary role of public enterprises. These mechanisms should help facilitate competition and allow investors to discriminate among firms according to their corporate governance practices, making it

[165] Recent studies conclude that resort to ADRs issuance in foreign markets affects negatively the liquidity and investability of domestic capital markets, and their ability to foster growth—although it has a positive effect on accounting standards and disclosure-related openness. See Moel (2001).

possible for the firms that better protect investors to access capital at lower cost. At the same time, adoption of such measures would help develop a culture of investor protection and build momentum for legal reforms to take place.

While these market-based mechanisms can help, ultimately they should be complemented with legal reforms whose effects can reach all firms and can be more easily enforced as the standard in the country. However, effective enforcement of legal rules is deeply connected with the rules themselves, and the design of successful legal reforms in Mexico needs to take into account the weakness of the legal system. The proper strategy for reform is not to create an ideal set of rules and then see how they can be enforced, but rather to enact the rules that can be enforced with the existing enforcement structure. With this general perspective, Box 3 outlines some principles for enhancing securities, corporate and bankruptcy law.

Box 3. Corporate Governance Reform in Mexico

What can policymakers do to foster better investor protection in Mexico? In a background paper for this report, Lopez de Silanes (2002) outlines a set of reforms aimed at deepening Mexico's financial markets. Because legal reforms are typically slow and complicataed, this proposed agenda combines then with complementary market-based mechanisms which would constitute a useful first step to foster a culture of respect for investor protection and set the basis for the eventual legal reform.

A. Market-based Mechanisms

1. Committee on Best Corporate Governance Practices

Mexico's "Committee on Corporate Governance" created in January 2000 follows the example of Australia, New Zealand and England, which established commissions formed by members of the private sector and government to review corporate practices and investor protection. These committees compiled best practice codes detailing rules of good corporate governance mechanisms. The underlying principle is that firms' disclosure of information about their corporate practices will allow shareholders to single out those firms which adhere to investor protection, making investors more willing to fund them. Firms with better practices should find it easier to access capital at lower cost, as they provide a more certain environment for the investor. Adherence to the Code of Best Practice is voluntary, but disclosure by listed firms is compulsory. While it is a step forward, the Code also has clear limitations: it is only a guideline for publicly-traded firms, and concern with its initial deficiencies—the generality of some principles and the vague definition of directors' responsibilities—has risen in the wake of corporate scandals in the U.S. Thus, the Code needs to be revised and a permanent Committee should be created to oversee its improvement and adaptation to the changing corporate environment

2. Alternative Markets with Higher Standards

In Mexico and many European countries stock markets attract few initial public offerings. The absence of competition from new entrants allows established firms to raise capital on favorable terms, but slows the development of new firms. The successful experience of Germany since 1997 with the Neuer Markt, a sub-exchange of the Frankfurt Stock Exchange for new firms wishing to go public, shows one way to overcome the resistance of existing firms to changes in the rules. Companies wishing to list on the Neuer Markt must comply with international accounting standards (U.S. GAAP or IAS), including more stringent disclosure requirements than those applicable to already-listed firms. This has allowed new firms easier access to the market: over two hundred firms have gone public in the past three years, more than in the previous fifty years. Korea, despite a relatively weak legal system, has recently started implementing a similar approach. In Mexico, a new listing venue—with U.S.-style rules and greater restrictions on entrepreneurs—could accelerate the pace of initial public offerings. By leaving incumbent firms unaffected, this could offer one possible strategy for overcoming political opposition to reform.

3. Prudential Measures for Institutional Investors

Enhanced disclosure requirements may not be sufficient in countries like Mexico with weak legal institutions or where investors have very few rights, which prevents them from demanding changes. In such instances it may be desirable to restrict institutional investors to investments in companies that meet minimum corporate-governance standards, as determined by the code of best practices or by independent best-practice commissions. This is advisable not only on prudential grounds, but also to encourage firms to improve investor protection. An approach along these lines has been implemented in Chile.

4. State Controlled Enterprises

Despite significant privatization in Mexico, there are still close to 150 state-controlled enterprises. These firms could set the example for private firms by adopting better investor protections. Most of the state-run firms are large public utilities, for which external funding has become as important, if not more, than for private firms. Adoption of the code of best practices outlined above can provide a quick and easy way for these state-controlled firms to substantially transform themselves and secure access to funds at better rates, thereby alleviating also their pressure on the government budget.

Box 3 *(continued)*

B. Legal Reforms

5. Securities Regulation

The new Securities Law tries to refocus regulation so that supervision is concentrated on intermediaries, rather than issuers, with the idea that well-supervised intermediaries—brokers, accounting firms, investment advisors—will in turn enforce compliance of issuers and the traders with regulatory requirements. This approach was pioneered by the U.S. and later successfully applied by other countries. In Poland, for example, stringent and toughly enforced regulations of this kind have stimulated rapid development of securities markets. Thus, smart regulations, particularly in countries with relatively weak legal systems such as Mexico, can improve the protection of investors, and this will help firms obtain external finance. Mexico's recent takeover regulations represent the newest impetus in this area. The new rules, among the most stringent in the world, try to prevent differential treatment of investors through acquisitions of control, and protect minority shareholders to a far greater degree than was previously the case. Overall these rules level the playing field between majority and minority shareholders in change-of-control situations, and thus should boost the value of minority stock. While enforceability is always an issue, the movement is clearly on the positive side.

6. Corporate Law

Securities regulations requiring disclosure need to be complemented with changes in corporate law to give shareholders the rights to act on the information they receive. As Mexican shareholders' rights are among the worst in the world, the "Ley de Sociedades Anónimas" must be revamped. The reforms do not need to follow U.S.-type mechanisms that rely heavily on the judicial system, by means of derivative or class-action suits. Instead, given the state of the legal system, the application of more "automatic" principles, as done in Chile, may be a better answer for Mexico. Specifically, the reform of Mexico's corporate law should enforce: (i) better information and simplified attendance procedures for shareholders' meetings; (ii) easier participation and voting procedures for dissenting shareholders; (iii) mechanisms for qualified minorities to submit proposals; (iv) proportional board representation for qualified minorities; (v) non-discriminatory treatment of minorities, including a semi-automatic procedure for their compensation if controlling shareholders act in detriment of the corporation (as in the case of Chile); (vi) definition of fiduciary obligations and responsibilities of officers and board members; (vii) regulation of conflicts of interest; (viii) strengthened internal auditing procedures and committees for material transactions.

7. Bankruptcy Law

Improving bankruptcy procedures is more difficult than improving shareholder rights because different types of creditors, unlike different non-controlling shareholders, have different objectives. Reform typically involves the whole mechanism, not just a few principles or articles of the law. In addition, bankruptcy procedures tend to rely on adjudication by the courts, which leaves the process vulnerable to political pressures and weak judiciaries, particularly in countries with poor enforcement and high corruption. Procedures leaving most of the discretion in the hands of creditors rather than judges (like in the U.K.) may be much better. In this light, Mexico's new bankruptcy law, adopted in May 2000, still falls short in key areas. Most significantly, the discretion and decision powers remain in the hands of judges and a new breed of regulators. These shortcomings are reflected in the fact that there are almost no cases brought to court as people are simply not using the law. In terms of basic creditor rights, Mexico scores equally poorly before and after the reform. Yet an efficient bankruptcy procedure is essential to expand credit access and restore the stability of the banking sector. The key objectives of the pending reform should be: (i) minimizing transaction costs as well as the discretionary ability of third parties, such as the judiciary; (ii) facilitating firms' access to credit; (iii) ensuring that the assets of the firm are used efficiently, either through reorganization or liquidation; (iv) preserving the absolute priority of creditors; (v) allowing creditors holding collateral to repossess it in due course and before other creditors benefit from it; and (vi) maximizing the payments to all those investors that provided financing to the firm.

In some of these dimensions Mexico has already made significant progress in the right direction. However, major issues still remain to be addressed in order to achieve a more satisfactory protection of investor and creditor rights. A decided push on this front can be instrumental to help Mexico realize the full growth potential of the new opportunities created by NAFTA.

4.7 NAFTA and the evolution of Mexican labor markets

4.7.1 Introduction

This section focuses on two broad themes. First, what has been the impact of product and factor market integration discussed in earlier chapters on integration of the Mexican and U.S. labor markets. In particular, our workhorse trade models suggest that the integration of product markets should cause pressures towards convergence of wage levels even in the absence of labor market integration. Relevant to this discussion is the evolution of relative wages of skilled and unskilled workers. Second, what can be said about the impact on the quality of jobs workers face. The vastness of this topic restricts us to focusing on a couple particularly visible sectors and selected indicators.

Approaching these issues is difficult for three reasons. First, only a decade has passed since NAFTA was implemented. Second, this decade was interrupted by the Tequila crisis which caused real wages to fall by 25% and from which the country has only recently recovered. Both factors lead us toward relying heavily on inference from the unilateral liberalization of 1986 when Mexico jointed GATT. In spirit, they are part of the same process but such inference is limited in telling us about the impact of NAFTA per se. Third and finally, Mexico is unique in sharing a long border with the U.S. that has exhibited varying degrees of porousness across the period. Among males 25-24 years old, the 1990 stock of Mexican immigrants in the U.S. was equivalent to a very significant 12% of that age cohort.[166] Hence, it is often difficult to isolated what is a function of demand shifts due to trade reform, and what is a result of migration flows.

The next section approaches the question of whether there has been a greater integration of Mexican wage levels across the period of liberalization. The third section looks more carefully at a phenomenon found throughout the region- increased returns to skilled workers which, in theory are the opposite of what theory suggests should have happened. Section four broadens our view of job quality to include labor protections, and particularly the evolution of the uncovered or "informal" sector.

We conclude with a discussion of labor policies for a more open Mexico.

4.7.2 Convergence of wages

Standard neo classical trade theory, and especially the Stolper Samuelson theorem of the Heckscher-Ohlin framework, suggest that converge of product prices will also cause convergence in factor prices. A fall in the cost of capital intensive goods relative to the price of labor intensive goods, should cause a rise in the relative return of the factor in which Mexico appears to be most abundant, labor. Box 4 lays out the logic of the theorem, and offers only a partial list of the many possible theoretical slips twixt cup and lip. Other associated elements of NAFTA- greater flows of FDI and of technology may work in a similar direction. In particular, FDI is seen as bringing jobs at good wages that would reduce the incentive to search for work in the U.S..

Figure 4 graphs two possible measures of wages in Mexico relative to those in the U.S.. The first "dollar based" ratio converts the peso wages into dollars through the exchange rate and then forms a ratio with relatively comparable U.S. wages. It has the advantage of measuring worker incomes in a globally comparable basket of goods or unit of purchasing power. It has the disadvantage of being heavily affected by the evolution of the real exchange rate which, over the medium term, is largely a function of macro-economic balance and not economic integration. The second "home based" measure deflates each series by its home consumer price index and then forms a ratio. This measure is less affected by exchange rate movements and uses the basket of goods most relevant to the workers, and hence the local labor market as captured by the local CPIs. Neither is an ideal measure of convergence of wages, but both tell a similar story.[167]

[166] Hanson and Chiquiar (2002)

[167] Similar calculations were done using PPP adjusted series. Predictably, they fall between the two measures plotted here. The problem with the dollar-based measure is that should the exchange rate appreciate for reasons not directly related to the labor market in the short run, for instance, a burst in foreign investment, in dollar terms, Mexican wages will rise, but they may not move significantly at all in terms of domestic purchasing power. The series were taken from the Mexican statistical agency (INEGI) for the Mexican hourly production worker and CPI series and from the U.S. Bureau of Labor Statistics.

Box 4. Stolper-Samuelson

The logic behind the Stolper-Samuelson theorem is simple. Suppose we have two goods, X, where we use two units of labor for each unit of capital, and Y, where we use one unit of labor for each unit of capital. And suppose that before liberalization, Y was heavily protected. Liberalizing which lowers the price of Y relative to X, reducing and raising the production of each, respectively. If we produce one less Y, this frees up 1unit of labor and 1 unit of capital. To produce one more bottle of X takes that 1 unit of capital, but 2 units of labor. This means that there is excess demand for labor, and the wage must rise relative to capital. The logic is the same when the two factors are skilled and unskilled labor.

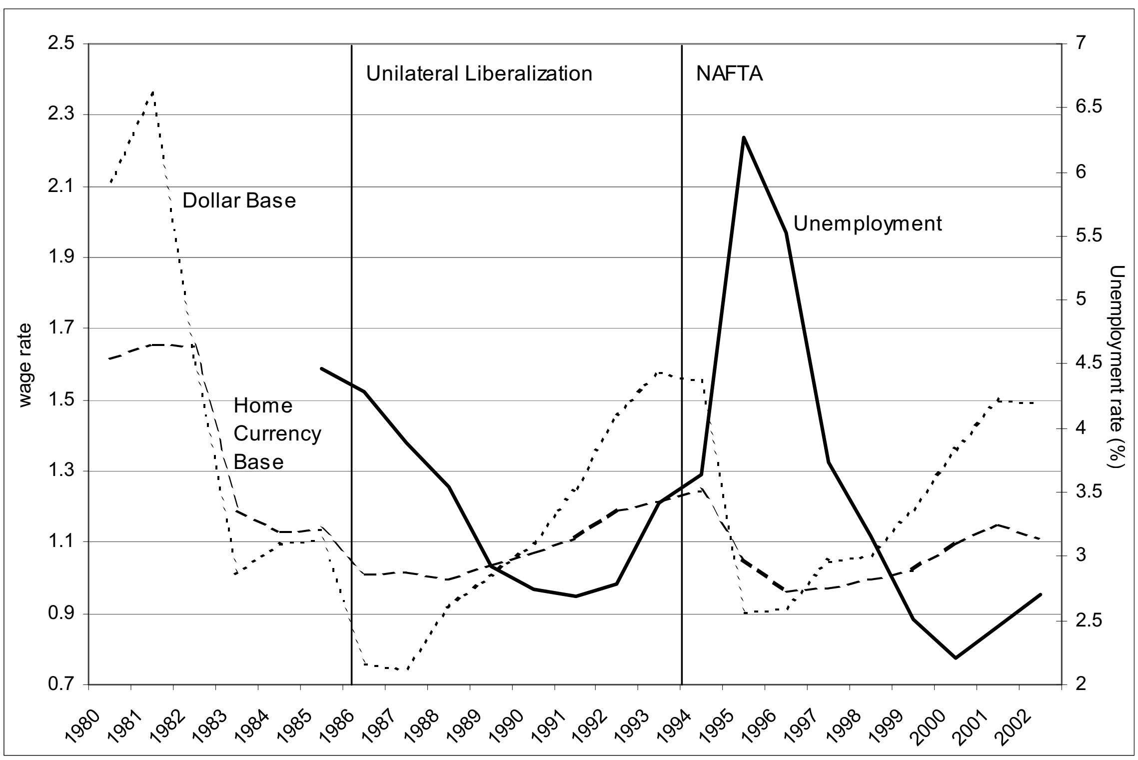
There are several reasons why the predicted result may not have occurred in Mexico and LAC more generally. First, as Leamer has noted, and has been documented in this report, Latin America does not export labor- intensive manufactures in general. Compared to the OECD, the region is unskilled labor abundant, but compared to Asia, it is not, and hence the Stolper-Samuelson effect may simply be reflecting that the "abundant" factor of production whose product price is rising is not labor-intensive goods, but resource-intensive goods.

Second, Stolper-Samuelson is fundamentally a long-term story where factors are fully mobile among industries. This leads to the counterintuitive finding that labor and capital should never be on the same side of a protection dispute: if capital is intensive in the industry, then more protection will help capitalists and hurt labor. Yet in real life we see both owners and unions resistant to lowering protection. This makes much more sense when we realize that in the short to medium term, both groups are tied to the sector, either by invested capital or specific skills, and hence are not mobile. Decreasing protection on existing unskilled labor-intensive products will lead to a fall in their wages relative to other factors.

Third, there are no intermediate factors or mobile factors of production in the HOS framework, yet one of the big influences of the trade reform was exactly to give firms access to better capital and intermediate goods. This could potentially have two very important effects. First, as Jones (2000) argues, if factors of production are mobile, the traditional Stolper-Samuelson results can be overturned under reasonable conditions, one being that the recipient country is actually not unskilled-worker-intensive relative to the world.

Finally, by construction, the theorem also holds only if technologies are similar, there are no factor intensity or demand reversals and if factor endowments are not very different, which is not a defendable assumption in the Mexican case.

Figure 4. Evolution of Real Mexican/U.S. Hourly Manufacturing Wages for Production Workers, and Unemployment



Source: Mexican Statistical Institute (INEGI) and U.S. Bureau of Labor Statistics.

Unfortunately the period across which we would want to test for convergence of wages among the NAFTA partners is one characterized by extraordinary macroeconomic fluctuations unrelated to trade liberalization that have taken Mexican workers and their families on a brutal ride since 1980. The difficulty of comparing levels is immediately obvious: both measures suggest that Mexican and U.S. wages were closest two decades ago in 1980, during the oil bonanza and before the debt crisis. The lost decade of the 1980s led to a sharp divergence where wages were roughly halved relative to those in the U.S.. This probably does not represent a process of dis-integration of factor markets through lower trade and investment flows, but that the overheated economy pushed wages above the level compatible with sustainable macro-policy and a sharp downward adjustment was inevitable.

Similarly, the unsustainable appreciation of the peso in the early 1990s exaggerates the workers' purchasing power in 1993-44 and the horrendous blow to Mexican households during the following crisis represents an extreme overcorrection of wages on the order of 25% in real terms in the opposite direction. The period from 1996-2000 represents a relatively rapid recovery relative, say, to the crisis in Argentina or Colombia where unemployment rates have remained in double digits for a decade. By 2000 open unemployment rates had reached their lowest levels since 1980 and real wages measured in Mexico or relative to U.S. wages (dollar base) has largely recovered. This is particular striking given a very sharp increase in female labor market participation over the same period. The strong rise in U.S. productivity and wages in the 1990s keeps the home currency base measure substantially below 1993 levels.

The crisis contaminates inference of the impact of NAFTA and makes any casual conclusions unreliable. Trade liberalization cannot be held responsible for the dramatic fall in wages. Nor can we attribute to it the rapid wage growth and employment creation after- the sharp devaluation of the peso is likely to have had a much larger effect although NAFTA likely did help by bringing in more FDI and perhaps stimulating exports. We cannot know what might have been the outcome if the peso crisis were not to have occurred, but we cannot, simply looking at figure 4 come to any conclusion about the impact positive or negative on the labor market due to NAFTA. For this reason, the next sections attempt less direct measures which may shed some light.

Estimating synchronization and convergence effects

One approach is to employ time series regression techniques that specifically attempt to measure convergence and control to the limited degree possible for crisis related effects. In one of the few papers to address the topic, Robertson (2000, 02) constructs a panel of synthetic cohorts from household survey data in both countries over the period 1987-1997 and then updated for this study.[168] Both his and other work takes an approach similar to that of chapter 1: convergence implies that cohorts with larger wage gaps vis a vis similar cohorts in the U.S. should catch up faster and hence show larger wage gains. In addition, as integration increases, overall wage growth in the U.S. should presumably be communicated more rapidly (see Box 5 for more details.) Robertson found wage changes in Mexico to be negatively correlated with the U.S.-Mexico wage difference, which suggests that over time wages in the two economies tend to converge. He also found wages to be strongly positively correlated with wage changes in the United States: a rise in U.S. wages by 10% is correlated with a rise of wages in Mexican interior cities by 1.8% and wages in Mexican border cities by 2.5%. suggesting that the border is more integrated with the U.S. economy. The implied rate of wage convergence was faster in Mexican border cities than in

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[168] Robertson takes mean wages by age, education level, region of residence, and time period to construct a panel of synthetic cohorts. The data used to estimate (1) and its variants are the same log wage means for matched U.S.-Mexican age-education cells. The data are quarterly and run from 1987 to 2001. The maximum number of observations possible is 14,400 (48 age-education groups, 15 years, 4 quarters per year, and 5 Mexican regions). Not all cells can be matched due to demographic differences between the countries and following age groups over time, so that the actual number of observations used in estimation is 13,145

Box 5. Estimating Convergence

Robertson (2000) estimates an error correction model

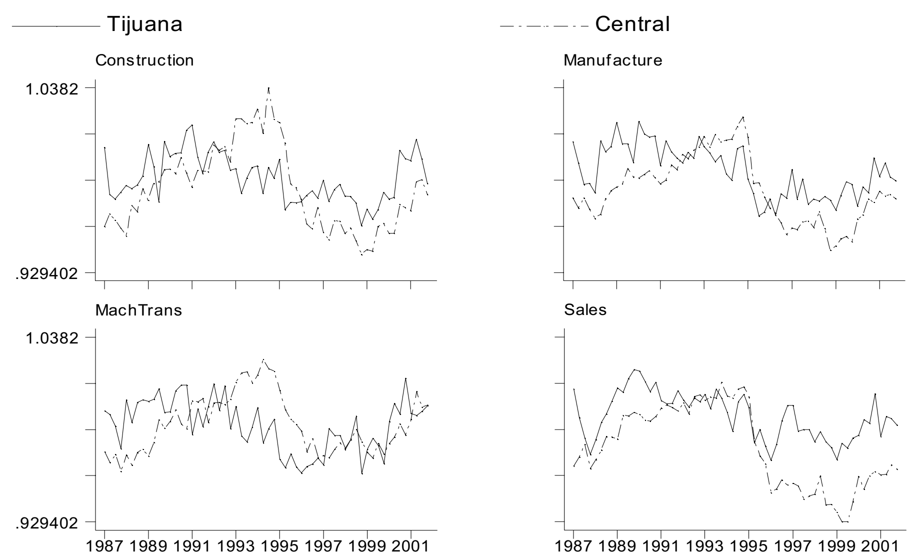
$$\Delta w_{jt}^{mex} = \eta_0 + \eta_1 \Delta w_{jt}^{us} + \eta_2 (w^{mex} - w^{us})_{jt-1} + e_t$$

The equation describes the relationship between the change in the Mexican log wage for group *j* (defined here as an age-education group) at time *t* , the change in the log wage in the United States, and the difference between the U.S. and Mexican log wage levels (the error correction term). In this approach, the η_1 term captures the effect of the U.S. wage shock on Mexican wages, and η_2 measures the rate of convergence back to the equilibrium differential. Larger differences between the two suggest a faster rate of return to the equilibrium differential. These two coefficients are measures of integration. More integrated labor markets should have larger coefficients (in absolute value). The effects of NAFTA are estimated by modifying the basic equation by including a dummy variable equal to 1 for the post NAFTA years (1994 and on). In addition to the main effect, this dummy variable is interacted with the shock and convergence terms. A possible objection to this approach is that is assumes that the wages will always converge to a fixed U.S./Mexico gap which seems unlikely given Mexico's history and inconsistent with long run convergence of wage levels among the two countries. On the other hand, Robertson argues that U.S. border policy in fact targets, to some degree, a constant differential.

Hanson (2002), in a similar spirit and using similar data, simply uses OLS to estimate the determinants of wage growth of the cohorts between the points 1990 and 2000 including, to begin, the difference term and a measure of the gap between comparable U.S./Mexican cohorts in 1990.

Mexican interior cities, the highest rates of migration, and the largest number of maquiladoras.[169] Somewhat puzzling, however is that as figure 8 shows that regardless of the degree of tradedness of the sector-transport equipment most traded and services and construction least, the impact of the Tequila crisis was far more moderate and shorter in duration on the border in Tijuana than in central Mexico. This is perhaps more consistent with migration integrating the markets than trade.

Figure 5. U.S./Mexico Wage Differentials by Industry, Proximity to U.S. Border



Graphs by Industry

Source: Robertson (2002)

[169] Hanson (2002) finds the very rapid rates of convergence—the equilibrium U.S.-Mexico wage differential being reached within one to two quarters—to be inconsistent with rising levels of trade, investment, and migration between the two countries which, in themselves, suggests incomplete integration and hence less rapid adjustment The rapid rate of convergence that Robertson estimates may be influenced by the high frequency of his data (which is quarterly) and the relatively short span of years they cover. If, in fact, we are observing a gradual transition to a new steady state, then his data would not be able to pick this up.

As surprising is that there is limited impact of NAFTA on convergence, except for educated workers.[170] Excluding 1987 and 1995 from estimation to compensate for the devaluations in those years, Robertson finds stronger impacts of U.S. wages and regional effects and a slightly stronger, although statistically again significant increase only for educated workers in the rate of convergence after 1994. More disturbingly, he runs a similar exercise by industry which in theory may be informative if shocks to demand in, textiles, for example, affect the labor market in Mexico through trade or FDI links. If local labor markets are well integrated, there is no particular reason to expect differential effects among industries.[171] Nonetheless, it is somewhat surprising to find no impact of U.S. wage changes on Mexican changes and strong convergence effects emerge only for the construction industries. Again, since this is generally considered non-tradeable sector the appearance of high linkages lends some support to the idea that migration is the largest integrating force. So also does his related finding that between 1987 and 1993 inter-industry wage differentials in Mexico became less similar to inter-industry wage differentials in the United States (which are very stable over time).

A similar exercise by Hanson (2002) further muddies the initial convergence findings. Focusing only on the determinants of Mexican wage growth between the two points 1990 and 2000 for a similar set of synthetic cohorts, there is no robust impact of the gap between Mexican and U.S. wages that would be expected for convergence (See table 7). In fact, during the 1990's, interior regions had higher wage growth for cohorts with *higher* initial wages-evidence for wage *divergence*-, an effect diminishing near the border (column b). Though there is still evidence that changes in U.S. wages are communicated to Mexican wages, the evidence for convergence is fragile. This may partly be due to the span of time between observations. Robertson's work suggests that most adjustment occurs in just over a year implying that a ten year period would miss the adjustment process. However, the evidence of growing wage dispersion is not surprising, given the rising returns to skill that we will discuss later. In fact, as column c suggests, including education cohorts virtually eliminates the impact of U.S. wages growth on Mexican wage growth. This suggests a common rise in the skill premium in both countries accounts for the apparent co movement in wages.

Geographical and direct trade/FDI/migration effects

Column a does suggest strong regional effects on wage growth rates with the north and capital growing especially fast and these seem to be linked to liberalization related phenomena. These effects almost completely disappear when a set of "globalization" variables is included in column d. The share of manufacturing in state GDP and agriculture does not enter significantly, consistent with recent evidence that there is no particular productivity growth advantage to manufactures over natural resources[172] What does enter significantly is the share of FDI in state GDP, and greater exposure to foreign trade suggesting that regions better integrated with foreign markets have experienced greater labor demand growth. The share of employment in maquilas enters positively but insignificantly as would be the case if there were no special effect of assembly operations (and no deleterious effect either) beyond the fact that they represent FDI. States with traditionally high migration rates also had especially high wage growth

[170] The sign of the interaction coefficients on the shock terms are often negative and are generally positive on the convergence coefficients. With the NAFTA effects, there is some some evidence of a small increase in convergence in electric machinery in the center, and faster convergence only in Tijana and Matamoras, again suggesting migration.

[171] Further, Robertson and Dutkowsky (2002) find that labor market adjustment costs at the 2-digit level of Mexican manufacturing are small—about an order of magnitude smaller than in developed countries so persistent differentials should be eroded. On the other hand, the phenomenon of inter-industry wage differentials has spawned a very large literature, and significant differences in industry wages persist in Latin America. These differentials are also highly correlated across developed countries.

[172] See, for example Lederman and Maloney 2003, Martin and Mitra (2001).

Table 7. Change in Log Wages 1990-2000 for Synthetic Cohorts, Males

	a	b	c	d
Mexico 1990 Wage - U.S. 1990 Wage	-0.027	-0.133 *	-0.015	-0.027
U.S. 2000 Wage - U.S. 1990 Wage	1.276 ***	1.202 ***	-0.046	-0.132
(Mexico 1990 Wage - U.S. 1990 Wage)*Border	-0.221 **	-0.067	0.05	0.008
(U.S. 2000 Wage - U.S. 1990 Wage)*Border	0.446	0.538	0.175	0.186
Border	-0.256	0.033	0.391 **	0.099
North	0.106 **	0.106 **	0.143 ***	0.05
Center	0.071	0.072	0.108 ***	0.052
Capital	0.105 ***	0.098 **	0.122 ***	-0.022
Yucatán	0.006	0.005	0.003	-0.015
Mexico Wage 1990		0.096 ***	-0.277	-0.374 **
Mexico Wage 1990* Border		-0.139 ***	-0.148 ***	-0.133 ***
Age Cohort 26-35			-0.031	-0.014
Age Cohort 36-45			-0.064	-0.032
Age Cohort 46-55			-0.099	-0.069
Education Cohort Grades 5-8			0.129 ***	0.143 ***
Education Cohort Grades 9-11			0.232 ***	0.264 ***
Education Cohort Grade 12			0.398 ***	0.45 ***
Education Cohort Grade 13-15			0.631 ***	0.697 ***
Education Cohort Grade 16			0.708 ***	0.818 ***
State GDP 1999 - State GDP 1993				0.143
Manufacturing Share of State GDP 1993-99				0.009
Agriculture Share of State GDP 1993-99				-0.159
Net FDI Inflow Share of State GDP 1994-99				2.821 **
State Share of National Maquila Employment				0.147
Import Share of State GDP 1993-99				1.506 **
Kilometers to Nearest U.S. Border Crossing				-0.014
Share of State Pop. Migrating to U.S. 1955-59				3.281 ***
No. of obs.	728	728	728	728
R-Squared	0.239	0.254	0.595	0.667

Source: Hanson (2002).This table shows regressions using as the dependent variable the 1990-2000 change in log wages for synthetic age-education-state cohorts of males in Mexico. Standard errors are in parentheses. All wage measures are in logs as is GDP used to calculate the 1993-1999 change in the variable. All share measures are entered in levels.

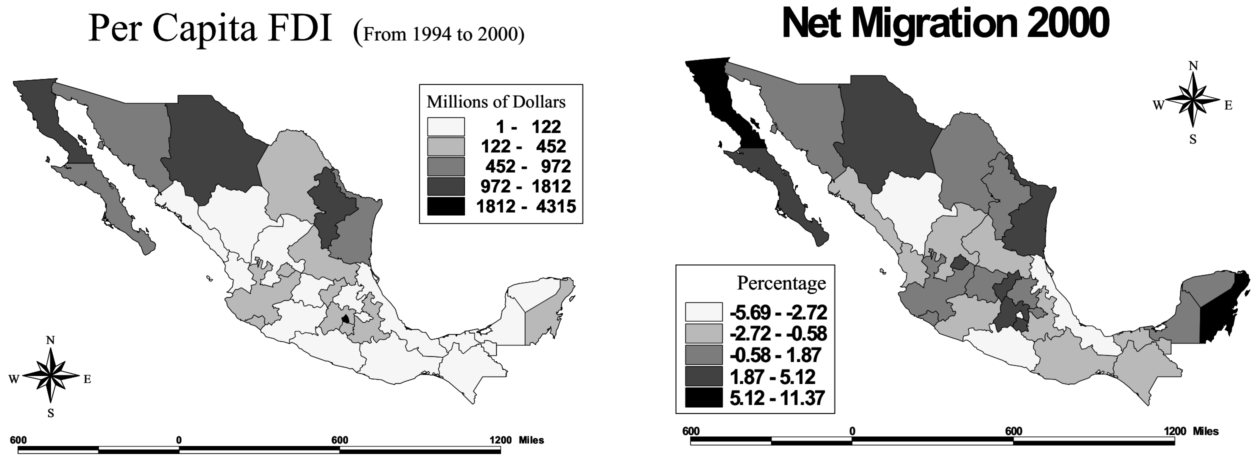
rates reflecting the greater integration of the labor markets or the role of migratory remittances in starting businesses.[173]

These findings are consistent with those that high levels of FDI, imports and, maquila value added in an individual Mexican state all increase migration to and deter migration away from it. Figure 6 suggests a broad geographic correlation in particular between FDI and migration which is found in the other variables as well. The principal channel through which these variables work is increased labor

[173] See, for example, Woodruff and Zenteno 2001. A large literature documents how particular Mexican states are more likely than others to send migrants to the United States and have been for many decades (see Woodruff and Zenteno 2002 for references). These states are mostly in an agricultural region in western Mexico. They are neither the poorest states in the country nor the states that are closest to the United States. Most research attributes these migration patterns to longstanding regional networks that help Mexican workers find jobs in the United States. The persistence of these migration networks suggests that historical migration flows are a good indicator of current regional opportunities for migration abroad.[173]

demand manifested in reduced unemployment and higher wages.[174] In principal, then, the idea that NAFTA would reduce migration by creating jobs enjoys some support. Though the poor quality of illegal migration data makes direct calculations of the impact on cross border flows difficult, a crude calculation holding total migration from any state to any destination including the U.S. fixed generates an elasticity of reduction of migration to the U.S. in response to a 10% rise in investment averages roughly 1.5%-2.5%.

Figure 6. FDI and Net Migration by State



Source: Aroca and Maloney (2002)

The high share of imports, FDI and maquila operations in the North are all part of a larger process of industrial reallocation that appears to have partially driven the spatial distribution of wages.[175] In 1980, five years before trade reform began, 46.4% of the Mexico's manufacturing labor force was located in the Mexico City and 21.0% was located in states on the U.S. border In 1993, after eights years of trade reform, the share of manufacturing activity in Mexico City had fallen to 28.7% and the share at the border had risen to 29.8%. By 1998, four years after NAFTA, Mexico City's employment share had fallen further to 23% and the border's employment share had risen to 34%. This had a striking impact on the shape of the wage gradient within Mexico. Generally speaking, regional relative wages decrease with the distance from Mexico City and from the Mexico-U.S. border. Prior to trade reform, a 10% increase in distance from Mexico City and the border was associated with a 1.9% and 1.3% decrease in the relative state nominal wage respectively. After trade reform, however, the effect of distance from Mexico City on state manufacturing wages weakens and the effect of distance from the United States strengthens. Since this

[174] When unemployment and wages are included in the migration equation, the impact of all of the "globalization" related variables is sharply reduced and in some cases, eliminated. Maloney and Aroca (2002)

[175] As Hanson (1996, 1997) discusses, models of interregional trade based on increasing returns to scale (e.g., Krugman and Livas, 1996) imply that economic activity will tend to agglomerate in a small number industry centers and that regional wages will decrease with transport costs to these centers. This latter result is due to a combination of congestion in industry centers, which drives up local housing prices relative to housing prices in outlying locations, and labor migration between regions, which requires that nominal wages in industry centers be sufficiently high that real wages are equalized across locations. Krugman and Livas (1996) show that two types industry centers emerge: a principal center (e.g., in Mexico City), in which firms produce for the domestic market, and a smaller center (e.g., at the northern border), in which firms produce for the foreign (e.g., U.S.) market. If these two centers are in different parts of the country, then trade reform will shift activity away from the industry center oriented towards the domestic market and towards the industry center oriented towards foreign markets. See Hanson, 1998 and Chiquiar, 2001.

tilting of gradient happened during a time of greater U.S. restrictions on migration from Mexico it is more likely to be due to trade and investment liberalization.[176]

The apparent tilt in wage gradient is also broadly consistent with work analyzing spatial patterns of Mexican growth using state level GDP[177] that finds a cluster of states with high per capita GDP income among the border states, and a low income cluster in Chiapas, Guerrero and Oaxaca in the south, far from either the capital city or the border (see chapter 2). However, in this case, there is little evidence for a smooth gradient flowing from the border south. The row of states behind the front line- Durango, Tamaulipas, Zacatecas and San Luis Potosi are not rich and do not appear to form a "convergence club" with the border states. Whether this same pattern will emerge for wages remains to be tested.

In sum, the mechanisms through which convergence is thought to work are confirmed in much of the empirical work to date- FDI, trade, and maquila presence all increase labor demand in an individual state, raising its wages, lower unemployment, and reducing out migration. Given this, perhaps the fact that aggregate measures of convergence are ambiguous should perhaps not be too distressing. The last decade has been an extremely noisy one from a macro economic perspective and extracting a clean result is difficult. However, it is also the case that there have been striking movements in the distribution of wages across skill groups whose roots are not known with confidence, but which add additional noise to the aggregate convergence regressions. We turn now to this phenomenon.

4.7.3 Increasing wage dispersion and the skill premium

The same Stolper Samuelson logic that predicts that trade liberalization should lead to a convergence of wages and returns to capital to those of trading partners applies to sub- categories of the labor force as well. Mexico is abundant in unskilled labor and relatively scarce supplies not only of physical, but human capital. The expectation would be then that liberalization of trade with the U.S. and Canada would lead to an increased demand for unskilled labor intensive goods relative to skilled labor intensive goods leading to a fall in the premium for skills, and an improvement in the distribution of wages. Even if levels of wages are too muddied by crises to tell clear stories, the distribution of wages may be less so.

However, since the mid 1980's, the reverse of the predicted evolution has occurred, a phenomenon found throughout the region as well as Europe and the U.S..[178] After the trade liberalizations of the 1980s wages of skilled workers rose sharply relative to those of unskilled workers.[179] Cragg and Epelbaum (1996) show that between 1987 and 1993, relative to the wages of workers with a primary education (grade six completed) wages of those with secondary education (completed grade nine) rose by 15% and the wages of urban workers with post-secondary education rose by 60%. The rise does not continue throughout the 1990s, though. Esquivel and Rodriguez-Lopez (2003) document the same rise in the ratio of the wages of non-production to production workers until 1996 before the series levels off or

[176] It is worth noting that Reyes, Johnson and Van Swearingen (2002) find no impact of this increased enforcement on actual migration rates.

[177] Aroca, Bosch and Maloney (2002)

[178] Robertson (2001) finds that the returns to education for urban workers rose from 0.035 in 1987 to 0.05 in 1994 and to 0.07 in 1998. See, for Argentina, Galiani and others (2001); Colombia, Santamaria; 2000); Chile, Robbins (1990); Costa Rica, Robbins and Gindling (1999); Mexico, Cragg and Epelbaum 1998; Montes Rojas 2001, and Uruguay, Sanguinetti and others (2001).Sanchez –Paramo and Schady (2002) find similar increasing skill premia for several liberalizing countries of Latin America.

[179] Esquivel and Rodriguez-Lopez conclude that during the period 1994-2000, the effect of trade liberalization on the wage gap was nil, suggesting that the very slight increase in wage inequality that occurred in this period was driven by technological progresss.

even declines, a pattern repeated if we simply look at the ratio of the 10% best paid of the bottom 10% (de Ferranti et al 2002).

Despite this levelling off after NAFTA, the issue is still critical for several reasons. First, we are interested in the impact of NAFTA in the context of overall integration with the U.S. including previous reforms so the pre-NAFTA period remains of interest. Second, the earlier dynamic may still be present during NAFTA, but masked by the crisis. Finally, as noted in table 1, the common co movement in skill premium seems to explain any overall co movement of U.S. and Mexican wages, identifying the roots of this increasing premium are important to the issue of overall integration of wages in levels as well.

That said, there is as yet no consensus on those roots beyond the fact that they are relative demand, not supply phenomena. [180] Staying within the Stolper Samuelson theorem, several factors suggest themselves as possible explanations. First, prior to liberalization, labor-intensive sectors had the highest tariff and non-tariff barriers and hence experienced *falls* in their prices. Initial tariff reductions in Mexico due to NAFTA have been larger in more-skill intensive sectors, raising the possibility that in the late 1990's trade reform may have halted the increase in skill premia as crude comparisons suggests has been happening.[181] It is also the case that, though Mexico is unskilled labor abundant relative to the U.S. and Canada, this is not the case with respect to the emerging competition in the far east. Hence, SS may be predicting correctly given the new trade patterns.

Skill biased technical change

However, the phenomenon is so widespread that such specific policies are unlikely to be capturing all relevant effects. Skill biased technical change, unrelated to trade is the dominant explanation for the rising differential in Europe, the U.S. and in Argentina, Brazil, and Colombia[182] and there is some support for this view in Mexico. Firms that invest in research and development or training of workers tend to have wider spreads between skilled and unskilled workers than firms that do not and consistent with studies of the OECD, firms with greater access to technology have, overall, a higher demand for skilled workers. [183]

These phenomena may, in fact, be more related to trade liberalization in the developing countries than in the advanced countries, although the evidence is far from certain. Figure 7 suggests that exposure to global competition is associated with higher wages after adjusting for education, and hence demand for unobserved skills. The bar on the extreme left represents the third of workers in import-competing industries that are most exposed, measured as the dollar value of imports per worker and exposure decreases moving toward the middle bar which represents non-tradeables such as services or commerce.

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[180] Most studies employ the methodology of Katz and Murphy (1992)to separate the two possible causes. See for Mexico Cragg and Epelbaum (1995) Lopez-Acevedo and Salinas 2000 and by Sanchez-Paramo and Schady (2002). Similar findings by Sanchez and Nunez (1998) and Robbins (1994) for Colombia, and Meller and Tokman (1996) for Chile. A now substantial U.S. and European literature has found similar phenomena there.

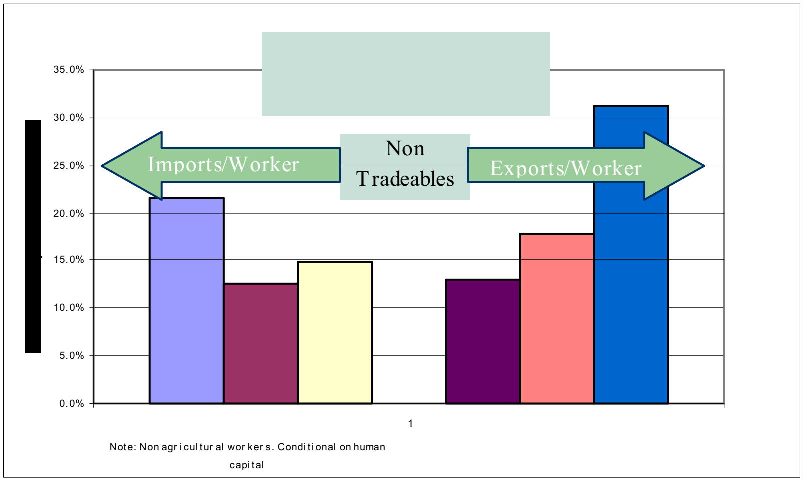
[181] See Hanson and Harrison (1999) and Robertson (2001) De Ferranti et al (2002)

[182] See Abrego and Whalley 2002 for a review. Sanguinetti and others find that import penetration increases inequality in Argentina, although Galiani (2000) finds that this can account for only a small share of the increase. Santamaria (1999) finds a similarly small effect for Colombia. Blom, Pavcnik, and Schady (2001) show that in Brazil, after controlling for workers' personal characteristics, wages rose in the industries where tariffs experienced larger reductions, but they do not find any correlation with inequality. Similarly, Sanguinetti and others (2001) find no connection in Uruguay. Most recently, Behrman, Szekely, and Birdsall (2001) find for 18 Latin American countries during 1977–98, that technological progress, rather than trade flows, appears to be a channel through which reforms affect wages.

[183] Tan and Batra (1997) Lopez -Acevedo (2001) see also Esquivel and Rodríguez-Lopez.

The right three bars capture increasing exports per worker moving right. What jumps out immediately is a U pattern where those industries most exposed to competition pay higher wages.

Figure 7. Wages Adjusted for Human Capital by Degree of Exposure to Foreign Competition



Source: De Ferranti et Al (2001)

In firm level studies, external competition is associated with the adoption of new technologies and these, in turn, require training and skill upgrading. The tripling of manufacturing exports observed during the 1990s has been associated with increased rates of adoption of modern production technologies, an acceleration of productivity growth, and a relative increase in the demand for skilled labor. Between 1992 and 1999, the rates of adoption of modern manufacturing technologies were not only higher among exporters than non-exporters, but also increased more rapidly. Firms also show higher rates of both human capital and skill building prior to entering export markets, and there is an association between plant-level efficiency (TFP) and exporting. To the degree that these additional skills are not captured by the fairly standard and imprecise human capital variables, more open industries will appear to pay higher wages as suggested in figure 7. [184] Further, these industries may also pay higher than market clearing or "efficiency" wages to hold onto workers who they have trained. The inability of these micro studies to establish causality- whether more technologically able firms are taking advantage of new trade opportunities or whether, in fact, more trade caused technological upgrading—means there may be no necessary contraction with the findings from Europe, the U.S. and Brazil, Colombia and Chile noted above that trade did not drive the skill premium is that they have difficulty telling us

Finally, studies using household data have found a correlation between the wage premium with technology embodied in trade measured by Keller's measure of trade weighted technology imports correlated with the skill premium.[185] This measure does have the odd property that the technological transfer effect appears counterintuitively to decline with distance- that is European embodied technology has a lower impact than U.S. (see innovation chapter). It may not be trade per se, but the relationships among firms or individuals that is responsible for technology transfer and is simply being proxied for by trade variables. This does not imply that the widening skill differential is unrelated to liberalization or NAFTA, only that the impact may be through encouraging firms to look outward more generally than trade itself.

[184] Lopez-Acevedo (2001a) Audretsch and Lopez-Acevedo (2001) Hallberg and Tan (1998)

[185] Schady and Sanchez-Paramo (2002)

FDI and outsourcing

Increased outsourcing to Mexico by foreign firms may also explain the observed outcome. [186] A large fraction of U.S.-Mexico trade in manufactured products is the result of U.S. multinational firms establishing maquiladoras in Mexico. In 1995, exports by maquiladoras accounted for 40.2% of all Mexican exports to the United States and grew to account for to 25.1% of manufacturing employment in 1997. While U.S. firms have relocated the low skilled aspects of the production process below the border, these processes in fact are relatively skill intensive by Mexican standards. In regions where maquiladoras are concentrated, maquiladora growth can account for over 50% of the increase in the skilled labor wage share that occurred during the late 1980's. While foreign outsourcing also appears to have contributed to rising wage inequality in the United States its impact on Mexico appears to be far more substantial. More generally, FDI is likely to have an impact on the differential although the empirical studies to date are inconclusive.[187]

Migration

Migration may have also played an important role in the skill gap. There is a substantial literature on the labor-market consequences of immigration in the United States that suggests that immigration has at most put slight downward pressure on the wages of low-skilled U.S. native workers.[188] However, the impacts may have been larger on the Mexican side. Mexican immigrants, while much less educated than U.S. natives, are on average more educated than residents of Mexico. The most likely group to migrate are individuals with 12 to 15 years of schooling and removing this relatively large number of individuals from the middle of Mexico’s wage distribution, may contribute to raising wage dispersion in the country.[189]

Labor-market institutions

Another factor potentially driving the wage distribution as well as the rapidity of convergence to U.S. wages is the degree of flexibility of the labor market, and how it may have changed across the liberalization process. For instance, the process of privatizing and deregulating state owned enterprises, and in general exposing firms to greater external competition may have altered the bargaining power of workers. The same may have occurred in the various Pactos and policies taken by the government that urged firms to exercise restraint in raising wages and prices during Mexico’s inflationary period of the late 1980’s and early 1990’s.

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[186] See Feenstra and Hanson (1996,1997, 1998)

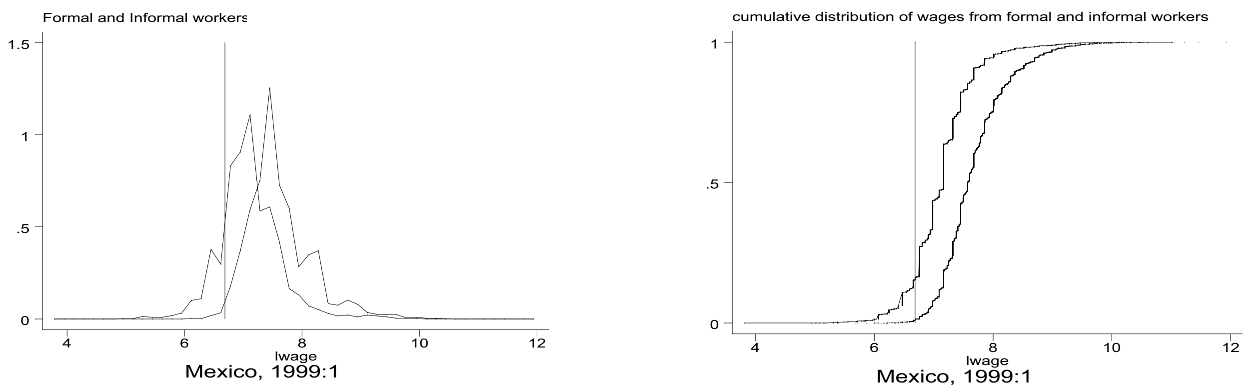
[187] Aitken, Harrison, and Lipsey (1996) find that, controlling for plant, industry, and region characteristics, manufacturing plants that are foreign owned pay their skilled workers 21.5% more and their unskilled workers 3.3% more than plants that are domestically owned. On the other hand, using firm level surveys, Maloney and Ribeiro (1999) find the reverse, that skilled workers are paid 2-5% more and unskilled 2-17% more for union and non-union firms respectively.

[188] For surveys see Smith and Edmonston, 1997, and Borjas, 1999., Borjas, Freeman, and Katz, 1997, There has also been research on the performance of Mexican immigrants in the United States.See Cornelius and Marselli (2001) and Durand, Massey, and Zenteno (2001) on the changing characteristics of Mexican immigrants in the United States.

[189]Chiquiar and Hanson reach this conclusion by constructing counterfactual wage densities for Mexican immigrants, which show the distribution of wages that would obtain were Mexican immigrants in the United States paid according to the wage structure of Mexico. Comparing this counterfactual wage distribution with the actual wage distribution for residents of Mexico, it appears that male Mexican immigrants in the United States would tend to fall disproportionately in the upper middle of Mexico’s wage distribution.

One by-product of Mexico's incomes policies was a steep decline in the real minimum wage of 45% across the 1980s and by the mid 1990s it was only binding among informal salaried workers.[190] The first panel of 5 offer kernel estimates of the density function with a vertical line to mark the location of the minimum wage. The second panels are the cumulative distributions of wages. The informal and informal wage distributions are plotted in light and dark lines respectively.[191] In each graph, a "piling up" of the probability mass around the minimum wage suggests that the policy has, in effect, forced a change in the distribution. Both graphs suggest that, in the formal sector, the minimum wage is not strongly binding although in the informal sector, it is. This may reflect a "lighthouse" effect where what informal workers consider to be the "fair" wage is indexed off the minimum. This lack of relevance to the formal sector distribution appears even prior to 1990 when plant level employment seemed unaffected by minimum wages. Changes in the minimum wages probably had little effect on wage structure overall.

Figure 8. Impact of Minimum Wages on Wage Distribution



Source: Maloney and Nuñez (2000)

Whether unions have become less powerful, and whether their power was previously exercised in the search of higher wages for the less educated is less clear. Before NAFTA 83% of manufacturing firms report at least some union representation, and among these the average fraction of workers that are unionized is 68%. Part of the observed proportionately greater dispersion occurring in the union sector could be due to losses in union power to set wages.[192] This would be consistent with the finding that from 1984-1990, which spans the first period of liberalization, both production and non-production workers in manufacturing plants experienced a fall in their wages relative to U.S. workers with the fall in protection that was roughly equal, a finding inconsistent with Stolper Samuelson, but also not helpful in explaining the increasing skill gap.[193] Further, the declining Mex/U.S. differential might not reflect diminished union power per se, but simply that increased competition reduced monopoly rents that unions previously were

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[190] On wages in the informal sector in Mexico see Marcouiller, Ruiz de Castilla, and Woodruff (1997), Maloney (1999, 2002). Bell (1997) finds evidence of substantial non-compliance with minimum-wage laws in informal-sector workplaces although, figure 8 speaks for itself. She also finds no impact on firm hiring.

[191] Informal sector is defined in each country either by whether a salaried worker is un-affiliated with social security systems, or works in very small firms (around 6 or less)

[192] Fairris (2002).

[193] Revenga and Montenegro (1998) regress the log ratio of average wages in Mexican plants to average wages in the corresponding U.S. industry on average industry tariffs in Mexico, average industry import license requirements (a measure of quota coverage) in Mexico, value added per worker in the Mexican plant, capital per worker in the Mexican plant, and dummy variables for the industry and for the year. A 50% reduction in tariffs would be associated with a 3.7% reduction in relative Mexico-U.S. wages for production workers and a 4.3% reduction in relative Mexico-U.S. wages for non-production workers (where the difference in the estimates for the two samples is not statistically significant).

able to bargain for a share of. More fundamentally, Mexican unions appear to use their power more to affect levels of employment, but not wages except to put a floor under wages of each skill class.[194] This would be reasonable if, given the limited reach of unemployment support programs employment is more valued than wage gains.

These ambiguous findings, combined with the fact that the rising skill premium has appeared in countries with a wide variety of labor market structures suggests that this is probably not the place to look to explain the evolution of the wage distribution. The very weak linkages through trade, both in Mexico, elsewhere in the region and in Europe and the U.S. suggests that the opening process more generally- through FDI and greater contacts with firms abroad- may have led to greater rates of transfer of skill biased technology.

This topic merits two final observations. First, the rising skill premium, to the degree that it is being driven by the creation of more demanding jobs that will be more satisfying to workers over the longer term, is preferable to the alternative. The challenge is to ensure that the educational system is able to generate workers with the necessary skills.

Second, neither the increasing wage dispersion nor other liberalization factors appear have translated into worsening household income distribution. Table 8 reports two sets of Gini statistics measuring household inequality, the first from a recent World Bank report entitled *Inequality in Latin America and the Caribbean: Breaking with History?* and the second the official Mexican statistics. There are definitional differences so the absolute levels are not necessarily comparable. But the trends are similar. In both series, in the period of increasing trade liberalization to just after the tequila crisis, there appears to be a decrease in inequality, then in the recovery after, a slight increase. But taking the 1992 numbers as pre-NAFTA and compare them to either to 2000 or 2002, there appears to be a decrease over the period overall. Again, with the noise from the Tequila crisis, and without controlling for other factors, it would be difficult to attribute this with any confidence to trade reforms.

Table 8. Evolution of Household Inequality

	Gini (World Bank)	Gini(Mexican Gov't)
1992	55.9	47.5
1996	54.4	45.6
2000	54.6	48.1
2002	NA	45.4

Source: De Ferranti et al (2003) for World Bank, INEGI web site for Mexico

4.7.4 Other measures of labor market performance

Though the rising wages and historically low unemployment figures cast some doubt on the argument that NAFTA has reduced overall employment, some observers have argued that trade liberalization and NAFTA more specifically have led to decreases in certain types of employment, and more generally to an erosion in the quality of work. On preoccupation is that trade liberalization has contributed to the rising number of "informal" workers—those unprotected by social security and health benefits.[195] A second is Rodrik's (1997) concern that the increased competition leads to a greater product

[194] Maloney and Ribeiro (200) find some impact at the 20th regression quantile. This suggests that unions assure a minimum pay level *for each skill class,* but no obvious bias in favor of those with less skill.

[195] Conceptual and statistical definitions of the informal sector are not as clear-cut as one might expect because of its characteristically diverse and complex nature. In this section, the informal sector includes three groups of workers: (i) employers who hire at most 15, or in most cases less than five paid workers, with or without apprentices; (ii) self-

demand elasticity which, through Marshall's Iron Law of Factor demand, translates into greater own wage elasticities of demand. This, in turn, means shocks are more directly translated to the labor market than previously leaving workers facing more aggregate risk.

Job creation and destruction

Trade liberalization leads to a better allocation of workers from sectors with little future in the global economy to those to those more in line with a country's comparative advantage. The actual impacts are not always so easy to measure and we examine only two that have received special attention. For a more complete treatment of issues of job quality see de Ferranti et al (2002).

Export Processing Zone Work: Figure 9 plots the level of employment in export oriented maquilas and a measure of rural employment over the last twenty years. Export processing sectors have generated high rates of employment growth, rising from under .5% of employment just before the 1987 liberalization to just over 3% at their peak in 2000. The graph suggests that there may have been an increase in the rate of job creation in the sector after 1995 although this is partially due to the substantial depreciation of the Peso. The overall impression from the limited data is that these are considered good jobs for modestly educated people, a view supported by admittedly small surveys,[196] and the rising concern within Mexico that they are being lost to lower wage Asian locales. Recent studies suggest that pay is higher than comparable sectors, the jobs are desirable and, in fact, among women's groups the concern is that men are crowding women out of these jobs.[197] The literature suggests considerations a combination of job security, low skill demand, flexibility in managing home and child responsibilities, and a rapid route to financial autonomy as attractive to the overwhelming majority of the workforce that is female.[198]

The high degree of homogeneity of product, and the strong competition with Asia, means that Marshall's fundamental law of labor demand holds ferociously in this industry. A very high elasticity of product demand means there is relatively little latitude for raising wages without corresponding increases in productivity. Electronics producers in Guadalajara report a very slim margin (3 percent including transport) over Malaysia in electronics assembly, and the source of their comparative advantage lies in the ability to respond quickly to customize machines within days, which the Asian manufacturers cannot do. The loss of some of these jobs may be welcome. The now established Asian NICs went through a process of graduation from low wage low skill industries to those requiring higher skill higher quality work forces. However, to the degree that it reflects, for example, new reasonably educated and very low cost Chinese capacity coming on line with the increasing global integration of that country, it represents a major challenge for the Mexican labor market.

Rural employment: Concerns about the impact of trade and in particular NAFTA on the rural areas has focused both on the potential adverse impacts on rural employment, and on the quality of new jobs created. Unfortunately, Mexico's surveys do not permit trustworthy evaluation of the impact of

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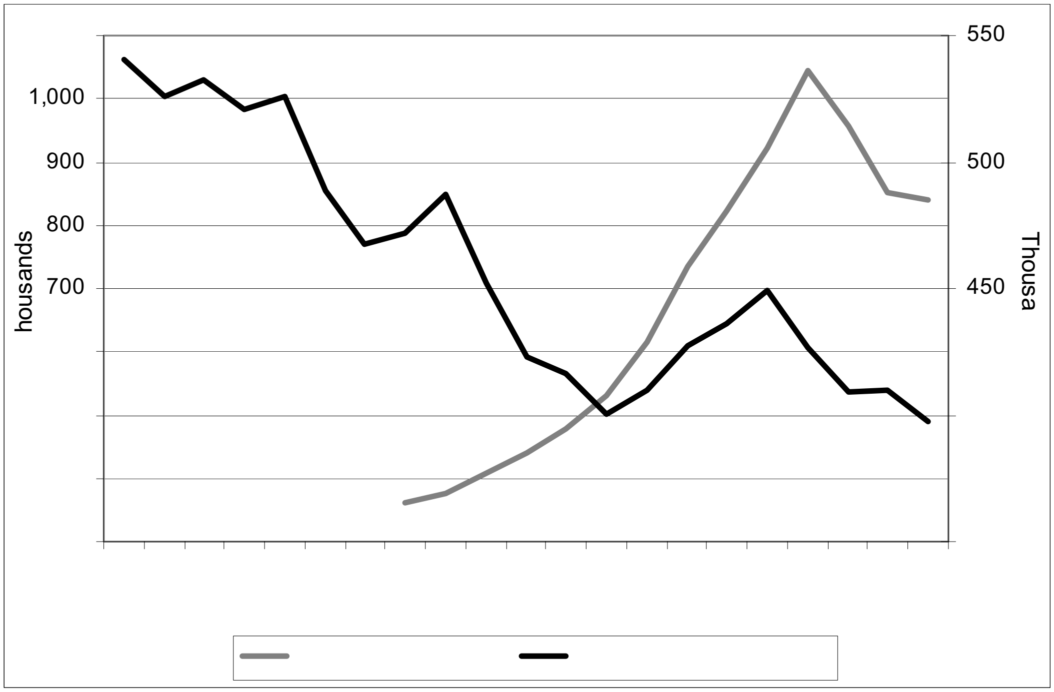
employed workers who own and operate one-person businesses alone or with the help of unpaid workers, generally family members, and apprentices; and (iii) employees in these microfirms regardless of their degree of protection. Alternative definitions of the informal sector focus on the issue of "protectionism," and thus include owners or workers in firms of fewer than 15 employees who do not have social security or medical benefits.

[196] Sargent and Mathews (1999).

[197] Fleck (2001) finds that in 1998 maquila hourly earnings were 2.6 percent lower than Mexican wage workers in other sectors, but benefits averaged 8 percent more, leaving maquila workers ahead. More recently, Brown (2001) finds that women and men who work in maquilas earn 38 percent and 31 percent, respectively more than their counterparts in non-maquila manufacturing.

[198] Fussell 2000 UNIFEM 2000 Chant 1991; Sargent and Matthews 1999.

Figure 9. Jobs in the Maquila and Registered Rural Sector (in thousands)



Source: Mexican Government, INEGI and the Mexican Social Security Institute (IMSS)

NAFTA on the sector. The National Employment Survey (Encuesta Nacional de Empleo) is available only since 1988 and has a significant change in methodology that makes comparisons before and after 1994 suspect. As an alternative although imperfect measure, figure 9 graphs the employment of workers registered with the social security administration. Though this measure almost certainly misses subsistence farmers, what it suggests is that employment in the rural sectors has been falling steadily across the 1980s and that, if anything, the rate of job destruction slowed with the devaluation and recovery of the post NAFTA period.

Further, the limited available evidence at a micro economic level suggests that subsistence farmers were substantially less affected by NAFTA than was expected. For example, NAFTA calls for a gradual (15-year) phase-out of price supports for corn staples. Taylor (2001) undertook some simulations of the impact this would have, and then compared it with detailed surveys at the village level in Michoacan. When perfect integration of the small farmer economy with the national and international market is analyzed in a village level computable general equilibrium model (CGE), the 18 percent real drop in the support price for white corn between 1994 and 1997 was predicted to lead to a massive fall in output of 26 percent and an increase in migration to the U.S. of 4 percent. However, in fact, what was observed was that corn output declined only slightly, from 18.13 to 18.02 million metric tons, and neither rural incomes nor migration to the U.S. were greatly affected. (see chapter on Remaining Barriers to Trade). The reason he argues is that rural *campesino* communities are much more diversified than thought, and face very high transaction costs getting their crops to market, making prices locally determined and not internationally.[199] Simulating this relative isolation from the market in the model by

[199]Taylor (2001) In a sample of 196 households in the central Mexican state of Michoacan, a number of surplus-producing farmers sold their excess production locally, rather than selling to the government at the higher guarantee price. When asked why, most responded that it was too costly to transport their harvest to the nearest government (CONASUPO) purchase point, approximately 40 miles away. Others cited cases in which neighbors had paid to transport their maize, only to have it rejected on the grounds that the quality was not sufficiently high or the silo was already full; this added marketing uncertainty, discouraging farmers from selling unless there was a sufficient price

allowing prices to be determined locally, production actually increased, due to the impacts on consumption of the transfer from PROCAMPO.

Some of the factors which isolate rural communities from the heat of international competition, however, have also kept them among the poorest Mexicans and prevented them from taking advantages of what new opportunities are offered by trade reform. Subsistence farming is very low productivity agriculture that does not offer long term potential for exit from poverty. The limited evidence suggests that earnings in non -traditional agricultural sectors- flowers in Ecuador and fruits in Chile- tend to be higher than other wages in rural areas.[200] However, this more optimistic picture seems hard to square with, for instance, the situation of indigenous migrant workers in Sayula, Jalisco, roughly an hour from Mexico's Silicon Valley in Guadalajara, where working conditions are indeed harsh and have been subject to human rights investigations. As is the cases of maquila workers, the available evidence suggests that workers do consider these jobs to be better than their next best alternative.[201] However Mexicans might reasonable hope for something better. Unfortunately, the migrants to Jalisco are very poorly equipped for more sophisticated jobs and more generally competition in the global market place. At the most basic level, only 55 percent spoke Castilian making coordination difficult even in the tomato business. As with other indigenous groups, they have among the lowest level of literacy, and the need to put their children in the fields perpetuates low educational attainment.

This also partly explains why little of the arriving FDI gone to the states with the highest indigenous populations. There is a statistically negative relationship between the percent of the population that speaks an indigenous tongue, and FDI[202] although the effect appears completely due to the correlation with being distant from the U.S. and low levels of education. That said, Yucatan and Quintana Roo, which have ready access by sea to U.S. markets, have higher than predicted FDI, suggesting that indigenous language or culture need not be a barrier to participating in emerging industries.

The overall picture the emerges it that the poor infrastructure, geographical distance, and even cultural norms that often isolate indigenous communities prevent ready access to the new opportunities offered by the global marketplace, but also has given them time to adjust to the inevitable long run competition on the import side. This time can be used to both raise the quality of education and to think through appropriate strategies of growth that maintain to whatever degree possible, cultural integrity.

Unemployment and informality

Looking again at figure 1, it is difficult to infer any secular increase in unemployment after NAFTA. There is no apparent rise in unemployment after recovery from the crisis compared the 1987-1994 period- in fact, unemployment reaches its lowest level in decades. This is consistent with global comparisons which suggests that there is no long term relationship between openness and unemployment (see De Ferranti et al, 2001). Nonetheless, it may be argued that the low unemployment figures disguise a

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spread to cover not only transportation but also an implicit marketing risk premium. Some farmers complained that, lacking their own vehicles, they would have had to sell to intermediaries at a price below the guarantee price (reflecting the high transaction costs and marketing risks in this region).

[200] See De Ferranti et al (2001)

[201] The System for the Integral Development of the Family (2000) jointly with the National Autonomous University of Mexico interviewed 728 migrant families in the Sayula area as to their reasons for leaving their home areas in Veracruz, Guerrero and Oaxaca, three of the poorest states in Mexico. 53% percent said they lacked good work, 27 percent that they needed money, 15 percent wanted to travel to other places, 3 percent had no, bad or contested land. But, importantly, only 1 percent said they were deceived by the contractor who brought them to Jalisco. This, combined with the recurrent seasonal nature of the jobs and well-developed information networks, suggest that migrants knew about the conditions they would find and were so poor as to chose to take the jobs anyway.

[202] Aroca and Maloney 2001

persistent and increasing level of underemployment or unprotected employment of poor quality. One view sees the "informalization" of employment occurring as global manufacturing networks seek to control costs by reducing worker benefits: large- and medium-size firms facing international competition, or multinationals themselves, outsource production to informal small firms, including home-based and self-employed micro entrepreneurs.[203]

The evidence to date is less pessimistic. To begin, repeated micro enterprise surveys suggest that 65% of informal firm owners report entering the sector voluntarily for higher earnings or more flexibility, and the vast majority (90%) remain oriented towards the domestic market. [204] In fact, a similar U shaped relationship to that in figure 7 appears between degree of industry exposure to external competition and share of formal workers in the industry- more exposed sectors show fewer informal workers. Further, the number of micro firms reporting links with large firms that might be international has actually fell from 2 percent in 1992 to 1.5

in 1996 and those connecting with larger firms appear to do relatively better.[205] Micro firms whose clients are large firms, or those located in areas with high direct foreign investment, earned roughly 25 percent more than their comparable counterparts, and those with large suppliers do better than comparable firms by roughly 10 percent. [206] Arguably, it is the *isolation* from markets more generally and from public institutions that is the larger problem.[207]

The largely voluntary and non tradeables nature of the sector suggests that movements in the sector size over the last decade may be better described as outcomes of the macro evolution over the last decade in the spirit of standard tradeable/non tradeable small economy or "Australian" models of the economy.[208] Figure 9 plots the ratio of the number of formal sector workers relative to the number of informal workers, their relative incomes, and the real exchange rate. In a traditional dualistic or segmented view of the informal sector, we would expect to see the two labor market variables move against each other: a rise in the formal sector wage, perhaps due to an increase in minimum wages or increased competitive pressures, forces workers into the informal sector and drives down the informal wage relative to the formal. But what is striking is that in Mexico, these series move together in the beginning of the 1990s, and at the same time that the exchange rate is appreciating. This suggests that the dramatic rise in informality during this period was driven by increased opportunities in the nontradeables

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[203]Castells, Portes, and Benton (1989) Borrus and Zysman 1997

[204] To say voluntary is not to say well-off or even happy, only that in a market without segmentation, this option was deemed better than alternative jobs in the formal sector. For a review of thinking on the role of the informal sector (see Maloney 2002).

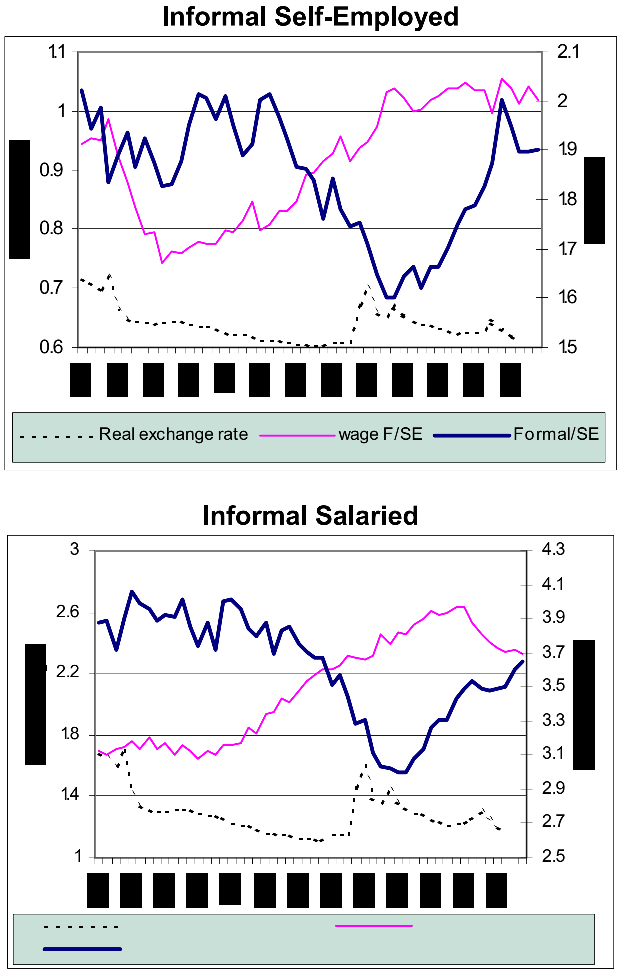
[205] Sanchez and Yoo 2001.

[206] The very small fraction of these who are homebased do tend to earn about 20% less, this is likely to represent to cost of more flexible work arrangements for the overwhelming share who are female with familes. (Cunningham and Ramos 2001).

[207] For a more complete discussion of micro firm dynamics and informality, see Fajnzylber and Maloney (2002) Microenterprise Dynamics and Growth and ch 5 of De Ferranti and others (2001) From Natural Resources to the Knowledge Economy.

[208] Fiess, Fugazza, and Maloney 2001 use a multivariate Johansen approach (Johansen 1988) to explore cointegration relationships in relative earnings, relative sector size and the real exchange rate and formulate hypotheses to identify the degree of segmentation in the labor market in Mexico, Brazil and Colombia. Positive co-movements between relative wages and sector sizes is attributed to segmentation, while a negative co-movements of relative wages and sector sizes is classified as integration. Different labor market regimes are empirically identified with LR-test on the coefficients of the cointegration vectors. 1987:Q1 to 1999:Q1 for Mexico. For Mexico the test of integrated markets cannot be rejected prior to 1995. Tests of the stability of the cointegration space suggest the possibility of different relationships in different sub-periods. This finding is consistent with the argument that rigidities in the formal sector may bind in some periods and not in others depending on the macroeconomic environment.

Figure 10. Relative Formal/Informal Sector Sizes and Incomes and the Real Exchange Rate



Source: Fiess, Fugazza, and Maloney (2001).

sectors that expanded across this time. In the period of the strengthening peso, there does seem to be evidence of an increase in informality concomitant with a decline in relative informal income in Mexico from 1992 to 1994 that suggests segmentation arising from nominal rigidities presenting difficulties in adjusting to further shocks. This tendency is sharply reversed after 1995 as the share of the work force in formal employment increases sharply again, rising towards traditional levels. In the same way it is unreasonable to attribute the sharp wage declines after NAFTA to trade liberalization, so it is also to attribute to NAFTA the any increasing informalization of the work force. Preliminary work suggests that there is a secular increase in female employment in the informal sector across a similar period. However, it appears to be largely driven by the striking increase in female labor force participation.

Increased labor market risk

A final concern is that more competitive product markets are likely to lead to a greater sensitivity of the labor market to shocks: NAFTA would make life riskier for Mexican workers. For on going firms, Marshall's "iron law" of factor demand suggests that a higher product elasticity will translate into greater own wage demand elasticities. However, As box 6 points out, the theoretical case is not clear cut, and there is little evidence of the effect from liberalization experiences in Chile, Colombia or Turkey and only

Box 6. NAFTA and Marshall's Fundamental Law of Factor Demand

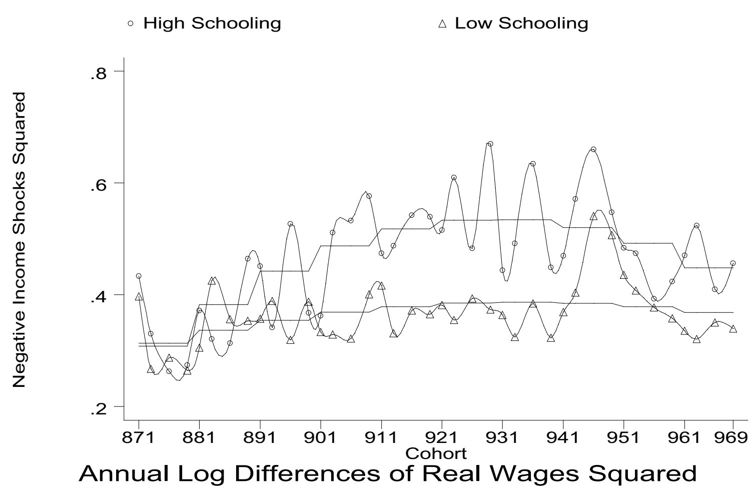
Beginning from the standard neoclassical model of the firm with linear costs in a competitive context 1894 Alfred Marshall derived a simple "fundamental law of factor demand" that describes the relation between employment and the cost of labor:

$$\div L \mid \; \zeta \div w \, 2 \, \xi \frac{w^* L}{P} \div w$$

The first term on the right-hand side simply measured the ease of substitution with other factors—machinery, for example. But the second term measured how much a rise in the wage translated into a rise in the cost of the finished product through labor's share in the price of the good. Then N, the product elasticity of demand, would tell by what percent output would fall with a 1 percent rise in product price and, hence, proportionally how much demand for labor would fall. When a firm sells a very common object that many people sell—tomatoes, nondescript textiles, or even basic computers, for example—it faces perhaps an almost infinite N. This means even very small rises in labor costs cause a very large fall in employment. But more generally, any increase in product elasticity through trade liberalization will be translated into the own wage elasticity. This implies that any product market shock is communicated more directly to labor markets increasing the risk workers face. As Fajnzylber and Maloney (2002) note, this "Iron Law" is in fact less rigid when the assumption of linearity of costs and perfect competition are relaxed and the actual impact of liberalization on demand elasticities may be indeterminate.

weak evidence from Mexico after the first wave of reforms in 1987.[209] The literature is very ambiguous about what the impact on firm entry and exit should be with the changes in competition, uncertainty, barriers to entry surrounding trade liberalization though existing studies from Colombia and Chile do not suggest large effects. Looking at household panel surveys that permit following workers across five quarters (ENEU), any increase in labor market volatility seems marginal. Figure 11 suggests that the square of negative shocks to both skilled and unskilled workers wages rose after 1987 but has been decreasing since the crisis and NAFTA. There seems no strong impact on propensity to be fired, the volatility of incomes, the propensity to be fired, or the duration. although there is some evidence that sectors relatively more open to trade experience higher risks of involuntary separation.[210] Were a more general increase in propensity to be fired to appear, it may also have emerged precisely because of the success in fighting inflation. Prices stability makes it more difficult to respond to aggregate shocks by reducing real wages by holding nominal wages fixed.[211]

Figure 11. Variance of Wages (Negative Shocks) Across Time



Source: Arango and Maloney (1999)

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[209] See Rodrik (1997), Maloney and Fajnzylber (2000), Krishna et al. for Turkey

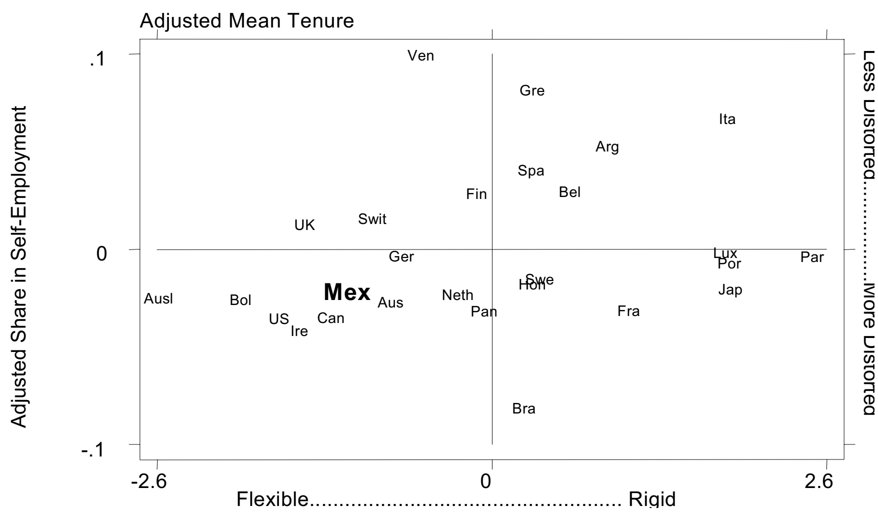
[210] Arango and Maloney (2000) "Reform and Income Insecurity in Mexico" in Maloney (2000) "Income Risk and Household Coping Strategies in Mexico"

[211] Galindo and Maloney (2000) show that a fall in inflation increases the "wage Okun coefficient (how much a 1% fall in output drives down aggregate wages) and increases the "unemployment Okun coefficient." See also Gonzalez (199x).

4.7.5 The challenge of labor policy in a free trade world: Raising labor productivity

At the time of NAFTA's signing, the Mexican labor market was not excessively rigid or distorted: minimum wages were not binding and unions seemed primarily concerned with maintaining employment rather than fixing wages. [212] Arguably, the fact that unemployment has remained so low in Mexico, even in times of crisis, reflects the relative ease of adjusting real wages. The very large informal sector, accounting for close to 50% of the workforce, probably reflects the low opportunity costs of self employment due to low formal sector productivity, and the weak linkages between contributions and benefits in the formal sector rather than segmentation as customarily imagined. There is a very high degree of turnover, much of it voluntary and dramatic flows of workers between both formal and informal sectors. Figure 12 suggests that, once adjusted for demographic and other variables, Mexico shows neither a high degree of informality (a measure of segmentation) or low turnover, (a common measure of flexibility). To the degree that there is segmentation and involuntary informality, it may emerge endogenously: in an economy with a weak education system, firms pay "efficiency" (above market clearing) wages to retain the workers they have trained.

Figure 12. Estimated Flexibility/Distortion in Selected Labor Markets



Source: Maloney 2001

Though a full examination of labor market reform priorities is beyond the scope of this chapter at present, conventional concerns with reducing wage rigidities should probably not be the primary focus of a NAFTA compatible labor policy although care is required that they do not become a problem over the medium term: Numerous factors, including the fall in inflation, greater openness to trade, and the weakening of labor unions may lead to more frequent labor market adjustments through unemployment in the future.

Two issues do merit attention. First, ensuring that the Mexican labor code is consistent with an overall strategy of moving toward a dynamic innovation driven economy. The many ways where Mexico is sorely lacking in this respect, and how critical this is to the long run benefits of NAFTA are discussed at length in the innovation chapter. Second, it is essential that institutions evolve such that workers are protected in a more open and dynamic economy.[213] It is essential to highlight that in many areas of potential change, there are net gains to be made by both workers and firms in overhauling an inefficient

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[212] See Maloney (2001) Labor Strategy Paper in Giugale, Lafourcade and Nguyen for a more thorough treatment.

[213] See De Ferranti et al (2000) "Securing Our Future in the Global Economy"

system: both would unequivocally benefit from restructuring the severance pay system, and improving and expanding worker training. Reform of the industrial relations and collective bargaining framework involves altering some legal structures dating to 1917. But if placed in the context of modernizing the work place, enhancing the technical proficiency and productivity of the worker and thus, in the medium term, compensation, common ground is more likely to be found and support generated for a coherent package of reforms.

Enhancing labor productivity

Over the long term, the only way to raise the standard of living of Mexicans is to increase labor productivity. This requires both flexibility in introducing new techniques into existing industries as well as facilitating the flow of labor from industries adversely impacted by NAFTA into new industries that benefit from it. There is a lesson to be learned from the Swedish labor unions who have consistently embraced a policy of open trade regimes, encouragement of technological adoption, and outsourcing of low productivity jobs despite their short run costs in worker dislocation.[214]

Mexican labor productivity has grown below the regional average for the last decades and many of its existing characteristics and institutions will likely to continue to impede turning this around. Human capital levels remain below those customary of a country of its income level and below those of countries who have engaged in "take offs" in innovative activity such as Israel, Finland, Taiwan, Korea. This is critical for several reasons. First, it is key to redressing the worsening distribution of wages discussed earlier. Greater exposure to trade, investment and outward orientation have increased the returns to skills and hence the incentive to acquire them. Institutions need to be responsive to this increased demand. Second, the increasing flight of jobs out of Mexico to cheaper venues dictates that Mexico upgrade its workforce so as to occupy higher rungs of the international production chain. The experience of Costa Rica suggests the potential for deepening and moving into more sophisticated technologies. The fact that Costa Rica has the highest software exports per capita in the region, and that Intel is establishing a center to develop software, suggests that the technological sector can will have "roots" in a way that previous assembly did not.

But there are also ongoing barriers to productivity growth built into the labor code. Firms must face incentives not only to technologically upgrade their production practices through a coherent R & D related policy described in chapter 5, they must also be able to make the accompanying changes on the shop floor and this is often cumbersome. As an example, in a labor code designed in the context of a closed economy, the worker-employer relationship is conceived of as a contract for life and legally a firm cannot adjust its work force, for example, to adopt new technologies or, more broadly, to adjust for economic reasons including downturns. On paper, this proves far greater protection than that of comparable workers in the neighbor NAFTA countries and there is a logic for it: The absence of any system of unemployment insurance and the lack of portability in some pension funds (particularly in the public sector) has led to an excessive emphasis on job stability, very costly severance payments, and a system prone to involved litigation. However, the incentives of this arrangement are to reduce labor mobility, impair resource reallocation, increase labor costs, and discourage job creation by leading to:

- An Excessive Emphasis on Employment Stability. This is reflected both in the legal framework, which heavily protects employment and mandates generous severance pay and in the importance given to corporatist bargaining mechanisms such as the PACTO. The latter have allowed for substantial real wage flexibility in exchange for preserving employment which have helped to dampen short-term social costs of adjustment, but could have

[214] Hjaalmarson (1991)

detrimental medium-term effects by deterring necessary productivity-enhancing labor shedding.

- Increased Labor Costs and Reduced Employment. High mandated severance payments represent a substantial addition to the cost of labor: compensation is a function of last salary and years of service and is very generous, amounting to four months salary per year of service. The only other OECD countries that mandate equally large severance compensation are Spain and Italy—both countries that suffer from extremely rigid labor markets.
- High Costs of Litigation and Increased Uncertainty. In contracting labor, firms must incorporate the likely labor costs and legal fees in the case of a dismissal. The accompanying uncertainty and managerial distraction can lead to substantially lower labor demand and reduced employment levels.[215] Further, labor lawyers typically charge between 30-40% of what the worker would obtain through indemnization. Due to the long duration of cases, the majority of suits end in private settlements. [216]
- Impaired Resource Reallocation. The implied costs of dismissal cause firms to shed less labor in a downturn than if dismissal were costless. Workers for their part, are reluctant to investigate more productive employment opportunities, or retire, because of the loss of seniority related benefits. Should they choose to leave, they are more likely to seek to be fired than to quit.[217] These distortions hamper the necessary reallocation of labor between firms and sectors.
- Barriers to Growth and Expansion of Small Firms. The proportionally higher transaction costs of dismissals and the difficulty of financial provisioning for dismissals given poor access to capital markets may put a greater burden of severance payments on small and medium-sized firms. This may discourage smaller firms from hiring new workers in good times or only contracting temporary workers because of the inability to reallocate internally or shed workers in a downturn. The higher implied turnover may lead to less investment in training. Dismissal costs may also discourage small informal firms from growing and becoming "formal".

These arrangements impose high costs in terms of transactions and in risk of not knowing the true costs of adjusting the work force. Recent simulations by Parente and Prescott suggest that the dynamic costs of such barriers in terms of productivity growth foregone can be very high. NAFTA may have removed one set of barriers to technological adoption in the form of barriers to competition and the technology embodied in foreign goods, but there are still substantial barriers within firms.

Worker protections

In addition, the present system protects workers poorly. A comprehensive treatment of issues of social protection can be found in De Ferranti et. al (2001) *Securing Our Future in the Global Economy* but a couple points merit mention.

The system of job protection and severance pay discussed above is perhaps the least effective imaginable in protecting workers against the inevitable shocks to the labor market. Effectively, risk is

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215. The rise in the number of wrongful dismissal cases that have challenged the "fire at will system" in the U.S. has lead to a 2-5% decrease in employment despite payments that amount only to U.S.$ 10 per employee. The subsidiary effects on costs thus appear to be very large, on the order of 10% of labor costs at a labor demand elasticity of .3. Dertouzos and Karoly (1993).

216 Davila (1997)

217. Dismissal can imply up to 122 days of salary per year of service in severance compensation; quitting entitles the employee to payment of only 12 days of salary per year of service.

pooled not over the national work force, but over the worker's firm. Severance payments are often demanded exactly at the moment when a firm is least able to honor its obligations, leading to increased stress on weak firms and uncertainty for the worker about the firm's ability to pay. In practice, most severance packages are renegotiated and the worker gets substantially less that the amount mandated by law. But again, fundamentally, workers lose out by the inability of the firm to efficiently adopt new technologies and increase labor productivity. Other options, such as individual accounts and a "pago a todo evento", or even unemployment insurance schemes ensure greater security and with fewer distortions of the firms incentives to hire and innovate. [218]

NAFTA had as a specific side agreement, the North American Agreement on Labor Cooperation (NAALC) discussed briefly in Annex 1 to ensure enforcement of existing labor protections. More generally, the issue of labor protections and making them uniform across trading partners is a complicated one. The literature is ambiguous on their impact (see De Ferranti et. al 2002) even from a conceptual point of view. In a competitive market, higher legislated workplace quality or benefits that do not cause unemployment necessarily diminish the fraction of total remuneration paid in wages. Where wage rigidities are binding, and in a world where labor cost differences across competing developing countries are fairly small, a moderate increase in labor costs may lead firms to substitute labor for capital, to substitute across different types of labor, or simply leave the country. Given the significant outflow of maquila jobs to cheaper labor countries, this cannot be ruled out as a potential downside. Of equal concern is who gets to set the labor standards. There is no guarantee that regionally or globally set standards about the composition of benefits will reflect local worker or local preferences, or that NAALC cases will not be abused as trade barriers in the industrialized countries.

In any case these proposed measures can make only marginal changes in worker welfare. Historically, the only way to raise living standards in a sustained fashion is through increasing labor productivity—workers can be paid more if they produce more. As this report has argued, the challenge of raising productivity is a multidimensional one involving measures to accelerate capital formation, innovation, and the adoption of foreign technologies, and those to increase the human capital of the workforce. Swedish labor unions understand the fundamental fact that Swedish forestry workers earn more than those in Brazil and Chile, not because of labor legislation, but because of a higher degree of mechanization combined with a dynamic knowledge cluster that encourages constant innovation and increasing labor productivity. The process of raising job quality is thus the process of development

[218] See the Mexico Labor Policy Note (Maloney 1991 in Giguale et. al 1991) and Davila

Annex: North American Agreement on Labor Cooperation (NAALC)[219]

Objectives

The objectives of the NAALC are to exchange information related to labor laws and institutions, to foster transparency in administration of labor laws, to pursue cooperative labor related activities, and to improve the working conditions and living standards of the three countries through the compliance and enforcement of 11 principles divided in 3 groups: I)Union related activities, II)Workers rights and, III)Child labor and workplace safety (Table A.1). Most of the compliance of this agreement is voluntary. NAALC does not require any country to adopt new labor laws, but to enforce the existing ones.

Table A1. Common Principles

Group I
Freedom of association and right to organize
Right to bargain collectively
Right to strike
Group II
Prohibition of forced labor
Elimination of employment discrimination
Equal pay
Compensation for occupational injuries and illnesses
Protection of migrant workers
Group III
Child labor protections
Minimum wage technical standards
Prevention of occupational injuries

Disputes

Any person or groups can file submissions (complaints) questioning implementation of labor laws. Lack of compliance of principles in group I is subject only to discussions among NAALC partners. Violations to principles in group II may be addressed in addition by recommendations from an outside committee of experts. Only principles in group III are enforceable through fines or trade sanctions. The maximum disciplinary action is suspension of a portion of NAFTA benefits for one year. The process for filing submissions is the following:

- An observer may bring a complaint to the National Administrative Office (NAO). Each country has a NAO located in its labor department. The submissions must concern a matter arising in a country other than the country where the submission is being made. NAOs may consult with each other to solve the claim.
- If the dispute is not settled, the issue is taken to the labor ministers of the countries involved. If it is still not resolved, then it can be taken to a meeting of labor ministers from NAFTA countries, who form the Ministerial Council (MC). This council is aided by a Secretariat that is located in Dallas.

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[219] This annex based heavily on Bolle (2002), U.S. Accounting Office (2001), Human Rights Watch (2001) and was compiled by Laura Saenz.

- If the issues is not resolved and it relates to violations of principles of groups II or III, the MC can refer it to an Evaluation Committee of Experts (ECE) that is created at the request of any NAFTA partner. The ECE conducts investigations and make recommendations after which the ministers consult again.
- If the matter is still not resolved and is related to labor issues comprehended in group III, an Arbitral Panel (AP) may be created by the MC. The ultimate penalty that the AP can issue is a monetary assessment. If it is not paid, sanctions may result. The maximum penalty would be the suspension for NAFTA benefits to the amount of the monetary penalty (which may be no greater than the NAFTA benefits from tariff reductions) for one year.

Number of cases and outcomes

The three NAOs received 23 cases between January 1, 1994 and September 6, 2000. Most of the allegations against Mexico were related to workers' rights to organize and bargain collectively. Others issues involved the illegal use of child labor, pregnancy based gender discrimination, minimum employment standards, and occupational safety and health. The ones against the U.S. involved migrant workers, freedom of association, protection of migrant workers, various worker standards, and safety and health. Submissions against Canada were related to freedom of association and health and safety issues. (Table A.2). In 2001, no submission had progressed past the minister to minister consultation stage of the process. To reach this phase has taken at least 2 years.

Table A2. NAALC Case Summaries

Total cases filed by nongovernmental and business groups	23
Duplicate filing	2
Cases rejected by NAOs	4
Cases filed in Canada	3
Cases filed in Mexico	5
Cases filed in the United States	15
Cases against Canada	2
Cases against Mexico	14
Cases against the United States	7
Case reports issued	12
Cases withdrawn by petitioners	3
Cases closed for lack of follow-up form submitters	1
Source: Human Right Watch, April 2001	
Submissions closed	15
Submissions under review	8
Submissions addressing labor principles in group I*	20
Submissions addressing labor principles in group II*	9
Submissions addressing labor principles in group III*	15

* Numbers exceed 23 because a submission can address multiple labor principles
Source: United States General Accounting Office, July 2001

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Chapter 5

Innovation in Mexico: NAFTA Is Not Enough[220]

[220] Pastor (2002) used the title "NAFTA Is Not Enough." This author, however, does not address issues related to innovation policies.

5.1 Introduction

This chapter examines the evolution of Mexican technological progress in the past few decades, with special attention given to the role of trade, foreign direct investment, and the national innovation system. The main message is that trade liberalization and NAFTA are helpful but they are not enough to help Mexico catch-up to the levels of innovation and the pace of technological progress observed in its North American partners, especially the United States. In fact, the evidence reviewed here suggests that, given its level of development, Mexico suffers from low levels of research and development expenditures and low levels of patenting activity, and it severely under-performs when compared to successful economies, such as Korea, needless to mention the U.S. In addition, its national innovation system—how the private sector, universities, and public policies interact to produce economically meaningful innovation—is inefficient. Without addressing these deficiencies, it is unlikely that NAFTA alone will be sufficient for Mexico to catch-up with the pace of innovation in North America.

Most of the analyses presented in this chapter are quantitative, relying on internationally comparable indicators of various aspects of innovative activity and technological progress provided by Lederman and Sáenz (2003). We also attempt to compare Mexico's performance in the various dimensions of innovation to a set of countries and regions.

In addition to international comparisons, this chapter also relies on econometric analyses of various aspects of innovation. In particular, we look at the empirical determinants of patenting activities and the economic returns of research and development expenditures (R&D) and licensing payments. In addition, our analysis of Mexico's innovation system also relies on estimates of the evolution of sector-level "revealed comparative advantage in innovation," as well as on more qualitative discussions of the incentives faced by Mexican researchers and firms. The hope is that the combination of analytical approaches presented herein will suffice to convince the reader that in the long-run, Mexico needs to make substantial policy improvements in order to help it catch-up with the pace of innovation in North America—NAFTA is not enough.

The rest of the chapter is organized as follows. Section 5.2 reviews the basic facts concerning Mexican innovation and technological progress since the 1960s by examining the evolution of various indicators of innovation and technological progress. Section 5.3 reviews the literature linking growth, innovation, trade, and FDI. Sections 5.4 and 5.5 are the core of the analysis on Mexican innovation, they attempt to answer two essential policy questions: does Mexico need to raise the level of R&D or licensing efforts and does it need to improve the efficiency of its National Innovation System (NIS) in order to raise the innovation outputs of its R&D inputs? The final section 5.6 summarizes the main policy recommendations of this chapter.

5.2 Mexican innovation and technological progress since the 1960s

At the outset of any analysis of innovation performance it is necessary to discuss how innovation and technological progress can be assessed. In fact, there are numerous potential indicators of innovation. The following paragraphs discuss some key methodological issues.

5.2.1 Measuring innovation and technological progress

Studies of innovation performance usually focus on indicators of outcomes and inputs. One of the most heavily used indicators of outcomes is the level and growth rate of total factor productivity (TFP). This is generally understood to be the portion of the economic growth, or growth of Gross Domestic Product (GDP), which is not explained by the accumulation of raw labor, physical capital, perhaps human capital, ideally after controlling for capacity utilization. Since the pioneering work of Solow (1956, 1957), this indicator has been thought to be driven by technological progress, although as discussed in section 5.3 below, it is not clear that technological progress is driven only by worldwide innovation that can be easily adopted by developing countries.

Another commonly used innovation proxy is the number of patents. That is, it is widely believed that patent statistics reflect the flow of innovations covering either adaptations of existing patents or brand new inventions (Griliches 1990; Patel and Pavitt 1995). Measures of the number of patents granted to researchers from around the globe, however, are not without flaws. One particularly important consideration is that costs of applying for patents, the level of intellectual property protection, the pecuniary benefits from patents, and other institutional features vary greatly across countries. Thus patents granted by agencies from one country are not strictly comparable to those granted by others. In what follows we also use the number of patents granted to Mexican residents by the United States Patent and Trademark Office (USPTO) as a proxy for the flow of innovation.[221] The data from the USPTO is attractive due to its global and long time coverage, and especially because it is commonly understood that the U.S. offers perhaps the most advanced levels of intellectual property protection in the world (Maskus 2000). Although the costs of the application process are likely to be higher in the U.S. than in most other countries, the benefits are also likely to be higher. In any case, U.S. patents are our preferred indicator of the flow of innovation worldwide.

5.2.2 Evolution of innovation outcomes in Mexico

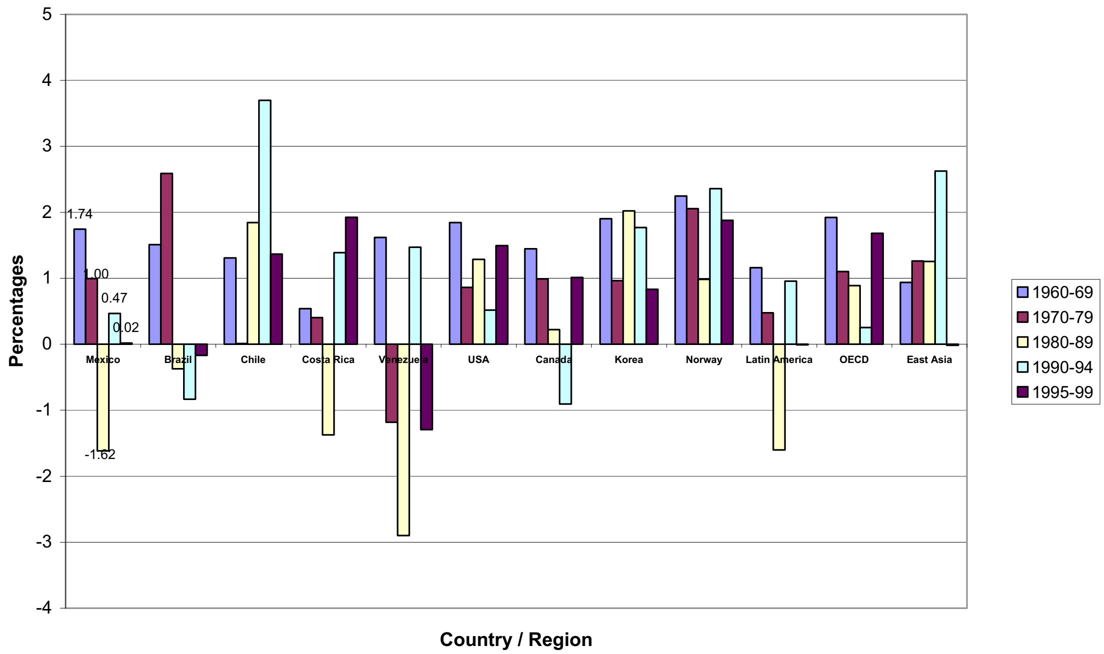
TFP growth – an indicator of technological progress

Figure 1 shows the average annual growth rates of TFP for Mexico since the 1960s, compared to Chile, Costa Rica, Latin America as a whole, the high-income countries of the OECD, and the East Asia and Pacific region. These estimates were provided by Loayza, Fajnzylber and Calderón (2002). The estimates shown were derived from a growth accounting exercise that assumed that all countries have the same capital and labor shares (30 and 70 percent, respectively). Due to data limitations, these estimates also do not control for fluctuations in capacity utilization or human capital. However, Loayza and his coauthors estimated TFP growth rates for the same period controlling for human capital in various LAC countries. Those estimates follow a very similar pattern as those in Figure 1. In addition, we estimated alternative measures of TFP growth using regression analysis, with and without controlling for years of recessions in order to imperfectly adjust the estimates for severe fluctuations in capacity utilization. The over-time trends of these estimates also followed the patterns shown in Figure 1.

Mexico's TFP performance was highest in the 1960s. As in most of the other countries, except Brazil and the East Asia region as a whole, Mexico's TFP growth rate declined in the 1970s. Most Latin American countries experienced a further decline in the 1980s and moderate recovery in the 1990s. While the fall inproductivity growth in the United States and other high-income countries in the 1970s has been attributed to the oil shock of 1973 and its macroeconomic repercussions (Griliches 1988), it is difficult to blame the fall in productivity in Mexico and other oil exporters on this factor. Also, the East Asia region did not experience such a slowdown, perhaps due to the fact that some EAP countries such as Indonesia are oil exporters, but Korea did experience it. The story of the lost decade of the 1980s is now well understood (Edwards 1995) and it was due to the debt crisis and the subsequent attempts to stabilize the regional economies. The slight recovery in the 1990s is possibly due to the economic reforms implemented in the late 1980s and early 1990s in most LAC countries. Finally it is worth noting that productivity growth in Norway was quite fast for international standards throughout this period. This example illustrates the more general empirical finding that net exporters of natural resources, such as

[221] The USPTO demands that the invention be "novel and nontrivial, and has to have commercial application" (Jaffe and Trajtenberg 2002, 3-4).

Figure 1. Growth Rates of TFP, 1960-1999



Norway, do not necessarily have lower potentials for productivity growth. On the contrary, Lederman and Maloney (2002) find that natural-resource rich countries tend to experience faster economic growth even after controlling for the contributions of human and physical capital accumulation.

Loayza et al. in assessing the impact of various factors on TFP growth in the region found that for all 20 Latin American countries in the sample, the impact of structural reform policies was positive and for 15 stabilization policies was also positive. They note, however, that the estimated growth combined contribution of the two ranged between 2.5-3%, not insignificant, but not likely to transform the region into Asian or Scandinavian growth miracles. On the other hand, figure 1 suggests that Chile, the most advanced reformer, has performed far above both the Latin American and Asian regional averages for the last two decades. Given the overall similarity in policy packages, there would seem to be nothing in the economic model adopted that intrinsically dictated lower rates of TFP growth.

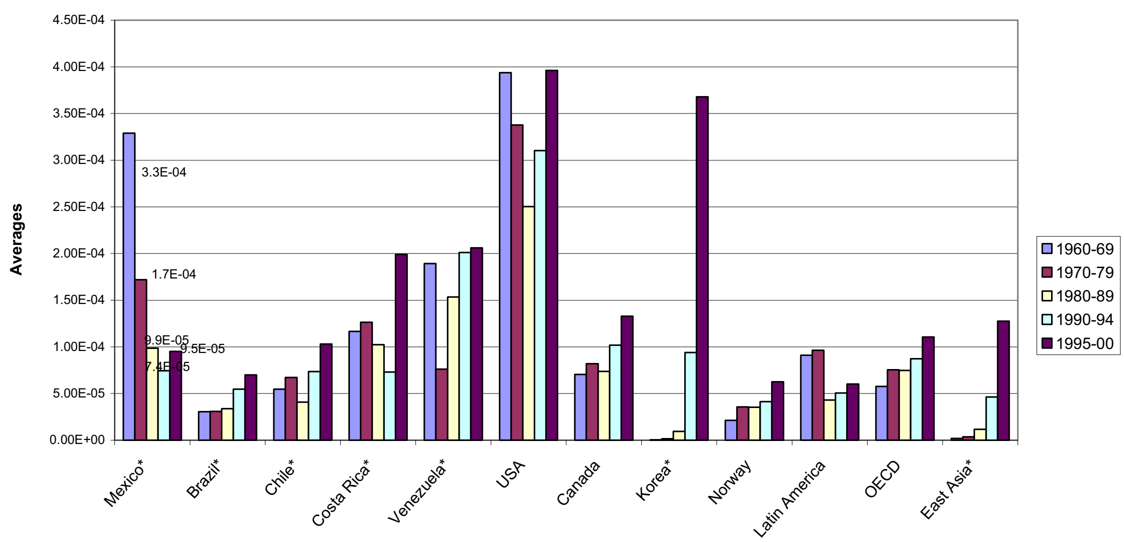
One possible explanation of the lackluster TFP growth in Mexico may lie in Acemoglu, Aghion, and Zillibotti's idea of there being two stages of technology adoption (see section 5.3 below). The first is based on fomenting the accumulation of technology embodied in capital formation even if this required some static efficiency losses through interventionist policies, including, arguably, the period of import-substituting industrialization (ISI) in Latin America. The following stage centered on "innovation" requires a greater structural flexibility and fewer distortions. In their view, Korea, Taiwan, Brazil, Mexico, and Peru all successfully pursued the first stage but the Asian countries were able to make the transition to efficient innovative economies while Latin America was not. The Chilean case, which leads the Mexican in liberalization by roughly 10 years, offers broad support to this diagnosis and offers some reason to suppose that Mexico will experience a similar rebound in TFP in the coming years. It must also be said that, in the light of the successful growth experiences of the relatively open Ireland, Spain, Finland, and Israel across a similar period, it is difficult to argue that the extreme closed ness of the region was necessary or desirable, especially given the difficult political economy problems of moving to a more "innovative" structure later.[222] The various theories linking innovation to economic growth are further discussed below in section 5.3.

In Mexico, the overall impact of NAFTA on productivity was positive. Chapter 1 of this report showed that the agreement was associated with convergence in rates of TFP growth among the manufacturing sectors in the U.S. and Mexico. López-Córdova (2002) offers estimates of the whole package of NAFTA-related phenomena, namely lower Mexican tariffs, the preferential tariff margin in the U.S., higher import to output ratio, and participation of foreign producers to have increased TFP by 10%. Schiff and Wang (2002) offer a similar estimate of 5.6%- 7.5%. These estimates are broadly consistent with estimates of very large impact of the FTA in Canada. Trefler (1998) argues that, overall, manufacturing TFP rose by .2% per year, or 1 % for the firms most affected by trade, due primarily to plant turnover and rising technical efficiency within plants. Hence it is likely that TFP growth in Mexico and Canada would have been even lower than those shown in Figure 1 if NAFTA and its predecessor, the Canada-U.S. Free Trade Agreement (CUSFTA), had not been implemented. Nevertheless, this does not mean that innovative activity in these countries has improved sufficiently in order to help Mexico catch-up to the levels and even growth rates of productivity observed in the United States. Some of these issues are further explored in section 5.3 below.

Patent counts – indicators of innovation flows

As mentioned earlier, the number of patents granted by the USPTO is a reasonable indicator of innovative activity. Patents represent innovations that can be either an adaptation of a previous patent or a brand new invention, but virtually all patent applications in the U.S. cite previous patents as the origins of present inventions. Another indicator of scientific innovation is the number of scientific publications, which can be interpreted as a measure of outcome of basic research, as opposed to applied research. Figure 2 shows the evolution of the number of patents per worker granted to inventors residing in Mexico and the group of comparator countries and regions since 1963.

Figure 2. Patents per worker (various scales), 1960-2000



Caution: Latin American region and countries are multiplied by 100. East Asia and Korea are multiplied by 5.

[222] Many resource-rich countries—Sweden, Finland, Australia, Canada—also closed somewhat after the Great

The evidence shows that Mexico's patenting activity follows a similar pattern over time as its TFP growth rates discussed above. Patent counts for Mexican innovators were highest in the 1960s, declined continuously until the first half of the 1990s, and finally picked up again after the implementation of NAFTA in the second half of the 1990s. This resurgence was, however, quite modest for historical standards. It was also insufficient to make a significant dent in the observed gap with respect to Canada, needless to mention the United States. (Please note that Mexico's patents per worker are multiplied by 100 in Figure 2). Mexico is also still far behind East Asian and especially the Korean levels of patents (which are multiplied by 5 in Figure 2). Moreover, it is also behind Costa Rica and Venezuela. Thus Mexico's rate of innovation, as proxied by its patent counts, seems to be lagging behind its North American partners, several Latin American countries, and high-income and East Asian countries in general.

One potential weakness of the ongoing analysis is that patent counts might be related to the level of development. It is reasonable to expect that patent counts will be higher for richer countries, and thus the following section provides an assessment of where Mexico stands in patent counts relative to the "average" country with the same level of development. In turn, we also look at where Mexico stands in terms of another indicator of innovation outcome, namely the publication of scientific journal articles, with respect to the "typical" (median) country.

5.2.3 Given its level of development, is Mexico still lagging behind in patenting and scientific publishing?

How innovation outcomes evolve with the level of development

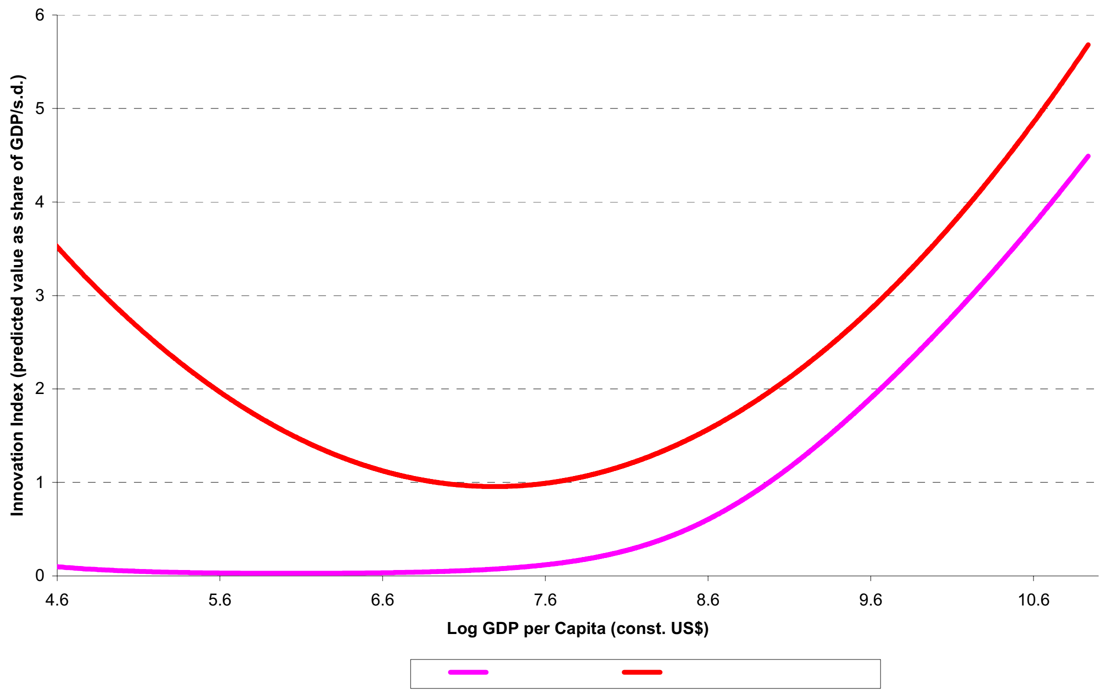
This section assesses how patent counts and scientific publications evolve with development. We first examine the correlation between these variables and the level of GDP per capita, based on data dating back to the early 1960s until the year 2000, covering a world sample of developed and developing countries from all regions. Figure 3 shows the resulting relationship of these two variables, using a common scale (GDP) and normalizing the econometric predictions resulting from a Tobit model for patents per GDP dollar (of 1995) and a Median Regression estimate of the number of scientific publications per GDP dollar.[223] In both cases, the series were estimated by using the log of GDP per capita and the log of GDP per capita squared as explanatory variables, in order to capture any non-linearities in the correlation between both innovation variables and the level of development. We later present country-specific estimations based on less restrictive specifications.

The graph in Figure 3 shows that the relationship between these two proxies of innovation outcomes have a strongly non-linear relationship with the level of development. The number of scientific publications, which is best interpreted as a proxy of the output of basic research (i.e. not necessarily applied research) tends to decline initially with development, but rises quickly after a certain point. That is, the variables associated with "pure" scientific investigation seem reasonably high among the very poor. We speculate that this may be due to the fact that many poor countries have a university housing a few scientists of global quality. As a relatively non-innovating private sector grows over time and GDP rises, these effects become diluted and the recovery happens only after the country reaches middle income. In any case, Latin America, and Mexico in particular, have GDP per capita levels found just before the second upturn.

Depression, but non to the degree of Latin America (Maloney 2002).

[223] Both resulting estimated series were normalized by the standard deviation of the predictions. Due to the different methods, the resulting estimates have slightly different interpretations. The predictions on patent counts over GDP based on the Tobit estimator yields the "average" level of patents for a given level of development. The Median Regressions for the scientific publications yield the "median" for a given level of development.

Figure 3. Innovation and Development



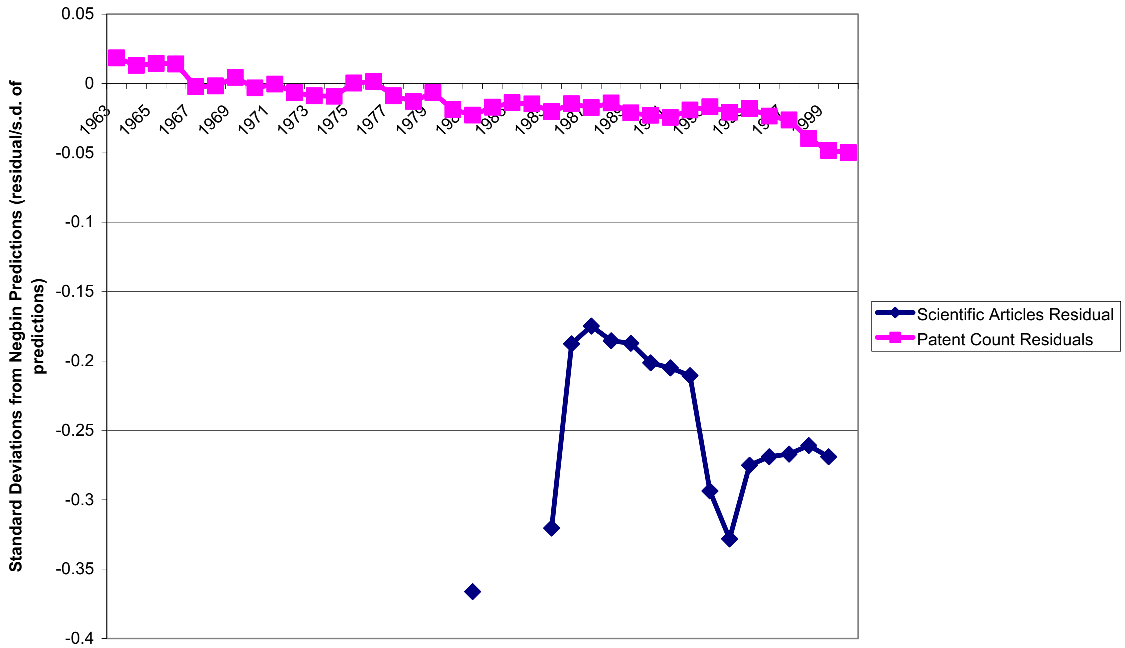
Patent counts over GDP tend to be close to zero among the poorest countries, but they seem to take-off after a certain point. It is interesting that this take-off seems to take place more or less at the same point of inflection observed for the scientific publications. Again, Mexico has a level of development corresponding to the take-off phase. We now turn to addressing the question of whether Mexico is lagging behind in terms of these innovation indicators while controlling for its level of development.

Where Mexico stands, given its level of development

To assess Mexico's relative position in patents and scientific publications, we estimated a more general functional form for each variable of interest. In both cases we used log of GDP, log of GDP squared, log of labor and log of labor squared, and time dummy variables as explanatory variables. For patent counts we also included the log of the value of exports to the U.S. market and this variable squared as additional arguments. This adjustment was necessary due to the fact that we are relying on patents granted by the USPTO and there are strong theoretical reasons to expect that countries that export more to the U.S. will have stronger incentives to patent in this country. The intuition is that when firms export to a particular market they have stronger incentives to patent their ideas in the market of destination in order to reduce the extent of imitation by local competitors. In addition, the method of estimation for both variables is now Negative Binomial regressions, which are designed precisely to deal with count data, such as patents and journal publications (see, among many others, Hausman, Hall, Griliches 1984; Cameron and Trivedi 1998; Winkelmann 2000).

The resulting benchmarking exercises for patents and articles for the case of Mexico are shown in Figure 4. Our estimates indicate that Mexico is currently under-performing in both dimensions of innovation outcomes for its level of development. However, the country has not always under-performed in terms of its patent counts. In fact, consistently with our previous discussion of TFP growth, Mexico seems not only to have patented more in the 1960s than anytime afterwards, but it was performing at more or less the predicted level given the country's development level (and value of exports to the U.S.)

Figure 4. Mexico: Underperforming in Scientific Publications and Patents, 1963-2000

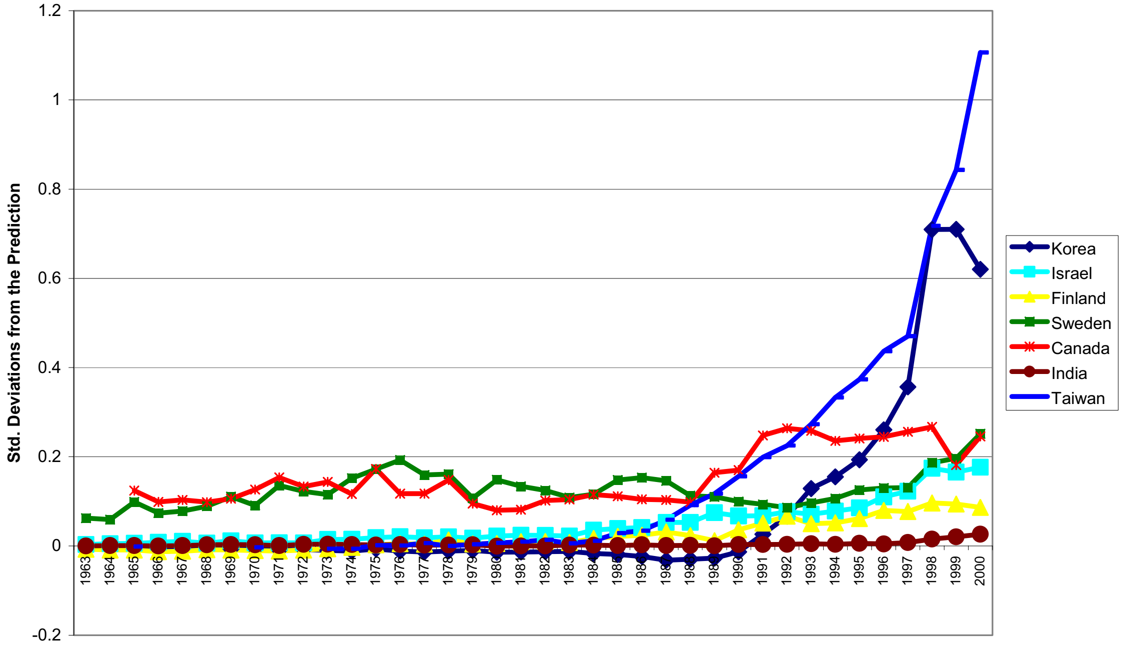


during those years. This position steadily deteriorated, beginning in the early 1980s, just prior to the debt crisis and the structural reforms. Yet in spite of the recovery of overall patenting and publication activity in the 1990s, this recovery was not sufficient for Mexico to catch-up with the predicted levels. In other words, Mexico's modest recovery in innovation outcomes in the NAFTA period was not fast enough to bring it back to the levels observed for other countries with similar levels of development (and exports to the U.S. in the case of patents granted by the USPTO).

At this point it is worth highlighting that even if Mexico were to catch-up to the average level of patents and scientific publications for countries with similar characteristics, this would not imply that it has reached optimal levels. In fact, it is possible that high-performing countries with whom Mexico might want to compare itself have above-average patents. One best-practice example is Korea, whose corresponding residuals are shown in Figure 5 below, along with those from a set "patenting over achievers". This group of countries also includes Israel, two natural-resource-rich countries (Finland and Sweden), Canada (who also happens to be an agricultural powerhouse), Taiwan, and India. If Mexico wanted to benchmark itself with high-performers, its goal should thus be way above the average.

In order to understand why trade reforms and NAFTA might not have been enough to help Mexico catch-up in innovation and productivity growth, we now turn to a review of the existing theoretical and empirical literature linking growth with innovation, and trade and FDI with innovation.

Figure 5. Patenting Over Achievers



5.3 How trade and FDI affect innovation and technological progress

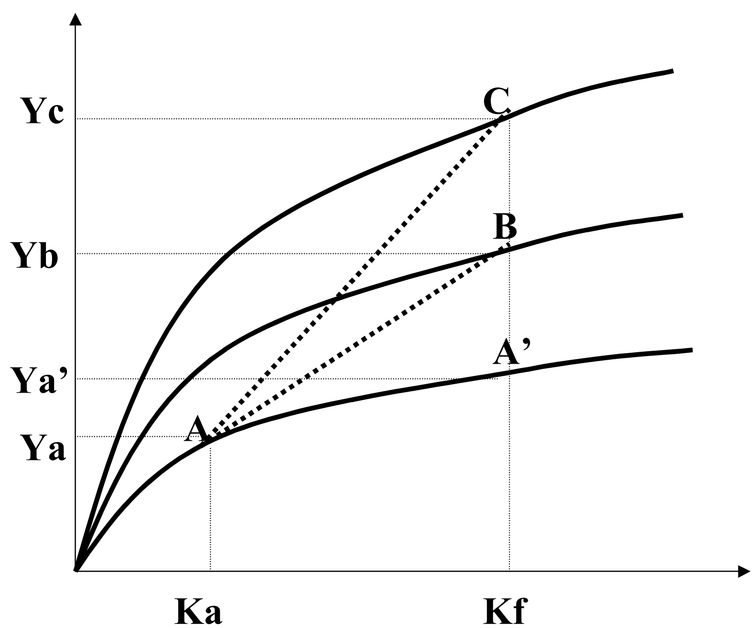
5.3.1 Growth theories: Multiple productivity growth paths

An emerging scientific literature on economic growth suggests that the overall learning capacity of countries is critical for growth and international economic convergence. Acemoglu and Zilibotti (2001) argue that most technologies developed in advanced countries are not as productive in developing countries, because the host countries' low human capital is not appropriate for utilizing innovative production processes. Lloyd-Ellis and Roberts (2002) similarly argue that education and technological progress are not only complements, but dynamic complements with the return to each determined by the growth of the other. Hence logic dictates that technology transfer from the U.S. to Mexico, for example, will not lead to the equalization of productivity levels between these countries as long as Mexico's human capital is deficient relative to that in the U.S. More generally, however, there are strong reasons to think that even if both countries had the same level of human capital, the desired economic convergence would still not be realized due to the low levels of R&D effort in Mexico.

Peter Howitt of Brown University and David Mayer of Mexico's CIDE (2002) offer a "convergence club" theory, which explains why R&D effort is essential for convergence among countries. In a simplified version of their model, these authors trace three possible productivity-growth paths for countries exposed to identical technological progress. Countries with high "innovation-effective" human capital will experience the fastest rates of TFP growth. For these authors, "innovative-effective" human capital is a combination of the level of education and the effort invested by the economy to develop new technologies based on the existing technological frontier. That is, the most dynamic economies would tend to be those that have the necessary human capital and the required learning capacity for pushing the technological frontier forward. Countries with lower learning capacity will tend to rely on the adoption of previously invented technologies in the most dynamic countries. But their pace of TFP growth will be slower than in the leading countries even if they have the same level of capital and human capital per worker, because they will always be working with less efficient technology than the innovation leaders as the transmission of the latest ideas takes time and adoptive effort. Of course, the slowest growing countries will be those that are not exposed to the leaders' technologies or that have inadequate human capital to adopt even old fashioned technologies previously developed by the more dynamic economies. Similar results were previously suggested, among others, by Grossman and Helpman (1991, chapter 8), who proposed a model with multiple growth equilibria resulting from intra-national R & D externalities.

Some of the intuition of these arguments can be illustrated with the standard growth production function (Nelson and Pack 1999, 427). The three development paths discussed above are shown in Figure 6. The vertical axis measures output per worker (Y) and the horizontal measures capital per worker including human capital (K). If the three countries start their development process at point A, the slowest country that chooses to remain in technological autarky will move along the lowest production function to a point such as A'. The horizontal distance KaKf is the increase in capital per worker and the vertical distance YaYa' is the increase in income per worker. The movement along AA' suffers from diminishing returns to scale since there is insignificant technological progress to raise the returns to physical and human capital investments.

Figure 6. Technological Progress and Development Paths



The leading country, in contrast, also accumulates KaKf worth of human and physical capital, but it also invests in developing new technologies. Hence its production function shifts upwards and its income per worker rises from Ya to Yc. The follower country, which also makes the necessary investments in human and physical capital but also imports technological innovations from the leading country also experiences an upward shift of its production. However, since the adopted technology is implemented in the follower country with a lag or because intra-national spillovers predominate over international spillovers, the shift in production is smaller than that of the leading country and the corresponding increase of income is also smaller. The vectors joining points C, B with the initial point A can be interpreted as the transitional productivity growth paths for the leader and the follower. The higher slope of the AC vector relative to AB implies that the leader experiences faster productivity growth in the transition than the follower, which nevertheless performs better than the country that stays on the autarky AA' path. Indeed, it is quite plausible that the three countries described in Figure 6 would not even experience the same increases in physical and human capital, precisely because of the possibility that the returns to physical and human capital investments depend on the production technologies, as argued by Lloyd-Ellis and Roberts (2002) and Acemoglu, Aghion, and Zilibotti (2002). In the Mexican case, our concern is that trade liberalization and NAFTA has allowed Mexico to become the follower, which is not enough to help it catch-up with its leading partners.

5.3.2 How trade affects growth: Theory, international evidence, the Mexican experience

Theory

In theory, international trade and foreign direct investment might affect the pace of economic growth through various channels, but not all imply an enhancement of a developing country's learning or innovative capacity. In terms of the previously discussed Howitt-Mayer model, trade liberalization and the attraction of the FDI might *not* ensure that Mexico or any other developing country will end up in the high-TFP growth path portrayed in Figure 6.

Generally speaking, trade (and FDI) could potentially have positive effects on factor accumulation and efficiency. Regarding the latter, the efficiency gains can be static or dynamic, the former being a result of resource-reallocation effects, rather than to learning or technological spillovers.

Trade liberalization can increase the rate of factor accumulation in developing countries mainly by reducing the relative price of capital or investment goods. When the cost of investment falls, overall investment rises (Baldwin and Seghezza 1996). Also, capital accumulation might rise as trade liberalization increases the size of the target market, especially for exports (Wacziarg 2001). There might also be an effect on the accumulation of human capital, if imported machines are complementary to human capital, as in the previously mentioned Acemoglu-Zilliboti model. These premia might then provide incentives for household, firms, and governments to increase their human capital investments (see Sánchez-Páramo and Schady 2002; Dömeland 2002). However, these types of effects should not be automatically equated with learning effects. They are qualitatively different primarily because education alone might be insufficient to promote innovation-led TFP growth. Education might obviously have the traditional labor-augmenting effects as skilled labor tends to produce higher output than unskilled labor, and the skills premium might also fall as the supply of skilled workers increases. But this does not ensure that workers and firms will be engaged in a continuous learning process, even if imports of intermediate goods lead to once-and-for-all increases in the level of TFP.

However, trade can have other efficiency gains. One type of efficiency gains could be due to reallocation effects, which result from the reallocation of factors of production across firms and industries. This is the traditional welfare gains from the neoclassical trade theories, but also include the reallocation of factors previously used for rent-seeking activities associated with distorted protectionist regimes (Krueger 1974). These are once-and-for-all static gains, and thus do not lead to a higher TFP growth path based on learning by firms and workers.

Other efficiency gains result from a Schumpeterian process of creative destruction, whereby increased international competition results in the exit of inefficient firms and the survival of efficient firms. These gains are also once-and-for-all if the surviving firms do not engage in learning activities. Thus competitive pressures do not necessarily lead to enhanced learning, even if they have other positive effects on developing countries.

Trade-induced productivity gains based on learning entails the transmission of knowledge regarding production processes via trade in goods. Such knowledge could be captured by the importation of foreign final and especially intermediate capital goods. A related effect might come from learning-by-exporting effects, whereby exporting firms learn about production (or management) processes from its competitors in foreign markets. Whether ideas can be transmitted through trade hinges essentially on whether such knowledge can be appropriated by imitators at low costs. If acquiring knowledge is costly, even if it is based on reverse engineering or any procedure that might help producers in developing countries use the latest technologies, then trade (and FDI) alone might not automatically lead to a sustained development process based on learning (see Grossman and Helpman 1995 for a review of the theoretical literature). If learning is costly, then lackluster R&D effort, can lead to the low TFP-growth development paths suggested by the Howitt-Mayer growth model. In any case, if trade liberalization leads to the importation of ideas via imports or via exports, then NAFTA might have helped Mexican firms improve their productivity, besides the reallocation and factor accumulation effects that were previously discussed.

What does the international evidence say about how trade affects growth? A corollary question of particular importance for this report is how much of the recent upturn in the observed levels of TFP in Mexico can be attributed to once-and-for-all effects (e.g., factor accumulation and reallocation effects) as opposed to learning effects? The factor accumulation effects of trade liberalization are thus once-and-for-all gains, which might take place slowly and thus could empirically appear as economic growth effects. Fortunately, empirical studies discussed below have attempted to identify the channels through which trade enhances economic growth. Interested readers can also consult other literature reviews on these issues, including Navaretti and Tarr (2000) and Saggi (2002).

International evidence and the Mexican experience

The questions posited above can only be addressed by looking at the empirical evidence based on cross-country, sectoral, and firm-level studies. Beginning with the first, Loayza et al. (2002) looked at the impact of various indicators of economic reforms, including trade, on the economic growth of countries since the 1960s. Their panel-data estimates indicate that a one percent increase in the portion of the trade-to-GDP ratio that is related to trade policies leads to an increase in the growth rate of GDP per capita ranging between 0.025 and 0.010 percentage points per year.[224] This effect is unlikely to be large enough to help Mexico and other Latin American economies to catch-up with the world's TFP growth frontier. Even if trade reforms have a dynamic effect on economic performance by lifting the long-run growth rate, it seems that this effect might be quite small.

In another recent cross-country study that also paid careful attention to the treatment of trade-policy variables is Wacziarg (2001).[225] This author found that the most statistically robust channel through which trade positively affects economic growth is via investment, both domestic and foreign. But the stimulus of domestic investment accounts for over 60% of the positive effect of trade on growth. Hence this study indicates that trade reforms might affect growth through the factor accumulation channel, rather than via enhanced learning by firms and workers. The author then speculates that these results are consistent with theories that focus on the pro-competitive effects of trade, because the survival of firms and the entry of new ones after trade liberalization probably requires large fixed capital costs. Finally, it is worth pointing out that this finding that trade spurs growth mainly through capital accumulation had been previously found in the cross-country studies by Levine and Renelt (1992) and Baldwin and Seghezza (1996).

Yet there is an extensive and still growing literature that focuses on the TFP gains from imported inputs. Studies that focused on this channel and examined its role in developing countries include Coe, Helpman, and Hoffmaister (1997), and Schiff and Wang (2002a, 2002b). The larger literature that focuses mainly on developed countries was reviewed by Keller (2001), and Keller (2002) looks at how geography might affect the magnitude of the TFP gains from imported capital goods. In a parallel literature, Eaton

[224] The corresponding result from a 30-year cross-section of countries was below this range, falling to 0.005%

[225] For a strong critique of cross-country studies that examine the link between trade and economic growth, see Rodríguez and Rodrik (2000).

and Kortum (2002) have proposed a theory and empirical applications that consider the impact of trade on economic welfare via the increased importation of capital goods. In this case, Eaton and Kortum focus directly on the impact of reductions in the prices of capital goods on the overall economy (i.e., general equilibrium effects, rather than sectoral effects) as a consequence of trade liberalization among *developed* countries.

Overall, the results of this literature indicate that imports of capital or intermediate goods do have a positive effect on the levels of TFP in developing countries. But it is not clear that these are due to enhanced learning by the productive sector. Coe, Helpman, and Hoffmeister (1997) find that the overall level of imports is important for international technology diffusion for 77 developing countries. Keller (2002), looking at industry level data from eight OECD countries, finds that roughly 50% of TFP growth in manufacturing industries is due to own R&D spending, 30% from other domestic industries and a remaining 20% due to R&D expenditures in foreign industries. He speculates that the latter share may be much higher in developing countries where local R&D effort is substantially lower than in the high-income countries of the OECD. For Latin America, Schiff and Wang (2002a) find modestly positive effects of the technology embodied in intermediate inputs on TFP for certain high-R&D industries in Latin America.[226] And looking specifically at NAFTA, Schiff and Wang (2002b) find that the roughly 14-18% increase in total imports after NAFTA to Mexico led to between a 5.1 and 7.0% increase in TFP levels in manufacturing industries. The 3% diversion of imports from other OECD countries, whose imports have no impact on TFP, led to another 0.47.[227]

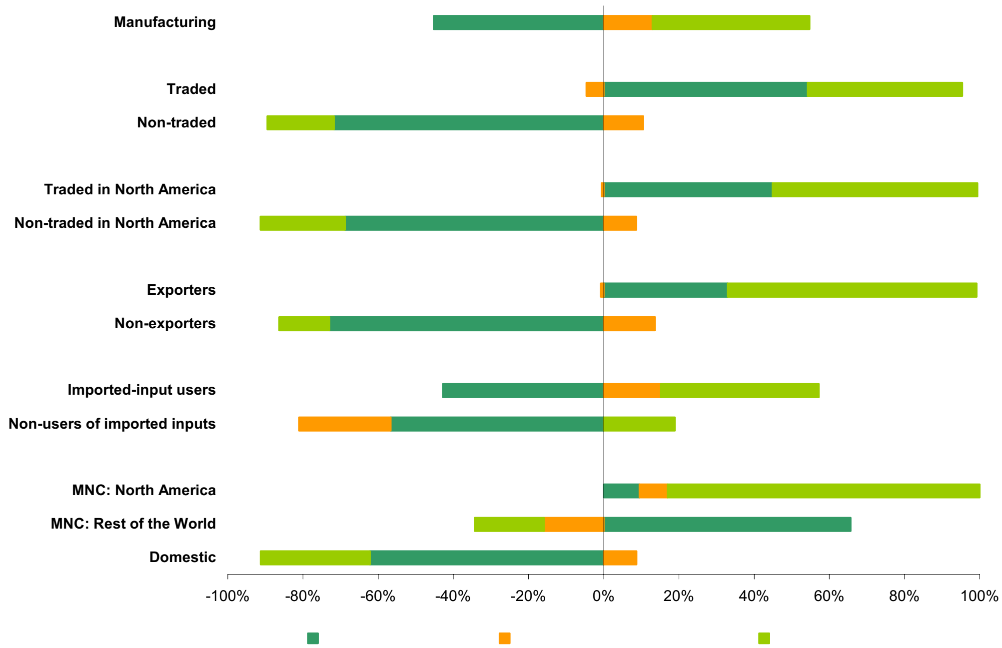
However, the interpretation of these results is not obvious. Seemingly in contradiction with the above studies, Eaton and Kortum (1996), find that bilateral imports do not help to predict bilateral patenting activity, the indicator of international technology diffusion. Based on firm-level data from Mexico, López-Córdova (2002), like Muendler (2002) for Brazil, finds a *negative* impact of imported inputs on manufacturing TFP.[228] Furthermore, Schiff and Wang express doubt about the meaning of their own estimates in the Coe-Helpman-Hoffmaister tradition. The fact that input trade with the U.S. is a good vehicle for technology transfer to Mexico, but apparently trade with other high-income OECD countries has no effect on TFP is counterintuitive. The result is strikingly consistent with Keller (2002) who finds that the impact of trade in intermediate goods decreases with geographic distance between trade partners. In fact, employing Keller's elasticity, the U.S. impact on Mexico should be, and is, roughly 10 times as large as that with respect to the OECD. However, space dependent depreciation of technology embodied in inputs seems unlikely and, as Schiff and Wang suggest, these results might be picking up greater collaborative and subcontracting relationships across the border, rather than an effortless transfer of production knowledge embodied in the intermediate inputs themselves. This in no way undermines the benefits of an open trade stance with respect to the U.S., but it does suggest that the incredibly large TFP-enhancing effects of trade with the U.S. reflect non-trade channels of influence, which might be related to personal and business interactions among businesspeople, firms, and researchers. Thus Mexico's national learning capacity might still be the key for maximizing the potential dynamic gains promised by NAFTA and international trade.

[226] The high-R&D industries are those that have relative high shares of R&D expenditures over sales in the high-income countries. These authors do not look at the sectoral pattern of R&D in the developing countries themselves.

[227] There was no difference between high R&D-intensive industries and low R&D-intensive industries suggesting that industrial composition is not critical to the benefits of NAFTA

[228] Muendler argues that this may be explained by the failure among manufacturers to adjust production practices to the increased availability of imported inputs.

Figure 7. Mexico, 1993-1999: Productivity Decomposition



Source: López-Córdova (2002)

Finally, the study by López-Córdova (2002), also cited in IDB (2002, Figure 11.8(b)), provides a decomposition analysis of the sources of TFP in Mexico's manufacturing firms during 1993-1999. Figure 7 shows the contributions of three types of TFP changes: (1) within-firm changes in TFP, (2) across firms but within industries, and (3) across industries. As mentioned earlier, if NAFTA and trade liberalization lead Mexico towards a learning development path, then most of the improvement in TFP should be due to within-firm improvements, rather than the latter two channels. Figure 7 shows clearly that for the manufacturing industry as a whole, all of the TFP improvement in Mexico was due to reallocation effects, both within sector and across sectors. Although there were differences between firms that operated in sectors with some exports and imports (labeled "traded" in Figure 7) when compared to firms in sectors with less exports or imports. However, it is difficult to interpret these differences, because all manufactures are tradable goods, and thus the differences are not due to lack of international competition in the "nontraded" sectors. The key finding is that manufacturing TFP in Mexico during 1993-1999 was driven mainly by reallocation effects.

It could also be argued that firms learn by exporting in the sense that participation in foreign markets might help firms identify the latest production, management and even marketing techniques. Thus exporters in Mexico could have enhanced their learning capacity during the post-NAFTA and trade liberalization period. Numerous cross sectional studies have shown that Mexican exporters tend to be more technically efficient, presumably because of technological development related to the import of technologies from abroad (see recent work for Mexico by Meza Gonzalez 2002; Alvarez and Robertson 2001). However, the only micro-level panel data spanning the NAFTA period that allows for the determination of causality—whether exports make a firm more efficient or whether more efficient firms export—López-Córdova (2002) finds no impact of exporting on TFP growth and actually a *negative* correlation with productivity levels. In Figure 7 above, the author's data indicates that exporters experienced negative within-firm TFP effects. In a recent study, the World Bank (2000) found that years of experience in exporting does seem to be associated with rising TFP levels, although these estimates did not control for unobserved firm-specific characteristics.[229] But in this optimistic study, the act of exporting itself did not come out as a robust stimulus for productivity growth. Hence it seems that exporting alone does not necessarily lead to a sustained learning trajectory.

The absence of a positive finding is consistent with the panel regressions done by Clerides, Lach and Tybout (1998) for Mexico for the early period of liberalization, as well as Colombia and Morocco. These authors found little evidence in any country for firms' cost structures changing after breaking into the export market and argue that the higher productivity is likely to be due to selection of the better firms into exporting—that is, the Schumpeterian reallocation effect. They do find, however, that the presence of exporters may make it easier for non-exporters to break into foreign markets; in Colombia, non-exporters appear to experience cost reductions when export activity increases. These results are also consitent with the analysis of firms in the chemical industry by Kraay, Soloaga and Tybout (2002) of Mexico and Colombia. These authors were not able to establish Granger causality between engaging in international activities—be it imports or exports—and indicators of productivity gains.[230] It is worth noting that the disappointing results regarding the lack of a robust positive effect of exporting on TFP growth for Mexico is also apparent with U.S. micro data (Bernard and Jensen 1999). Likewise, a recent study of a panel of Spanish firms concludes that there is only evidence in favor of the (Schumpeterian) firm-selection channel, but the evidence concerning the learning-by-exporting hypothesis is very weak (Delgado, Fariñas, and Ruamo 2001). Similar results were reported for Korean and Taiwanese firms by Aw, Chung, and Roberts (2000).

Canada offers some support for the view that free trade is not enough to remedy low productivity growth. Daniel Trefler (1999a, b) of the University of Toronto has argued that the FTA helped close the gap with respect to the U.S. in some manufacturing activities, but it has risen in some others, such as computers and industrial machinery. Part of this is due to low Canadian R&D (see section 5.4.2 below) and to deficient basic science. He argues that the presumption that this country can simply rely on basic science from the U.S. is misguided. By the time a seminal innovation is transferred from the U.S., its most valuable applications have already been exploited by U.S. companies. To support this point, Trefler cites evidence provided by Elhanan Helpman showing that a 5% increase in U.S. R&D is associated with a rise of 6.7% in U.S. productivity, but only with a 2.4% increase in Canadian productivity.

While much additional research should be done to understand the precise channels through which trade affects productivity growth in Mexico and other developing countries, it is difficult to argue based on the macro and micro evidence that trade has enhanced Mexican firms' learning or technological absorptive capacity. Rather, Mexico benefited predominantly from the reallocation effects of international trade, and temporarily from its factor accumulation effects (see Chapter 3). From this vantage point, Mexico faces an important challenge in terms of improving its learning and technological absorptive capacity in order to get on a high-TFP growth development path—trade and NAFTA are not enough.

5.3.3 How FDI affects growth: Theory, international evidence, and the Mexican experience

The impact of FDI on economic performance can also be attributed to factor accumulation and efficiency effects. Exogenous increases in FDI might help capital accumulation directly as long as it does not completely displace domestic investment. FDI might also raise the demand for human capital in the domestic labor market when foreign corporations utilize technologies that require above-average skills. Again, this effect should not be confused with learning effects.

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[229] The study used random-effects estimation, rather than fixed-effects.

[230] Intermediate inputs increased marginal costs and quality among rubber producers and fertilizer/pesticide producers. Pharmaceutical producers, imported intermediates, combined with exports or imported capital goods, reduce marginal costs and tend to increase product quality. But these are exceptions to a fairly ambiguous record.

Similar to the previous discussion of the efficiency impacts of trade, FDI can have both reallocation and technological spillover effects. The former entails the exit of previously inefficient firms that are unable to compete with the incoming foreign companies, as well as the survival and perhaps entry of more competitive domestic firms. Hence productive resources get reallocated to more efficient firms. But this is not the same as the technological spillover effects, which would entail learning new production techniques by previously existing domestic firms. Thus spillover effects should be observed in within-firm TFP growth.

There can be little doubt that FDI increases the host country capital stock and contributes the technology embodied in that capital. However, the evidence for technological spillovers to other firms is sparse, but pessimistic. López-Córdova (2002) finds a *negative* direct impact of FDI on the same industry's TFP. This is consistent with numerous other panel studies of other developing and industrialized countries.[231] Other literature on Mexico is sparse. Early cross-sectional work by Blomstrom and others using industry-level cross-sectional data finds productivity spillovers. Blomstrom and Wolff (1994) finds that both the rate of local firms' labor productivity growth and their rate of catch up to the multinationals were positively related to the industry's degree of foreign ownership. Further, the rate of convergence of industry labor productivity to the U.S. rate of growth is higher in industries with a higher share of multinationals. They point out, however, that it is difficult to distinguish a rise in within-firm productivity from simply increased competition forcing out less efficient firms thus raising the average rate of growth.

The macroeconomic evidence regarding the role of FDI in spurring TFP growth is also pessimistic. First, most studies of the causality between investment and growth indicate that investment follows growth (see, for example, Loayza et al. 2002). Calderón, Loayza, and Servén (2002) find that in developing countries FDI also follows national growth. Finally, Carkovic and Levine (2002, abstract) conclude that "the exogenous component of FDI does not exert a robust, independent influence on growth."

In sum, our reading of the existing international evidence is that NAFTA might have helped spur trade, FDI, and economic growth. But the trade channel's benefits were mainly driven by reallocation and factor accumulation effects, and FDI was probably stimulated by NAFTA and Mexico's economic recovery, but it did not necessarily lead to enhanced learning capacity in Mexico's private sector.

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[231] Lipsey (2002), in a comprehensive review of the literature argues, that the evidence is vast that foreign firms tend to be at least as productive as domestic firms and hence their presence pushes up average productivity. However, the evidence that the presence of foreign firms has positive productivity spillovers is extremely ambiguous. The vast majority of the papers that find strong effects employ cross sectional data which cannot control for unobserved country characteristics. Those using firm level panels frequently find insignificant or, even negative effects (e.g., Aitken and Harrison (1999) for Venezuela). Van Pottelsberghe de la Potterie and Lichtenberg (2001) find that investing in a relatively more technologically advanced country and hence adding foreign production to domestic production increases productivity in the home country. But the reverse case of investment in a technologically less advanced country has insignificant or negative results for the host, developing country. Baldwin, Braconier, and Forslid (2000) find mixed results for seven OECD countries and using panel firm level data from Sweden, Braconier, Ekholm, and Midelfart Knarvik (2000) find no spillovers from incoming FDI on productivity and the only variable in their sample affecting TFP is own country R & D. Using global industry level data, Schiff and Wang (2002) find no impact of FDI on TFP. Xu (2000) using panel data on technological transfer from U.S. finds a technology transfer effect by U.S. Multinationals only for advanced countries although a competition effect that does appear to increase productivity. Kinoshita (2000) found, for example, little evidence at the firm-level of positive effects of FDI in the Czech republic from 1995-1998. Smarzynska (2002) finds no direct impact of FDI in Lithuania on firms in the same industry although there was an impact on affiliated upstream suppliers.

5.3.4 Some evidence on the determinants of adoptive capacity of Mexican firms

In this brief review of the theory and empirical evidence concerning the role of trade and FDI in promoting learning by economic agents we have concluded that NAFTA and its trade and FDI effects are unlikely to lead to a sustained growth path lead by technological progress. Hence our focus now turns to the determinants of adoptive or learning capacity.

López-Acevedo (2002) studied the determinants of various types of technological adoption by Mexican manufacturing firms. The study relied on a series of cross-sectional and panel, random-effects regressions, without controlling for endogeneity. Thus the results should be treated only as suggestive. The findings of this study indicate that firms that spend more in R&D, train workers, and use highly skilled workers also have higher probabilities of adopting new technologies. In turn, Meza and Mora (2002), also in a cross-sectional analysis found that in 1992, prior to the implementation of NAFTA, R&D investment by firms was positively correlated with the domestic market share of each firm. In a post-NAFTA sample for 1999, import tariffs were negatively correlated with R&D effort, and exports were positively related to R&D. Yet these results are difficult to interpret since it is not clear that R&D effort lead to exporting or that poor R&D effort was associated with lobbying efforts to maintain high tariffs. Thus these analyses do not take us far enough in terms of identifying the policies that can help Mexico get on a development path characterized by learning and fast productivity growth measured by international standards. In the following sections we attempt to answer the key policy questions for the future of Mexican innovation: Does Mexico invest too little in R&D?; does the national innovation system (NIS) suffer from inefficiencies?

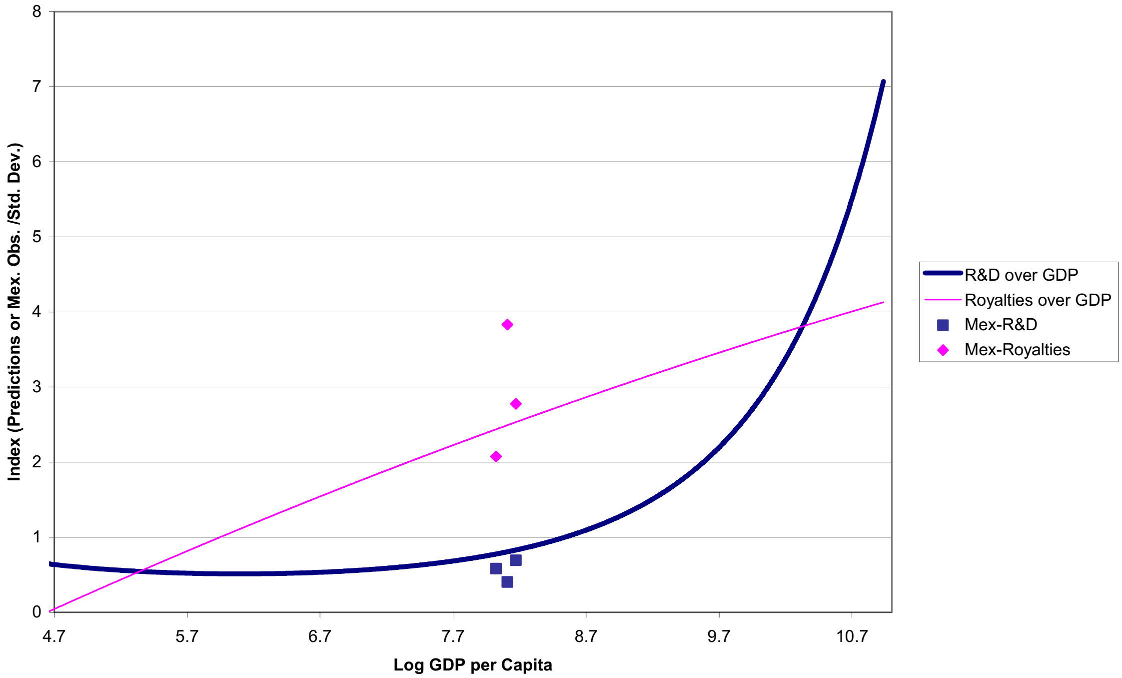
5.4 Should Mexico invest more in R&D and licensing?

In this section we take the same approach we used for analyzing where Mexico stands in terms of the indicators of innovation outcomes. That is, we first discuss how the rate of R&D and licensing investments tend to move with the process of development. We then assess whether Mexico is under- or over-investing in R&D and licensing given its level of development. Next, we address the same question, but with a different lens: we ask whether Mexico is under- or over-investing in R&D given estimates of the social rates of return to R&D. Based on the work of Jones and Williams (1998) we provide from estimates both the rates of return to R&D and of the optimal levels of R&D investment, which depends on the rate of returns of R&D relative to the rate of return of other capital investment. We conclude this section with a policy discussion of alternatives for stimulating R&D expenditures.

5.4.1 How total R&D and licensing payments evolve with development

To derive the relationship between the rate of R&D investment relative to GDP, we estimated a Median Regression where the dependent variable was the log of R&D expenditures over GDP and the arguments were the log of GDP per capita and log of GDP per capita squared. The data was composed of a worldwide sample of developed and developing countries from the early 1960s to 2000. The resulting relationship between the ratio of R&D expenditures and license payment over GDP and the log GDP per capita is shown in Figure 8. This graph also shows where Mexico stands in terms of these two variables. The three Mexican observations correspond to the years 1986, 1993, and 1998.

Figure 8. R & D Effort, Licensing, and Development: Predictions from Median Regressions



It seems that R&D effort follows a similar pattern along the process of development as the previously discussed patent counts. Both exhibit a take-off after a certain level of development, namely around $1100 per capita U.S. dollars of 1995. Clearly Mexico is in the fast upward sloping part of the curve. It is worth noting that only a handful of Latin American countries (Haiti, Bolivia, Honduras, Guyana, and Nicaragua) have not yet reached the take-off point. In any case, for our country of interest it is worth asking whether Mexico is under-performing given its level of development, and the preliminary evidence in Figure 8 indicates that it was under-performing before and after NAFTA.

Figure 8 also suggests that license payments rise almost linearly with the level of development. A cursory look at the data reveals that Mexico had not systematically under-performed in licensing relative to the median. The following section takes a more careful look at this country's relative position in R&D and licensing.

5.4.2 Considering the level of development, where does Mexico stand in R&D effort?

Figure 9 presents Mexico's residuals from more general Median Regressions for both R&D and licensing, which included log GDP, log GDP squared, log labor, log labor squared, and time dummies as its arguments. It seems that since the late 1960s, Mexico's R&D effort has been below the level of the median or "typical" country with similar characteristics. The evolution of the licensing residuals shows that since the late 1970s Mexico has been above or right on the predicted typical level.

Figure 9. Mexico's R&D (But Not Licensing) Effort Is Below the Median

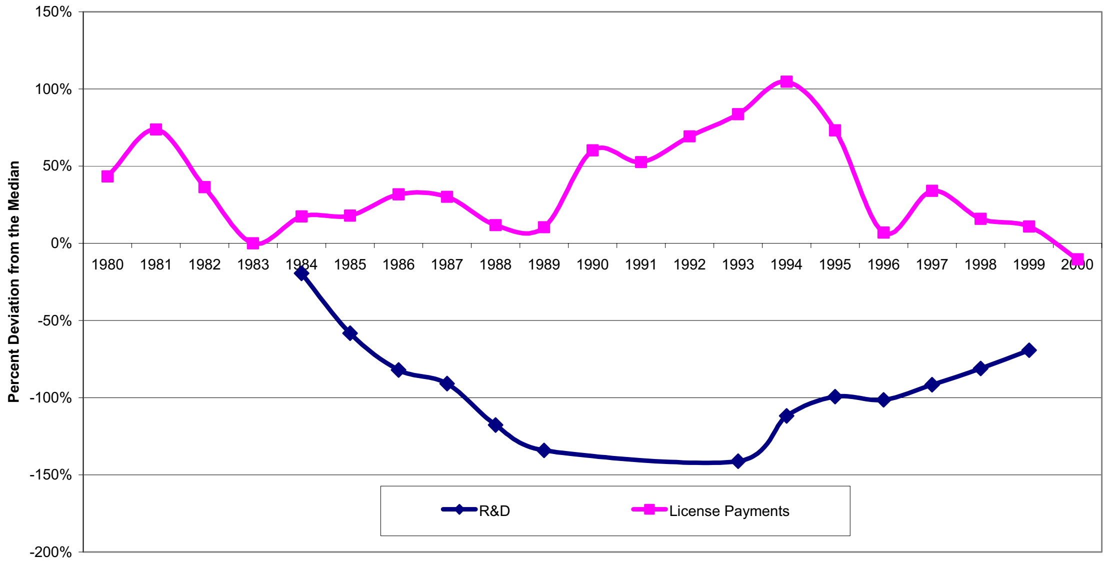
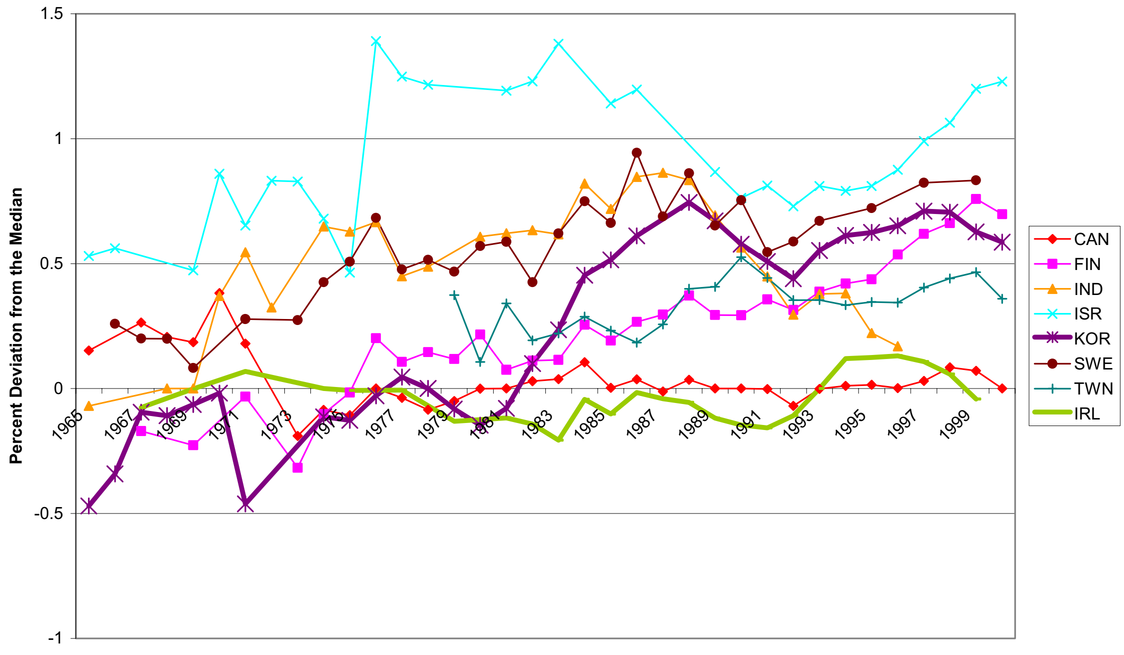


Figure 9 also highlights an interesting pattern related to the lost decade of the 1980s. The crisis of the 1980s was associated with a fast decline in Mexico's relative position in R&D effort. Thus it is possible that one of the channels through which the process of adjustment during the 1980s hampered productivity growth might have been through the reduction of R&D investments. Moreover, since R&D is both a means for adapting foreign technologies to domestic circumstances and for creating new technologies and products, seemingly transitory collapses in R&D effort might have long-term consequences. In other words, in the multiple equilibria growth model discussed earlier, it could be argued that countries like Mexico in part now face a challenge for stimulating long-term growth due to the lost opportunities of the past in terms of not having been able to move into the highest productivity growth path.

Subsequently, during the NAFTA period, Mexico's R&D effort rose, although it has not yet reached the median. From this viewpoint, Mexico needs to do more to stimulate R&D investments. This becomes even more obvious when we look at the high-innovation countries discussed in the section on patents. Their residuals for the R&D effort regression are shown in Figure 10. Of these, only Canada did not experience either a boom or a continuously high level of R&D effort relative to the median. The Canadian result is consistent with the discussion in section 5.3 and the cited studies by Trefler, who has concluded that this country is risking falling into a lower growth equilibrium if it does not push up its R&D effort. The Korean and Finnish cases are remarkable in that they went through a period of very rapid improvements in their relative R&D effort, and by the early 1980s they were both well above the median. Thus these countries had exactly the opposite experience of Mexico (and many other LAC countries) that experienced very rapid declines in their R&D efforts relative to the typical country at those levels of development. Nevertheless, benchmarking relative to the median is only one way of assessing whether a country invests sufficiently in R&D. In the following section we estimate social rates of return to R&D and then we assess whether Mexico could benefit from policies aimed at increasing its R&D investment.

Figure 10. The Patenting Over-Achievers Also Do a Lot of R & D



5.4.3 Given the returns, how much should Mexico spend on R&D?

Is Korea and Finland's departure from the benchmark a key element in their rapid catch up, or evidence of a wasteful high-tech white elephant? Another way of phrasing the question is whether the returns to R&D can justify these above-median R&D expenditures. Most estimates of the impact of R&D spending on TFP in selected U.S. firms and industries is astronomical, ranging from 30 to 120 percent which, compared to a return on capital of 7% implies the U.S. should invest more by a multiple of at least 4—see Table 1 and Box 1.[232]

Table 1. Estimates of the Rates of Return to R&D in the U.S.

		Return (own)	Spillovers	Social Return	S*/S
Sveikauskas (1981)	1981	.17			2.4
Griliches (1994)	1994	.30			4.3
Griliches and Lichtenberg	1984	.34			4.9
Terleckyj	1980	.25	.82	1.07	11.7
Scherer (1982)	1982	.29	.74	1.03	10.6
Griliches Lichtenberg	1984	.30	.41	0.71	5.9
Jones and Williams	1998	.35			5.0

Source: Jones and Williams (1998)

[232] Griliches (1992) estimates social returns to R & D in the U.S. of between 20-60%. In fact, for the U.S., Jones and Williams (1998) confirm that rates of return are at least 30% and calculate that the optimal resources that should be devoted to R & D could be 4 times the present level in the U.S.

Box 1. How Much Should Mexico Spend on R&D? Some Algebra.

Beginning with a simple production function

$$Y = K^{\alpha} L^{1-\alpha} S^{\beta}$$

where S is the stock of accumulated R&D. This can be rewritten as

$$\Delta \ln Y = r_k \left(\frac{I}{Y}\right) + r_s \left(\frac{\dot{S}}{Y}\right) + (1-\alpha)\Delta \ln L$$

using the fact that $\eta_x \Delta \ln(X) = r_x \left(\frac{\dot{X}}{Y}\right) = r_x (x)$

where r_x is the rate of return on factor X and x is the share of investment in X over Y, and η_x is the output elasticity of this factor. If we remove the influence of physical factors to get TFP then the social rate of return to R&D is

$$r_s = \Delta \ln TFP / s$$

where s is the share of R&D spending in income. Following Jones and Williams (1998), the optimal level of R&D expenditure occurs where $r_s = r$, the real interest rate. So, the ratio of the optimal level of R&D investment to actual along a balanced growth path can expressed as the ratio of the social rate of return to R&D to the real interest rate.

$$\frac{s^*}{s} = \frac{r_s}{r}$$

Jones and Williams argue that for a very conservative estimate of 28% return to R&D in the U.S., a long run 7% rate of return on the stock market over the last century suggests that the U.S. should be investing perhaps 4 times the present level.

On the other hand, poor countries may invest less in R&D because returns might be lower. Table 2 presents estimated *social* returns for a panel of countries provided by Lederman and Maloney (2003). Not only are the estimated returns of 40% of the same order of magnitude found in previous studies, but it appears that they *decrease* with development. The return in the average OECD country is somewhere between 20-40%. As figure 11 shows, for a country at Mexico's level of development, the return would be around 60%. This makes sense if we suppose that a dollar's worth of R&D buys much greater increases in productivity for countries far from the technological frontier than for innovating countries who must invent the new technological advance. In a sense, this simply confirms the intuition of numerous convergence regressions in the Barro (1991) tradition, which are consistent with the neo-classical growth theory mentioned in Chapter 1 of this report.

Figure 11 also plots the estimated return to physical capital and the ratio of the two returns. For the U.S., the gap of 2.25 is somewhat more moderate than that offered by Jones and Williams but consistent with the speculative nature of these exercises. Latin America's gap rises slightly, but, due to the rise in the returns to physical capital, it remains under 2.5. If instead, we were to assume free access to international capital markets and the 20th century's return on the U.S. stock market of roughly 7%, as suggested by Jones and Williams, the gap for Mexico would rise to about 8.

Another important finding merits mention. Not only do natural resource abundant economies (captured by the ratio of net exports of natural resources, labeled "NR-Leamer" in the table), such as Mexico, appear to grow faster than others (see also Lederman and Maloney 2002), but the interaction with R&D spending is significantly positive. That is, consistent with the previous discussion, we may be able to explain the better performance of, for instance, Scandanavia or Australia in their exploitation of natural resources compared to Mexico and other Latin American economies by their much higher commitment to innovation.

Table 2. Returns to R&D

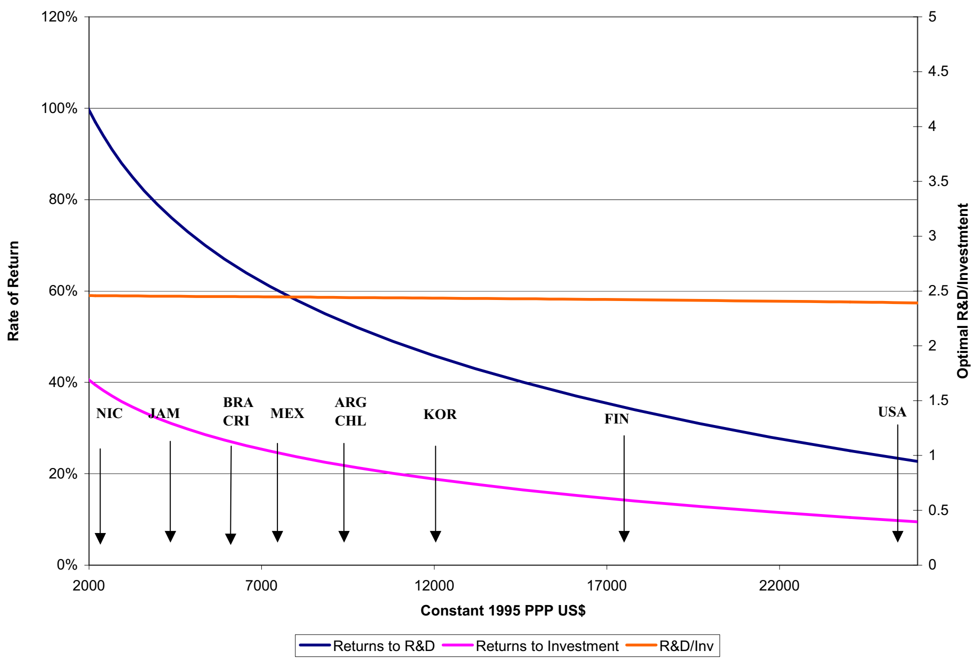
Dependent Variable: Growth of GDP (constant PPP), five-year averages from 1960-2000
Methodology: GMM system estimator

	(1)	(2)	(3)	(4)	(5)	(6)
Countries	53	43	43	43	43	43
Observations	162	107	107	107	107	107
Initial level of gdp per capita	0.03461 ***	0.00059	-0.0088 **	0.00026	0.00116	0.0877 ***
Investment/GDP	1.29895 ***	0.18948 ***	0.32838 ***	0.23743 ***	0.2713 ***	0.88322 ***
Labor growth	0.50922 ***	0.59981 ***	0.49541 ***	0.7535 ***	0.48368 ***	0.7708 ***
R&D/GDP	3.19316 ***	1.38194 ***	0.51829 ***	1.02247 ***	9.62216 ***	9.29019 ***
Tertiary Enrollment ratio			0.05567 ***	0.02778 *	0.05302 **	0.02258 **
NR-Leamer				0.00106 **	-0.0059 ***	-0.0056 ***
R&D*(gdp per capita)	-0.3 ***				-1.029 ***	-0.9924 ***
R&D*(NR-Leamer)					0.37071 ***	0.32784 ***
Investment/GDP*(gdp per capita)	-0.1307 ***					-0.0792 ***
Wald test for joint significance(p-value)	0	0	0	0	0	0
Sargan Test(p-value)	0.326	0.437	0.703	0.372	0.485	0.917
1st order serial correlatin	0.002	0.007	0.005	0.005	0.005	0.004
2nd order serial correlation	0.23	0.984	0.625	0.721	0.798	0.885

Levels of significance: *** 1%, ** 5%, * 10%

The fact that social returns are high does not ensure that private returns are high because unattended market imperfections tend to reduce the equilibrium marginal private returns to R&D.[233] These market failures are discussed in the following section. In turn, the final section of this chapter explores the determinants of R&D expenditures in an attempt to explain why rich countries invest more than poor nations.

Figure 11. Estimated Returns to R&D Expenditures and R&D Gap



[233] For an intuitive discussion of the determinants of the equilibrium private marginal rate of return, see David et al. (2000). Briefly, the equilibrium return is determined by the marginal costs of and returns to R&D. Some of the market failures affect the costs (i.e., capital markets might be incomplete) and others affect the returns (i.e., the non-appropriability problem).

5.4.4 *Why, if returns are so high, is R&D so low in Mexico and elsewhere?*

Knowledge is especially susceptible to market failures that lead to an under-investment in R&D and other innovation-related activities.

Non-appropriability. Most commonly cited is the inability of innovators to exclude others from using their ideas. This is implicit in the finding that rates of return to R&D tend to be estimated to be roughly 4 times the private rate in the studies cited above. In fact, recognition of this failure has led to an emphasis on public interventions necessary to ensure the socially optimal level of innovation: Temporary monopoly rights are granted through patents and other intellectual property regime (IPR) instruments, research and development (R&D) subsidies are awarded, and so forth.

Lumpiness and scale economies dictate specialization. R&D and innovation are characterized by economies of scale and lumpiness. To be effective, resources need to be concentrated in a manner beyond the capacity of the individual firm. This, combined with the fact that even patents are not effective at resolving the non-appropriability problem in "pure science," provides a rationale for institutions dedicated to R&D and innovation efforts, such as research centers and universities, in their research role. Innovation and knowledge developed by those institutions tend to be non-exclusive and are made available to all and any interested parties, guided by an appropriate allocation of property rights.

Free rider problems impede diffusion as well as innovation. Once an innovation has been developed, its social value is measured not only by that knowledge itself, but also by how many agent-institutions and firms (ultimately embodied in workers) have it and, once it is there, by how fast it is disseminated to others. The more agents have access to it and the faster that access, the higher the social value of that innovation. But the same market failure that impeded discovery of new ideas slows the transmission of existing ones as well. A firm that incurs the costs of tapping into the global stock of knowledge by, for instance, by financing a study tour, will soon find its discoveries adopted by other firms who free-ride on the investment. Historically, this has given rise to institutions ranging from agricultural extension services to technology parks to institutions designed to act as "antennae" for new ideas at the sectoral and national level.

Innovation, diffusion, and application require collaboration among many institutions and firms. Although innovation is sometimes the product of one firm alone, the more common pattern is one of joint efforts, among various firms, or among firms and R&D-related institutions, or among various R&D-related institutions. Further, progress does not proceed linearly from pure science to applied technologies, but moves in both directions (Nelson and Rosenberg 1993); and feedback from frontline users of technology to researchers is essential for the refinement of products and production processes (Nelson & Rosenberg 1993). Finally, as a result of specialization, the full supply chain of knowledge is not fully integrated, either vertically or horizontally. Technological advance is therefore not necessarily evenly diffused throughout the supply chains. In each example, success requires coordination and cooperation across all necessary actors that is subject to coordination failures and transaction costs. In many industrial countries, these issues have given rise to national institutions devoted to fomenting or eliminating impediments to technological collaboration among different institutions.

5.5 Is Mexico's innovation system efficient?

The development and necessary interaction and coordination of these market and non-market institutions has led to the concept of National Innovation Systems (NIS) and an extensive literature that we can only touch on here (Nelson et al.1993, OECD 1999, 2001). It is the networks of public and private firms interacting in a concerted way to generate and adopt technologies through which nations can be said to learn. This "national learning capacity," as numerous observers have called it, is what permits nations to adopt and innovate in their initial areas of comparative advantage and helps create new ones (Furman, Porter, and Stern 2002, Romer 1990, Nelson 1993, Wright 1999).

Mexico has numerous innovation-related public institutions to address particular market failures, which are associated with the education ministry (SEP), the National Council for Science and Technology (CONACYT), and the national petroleum company (PEMEX). However, the idea of a system entails a deliberate design and coherent functioning. In fact, a central tenet of this system or network is that there are no market forces that guarantee that the various components alone will remedy the market failures they were intended to address. By their very nature, many of the institutions developed to remedy market failures are not market based, and as a result they do not respond to market signals. The challenge for public policy is thus not only to help establish research and educational agencies, but also to ensure that these are adequately integrated with the productive sector. That is, ensuring the effective interaction of the available innovation-related factors poses Mexico's other great challenge after remedying the gaps in its stock of innovation-related factors. The following sections provide a diagnosis of the extent to which this country's innovation system suffers from inefficiencies stemming from the lack of quality research institutions and their linkages with the productive economy.

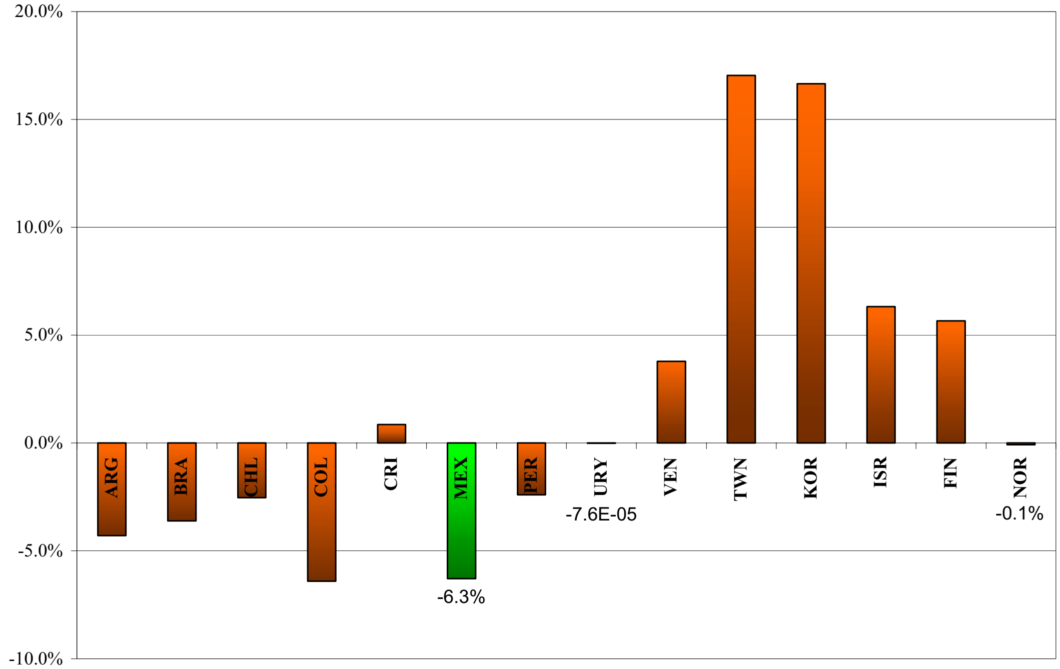
5.5.1 How much bang for the buck? The patenting efficiency of Mexican R&D

One measure of how the system functions is how well it converts R&D financing into patenting. This standard of R&D efficiency is superior to our previously discussed estimates of the social returns to R&D, because the returns tend to be high in poor countries, including Mexico, precisely because the overall level of R&D effort is low. As the supply rises, the returns fall. Moreover, the efficiency of R&D should be measured with respect to direct outputs of such efforts, rather than social outcomes, which reflect the impact of economic externalities rather than R&D efficiency.

To assess the efficiency of Mexican and Latin American R&D effort, Figure 12 presents econometric estimates of country-specific patenting elasticities with respect to total R&D investment. These estimates were obtained using a pooled regression of 52 countries over a 15 year period (1985-2000) in a negative binomial regression application of Blundell et al.'s (2002) Pre-Sample Mean estimator, which aims to control of unobserved country-specific characteristics and the likely endogeneity of some of the explanatory variables. The latter include the log of R&D expenditures, log of exports to the U.S., net exports of natural resources, the log of the pre-sample mean of patents (1963-1985) and the corresponding country dummies interacted with the log of R&D expenditures, leaving the OECD countries as the reference. The differentials shown in the figure are the result of dividing the country dummy by the R&D coefficient for the OECD countries, thus yielding the percent deviation from the OECD average. What is immediately apparent is that Mexico is among the worst performers with its coefficient roughly 6.3% below that of the OECD and far below Korea, and even Costa Rica and Venezuela, two countries that have significantly higher tertiary enrollment rates than Mexico and proportionately higher numbers of adults with some tertiary education (see De Ferranti et al. 2003).

Table 3 presents further econometric estimates of the impact of R&D on patenting activity. The statistical technique used for these estimates shows the impact of R&D on patents (see Box 1 for details) and finds that, there is a close and significant relationship between the two. However, even after adjusting for trade, resource endowments, that might affect patenting in the U.S. independent of the true innovative region performs substantially worse than the norm in converting R&D expenditures into innovation. The results in Table 3 also indicate that the negative Latin American effect disappears altogether when effort, a Latin American dummy with R&D generates a strongly negative coefficient suggesting that the variables that control for the interaction between various research and educational indicators and R&D

Figure 12. R&D Efficiency, 1985-2000
(% deviation from OECD average)



expenditures. This is the case, for example, with the Global Competitiveness Report's indicators of the quality of scientific and research organizations (i.e., universities and public research institutes) and of the extent of collaboration between the productive sector and universities. In the case of Mexico's inefficiency, only a portion of it is explained by these variables. But these variables, plus the gross enrollment rate in tertiary education are sufficient for explaining Mexico's inefficient R&D expenditures. It is noteworthy that secondary enrollment and the level of development of information and

Table 3. Determinants of Patent Counts

Methodology: Negative Binomial, Pre-Sample Mean Estimator
Presample: 1963-1984

Observations	512	512	512	512	512	512	328	512	328	295
Countries	53	53	53	53	53	53	52	53	52	49
ln(Average Patents 1963-1984)	0.32 ***	0.40 ***	0.38 ***	0.26 ***	0.33 ***	0.28 ***	0.37 ***	0.23 ***	0.30 ***	0.28 ***
ln(R&D Expenditure)	0.78 ***	0.48 ***	0.48 ***	0.24 ***	0.35 ***	0.31 ***	0.42 ***	0.15 ***	0.29 ***	0.34 ***
ln(Ustrade)		0.37 ***	0.35 ***	0.32 ***	0.30 ***	0.38 ***	0.27 ***	0.37 ***	0.22 ***	0.19 ***
Nrleamer		-0.03 **	-0.03 ***	-0.07 ***	-0.08 ***	-0.10 ***	-0.07 ***	-0.11 ***	-0.09 ***	-0.08 ***
ln(Quality)*ln(R&D)				0.17 ***				0.12 ***	0.09 ***	0.09 ***
ln(Colaboration)*ln(R&D)					0.11 ***			-0.01	0.03 **	0.02
ln(years of Education)*ln(R&D)						0.10 ***		0.08 ***		
Tertiary enrollment*ln(R&D)							0.08 ***		0.07 ***	0.07 ***
Secondary Enrollment*ln(R&D)							0.02		-0.01	-0.01
LAC*ln(R&D)	-0.03 ***	-0.04 ***	-0.04 ***	0.00	-0.01	-0.01 ***	-0.02 ***	0.01	0.00	0.00
MEX*ln(R&D)	0.00	-0.04 ***	-0.04 ***	-0.02 ***	-0.03 ***	-0.03 ***	-0.03 ***	-0.02 **	-0.01	0.00
Openness*ln(R&D)			0.02 **	0.02 *	0.01	0.00	0.02 ***	0.00	0.02 ***	0.03 ***
Trade Resiudal*ln(R&D)										
ICT*ln(R&D)										0.00
Time Trend	0.05 ***	0.04 ***	0.03 ***	0.03 ***	0.03 ***	-0.01	-0.03 **	0.00	-0.01	-0.02
Pseudo R-squared	0.17	0.19	0.18	0.21	0.20	0.21	0.23	0.22	0.24	0.25
Log likelihood	-2889.4	-2828.5	-2946.6	-2766.2	-2770.7	-2731.7	-1722.0	-2700.3	-1686.5	-1529.6

Levels of significance: * 1%, ** 5%**

communications technology (ICT) *do not* explain Latin America's or Mexico's innovation inefficiencies.[234] In sum, Mexico's inefficiency is due to a combination of low enrollment rates in universities and poor quality research and linkages between the universities and the productive sector.

A partial explanation for this pattern throughout the Latin American region, including Mexico, is found in the proliferation of state-owned public agencies during the ISI period that developed R&D capacity in order to better exploit the available natural resources and to jump start industries to supply local demand in the postwar period. For some reason, universities played the dominant role throughout the region in both government funding for innovation and attracting most of the skilled researchers. In part, insulated from competition, the research institutes had little incentive to coordinate with the productive sector, and the minor efforts in adapting imported technologies to the local environment were undertaken by subsidiaries of large multinational corporations, and many fewer by privately owned small and medium enterprises. The previously mentioned preliminary evidence on the determinants of R&D spending by private firms in Mexico provided by Meza and Mora (2002) indicates that prior to NAFTA, manufacturing-sector R&D was mainly a function of the domestic market share held by the company. It was until after NAFTA (the sample corresponds to 1999) when trade-related variables became positively correlated with R&D effort in the private sector. Yet it seems that the slight overall increase in productive sector R&D after NAFTA was not necessarily accompanied by improvements in the efficiency of total expenditures, thus indicating that the lack of coordination among the key elements of the NIS remains an important obstacle for Mexican innovation.

This pattern appears in sharp divergence with some of the Asian newly industrial countries (NICs), who very early on made dramatic investments in education, and who also recognized the importance of a well-coordinated NIS to support the private sector in the context of an export-oriented trade policy (De Ferranti et al. 2003). Unlike Latin America, where R&D activities were concentrated in public research institutions, these countries emphasized science and technology in the productive sector by providing financial and tax incentives, and the productive sector became the main user of R&D funds. Korea and Taiwan, in addition to making large investments in R&D, coordinated technology importation, diffusion, and development. At the same time, the large investment in education in these countries resulted in a highly schooled labor force able to adapt to constant industrial upgrading and economic restructuring. We return to these policy issues in the final section of this chapter.

5.5.2 Structural change in trade, but not in innovation

A World Bank report (De Ferranti et al. 2002, chapter 4) documented how Mexico's trade structure had changed during the post-NAFTA period. In a nutshell, NAFTA stimulated a structural change whereby Mexico became a net exporter of machinery, including telecommunications equipment, road vehicles and parts, and office and data processing equipment (i.e. computers). In addition, the incidence of intra-industry trade rose remarkably fast after 1994. If this transformation of trade flows was accompanied by a transformation of the patterns of innovative activity, then we could be certain that Mexico's innovation system has accompanied the productive sector, thus indicating that the emerging sectors are driven by innovation rather than simple maquila-type processes. Based on sector-level patent data from the USPTO collected by Lederman and Sáenz (2003), Figures 13 a-d show an index of Innovative Revealed Comparative Advantage (IRCA) that captures how patenting in various sectors in Mexico, Brazil, Korea, and Taiwan, relative to each country's total patenting compares to the world's share of total patenting in that sector. A value above unity suggests that a country has an innovative

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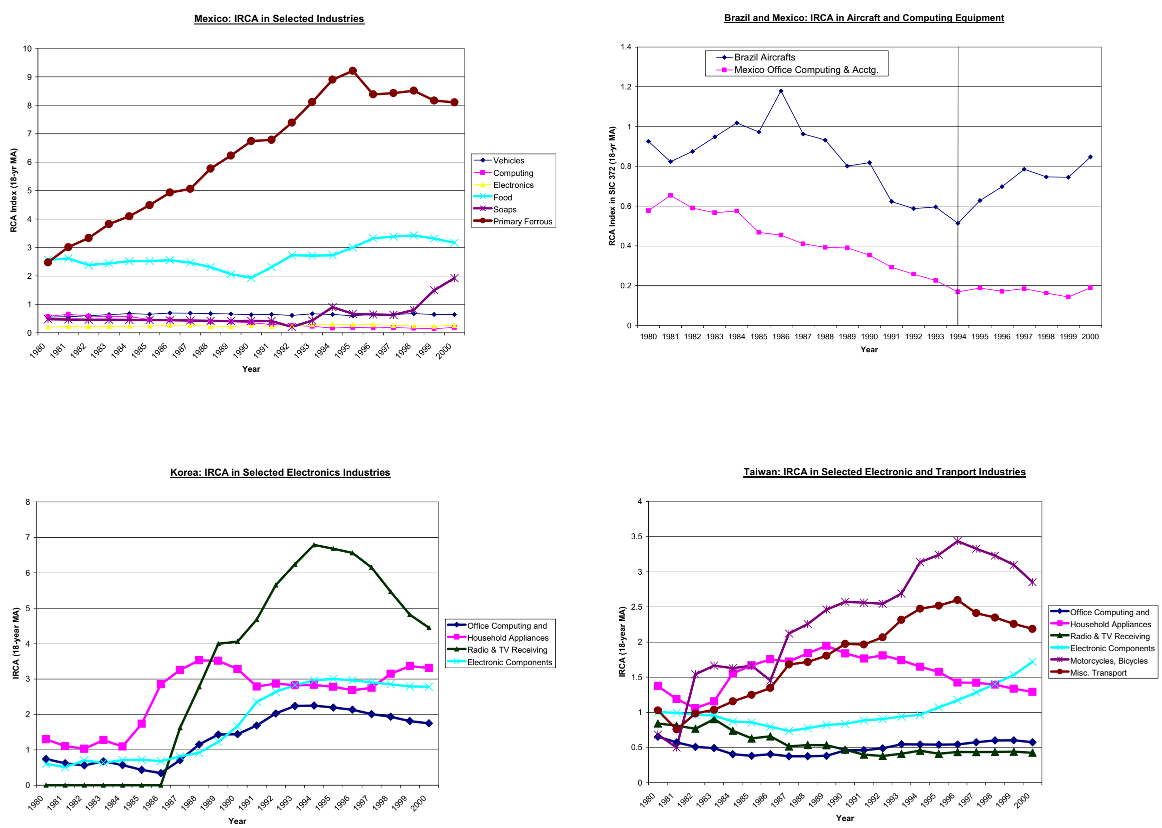
[234] The ICT index used in this analysis is the one provided by Lederman and Xu (2001), which is the result of the first principal component from factor analysis using four indicators of ICT: telephone lines per capita, cellular phones per capita, personal computers per capita, and internet hosts per capita.

comparative advantage in that sector. This index of innovation comparative advantage has been used in the scientific literature (Patel and Pavitt 1995).

Strikingly, the principal sectors where Mexico shows a comparative advantage is in more traditional sectors, such as processed foods, soaps and paints, and primary ferrous products. Somewhat surprisingly, the emerging sectors of computers and automobiles are not above 1 and have not shown an upward trend. In contrast, Figure 13b shows Brazil's IRCA in aircrafts and indicates that since the privatization of EMBRAER (Brazil's small airplane and parts producer) in 1994, there has been an upward trend in this index.

If we compare these trends with Taiwan's and Korea's IRCA in electronic equipment and appliances, we see that both of these countries experienced substantial movement in the IRCA of these industries, as shown in Figures 13c and 13d. Korea in particular has demonstrated substantial increases in its innovative comparative advantage in these sectors relative to what it had in the 1980s, just prior to itsbig take-off in R&D effort. By 2000 Korea maintained a clear comparative advantage in innovation in the four sectors shown in the graph. Taiwan also experienced substantial changes in its innovative structure, and now has a clear comparative advantage in transport industries (motorcycles and bicycles, miscellaneous transport equipment) and various electronics products (radio and TV receiving equipment, household appliances). Thus, in stark contrast to these other developing countries with comparative advantage in net exports of electronics and transport equipment, Mexico seems not be experiencing a

Figures 13a-d. Mexico's IRCA in Innovation: Not in the "New" Sectors



favorable change in its innovative activity. On the contrary, Mexico seems to have an innovative comparative advantage in traditional sectors, but not in the emerging machinery sectors. We interpret this as evidence that Mexico suffers from poor linkages in its national innovation system. To the degree that Mexico is simply relying on temporarily low labor costs to assemble computers, rather than developing depth in supporting a knowledge base, then these sectors may lose steam in the near future.

5.5.3 Are there linkages in Mexico's R&D effort?

In this subsection we "follow the money" by looking at how much of the R&D performed by the productive sector is financed by the public sector, how much of the R&D performed by universities is financed by the productive sector, and so on. Table 4 shows that in 1999, less than 20% of the productive sector's R & D is financed from foreign sources. Neither the government nor universities contribute significant amounts to the productive sector's efforts. In turn, all of the government's R&D is self-financed, and less thane 8% of the R&D performed by universities is financed by the productive sector. The three sectors function more or less autarkically, a recipe that is unlikely to produce economically meaningful innovation in the future.

Table 4. R&D in Mexico: Who does it and who pays for it? Expenditures in 1999 (millions of USD)

	Performed	Financed	Share of Financing
1. Productive Sector	**$588.7**		
Financed by:			
Productive Sector		$473.2	80.2%
Government		$7.3	*
Other		*	*
External		$109.2	18.5%
2. Government	**$1,037.3**		
Financed by:			
Productive Sector		n/a	
Government		$1,037.3	100%
Other		n/a	
External		n/a	
3. Universities	**$607.3**		
Financed by:			
Productive Sector		$47.3	7.8%
Government		$332.2	54.7%
Higher Education		$223.5	36.8%
Higher Education and Government		$555.7	91.5%
4. Private/Non Profit	**$71.9**		
Total	**$2,304.2**		

Source: Carlos Bazdresch, CIDE, based on data from CONACYT.

In sum, beyond making a stronger effort to increase the stock of factors of innovation, Mexico needs to reexamine the package of incentives, explicit and implicit, in the innovation system. These include those affecting the research effort within each institution in the system—private firms, universities, and think tanks—and also the interactions among them. Below we deal with three elements of the NIS, namely government-financed research institutes, universities, and capital markets. These policy issues are discussed in more detail in the following and concluding section of this chapter.

5.6 Policies to increase R&D effort and to improve its efficiency

As shown by the previous empirical analyses, the efficiency of the national R&D effort depends on the incentives for the productive sector to be linked and to help finance such effort. For the specific cases of Latin America and Mexico, the most important factor affecting the efficiency of NIS is the quality of university research, the lack of linkages between universities and the productive sector, and enrollment in tertiary education. Also, the low efficiency of the NIS itself might limit the productive sector's interest in raising its R&D investment, in spite of the potential high returns to R&D. Although there are numerous ways of improving the efficiency of the NIS and to raise the overall R&D effort, but improving the links between research organizations and the productive sector should be at the center of the reform effort in Mexico and more generally in Latin America.

The following paragraphs qualitatively evaluate existing evidence regarding policies to support technology transfer among private-sector firms (inter- and intra-national), Public Research Centers (PRCs), universities (both public and private), and capital markets. The main focus is on various country experiences that might be worth emulating by Mexico. In particular, whenever possible we describe policies and outcomes in several of the innovation leaders in the world, including the United States, Japan, Korea, Finland and others, and we also compare some of Mexico's policies to those observed abroad. This approach is consistent with the view that countries with relatively lagging innovation policies should attempt to "converge" towards policy models that have been tested elsewhere. Imitating policies and institutions and quantitatively monitoring the outcomes of these policies has been the guiding principle for the strengthening, for example, of Finland's science and technology policies since the early 1960s (Lemola 2002).

5.6.1 State-owned enterprises

A crude way of ensuring links between productive activities and R&D efforts is through public management of important economic sectors. This is the case in countries like Chile (CODELCO), Venezuela (PEDEVESA), Taiwan (Telecommunications), Costa Rica (Telecommunications, utilities), Brazil (Embraer prior to 1994), and Mexico (PEMEX). The evidence on the efficiency of total R&D expenditures in several of these countries is quite high, thus indicating that public firm management does not necessarily condemn a NIS to failure. In the case of Mexico, further research should assess the efficiency of PEMEX's R&D effort or existing analyses should be scrutinized. But even if PEMEX's efforts have prevented Mexico's NIS efficiency to be higher than it would otherwise be, they have not been sufficient to push Mexico towards the "average" OECD standard. In any case, there are various other government interventions, besides public management, that can help improve Mexico's R&D efficiency.

5.6.2 Promoting firm-firm linkages – how should the government intervene?

One of the most famous policy initiatives to promote inter-firm linkages in the U.S. is SEMATECH, a research consortium of semiconductor manufacturers set up in 1987 by 14 U.S. semiconductor firms with the financial assistance of the U.S. government, which has been given credit for reviving the industry in the face of Japanese competition (Irwin and Klenow 1999).

Firm collaboration exists in Mexico, for instance, in the Mexican *Unión Nacional Avícola* which partly concerns itself with raising the quality of technological inputs into the production process—again, with important interest in importing foreign technologies (Mayer 2002). There are other examples of international firm-firm interactions in Mexico, including TELMEX's technology transfer contract with its main technological supplier, ALCATEL, a U.S. company. In the latter case, the Mexican telecom concern implemented this firm-firm agreement as a "lateral" agreement to complement the work of its Long

Distance Supervision National Centre located in Querétaro, which was created after the company's privatization to centralize "… the functions of supervision, maintenance, and negotiation to acquire long-distance technology for the firm" (Casas, De Gortari, and Santos 2000, p. 228). In both cases, the dominant private sector presence ensures relevance of R&D. Yet these efforts have developed without the involvement of the public sector, and have arisen out the firms' own concerns about their competitiveness.

In theory, it is unlikely that market forces alone will lead to the establishment of strong knowledge sharing and technology diffusion agreements among private firms, primarily because firms are naturally concerned about allowing potential competitors to profit from their own R&D investments and know-how. This is the so-called "limited appropriability" problem discussed earlier in this chapter. But there are other potential market failures related to capital markets that affect the financing of R&D efforts, especially for small and medium enterprises that wish to supply inputs of production to larger, often multinational corporations. In addition, in some sectors that rely on high-science technologies, markets are often non-existent for scientific applications due to lack of scientific knowledge in the private sector and lack of productive knowledge on the part of research scientists. Martin and Scott (2000) summarized the relevant market failures that are likely to limit the extent of private sector knowledge and innovation linkages among firms. The market imperfections, the productive sectors in which they might arise and the potential policy instruments that can help to resolve these failures are listed in Table 5. To Martin and Scott's original table, we have added the fourth column that lists the countries in which those policies have been applied.

Table 5. Innovation, Sectoral Market Failures, Policies

Main mode of innovation	Sources of sectoral innovation failure	Typical sectors	Policy Instrument	Countries
Development of inputs for using industries	Financial market transactions costs facing SMEs; risk associated with standards for new technology; limited appropriability of generic technologies	Software, equipment, instruments	Support for venture capital markets; bridging institutions to facilitate standards adoption	Israel, Sweden, Finland
Application of inputs developed in supplying industries	Small firm size, large external benefits; limited appropriability	Agriculture, light industry	Bridging institutions (extension services) to facilitate technology transfer (e.g., PRCs)	USA, Chile
Development of complex systems	High cost, risk, limited appropriability (particularly for infrastructure technology)	Aerospace, electrical and electronics technology, telecom/computer technologies, semiconductors	R&D cooperation subsidies (e.g. research consortia)	Japan, USA
Applications of high-science-content technology	Knowledge base orginates outside commercial sector; creators may not recognize potential applications to effectively communicate new developments to potential users	Biotechnology, chemistry, materials science, pharmaceuticals	Bridging institutions to facilitate diffusion of advances in big research; incentives for knowledge appropriation	USA

Source: Adapted from Martin and Scott (2000).

In general terms, Table 5 indicates that the establishment of non-market "bridging" institutions can help solve key market failures. There is not magic recipe for designing these organizations, although PRCs and universities often fulfill this bridging role.

5.6.3 Public research centers (PRCs)

In Mexico, government financed institutes enjoy a disproportionate share of the national research budgets. The logic of the ISI period was that fledgling industries often lack the in-house capability to undertake the necessary research. Alternatively, the same problems of appropriability and lumpiness suggest that industry-level institutions can address an important market failure. However, as Rosenberg (2000) argues, in practice, government institutions established for these purposes are likely to have little positive impact for two reasons. First, in general, government researchers have relatively little understanding of the specific needs of the productive sector. Second, it is difficult to provide researchers at public institutes with strong incentives to be responsive to economic needs.

This problem of mismatched agendas appears in force in Mexico, where the situation of the roughly 150 PRCs reveals the perils of poor incentive design. These centers are dependent on the secretariat to which they belong and frequently oppose any efforts of the secretariat to contract firms or outside universities who might be more qualified to investigate a particular question.[235] If the private sector and universities perceive that PRCs that enjoy ample government subsidies will thus succeed in producing economically meaningful innovations, they might actually curtail their own R&D efforts since they might consider themselves to be uncompetitive relative to the governments' PRCs. This is one of the reasons why theory indicates that publicly funded R&D might crowd-out private R&D. Most existing empirical studies at the micro- and national levels find that publicly financed R&D in the U.S. and European countries are not substitutes for private R&D, although most studies suffer from methodological and data problems that led David et al. (2000) to conclude that this evidence should still be treated with great caution. The extent to which public funding of R&D in Mexico, without firm links with the private sector, has led to a crowding out of private R&D needs to be investigated further, but it is likely that complementarities have been quite rare.

Further, the lack of competition has had the usual depressing effects on quality and created obvious disincentives to work with other institutions who might be potential rivals. Proposed reform laws foresee greater autonomy for the centers and further offer the possibility that research funds will be allocated by competition and not automatically to the particular center of investigation. These reform efforts should be supported.

Having said this, it is important to note that some PRCs in Mexico have successfully performed technology transfers to the private sector. On the other hand, low levels of human capital in the private sector itself, which is related to low tertiary and secondary schooling especially in rural areas, have also become obstacles to successful PRC-intermediated technology transfers. Three such cases are summarized in Box 2. An interesting aspect of the three cases is that they are related to areas of innovation where Mexico has a notable IRCA, as discussed in section 5.5.2 above, namely primary ferrous metals (the relationships between CIATE-Querétaro and Altos Hornos) and food items (the case of CINVESTAV-Irapuato; and CIATEQ's relationship with sugar producers from Veracruz). Yet in both of the cases related to CIATEQ, its original relationship with Altos Hornos and the sugar industry dates back to prior to the privatization of both industries. Hence this experience reveals that successful technology transfer relationship between PRCs and firms might take time to develop, and government management of firms might be a useful stepping stone towards more effective R&D investments.

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[235] Discussions with and presentations by Carlos Bazdresch, CIDE, who is a former head of CONACYT in Mexico, various dates during 2001 and 2002.

Box 2. Knowledge flows from PRCs to the productive sector in Mexico

This text box uses the words and materials from Casas, de Gortari, and Santos (2000, 230-232).

Case 1. Since its establishment in the 1970s, the Center of Research and Technical Assistance based in Querétaro (CIATEQ) has interacted with industry. One of its first projects was on metal-mechanics, particularly metallurgy. This project involved long-term collaboration with the Altos Hornos de México company in Coahuila. CIATEQ's early specialization in metal-mechanics led to another long-term collaborative project mechanizing agriculture, first with industries producing capital goods for agriculture in general and later with the sugar mills. The latter has been maintained without interruption and has involved multidisciplinary projects in several areas, including materials technology. At first, this collaboration was with the sugar cane producers association from Veracruz. Due to privatization, collaboration now exists directly with sugar cane enterprises from other regions and countries, such as Guatemala. This example shows how knowledge and technological capabilities accumulated by CIATEQ on metal mechanics have gone through different learning stages, starting with state-owned companies prior to the mid-1980s. These efforts contributed to the development of material sciences, leading innovations in metal pieces and metal casts, and the design, development and operation of industrial plants and services. This network is interregional and international.

Case 2. In Mexico's Bajío region, farmers' associations[236] are becoming aware of the value of knowledge to solve their crop problems. This is the case of the strawberry, which is one of the main regional crops and has huge potential for the national market as well as the export market. The Center for Research and Advanced Studies based in Irapuato (CINVESTAV-Irapuato) has tried to help farmers acquire technology to make virus-resistant strawberries by applying a 20-year old technology. It is called in vitro micropropagation and is utilized to propagate virus-free strawberry plants. Since 1983, CINVESTAV has worked to establish contacts with peasants without success. In 1995, new contacts were made through state and municipal governments, establishing a bilateral relationship with farmers through governmental financial support. The goal of the project was to establish a laboratory to teach farmers how to micropropagate the plants. Despite CINVESTAV's on-site laboratory and extensive training, the peasants have not been able to assimilate the knowledge because of their lack of adequate education and interest in the strawberry species micropropagated by the research center. Nevertheless, farmers' associations in Mexico have begun to initiate interactions with PRCs and to convince local governments to support them.

Case 3. In 1991, CINVESTAV-Irapuato began collaborative interactions with a foreign company—Monsanto. This company developed technology for the genetic modification of potatoes to make them virus resistant. CINVESTAV-Irapuato sought to apply this technology to Mexican potato varieties from different regions. The transfer of technology involved several knowledge flows and diverse knowledge networks, including: the transfer of genes modified by Monsanto; the training of researchers in the Monsanto Research Centre on the Science of Life located in St. Louis, MO; the field tests of the genetically modified Alpha potato, performed in the state of Washington by Monsanto; the acquisition of equipment by the center, and the rapid advancement in scientific capacities for developing new modified varieties. In this bilateral collaboration, other actors have participated as intermediaries or financing agencies.[237] This networking allowed CINVESTAV-Irapuato to make a breakthrough in applying modified genes to local agriculture, creating a knowledge capability that could, in the near future, lead to further innovation.

These examples cannot be used to support the nationalization of industries, because the interesting finding is precisely that the CIATEQ-Altos Hornos relationship has survived after privatization. This experience does suggest, however, that additional incentives, such as collaboration subsidies, might be necessary to instigate knowledge linkages between the PRCs and the private sector in current market economy. But competition among PRCs and universities will be required in order to raise the quality of the scientific institutions that are key for the efficiency of the NIS, as demonstrated by our econometric evidence discussed in section 5.5 above.

In addition, the experience of CINVESTAV-Irapuato indicates that linkages with sources of innovation in the United States can be quite rewarding in terms of the helping to diffuse and adapt

[236] These organizations are crop-specific, close to government agencies (particularly the Ministry of Agriculture) and play an important role in the diffusion of official policies related to technical aspects of crops. They participate in public/private organizations representing the interests of middle-man farmers. However, they also take independent positions with regard to government policies.

[237] On the international side, the project has been mediated by: (a) the International Service for Acquisition of Agri-Biotech Applications (ISAAA), which is a nonprofit organization, that has the role of easing the acquisition of technology from industrialized countries for developing countries; (b) the Rockefeller Foundation, which has financed the collaboration, mainly the salaries and travel expenses, of researchers going to the United States, as well as the purchase of reagents and equipment for CINVESTAV; and (c) the INIFAP, in charge of carrying out large scale field tests throughout Mexico on the modified potato variety.

knowledge from abroad for practical uses in Mexico. This types of international linkages could also be supported by both the Mexican and the U.S. government.

5.6.4 Universities

There are several channels through which universities enrich the innovation network. First, they produce tertiary educated workers who are the lifeblood of the NIS. The overriding importance of this function cannot be overstated. Interviews with high-tech companies in Costa Rica highlight the issue of generation of quality human capital in a country as an order of magnitude more important than other factors including R&D incentives, or R&D suppliers, and so forth (see De Ferranti et. al. 2002, 100-104). Second, universities are well suited for large, long-term, basic research. Third, they are likely to maintain contacts with research centers in industrial countries and hence perform an important role as a link to worldwide scientific and technological know-how. In all cases, the degree to which they remedy the underlying market failures depends on the links to the productive sector.

Higher education plays a dominant role in Mexican and Latin American R&D, as shown in Table 6.[238] The high concentration of R&D performed by the universities has an impact on the nature of the research done. Hansen et al. (2002) argue that there is a rough correlation between the dominance of the university sector and the proportion of R&D expenditures on basic research. Logic dictates that this slight bias is not necessarily a weakness, depending on the extent to which universities and their researchers have incentives to link their research efforts to the productive sector.

Table 6. Structure of R&D Effort in Selected Countries, 1995-2000
(percentages of total R&D expenditures, annual averages)

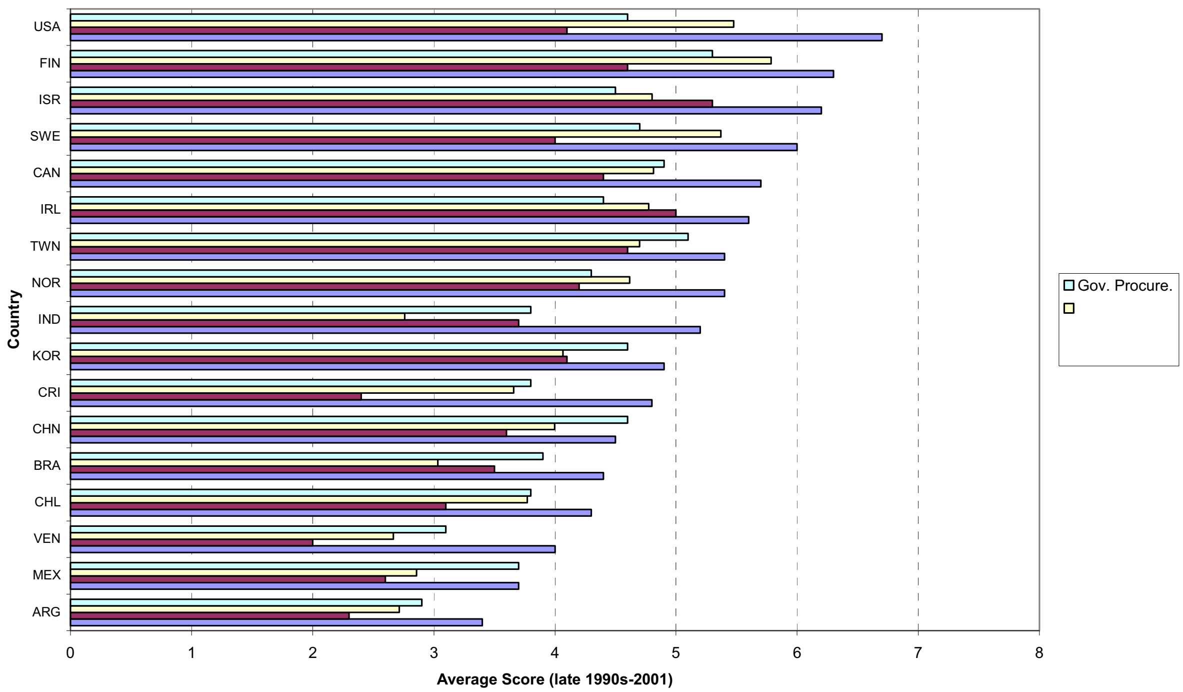
Country	Financed by the Productive Sector	Financed from Abroad	Performed by the Productive Sector	Performed by Higher Education	Performed by the Non-Productive Public Sector
BRA	39.14	0.00	44.04	44.27	11.69
CAN	44.56	12.69	57.69	28.67	13.64
CHL	19.37	5.75	9.62	47.11	43.27
CRI	n.a.	n.a.	32.58	48.72	18.70
FIN	62.72	4.12	66.95	19.12	13.93
IRL	66.46	8.79	71.58	20.46	7.96
KOR	73.02	0.08	72.53	10.42	17.05
MEX	19.06	5.22	22.66	39.82	37.52
SWE	64.37	3.47	75.73	21.57	2.70
TWN	60.03	0.10	61.00	12.20	26.80
USA	62.98	0.00	73.88	14.33	11.78
VEN	38.13	0.00	n.a.	n.a.	n.a.

Source: Authors' calculations based on annual data collected by Lederman and Sáenz (2003).

The economic value of this non-applied research to the economy can to some degree be measured by the degree of interaction with firms. For example, in Finland, 40 percent of firms have collaborative arrangements with universities (Brunner 2001), and as Blomström et al. document, these interactions have been vital to the continued dynamism of both the high-tech and more traditional forest industries. Comparable numbers are not available for Mexico. However, Figure 14 reports survey results published by the latest issues of the Global Competitiveness Report (GCR) of business perceptions of university-

[238] The data in Table 4 for Mexico differs from that in Table 6 due to the different sources of the information and different time periods. The data in Table 6 are internationally comparable.

Figure 14. GCR Survey Results: Private-Sector Perceptions on Innovation-Related Factors, 1996-2001



private sector interactions (labeled "collaboration" in Figure 14). Mexico, as many Latin countries, appears with a very low ranking.

This is consistent with case studies by Mayer of Avimex, a veterinary pharmaceutical company in Mexico, who notes that despite a high 10–15 percent of sales spent on R&D and world-class innovations in joint projects with U.S. research institutes, the major disadvantage Avimex and Mexican firms in general face is the lack of research partners within the country, which has forced them to look for partners in the U.S. Returning to the patent regressions discussed in the previous section of this chapter, the roots of the Mexico's R&D inefficiency appear to be precisely these quality and collaboration factors.

The isolation of the Mexican university arises from both demand and supply sides. There are a number of factors—along the themes of poor design and faulty incentives—responsible for the dearth of effective linkages and collaboration between scientific institutions and the private sector in LAC. But there is also a lack of incentives for universities to link and address private sector knowledge needs. The incentives within the universities are generally biased away from collaboration with business. Arguably there is a more "liberal arts" as opposed to "technical" culture, with deep historical roots that resonate with Lazonik's analysis of the inadequate U.K. system.[239] Because researchers cannot appropriate the benefits of innovation, they have little incentive to undertake innovations and link with the private sector. Various developed countries allow ownership rights to government-funded R&D—often on a case-by-case basis—and in some instances, such as in the United States and Japan, explicitly in the national patent laws. In the United States, the Bayh-Dole Act of 1980 allows industry contractors of the government,

[239] This appears to be the case throughout the region. Agapitova and Holm-Nielsen (2002) argue that, overall, the university mentality in Chile is not geared to solving problems on a business time scale, and Mullin (2001) argues that overall academic interests tend to be narrow and unapplied. Observers of Costa Rica's two-star technical school stress not so much incentives, but the "foundational impulse"—a desire to be patterned more on the Massachusetts Institute of Technology (MIT) or other technical schools of excellence than on those with a liberal arts bias.

national laboratories, and academic institutions to automatically retain title to the inventions that come out of their research work, even if it is funded by the government. In return, the government receives from the university or industry a royalty-free license for governmental purposes. There is convincing evidence that these laws have in fact helped speed the rate of patenting by research conducted in the U.S. public laboratories (Jaffe and Lerner 2001), and thus the lessons regarding incentives for patenting by researchers applies also to the Mexican PCRs as well as universities.

Goldfarb, Henrekson, and Rosenberg (2001) cite differences in academic structures and their influence on researcher involvement with the commercialization of research ideas as an important reason for the much lower spillovers from academia to industry in Sweden as compared to the United States. In the United States, competition for researchers and scientists has reinforced the need for policies that are attractive to them. Universities have established technology transfer offices (TTOs) and have liberal policies on faculty leave of absence and consulting privileges that allow faculty to pursue commercial opportunities while keeping their position as a faculty member intact. In Sweden, however, universities do not gain from the commercialization, and hence offer resistance to faculty involvement with industry. For instance, it is difficult for Swedish professors to take temporary leave to organize firms, as is done in the United States. What matters is that property rights are allocated to the university or the researcher, and thus the innovation can be commercialized. However, how they are allocated also has a significant impact. If researchers get the property rights, they are likely to remain at the university; otherwise, they will likely move to the productive sector.

At a more mundane level, Mayer (2002) argues that, in Mexico, bureaucratic rigidities make it difficult to write contracts and get access to the use of laboratories and equipment from the university. The approval process is very centralized and bureaucratic and hence a disincentive to firms to attempt interactions with the universities.

5.6.5 Capital markets

By nature, innovation has long gestation periods and high risk. Hence, innovation policy is necessarily tightly linked to credit markets and failures in the latter can paralyze innovation. In particular, the absence of venture capital where the introduction of a new idea might get seed money is noted throughout the region as a barrier to technological progress. In Mexico there is presently no recognition of the venture capital firm as a legal entity. There are holding companies or “SIMCAS” that hold other firms’ assets, but the legal structure does not encourage the association of several entrepreneurs to share risk. Further, the profits of the SIMCAs enjoy unfavorable fiscal treatment.

We showed earlier in this chapter that total R&D expenditures tend to be higher in high-income countries than in poor countries. It is possible that one reason why this occurs is that rich countries have more developed domestic capital markets that help finance risky R&D efforts. Lederman and Maloney (2003) analyzed the empirical determinants of R&D expenditures over GDP with data covering developed and developing countries during 1960-2000 using five-year averages of the available information from Lederman and Sáenz (2003). Their results are presented in Table 7. Regarding capital markets, the variable “private credit” stands for credit to the private sector as a share of GDP. It has a positive and significant effect on R&D effort. Moreover, combined with, the level of public expenditures, and the extent of protection of intellectual property rights, financial depth explains the lion’s share of the positive correlation between GDP per capita and R&D effort.[240] Consequently, an important element of the Mexican NIS reform agenda for the future is inextricable from financial-sector policies aimed at deepening the domestic credit market and/or increasing the extent of financial integration with the U.S. (see chapter 3 of this report).

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[240] The IP index was provided by Park (2001).

Table 7. Determinants of R&D/GDP

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable		R&D/GDP								
Estimation Method		GMM System Estimator								
Explanatory Variables:										
R&D/GDP at t-1	0.791***	0.760***	0.651***	0.826***	0.736***	0.787***	0.731***	0.834***	0.576***	0.643***
Log (GDP per capita)	0.004***	0.002***	0.004***	0.001*	0.002***	0.004***	0.001**	0.001***	0.000	0.000
GDP growth	0.028**	0.033***	0.035**	0.053***	0.023***	0.018	0.024**	0.035***	0.047***	0.044***
Fixed Investment/GDP	-0.007	-.013***	-.016***	-0.012**	0.001	-0.007	-0.006*	-0.013**	-0.011**	-0.009*
Log (IP Index)		0.003***							0.003***	0.003***
Private Credit/GDP			0.003***						0.004***	0.003***
Log (Educational Attainment)				0.004***						
Government Expenditure/GDP					0.032***				0.033***	0.024***
Openness						0.001***				
Quality of Research Institutions							0.009***			0.001
Collaboration between productive sector & universities								0.005***		
Sargan Test (p-value)	0.10	0.45	0.10	0.18	0.32	0.26	0.13	0.16	0.54	0.79
2nd Order Serial Correlation (p-value)	0.47	0.53	0.51	0.43	0.65	0.44	0.50	0.43	0.81	0.69
Observations	102	102	102	102	102	102	101	102	102	101
Countries	41	41	41	41	41	41	40	41	41	40

Notes: Period dummies were included in all regressions. Coefficients are significant at *** 1%, ** 5%, and * 10%.

In India, besides ample fiscal incentives for R&D, a development financial institution (namely the Industrial Credit and Investment Corporation of India—ICIC—and its subsidiaries) initiated venture capital in 1988 and subsequently private venture capital firms emerged, albeit at a smaller scale. In Israel, Trajtenberg (2001) reports that innovation policy is essentially credit policy. Hence Mexico might want to consider proposal to revamp the role of its development financial institutions with a narrower focus on innovation and R&D credit programs. This is the logical next step in moving away from the old-fashioned industrial policies in favor of focused innovation incentives. But clearly the NAFTA chapter on intellectual property rights had a substantial impact on Mexican R&D, which explains, together with the recovery of the Mexican economy after 1995, the resurgence of R&D especially after 1996, as shown in Figure 9 above.

5.6.6 Summary of policy recommendations and monitoring progress

The main policy implications can be summarized as follows.

First, NAFTA effects on innovation could have acted either through trade liberalization or through the improvement in the protection of intellectual property rights demanded by the agreement. While import competition was associated with improvements in manufacturing TFP as discussed in section 5.3 and Chapter one, it might also have helped indirectly by improving the efficiency of R&D in Mexico as shown in section 5.5.1. But Mexico still has an inefficient NIS. In addition, Mexico's improvements in intellectual property rights were probably associated with the moderate yet insufficient increase in R&D expenditures in the late 1990s. Finally, to the extent that NAFTA increased credit availability to Mexican firms (see Chapter 3), then this might have stimulated the modest recovery of R&D. Nevertheless, the main conclusion of this chapter is that NAFTA is not enough to ensure technological convergence in North America, since Mexico still suffers from inefficiencies and low levels of R&D.

Thus our second conclusion is that Mexico needs to address issues related to the inefficiency of its NIS. In particular, it needs to improve the quality of its research institutions (PRCs and universities). This is likely to be associated with incentive reforms and public subsidies to stimulate linkages between the existing research institutions and the productive sector. This applies not only to private firms, but also to strengthening the R&D effort of PEMEX. In this regard, we have proposed various policies that can provide incentives for researchers to get involved with the productive sector, in particular incentives for the appropriation of innovations emanating from technical research. In practice it is difficult to know before the fact what is the most effective institutional design for establishing contracts between firms and researchers so that the firm can be confident that the researcher will provide effective applied research services and not divulge corporate strategy secrets to other competitors. Besides regulatory changes affecting IPRs for university and PRC researchers, it is also likely that public subsidies will be needed to provide additional incentives for firms to establish such links, especially when there is little previous collaborative experience and thus little mutual trust. Hence we recommend that subsidy programs of this sort be implemented initially only with modest funding on an experimental basis. These are reforms that Mexico can implement on its own after more careful study.

Third, Mexico needs to keep working on the development of its domestic credit markets. Generally related policies are discussed in chapter 4 of this report. Policymakers should also consider revamping their development financial institutions to focus their efforts on providing credit for venture capital funds and more generally to help finance collaboration between PRCs, universities, and the productive sector. Together with the improvement of the quality of universities and further efforts to expand tertiary enrollment, in time these policies will stimulate increases in Mexico's total R&D effort as the productive sector finds more rewarding research partners.

Fourth, Mexico could negotiate with its NAFTA partners the co-financing of research exchange programs. While we have noted efforts that have produced fruitful collaboration between PRCs and innovative firms in the U.S., it is quite likely that not enough is being done. Given the fact that the U.S. government remains the world's leader in funding R&D, and given Canada's interest in promoting its own R&D, it is likely that Mexico can find receptive ears in these countries.

Finally, any such efforts will need to be evaluated over time in order to adjust and continuously improve them. To conduct such evaluations, it will be necessary to improve the quality and availability of innovation-related data. In fact, besides close monitoring the financial linkages between PRCs, universities, and firms, it might be useful to build an information-based monitoring facility that would play a similar role as the National Commission for the Evaluation of Research Activity (CNEAI) in Spain since 1989. This commission has improved the quality and quantity of basic research output in Spain, even in a period of time when public funding of research declined (Jiménez-Contreras et al. 2003). The main monitoring variable used by the CNEAI is the number of publications of government- and university-funded research, which are made public once or twice a year. Indeed, given the reputational rewards sought by researchers, it is likely that the mere publication of the performance index can by itself improve the quality of research. This principle could be used to improve the quality of applied research by, for example, maintaining an accurate count of patents granted by the U.S., Canadian, and Mexican governments to researchers residing in Mexico and financed by public funds, either via the PCRs or universities. Other important variables to monitor are discussed in De Ferranti et al. (2003, Chapter 8).

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Chapter 6

NAFTA and the Trade Flows of Nonmember Countries

6.1 Introduction

Has Mexico benefited from NAFTA at the expense of other countries? The potential welfare-reducing effect of NAFTA through trade diversion has long been a major concern for nonmember countries, and particularly for Central America and the Caribbean, whose geographical location and pattern of specialization are relatively similar to Mexico's. As a result, preventing the presumed damage from NAFTA has been a major driving force in the efforts of some neighboring countries to achieve "NAFTA parity".

Conceptually, in contrast with welfare-enhancing trade creation—which reflects the removal of distortions in the relative price of goods between two members of a preferential trading arrangement—trade diversion results from the introduction of distortions in the relative prices of goods between member and non-member countries.[241] Trade creation involves replacing high-cost suppliers in a member country with lower cost producers from another member country. Trade diversion instead replaces low-cost suppliers from nonmember countries with higher-cost producers from member countries.

Trade diversion can result from the formation of both customs unions and FTAs such as NAFTA. In the latter case, however, there is an additional reason why trade diversion is more likely to result from FTAs than customs unions.[242] Since external barriers generally differ among FTA members, rules of origin (ROOs) are usually imposed to prevent 'trade deflection'—i.e., goods from nonmember countries being imported by the member with lowest external tariff for re-export to other members (see Chapter 3). In the case of NAFTA, ROOs provide incentives for producers in Mexico, say, to purchase higher-cost inputs from another partner country (e.g., the U.S.) despite the existence of lower-cost suppliers from nonmember countries, in order to satisfy ROO requirements allowing export of the final product to the U.S. free of duty. In this sense, ROOs export protection from one partner country to the rest, even if the external tariff structure of the FTA members remains unaltered. From a welfare perspective, the trade diversion induced by ROOs makes FTAs inferior to customs unions.

The purpose of this chapter is to assess if NAFTA has had significant trade- diverting effects on third countries, and especially the neighboring countries of Central America and the Caribbean.[243] A number of recent studies have been similarly concerned with the trade creating and diverting effects of other FTAs. As preferential trading arrangements have proliferated across the world over the last decades, so have empirical analyses of their consequences. A considerable part of this literature has focused on the EEC / EU (see Box 1), but some studies have examined also the trade creation and diversion of various other PTAs, including EFTA, ASEAN, CUSFTA and Latin American PTAs other than NAFTA. Most studies find significant trade creation effects of these RIAs. Some also find trade diversion.[244]

These studies have used various approaches to assess the effects of FTAs on the welfare of excluded countries. In theory, a direct indication of the effects of an FTA on nonmembers would be given by the resulting change in their terms of trade.[245] The presumption is that the change in trade preferences against nonmember countries could lead to a decline in demand for their exports and thus require a fall in their relative price to restore equilibrium, leading to an unambiguous welfare deterioration (Corden 1990).

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[241] The concept of trade diversion dates back to Viner (1950).

[242] See Krueger (1995).

[243] Concern with the potentially harmful effects of NAFTA on these countries has been expressed by a number of observers. See for example Jorge and Salazar-Carrillo (1997).

[244] See for example Bayoumi and Eichengreen (1997), Frenkel (1997), Frenkel and Wei (1995) and Soloaga and Winters (2001).. The latter paper does find clear indication of trade diversion in EFTA and the EEC.

[245] This presumes that the FTA is "large" relative to nonmember countries, in the specific sense that its creation can affect their terms of trade.

Box 1. Trade Creation and Diversion in the process of enlargement of the EU

Right after the Treaty of Rome, trade within the EU started rising more rapidly than with non-EU countries. Imports from EFTA6 countries remained somewhat stable over the period while those from other regions fell noticeably. Later accession by new members further increased intra-EEC trade. With the accession of Greece, Portugal and Spain, intra-EU trade increased by over 20 percent.

The overwhelming part of this growth has been identified as trade creation, and available estimates vary between $ 8 and 17 bn. On the other hand, trade diversion over this period is usually found to be small (less than $ 2 bn) relative to trade creation (see Ohly 1993).

Bayoumi and Eichengreen (1995) conclude from a gravity-based analysis that some trade diversion did occur between the initial period of the EU (EEC) and the late 1960s, but less so thereafter. Their figures indicate that around half of the increase in the intra-EEC trade that was observed over the 1956-1970 period was matched by a decrease in trade with other partners, largely developing countries. Later on, accession by the UK, Ireland, Denmark (all in 1972) also generated some trade diversion. Between 60 and 90 percent of their new trade with the EEC corresponded to trade creation. As to Greece's entry (1981), between 65 and 75 percent was trade creation. In contrast, no evidence of trade diversion was found after the accession of Spain and Portugal.

Sapir (1998) also finds that EU-EFTA trade was penalized by EEC formation and enlargement, although in later years he finds no significant evidence of trade diversion. In turn, Soloaga and Winters (2001), using a larger country and RIA sample, conclude that the EU's trade with non-member countries declined significantly with the RIA's Southern enlargement

But in practice, changes in aggregate export and import prices reflect many factors—including the changing composition of each country's imports and exports—and proper analysis of the terms of trade effects of an FTA requires disaggregate import and export price data which are seldom available.[246] As a consequence, to date few studies of the effects of FTAs on nonmember countries have followed this approach, and most studies have focused instead on the observed evolution of trade flows as a more tractable proxy for welfare changes.[247] The analysis below follows this methodology.

Its simplest version is based on the intuitive observation that if the FTA's trade flows with the rest of the world are no smaller than they were prior to FTA formation, then the rest of the world cannot have suffered a welfare loss, while FTA members must have experienced a gain.[248] This condition may seem easy enough to check in a static world, but in a world of expanding trade FTA imports and exports of most commodities will tend to rise along with overall trade, so that the condition will be automatically satisfied. Thus, it is common to restate the condition in terms of shares, and examine the extent to which increases in intra-FTA trade are achieved at the expense of the trade shares of nonmember countries.

However, there is no obvious reason to presume that in the absence of the FTA under consideration trade shares would have remained constant, and a more rigorous approach requires specifying carefully the counterfactual scenario to characterize what trade flows would have been had the FTA not been created. This amounts to identifying the determinants of members and nonmembers' trade flows, and then analyzing the extent to which flows were affected by the preferential trading arrangement, holding all other determinants constant. Such analysis typically looks for declines in member imports

[246] In the case of NAFTA, the observed changes in both aggregate terms of trade, as well as in the relative export prices of specific commodities (in particular apparel exports), fail to yield any evidence of diversion against neighboring Central America and Caribbean countries. See section 3 below.

[247] A recent study that looks a price changes that by Winters and Chang (2002), who find large terms of trade losses for third countries in the case of MERCOSUR.

[248] This is the so-called Kemp-Wan theorem (Kemp and Wan 1976). In the context of a customs union, the underlying notion is that there exists an ideal 'compensating common tariff' that leaves nonmembers' trade with members exactly at the pre-union levels, thus offsetting the trade diversion loss and leaving union members with the trade creation gain. See Winters (1997) for a discussion of this argument.

from nonmember countries—for given values of all non FTA-related trade determinants—as evidence of trade diversion.[249]

In spite of its popularity, however, this focus on nonmembers' exports to FTA member countries may be misleading. The reason is that the link between exports and welfare of nonmember countries is conceptually tenuous. Instead, under certain conditions it can be shown that the latter's welfare is more closely related to their *imports* from member countries. The intuitive reason is that welfare should be more tightly linked to what the country in question purchases, and consumes—provided it does so within its intertemporal budget constraint—than to what it sells in the post-FTA environment.[250]

The analysis in this chapter combines these various ingredients. First, it looks at the broad trends in aggregate trade and market shares of NAFTA member and nonmember countries in Latin America. Next, it reassesses those trends controlling for the observed changes in trade determinants other than preferential trading arrangements. In view of the above considerations, the analysis departs from the conventional emphasis on FTA imports alone and examines the changes in trade between NAFTA members and nonmembers in both directions.

Finally, some earlier assessments of the impact of NAFTA on third countries have identified in particular the textile and apparel sector as prime suspect for trade diversion. Because industry-specific effects may be masked in the aggregate analysis, and the apparel sector is particularly important for several Central American and Caribbean countries as a source of exports, we examine it in some detail to complement the aggregate analysis.

Trade diversion is not the only channel through which preferential trading arrangements may harm excluded countries. Trade preferences can distort also the international allocation of investment in favor of member countries, especially when the preferences are accompanied by ROOs. They encourage suppliers located outside the FTA to relocate to a member country in order to benefit from the preference and meet ROO requirements. These potential FDI diversion effects of NAFTA will be explored in the next chapter.

6.2 Trends in trade flows before and after NAFTA[251]

Assessing the trade effects of NAFTA is no easy matter because many other factors relevant for the trade flows of member and nonmember countries were also changing around the time of NAFTA's inception. First, total world trade grew considerably over the 1980s and 1990s. Second, many countries undertook significant trade liberalization measures, including Mexico in the late 1980s, so that trade flows in the 1990s partly reflected the continuing effects of those reforms. Likewise, the phasing out of tariffs under NAFTA extends over a 15 year period initiated in 1994, so its effects on trade flows should appear gradually rather than abruptly. Finally, Mexico's real exchange rate experienced a large appreciation over 1987-94, followed by a big depreciation at the end of 1994.

In this section we review the main trends in trade flows between 1980 and 2000. To place NAFTA in a broader perspective, the analysis includes also eight other RIAs—the Andean Group, the Central American Common Market (CACM), CARICOM, MERCOSUR (all in LAC); EFTA, EU, ASEAN and

[249] Empirical implementations of this approach have been most commonly, although not exclusively, based on the econometric estimation of gravity models of international trade. However, computable general equilibrium models have also been popular for this kind of exercise; see Baldwin and Venables (1996).

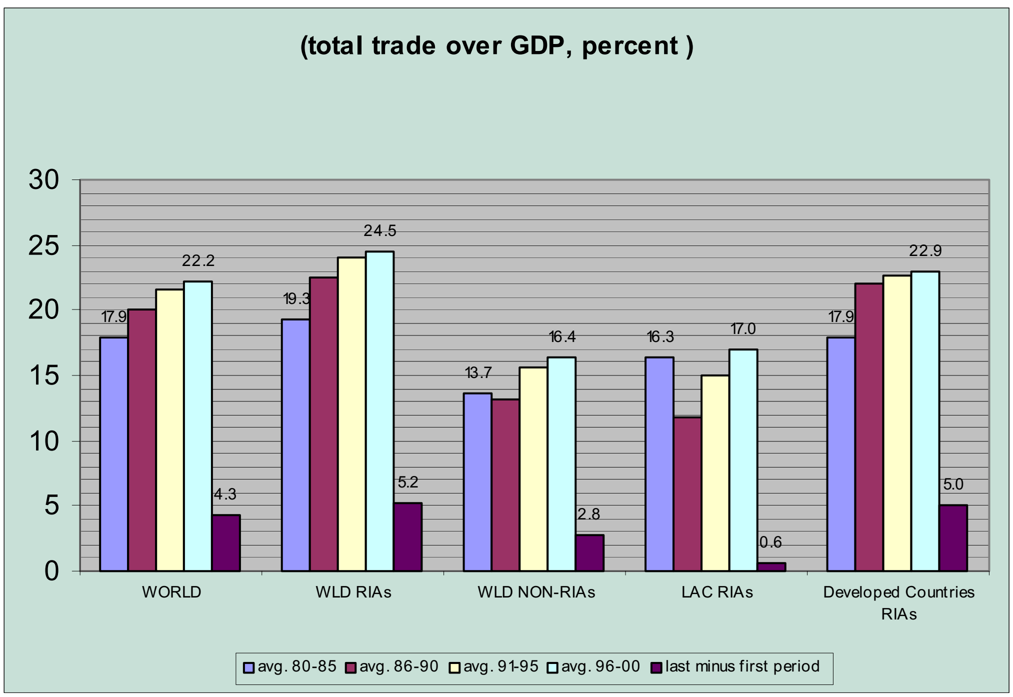
[250] See Winters (1997) for the detailed argument.

[251] This section and the next summarize results in the background paper by Montenegro and Soloaga (2002).

the Gulf Cooperation Council (GCC). Table A1 in the Appendix provides summary information on the origins and membership of each of these blocs.

Figure 1 documents the upward trend in world openness to trade (measured by non-fuel exports plus imports divided by GDP). It also shows the comparative trends in total trade for countries that belong to a RIA and those that do not, and for LAC countries belonging to RIAs (Andean Group, CACM, CARICOM, and MERCOSUR) as well as RIAs integrated only by industrial countries. It is apparent from the figure that total world non-fuel trade has grown faster than world GDP: after rising steadily over the last two decades, world openness was 4.3 percentage points higher in 1996-2000 than in 1980-85.[252] For countries included in the nine RIAs considered, openness also increased since the late eighties, by 5.2 percentage points of GDP by the end of the sample period. In turn, countries not included in these nine RIAs also increased their openness over the same time period, but to a lesser extent (2.8 percentage points). Looking separately at RIA countries in LAC and the industrial world, it can be seen that the latter increased their openness considerably more than the former (5 percent vs. 0.6 percent) between the early 1980s and the late 1990s.

Figure 1. Openness in RIA and non-RIA countries



Over the same period, and particularly since the late 1980s, trade barriers declined in most developing countries. For a sample of 129 developing countries, the mean unweighted tariff declined from an average of 27.2 percent in 1985 to 11.3 percent in 1999. For Mexico, the decline was very similar: the mean tariff fell from 25.2 percent to 10.1 percent over the same period.[253] In addition, non-tariff barriers were also lowered in most countries, although the extent of their decline is difficult to quantify.

[252] Comparing the first and last periods in the figure, total trade grew by 108% in real terms, while total GDP grew by 68%.

[253] See Appendix Table A2 for detailed data on average tariff levels across countries over the last two decades.

Against this background of trade expansion and liberalization, Figure 2 shows the trends in NAFTA members' imports (measured in 1995 U.S. dollars) over the last two decades. Total bloc imports from all sources more than doubled, while intra-bloc imports were 2.5 times higher in 1996-2000 than in 1981-85. In contrast, NAFTA imports from LAC RIAs increased only 1.4 times, while imports from the rest of the world (i.e., excluding LAC RIA countries) doubled over the same period. As a result of these trends, in 1996-2000, the share of intra-bloc imports in NAFTA members' total imports had risen to 40%, over 5 percentage points above the level at the beginning of the 1980s. In contrast, the share of LAC RIAs in NAFTA markets declined to 4.6% --from 7.1% in the early 1980s-- while the share of other countries decreased by almost 4 per percentage points (from 58.8 to 54.8). Thus, over the period there was a substantial intensification in intra-bloc trade within NAFTA, and a loss of market share by nonmember countries.

Figure 2. NAFTA: Total Imports by Source

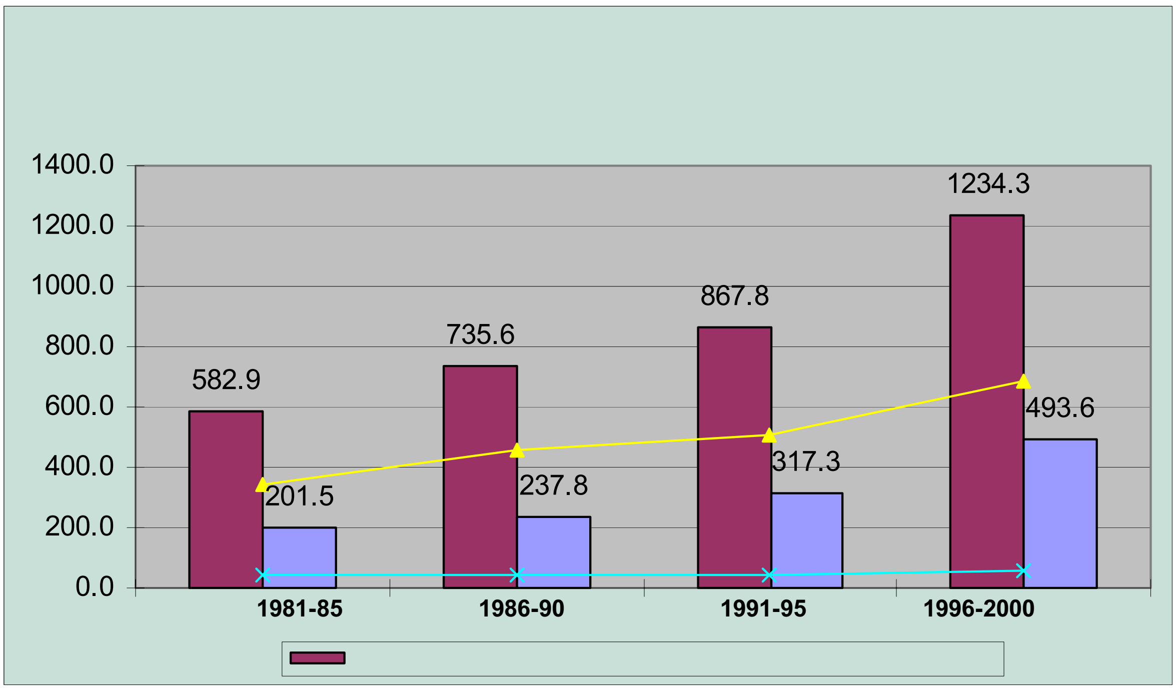


Figure 3 shows the evolution of total trade (imports + exports) in real terms for countries belonging to LAC RIAs. Aggregate trade rose in all cases over the period of analysis, but to very different degrees. MERCOSUR countries increased their total trade by 177% between the first and last five-year period of our sample, while CACM countries' total trade increased by 125%. Countries belonging to CARICOM and the Andean group showed considerably less dynamism. Their overall non-fuel trade rose by only 20% over the same period. [254]

[254] Of course, the figures are considerably bigger if we instead compare average levels for 1996-2000 with those for 1986-90. The resulting change was 203% for MERCOSUR, 137% for CACM, 57% for the Andean group and 33% for CARICOM countries.

Figure 3. Total Trade in LAC RIAs

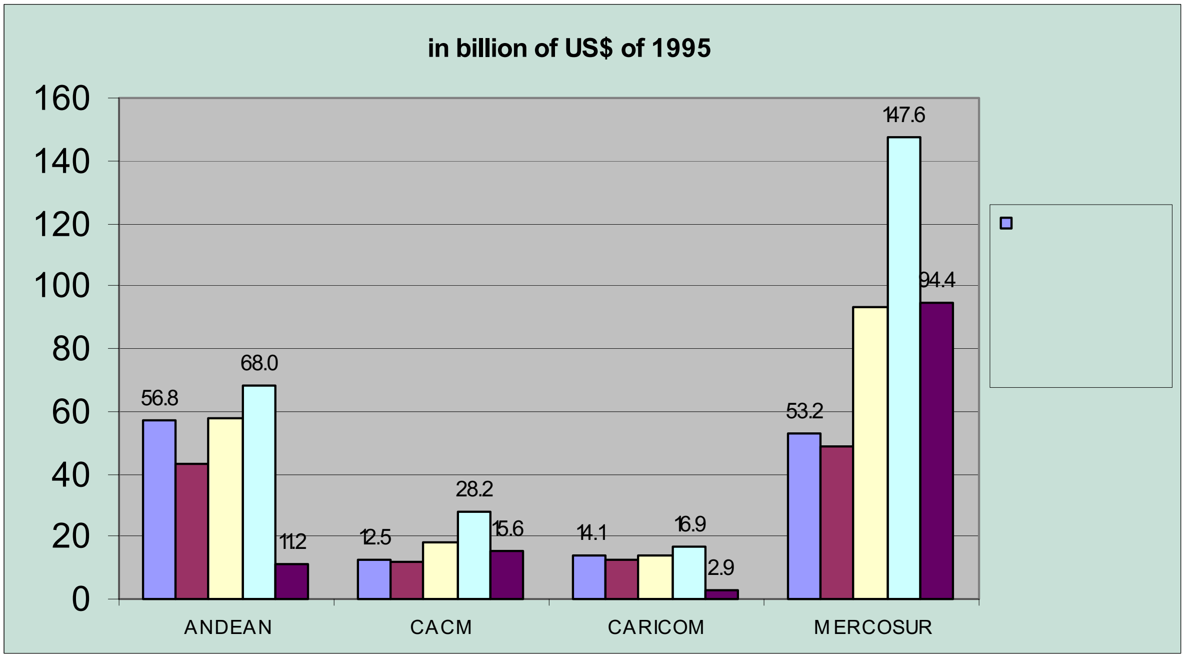


Table 1 offers a comparative perspective on intra-bloc trade across LAC RIAs since the early 1980s. Two main facts emerge. First, intra-bloc trade is particularly significant for NAFTA countries—it accounts for a higher fraction of total bloc trade than in any of the other blocs shown. Second, all RIAs in LAC have exhibited an upward trend in the share of intra-bloc imports, although to varying degrees. The increase was most pronounced in MERCOSUR, and least for CACM and CARICOM countries.

Table 1. Intra bloc imports (as % of total imports)

Period	Andean Group	CACM	CARICOM	MERCOSUR	NAFTA
1981	5.8	16.5	8.4	7.0	34.2
1982-83	5.5	17.3	8.2	7.7	34.7
1984-85	5.8	5.9	7.9	11.1	34.0
1986-87	4.4	11.7	7.7	12.2	31.4
1988-89	5.1	10.8	6.9	15.3	33.2
1990-91	7.9	11.0	8.3	16.0	34.4
1992-93	9.4	12.2	8.8	20.2	37.1
1994-95	13.0	13.5	10.4	19.6	38.1
1996-97	14.4	13.7	9.9	20.9	40.2
1998-2000	13.1	14.3	11.1	20.7	40.7
Averages					
1981-89 (a)	5.3	12.4	7.8	10.7	33.5
1990-95 (b)	10.1	12.2	9.2	18.6	36.5
1996-2000 (c)	13.7	14.0	10.5	20.8	40.5

Table 2 shows that the increasing trend in the share of intra-bloc imports in total NAFTA imports affected almost all industries at the 1-digit SITC level. When comparing the average shares of 1996-2000 with those of 1981-1985 (column ”e” in the table), the share of intra-bloc imports shows a decrease only in two sectors (Chemicals--SITC 6, and Paper-- SITC 64). For all the other aggregates the shares have gone up, and in some cases by a substantial amount: over 10 percentage points in Food (SITC 1), Animal Fats (SITC 5), and in most of the Manufactured Goods subsectors (SITC 6 components). The last columns of the table show that most of the gains in the share of intra-bloc trade happened in the late eighties and early nineties, prior to the passage of NAFTA. Share increases over the late 1990s were in general more modest (even negative in some cases), although still significant for sectors such as Leather and Textiles.

Table 2. NAFTA: Changes in import shares

Product group	Share of product group in total NAFTA imports from all sources, 1995-2000	Imports from NAFTA Members as % of total NAFTA imports						
		1981–1985 (a)	1986–1990 (b)	1991–1995 (c)	1996–2000 (d)	(e)= (d)-(a)	(f)= (d)-(b)	(g)= (d)-(c)
Food	0.040	30.90	34.67	42.90	45.35	14.45	10.68	2.45
Beb. & Tobacco	0.008	16.20	17.87	22.85	22.70	6.50	4.83	-0.15
Crude Materials	0.027	58.23	61.27	62.85	61.70	3.47	0.43	-1.15
Fuels	0.079	26.17	25.70	30.95	33.20	7.03	7.50	2.25
Anim.& Veg. Fats	0.002	19.03	27.07	37.40	40.40	21.37	13.33	3.00
Chemicals	0.067	43.00	37.03	39.35	37.85	-5.15	0.82	-1.50
Manufactures	0.130	32.33	35.53	42.40	45.10	12.77	9.57	2.70
– Leather	0.002	16.70	14.30	23.20	32.80	16.10	18.50	9.60
– Rubber	0.009	34.30	35.23	44.95	51.65	17.35	16.42	6.70
– Cork	0.005	39.10	40.57	49.30	57.20	18.10	16.63	7.90
– Paper	0.016	82.30	74.73	76.80	75.95	-6.35	1.22	-0.85
– Textiles	0.017	20.93	20.33	31.65	39.90	18.97	19.57	8.25
– Non-Metalic	0.020	16.93	18.60	21.85	22.55	5.62	3.95	0.70
– Iron & Steel	0.021	18.10	24.77	32.75	33.50	15.40	8.73	0.75
– Non-Ferrous	0.017	39.57	48.97	53.35	50.05	10.48	1.08	-3.30
– Other Metals	0.025	33.67	32.90	42.85	49.25	15.58	16.35	6.40
Mach. & Transport	0.484	42.23	35.80	39.15	42.75	0.52	6.95	3.60
Misc.Manufactures	0.164	17.83	14.67	20.75	26.10	8.27	11.43	5.35

Source: Author’s calculations with data from WITS

In contrast with the increasing share of intra-bloc imports in NAFTA trade, the shares of other LAC RIAs in total NAFTA imports experienced a decline. The only exception was CACM, whose share rose from 0.4 percent in the 1980s to 0.7 percent in the late 1990s. In turn, the biggest loss in market share was that of MERCOSUR, whose share of NAFTA imports fell from 2.3 percent in the 1980s to 1.4 percent in the late 1990s. CARICOM and Andean Group countries also lost market share, but to a lesser extent (Table 3). It is also important to note that Mexico’s market share started rising in the late 1980s, around the time of its unilateral trade liberalization.

Table 3. NAFTA: sources of imports
(as % of total NAFTA imports)

Period	From ANDEAN	From CACM	From CARICOM	From MERCOSUR	From NAFTA TOTAL	From NAFTA From Mexico	From NAFTA From USA	From ROW
1981	2.98	0.48	1.46	2.02	34.23	3.75	16.94	58.83
1982-83	2.83	0.51	1.33	2.22	34.68	4.84	14.39	58.43
1984-85	2.69	0.43	1.00	2.56	33.96	4.26	13.80	59.35
1986-87	2.07	0.43	0.70	2.19	31.35	3.83	12.92	63.27
1988-89	1.89	0.39	0.68	2.31	33.18	4.28	14.11	61.56
1990-91	2.31	0.47	0.71	1.85	34.35	4.79	14.77	60.32
1992-93	1.90	0.56	0.69	1.64	37.08	5.08	17.39	58.14
1994-95	1.81	0.58	0.64	1.58	38.09	5.98	16.85	57.29
1996-97	2.05	0.68	0.62	1.42	40.20	7.17	17.85	55.02
1998-2000	1.76	0.74	0.55	1.37	40.74	7.94	18.21	54.84
Averages								
1981-89 (a)	2.5	0.4	1.0	2.3	33.5	4.2	14.4	60.3
1990-95 (b)	2.0	0.5	0.7	1.7	36.5	5.3	16.3	58.6
1996-2000 (c)	1.9	0.7	0.6	1.4	40.5	7.6	18.0	54.9

Source: Author's calculations with data from WITS

Figures 4 and 5 depict the main trends in Mexico's exports. Figure 4 tracks Mexico's market share of overall NAFTA and non-NAFTA non-oil imports. The sharp increase in Mexico's presence in NAFTA markets is apparent from the figure. However, it is worth noting that the upward trend was already present in the pre-NAFTA years. Furthermore, Mexico has also gained share in non-NAFTA markets. Its share of world imports (excluding those of NAFTA countries) more than doubled in the post-NAFTA years, rising from 0.20 percent in 1993-94 to 0.40 percent in 2000-01. Thus, Mexico's steady gain in NAFTA market share mirrors its rising share in non-NAFTA markets, where it enjoys no preferential treatment. This suggests that Mexico's increased presence in NAFTA markets is, to a significant extent, a result of factors other than preferential tariff treatment.

In turn, Figure 5 clearly shows that NAFTA, and the U.S. in particular, have become increasingly important for Mexico's exports since the early 1990s. By the end of the decade, close to 90% of Mexico's exports were directed to the U.S.. In contrast, none of the other LAC RIAs considered accounted for much more than 1% of Mexico's total exports.

What happened to exports from other LAC RIAs? Figures 6 to 9 highlight their destination. Figure 6 shows that NAFTA is the main destination of Andean Group exports, and increasingly so since the mid 1990s. The figure also shows that the increasing intra-bloc trade within the Andean Group in the 1990 came along with a modest increase in exports to other LAC RIAs and a decline in the share of exports to the rest of the world (defined here as those countries not included in NAFTA or the other LAC RIAs under analysis).

Figure 4. Share of Mexico's non-fuel exports in NAFTA and non-NAFTA markets (percent)

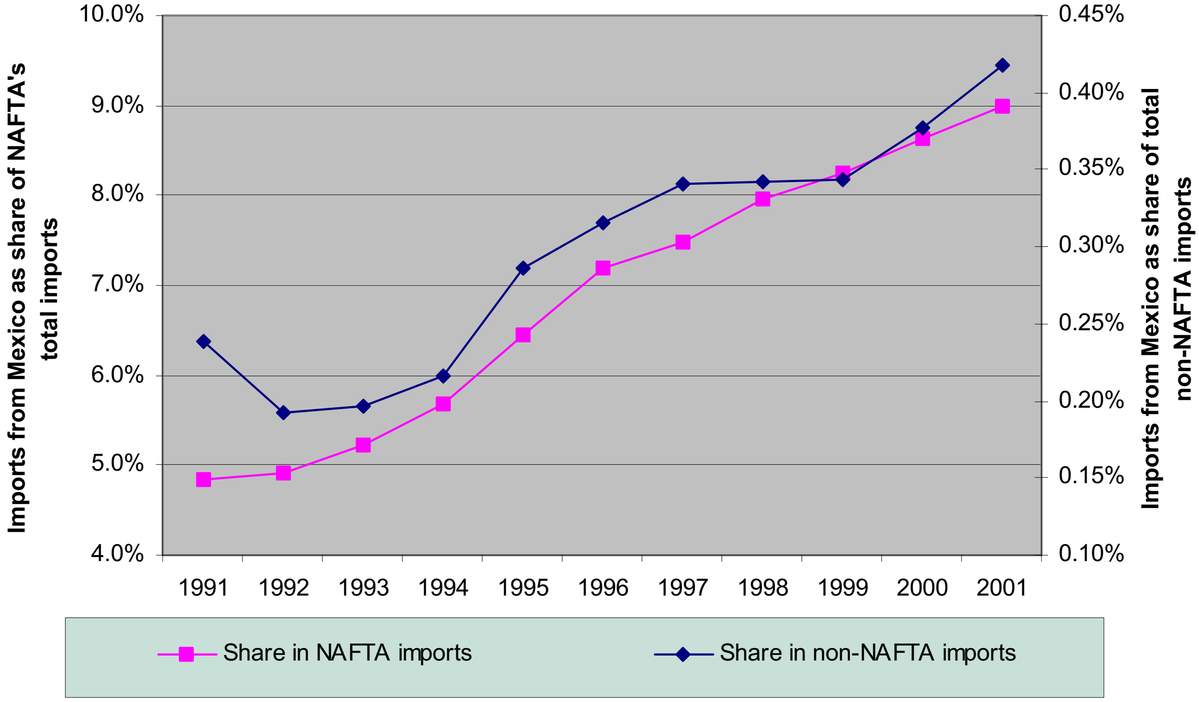


Figure 5. Destination of Mexico's exports

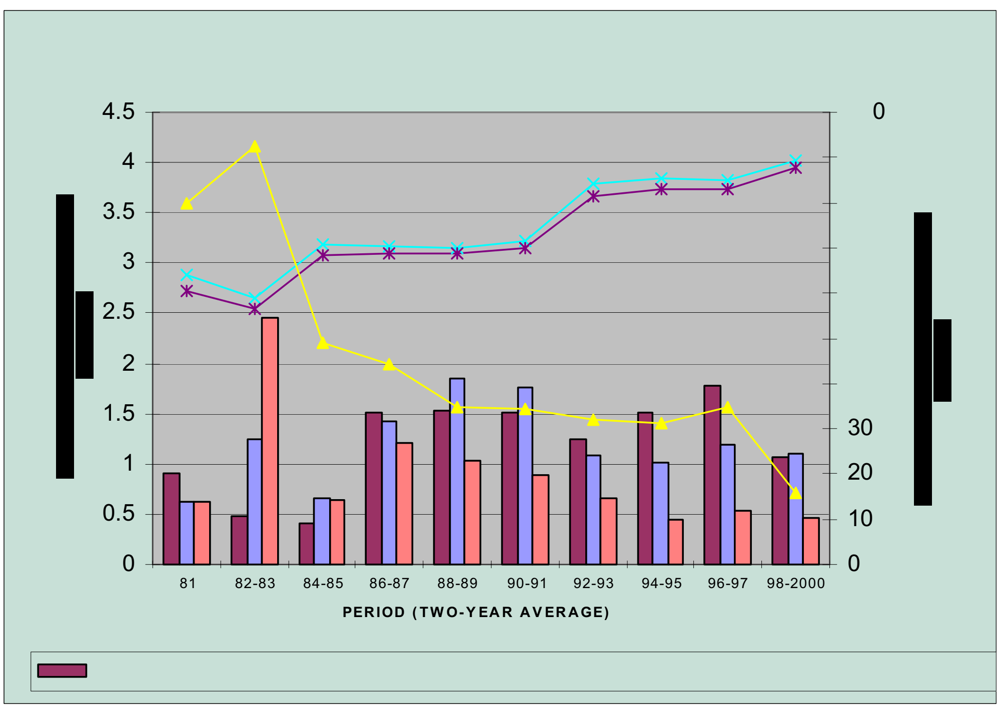
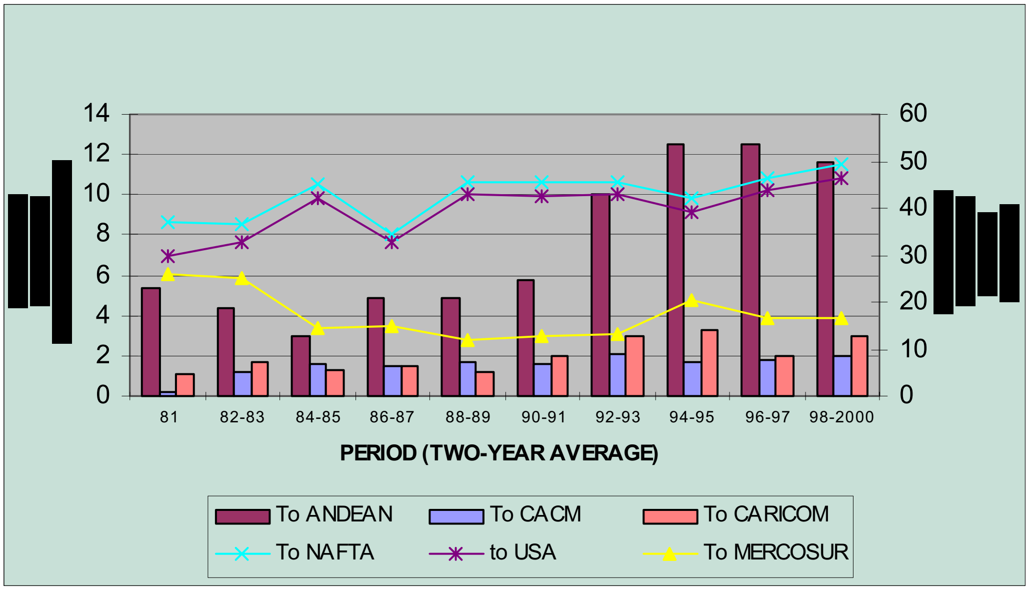
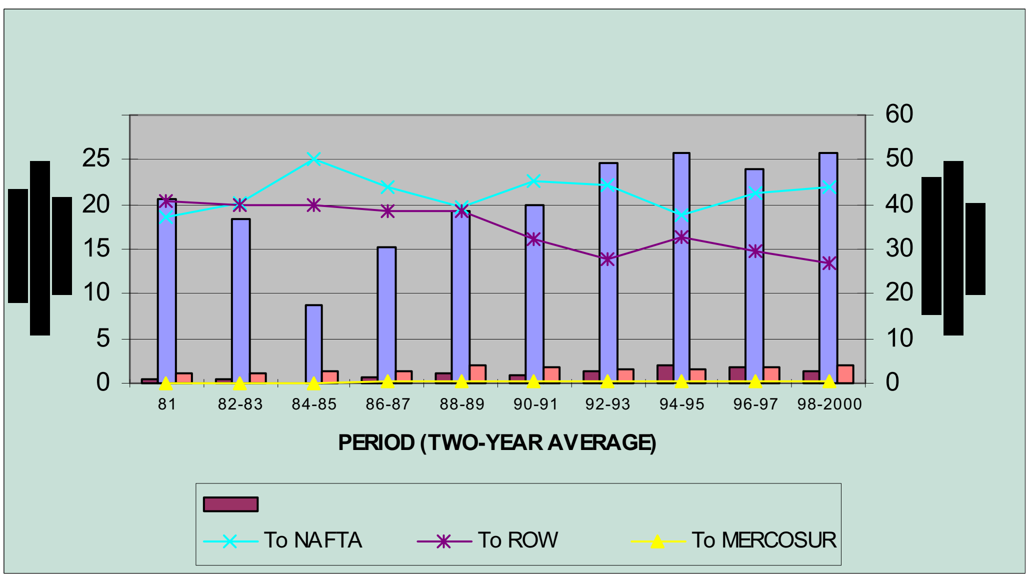


Figure 6. Destination of ANDEAN exports



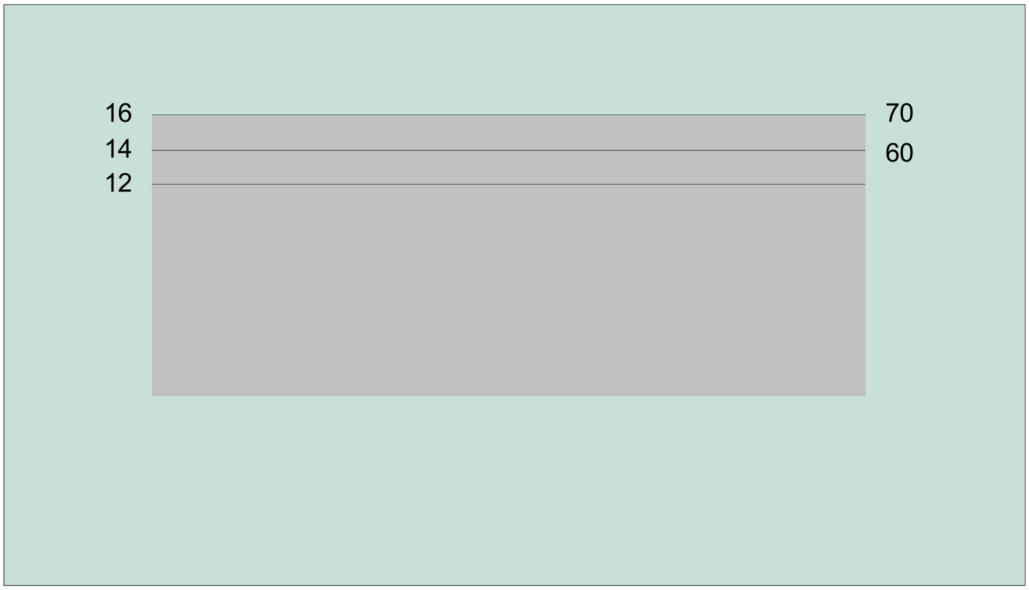
Likewise, Figure 7 shows that for CACM countries NAFTA is also the main export destination, accounting for over 40% of total bloc exports. In this case, however, the share of NAFTA does not show any clear trend in recent years. Trade among bloc members has been on the rise, to account for about a quarter of total bloc exports by the end of the nineties.

Figure 7. Destination of CACM exports



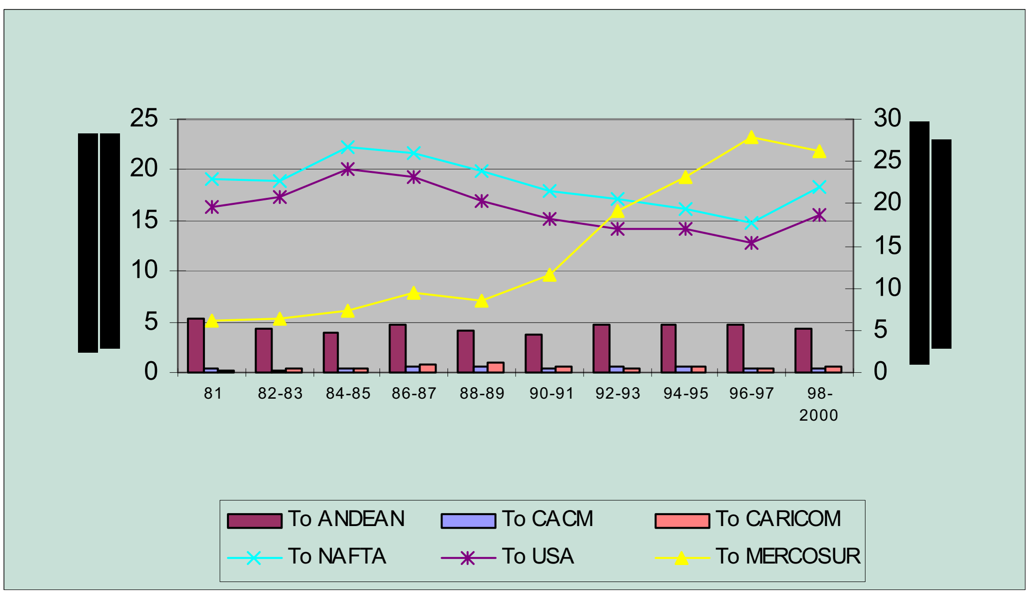
In the case of CARICOM countries (Figure 8), the pattern is rather different. The share of NAFTA in total bloc exports decreased sharply in the late nineties, from over 50% in the 1980s and mid 1990s to around 30% in 1998-2000. In addition, the intra-bloc trade share does not display any clear trend. As already noted, total exports of these countries did not expand at the same pace as those of the rest of the blocs analyzed here.

Figure 8. Destination of CARICOM Exports



Finally, Figure 9 shows the sharp increase in MERCOSUR intra-bloc trade since the mid 1980s, along with a slight decrease in the share of NAFTA countries in the bloc's exports. By 1999-2000, MERCOSUR's trade with non-NAFTA, non-LAC RIA countries represented about 50% of its total trade, a drop of 14 percentage points from the 64% average share in 1981-90.

Figure 9. Destination of MERCOSUR Exports



In summary, the share of intra-bloc trade has been on the rise in all LAC RIAs, perhaps with the exception of CARICOM countries. Furthermore, NAFTA has become a more important export destination for most of the other RIAs, again with CARICOM—and, to a lesser extent, MERCOSUR—as the main exception.

Which Latin American and Caribbean countries have been the winners and losers in U.S. markets? Table 4 shows the evolution of the shares in U.S. imports of most countries in the region. The last four columns rank them in terms of the share loss over different periods (i.e., a "1" denotes the country or RIA with the biggest loss in U.S. import market, "2" for the second biggest loss, and so on). Columns (g) and (h) would most closely identify the post-NAFTA changes in market shares.

Mexico emerges as the clear winner. However, Colombia, Chile and Central American countries (excluding Panama) also fared well. At the other end, Brazil appears as the biggest loser among LAC countries, along with Ecuador and Venezuela. In terms of LAC blocs, MERCOSUR and CARICOM were the biggest losers. In both cases, however, the erosion in market share began well ahead of the creation of

Table 4. U.S. imports: shares by country, and ranking by shares

RIA & Country	Average 1981–1985 (a)	Average 1986–1990 (b)	Average 1991–1995 (c)	Average 1996–1998 (d)	Average 1999–2000 (e)	99–2000 minus 81–85 (f)= (e)-(a)	99–2000 minus 86–90 (g)= (e)-(b)	99–2000 minus 91–95 (h)= (e)-(c)	99–2000 minus 96–98 (l)= (e)-(d)	Ranking following col. (f)	Ranking following col. (g)	Ranking following col. (h)
ROW	**67.06**	**70.44**	**68.08**	**65.21**	**64.69**	**-2.37**	**-5.75**	**-3.39**	**-0.51**			
Chile	0.278	0.281	0.292	0.302	0.300	0.022	0.020	0.009	-0.001	25	23	23
Panama	0.122	0.074	0.050	0.042	0.031	-0.090	-0.043	-0.019	-0.011	10	8	8
Mercosur	2.59	2.29	1.65	1.44	1.43	-1.16	-0.85	-0.21	0.00	2	2	2
Argentina	0.375	0.300	0.249	0.274	0.264	-0.112	-0.037	0.015	-0.010	7	9	24
Brazil	2.072	1.906	1.351	1.131	1.144	-0.929	-0.762	-0.207	0.012	1	1	1
Paraguay	0.013	0.009	0.009	0.005	0.004	-0.009	-0.005	-0.005	-0.001	17	13	11
Uruguay	0.129	0.072	0.037	0.027	0.023	-0.106	-0.049	-0.014	-0.004	8	6	10
CARICOM	**1.63**	**0.87**	**0.86**	**0.79**	**0.70**	**-0.92**	**-0.17**	**-0.16**	**-0.09**	**4**	**4**	**3**
Antigua	0.000	0.001	0.001	0.001	0.000	0.000	-0.001	-0.001	0.000	19	18	16
Bahamas	0.406	0.103	0.060	0.019	0.021	-0.385	-0.082	-0.039	0.002	3	4	7
Belize	0.014	0.011	0.009	0.008	0.008	-0.006	-0.003	-0.001	-0.001	18	14	15
Barbados	0.056	0.014	0.006	0.005	0.004	-0.052	-0.009	-0.001	0.000	12	12	14
Dominica	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	21	21	18
Dominican R.	0.307	0.322	0.447	0.476	0.383	0.076	0.061	-0.064	-0.093	27	26	5
Grenada	0.000	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	22	22	19
Guyana	0.028	0.014	0.019	0.016	0.014	-0.015	-0.001	-0.005	-0.002	16	20	12
Haiti	0.118	0.086	0.025	0.024	0.027	-0.091	-0.059	0.002	0.003	9	5	21
Jamaica	0.117	0.104	0.119	0.093	0.061	-0.056	-0.044	-0.058	-0.032	11	7	6
St.Lucia	0.000	0.003	0.005	0.003	0.002	0.002	-0.001	-0.003	-0.001	23	17	13
Surinam	0.035	0.014	0.010	0.012	0.012	-0.023	-0.002	0.002	0.000	15	15	20
Trinidad Tobago	0.544	0.192	0.160	0.128	0.165	-0.379	-0.027	0.005	0.037	4	10	22
St. Vincent	0.000	0.002	0.001	0.001	0.001	0.001	-0.001	0.000	0.000	20	19	17
ANDEAN	**3.31**	**2.59**	**2.45**	**2.45**	**2.35**	**-0.96**	**-0.24**	**-0.10**	**-0.10**	**3**	**3**	**4**
Bolivia	0.049	0.030	0.036	0.028	0.018	-0.031	-0.012	-0.017	-0.010	14	11	9
Colombia	0.368	0.566	0.535	0.545	0.603	0.235	0.037	0.067	0.058	31	24	28
Ecuador	0.506	0.333	0.277	0.241	0.195	-0.311	-0.138	-0.083	-0.046	5	2	3
Peru	0.415	0.181	0.141	0.197	0.179	-0.236	-0.002	0.038	-0.019	6	16	27
Venezuela	1.975	1.480	1.461	1.439	1.358	-0.617	-0.122	-0.103	-0.081	2	3	2
CACM	**0.60**	**0.52**	**0.74**	**0.97**	**1.03**	**0.43**	**0.51**	**0.29**	**0.06**	**5**	**5**	**5**
Costa Rica	0.161	0.196	0.264	0.283	0.343	0.182	0.147	0.079	0.060	30	30	30
Guatemala	0.139	0.140	0.207	0.229	0.223	0.084	0.083	0.016	-0.006	28	27	25
Honduras	0.150	0.117	0.164	0.263	0.259	0.109	0.142	0.095	-0.003	29	29	31
Nicaragua	0.033	0.001	0.022	0.049	0.048	0.016	0.048	0.026	0.000	24	25	26
El Salvador	0.119	0.067	0.086	0.149	0.157	0.038	0.090	0.070	0.008	26	28	29
NAFTA	**24.41**	**22.94**	**25.88**	**28.80**	**29.46**	**5.05**	**6.52**	**3.58**	**0.66**	**6**	**6**	**6**
Canada	18.779	17.718	18.818	19.137	18.738	-0.041	1.020	-0.081	-0.400	13	31	4
Mexico	5.628	5.224	7.059	9.666	10.721	5.093	5.496	3.662	1.055	32	32	32
Memo: Total U.S. Imports (in 1995 U.S. dollars)	**457160**	**581836**	**657202**	**843224**	**1041176**	**584015**	**459339**	**383973**	**197952**			

NAFTA. For MERCOSUR, the decline is mainly due to Brazil. For CARICOM, the losses are concentrated in Bahamas and Trinidad and Tobago. Table A3 in the Appendix shows that CARICOM's declining share in NAFTA's import markets extends to a variety of export sectors, and not just to one or two export industries.

To summarize this section, the information reviewed so far does not point to any definite conclusions regarding the effects of NAFTA on trade with non-member LAC countries. CARICOM countries perhaps provide the exception, although in this case their declining participation in NAFTA imports is associated with an overall underperformance in export growth relative to other countries. But on the whole we do not observe any obvious turning points in trade trends around the time NAFTA was signed.

From the demand side (i.e., NAFTA imports), it is clear that total imports from bloc members increased more than imports from non-member LAC countries. However, imports from the latter rose as well. Furthermore, Table 4 above shows that CACM countries--clear candidates for trade diversion--either maintained or increased market shares in NAFTA's import markets. From the supply side (i.e., LAC RIA exports), intra-bloc trade increased markedly, and the share of total RIA exports to NAFTA countries behaved differently for the various LAC RIAs: it increased for CACM and Andean Group countries, and decreased for MERCOSUR and CARICOM.

6.3 Assessing the impact of NAFTA on aggregate trade flows

In a world of increasing global trade and with trade reforms taking place simultaneously in a number of countries and regional blocs, the trends just reviewed may reflect a variety of factors in addition to the creation of NAFTA. Thus, they have to be taken as indicative rather than conclusive regarding the effects of NAFTA on members and nonmembers trade. For example, the fact that Central American countries increased their presence in NAFTA markets after 1994 does not automatically imply that they were unaffected by trade diversion: their share of member countries' total imports might have been even higher were in the absence of NAFTA. In other words, to identify the impact of NAFTA we need to control for other factors affecting trade flows.

6.3.1 Background

A number of recent empirical studies have examined the effects of NAFTA on trade flows taking into account major trade determinants. To date, no published study has attempted to explore the impact of the agreement on members' and/or nonmembers' terms of trade.[255] Most have examined aggregate imports and exports, but there are also some studies focusing on disaggregated trade data. A comparative summary is given in Table 5.

Studies focusing on aggregate trade flows most often adopt a gravity approach. Among them, Krueger (1999, 2000), who uses data up to 1997, finds that events other than NAFTA, such as Mexico's real exchange rate and its trade liberalization process, appear to have dominated whatever effects NAFTA may have had on trade patterns. According to this analysis, Mexico's unilateral trade liberalization since the late 1980s was the main factor behind the observed increase in its trade/GDP ratio. In this context, the increase in Mexico's trade with the U.S. is unsurprising given that prior to liberalization the U.S. already accounted for two-thirds of Mexican trade.

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[255] A quick look at the evolution of aggregate export prices of nonmember countries in Central America and the Caribbean relative to those of Mexico yields no evidence that nonmembers lost out to Mexico in the post-NAFTA years. Indeed, those countries' export prices rose faster than Mexico's over 1994-2001. The same result is obtained when looking at relative prices of apparel exports from Mexico and neighboring countries to the U.S.

Table 5. Econometric studies of the trade impact of NAFTA

Study	Trade disaggregation	Framework	Evidence of trade diversion
Gould (1998)	Aggregate	Gravity model	No
Krueger (1999, 2000)	Aggregate	Gravity model	No
Soloaga and Winters (2001)	Aggregate	Gravity model	No
Garcés-Diaz (2002)	Aggregate	Import and Export equations	
CBO (2003)	Aggregate	Import and Export equations	
USITC (1997)	68 sectors	Import and Export equations	In textiles and apparel
Romalis (2001)	5,000 commodities	Commodity demand equations	Yes
Fukao, Okubo and Stern (2003)	2-digit level manufacturing	Share (in U.S. market) equations	In textiles and apparel

Gould (1998) also adopts the gravity framework to analyze the impact of NAFTA on North American trade. Using aggregate quarterly data, he concludes that NAFTA may have stimulated U.S. exports to, but not imports from, Mexico. He finds no evidence of trade diversion. In another gravity-based study using a multi-RIA perspective, Soloaga and Winters (2001) find no discernible impact of NAFTA on the intra or extra-bloc trade of NAFTA members.

Two recent studies use a time-series approach to analyze aggregate trade flows. The study of Mexican imports and exports by Garces-Diaz (2002) concludes that the U.S. economic expansion is the main reason for the outstanding performance of Mexican exports in the 1990s. Income effects and real depreciation, rather than NAFTA, account for bulk of the expansion in Mexican exports since 1994. These results, which agree with those reported by Gould, hold at both aggregate and disaggregated levels. Likewise, the recent assessment of U.S.-Mexico trade by the U.S. Congressional Budget Office (CBO 2003) concludes that NAFTA had a very modest effect on bilateral trade flows, and attributes the growth in Mexico's exports to the U.S. after 1994 to the real depreciation of the peso and the sustained expansion of the U.S. economy. While neither of these studies tackles directly the issue of trade diversion, both of them conclude that the behavior of Mexican exports did not experience any significant structural changes over the 1990s. This, combined with the relatively modest impact on aggregate trade flows that both studies attribute to NAFTA, suggests that significant trade diversion is unlikely to have occurred.

All these studies focus on aggregate trade flows. It is conceivable that NAFTA (or any similar RIA) could cause sharp variations in patterns of trade *at the commodity level*. From the perspective of third countries, aggregate models might be unable to capture trade diversion effects if the share in total exports of those sectors adversely affected is small, or, even if it is large, if changes in those sectors are compensated by changes of opposite sign in exports of other commodities.

Disaggregated analyses attempt to capture these composition effects. Among such studies, the sector-by-sector study of NAFTA developed by USITC (1997) found evidence of trade diversion in one sector (apparel products) out of 68 sectors analyzed. In apparel, the study concludes that U.S. imports from NAFTA partners rose at the expense of Asian and Caribbean Basin countries.[256]

Using a highly disaggregated approach based on the estimation of import share equations, Romalis (2002) finds that NAFTA and CUSFTA had a substantial impact on North American trade. His study identifies the impact of NAFTA by exploiting the variation across commodities and time in the U.S. tariff preference given to goods produced in Canada and Mexico. The paper finds that 25-50% of the rise in Mexican exports to U.S. since 1993 is due to Mexico's improved preferential treatment, implying substantial trade diversion.[257] However, it is worth noting that, rather than (or in addition to) effects from NAFTA, these findings could partly reflect different (higher) income elasticities for some of the commodities with larger increases in tariff preferences.

Finally, Fukao, Okubo and Stern (2003) examine the behavior of Mexico's share in the U.S. import market by estimating import share equations at the 2-digit level. Out of the 60 sectors examined, they find evidence of trade diversion in the textile and apparel sector, where Mexican exports would have replaced lower-cost Asian exports. This is in agreement with the results of the USITC study mentioned earlier.

On the whole, therefore, existing studies find no evidence of trade diversion from NAFTA at the aggregate level. In general, aggregate studies also find that the contribution of NAFTA to the expansion of Mexico's trade with its partners was modest. Finally, there are indications that trade diversion may have occurred in the textile and apparel sectors. We next revisit these issues in more detail.

6.3.2 Methodological approach

To examine the effects of NAFTA on aggregate trade flows, we adopt a gravity approach. The empirical robustness of the gravity model has made it the workhorse for investigations of the geographical patterns of trade.[258] In this framework, trade between two countries depends on their economic and physical size (GDP, population, land area) and on transaction costs (distance, adjacency, cultural similarities).

In addition to these standard determinants, the empirical model used here allows countries' membership in RIAs to affect their trade flows. We depart from previous analyses by allowing RIAs to affect both members' imports from, and exports to, nonmember countries. Furthermore, we allow for both 'anticipation effects' (e.g., the level of trade between RIA members rising above 'normal' levels *before* the RIA is formally commenced [259]) and for the effects of non-RIA relationships on trade flows between

[256] The study also finds that in 59 out of the 68 sectors NAFTA had a negligible effect on U.S. trade, due in part to the low level of pre-NAFTA trade-weighted duties. Imports from Mexico already received preferences under the GSP (also available for other countries) and from duty-free treatment for U.S. inputs; those from Canada were substantially liberalized by the previously agreed (1988) USA-Canada FTA. The remaining 8 sectors experienced a "significant" effect from NAFTA, but no trade diversion (USITC, 1997, p 5-12).

[257] Romalis finds that Mexico's share of U.S. imports has increased most rapidly in those commodities for which NAFTA gave the greatest increase in tariff preferences. For those commodities with at least a 10 percentage point increase in relative tariff preference for Mexican goods, the simple average of Mexico's share in U.S. imports has risen by 224% since 1993. This is an order of magnitude higher than the more modest 23% rise in the rest of the goods (i.e., those without increase in relative tariff preferences for Mexican goods).

[258] Tinbergen (1962), Pöyhönen (1963) and Linneman (1966) provided initial specifications and estimates of the determinants of trade flows, and Aitken (1973) applied the gravity model to RIA. More recently, Anderson (1979), Bergstrand (1985), Deardorff (1998) and Anderson and Mercouiller (1999) have provided partial theoretical foundations for the gravity equation, although none of the models generate exactly the equation generally used in empirical work.

[259] See Freund and McLaren (1998).

RIA members, reflecting the fact that RIAs are not usually formed between randomly selected countries but between countries with long-standing economic ties.

In this framework, country *i*'s imports from country *j* can be expressed:

$$
\begin{aligned}
LnX_{ij} = {} & \alpha + \beta 1 \; LnY_i + \beta 2 LnN_i + \beta 3 LnY_j + \beta 4 LnN_j + \beta 5 Ln\overline{D}_i + \beta 6 LnD_{ij} \\
& + \beta 7 LnT_i + \beta 8 LnT_j + \beta 9 C_{ij} + \beta 10 I_i + \beta 11 I_j + \beta 12 L_{ij} \qquad (1) \\
& + \sum_k b_k P_{ki} P_{kj} + \sum_k m_k P_{ki} + \sum_k n_k P_{kj} + \varepsilon_{ij}
\end{aligned}
$$

where X_{ij} is the value of imports of country *i* from country *j* (i.e. exports from *j* to *i*),

Y_i, Y_j is the Gross Domestic Product of country *i* (or *j*),

N_i, N_j is the population of country *i* (or *j*),

$\overline{D}_i$ is the average distance of country *i* to exporter partners, weighted by exporters' GDP share in world GDP ("remoteness" of country *i*),

D_{ij} is the distance between the economic center of gravity of the respective countries,

T_i, T_j is the land area of country *i* (or *j*),

C_{ij} is a dummy that takes value 1 if countries *i* and *j* share a land border and 0 otherwise,

I_i, I_j is a dummy that takes value 1 when country *i* (or *j*) is an island, and 0 otherwise,

L_{ij} is a dummy for cultural affinities, proxied by the use of the same language in countries *i* and *j*,

P_{km} is a dummy taking value 1 if *m* is a member of bloc *k* and zero otherwise,

ε_{ij} is a white noise error term.

The first two lines of equation (1) characterize exports from *j* to *i* if neither is a member of a RIA. Thus they represent the volume of trade that would be considered "normal" between two countries in the absence of any RIAs.

Our main interest is the third line of equation (1), which captures the effects of regional arrangements on members' trade flows. Here b_k is a coefficient measuring the extent to which trade is higher than normal if both *i* and *j* are members of the bloc (intra-bloc trade), m_k is a coefficient measuring the extent to which members' imports from all countries are higher than expected, and n_k is a coefficient measuring the extent to which members' exports to all countries are higher than expected. In other words, flow *ij* is raised by m_k if *i* is in a given RIA, whether *j* is also a member or not; by n_k if *j* is in a given RIA, whether *i* is a member or not, and by $(m_k+n_k+b_k)$ if both are members of the same RIA.

For many of the blocs considered here, regionalism was accompanied by a strong non-discriminatory (most-favored-nation) trade liberalization. We take m_k and n_k as combining the effects of the general liberalization and trade diversion, while b_k captures the increase in intra-bloc trade over and above the general effect. In this context, the traditional estimate of so-called (gross) intra-trade effects is equal to (m_k+n_k+b_k).

A negative coefficient on the dummy for a given RIA's imports from non-members (m_k) indicates that, *ceteris paribus*, the RIA has traditional import diversion effects. In turn, a negative coefficient on the dummy for a given RIA's exports to non-members (n_k)—which, for want of a better term, we label 'export diversion'—may be taken to mean that the RIA hurts the welfare of non-member countries, along the lines of the argument mentioned above.

We estimate the gravity model over the largest available set of countries and a long time period to describe 'non-RIA' years adequately. Hence, we use data on non-fuel visible imports for 130 countries over 1980-2000 from WITS (World Bank trade database). This set of countries represents around 95% of total world imports in the period covered. The distance variable is the great circle distance between economic centers and was based on distances calculated by the authors. All the other variables are from the World Bank's Economic and Social Data (BESD).

To place NAFTA in perspective, we consider the same nine RIAs as before: NAFTA, CACM, CARICOM, MERCOSUR, Andean Pact, EEC/EU, EFTA, ASEAN and GCC. Since our focus in on the impact of regionalism in the Americas, and in particular NAFTA, the inclusion of non-LAC RIAs in our analysis is mainly to control for their effects on the trade of LAC countries. The last column in Table A1 in the Appendix and identifies specific dates in which major developments in the nine RIA analyzed could be expected to have impact on trade patterns.

We define the trade bloc dummies (P_{km}) by bloc membership in 1996. In this setting, it is important to note that 'abnormal' levels of trade captured by the bloc-related dummy variables could reflect both RIA effects or the action of unobservable characteristics of country members that affect their levels of trade. However, here we are interested in whether RIAs *change* the intensity with which particular countries trade with each other. Thus, we allow the coefficients on the bloc dummies to change over time, and measure the effects of trade blocs not by the values of the dummy coefficients per se, but by their movements over time. The rationale is that pairs of countries may have 'abnormal' trade relationships for a variety of reasons other than RIA membership, but if those reasons do not change significantly over time the coefficients on the RIA dummies should not change either. This approach also allows us to assess both 'anticipation effects' mentioned earlier.

Because trade values are bounded from below by zero, the appropriate estimation procedure is that of a Tobit model.[260] We computed three different sets of Tobit estimates.[261] The first is a set of 21 separate regressions–one for each year–for the annual data 1980-2000. From these we seek to identify not only the 'level' effect on trade of RIA but also the variation of this effect through time, in particular around the years marked in the last column of Table A1, to assess whether any observed 'abnormalities' in trade are directly associated with preference effects.

Second, we averaged the data over non-overlapping three-year periods (to smooth out transitory shocks and cyclical changes) and estimated a single pooled regression with time dummies allowing all

[260] In truth, however, this refinement does not add much relative to standard OLS estimation, because with the logarithmic transform the truncation occurs at the logarithm of the minimum recorded value of trade ($0.001million), and only about 2% of observations are recorded at that level.

[261] The first two basically update the analysis in Soloaga and Winters (2001).

coefficients to change across periods. We used these estimates to test for significant differences in coefficients across periods.[262]

Finally, in the third approach we extended the basic equation with *ad hoc* dummies to track the evolution of trade of CACM and CARICOM countries with Mexico and the U.S. In this way, we tailor the gravity model to test the impact of NAFTA on trade among this subset of countries. Pooling all NAFTA nonmember countries together—as the previous exercises implicitly do—could make it difficult to detect the trade-diverting effects of the Treaty on this specific group of countries that had been feared by numerous observers.

6.3.3 Results

The detailed results are described in Montenegro and Soloaga (2002); here we just summarize the main findings. In the estimations, the gravity variables—GDP, area, absolute distance—generally had the expected sign and were highly significant: trade increases slightly more than proportionately with the GDP of the importer and exporter countries and decreases with size and distance. The coefficients reflecting population effects (of importer and exporter) were negative and not always significant. The degree of 'remoteness' of the importer country from its suppliers had the expected positive sign although in the annual estimation it was not always significant, while the estimated parameters for common land borders was always positive and significant. The coefficients for the exporter being an island were positive and significant, while those for the importer were imprecise in the annual estimates and significantly negative in the pooled estimates. The proxy for 'cultural similarities' (common language) was always statistically significant, with the expected sign (positive). Further, most of these effects were stable over time.

The estimates of the RIA dummies are of more direct interest here. The detailed annual estimates for LAC RIAs are reported in Table A4 in the Appendix.[263] They are quite heterogeneous across RIAs. Regarding the intra-bloc trade coefficients, they are positive for all LAC RIAs in all periods, but in the case of NAFTA they were not significant. Thus, Latin American countries in LAC-only RIAs—CACM, CARICOM, Andean Group, and MERCOSUR—trade significantly more heavily with each other than predicted by standard trade determinants. For non-LAC RIAs, positive but insignificant bloc-trading effects were also found for ASEAN and EFTA, while a negative and significant effect is found for the EU.

In turn, the coefficients for NAFTA's overall block imports appear to have become significantly positive in the late 1990s. Earlier estimates are generally imprecise. For the other LAC RIAs, the estimates are in general negative and significant, although for CARICOM and CACM many of the estimates are rather imprecise. Among the non-LAC RIAs, the estimates are also negative for EFTA, and positive in the other cases (EU, ASEAN and GCCl).

As for block exports, the coefficient estimates for NAFTA are negative and generally significant since the late 1980s. Results for the other RIAs were fairly heterogeneous: negative and significant for the Andean Group and CARICOM, positive and significant for CACM (outside LAC, the same result was found for the EU and ASEAN) and insignificant for Mercosur (as well as EFTA).

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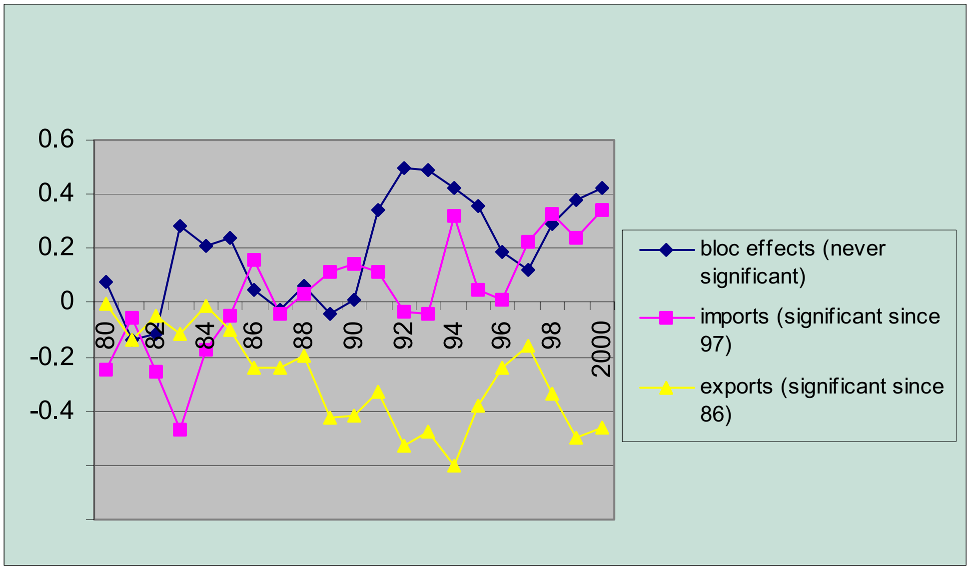
[262] Other experiments used four-, five-, and seven-year periods. Qualitative results were similar to those reported in the text.

[263] To save space we do not report the detailed results for non-LAC RIAs. These can be found in Montenegro and Soloaga (2002).

Figure 10 depicts graphically the annual estimation results for NAFTA: positive but insignificant bloc effect dummies, and increasing openness to imports since 1997 coupled with a decrease in total bloc propensity to exports since 1998.

Figure 10. NAFTA: Annual estimates of bloc dummy coefficients



To draw inferences on the impact of NAFTA we need to look for significant *changes* in the coefficients of the RIA's intra-bloc, import and/or export dummies around the date of creation of NAFTA. For this we turn to the pooled estimates on three-year averages.[264] The results for NAFTA are summarized in Table 6, and are fairly consistent with those from the annual estimation. The coefficients of intra-bloc trade dummies show a positive trend, but are not statistically significant. It appears that the observed changes in intra-bloc trade are not significantly associated with events such as CUSFTA in 1988 and NAFTA itself, once we take into account the 'normal' variation in trade levels dictated by the gravity variables. In turn, overall bloc imports display a positive trend, while the bloc coefficient for exports remains roughly constant in the last part of the sample, although it declines from the levels of the early 1980s.

For other LAC RIAs, when we control for the impact of the gravity variables the revamping (Andean Group, CACM and CARICOM) or launching (MERCOSUR) of RIAs in Latin America does not seem to have been accompanied by a larger-than- expected increase in intra-bloc trade propensities. The positive trend in the estimated coefficients for bloc members' imports, significant in the cases of CACM, CARICOM and MERCOSUR, presumably reflects the drive to unilateral trade liberalization that swept Latin America in the late 1980s and early 1990s.

So far we have found no clear evidence of any effects of NAFTA on third countries. This might be due to the fact that we are lumping all nonmember countries together and not considering separately the neighboring countries of Central America and the Caribbean, which on *a priori* grounds should be expected to have been most affected by Mexico's preferential access to the U.S. market. Thus, in the final experiment we expand the gravity framework to try to capture any particular effects of NAFTA on those countries.

[264] Given the amount of information involved, the detailed results are confined to Table A5 in the Appendix.

Table 6. NAFTA dummy estimates with pooled data
(Dependent variable: log imports)

Dummy	Period	Coefficient (gravity estimates)	Stat. signifi-cance	Test of equality of coefficientes: periods in rows vs. periods in columns (a)					
				83-85	86-88	89-91	92-94	95-97	98-00
Bloc trade	80-82	-0.074							
Bloc trade	83-85	0.221							
Bloc trade	86-88	0.018							
Bloc trade	89-91	0.102							
Bloc trade	92-94	0.478							
Bloc trade	95-97	0.222							
Bloc trade	98-00	0.391							
Imports	80-82	-0.249	***		***	***	***	***	***
Imports	83-85	-0.285	***		***	***	***	***	***
Imports	86-88	0.060							***
Imports	89-91	0.150	**						**
Imports	92-94	0.122	#						***
Imports	95-97	0.120	#						***
Imports	98-00	0.397	***						
Exports	80-82	-0.132	*		*	***	***		***
Exports	83-85	-0.205	***			***	***		***
Exports	86-88	-0.338	***				**		
Exports	89-91	-0.479	***					**	
Exports	92-94	-0.564	***					***	
Exports	95-97	-0.267	***						**
Exports	98-00	-0.486	***						

Notes: " "***" indicates significance at the 1% level; "**" at 5%; "*" at 10%; "#" at 15%.

(a) F test of equality of coefficients. For instance, for the period 1980-82 the coefficient of -0.249 for NAFTA imports is not statistically different from the coefficient for 1983-85 (-.285), but is statistically different from those corresponding to 1986-88 (0.060), 1989-91 (0.150), 1992-94 (0.122), 1995-97 (0.120), and 98-2000 (0.397). The latter result is indicated with *** in columns 5th to 10th.

To perform this experiment, the empirical model was left unchanged for all the RIAs except NAFTA, CACM and CARICOM. For these blocs, we amended the model as follows: (i) we replaced the dummy for NAFTA and separately modeled trade between the U.S. and Canada, between the U.S. and Mexico, and between Canada and Mexico. The purpose is to isolate the evolution of U.S. imports from (exports to) Mexico; (ii) we did the same for CACM and CARICOM countries with two dummies per RIA capturing imports from the U.S. and exports to the U.S.; and (iii) we also created dummies for trade between Mexico and CACM, and Mexico and CARICOM to capture changes in the patterns of trade that could statistically be associated to NAFTA (i.e., a 'stopover effect').

Like with the preceding exercise, the estimation was performed using pooled data averaged over subperiods allowing all coefficients to change over time and then testing for parameter constancy. Various experiments with different period lengths were performed, but the qualitative results were similar in all cases.

Table 7 reports the resulting coefficient estimates on the variables of interest and the F-tests of equality of coefficients across periods. Rows 1 to 14 show results for Mexico's overall openness to

Table 7. Expanded gravity model
Impact of NAFTA on trade flows from CACM, CARICOM and Mexico

Row	Dummy	Period	Coefficient (gravity estimates)	Stat. signifi-cance	Test for the equality of coefficientes: periods in rows vs. periods in columns (1)					
					83-85	86-88	89-91	92-94	95-97	98-00
1	Mexico overall ***exports***	80-82	-2.114	***	#	***	***	***	***	***
2	Mexico overall ***exports***	83-85	-1.847	***		***	***	***	***	***
3	Mexico overall ***exports***	86-88	-1.194	***				ns	***	***
4	Mexico overall ***exports***	89-91	-1.245	***				ns	***	***
5	Mexico overall ***exports***	92-94	-1.305	***					***	***
6	Mexico overall ***exports***	95-97	-0.447	***						ns
7	Mexico overall ***exports***	98-00	-0.564	***						
8	Mexico overall ***imports***	80-82	-1.362	***	*	ns	***	***	***	***
9	Mexico overall ***imports***	83-85	-1.706	***		**	***	***	***	***
10	Mexico overall ***imports***	86-88	-1.342	***				***	***	***
11	Mexico overall ***imports***	89-91	-0.678	***				ns	***	***
12	Mexico overall ***imports***	92-94	-0.540	***					*	***
13	Mexico overall ***imports***	95-97	-0.247	**						*
14	Mexico overall ***imports***	98-00	0.071							
15	USA exports to Mexico	80-82	-0.056		ns	ns	ns	ns	ns	ns
16	USA exports to Mexico	83-85	-0.264			ns	ns	ns	ns	ns
17	USA exports to Mexico	86-88	-0.386					ns	ns	ns
18	USA exports to Mexico	89-91	-0.020					ns	ns	ns
19	USA exports to Mexico	92-94	0.775						ns	ns
20	USA exports to Mexico	95-97	0.902							ns
21	USA exports to Mexico	98-00	1.250							
22	USA imports from Mexico	80-82	1.141		ns	ns	ns	ns	ns	ns
23	USA imports from Mexico	83-85	1.323			ns	ns	ns	ns	ns
24	USA imports from Mexico	86-88	1.819					ns	ns	ns
25	USA imports from Mexico	89-91	1.478					ns	ns	ns
26	USA imports from Mexico	92-94	1.467						ns	ns
27	USA imports from Mexico	95-97	2.130	#						ns
28	USA imports from Mexico	98-00	2.304	#						
29	USA exports to CACM	80-82	0.552		ns	ns	ns	ns	ns	ns
30	USA exports to CACM	83-85	0.423			ns	ns	ns	ns	ns
31	USA exports to CACM	86-88	-0.173					ns	ns	#
32	USA exports to CACM	89-91	0.222					ns	ns	ns
33	USA exports to CACM	92-94	0.670						ns	ns
34	USA exports to CACM	95-97	0.813	#						ns
35	USA exports to CACM	98-00	0.985	*						
36	USA imports from CACM	80-82	2.084	***	ns	ns	ns	ns	ns	ns
37	USA imports from CACM	83-85	2.133	***		ns	ns	ns	ns	ns
38	USA imports from CACM	86-88	1.201	**				ns	*	**
39	USA imports from CACM	89-91	1.346	**				ns	*	**
40	USA imports from CACM	92-94	2.290	***					ns	ns
41	USA imports from CACM	95-97	2.628	***						ns
42	USA imports from CACM	98-00	2.897	***						
43	USA exports to CARICOM	80-82	0.373		ns	ns	ns	ns	ns	ns
44	USA exports to CARICOM	83-85	0.596	#		ns	ns	ns	ns	ns
45	USA exports to CARICOM	86-88	0.190					ns	ns	ns
46	USA exports to CARICOM	89-91	0.221					ns	ns	ns
47	USA exports to CARICOM	92-94	0.183						ns	ns
48	USA exports to CARICOM	95-97	0.285							ns
49	USA exports to CARICOM	98-00	0.266							
50	USA imports from CARICOM	80-82	0.767	*	ns	ns	ns	ns	ns	ns
51	USA imports from CARICOM	83-85	1.263	***		ns	ns	ns	ns	ns
52	USA imports from CARICOM	86-88	1.031	***				ns	ns	ns
53	USA imports from CARICOM	89-91	0.883	**				ns	ns	ns
54	USA imports from CARICOM	92-94	0.777	**					ns	ns
55	USA imports from CARICOM	95-97	0.669	*						ns
56	USA imports from CARICOM	98-00	0.798	**						

Table 7 ***(continued)***

Row	Dummy	Period	Coefficient (gravity estimates)	Stat. significance	Test for the equality of coefficientes: periods in rows vs. periods in columns (1) 83-85	86-88	89-91	92-94	95-97	98-00
57	Mexico exports to CARICOM	80-82	-0.928	**	ns	ns	ns	ns	**	***
58	Mexico exports to CARICOM	83-85	-0.402			ns	ns	ns	ns	**
59	Mexico exports to CARICOM	86-88	-0.624	#				ns	#	***
60	Mexico exports to CARICOM	89-91	-0.711	*				ns	#	***
61	Mexico exports to CARICOM	92-94	-0.573	#					ns	***
62	Mexico exports to CARICOM	95-97	0.153							ns
63	Mexico exports to CARICOM	98-00	0.782	**						
64	Mexico imports from CARICOM	80-82	-1.415	***	ns	ns	ns	**	ns	ns
65	Mexico imports from CARICOM	83-85	-2.071	***		ns	*	***	#	***
66	Mexico imports from CARICOM	86-88	-1.895	***				***	ns	**
67	Mexico imports from CARICOM	89-91	-0.983	***				*	ns	ns
68	Mexico imports from CARICOM	92-94	0.077						**	ns
69	Mexico imports from CARICOM	95-97	-1.143	***						ns
70	Mexico imports from CARICOM	98-00	-0.613	#						
71	Mexico exports to CACM	80-82	-0.454		ns	ns	ns	ns	ns	*
72	Mexico exports to CACM	83-85	-0.213			ns	ns	ns	ns	ns
73	Mexico exports to CACM	86-88	-0.109					ns	ns	ns
74	Mexico exports to CACM	89-91	-0.286					ns	ns	#
75	Mexico exports to CACM	92-94	0.024						ns	ns
76	Mexico exports to CACM	95-97	0.648							ns
77	Mexico exports to CACM	98-00	0.900	#						
78	Mexico imports from CACM	80-82	-1.440	***	ns	ns	ns	ns	ns	*
79	Mexico imports from CACM	83-85	-2.143	***		ns	*	**	**	***
80	Mexico imports from CACM	86-88	-1.707	***				#	#	**
81	Mexico imports from CACM	89-91	-0.689					ns	ns	ns
82	Mexico imports from CACM	92-94	-0.525						ns	ns

(1) F test of equality of coefficients. For instance, the first cell shows results from comparing Mexico's overall export coefficient for 1980-82 (row 1=-2.114) to that of 1982-84 (row 2=-1.847). They were different at the 15% significance level, indicated by "#". "***" indicates that parameter estimates are statistically different at the 1% level significance level; "**" at 5%; "*" at 10%; "#" at 15%.; "ns" means parameters are not significantly different from each other.

exports (rows 1 to 7) and imports (rows 8 to 14). There is a clear positive trend in both since 1986-88.[265] As before, these trends seem to reflect Mexico's unilateral trade liberalization since the late 1980s. For both variables, however, levels in 1995-97 and 1998-2000 are statistically higher than in all the previous periods in the sample. For the case of Mexico's global exports (to the world, including its NAFTA partners), these results suggest that the anti-export bias declined from an average of –1.25 in 1989-1991 to –0.56 in 1998-2000. This implies that Mexican exports would have been between 25 and 30% lower in the latter period if NAFTA had not been implemented. The corresponding number for Mexico's global imports is close to 50%.

Rows 15 to 28 show results for Mexico's imports from the U.S. (rows 15 to 21) and exports to the U.S. (rows 22 to 28). Although a positive trend is apparent for both variables (since 1989-91 in the case of imports), indicating an increasing level of trade above what could be expected for similar countries in the sample, neither the coefficients nor their changes are statistically different from zero at conventional levels. Only the coefficients for exports to the U.S. in 1995-97 and 1998-2000 approach significance, but their values are not very different from that obtained in 1986-88. Recall that we are controlling for trends in Mexico's global exports and imports, so the conclusion is that once those trends are taken into account there is little left for the Mexico-U.S. dummy to capture.

[265] Note that the dummies for exports and imports reported here *exclude* trade between Mexico and the U.S.. Thus, these dummies capture all of Mexico's non-U.S. trade. Trade between Mexico and the U.S. is captured by another specific dummy.

Were there significant changes in trade between the U.S. and CACM or CARICOM? The next two blocks in the table address this question. Trade between CACM countries and the U.S. has been consistently above what could be considered ‘normal’ between countries of similar size and distance (save for CACM imports in 1986-88). While the coefficient for ‘abnormal’ CACM imports from the U.S. became significant only in the last period of our sample, the coefficient for ‘abnormal’ exports from CACM to the U.S. was always statistically significant. These parameters show a positive trend since 1989-91, and the F-tests show that the coefficients for 1995-97 and 1998-2000 are statistically higher than that those for 1986-88 and 1989-1991. This points against any negative impact of NAFTA on CACM exports.

In the case of CARICOM-U.S. trade, only the coefficients for CARICOM exports were statistically significant. They are positive and show a negative trend from 1986-1988 up to 1995-97. Statistically, however, there was no difference in coefficients across periods.

As for the stopover effect, results from the expanded gravity model show that CARICOM exports to Mexico generally remained below ‘normal’ levels throughout the sample, but the estimated coefficients display large swings. It is hard to conclude much from this pattern, but in any case a positive trend with changes that could be associated to NAFTA is certainly not evident. Finally, regarding exports from CACM to Mexico, since 1989-91 they were not different from to what could be expected from countries of similar sizes, distances and other gravity variables. If anything, we find a positive, and marginally significant, change between the late 1980s and present levels.

6.3.4 Summary

On the whole, the empirical results in the preceding section agree with those of most previous studies using aggregate trade flow data. We can summarize them in two points. The first one is that NAFTA appears to have had a positive, albeit modest, effect on the volume of Mexico’s trade with the U.S. and Canada. This prompts the immediate question of what, if not NAFTA, is the main factor behind the upward trend in Mexico’s trade with the U. S. The clearest answer is given by the time-series studies cited earlier, which attribute the bulk of the rise in trade to income effects—most notably, the expansion of the U.S. economy[266]—and the real exchange rate of the peso. The gravity model gives a similar verdict, as its estimates show that bilateral trade rises more than proportionately with the GDP of the importer and exporter.[267] Once account is taken of these factors, there is not much left for NAFTA to explain.[268]

The second conclusion is that there is little evidence of any significant adverse effect of NAFTA on the *aggregate* trade flows of neighboring countries. This, however, stands in contrast with the findings from the more disaggregated studies cited earlier that suggest trade diversion in the textile and apparel sector specifically. For this reason, we explore it further below.

6.4 Trade diversion at the sector level in Central America and the Caribbean

There are two facts that make this contrast between aggregate and micro studies puzzling. First, apparel products account for a considerable fraction of NAFTA’s imports from Central American and

[266] Both Garces-Diaz (2002) and CBO (2003) find U.S. income elasticities of Mexico’s exports around 3. Further, the estimated value is virtually the same in the pre- and post-NAFTA periods.

[267] In contrast, some studies (e.g., Romalis 2002; Anderson and van Wincoop 2003) often impose unit scale elasticities.

[268] For example, CBO (2003) concludes that NAFTA might account for an increase of about 10 percent in Mexico’s exports to the U.S.

Caribbean countries. Second, apparel is the sector in which NAFTA introduced the largest gap in U.S. trade preferences between those countries and Mexico.

6.4.1 Trade preferences and the performance of apparel exports

The first of those facts is documented by Table 8, which highlights the importance of apparel in overall NAFTA imports from Central American and Caribbean countries, as well as Mexico.[269] It is clear from the table that apparel plays a major role in the region's trade with NAFTA, and increasingly so for most countries in the table, with the only exception of Costa Rica in the late 1990s.

Table 8. Apparel exports to NAFTA
(as % of total exports to NAFTA)

	-	19 5-01
Mexic	2.9	77%
Costa	35.9	27.39%
Guate	37.7	47.79%
Hondu	45.5	71.43%
Nicara	6.6	18%
El Sa	43.8	04%
Centr er	**38.52%**	**51.51%**
Dominican Republic	47.86%	50.97%
Jamaica	41.71%	42.23%
CARICOM	**31.24%**	**34.78%**

Access by Central America and the Caribbean to the U.S. market has been governed since 1983 by the Caribbean Basin Initiative (CBI), which granted free access—with no tariffs or quotas—to most goods produced by those countries, but with a number of major exceptions, of which the most relevant is the textile and apparel sector. Imports from the excluded sectors received no preferential treatment and were subject to maximum tariffs (those applicable to third countries).

Prior to NAFTA, Mexican apparel exports to the U.S. were subject to the same tariff treatment as those from CBI countries. But the passage of NAFTA created a bias in favor of Mexican goods: in the post-NAFTA years, effective tariffs barely declined for CBI countries (they hovered in the 15-18 % range), while they basically vanished for Mexico. More recently, enhancements to the original CBI terms have brought them closer to "NAFTA parity" in terms of preferences in the textile and apparel sector, although the bias was not completely eliminated until the passage of a new U.S. law in 2000, and even after that some differences remain (see Box 2).

The change against CBI countries in relative preferences in the textile and apparel sector imposed by NAFTA had long been regarded as one of its major threats for the neighboring countries (e.g., Leamer et. al. 1995; Jorge and Salazar-Carrillo 1997). Has it been borne out by the facts? Table 9 shows the shares of CBI countries and Mexico in NAFTA's total apparel imports. It is clear that Mexico has

[269] Apparel is defined here as chapters 61 and 62 of the Harmonic System.

Box 2. The Caribbean Basin Initiative

The 1983 Caribbean Basin Economic Recovery Act (CBERA), commonly referred to as the Caribbean Basin Initiative or CBI, is a unilateral, non-reciprocal, grant of duty-free or reduced duty access for certain exports to the U.S. market. Most textiles and apparel, certain footwear, canned tuna, petroleum and its derivatives, and certain watches are not eligible for any preferential treatment. The CBERA was amended by Caribbean Basin Economic Recovery Act of 1990, which made the trade benefits permanent

Currently, 24 Caribbean, and Central and South American countries enjoy these trade preferences.[270] Benefits under CBI are dependent on various mandatory and discretionary conditions, including intellectual property rights protection, investment protection, improved market access for U.S. exports, and workers' rights. Over the late 1990s, about one-fifth of overall U.S. imports from CBERA countries entered the U.S. under CBERA preferential provisions.

Ever since NAFTA was proposed in the early 1990s, Caribbean Basin countries expressed concern that Mexico's more preferential trading status would erode their own preferential access to the U.S. market. This led to demands for modifying the CBI to achieve "NAFTA parity", to prevent a diversion of exports and investment, particularly in the textile and apparel sectors, from the CBERA region.

In May 2000 the U.S. enacted the Caribbean Basin Trade Partnership Act (CBTPA), which focuses primarily on the preferential treatment of textile and apparel products and adds several eligibility criteria. Articles accorded duty-free and quota-free treatment include apparel assembled in a beneficiary country from fabric wholly formed and cut in the United States from U.S. made yarn, or from a fabric made in the United States from U.S. made yarn, cut in a beneficiary country and sewn together there with U.S. made yarn. Duty-free access for apparel knit in the region is subject to an annual cap, with separate limits for knit apparel and t-shirts. The Trade Act of 2002 expanded further the benefits under CBERA through a substantial increase in the quota ceilings for knit-to-shape apparel and exclusion of the cost of trimmings and findings from the cost of U.S. fabric components.

CBTPA requirements for duty-free import of textiles and apparel remain more stringent than those imposed by NAFTA, in that the latter allows the use of yarn from any NAFTA member country, not only the U.S. Nevertheless, the available information shows that since enactment of CBTPA a considerable fraction of the region's apparel exports have entered the U.S. under the new preferential regime, approaching the utilization rate of NAFTA by Mexican exporters (Box Table 1).

Box Table 1

Apparel exports to the U.S.
under CBI/CBTPA and NAFTA preferences
(percent of apparel exports to the U.S.)

Caribbean Basin Countries	0%	0%	2%	54%	65%
Mexico	0%	30%	61%	69%	74%

Source: U.S. International Trade Commission
a/ January - November

Source: Ahearn (2002) and Gitli and Arce (2000).

experienced a spectacular increase in market share in the post-NAFTA years.[271] By 1999, Mexico had caught up with CBI exporters as a group (Figure 11). But CBI countries did not lose market share. Instead, they expanded considerably their combined presence in the NAFTA market, although at a slower pace than Mexico. Of the region's countries shown in the table, only Costa Rica and Jamaica—two higher-wage countries—saw their market share decline in the post-NAFTA period. As the table shows, these gains were achieved at the expense of Asian exporters (China, Hong-Kong, Korea, Taiwan), whose combined share of the NAFTA market was drastically cut over the last decade. These latter countries, rather than the CBI area, appear therefore as prime candidates for trade diversion in apparel.

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[270] The following 20 countries were designated on January 1, 1984: Antigua and Barbuda, Barbados, Belize, British Virgin Islands, Costa Rica, Dominica, Dominican Republic, El Salvador, Grenada, Guatemala, Haiti, Honduras, Jamaica, Montserrat, Netherlands Antilles, Panama, St. Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago. The Bahamas was designated on March 14, 1985. On April 11, 1986, Aruba was designated retroactive to January 1, 1986, upon becoming independent of the Netherlands Antilles. Guyana was designated effective November 24, 1988, and Nicaragua was designated effective November 13, 1990.

[271] Mexico's share of the non-NAFTA apparel market also rose in the post-NAFTA period, from 0.03 percent in 1991-94 to 0.07 percent in 1995-2001.

Table 9. Shares in NAFTA's total apparel imports

	1991-94	1995-2001
Mexico	3.74%	10.76%
Costa Rica	1.79%	1.50%
Guatemala	1.48%	2.04%
Honduras	1.27%	3.28%
Nicaragua	0.03%	0.41%
El Salvador	0.67%	2.06%
Central America	**5.24%**	**9.29%**
Dominican Republic	3.76%	3.91%
Jamaica	1.05%	0.77%
CARICOM	**5.00%**	**4.78%**
Bangladesh	2.21%	2.88%
China	15.44%	11.71%
Hong Kong	14.54%	8.82%
Indonesia	2.82%	3.31%
India	3.24%	3.29%
Korea	6.67%	3.81%
Thailand	2.48%	2.82%
Taiwan	7.48%	3.84%
Asia	**54.89%**	**40.47%**

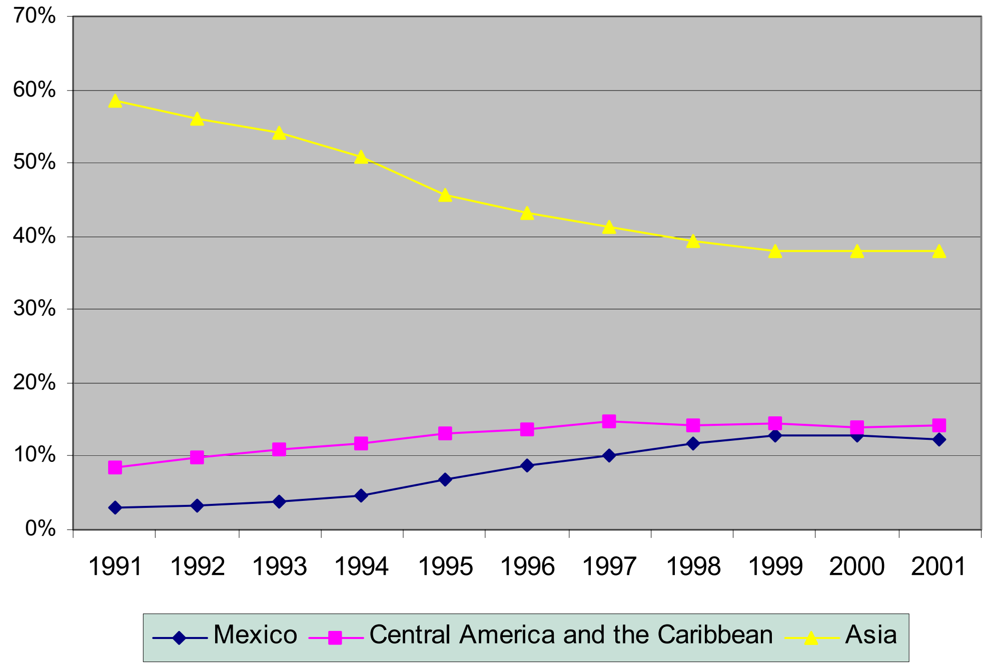
Source: UN-COMTRADE, Apparel HS 61, 62

In principle, the fact that most CBI countries (and the group as a whole) gained market share in the post-NAFTA period seems to provide evidence that they were not affected by trade diversion.[272] Since the entire region faced the same relative preferences vis-à-vis Mexico, the contrast between the shrinking market shares of some individual countries and the rising shares of others should instead reflect country-specific factors—such as the relocation of exporters across countries within the region in view of their relative production cost (Chacón 2000). Regarding Asian exporters, Figure 11 clearly suggests they might have been affected by trade diversion. However, it should be noted that the decline in their market share had already started well ahead of NAFTA.

Of course, these before-and-after comparisons are only suggestive. The proper experiment should instead compare the observed export pattern with the one that would have prevailed in the absence of NAFTA. In this regard, it is important to recall that the changing export patterns also reflect the influence of other factors as important as NAFTA or even more, most notably the Mexican devaluation of 1994, which resulted in a huge increase in the wages of neighboring countries relative to those in Mexico. Over 1994-1999, the change in relative wages was two or three times larger than the change in relative tariff preferences granted by NAFTA, and this is particularly relevant for textile and apparel plants in the region

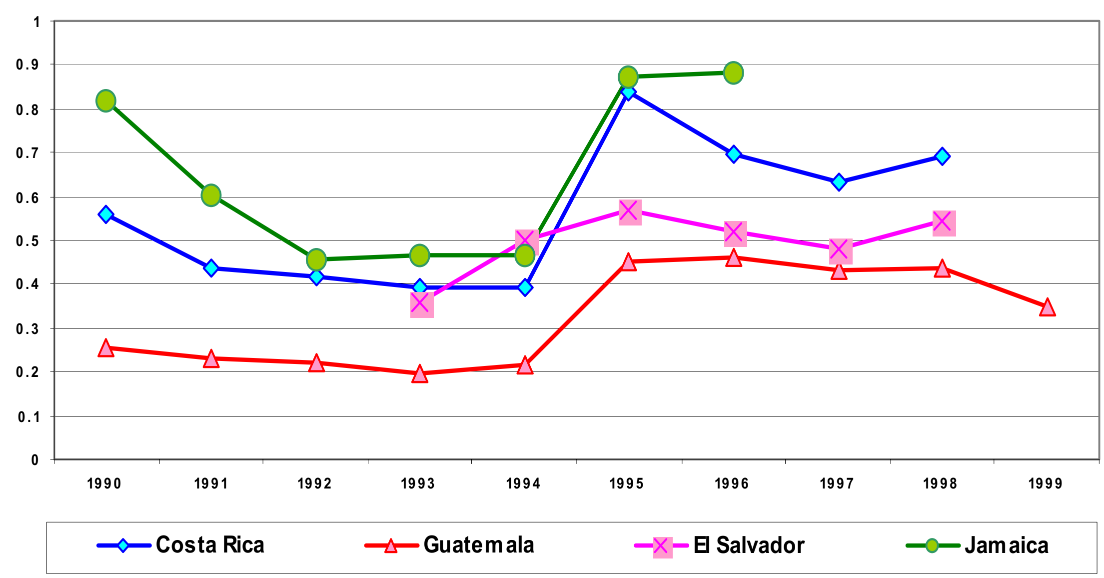
[272] Rather than showing up in trade flows, diversion might have resulted in a decline in the price of U.S. apparel imports from CBI countries relative to those from Mexico. However, an analysis of apparel price data from the U.S. Customs Service (as reported in the data web page maintained by the USITC) at various levels of disaggregation fails to yield evidence of any such decline in CBI countries' relative export prices.

Figure 11. Shares in NAFTA's total apparel imports



and elsewhere given that wages reportedly account for a large share of total production cost.[273] Information on wage levels comparable across countries is unfortunately scarce, but for those economies with available data Figure 12 shows that between 1994 and 1998 U.S. dollar wages almost doubled relative to Mexico's, with El Salvador as the exception.

Figure 12. U.S. dollar wages relative to Mexico



[273] Gitli and Arce (2000).

6.4.2 The role of Export Processing Zones

Trade-promoting actions in Central American and Caribbean countries were probably instrumental to prevent their NAFTA market shares—both in apparel and more generally—from declining in the post-NAFTA years. Most of the countries in the area are very open to trade, having pursued since the late 1980s active trade liberalization policies on several fronts—unilateral, multilateral, bilateral and regional—which by the end of the 1990s had led to fairly low levels of tariff and non-tariff barriers.[274]

In most countries in the region the process of trade liberalization has been accompanied by significant export-oriented incentives, which in most cases are articulated around Export Processing Zones (EPZs). These have grown substantially in recent years, and in several countries account at present for half or more of total exports. (Table 10).

Table 10. Exports from EPZs
(Gross Exports of EPZs/Total Gross Exports)

	1990	1995	2001
Costa Rica	6.5	12.5	47.5
Dominican Republic	81.2	77.4	83.3
El Salvador	12.2	39.1	57.7
Honduras	1.7	11.8	29.3
Mexico	42.1	38.5	46.8
Nicaragua	0.9**	22.6	54.3

**1992.

Sources: Larrain (2001) except for Mexico and Dominican Republic

Data for Mexico and Dominican Republic from National Central Banks

EPZ incentives are relatively homogeneous across the region. All countries offer similar exemptions from taxes on intermediate inputs, taxes on exports and remittances of goods and profits (see Robles-Cordero and Rodriguez-Clare 2003). The bulk of firms and jobs in Central America's EPZs are found in the textile and apparel industry, especially in the cases of Honduras, Nicaragua and El Salvador. In these countries, the textile and apparel sector accounts for over 90 percent of EPZ employment.[275] While the limited data available on EPZs does not allow a formal analysis, they likely played an important role in the continued expansion of apparel exports from CBI countries to the NAFTA bloc in spite of Mexico's preference advantage.

In summary, while we cannot rule out the possibility that some degree of trade diversion against neighboring countries in the apparel sector may in fact have occurred as a result of NAFTA, the impact of the trade agreement in this regard is likely dwarfed by the effects of the Mexican devaluation on relative wages across the region. In addition, the rising trend in apparel exports from Central American and Caribbean countries to the NAFTA area runs against the possibility of significant trade diversion. However, diversion could also be masked in the trade flow data because of the offsetting incentives offered by EPZs in the affected countries.[276] Trade diversion avoided by those incentives would show up

[274] The process of liberalization is documented in detail in CIEN (2002). Tariffs declined more markedly in Central American than in Caribbean countries, however. See Table A2 and Perry, Lederman and Suescún (2002).

[275] This is shown by the data reported in Robles-Cordero and Rodriguez-Clare (2003).

[276] Trade diversion masked by those incentives would still be reflected in a loss of fiscal revenues and welfare costs from other distortions, hard to quantify, imposed by the EPZs to sustain trade flows.

instead in a loss of fiscal revenues and welfare costs from other distortions, hard to quantify, imposed by the EPZs to sustain trade flows.

6.5 The road ahead

The success of NAFTA's neighbors at maintaining their market share following Mexico's acquisition of preferential status in the U.S. and Canada likely reflects their continuing efforts at trade liberalization, the generous export incentives granted by the EPZs, and the (limited) preferential access to the U.S. market offered by CBI and related provisions.

Looking to the future, in the apparel sector the upcoming elimination (by 2005) of import quotas derived from the Multi-fiber Agreement will cast the issue of U.S. and NAFTA preferences in a new light. Increased competition from low-cost Asian exporters is likely to follow. More generally, the levels of U.S. protection are likely to continue declining over the medium term as the economic (and political) dimension of the sector gradually shrinks. Thus, the magnitude and relevance of apparel tariff preferences is likely to decline in the future.

From a broader perspective, however, Central American and Caribbean countries still stand to gain from joining an FTAA, for two main reasons. First, EPZs do not represent a final stage on the road to trade integration. In most countries in the area EPZs have specialized heavily in relatively low-skill production processes and remain largely de-linked from their respective local economies, which have drawn correspondingly little benefit in terms of technological advancement (Robles-Cordero and Rodriguez-Clare 2003). Even more important, EPZs incentives are typically granted on the basis of export performance, and therefore conflict with WTO rules outlawing export subsidies, which were scheduled to come in to action in 2003—although an extension of the deadline looks likely.[277] This means that over the medium term those countries in Central America and the Caribbean whose trade promotion and FDI attraction efforts—as well as the avoidance of market share losses in the post NAFTA period—have been primarily based on EPZs will need to develop a new framework. The FTAA offers these countries an opportunity to do so in a coordinated manner.

Secondly, in spite of the progress made towards NAFTA-like tariff preferences after the CBTPA, and the fact that a major fraction of Central American and Caribbean exports to the U.S. already enjoy preferences comparable to NAFTA, these unilateral U.S. concessions do not amount to "NAFTA parity", in two fundamental respects.[278] On the one hand, unilateral concessions do not offer a firm guarantee of U.S. market access. Unlike NAFTA, such preferences are often granted on a temporary basis[279] and subject to unilateral revocation by the U.S. at any time. Furthermore, the resolution of trade disputes is likewise left to the discretion of U.S. authorities. Importantly, these considerations apply not only to Central America and Caribbean countries, but more broadly to all Latin American economies except Mexico and, more recently, Chile.

On the other hand, an FTA with the U.S. and Canada can also help "lock-in" the progress made on unilateral trade liberalization, making it immune to potential protectionist pressures that might arise in the future. This would offer investors, domestic and foreign, a more predictable framework without the possibility of backtracking in the rules governing international trade, and perhaps in the reforms on other

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[277] Among the countries considered here, El Salvador is the only one where EPZ tax concessions are not related to export performance. Some specific concessions are still allowed under WTO rules. This is the case of duty drawback schemes and of concessions related to trade in services.

[278] Bake and Spross (2003) outline the key differences between the current situation and an FTAA.

[279] In the case of CBTPA, they run until 2008.

fronts as well. As Chapter 7 argues, this positive impact on credibility would likely encourage investment in the new FTAA member countries.

The importance of this his lock-in effect, however, may vary considerably across FTAA prospective members. It is likely to be most important for countries at an early stage of trade opening whose reforms still suffer from poor credibility. In contrast, a number of Central American and Caribbean economies already possess low barriers to trade and a strong constituency in favor of trade openness. For such countries, the credibility dividend will largely depend on the extent to which FTAA accession prompts improvement and strengthening of policies and institutions.

An FTAA also entails costs, however. Some of these are explicit, like in the case of negotiation costs, which for small economies may be substantial. Even more important from the macroeconomic perspective is the cost of elimination of tariffs against other FTA members, which for some countries will imply a fiscal shock, particularly significant for countries whose public revenues are highly dependent on tariff collection and whose imports are largely originated in the NAFTA area. Within Central America, the fiscal loss from removal of tariffs against NAFTA members could exceed 8 percent of total current revenues in Honduras, and would be almost as large in El Salvador and Guatemala.[280] This underscores the need for fiscal reform in preparation for the FTAA.

Others costs are less-directly visible, but no less significant, like in the case of the distortions imposed by ROOs under NAFTA (see Chapter 3). If not properly tackled in the negotiation process, they can detract substantially from FTAA benefits by generating more trade and investment diversion than creation.

More broadly, the prospect of an FTAA makes it all the more important for prospective members to take the necessary policy steps to ensure that the potential benefits of the agreement can be reaped. Such steps will vary across countries depending on their respective initial conditions and policy and institutional frameworks. But some are likely to apply to a broad range of countries. For example, in addition to the fiscal strengthening already mentioned, Chapter 2 argued that macroeconomic and, especially, real exchange rate stability are important preconditions for the expansion of trade and investment flows which will allow FTAA benefits to materialize.

Regarding trade policies, the anticipated gains from an FTAA do not reduce the need for continued progress in unilateral trade reforms and multilateral negotiations under the WTO. Major trade issues, such as those surrounding agricultural trade, are unlikely to be resolved in the context of an FTAA and will require multilateral action. For some countries, especially in South America, the Doha Trade round discussions are likely to as be important for market access, or even more, than the proposed FTAA. Success of the WTO round in providing incentives for all countries to de-link their subsidies from production decisions—as previously attempted by the European Union, and implemented by the U.S. and Mexico—would be a significant improvement over the current situation for these countries, as Chapter 3 noted.

The FTAA should not preclude simultaneous pursuit of other free trade agreements. Indeed, for some countries in LAC (notably those in MERCOSUR) trade with the EU is quantitatively more significant than trade with the U.S., and thus the gains from an FTA with the EU could be even larger than those stemming from the FTAA. Furthermore, even for other countries, complementing the FTAA with trade agreements with other partners (such as the EU, as done for example by Chile) might help reduce the scope for trade diversion.

[280] Perry, Lederman and Suescún (2002).

Finally, the above analysis suggests that much of the gain in export market share achieved by Mexico in recent years reflects its unilateral trade liberalization since the late 1980s. The implication for other LAC countries is that trade-friendly policies, even if unilateral, can yield large dividends in terms of market expansion.

6.6 Concluding remarks

The assessment of the effects of NAFTA on the trade flows of nonmember countries faces a number of difficulties. First, too little time has elapsed since the passage of NAFTA for its full effects to unfold, especially given the gradual tariff reduction envisaged by the treaty. Second, other major trade determinants have not remained constant. Among these, the overvaluation of the Mexican peso up to 1994 and its subsequent collapse, the global trend towards trade liberalization, and the emergence or revamping of other trading blocs, must all have had major effects on the trade flows of NAFTA members as well as nonmembers. This means that the conclusions from any empirical evaluation of NAFTA's impact on trade have to be taken with considerable caution.

With this major caveat, the results in this chapter are in broad agreement with the majority of previous studies. On the whole, both casual inspection of the data and econometric estimates yield little evidence of any adverse impact of NAFTA on the aggregate trade flows of neighboring countries.

Inspection of trends in trade flows reveals that Mexico has expanded substantially its share in U.S. overall imports. However, Mexico has also raised its export share in the non-NAFTA market,[281] and thus the fact that it emerges as the top winner in the U.S. market does not constitute evidence of trade diversion. Furthermore, Central American countries, which would have been prime candidates for trade diversion, have actually increased their presence in U.S. markets. From the perspective of U.S. imports, the big losers appear to be instead Brazil, Venezuela and Ecuador, which on *a priori* grounds should have been less affected by NAFTA than the neighboring countries of Central America and the Caribbean.

Econometric analysis of aggregate trade flows using a gravity approach likewise fails to find any significant trade diversion effects from NAFTA. In fact, there is no clear evidence as to whether NAFTA members' propensity to trade exclusively among themselves has risen significantly in recent years, once conventional trade determinants are taken into account. Much of the increase in trade among members, and especially the substantial increase in Mexico's exports to the U.S., may reflect factors other than NAFTA, such as the sustained expansion of the U.S. economy. On the other hand, Mexico's global trade patterns after 1994 mimic the behavior of trade under unilateral liberalization. A more detailed analysis of the trade flows of Central American and Caribbean countries with NAFTA does not change these conclusions. Overall, our estimates suggest that Mexico's *global* exports would have been about roughly 25-30% lower without NAFTA, whereas *global* imports would have been almost 50% lower.

Aggregate flows could conceal significant trade diversion at the microeconomic level, and some studies have pointed to the textile and apparel sector as a likely candidate. This is particularly relevant for Central America and the Caribbean, since apparel accounts for the bulk of the region's exports to the NAFTA bloc, and given the fact that after 1994 Mexico has enjoyed a significant preference advantage vis-à-vis the other countries—although the preference has recently been almost completely eliminated.

A thorough evaluation of the impact of NAFTA on the patterns of apparel trade between member and nonmember countries is still lacking, but the available information does not show strong evidence that neighboring countries lost market share from apparel trade diversion caused by NAFTA preferences.

[281] This holds not only at the aggregate level, but also for most of the sectors in which Mexico's share of U.S. imports has risen. See Krueger (1999, 2000).

On the one hand, observed changes in trade patterns across the region—most notably, the rapid increase in Mexico's share of the U.S. market—likely reflect the effects of the Mexican devaluation as much as (or even more than) those of NAFTA. On the other hand, while all countries in Central America and the Caribbean faced the same change in U.S. preferences relative to those enjoyed by Mexico, their post-NAFTA performances showed considerable diversity. Most Central American countries managed to raise their export share in NAFTA markets, while Caribbean economies fared less well. This suggests that factors other than NAFTA preferences are responsible for much of this diverse post-NAFTA performance.

Among such factors, export incentives granted by a number of countries in the context of EPZs may have played an important role. It is thus possible—although hard to verify—that the upward trend in the region's apparel export shares might have been achieved at significant costs derived from EPZ concessions, such as foregone fiscal revenues and other potential distortions. In this regard, WTO rules imply that most EPZs incentives in their current form will have to be phased out over the medium term, so that a new export- and investment-friendly framework will have to be developed.

While NAFTA's neighboring countries have fared relatively well, they would still derive benefits from an FTAA. First, it will offer the opportunity to phase out the EPZ regime in an orderly manner and avoiding potentially large adverse effects on exports. Second, even aside of tariff preferences, the FTAA would provide a guarantee of market access and a locking-in effect of unilateral reforms, boosting credibility and investor confidence in those countries where they are still low. However, an FTAA also entails potentially significant costs and raises new policy challenges, including the need for fiscal reform in countries that stand to lose badly needed tariff revenues, and the achievement of macroeconomic and real exchange rate stability for the FTA benefits to materialize.

Finally, while most Latin American and Caribbean countries are likely to derive significant benefits from an FTAA, the latter does not detract from the need for continued progress in unilateral and multilateral trade reform. Major trade issues, such as those surrounding agricultural trade, are unlikely to be resolved in the context of an FTAA, and will continue to depend on the progress of multilateral negotiations. Regarding unilateral liberalization, the analysis in this chapter suggests that much of the gain in export market share achieved by Mexico in recent years reflects its unilateral trade liberalization since the late 1980s. The implication for third countries is that trade-friendly policies, even if unilateral, can yield large dividends in terms of export market expansion.

Annex

Table A1. PTA Membership and key developments

PTA and creation dates	Country members	Recent key developments	Year of expected change in trade patterns (on or around)
PTAs in the AMERICAS			
ANDEAN PACT Signed: 1969 (Changed name to ANDEAN Community since 1996)	Bolivia, Chile (left in 1976), Colombia, Ecuador, Peru (left in 1992), Venezuela (joined in 1973)	- Summit in Cartagena in 1989 sought to perfect the Custom Union. - Act of La Paz in Nov.1990 (FTA for Bolivia,Colombia, and Venezuela) and Act of Barahona in Dec. 1991 (Ecuador and Peru joined the FTA) renewed the PTA.. - Unilateral trade liberalization in the region since 1989-90. - Act of Trujillo in March 1996 revitalized political commitment for integration.	1990-91
CACM 1960	Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua	- Declarations of Antigua and of Puntarenas in 1990, and Declations of San Salvador and of Tegucigalpa in 1991, renewed the PTA. - New scheduled for convergence to CET by 2000 was set in 1996. - Unilateral trade liberalization in the region since 1987-89.	1990-91
LAIA 1980 (Formerly LAFTA, signed in 1960)	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay, Venezuela	- All members have double membership (to LAIA and to sub-groups within LAIA). It is generally thought that LAIA had limited effect once the impact of the smaller blocs is taken into account.	
MERCOSUR Signed: March 1991 Internal trade liberalization: 1991-95. Schedule for convergence to CET and to Free Trade started in 1995	Argentina, Brazil, Paraguay, Uruguay	- Argentina-Brazil protocols 1986-1989 - Unilateral trade liberalization started during 1988-90 in Argentina, Brazil and Uruguay - Treaty of Asuncion- March 1991. - Agreement of Ouro Preto- Dec.1994 (CET for 85% of tariff lines) - Bolivia and Chile joined MERCOSUR as associated members in 1996.	1991
NAFTA Signed: December 1992 Effective: January 1994	Canada, Mexico, U.S.	- Mexico's unilateral trade liberalization started in 1985. - Canada-U.S.-FTA started in 1988 - NAFTA negotiations started in 1990.	1994
PTA in ASIA:			
ASEAN FTA 1992 (Formerly ASEAN, signed in 1967)	Indonesia, Malaysia, Singapore, Thailand, Philippines	- Changed from 'Economic Cooperation' to FTA in 1977.Very little intra-bloc liberalizatio - AFTA created in Jan-1992 - Unilateral trade liberalization in some countries: tariffs levels in 1994 were 1/2 of the average level in 1986-90 in Thailand; 2/3 in Philippines, Indonesia and Malaysia.	1992
PTA in MIDDLE EAST:			
GULF COOPERATION COUNCIL- Signed in May 1981	Bahrain, Kuwait, Oman, Qatar, Saudi-Arabia, United Arab Emirates (UAE)	- Virtual elimination of customs tariffs by 1982 and liberalization of trade and services by 1983.	1982-83

Table A1 *(continued)*

PTA and creation dates	Country members	Recent key developments	Year of expected change in trade patterns (on or around)
PTAs in EUROPE			
EFTA 1960	Austria (left in 1995), Denmark (left in 1972), Norway, Portugal (left in 1985), Sweden (left in 1995), Switzerland, United Kingdom (left in 1972), Iceland (joined in 1970), Finland (associated in 1961, full membership in 1986, left in 1995), Liechtenstein (joined in 1991)	✐ Lost many members to the EC. ✐ The European Economic Area, in effect since 1994, created a FTA between remaining EFTA members (with the exception of Switzerland) and EU. (An agreement of free trade in manufactures between EEC and EFTA was in place since 1974).	1985-86 (impact of the Single European Act), 1994
EU (since 1993) (Originally EEC, signed in 1957) EU (Cont)	France, Germany, Belgium, Italy, Luxembourg, Netherlands, United Kingdom (joined in 1973), Denmark (joined in 1973), Ireland (joined in 1973), Greece (joined in 1981), Spain (joined in 1986), Portugal (joined in 1986), Austria (joined in 1995), Finland (joined in 1995), Sweden (joined in 1995)	✐ Single European Act (1986-87) set the goal of a single European market for goods, labor and capital in Europe in 1992 (to be known as "1992"). ✐ Maastricht Treaty, (Dec. 1991). Countries agreed on a formal plan to create a closer economic and political union. The economic component of the treaty mainly involves the adoption of a single currency by 1999. ✐ Enactment of the Maastricht Treaty (Nov. 1993)	1985-86, 1992-93

Table A2. Trends in Tariff Rates for Developing and Industrial Countries, 1980-99
(Unweighted averages, %)

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Caribbean Countries																				
Antigua & Barbuda							12.0			15.0						12.0			9.0	
Bahamas	29.8							32.3									32.0			
Barbados							17.3				22.0					17.0			9.7	13.6
Belize							17.3				20.0					17.0	9.8		9.2	
Dominica								31.9			28.0					15.0			9.0	
Dominican Rep															17.8	17.8		14.5		
Grenada								27.2			25.0								9.3	
Guyana							17.4			20.0						17.0			10.4	
Haiti			27.7					11.6								10.0				
Jamaica			16.0			17.0	17.3	19.3		20.0		20.3		19.3	19.3			10.9	9.6	8.7
St. Kitts & Nevis								12.9											9.2	
St. Lucia								12.0											9.7	
St. Vincent							17.3												9.2	
Suriname						40.0										30.0			9.5	
Trinidad & Tobago									17.3	17.0		18.6	18.7			18.7		9.1	9.2	
Central American Countries																				
Costa Rica						21.1	21.1	16.4					15.0	11.7	11.2	11.2		9.9	8.0	7.2
El Salvador							23.0	21.1		16.0				13.1	10.1	10.2	9.2	8.0	5.7	
Guatemala								22.8		16.0					10.8	12.0	11.4	11.4	8.4	7.6
Honduras																9.7				8.1
Nicaragua								22.1				8.0			17.4	10.7	9.5	6.9	5.9	10.9
Panama																	10.0	12.8	9.2	
Mexico			27.0	24.0	23.0	25.2	22.6	11.3	11.3	13.1	11.1	13.1	13.4		13.5	13.1	12.6	12.6	13.3	10.1
South American Countries																				
Argentina			28.0			35.0	23.3	27.0	27.0	25.0	20.5	12.2	11.8	10.9		10.5	11.2	11.3	13.5	11.0
Bolivia						12.1	20.0	20.0	19.0	17.0	16.0	10.0	10.0	9.8	9.8	9.7	9.7	9.7	9.7	9.0
Brazil	44.0	49.0	48.0	48.0	49.0	51.0	51.0	51.0	41.0	35.0	32.2	25.3	21.2	14.2	11.9	11.1		11.8	14.6	13.6
Chile					35.0	20.0	20.0	20.0	15.0	15.0	15.0	11.0	11.0	11.0	11.0	11.0		11.0	11.0	10.0
Colombia					61.0		33.6	29.4	27.3	27.3	27.0	21.1	11.8	11.5	11.5	13.3	11.7	11.7	11.6	11.8
Ecuador							37.7	28.0		37.1				9.3	11.9	12.3	11.3	11.3	11.3	11.6
Paraguay	11.2				10.9				10.9			15.9	15.4		8.0	9.3	9.3	9.2	11.2	9.0
Peru	19.0	17.0	21.0	31.0	42.0	46.0	46.0	45.0	46.0	42.0	26.0	17.0	18.0	17.6	16.3			13.3	13.2	13.0
Uruguay		47.0				38.0	40.0	29.1	27.5		23.0	21.5	18.2	17.0	14.7	9.3	9.5	10.0	12.2	4.6
Venezuela					28.0	28.0		32.9	32.9	30.6	19.0	16.0	16.4	15.7	11.8	13.4		11.9	12.0	12.6
Developed Countries																				
Canada										9.1	8.8			8.7	8.6		6.4	5.8	4.8	4.6
United States									6.6	6.3	6.3	6.3	6.3	6.4		5.9	5.8	6.6	5.2	4.8
Averages																				
Average LDCs (129 countries)	27.6	23.1	30.0	30.5	29.7	27.2	26.6	24.7	23.4	23.8	23.2	24.3	21.5	19.4	18.7	16.1	14.9	13.7	13.1	11.3
Average INDs (23 countries)	9.8		11.0		8.5		6.0		7.1	8.2	7.9	8.5	7.9	6.8	7.2	6.3	5.3	5.0	4.4	4.0

Source: World Bank data

Table A3. Shares in total NAFTA imports, by product (SITC rev. 2) and by main partner

Product	Period	Total imports (period average, millions of current U.S.$)	% SHARES IN TOTAL NAFTA IMPORTS								
			From ANDEAN	From CACM	From CARICOM	From MERCOSUR	From NAFTA	From Canada	From Mexico	From USA	From other countries
Food	81-85	23055	6.67	6.53	2.90	11.43	30.90	8.93	6.67	15.33	41.60
	86-90	30422	7.20	5.60	1.77	8.43	34.67	11.27	8.00	15.33	42.33
	90-95	38156	6.20	5.50	1.45	5.25	42.90	14.15	8.40	20.25	38.75
	96-2000	50069	5.75	5.30	1.30	4.70	45.35	16.45	9.00	19.90	37.50
Beb.& Tobacco	81-85	4100	0.17	0.90	1.87	3.53	16.20	11.40	3.07	1.70	77.37
	86-90	5258	0.20	0.53	1.40	3.30	17.87	10.77	5.10	1.97	76.73
	90-95	6639	0.25	0.65	1.50	4.00	22.85	13.20	5.60	4.05	70.80
	96-2000	9502	0.25	1.10	3.25	3.70	22.70	9.25	9.70	3.85	68.95
Crude Materials	81-85	15624	3.00	0.50	3.67	2.67	58.23	35.87	2.60	19.77	31.97
	86-90	19626	3.07	0.43	2.23	3.03	61.27	37.23	3.43	20.60	30.00
	90-95	25797	3.35	0.55	2.00	3.15	62.85	38.25	3.50	21.10	28.15
	96-2000	33442	3.40	0.60	1.65	4.25	61.70	37.40	3.10	21.20	28.45
Fuels	81-85	75535	11.10	0.03	3.57	1.23	26.17	11.57	11.60	3.03	57.87
	86-90	58275	14.70	0.03	1.60	1.43	25.70	14.10	7.67	3.90	56.57
	90-95	67357	15.45	0.00	1.00	0.90	30.95	19.00	8.05	3.85	51.65
	96-2000	98391	17.15	0.10	0.75	1.20	33.20	20.10	8.65	4.55	47.60
Anim.& Veg Fats	81-85	772	0.10	0.00	0.30	7.83	19.03	1.63	0.30	17.07	72.70
	86-90	1153	0.40	0.10	0.10	10.83	27.07	6.33	1.07	19.70	61.47
	90-95	1885	0.80	0.40	0.10	6.55	37.40	14.15	1.75	21.55	54.75
	96-2000	2398	1.25	1.85	0.00	4.05	40.40	16.45	1.70	22.25	52.40
Chemicals	81-85	17176	0.47	0.03	1.03	2.50	43.00	17.10	2.00	23.87	52.97
	86-90	29484	0.37	0.10	1.43	1.67	37.03	12.73	1.93	22.40	59.40
	90-95	50286	0.70	0.10	1.10	1.20	39.35	12.85	2.05	24.45	57.55
	96-2000	83545	0.70	0.10	0.75	1.00	37.85	11.95	1.95	23.95	59.55
Manufac.Goods	81-85	51803	1.47	0.10	0.30	2.70	32.33	18.20	2.07	12.10	63.07
	86-90	76890	1.10	0.13	0.37	3.17	35.53	19.60	3.17	12.80	59.60
	90-95	108028	1.20	0.20	0.45	2.80	42.40	19.15	3.55	19.70	52.95
	96-2000	163242	1.25	0.20	0.35	2.35	45.10	18.60	4.80	21.70	50.75
Leather	81-85	844	0.93	0.20	4.93	24.97	16.70	5.17	2.77	8.80	52.30
	86-90	1516	1.60	0.23	7.27	22.40	14.30	3.37	4.70	6.23	54.20
	90-95	2115	0.85	0.55	10.25	16.90	23.20	2.70	6.85	13.70	48.25
	96-2000	2784	0.65	0.80	7.35	17.85	32.80	2.50	7.00	23.30	40.60
Rubber	81-85	2605	0.00	0.10	0.00	1.77	34.30	17.23	0.60	16.50	63.87
	86-90	4642	0.07	0.13	0.00	2.90	35.23	16.17	1.37	17.70	61.63
	90-95	7075	0.15	0.35	0.00	2.60	44.95	18.50	1.70	24.80	51.90
	96-2000	10733	0.35	0.40	0.05	2.05	51.65	17.80	3.20	30.60	45.50
Cork	81-85	1717	0.47	0.80	0.10	2.17	39.10	24.27	4.80	10.00	57.43
	86-90	2618	0.53	0.87	0.10	3.10	40.57	25.27	4.27	11.00	54.77
	90-95	4157	0.60	0.85	0.30	4.70	49.30	32.05	3.10	14.15	44.30
	96-2000	6833	0.75	0.70	0.35	3.40	57.20	42.85	3.40	10.95	37.60
Paper	81-85	5744	0.03	0.00	0.20	1.00	82.30	65.60	2.10	14.70	16.43
	86-90	10032	0.30	0.13	0.13	1.03	74.73	58.53	2.73	13.43	23.77
	90-95	14057	0.25	0.15	0.00	0.85	76.80	51.30	1.45	24.10	21.90
	96-2000	19703	0.30	0.10	0.00	0.65	75.95	47.10	2.15	26.75	22.90
Textiles	81-85	5240	1.63	0.27	0.33	3.27	20.93	2.37	1.53	17.00	73.53
	86-90	9084	1.07	0.57	0.37	3.17	20.33	4.07	2.67	13.57	74.60
	90-95	14003	0.65	0.55	0.25	2.15	31.65	6.00	3.80	21.90	64.75
	96-2000	20660	0.45	0.40	0.25	1.15	39.90	7.85	6.15	25.90	57.80

Table A3 ***(continued)***

Product	Period	Total imports (period average, millions of current U.S.$)	% SHARES IN TOTAL NAFTA IMPORTS From ANDEAN	From CACM	From CARICOM	From MERCOSUR	From NAFTA	From Canada	From Mexico	From USA	From other countries
Non-metalic	81-85	6969	1.17	0.03	0.10	1.30	16.93	6.03	2.27	8.67	80.47
	86-90	11924	1.37	0.03	0.10	1.47	18.60	6.17	3.73	8.73	78.43
	90-95	15650	1.45	0.00	0.10	1.35	21.85	6.30	4.10	11.45	75.15
	96-2000	24749	1.30	0.00	0.20	1.15	22.55	6.70	4.85	10.95	74.70
Iron & Steel	81-85	13256	0.67	0.00	0.40	4.43	18.10	9.23	1.03	7.83	76.37
	86-90	13703	1.03	0.00	0.67	6.47	24.77	11.77	2.17	10.80	67.07
	90-95	17998	1.60	0.00	0.80	6.40	32.75	14.10	3.30	15.35	58.45
	96-2000	25921	1.75	0.00	0.80	6.85	33.50	11.60	5.55	16.40	57.05
Non-Ferrous	81-85	8065	5.87	0.03	0.23	2.00	39.57	26.47	4.30	8.77	52.33
	86-90	11064	3.30	0.03	0.10	2.90	48.97	32.97	4.63	11.40	44.63
	90-95	13939	3.90	0.00	0.15	2.10	53.35	33.25	4.00	16.10	40.45
	96-2000	21095	4.30	0.05	0.05	1.40	50.05	29.95	4.05	16.00	44.20
Other metal	81-85	7363	0.13	0.00	0.07	1.07	33.67	11.50	1.60	20.63	65.07
	86-90	12308	0.40	0.03	0.10	1.10	32.90	11.20	3.33	18.37	65.43
	90-95	19034	0.30	0.05	0.10	1.05	42.85	9.70	4.70	28.50	55.60
	96-2000	30764	0.25	0.10	0.10	0.55	49.25	11.40	6.00	31.80	49.75
Mach & Transp	81-85	137622	0.00	0.10	0.17	0.80	42.23	15.07	2.73	24.43	56.67
	86-90	262559	0.00	0.00	0.10	0.90	35.80	13.83	4.53	17.40	63.13
	90-95	396871	0.00	0.00	0.10	0.65	39.15	13.70	6.80	18.70	60.05
	96-2000	605694	0.00	0.15	0.10	0.60	42.75	13.35	9.75	19.70	56.40
Misc. Manufac	81-85	43085	0.27	0.30	1.00	2.07	17.83	4.80	2.53	10.50	78.57
	86-90	88892	0.43	0.70	1.43	1.93	14.67	4.07	2.73	7.83	80.83
	90-95	139683	0.60	1.80	1.85	1.50	20.75	4.40	4.60	11.80	73.45
	96-2000	205501	0.50	2.70	1.80	0.90	26.10	5.80	7.45	12.85	67.95

Table A4. Gravity Model: Annual Estimates
Dependent variable is ln(imports)

Year	NAFTA Additional effect on intra-bloc trade	NAFTA-Imports Overall Bloc Imports	NAFTA-Exports Overall Bloc Exports	CACM Additional effect on intra-bloc trade	CACM-Imports Overall Bloc Imports	CACM-Exports Overall Bloc Exports
80	0.075	-0.248	-0.002	2.325 ***	-0.723 ***	0.296 **
81	-0.136	-0.054	-0.135	2.142 ***	-0.697 ***	0.577 ***
82	-0.116	-0.255 *	-0.052	2.464 ***	-0.810 ***	0.533 ***
83	0.286	-0.469 ***	-0.118	2.324 ***	-0.480 ***	0.451 ***
84	0.208	-0.173	-0.009	2.025 ***	-0.206	0.525 ***
85	0.240	-0.051	-0.099	1.843 ***	-0.455 ***	0.589 ***
86	0.045	0.159	-0.238 *	1.621 ***	-0.526 ***	0.602 ***
87	-0.026	-0.043	-0.238 *	1.549 ***	-0.393 ***	0.258 **
88	0.064	0.033	-0.199	1.221 **	-0.155	0.459 ***
89	-0.039	0.117	-0.426 ***	1.765 ***	-0.339 ***	0.138
90	0.010	0.146	-0.418 ***	1.922 ***	-0.558 ***	0.173
91	0.339	0.112	-0.332 ***	2.076 ***	-0.500 ***	0.194 *
92	0.498	-0.036	-0.524 ***	2.354 ***	-0.397 ***	0.257 **
93	0.491	-0.042	-0.478 ***	1.989 ***	-0.148	0.205 *
94	0.422	0.321 ***	-0.600 ***	1.994 ***	-0.178	0.164
95	0.359	0.049	-0.379 ***	2.033 ***	-0.056	0.181 *
96	0.191	0.008	-0.240 *	2.244 ***	-0.322 ***	0.198 *
97	0.119	0.224 *	-0.160	2.137 ***	-0.276 ***	0.356 ***
98	0.289	0.325 ***	-0.338 ***	2.016 ***	-0.070	0.438 ***
99	0.377	0.236 *	-0.500 ***	2.093 ***	-0.092	0.286 ***
2000	0.425	0.344 ***	-0.459 ***	2.296 ***	-0.166	0.286 ***

Table A4 ***(continued)***

Year	Preferential Trade Agreements: CARICOM — Additional effect on intra-bloc trade		CARICOM-Imports — Overall Bloc Imports		CARICOM-Exports — Overall Bloc Exports		ANDEAN — Additional effect on intra-bloc trade		ANDEAN-Imports — Overall Bloc Imports		ANDEAN-Exports — Overall Bloc Exports		MERCOSUR — Additional effect on intra-bloc trade		MERCOSUR-Imports — Overall Bloc Imports		MERCOSUR-Exports — Overall Bloc Exports	
80	3.710	***	-0.137		-0.939	***	1.657	***	-0.650	***	-0.704	***	1.297	*	-0.777	***	0.011	
81	3.762	***	-0.098		-0.653	***	1.771	***	-0.921	***	-0.829	***	1.221	*	-0.970	***	0.014	
82	3.797	***	0.026		-0.734	***	1.511	***	-0.720	***	-0.725	***	1.195	*	-1.357	***	0.260	**
83	3.939	***	-0.029		-0.768	***	1.583	***	-0.928	***	-0.797	***	1.289	*	-1.503	***	0.288	**
84	3.312	***	-0.102		-0.672	***	1.309	**	-0.676	***	-0.827	***	1.644	**	-1.678	***	0.290	**
85	3.390	***	-0.112		-0.653	***	1.230	**	-0.863	***	-0.581	***	1.229	*	-1.438	***	0.464	***
86	3.183	***	-0.121		-0.782	***	1.430	***	-0.586	***	-0.960	***	1.366	**	-1.128	***	0.108	
87	3.352	***	-0.201	*	-0.896	***	1.054	**	-0.599	***	-0.785	***	1.057		-1.133	***	0.035	
88	3.146	***	-0.121		-0.788	***	1.476	***	-0.833	***	-0.875	***	1.221	*	-1.337	***	0.277	**
89	3.032	***	-0.002		-0.690	***	1.401	***	-0.972	***	-0.815	***	1.061		-1.277	***	0.250	**
90	3.493	***	-0.154		-0.534	***	1.451	***	-1.044	***	-0.418	***	1.007		-1.138	***	0.228	*
91	3.412	***	-0.166	*	-0.681	***	1.429	***	-0.648	***	-0.522	***	0.973		-0.981	***	0.268	**
92	3.224	***	-0.108		-0.531	***	1.621	***	-0.698	***	-0.584	***	1.179	*	-0.947	***	0.163	
93	3.068	***	-0.096		-0.357	***	1.496	***	-0.490	***	-0.605	***	1.124	*	-0.667	***	-0.028	
94	3.486	***	-0.283	***	-0.274	***	1.765	***	-0.583	***	-0.541	***	1.229	**	-0.617	***	-0.039	
95	3.142	***	-0.254	***	-0.123		2.008	***	-0.571	***	-0.515	***	1.139	*	-0.632	***	0.048	
96	3.034	***	-0.302	***	-0.079		1.962	***	-0.672	***	-0.552	***	1.217	**	-0.619	***	0.052	
97	3.258	***	-0.206	**	-0.187	**	2.137	***	-0.809	***	-0.540	***	1.515	**	-0.742	***	-0.037	
98	2.772	***	-0.014		0.030		2.213	***	-0.366	***	-0.651	***	1.597	***	-0.555	***	-0.146	
99	2.876	***	-0.077		-0.115		2.252	***	-0.668	***	-0.511	***	1.314	**	-0.793	***	-0.058	
2000	2.879	***	0.161	*	-0.168	*	2.325	***	-0.624	***	-0.441	***	1.521	***	-0.795	***	-0.068	

Table A5. Gravity Model: Pooled Data
Dependent variable is ln (imports)

xVariable	Coefficient	Stat. significance
constant	-34.101	***
dummy year 81	-0.19	***
dummy year 82	-0.28	***
dummy year 83	-0.69	
dummy year 84	-0.73	
dummy year 85	-0.81	#
dummy year 86	-1.36	***
dummy year 87	-1.32	**
dummy year 88	-1.28	**
dummy year 89	-1.56	***
dummy year 90	-1.61	***
dummy year 91	-1.64	***
dummy year 92	-3.06	***
dummy year 93	-3.14	***
dummy year 94	-3.11	***
dummy year 95	-3.75	***
dummy year 96	-3.84	***
dummy year 97	-3.89	***
dummy year 98	-2.92	***
dummy year 99	-3.05	***
dummy year 2000	-3.10	***
GDP importer (gdpi)	0.92	***
Population importr (popi)	0.21	***
GDP exporter (gdpj)	1.49	***
Population exportr (popj)	0.11	***
average distance	0.41	***
absolute distance	-1.13	***
Area importer (areai)	-0.34	***
Area exporter (areaj)	-0.51	***
Common borders	0.74	***
Importer is an island (islii)	-0.14	***
Exporter is an island (islij)	0.26	***
Common language (clang)	0.78	***
Importer is landlocked (lalocki)	-0.34	***
Exporter is landlocked (lalockj)	0.15	***

Table A5 ***(continued)***

					Test for the equality of coefficientes: periods in rows vs. periods in columns (2)					
Row	Dummy	Period	Coefficient (gravity estimates)	Stat. signifi-cance	83-85	86-88	89-91	92-94	95-97	98-00
1	gdpi1	80-82	0.037	*						
2	gdpi2	83-85	0.053	***			**			
3	gdpi3	86-88	0.048	***			*			
4	gdpi4	89-91	0.019					#	**	*
5	gdpi5	92-94	0.043	**						
6	gdpi6	95-97	0.052	***						
7	gdpi7	98-00	0.046	**						
8	gdpj1	80-82	-0.336	***	***	***	***	***	***	***
9	gdpj2	83-85	-0.291	***		*	**	***	***	***
10	gdpj3	86-88	-0.265	***						**
11	gdpj4	89-91	-0.255	***						
12	gdpj5	92-94	-0.245	***						
13	gdpj6	95-97	-0.252	***						
14	gdpj7	98-00	-0.235	***						
15	popi1	80-82	-0.206	***			***	***	***	#
16	popi2	83-85	-0.202	***			**	***	***	
17	popi3	86-88	-0.209	***			***	***	***	*
18	popi4	89-91	-0.149	***						
19	popi5	92-94	-0.135	***						*
20	popi6	95-97	-0.136	***						*
21	popi7	98-00	-0.172	***						
22	popj1	80-82	-0.093	***	***	**	*			
23	popj2	83-85	-0.155	***				**	**	**
24	popj3	86-88	-0.137	***						#
25	popj4	89-91	-0.131	***						
26	popj5	92-94	-0.112	***						
27	popj6	95-97	-0.106	***						
28	popj7	98-00	-0.103	***						
29	dist11	80-82	-0.055	#						
30	dist12	83-85	-0.122	***					*	
31	dist13	86-88	-0.107	***					#	
32	dist14	89-91	-0.105	***					#	
33	dist15	92-94	-0.075	**						
34	dist16	95-97	-0.041							#
35	dist17	98-00	-0.103	***						
36	dist1	80-82	-0.038	*				#		***
37	dist2	83-85	-0.019				#	**	**	***
38	dist3	86-88	-0.031					*	#	***
39	dist4	89-91	-0.058	***						***
40	dist5	92-94	-0.077	***						***
41	dist6	95-97	-0.067	***						***
42	dist7	98-00	-0.145	***						

Table A5 *(continued)*

Row	Dummy	Period	Coefficient (gravity estimates)	Stat. signifi-cance	Test for the equality of coefficientes: periods in rows vs. periods in columns (2)					
					83-85	86-88	89-91	92-94	95-97	98-00
43	areai1	80-82	0.282	***			***	***	***	**
44	areai2	83-85	0.280	***			***	***	***	**
45	areai3	86-88	0.269	***			*	***	***	
46	areai4	89-91	0.248	***				*		
47	areai5	92-94	0.229	***						**
48	areai6	95-97	0.236	***						*
49	areai7	98-00	0.256	***						
50	areaj1	80-82	0.397	***	#			***	***	***
51	areaj2	83-85	0.416	***					*	***
52	areaj3	86-88	0.406	***				*	***	***
53	areaj4	89-91	0.411	***				#	**	***
54	areaj5	92-94	0.428	***						*
55	areaj6	95-97	0.436	***						
56	areaj7	98-00	0.450	***						
57	border2	83-85	-0.121							
58	border3	86-88	-0.103							
59	border4	89-91	0.016							*
60	border5	92-94	-0.154							
61	border6	95-97	-0.001							*
62	border7	98-00	-0.221	*						
63	islii2	83-85	0.042			***	***	**	**	**
64	islii3	86-88	0.201	***						
65	islii4	89-91	0.263	***				**	**	**
66	islii5	92-94	0.148	***						
67	islii6	95-97	0.155	***						
68	islii7	98-00	0.154	***						
69	islij2	83-85	-0.020							**
70	islij3	86-88	-0.031							**
71	islij4	89-91	-0.078	#				**	*	***
72	islij5	92-94	0.022							
73	islij6	95-97	0.014							
74	islij7	98-00	0.079	#						
75	clang2	83-85	-0.032				**			
76	clang3	86-88	0.002							
77	clang4	89-91	0.046					**	#	
78	clang5	92-94	0.079	#						
79	clang6	95-97	0.136	***						
80	clang7	98-00	0.116	**						

Table A5 ***(continued)***

					Test for the equality of coefficientes: periods in rows vs. periods in columns (2)					
Row	Dummy	Period	Coefficient (gravity estimates)	Stat. signifi-cance	83-85	86-88	89-91	92-94	95-97	98-00
81	lalocki2	83-85	0.014				*	***	***	***
82	lalocki3	86-88	0.088					**	***	***
83	lalocki4	89-91	0.139	**				*	***	***
84	lalocki5	92-94	0.014							
85	lalocki6	95-97	0.053							
86	lalocki7	98-00	0.084							
87	lalockj2	83-85	0.049					**	***	***
88	lalockj3	86-88	-0.044						***	**
89	lalockj4	89-91	-0.073						*	
90	lalockj5	92-94	-0.187	***						
91	lalockj6	95-97	-0.222	***						
92	lalockj7	98-00	-0.263	***						
93	eu1	80-82	-1.497	***		*	**	***	***	***
94	eu2	83-85	-1.385	***			#	*	***	***
95	eu3	86-88	-1.248	***					#	*
96	eu4	89-91	-1.156	***						
97	eu5	92-94	-1.102	***						
98	eu6	95-97	-1.016	***						
99	eu7	98-00	-0.963	***						
100	eum1	80-82	0.521	***	#	*	***			
101	eum2	83-85	0.420	***		***	***	**	**	
102	eum3	86-88	0.644	***						**
103	eum4	89-91	0.733	***				***	***	***
104	eum5	92-94	0.575	***						
105	eum6	95-97	0.575	***						
106	eum7	98-00	0.506	***						
107	eux1	80-82	0.388	***		**	***	***	***	***
108	eux2	83-85	0.346	***			**	**	**	***
109	eux3	86-88	0.257	***						***
110	eux4	89-91	0.200	***						*
111	eux5	92-94	0.208	***						*
112	eux6	95-97	0.204	***						*
113	eux7	98-00	0.091	**						
114	efta1	80-82	0.358	#						
115	efta2	83-85	0.372	#						
116	efta3	86-88	0.344	#						
117	efta4	89-91	0.249							
118	efta5	92-94	0.370	#						
119	efta6	95-97	0.455	*						
120	efta7	98-00	0.406	*						

Table A5 ***(continued)***

Row	Dummy	Period	Coefficient (gravity estimates)	Stat. signifi-cance	Test for the equality of coefficientes: periods in rows vs. periods in columns (2) 83-85	86-88	89-91	92-94	95-97	98-00
121	eftam1	80-82	-0.207	***						**
122	eftam2	83-85	-0.329	***		**	**			
123	eftam3	86-88	-0.144	**					*	***
124	eftam4	89-91	-0.120	**					**	***
125	eftam5	92-94	-0.234	***						*
126	eftam6	95-97	-0.307	***						
127	eftam7	98-00	-0.373	***						
128	eftax1	80-82	-0.029							
129	eftax2	83-85	-0.079							
130	eftax3	86-88	-0.073							
131	eftax4	89-91	-0.019							
132	eftax5	92-94	0.030							
133	eftax6	95-97	0.005							
134	eftax7	98-00	-0.011							
135	asean1	80-82	0.312							
136	asean2	83-85	0.363	#						
137	asean3	86-88	0.252							
138	asean4	89-91	-0.445	*						
139	asean5	92-94	-0.301							
140	asean6	95-97	-0.314							
141	asean7	98-00	-0.311							
142	aseanm1	80-82	-0.007		*		*	*	***	***
143	aseanm2	83-85	0.070			*	***	***	***	***
144	aseanm3	86-88	0.106	*			#		**	**
145	aseanm4	89-91	0.431	***						
146	aseanm5	92-94	0.542	***						
147	aseanm6	95-97	0.766	***						
148	aseanm7	98-00	0.495	***						
149	aseanx1	80-82	0.260	***	***	***	***	***	***	***
150	aseanx2	83-85	0.333	***		***	***	***	***	***
151	aseanx3	86-88	0.409	***					***	***
152	aseanx4	89-91	0.510	***					**	***
153	aseanx5	92-94	0.642	***					**	***
154	aseanx6	95-97	0.744	***						***
155	aseanx7	98-00	0.932	***						
156	gcc1	80-82	1.449	***			**	*	*	*
157	gcc2	83-85	1.205	***			**	**	**	**
158	gcc3	86-88	1.374	***			**	#	*	*
159	gcc4	89-91	1.115	***						
160	gcc5	92-94	1.460	***						
161	gcc6	95-97	1.670	***						
162	gcc7	98-00	1.264	***						

Table A5 ***(continued)***

					Test for the equality of coefficientes: periods in rows vs. periods in columns (2)					
Row	Dummy	Period	Coefficient (gravity estimates)	Stat. signifi-cance	83-85	86-88	89-91	92-94	95-97	98-00
163	gccm1	80-82	0.338	***			***	***	***	***
164	gccm2	83-85	0.500	***			***	***	***	***
165	gccm3	86-88	0.310	***			***	***	***	***
166	gccm4	89-91	0.149	**					***	
167	gccm5	92-94	0.172	***					***	
168	gccm6	95-97	0.080							***
169	gccm7	98-00	0.074							
170	gccx1	80-82	-2.776	***		*	***	***	***	***
171	gccx2	83-85	-2.212	***			**	***	***	***
172	gccx3	86-88	-1.584	***				***	***	***
173	gccx4	89-91	-1.497	***				*	***	***
174	gccx5	92-94	-1.527	***						***
175	gccx6	95-97	-1.303	***						**
176	gccx7	98-00	-0.812	***						
177	nafta1	80-82	-0.074							
178	nafta2	83-85	0.221							
179	nafta3	86-88	0.018							
180	nafta4	89-91	0.102							
181	nafta5	92-94	0.478							
182	nafta6	95-97	0.222							
183	nafta7	98-00	0.391							
184	naftam1	80-82	-0.249	***		***	***	***	***	***
185	naftam2	83-85	-0.285	***		***	***	***	***	***
186	naftam3	86-88	0.060							***
187	naftam4	89-91	0.150	**						**
188	naftam5	92-94	0.122	#						***
189	naftam6	95-97	0.120	#						***
190	naftam7	98-00	0.397	***						
191	naftax1	80-82	-0.132	*		*	***	***		***
192	naftax2	83-85	-0.205	***			***	***		***
193	naftax3	86-88	-0.338	***				**		
194	naftax4	89-91	-0.479	***					**	
195	naftax5	92-94	-0.564	***					***	
196	naftax6	95-97	-0.267	***						**
197	naftax7	98-00	-0.486	***						
198	cacm1	80-82	2.257	***		*				
199	cacm2	83-85	2.065	***						
200	cacm3	86-88	1.470	***				#	#	#
201	cacm4	89-91	1.929	***						
202	cacm5	92-94	2.130	***						
203	cacm6	95-97	2.117	***						
204	cacm7	98-00	2.142	***						

Table A5 ***(continued)***

					Test for the equality of coefficientes: periods in rows vs. periods in columns (2)					
Row	Dummy	Period	Coefficient (gravity estimates)	Stat. signifi-cance	83-85	86-88	89-91	92-94	95-97	98-00
205	cacmm1	80-82	-0.662	***	***	***	***	***	***	***
206	cacmm2	83-85	-0.274	***				#	#	***
207	cacmm3	86-88	-0.246	***						***
208	cacmm4	89-91	-0.352	***				**	**	***
209	cacmm5	92-94	-0.126	*						
210	cacmm6	95-97	-0.124	*						
211	cacmm7	98-00	-0.003							
212	cacmx1	80-82	0.543	***			***	#		
213	cacmx2	83-85	0.612	***			***	**	*	
214	cacmx3	86-88	0.537	***			***	#		
215	cacmx4	89-91	0.261	***					*	***
216	cacmx5	92-94	0.396	***						
217	cacmx6	95-97	0.441	***						
218	cacmx7	98-00	0.522	***						
219	car1	80-82	3.746	***		**	*	*	***	***
220	car2	83-85	3.624	***		#			**	***
221	car3	86-88	3.269	***						*
222	car4	89-91	3.343	***						**
223	car5	92-94	3.344	***						**
224	car6	95-97	3.182	***						
225	car7	98-00	2.910	***						
226	carm1	80-82	-0.072					#	***	
227	carm2	83-85	-0.125	**					**	#
228	carm3	86-88	-0.192	***						**
229	carm4	89-91	-0.150	***					*	*
230	carm5	92-94	-0.199	***						***
231	carm6	95-97	-0.287	***						***
232	carm7	98-00	-0.005							
233	carx1	80-82	-0.931	***			***	***	***	***
234	carx2	83-85	-0.829	***			**	***	***	***
235	carx3	86-88	-0.854	***			**	***	***	***
236	carx4	89-91	-0.639	***				***	***	***
237	carx5	92-94	-0.412	***					***	***
238	carx6	95-97	-0.160	***						
239	carx7	98-00	-0.155	***						
240	and1	80-82	1.634	***						#
241	and2	83-85	1.379	***					#	**
242	and3	86-88	1.331	***					*	**
243	and4	89-91	1.407	***					#	**
244	and5	92-94	1.615	***						#
245	and6	95-97	2.014	***						
246	and7	98-00	2.232	***						

Table A5 ***(continued)***

					Test for the equality of coefficientes: periods in rows vs. periods in columns (2)					
Row	**Dummy**	**Period**	**Coefficient (gravity estimates)**	**Stat. signifi-cance**	**83-85**	**86-88**	**89-91**	**92-94**	**95-97**	**98-00**
247	andm1	80-82	-0.766	***		#		***		***
248	andm2	83-85	-0.810	***		**		***	*	***
249	andm3	86-88	-0.616	***			*			#
250	andm4	89-91	-0.802	***				***	*	***
251	andm5	92-94	-0.519	***						
252	andm6	95-97	-0.641	***						**
253	andm7	98-00	-0.466	***						
254	andx1	80-82	-0.741	***			***	***	***	***
255	andx2	83-85	-0.732	***			**	***	***	***
256	andx3	86-88	-0.850	***			***	***	***	***
257	andx4	89-91	-0.509	***						
258	andx5	92-94	-0.465	***						
259	andx6	95-97	-0.439	***						
260	andx7	98-00	-0.433	***						
261	mer1	80-82	1.160	***						
262	mer2	83-85	1.339	***						
263	mer3	86-88	1.180	***						
264	mer4	89-91	0.978	***						
265	mer5	92-94	1.141	***						
266	mer6	95-97	1.240	***						
267	mer7	98-00	1.448	***						
268	merm1	80-82	-1.087	***	***			***	***	***
269	merm2	83-85	-1.565	***		***	***	***	***	***
270	merm3	86-88	-1.210	***				***	***	***
271	merm4	89-91	-1.052	***				***	***	***
272	merm5	92-94	-0.645	***						
273	merm6	95-97	-0.608	***						
274	merm7	98-00	-0.640	***						
275	merx1	80-82	0.149	**	***	#	**			
276	merx2	83-85	0.405	***				**	***	***
277	merx3	86-88	0.294	***					#	***
278	merx4	89-91	0.362	***				*	**	***
279	merx5	92-94	0.176	***						#
280	merx6	95-97	0.147	**						
281	merx7	98-00	0.031							

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Chapter 7

The Impact of NAFTA on Foreign Investment in Third Countries

7.1 Introduction

Chapter 4 examined the effects of FTAs on foreign investment in member countries, focusing on the case of Mexico under NAFTA. As discussed in that chapter, an FTA may both raise the profitability and reduce the risk from investing in FTA member countries, prompting an increase in their investment inflows. Some evidence of this effect was found in the case of Mexico.

However, this also means that, other things equal, an FTA makes nonmember countries relatively less attractive investment destinations. From the perspective of international investors, this may prompt a portfolio reallocation away from these countries and thus a significant change in the allocation of investment across countries—an 'investment diversion' effect analogous to the trade diversion effect analyzed in Chapter 6.[282]

Has the rise in FDI to Mexico implied a reduction in FDI to other Latin American countries? If so, which countries and why? And what can they do to remedy this situation? While the investment creation effect of FTAs has attracted increased attention in recent years, few studies have examined the impact on investment flows to nonmember countries. On *a priori* grounds, the redirection of FDI inflows is likely to be more marked for those host countries most 'similar' to (i.e., closer substitutes for) the FTA members in terms of location, endowments and overall investment environment. Thus, like with trade diversion, in the case of NAFTA the neighboring countries of Central America and the Caribbean would be among the prime candidates for investment diversion, since from the location perspective they are relatively close substitutes for Mexico as FDI destinations.[283]

Like with FDI to FTA member countries, the impact on FDI to nonmembers depends also to a large extent on whether investment flows are horizontally or vertically motivated. As explained in Chapter 4, horizontal FDI is aimed at serving the local market of the host country, and is usually motivated by trade costs such as transportation and tariffs. Vertical FDI is typically aimed at exporting the production to third countries or back to the source country, and aims to exploit a cost advantage of the host country. Obviously, many intermediate forms of FDI are possible.

If FDI into nonmember countries is mainly horizontal, it is unlikely to be strongly affected by the creation or enlargement of an FTA.[284] If FDI is vertically motivated instead, then flows to host countries excluded from the FTA are likely to decline as source countries substitute investment within the FTA for investment outside it. This applies to all investors, both from within and outside the FTA, who export back from their host to the FTA, since now it will be cheaper to do so from member countries than from nonmember countries.

While foreign investment into industrial countries is primarily of the horizontal variety, in developing countries vertical investments account for a significant share of FDI.[285] Historically, both forms of FDI have been present in Central and South America. The early waves of FDI were directed to the most traditional sectors of the region (agricultural and mineral goods), which constituted the main exports of the host countries. Copper, bananas, oil, etc. were originally produced across Latin America by

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[282] The concepts of foreign investment creation and diversion in the context of trade integration date back to Kindleberger (1966).

[283] See Leamer et al (1995) for an *ex-ante* assessment of the potential effects of NAFTA on investment in Central America, including an evaluation of the location similarities between Mexico and Central America.

[284] If the FTA does have an impact, it is likely to be negative, as the relative size of the local market of nonmember countries decreases vis-à-vis the now enlarged local market of the FTA.

[285] See Shatz and Venables (2001).

foreign companies. During the import substitution era, Central and South America significantly raised tariffs, which attracted significant flows of horizontal FDI.[286]

In recent years, however, much of the FDI flowing to Central America and the Caribbean has been of a vertical nature. During the 1980s, the debt crisis, along with political instability in Nicaragua and El Salvador, practically shut down the Central American Common Market. In response, most countries in the area adopted a strategy of promotion of exports to alternative markets, first with direct fiscal subsidies and later with tax exemptions in the framework of the Export Processing Zones (EPZs) already discussed in the previous chapter. These incentives, which spread across the region, exempt domestic and foreign producers from import, export and income taxes, and typically require that most of the production be targeted to exports.

As a result of those incentives, much of FDI in Central America, aside from FDI in tourism and the privatizations recently observed in some countries (Guatemala, Panama and El Salvador) is closely linked to the EPZs. These flows are vertically motivated and, therefore, highly sensitive to relative cost considerations. This is so particularly in the case of textiles and apparel, which use easily-movable equipment and, as noted in Chapter 6, constitute a major fraction of the region's exports to NAFTA countries. As already noted in Chapter 6, in these sectors NAFTA introduced, at least temporarily, a preference advantage for Mexico over the excluded Central American and Caribbean countries, which might have encouraged redirection of their FDI inflows towards Mexico in the years following the FTA implementation.[287]

In contrast, FDI flows to South America appear less closely linked to exports. The average market size of host countries in South America is considerably larger than that of Central American countries, which provides a strong incentive to horizontal FDI. Moreover, during the 1990s most South American economies, especially Argentina and Brazil, received considerable FDI inflows from privatization of public utilities and concessions of public works. These flows should be relatively insensitive to whatever free trade agreements exist in the region, as they target the local market for non-traded goods.[288] Thus, on *a priori* grounds, if NAFTA did have an effect on FDI flows to excluded countries, its magnitude should have been smaller for South America than for NAFTA's Central American neighbors.[289]

However, as already noted in Chapter 6, FTAs are only a subset of the broad array of determinants of FDI inflows identified in the analytical and empirical literature. Much, or indeed most, of the variation in FDI inflows across countries can be explained quite apart from their preferential trading arrangements.[290] Thus, the above discussion of FDI creation and diversion has to be put in context. The FDI impact of an FTA may be dwarfed by the effects of changes in other FDI fundamentals.

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[286] During this period, major multinational companies (e.g., Firestone, Pfizer, Colgate, Sherwin Williams and many others) established production plants in Central America. Automakers established production units in Brazil, Argentina, and Mexico. Tariff jumping was one of the major motivations for those investments.

[287] The analytical underpinnings of this FDI redirection are examined by Elkholm, Forslid and Markusen (2003).

[288] Strictly speaking, FTAs could have an indirect effect on this kind of FDI as well, if they affect the growth prospects of the host country and thereby the anticipated profitability of the privatized firm and bidders' willingness to pay for it.

[289] This hypothesis is consistent with the empirical evidence presented by Hanson, Mataloni and Slaughter (2001), who find that vertical FDI is encouraged by low host-country trade barriers and discouraged by large host-country market size.

[290] Of course, FTA membership may have an impact on other 'deep' determinants of FDI flows, such as trade openness, and hence affect FDI indirectly through channels other than the 'credibility' effect discussed earlier.

This chapter assesses the impact of NAFTA on FDI flows to nonmember countries.[291] We first review the changing trends in FDI flows across Latin America and the Caribbean before and after NAFTA. Because FDI displays a generalized upward trend in most countries, in Section 3 we then examine in more detail the *relative* post-NAFTA performance of each host country—relative to the other hosts and to its own history as FDI destination—paying particular attention to the neighboring countries of Central America and the Caribbean. Section 4 takes a broader view of FDI determinants to Latin America beyond NAFTA, and reviews their evolution in the countries under analysis. Section 5 provides some concluding remarks and policy lessons.

7.2 Trends in FDI to Latin America and the Caribbean before and after NAFTA

The first step to assess the impact of NAFTA on FDI to nonmember countries is to examine their FDI performance relative to Mexico's. Figure 1 offers a comparative perspective on net FDI inflows to Mexico, Central America and the Caribbean, and South America since 1980. Here and in the rest of the chapter, we consider six major Central American and Caribbean countries—Costa Rica, El Salvador, Guatemala, Honduras, the Dominican Republic and Jamaica[292]—and nine South American economies—Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru and Venezuela.

The upward trend in FDI relative to GDP since the early 1990s is clearly apparent in the figure. Closer inspection reveals three distinct stages. First, until 1993 there was little difference in FDI performance across the three host regions in the graph. Annual flows to each one of them hovered around 1-2 percent of the respective GDP. Up to that year, South America consistently received lower flows than the rest, while Central America became the top FDI destination since 1987. Second, in 1994 FDI to Mexico shows a steep increase, coinciding with the inception of

NAFTA. As a result, Mexico became the leading FDI host over 1994-96. Third, after 1997 FDI flows to Central and South America catch up with, and even exceed, flows to Mexico.[293]

The individual country performances underlying Figure 1 are summarized in Table 1, which presents two alternative measures of FDI: per capita inflows in 1995 U.S. dollars and the ratio of inflows to current GDP. The former measure is shown because, unlike the latter, it is unaffected by gyrations in real exchange rates (such as the devaluation of the Mexican peso during the Tequila crisis), and therefore it may offer a superior yardstick when assessing changes in FDI performance over short time periods. In contrast, the latter measure provides a more accurate picture of the economic dimension of FDI, especially over longer periods of time. The table shows the mean and standard deviation of FDI from U.S. and non-U.S. sources to the countries under analysis for the years 1980-1993 (before NAFTA) and 1994-2001 (after NAFTA).[294]

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[291] Much of the material in this chapter is based on the background paper by Monge (2002).

[292] We exclude Panama from the sample, because its FDI inflows are very large and extremely erratic, likely reflecting its role as an international financial center; and Nicaragua, due to the unavailability of data for much of the period under analysis. Data on net FDI inflows were obtained from the World Bank World Development Indicators and UNCTAD's World Investment Report.

[293] The sharp rise in FDI flows to South America in 1999 shown in the graph is largely due to a surge in flows to Argentina related to the sale of YPF. In turn, the rise in FDI flows to Central America and the Caribbean in 1998 reflects a generalized increase in inflows to all countries in the area (except for Honduras), particularly abrupt in the case of El Salvador. Finally, the jump in FDI to Mexico in 2001 reflects the sale of Banamex, which amounted to over 2 percent of GDP.

[294] For Mexico, the breakdown of inflows into U.S. and non-U.S. sources is based on data from the Secretaría de Economía. For the other countries, it is based on data from the U.S. Bureau of Economic Analysis, so the comparisons have to be taken with some caution. Wile further disaggregation of inflows from non-U.S. sources might be of interest, the necessary data are unavailable for most countries in LAC.

Table 1(a). Net FDI inflows per person in host country, by period and source (in 1995 U.S. dollars)

Country	Statistic	1980-1993 U.S.	1980-1993 Non.U.S.	1980-1993 Total	1994-2001 U.S.	1994-2001 Non.U.S.	1994-2001 Total
Mexico	Mean	19.52	13.89	33.41	67.67	71.95	139.61
	St. Dev.	10.07	13.16	12.20	46.78	12.42	47.04
Costa Rica	Mean	1.08	36.10	37.18	54.17	68.18	122.35
	St. Dev.	18.81	31.05	19.48	94.18	105.51	29.31
Guatemala	Mean	-0.04	12.95	12.91	2.25	18.39	20.65
	St. Dev.	3.51	8.81	8.88	14.85	25.43	20.05
Honduras	Mean	1.69	4.86	6.55	1.14	21.27	22.41
	St. Dev.	12.09	13.52	3.53	14.90	16.89	13.54
El Salvador	Mean	0.66	1.99	2.65	10.39	27.57	37.96
	St. Dev.	2.23	3.09	2.03	19.86	46.46	60.72
Central America	***Mean***	***4.58***	***13.96***	***18.54***	***27.12***	***41.47***	***68.59***
Dominican Republic	Mean	7.97	5.42	13.95	9.64	63.05	81.22
	St. Dev.	10.87	8.36	7.23	8.30	50.05	54.05
Jamaica	Mean	23.79	-6.98	16.81	74.17	57.99	132.16
	St. Dev.	54.61	39.26	25.14	45.52	109.76	79.80
C A & Caribbean	***Mean***	***7.81***	***9.84***	***17.64***	***31.74***	***46.62***	***79.48***
Argentina	Mean	8.94	29.55	38.49	31.91	212.68	244.60
	St. Dev.	9.89	31.95	36.76	25.35	171.02	182.30
Bolivia	Mean	2.82	5.38	8.20	4.87	73.57	78.44
	St. Dev.	5.98	8.73	8.53	20.21	40.94	34.55
Brazil	Mean	7.99	4.01	12.00	24.91	88.26	113.17
	St. Dev.	7.15	9.18	5.87	14.15	72.58	66.59
Chile	Mean	14.03	32.23	46.27	82.56	242.09	324.65
	St. Dev.	16.81	24.83	29.62	62.59	166.02	134.22
Colombia	Mean	0.39	15.67	16.06	7.52	53.87	61.39
	St. Dev.	11.65	13.16	7.62	8.31	34.37	36.75
Ecuador	Mean	2.83	9.97	12.80	1.50	56.82	58.32
	St. Dev.	8.74	8.72	9.61	16.81	28.15	20.54
Peru	Mean	-0.07	3.91	3.85	13.74	69.01	82.76
	St. Dev.	6.85	9.62	8.09	11.82	32.77	38.53
Paraguay	Mean	0.45	8.25	8.70	8.69	22.32	31.01
	St. Dev.	2.17	8.21	8.63	12.03	21.36	16.91
Venezuela	Mean	11.68	4.59	16.26	52.98	81.93	134.91
	St. Dev.	23.64	17.88	24.66	43.76	76.63	72.16
All	***Mean***	***6.47***	***11.42***	***17.88***	***28.15***	***76.92***	***105.35***

Source: Data from the World Bank, the Bureau of Economic Analysis, and Secretaría de Economía: Dirección General de Inversión Extranjera.

Table 1(b). Net FDI inflows as percentage of GDP, by period and source

Country	Statistic	1980-1993 U.S.	1980-1993 Non.U.S.	1980-1993 Total	1994-2001 U.S.	1994-2001 Non.U.S.	1994-2001 Total
Mexico	Mean	0.71	0.46	1.17	1.39	1.60	2.99
	St. Dev.	0.42	0.53	0.22	0.65	0.34	0.50
Costa Rica	Mean	0.06	1.96	2.03	1.57	1.69	3.26
	St. Dev.	1.00	1.34	0.61	2.38	2.46	0.63
Guatemala	Mean	0.00	1.22	1.21	0.15	1.06	1.21
	St. Dev.	0.31	0.96	0.97	0.85	1.42	1.09
Honduras	Mean	0.22	0.65	0.88	0.18	2.46	2.64
	St. Dev.	1.52	1.75	0.51	1.67	1.71	1.36
El Salvador	Mean	0.06	0.25	0.31	0.54	1.35	1.89
	St. Dev.	0.26	0.37	0.26	0.99	2.33	3.05
Central America	***Mean***	***0.21***	***0.91***	***1.12***	***0.77***	***1.63***	***2.40***
Dominican Republic	Mean	0.64	0.58	1.30	0.48	3.23	3.95
	St. Dev.	0.97	0.93	0.66	0.37	2.24	2.20
Jamaica	Mean	1.15	-0.11	1.04	2.92	1.91	4.83
	St. Dev.	3.69	2.83	1.57	1.76	3.87	2.49
C A & Caribbean	***Mean***	***0.40***	***0.72***	***1.13***	***1.04***	***1.87***	***2.97***
Argentina	Mean	0.22	0.66	0.87	0.41	2.74	3.15
	St. Dev.	0.24	0.53	0.55	0.33	2.20	2.34
Bolivia	Mean	0.47	0.87	1.34	0.51	7.40	7.91
	St. Dev.	0.89	1.39	1.49	2.02	3.83	3.13
Brazil	Mean	0.32	0.25	0.57	0.59	2.43	3.02
	St. Dev.	0.26	0.43	0.31	0.30	2.18	2.03
Chile	Mean	0.62	1.48	2.10	1.92	5.23	7.14
	St. Dev.	0.78	1.13	1.37	1.58	3.59	2.92
Colombia	Mean	0.00	1.32	1.32	0.34	2.31	2.65
	St. Dev.	0.98	1.15	0.64	0.38	1.23	1.29
Ecuador	Mean	0.22	0.84	1.06	0.02	3.98	4.01
	St. Dev.	0.68	0.79	0.80	1.21	2.36	1.65
Peru	Mean	-0.07	0.35	0.27	0.63	3.18	3.81
	St. Dev.	0.58	0.70	0.54	0.55	1.62	1.87
Paraguay	Mean	0.04	0.57	0.61	0.58	1.31	1.89
	St. Dev.	0.15	0.59	0.60	0.88	1.36	0.97
Venezuela	Mean	0.39	0.16	0.55	1.29	2.00	3.29
	St. Dev.	0.76	0.53	0.93	0.83	1.95	1.64
All	***Mean***	***0.31***	***0.72***	***1.04***	***0.85***	***2.74***	***3.60***

Source: Data from the World Bank, the Bureau of Economic Analysis, and Secretaría de Economía: Dirección General de Inversión Extranjera.

Fourth, there is nevertheless considerable heterogeneity across host countries in terms of the level and growth of total FDI. Within Central America, growth was spectacular in Costa Rica, but modest in Honduras and El Salvador and, especially, in Guatemala. The two Caribbean countries shown also had large increases in FDI inflows.

Fifth, heterogeneity also extends to the volatility of FDI. Measured by the coefficient of variation of per capita inflows, volatility declined in some countries (e.g., Costa Rica, Jamaica, Ecuador) and increased for others (Guatemala and El Salvador).

In sum, while FDI inflows to most Latin American economies show a common upward trend, there is also a considerable degree of cross-country diversity. Even within Central America, some countries have attracted much more FDI than others. But a preliminary inspection of observed FDI trends does not provide much evidence of a generally negative change after NAFTA in FDI inflows to the neighboring countries of Central America and the Caribbean. Of course, a more rigorous analysis might find otherwise, and is developed below in two stages. First, we examine in detail the trends in FDI to Mexico and other countries looking for significant divergences between them. Second, we assess the ability of standard FDI determinants to account for the observed pattern of FDI allocation across Latin American countries in the pre- and post-NAFTA periods.

7.3 Assessing FDI diversion from NAFTA

7.3.1 Background

There are no formal studies of the impact of NAFTA on FDI flows to nonmember countries, and few assessments of the effects of other RIAs on the international allocation of FDI flows. This stands in sharp contrast with the growing empirical literature assessing the effects of RIAs on FDI flows to member countries.

The case of the EEC / EU has attracted a few empirical studies focusing specifically on investment diversion at various stages of the FTA—from its creation to the accession of Iberian countries in 1985, the Single Common Market of 1992 and the upcoming expansion of the EU to Eastern European countries (see Box 1 for a selective summary). On the whole, they do not find compelling evidence of investment diversion.

In a multi-RIA framework, a recent empirical study (Levy-Yeyati, Stein and Daude 2002) finds that RIAs divert investment originating in member countries away from non-member hosts. Importantly, the possible diversion of FDI flows from nonmember source countries is not taken into account. This is a potential issue because, as Table 1 showed, non-U.S. sources account for the majority of FDI across Latin America, as well as for the majority of the increase in investment flows in recent years.[295] Another caveat is that NAFTA is the only North-South trade agreement in the study and, unlike the framework in Chapter 6 above, which allows each FTA to be different, the basic framework of the study in question forces all FTAs to have the same effects on FDI allocation. Yet there is some evidence suggesting that the investment impact of FTAs may be different depending on whether they involve only North countries, South countries or both.[296]

In the analysis of the impact of FTAs on FDI in Chapter 4 we attempted to identify the diversion of investment flows from both member and nonmember source countries, but found no significant effects. Like the preceding study, however, the implicit assumption was that NAFTA is not different from other RIAs. Also, both approaches share another restrictive feature, namely the simplifying assumption that RIA-induced FDI diversion effects must be the same for *all* non-member countries. As already argued, analytical considerations strongly suggest that FDI diversion should be more substantial for nonmember

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[295] In spite of neglecting this channel, the study's estimated diversion effect is extremely large: entry by a source country into an FTA would reduce its stock of FDI to nonmember countries by about 27 percent.

[296] See Blomstrom and Kokko (1997). Indeed, experiments reported in the paper by Levy-Yeyati, Stein and Daude (2002) do suggest that NAFTA may be different from the other FTAs in terms of its FDI impact.

host countries that are closer substitutes for hosts belonging to the RIA under consideration. Admittedly, however, it is not easy to build an empirical framework allowing for varying degrees of substitutability among FDI hosts.

In view of these considerations, the analysis below follows a two-stage approach. The objective is to assess if flows to LAC countries excluded from NAFTA, and especially Central America and the Caribbean, show a different behavior than flows to Mexico before and after implementation of the FTA. To do this, we first examine carefully the observed trends in FDI across the region. As shown in the previous section, most countries in the region experienced large increases in FDI inflows in the second part of the 1990s. Thus, we use a simple descriptive procedure to isolate any differential behavior of nonmember countries vis-à-vis Mexico across the pre- and post-NAFTA periods. The second stage of the analysis, presented in the next section, goes one step beyond to explore the role of fundamental FDI determinants in the performance of FDI flows across the region, to assess the extent to which they can account for the changing foreign investment patterns across countries and over time.

Box 1. FDI diversion in Europe

The creation of the European Economic Community (1952); the EU accession of Spain and Portugal (agreed in 1986 and fully implemented in 1992); the creation of the Single Market (1992) and the ongoing EU eastern enlargement offer some insights on the changing pattern of FDI across Europe caused by economic integration. While there is evidence that European integration led to substantial investment creation for EU member countries, particularly in the late 1980s (see Chapter IV), empirical evidence of investment diversion away from non EU-member countries is limited. However, the empirical evidence is less than conclusive. First, the surge of FDI in Europe coincided with a worldwide increase in FDI flows, making it hard to disentangle the impact of global trends from that of European integration. Second, as Brenton et al. (1999) point out, the available theory on FDI does not provide clear testable propositions on the effect of simultaneous trade and investment liberalization.

EEC creation

Earlier studies of FDI patterns focused more on the determinants of FDI to Europe than on potential FDI diversion effects (Aristotelous and Fountas 1996). An exception is Scarperlanda (1967), who tests for a change in international investment patterns following the creation of the European Common market, and finds no evidence of any shift in U.S. investment into the EU and away from non-EU nations.

Single Market and EU accession of Spain and Portugal

Baldwin et al. (1995) suggest that the creation of the Single Market in the EU "probably led to investment diversion in the economies of the European Free Trade Association (EFTA) and investment creation in the EU economies"—in particular Spain and Portugal. Some EFTA firms reportedly adjusted by becoming EU-based firms, which resulted in an outflow of FDI from EFTA countries to EU countries (Oxelheim 1994). However, Brenton et al. (1999), using a gravity model of FDI flows, find no evidence that increased investment in Spain and Portugal during the 1980s came at the expense of reduced investment flows to other European countries (see also Box Figure 1). In the same vein, Agarwal (1996) documents that growth rates of FDI inflows to Iberian countries and the rest of the EU during 1986-90 were comparable to observed levels in 1980-95, and concludes that it is much more likely that Spain and Portugal benefited from the creation of additional FDI resulting from strong economic growth in the EU rather than from an investment diversion effect away from non-EU countries.

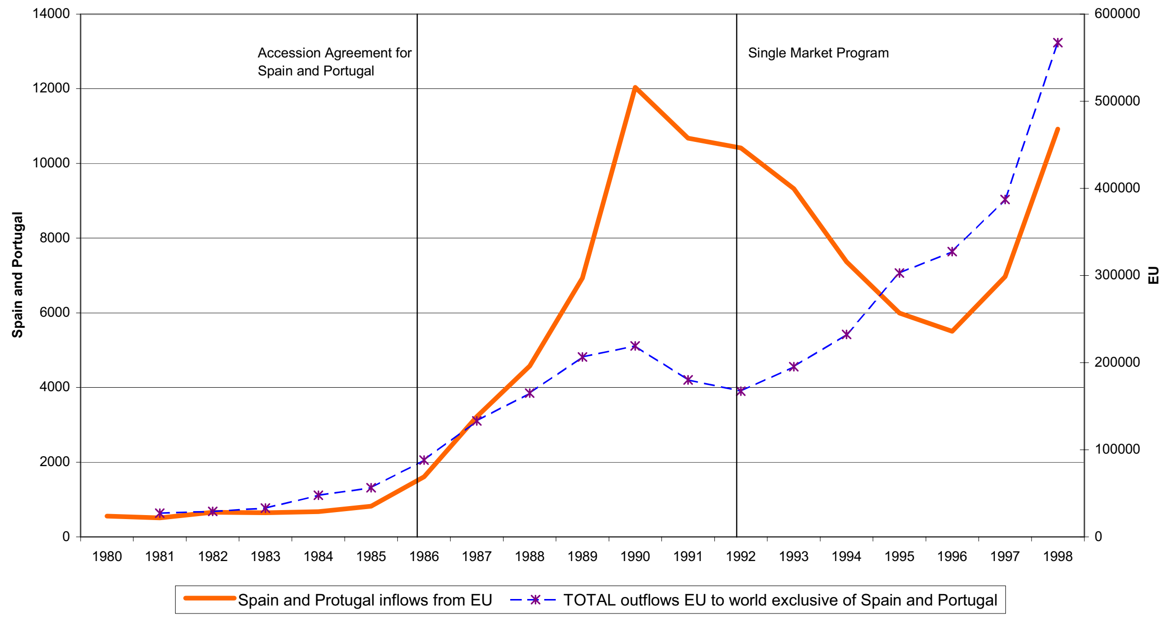
EU Eastern enlargement

Central and Eastern European economies (CEECs) have become an increasingly important destination for FDI in recent years, raising the concern than investment previously destined to the relatively cheap labor markets of Southern Europe may have been diverted to Central and Eastern Europe as the preferential status of Iberian countries is diluted (Box Figure 2). However, existing empirical studies do not find clear evidence in favor of this view (e.g., Brenton et al 1999). In fact, the stagnation or decline in FDI to Spain and Portugal in the late 1990s could just reflect the fact that FDI stocks into these countries have reached the equilibrium level (Buch et al. 2001). Moreover, their FDI may be largely location-specific and thus unlikely to be strongly affected by Eastern enlargement (Martin and Gual 1994). The same argument has been offered to support the view that Eastern enlargement should have minimal effects on FDI to other developing regions.[297] Furthermore, the expected positive impact on growth in Eastern Europe due to economic transformation and integration is likely to eventually translate into higher demand for products from developing countries, leading to an increase in FDI in these countries and overall investment creation (Agarwal 1996).

[297] The potential for FDI diversion is greatest in footloose labor and pollution intensive segments of international production, which is internationally mobile, however this part of FDI is generally considered to be relatively small.

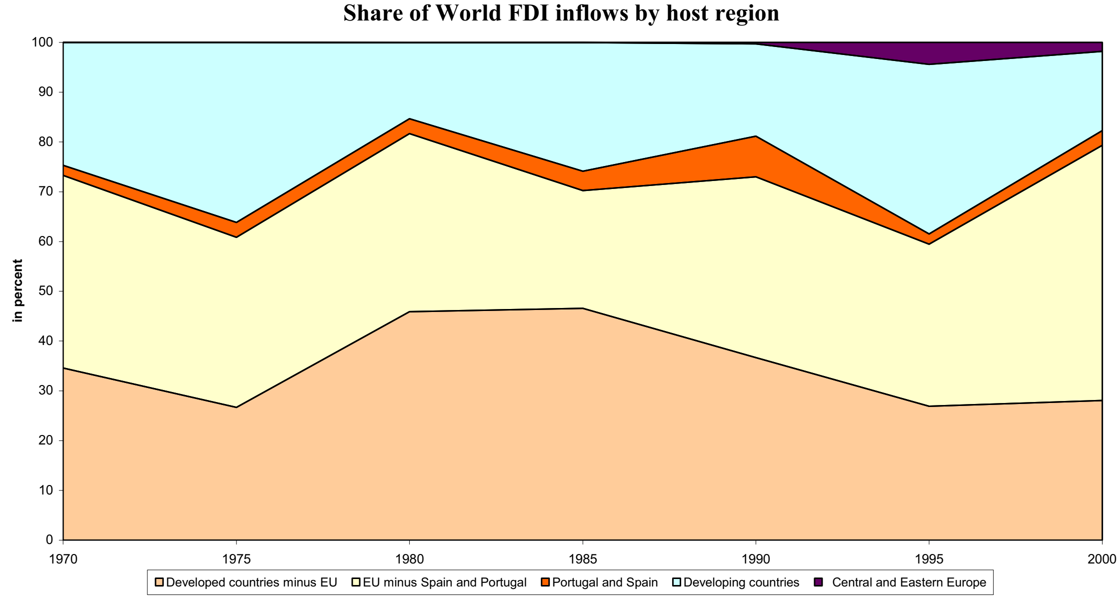
Box 1 *(continued)*

Box Figure 1
FDI inflows to Spain and Portugal from EU sources and total FDI outflows from the EU (excluding Spain and Portugal)



Note: figures in US$ million.
Source: OECD

Box Figure 2
Share of World FDI inflows by host region



Source: UNCTAD

7.3.2 Disentangling common and country-specific FDI trends before and after NAFTA

To disentangle country-specific FDI trends from common ones, we decompose observed FDI flows from source country *i* to host country *j* in year t as follows:

FDI(*i,j,t*) = source fixed effect (*i*) + source/host pair fixed effect (*i,j*)

+ common time effect (*t*) + source time effect (*i,t*) + host time effect (*j,t*)

+ residual

Such decomposition can be computed from a panel regression of FDI on sets of dummy variables, with each set defined so as to capture one of the components listed above. To identify the parameters of such regression, the conventional practice is to select a "base" country and year, dropping the corresponding dummies, in which case the coefficients on the remaining dummies can be interpreted as deviations from the omitted category. Therefore, they depend on the particular base chosen. Further, the sets of dummies normalized in this manner are not mutually orthogonal, and hence they cannot be strictly identified with the components in the above expression. For these reasons, it is more convenient to normalize the sets of dummies by expressing each one in terms of deviations from their respective means (see Box 2).

The decomposition can be implemented through a simple panel regression of FDI inflows including as explanatory variables several *full* sets of dummies, with each set capturing one of the components above, and with the coefficients on each set of dummies constrained to add up to zero. In this way, for example, the (normalized) common year effect estimates then capture annual deviations from the average flow of FDI during the sample period. This poses a restricted least squares problem in which inference can be performed along the lines of Greene (1991).

Of particular interest in this context are the source/host fixed effects and the host time effects. The former measure the difference between the average annual FDI flow received by a given host from a given source relative to the average flow from the same host to the average country in the sample. This can be viewed as reflecting the relative geographic, historical and political proximity of each host country to the source country under consideration.[298]

In turn, the host time effects represent for each host the deviation of its FDI inflow in each year from the common trend (i.e., the cross-country average for the year), as well as the deviation from the host country's typical performance (i.e., the average annual inflow it received over the sample). In effect, this removes from the host's annual inflow both the common trend and the unobservable factors that may make that host systematically more or less appealing than others to foreign investors.

To examine if under NAFTA Mexico has outperformed the other countries in the region, one can just compare the estimated host year effects for Mexico with those of other excluded countries. If NAFTA has implied a relevant advantage for Mexico, we must find that its time effects are negative prior to NAFTA and positive afterwards. Furthermore, the pattern of these time effects tells us whether such advantage narrows or widens over time. Likewise, the sum over the post-NAFTA years of the time effects

[298] Note that this represents a more general way of controlling for distance and other time-invariant characteristics of countries than the parametric measures commonly employed in gravity models. Indeed, in our context finding informative measures of closeness for Central American countries could be problematic given their geographic proximity and small size.

Box 2. Disentangling common and idiosyncratic FDI trends

Assume we have observations on FDI flows from *i=1,2,…,I* source countries to a sample of *n=1,2,…,N* host countries over periods *t=1,…,T*. Let *f(i,n,t)* denote FDI flows from country *i* to country *n* in year *t*. We can decompose *f(i,n,t)* into:

$$f(i,n,t)=h(i)+b(t)+m(i,n)+f(i,t)+g(n,t)+u(i,n,t)$$

here *h(i)* is a fixed source country effect, *b(t)* is a year effect that affects all source and host countries, *m(i,n)* is a fixed source/host country effect, f(i,t) is a fixed effect specific to source country *i*, *g(n,t)* is a year effect specific to a host country *n*. The term *u(i,n,t)* is simply the residual of the series once these effects have been accounted for.

This model is still unidentified, and the conventional solution is to use a country/year as the base. The main problem with this strategy is that then the right-hand side variables are not mutually orthogonal. Moreover, the numerical results depend on the choice of base country/year. It is therefore preferable to use a different set of identification assumptions, namely expressing the various effects as deviations from their respective means. This amounts to imposing the six conditions

$$\sum_{n=1}^{N} m(i,n) = 0, i = 1,...,I; \quad \sum_{t=1}^{T} b(t) = 0, t = 1,...,T; \quad \sum_{i=1}^{I} f(i,t) = 0, t = 1,...,T$$

$$\sum_{t=1}^{T} f(i,t) = 0, i = 1,...,I; \quad \sum_{t=1}^{T} g(n,t) = 0, n = 1,...,N; \quad \sum_{n=1}^{N} g(n,t) = 0, t = 1,...,T$$

These conditions make the right hand-side variables in the above equation mutually orthogonal. It is convenient to discuss their interpretation further. First, *h(i)* indicates the relative importance of source country *i* for the average host country in the sample during the sample period. For example, these estimates can be useful to assess the relevance of the U.S. economy as a source of FDI to the region. In turn, the estimates of *m(i,n)* represent the permanent deviation of country *n* with respect to the flows of FDI from country *i* to the average country in the group. This controls for permanent differences across countries, and can capture the effect of geographic, historical and political proximity of each of the *n* countries to the particular source country *i*.[299]

The second condition redefines the year effects *b(t)* as deviations from the average flow of FDI to the average country in the group during the sample period. This normalization plays an important role below, as FDI shows a rising trend in most countries. By including these year effects, we are able to separate the common factors behind the generalized increase in FDI flows to all the host countries in the region from those specific factors that favored a subset of countries with respect to others, which is our main interest.

The third and fourth equations normalize the source/year effects *f(i,t)* in such a way that for each year they represent deviations across source countries with respect to the mean time effect *(b(t))*, and for each source country represent year deviations from its average *h(i)*. Finally, the fifth and sixth equations have a very similar interpretation. Thus, *g(n,t)* are host country year effects that represent, for each year *t*, the deviation of host country *n* with respect to the mean year effect *(b(t))*. For each host country *n*, they represent year deviations from its average flow.

This simple statistical decomposition can be very useful to ascertain which countries have done best / worst under NAFTA. Specifically, to examine if under NAFTA Mexico has outperformed the other countries in the region, we can compare the estimated year effects for Mexico *g(Mexico,t)* with those of other countries *g(excluded,t)*. These host/year effects indicate positive or negative deviations of the respective host country with respect to the rest of the group in the year in question, as well as deviations of the host country with respect to its average over time. If NAFTA has implied a relative advantage for Mexico, its time effects should be negative prior to NAFTA and positive afterwards. Furthermore, the pattern of these time effects tells us whether such advantage narrows or widens over time. Likewise, the sum over time of the year effects of a given host provides an indication of the *cumulative* post-NAFTA performance of FDI flows to that host. For example, for Mexico we would compute

$$\sum_{t \geq 1994} g(Mexico, t)$$

of a given host provides an indication of the *cumulative* post-NAFTA performance of FDI flows to that host, which can help detect stock adjustments triggered by NAFTA.[300]

Finally, the estimated host/year effects of the excluded countries, especially in Central America, are also of direct interest. They provide a measure of how much each respective country deviated from the

[299] Note that this represents a more general way of controlling for distance and other time-invariant characteristics of countries than the parametric measures commonly employed in gravity models. Indeed, in our context finding informative measures of closeness for Central American countries could be problematic given their geographic proximity and small size.

[300] Even if the effects of NAFTA on FDI flows to Mexico were purely transitory, they might amount to a permanent change in the stock of FDI to Mexico. The cumulative sum in the text helps assess this possibility.

average FDI performance of the overall sample in the year in question, as well as how much the year in question deviated from the average FDI performance of the country under consideration. If FDI to excluded countries was diverted by NAFTA, they should show negative host/year effects after 1993.

7.3.3 Empirical results

This framework is used to compare Mexico with two different groups of countries. The first group includes only the Central American and Caribbean countries listed earlier. The second group adds the main South American economies. As before, the exercise is performed for two different measures of FDI: annual net inflows of FDI in 1995 U.S. dollars per inhabitant of the host country (FDI pc), and net inflows of FDI relative to the GDP of the host economy (FDI/GDP).[301]

Table 2 reports the estimated fixed effects for source countries and source-host country pairs for both country groups and both measures of FDI. There are several salient results in the table. The first concerns the relative importance of U.S. and non-U.S. FDI sources. For the sample considered here, the latter are on average more important than the former. Second, U.S.-based investors play a more prominent role in Central America than in South America. Finally, there is a large degree of heterogeneity across countries, even within Central and South American groups. We next discuss each of these points in more detail.

The estimated source country fixed effects at the top of the table show that that over the sample period as a whole the U.S. was, on average, a less important source of FDI than all other source countries combined. The U.S. invested, on average, 15 1995 dollars per person in each country in the group studied. This is less than half the $35 invested by all other sources combined. However, the difference narrows if we look only at Central American and Caribbean countries, where the respective figures are 17 and 23. The same qualitative results hold for FDI/GDP ratios from U.S. and other sources.

There is a great degree of heterogeneity across host countries, not only in terms of their total attraction of FDI but also in terms of the importance of the two sources. This is captured by the U.S. / host country and non-U.S./host country pair effects reported in the table. All these effects must add up to zero, and indicate how the host countries are ranked in terms of attracting FDI from each source. For example, Jamaica and Chile receive much more FDI from the U.S. than the other countries—specifically, $ 30 and $ 20 more per capita (in 1995 dollars) than the average of all Latin American countries. Mexico lags Jamaica and is on par with Chile in terms of U.S. inflows. In contrast, Guatemala, Paraguay and Colombia received around $12-13 less per capita than the average. Finally, countries receiving above-average FDI from the U.S. also receive more often than not above-average FDI from other sources—i.e., the two source/host effects of each host tend to have the same sign. There are exceptions, however, such as Jamaica, which is well above the average for U.S. investors but well below the average for the rest.

These fixed effects reflect each country's average FDI patterns over the whole sample period both before and after NAFTA. To assess the changes in FDI trends over time for the various host countries in LAC, we can inspect the estimated host/year specific effects, which capture the extent to which each host deviates from its average behavior, and from the average behavior of the sample as a whole, in a given year. Thus, to see if Mexico behaves differently from the rest of the sample in the post-NAFTA period it is sufficient to inspect the estimated host/year effects of Mexico. They are shown in Table 3, for both country groups and both measures of FDI.

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[301] The analysis was also performed measuring FDI by its ratio to fixed investment of the host country. The results were generally analogous to those obtained with FDI/GDP and thus are not reported.

Table 2. Estimated Fixed Effects on net inflows of FDI, 1980-01
Alternative measures of FDI and samples of countries

	FDI per capita (in constant prices)		**FDI as percentage of GDP**	
	All Lat. Am.	Only CA	All Lat. Am.	Only CA
US source Fixed Effect (common to all hosts)	15.01	17.23	0.51	0.63
Non-US source Fixed Effect (common to all hosts)	35.24	23.72	1.45	1.14
US source Fixed Effect (specific to each host)				
Mexico	16.15	13.93	0.33	0.20
Costa Rica	3.92	1.70	0.06	-0.07
Dominican Republic	-5.96	-8.19	0.04	-0.08
Guatemala	-12.91	-15.13	-0.37	-0.50
Honduras	-11.42	-13.64	-0.20	-0.33
Jamaica	30.38	28.16	1.40	1.27
El Salvador	-10.20	-12.42	-0.23	-0.36
Argentina	5.33	…	-0.20	…
Bolivia	-11.10	…	-0.06	…
Brazil	0.78	…	-0.07	…
Chile	20.26	…	0.44	…
Colombia	-12.17	…	-0.41	…
Ecuador	-10.63	…	-0.22	…
Peru	-9.60	…	-0.33	…
Paraguay	-13.05	…	-0.39	…
Venezuela	5.16	…	0.07	…
Non-US source Fixed Effect (specific to each host)				
Mexico	-0.48	11.04	-0.62	-0.30
Costa Rica	15.33	26.85	0.43	0.75
Dominican Republic	-11.70	-0.18	-0.02	0.29
Guatemala	-19.87	-8.36	-0.42	-0.11
Honduras	-27.95	-16.43	-0.48	-0.17
Jamaica	-38.35	-26.84	-1.47	-1.16
El Salvador	-26.67	-15.16	-0.92	-0.61
Argentina	51.89	…	-0.15	…
Bolivia	-8.68	…	1.37	…
Brazil	-11.56	…	-0.78	…
Chile	65.97	…	1.23	…
Colombia	-4.46	…	0.17	…
Ecuador	-13.54	…	-0.03	…
Peru	-8.54	…	-0.08	…
Paraguay	-19.61	…	-0.56	…
Venezuela	-5.68	…	-0.65	…

Source: Data from the World Bank, the Bureau of Economic Analysis, and Secretaría de Economía: Dirección General de Inversión Extranjera.

Table 3. Estimated Mexico/Year Effects on net inflows of FDI (including FDI from privatization)
Alternative measures of FDI and samples of countries

Year	FDI per Capita (in U.S. $)		FDI / GDP (%)	
	All Lat. Am.	*Only CA*	*All Lat. Am.*	*Only CA*
1980	7.75	-4.32	0.33	0.13
1981	22.51	16.53	0.34	0.38
1982	0.31	-2.35	0.58	0.63
1983	7.65	-3.77	0.99	0.67
1984	-6.15	-18.88	0.48	0.14
1985	-3.33	-11.74	0.50	0.36
1986	-2.31	-12.64	0.99	0.71
1987	-24.28	-35.46	-0.14	-0.53
1988	-16.60	-26.34	0.03	-0.53
1989	-7.79	-15.51	0.22	-0.05
1990	-16.11	-27.90	-0.15	-0.64
1991	1.66	-6.01	0.11	-0.29
1992	-7.88	-14.36	-0.21	-0.59
1993	-7.15	-12.75	-0.28	-0.30
1994	41.51	46.86	0.50	0.91
1995	15.93	21.73	1.12	1.23
1996	-11.73	16.37	0.03	0.92
1997	-2.79	38.05	-0.25	0.94
1998	-28.21	-22.02	-1.64	-1.65
1999	-57.64	-13.40	**-2.33**	-1.47
2000	7.75	17.23	-1.12	-0.83
2001	**86.90**	**70.68**	-0.11	-0.15
sum 94-01	51.72	**175.50**	-3.80	-0.09

Note: figures shown in **bold** are statistically significant at the 10 percent level or better.

A permanent, positive impact of NAFTA on Mexico's ability to attract FDI should be reflected in positive estimates from 1994 onward. Given the normalizations imposed, looking at those estimates suffices to compare Mexico before and after NAFTA, and Mexico vs. the countries excluded from NAFTA.[302] The table shows that for the first few years after NAFTA Mexico does perform above its own past as well as the rest of the sample. This result holds for all measures and country samples. In all those cases, when the sample of all Latin American countries is used, Mexico exhibits a positive effect in the first two years, 1994 and 1995. When only Central American countries are used, the positive effect holds for the first four years.

Further, when using FDI per capita, the effect is largest on impact (1994) and then declines. The estimates indicate that in the first year Mexico received an extra US$ 41 per capita in FDI above the Latin American average, or $ 47 relative to Central America and the Caribbean. The differences fall to US$16 and US$22, respectively, in the following year. In contrast, when we look at FDI/GDP the response is

[302] Recall that for a given country the sum of those terms *over the entire period* is equal to zero, and that for each year its sum across *all countries* is also equal to zero.

hump-shaped, with the positive effect peaking in the second year. The different time pattern is very likely due to the impact of the 1995 Mexican devaluation and recession, which raises artificially the FDI/GDP ratio in that year. In either case, the Mexico/year effects eventually decline, becoming negative by 1996 or 1998 depending on the specific measure and sample used. Finally, in 2000 and, especially, 2001 they turn positive again.

The fact that the Mexico/year effects rise at first and then turn negative is in agreement with the results reported in Chapter 4, where we found that in 1994-1995 FDI to Mexico exceeded the values predicted by an econometric model of FDI estimated on a large sample of countries. After 1995, FDI inflows fell increasingly short of the model's predictions. In turn, the jump in the estimated Mexico effect in 2001 is dominated by one single transaction (the sale of Banamex), which amounted to $ 108 per capita (or over 2 percent of GDP).

Did Mexico acquire a permanent advantage as FDI host in the post-NAFTA years? The bottom of Table 3 shows the cumulative effects for Mexico over the entire post-NAFTA period. They are positive when performance is measured by per capita FDI inflows, although the estimate is significant only when using the Central America sample, and is largely dominated by the spike observed in 2001. Indeed, if we stopped the econometric exercise in 2000 rather than 2001, the cumulative effect vis-à-vis Latin America would turn negative, while that against Central America would remain positive but insignificant. Admittedly, it is not clear that the large one-time Banamex sale in 2001 largely responsible for this result can be viewed as a result of NAFTA. In contrast, when using FDI as a percentage of GDP as the preferred indicator, the cumulative effect is negative but insignificant, even taking into account the Banamex transaction.

Are these results distorted by the differential timing and volume of privatization-related FDI in Mexico and elsewhere? Over the 1990s the sale of public enterprise assets attracted large volumes of FDI in a number of South American economies (Argentina, Brazil, Bolivia) and, more recently, Central American economies as well (most notably El Salvador). As already noted in Chapter 4, Mexico's privatization program was, in comparison, fairly modest. Since privatization-related transactions are included in total FDI flows, the differential effects of NAFTA on FDI to Mexico and other Latin American countries could be masked by the large volume of those transactions in other countries in the region.[303]

Table 4 reports the Mexico/year effects that result from re-estimating the model using FDI net of privatization-related inflows as the dependent variable. The exercise only covers the period up to 1999, given the lack of comprehensive privatization data after that date.[304] Qualitatively, the pattern of the estimates is not very different from the previous one.[305] They are positive in the initial years of the post-

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[303] The merit of this argument is not entirely clear, since it amounts to using as analytical benchmark a counterfactual excluding not only NAFTA, but also the privatization programs in question. Thus, it involves a presumption that privatization and other kinds of FDI flows are mutually independent. In reality, even though there are clear conceptual differences between investments in privatized utilities to supply the host country local market and investments aiming to take advantage of the host country's access to foreign markets, in the end both types of projects represent choices available to international investors, whose FDI location decisions at any given time reflect the entire array of investment opportunities open to them. It is quite possible that in the absence of the FDI opportunities offered by privatization the volumes and allocation of FDI across the region could have very different from the one actually observed.

[304] The information on privatization-related FDI was obtained from UNCTAD. It is not available after 1999 and, unfortunately, its coverage prior to 1987 is spotty at best. For these reasons, the results in the text have to be taken with some caution.

[305] Note that by changing the definition of the dependent variable the estimated source/host effects and the common time effects also change. They are not reported here to save space.

Table 4. Estimated Mexico/Year Effects on net inflows of FDI (excluding privatization)
Alternative measures of FDI and samples of countries

Year	FDI per Capita (in U.S. $) *All Lat. Am.*	*Only CA*	FDI / GDP (%) *All Lat. Am.*	*Only CA*
1980	8.55	0.55	0.10	0.04
1981	23.31	21.41	0.10	0.29
1982	1.11	2.53	0.34	0.54
1983	8.45	1.10	0.75	0.58
1984	-5.36	-14.00	0.25	0.05
1985	-2.53	-6.87	0.27	0.27
1986	-1.51	-7.77	0.75	0.62
1987	-23.48	-30.58	-0.38	-0.62
1988	-15.75	-21.46	-0.21	-0.62
1989	-6.40	-10.64	0.00	-0.14
1990	**-36.99**	**-44.64**	-0.96	-1.31
1991	9.68	-1.14	0.11	-0.38
1992	-7.23	-12.72	-0.44	-0.75
1993	-3.53	-7.87	-0.47	-0.39
1994	**54.64**	**51.73**	0.78	0.82
1995	26.91	26.61	**1.66**	1.14
1996	-4.81	20.35	-0.01	0.81
1997	-6.17	24.73	0.00	0.41
1998	5.69	8.96	-0.83	-0.30
1999	-24.59	-0.27	**-1.82**	-1.04
sum 94-99	51.67	**132.10**	-0.21	1.83

Note: figures shown in **bold** are statistically significant at the 10 percent level or better.

NAFTA period, peaking in 1994 when measuring FDI in per capita terms and in 1995 when measuring it as a ratio to GDP. Thereafter, they follow a declining pattern, and turn negative at the end of the sample. However, these negative values are smaller in magnitude than those shown in Table 3 As a result, the cumulative effect over 1994-99 vis-à-vis the Central America sample becomes positive also when measuring FDI as a percentage of GDP. However, like in the previous table, the effect is significant only when measuring FDI in per capita terms.

Thus, ignoring privatization-related FDI does not alter the main conclusions. The data continue to point towards an initial boom in FDI inflows to Mexico in 1994-95 (or 1994-97, depending on the country sample used) relative to the inflows to the other countries, followed by a slump at the end of the 1990s.

So far we have focused on the estimated year effects for Mexico. However, they only capture differences between Mexico and the (average of) the entire group of countries considered. But to assess the performance of other countries of specific interest —namely Central America and the Caribbean—we can compare their respective year effects with those of Mexico. Such comparison yields interesting information on how those countries have fared relative to Mexico (as well as their own past) after NAFTA.

Figures 2 and 3 depict the country/year effects of Mexico and Central America and the Caribbean, along with their 10 percent significance bands, for the two measures of FDI employed. Figure 2 corresponds to the estimates based on total FDI inflows, while Figure 3 reflects those based on FDI inflows net of privatization. In both cases, the estimates correspond to the sample excluding South America.

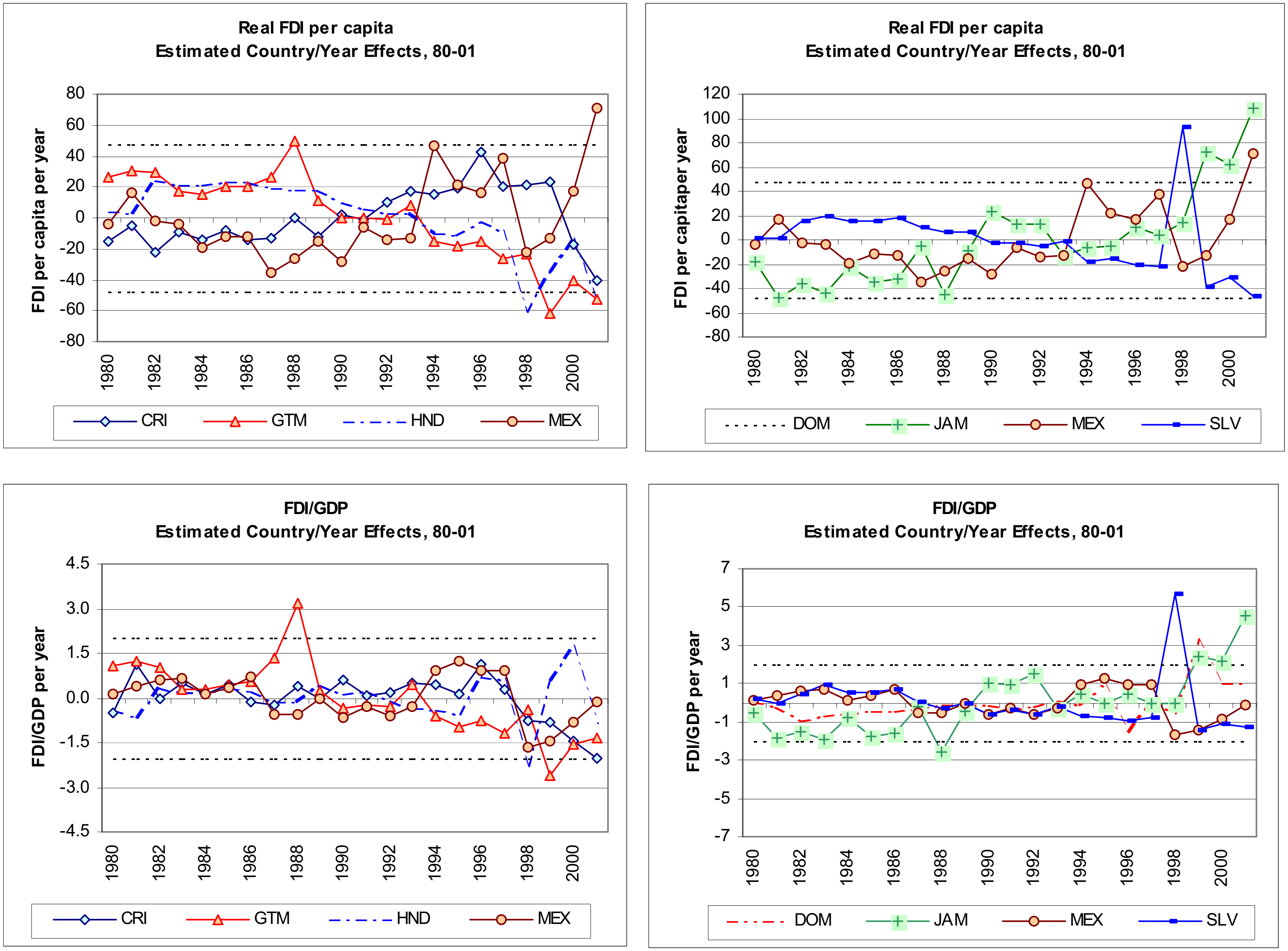
The top half of Figure 2 presents the results using real per capita FDI. Between 1994 and 1997 Mexico's year effects consistently exceed those of all other countries, with the only exception of Costa Rica. Over the rest of the 1990s, however, Costa Rica and Jamaica outperform Mexico in most years. These two countries exhibit positive time effects virtually throughout the 1990s. The graphs also show a clear spike in FDI to El Salvador in 1998, which reflects large privatization-related inflows in that year, and in Mexico in 2001 when using FDI per capita as the preferred measure. The bottom performers appear to be Guatemala and Honduras, with negative country-year effects during most of the 1990s when using per capita FDI. The information in terms of ratios to GDP, shown in the bottom half of the table, is qualitatively similar, although with this measure the performance of Honduras appears considerably stronger.

Figure 3 turns to the data net of privatization FDI. The sample period now ends in 1999, and the main difference is the removal of the outlying observation for El Salvador mentioned earlier. Costa Rica and Jamaica appear emerge as performers on par with Mexico in the post NAFTA period, while Guatemala remains as the main underperformer over the 1990s.

We can also inspect the country / year effects in search of co-movement among countries' idiosyncratic FDI trends, as given by the correlation between their respective year effects. Specifically, a negative correlation between the effects of Mexico and those of another country—implying that years of unusually high FDI into the former are also years of unusually low FDI into the latter —could provide a hint that they are substitutes as FDI hosts. However, it is important to recall that the effects are constrained to sum to zero across all countries for any given year, and hence their correlation is by construction biased towards –1. To minimize this distortion, it is convenient to work with the broader (LAC-wide) sample. Further, we use the per capita information to prevent the correlations from being distorted by movements in real exchange rates and output, which are likely highly correlated across countries.

With these caveats, Table 5 presents the correlation matrix of the country/year effects. Because the large spike in privatization-related FDI to El Salvador noted earlier tends to distort the correlations, we focus on the lower part of the matrix, which corresponds to the data net of privatization FDI. Even with the short time span of data available (which places the standard error of each correlation at 0.22) several significant correlations emerge. Most notably, Guatemala, Honduras, El Salvador and, to a lesser extent, the Dominican Republic show significant positive pairwise correlations, of 0.80 or higher in each case. In contrast, the effects of the first three of these countries are negatively correlated with those of Costa Rica and, to a lesser extent, Jamaica as well. The latter two countries also show a positive correlation. As for Mexico, its effects are not significantly correlated with those of any other country in the table.

Figure 2


Real FDI per capita
Estimated Country/Year Effects, 80-01
FDI per capita per year
CRI
GTM
HND
MEX
Real FDI per capita
Estimated Country/Year Effects, 80-01
FDI per capitaper year
DOM
JAM
MEX
SLV
FDI/GDP
Estimated Country/Year Effects, 80-01
FDI/GDP per year
CRI
GTM
HND
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FDI/GDP
Estimated Country/Year Effects, 80-01
FDI/GDP per year
DOM
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MEX
SLV

Figure 3

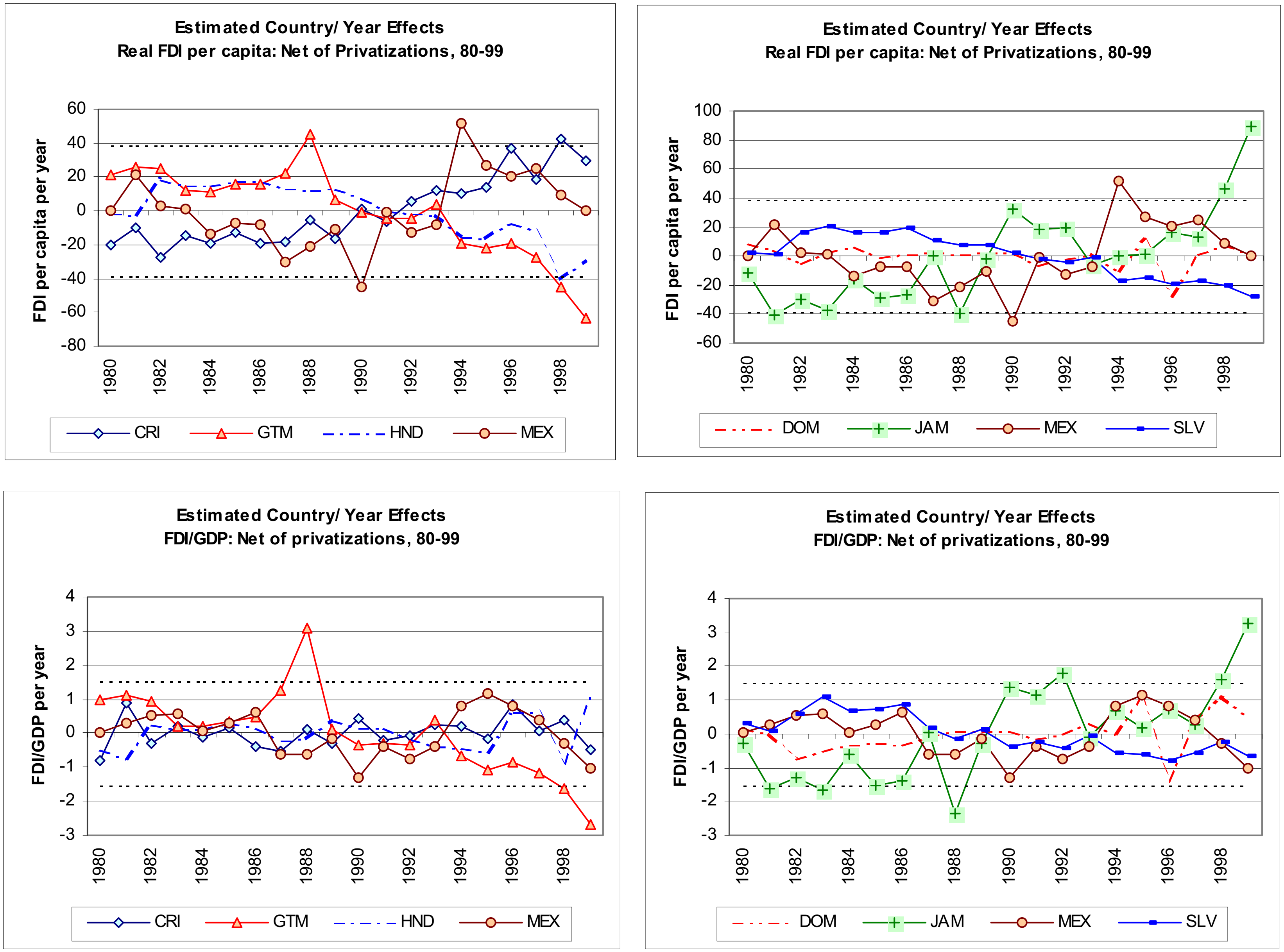

Estimated Country/ Year Effects
Real FDI per capita: Net of Privatizations, 80-99
FDI per capita per year
60 40 20 0 -20 -40 -60 -80
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998
CRI GTM HND MEX
Estimated Country/ Year Effects
Real FDI per capita: Net of Privatizations, 80-99
FDI per capita per year
100 80 60 40 20 0 -20 -40 -60
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998
DOM JAM MEX SLV
Estimated Country/ Year Effects
FDI/GDP: Net of privatizations, 80-99
FDI/GDP per year
4 3 2 1 0 -1 -2 -3
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998
CRI GTM HND MEX
Estimated Country/ Year Effects
FDI/GDP: Net of privatizations, 80-99
FDI/GDP per year
4 3 2 1 0 -1 -2 -3
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998
DOM JAM MEX SLV

**Table 5. Correlation of Estimated Country-Year Effects
1980–2001 & 1980–1999
Real FDI per capita**

	Mexico	*Costa Rica*	*El Salvador*	*Guatemala*	*Honduras*	*Dom.Rep.*	*Jamaica*
Mexico	1	-0.19	-0.09	0.06	0.04	0.23	0.36
Costa Rica	0.15	1	0.42	0.35	0.25	-0.24	-0.31
El Salvador	-0.03	-0.44	1	0.73	0.53	0.21	-0.25
Guatemala	0.01	-0.48	0.92	1	0.92	0.39	-0.41
Honduras	-0.10	-0.53	0.97	0.93	1	0.42	-0.37
Dom.Rep.	0.07	-0.11	0.79	0.69	0.67	1	0.40
Jamaica	-0.29	0.58	-0.41	-0.58	-0.45	-0.07	1

Note: The upper triangle of each matrix contains the correlations computed using FDI inclusive of privatization. The lower triangle uses FDI exclusive of privatization. The standard error of each correlation is 0.22.

What can we infer from these results? They suggest the existence of a block of Central American countries sharing similar FDI trends—Guatemala, Honduras and El Salvador. This may reflect a common pattern of specialization and/or FDI incentives across these economies. There is also some evidence of a second block, consisting of Costa Rica and Jamaica. Finally, there is very little suggestion of FDI reallocation from any of the countries shown towards Mexico, given the lack of any significant correlation between the time effects of Mexico and those of the other countries.

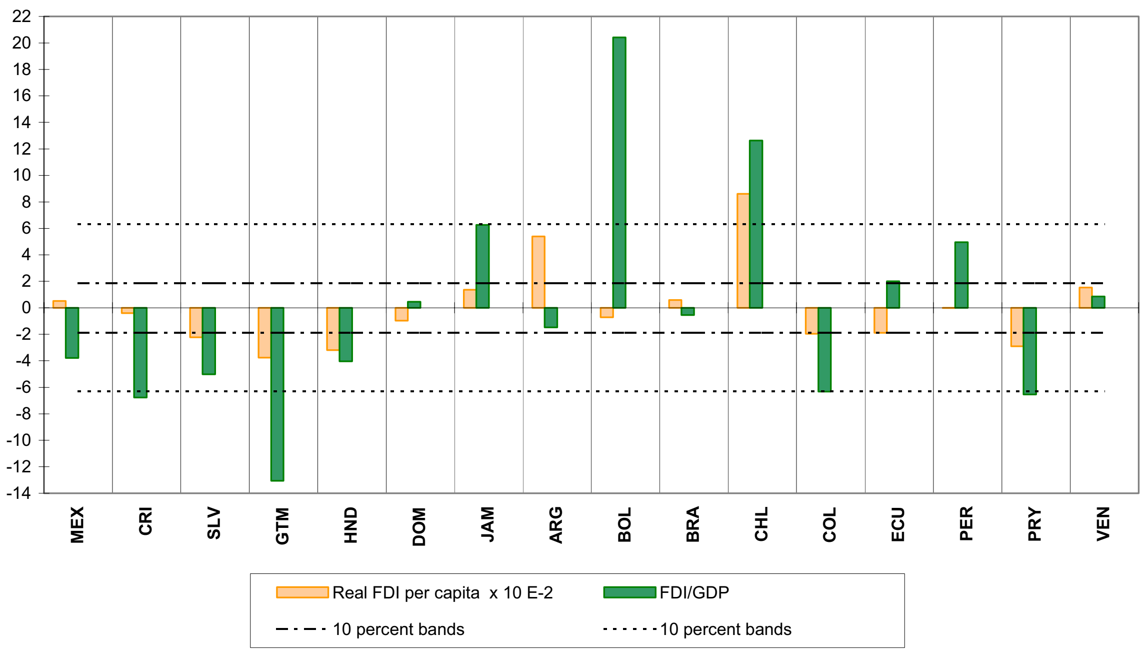
In summary, which countries overperformed and which underperformed—relative to the rest as well as to their own history—in terms of FDI inflows in the post NAFTA years? Figure 4 addresses this question. For each country, it shows the cumulative country/year effects for derived from the LAC-wide sample, for both measures of FDI employed, along with the corresponding 10 percent significance bands. Panel (a) uses total FDI over 1980-2001, while panel (b) uses FDI net of privatization transactions over 1980-99.

On the whole, Chile was the clear FDI leader in the post-NAFTA period. The main underperformer was Guatemala, regardless of whether privatization transactions are included. For the other countries, the rankings depend on the specific measure of FDI chosen. If we take per capita FDI as the preferred measure, Argentina fared significantly better than average, while in terms of FDI relative to GDP Peru and Bolivia did quite well. As for Mexico, its performance was roughly on par with the average, especially if privatization transactions are excluded. Relative to NAFTA's neighbors, Mexico did better than Guatemala and El Salvador, but worse than Jamaica and roughly on par with Costa Rica and the Dominican Republic.

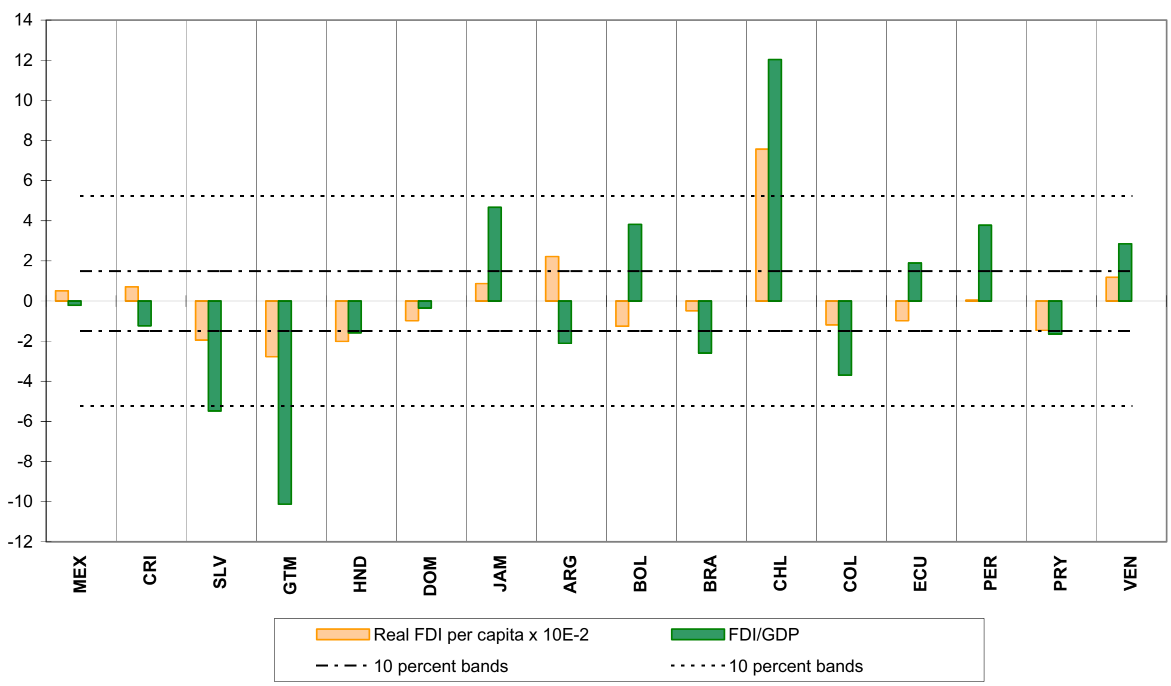
To conclude this section, on the whole FDI trends do not give strong indication that flows were diverted from other Latin American countries towards Mexico in the post-NAFTA years. Regarding Mexico, the evidence reviewed here is in broad agreement with that shown in Chapter 4. We find an increase in FDI inflows to Mexico in the early years of NAFTA, after controlling for common trends and the country's past FDI record. The rise tapers off at the end of the 1990s, which would be consistent with an FDI stock adjustment, a pattern similar to that encountered in Southern Europe at the time of EU enlargement. Over the post-NAFTA period as a whole, we also find that Mexico's FDI performance was not significantly different from the Latin American norm. Other Latin American countries experienced comparable or larger FDI rises, even if privatization-related flows are ignored.

Figure 4. Cumulative country / year effects and their 10 percent significance bands

(a) FDI inflows including privatization, 94-01



(b) FDI inflows excluding privatization, 94-99



As for NAFTA's neighboring countries, on average they did less well than Mexico in the post-NAFTA years, although the difference is only significant when measuring FDI in real per capita terms. However, their individual FDI trends were quite diverse. If we take the privatization-exclusive FDI measures as our preferred yardstick, Guatemala and El Salvador performed significantly worse than the Latin American norm according to the measures reported, while Costa Rica did no different than the average and Jamaica and the Dominican Republic actually did better. This diversity in FDI performance among NAFTA's neighboring countries—even though they all faced a common 'NAFTA shock'—suggests that, rather than (or in addition to) FDI diversion from the FTA, other country-specific factors were at work. This is explored next.

7.4 A broader view of FDI determinants in Central America and the Caribbean

We now move beyond the descriptive analysis. We first review some non-FTA determinants of foreign investment of particular relevance for NAFTA's neighbors, and then place the impact of NAFTA in a broader context of FDI determination.

7.4.1 Trade patterns and FDI incentives in Central America

One potential factor behind the dissimilar FDI trends across Central American countries is the divergence in their respective patterns of specialization over the last decade. As already noted in the preceding chapter, Guatemala, along with Honduras and El Salvador, increasingly tilted the composition of exports towards apparel, while Costa Rica did the opposite and Jamaica experienced no significant change in this regard. Chapter 6 also noted that NAFTA granted Mexico a substantial tariff advantage in the apparel sector over the rest of the region, although the advantage was largely temporary, as the recent realignment of U.S. import preferences in the CBTPA moved Caribbean Basin countries closer to tariff parity with Mexico.

Did this preferential treatment of Mexico's apparel sector significantly discourage FDI inflows into the neighboring countries, as argued by some observers? There are numerous indications, but little hard data, that the apparel industry has been a major recipient of FDI in these economies (e.g., ECLAC 1999, Ch. 6).[306] Thus, it is possible that the passage of NAFTA might have encouraged the redirection of further investment in the apparel sector to Mexico. However, it is very difficult to establish the order of magnitude of such an effect given the lack of adequate data.[307] Furthermore, as Chapter 6 already stressed, it is also hard to disentangle the effects that NAFTA might have had in this regard from those of the Mexican devaluation of 1994, which resulted in a sharp increase in the wages of neighboring countries relative to those in Mexico. Relative wage costs have been found to play a major role in the location decisions of export-oriented multinational firms across Central America and the Caribbean (Woodward and Rolfe 1993), and they are particularly relevant for textile and apparel firms, given the large weight of wages in total production cost. In any case, the fact that that the share of exports from these countries in NAFTA's apparel market actually rose in the post-NAFTA years—as shown in Chapter 6—suggests either that FDI diversion effects associated with the apparel sector were relatively minor, or that they were offset by other investment-attracting measures, such as those related to the EPZs discussed below.

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[306] The available evidence is only indirect, and is given by the fact that most textile exports originate in EPZs, where the majority of firms—most of which belong to the textile and apparel sector—are foreign-owned. The exception in this regard is Costa Rica. See Esquivel, Jenkins and Larrain (1998).

[307] In addition, one has to recall that policy initiatives towards "NAFTA parity" started to be discussed in the U.S. soon after passage of NAFTA (and even before), which suggests that the temporary nature of Mexico's preferential treatment was widely recognized. This would have mitigated its impact on fixed investment decisions guided by longer-term prospects.

In contrast with the pattern followed by Guatemala, Honduras and El Salvador, Costa Rica actively pursued the strategy of diversifying FDI away from traditional sectors. Large volumes of FDI into Costa Rica went to the production of electric and electronic equipment, including computer components and software.[308] In recent years, significant amounts have gone also to services, tourism and medical supplies (Robles-Cordero and Rodriguez-Clare 2003). The most celebrated case is that of INTEL, which is reviewed in detail in Box 3. Costa Rica's ability to attract significant FDI into these nontraditional sectors has probably been a major factor in its solid aggregate FDI performance during the post-NAFTA years.

Aside from the sector destination of FDI, Central American and Caribbean countries have made extensive use of tax incentives to attract foreign investors. Such incentives are linked to the EPZs instituted by most countries.[309] There is remarkable homogeneity in incentives across countries. One key difference lies in the taxation of profits. Mexico, like Chile, does not provide any exemption, and foreign investors are subject to the same 34% tax on profits as local firms. In contrast, the other countries fully exempt foreign firms from the profit tax for long periods of time, and in fact the main difference lies in the duration of the exemption period (Table 6).[310] It is conceivable that these incentives might have contributed to offset potential FDI diversion effects from the treaty, although most of the EPZs' legal codes were enacted before 1994, and were not altered in response to NAFTA—indeed, there was little margin for further profit tax concessions, since tax rates were already at zero.[311]

How effective are these incentives? The limited information available suggests that EPZs attract much of the FDI accruing to Central American countries (Robles-Cordero and Rodriguez-Clare 2003). There is some evidence that EPZs and the associated tax concessions have an impact on export-oriented FDI location decisions. Studies by Woodward and Rolfe (1993), who examine location decisions in the Caribbean basin; Kumar (1994), who analyzes the location of U.S. multinationals across 40 countries; and Choi (1995), who examines the location of U.S.-owned textile plants across 47 countries, all conclude that the existence of EPZs tends to attract FDI. The first of these studies also finds that the length of tax holidays has a positive effect on location choices, while the second finds no conclusive evidence in this regard.

Tax and other concessions to FDI are not necessarily inefficient when foreign (as opposed to domestic) investment involves positive externalities, through channels such as technological spillovers. However, they have major limitations. First, tax regulations in the home country may prevent multinational firms from taking advantage of tax concessions enjoyed by the subsidiaries in other

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[308] For all these goods, CBI and NAFTA provide equal benefits, so that exports from CBI countries enter the U.S. market on the same footing as competing goods from Mexico. This is not always the case in third markets, however, where some of these exports are sometimes viewed as being subsidized by EPZ benefits, and thus subject to exclusion from preferential treatment. This is reported in a recent study by PROCOMER-CINDE (the agencies promoting FDI and international trade in Costa Rica) which analyzes market access of goods produced in Costa Rica in the sectors listed in the text. The study finds that such goods (and hence those produced in any other country under the CBI/CBTPA umbrella) enter the U.S. market in the same conditions as if they were produced in Mexico, but face more obstacles in markets in Europe, South America and even Central America!

[309] Details on EPZ incentives are given in a recent study by CINDE-PROCOMER (2001) and the Ph D thesis by Borbon-Guevara (2002), who compare the incentives provided by Costa Rica and other countries. See also Robles-Cordero and Rodriguez-Clare (2003).

[310] In some cases (e.g., Costa Rica and Guatemala) the period of exemption depends on whether the plant locates in a low development region or not. In general, however, by reinventing/renaming themselves right before expiration of the exemption, it is quite possible that firms may be able to extend the exemption beyond the letter of the law.

[311] However, some anecdotal evidence indicates that governments might have resorted to other forms of incentives, such as worker training, co-financing of some investments, more generous infrastructure provision, power subsidies etc.

Box 3. Costa Rica vs. Mexico in the INTEL race[312]

Intel's decision in 1997 choosing Costa Rica to locate a large production plant—400,000 square feet, employing up to 2,000 people to assemble and test the latest microprocessors—illustrates the factors that affect the quantity and composition of FDI. First, it shows the region's potential to attract foreign investment into sectors that until then had been beyond its reach. However, it also highlights barriers to foreign investment that need to be removed. Finally, it shows that membership of an RIA with the source country and target market may be a relevant factor but not a determinant one.

Costa Rica was included in Intel's preliminary list of potential investment sites largely due to the active efforts of CINDE (Coalición Costarricense de Iniciativas para el Desarrollo), which since the late 1980s had switched its FDI-attracting strategy from general promotion of the country to targeting a specific groups of potential investors. At first it (successfully) targeted textile producers, but later, as the wages and labor benefits of Costa Rica put it in no position to compete with cheap-labor economies, CINDE switched to electronics, and among other large companies it approached Intel as early as 1993 (Spar 1998). Costa Rica's political stability, geographical advantage, and the quality of its labor force, earned the country a spot in Intel's initial list, which included also Argentina, Brazil, Chile, China, India, Indonesia, Korea, Mexico, Puerto Rico, Singapore, Taiwan, and Thailand.

Next in the selection procedure, countries were dropped from the list if they failed to offer workable conditions regarding wages, labor benefits, taxes, tariffs and regulations for capital repatriation. As all output was intended for export, tariffs and customs fees were particularly important. On the basis of these criteria, the list was first narrowed to Brazil, Chile, Costa Rica, and Mexico. By mid-1996, the list was narrowed further to only two contenders, Costa Rica and Mexico. By the end of 1996, Intel announced its decision to build the plant in Costa Rica, and construction began in April 1997.

In retrospect, the studies by Spar (1998) and Larrain et. al (2001) suggest that three main factors led to the selection of Costa Rica over Mexico. First, Costa Rican authorities responded promptly to Intel's concerns, which involved the inadequacies of the country's physical and educational infrastructures. Regarding education, while human capital indicators in Costa Rica outdid those of Mexico, they were not sufficient to support Intel's personnel needs. On infrastructure, the main problem was in the transport sector. The capacity and frequency of flights of the main airport were deemed inadequate, as was highway access from the plant's prospective location. Furthermore, the high cost of electricity was an additional concern.

The Costa Rican authorities moved swiftly to address all these issues. On education, a joint team of government officials and Intel identified the gaps in Costa Rica's educational system and proposed specific actions for improving technical skills and language training. On transport, the authorities granted more licenses to foreign carriers, accelerated plans for a new cargo terminal, and agreed to help improving access to the highway. A two-tier industrial rate structure was established for power, giving larger users like Intel more favorable pricing. The active efforts of the authorities may have been encouraged by the large magnitude of the prospective investment relative to Costa Rica's economy, making the country's small size an asset rather than an obstacle for attracting FDI.

Second, Costa Rica's system of fiscal incentives was aggressive and credible. It had successfully attracted other foreign firms. Political stability and the authorities' firm strategy of inserting the country's economy into international markets convinced investors that the incentives would remain in place for the long term. In contrast, Mexico's incentives were less generous, and the credibility of its attempt to offer special tax breaks was undermined by their discretional nature.

A third factor was the requirement in Mexico that investors be subject to a system of mandatory union rules. Intel's plants are union-free, so allowing an exception could have triggered unionization elsewhere. According to Spar (1998), Mexican authorities offered to exempt Intel from the rules, but the discretional nature of this very offer may have made Intel wary of the business environment in Mexico.

Three lessons can be extracted from the Intel episode. First, Costa Rica already had many of the conditions that Intel needed. It had enjoyed political stability for a long time, and had made efforts to liberalize international trade and labor markets.[313] It also possessed a fairly well trained work force and an incipient electronics sector.

Nevertheless, the second conclusion is that fiscal incentives were also important. But in a world where many countries compete for attracting FDI, one key factor in favor of Costa Rica was the credibility of its incentive regime, given by its generalized nature and automated process.

The third lesson is that active involvement of the authorities can be key in attracting a big investment project. They were prompt and effective in removing obstacles identified by the prospective investor. But an important fact, highlighted by Spar (1998), is that the Costa Rican government responded to Intel's concerns mostly by changing the general nature of the regulations and enhancing the education system, not by providing grants and subsidies specifically to Intel.

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[312] This section is based on Monge (2002), drawing from Spar (1998) and Larrain, Lopez-Calva and Rodriguez-Clare (2001).

[313] As discussed by Larrain et. al. (2001), a study carried out in 1999 confirmed that other foreign investors' perceptions of Costa Rica largely coincided with Intel's assessment. The 61 foreign investors interviewed ranked "political stability" and "well-educated labor force" as the top strengths of Costa Rica's.

Table 6. Fiscal incentives to foreign investors

Country	Income Tax Exemption	Years of Benefit
México	0% (tax is 34%)	n.a.
Costa Rica	100% first, then 50%	8-12/4-6
Guatemala	100%	12-15 years
El Salvador	100%	20
Honduras	100%	Indefinite
Dom. Republic	100%	15 to 20
Brazil	100%	3 to 10
Chile	0% (tax is 34%)	n.a.

Source: Borbon-Guevara (2000) and Robles-Cordero and Rodriguez-Clare (2003)

countries (Agosin and Machado 2000). Second, competition in tax and other concessions among FDI hosts can lead to a 'race to the bottom' whose outcome is an excessively low level of taxes in all countries without any stimulating effects on FDI. Incentives also involve potentially large costs in terms of foregone fiscal revenues, economic distortions, and enhanced scope for rent-seeking. Third, and most important, when the effectiveness of tax concessions in attracting FDI is examined in a broader empirical context including also 'deep' FDI determinants, such as productivity, macroeconomic stability, governance and institutional quality, available studies find that the latter factors have a larger and more robust impact than tax concessions on the cross-country distribution of FDI inflows. Incentives appear to make a difference only when the choice of location is made between competing jurisdictions for which those FDI fundamentals are roughly equivalent.[314]

From a practical perspective, a key issue is that income tax concessions to EPZs in Central America and the Caribbean, with the exception of El Salvador, are linked to export performance, and as such they represent export subsidies contrary to WTO regulations –except when the concessions apply to firms producing services (such as call centers and 'back-office' services). Such schemes were to be dismantled by January 1st, 2003, although the deadline is likely to be extended for a few more years.

How should countries respond to this new situation? In principle, they could replace existing EPZ incentives with broader tax concessions to all foreign investors, regardless of export performance, or even to all investors, both domestic and foreign. But the first option would still imply an asymmetric treatment of local and foreign firms for which there is no clear justification, in view of the inconclusive evidence on the existence and significance of spillovers from foreign firms (see Chapter 5). As for the latter option, it would entail unacceptably high fiscal costs.

In this regard, an upcoming FTAA or CAFTA treaty may offer a unique opportunity for the joint phasing out of EPZ-based investment incentives running counter WTO rules in Central America and the Caribbean. This would help the countries involved switch to a more promising investment-promotion strategy based on uniform taxation to all firms, possibly supported by a region-wide agreement to prevent tax competition, and focused on strengthening the FDI fundamentals mentioned earlier—macroeconomic stability, productivity growth and the quality of the institutional and regulatory framework. The empirical role of these fundamentals in FDI flows is discussed next.

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[314] See Morisset and Pirnia (2002) for an overview of the literature on the effectiveness of tax incentives, and Stein and Daude (2001) for some recent econometric evidence.

7.4.2 The relative appeal of alternative FDI destinations

Trade preferences and tax concessions are only two among many ingredients that determine the allocation of FDI across developing countries. Other factors also matter, or matter even more.[315] Conceptually, foreign investment flows can be viewed as reflecting the portfolio decisions of international investors regarding the location of their assets. Broadly speaking, these depend on two types of factors. First, global factors, which affect the willingness of international investors to invest in developing countries. Thus, global factors cause FDI to change across a broad range of countries. Second, local factors, which are country-specific and affect primarily the decision to invest in each host country. Global factors relate to required rates of return and risk perceptions in world financial markets, as reflected by industrial-country interest rates and term and risk premia. In turn, local factors capture the anticipated return and risk associated with FDI into specific host countries. They measure ingredients such as host country productivity, economic volatility and institutional quality.[316]

This framework provides a guide to the allocation of a worldwide pool of FDI resources across individual hosts. It is useful to recast it in terms of the *relative* attractiveness of each host country. In this context the latter can be summarized by two key variables: the anticipated return to FDI in each host country relative to the rest, and the perceived risk associated with FDI in each host, also relative to the rest. Other things equal, a higher relative return attracts FDI into the country offering it, while a higher relative risk redirects inflows to other host countries. This serves to underscore that, in addition to global factors impinging on worldwide FDI, what matters for the allocation of FDI inflows is not just the *absolute* appeal of each host, but its position vis-à-vis other hosts in terms of both level and volatility of investment returns.

It is useful to examine the predictions of this framework regarding the allocation of FDI across Latin America.[317] For this purpose, we construct a synthetic index of return as a weighted average of: (i) productivity growth, measured by per capita GDP growth[318]; (ii) market size and scale economies, measured by total population; (iii) openness, measured by the ratio of imports plus exports to GDP at constant prices; (iv) market distortions, measured by the premium in the black market on foreign exchange; (v) governance and institutional quality, proxied by the Kaufmann governance index and the Gastil civil liberties index; and (vii) overall tax burden, proxied by general government consumption as a ratio to GDP. In chapter 4 we already saw that many of these variables are significant determinants of FDI inflows.

Likewise, we construct a synthetic risk index summarizing four main ingredients: (i) overall macroeconomic stability, measured by the standard deviation of the rate of growth of GDP per capita; (ii) monetary and price stability, captured by the inflation rate and its standard deviation; (iii) external sector instability, measured by the standard deviation of real exchange rate changes, terms of trade shocks, and the openness measure above; and (iv) [lack of] governance and overall institutional quality, measured by

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[315] This is clearly illustrated by the results of a survey of Costa Rican textile forms reported by Monge (2002). While some respondents did mention trade agreements and EPZs as important factors in their decision to locate in a specific country, a number of other factors—from wage costs to infrastructure and availability of skilled labor—were mentioned by a larger number of survey participants.

[316] This framework and its empirical validation are spelled out in detail in Albuquerque, Loayza and Servén (2002). They show that while both local and global factors play a significant role in determining the worldwide allocation of FDI (each accounts for roughly half of the total explained variation) global factors have become increasingly important in recent years as a result of rising world financial integration.

[317] The material that follows is a brief summary of Albuquerque, Loayza and Servén (2002) and Calderón, Loayza and Servén (2003).

[318] Using instead a measure of TFP growth leads to analogous results.

the inverse of the two variables in (v) above.[319] Again, some of these variables were already encountered in Chapter 4.

To highlight the key role of relative return and risk, each country's index is expressed in terms of deviation from the (average) index of the other countries in the sample. Finally, to complete the empirical framework, we add a scale measure of FDI (namely, worldwide FDI outflows relative to world GDP) and the global financial factors mentioned above, which for added simplicity are represented by their first two principal components.[320]

The results from empirical implementation of this framework for a large sample of developing countries over the last three decades are shown in Table 7. Given the size of the sample, this stylized approach accounts for a fairly respectable portion of the observed variation in FDI flows. Most importantly, the results show that higher relative returns attract FDI, while higher relative risk deters it. Higher interest rates and risk premia in world markets also deter FDI, as implied by the negative coefficients on the synthetic global factors. Lastly, the coefficient on the scale variable is highly significant and below one, reflecting the fact that not all FDI hosts are included in the sample (which in fact excludes industrial countries) and, when privatization transactions are omitted, the significant role of privatization-related flows in worldwide FDI flows.

Table 7. Determinants of net FDI inflows
(percent of GDP, developing countries, 1970–99)

Dependent variable	*Total FDI / GDP*	*FDI / GDP excl. privatization*
Relative return	0.005 **	0.004 **
	0.001	*0.001*
Relative risk	-0.007 **	-0.006 **
	0.001	*0.001*
World FDI / GDP	0.647 **	0.535 **
	0.161	*0.153*
global factor 1	-0.001 **	-0.001 **
	0.001	*0.001*
global factor 2	-0.003 **	-0.003 **
	0.001	*0.001*
R-square	0.4316	0.4224
No. Obs	1025	1025
No. Countries	73	73

Note: standard errors in italics under each coefficient. For variable description, see text.

[319] Note that these institutional variables enter in both the return and risk indices. The reason is that weak institutions affect both transaction costs, and hence anticipated returns, and the predictability of returns, and hence perceived risk. See Calderón, Loayza and Servén (2002) for further discussion and the exact description of the variables involved as well as their weighting in the construction of the synthetic indices.

[320] The underlying global variables are world GDP growth, the U.S. real interest rate, the term premium on 10-year U.S. Treasury bonds, the U.S. credit spread and the U.S. stock market return. The use of principal components is convenient because these variables are strongly mutually correlated.

It is instructive to examine how Latin American countries fare vis-à-vis the rest of developing countries in terms of return and risk. Figure 5 depicts differential risk and return, averaged over the period 1980-1999, for the entire country sample. In the graph, the most attractive FDI host countries are those located in the upper left corner, characterized by low risk and high return. It can be seen that the lowest relative risk and the highest returns are found among East Asian countries. The Latin American country coming closest to this top group is Chile. Yet in the worldwide sample it does not appear particularly distinguished. At the other extreme, Argentina and Peru stand out in the world sample for their high risk over the period considered.

Figure 5. Relative Risk and Return
All Developing Countries, 1980–1999

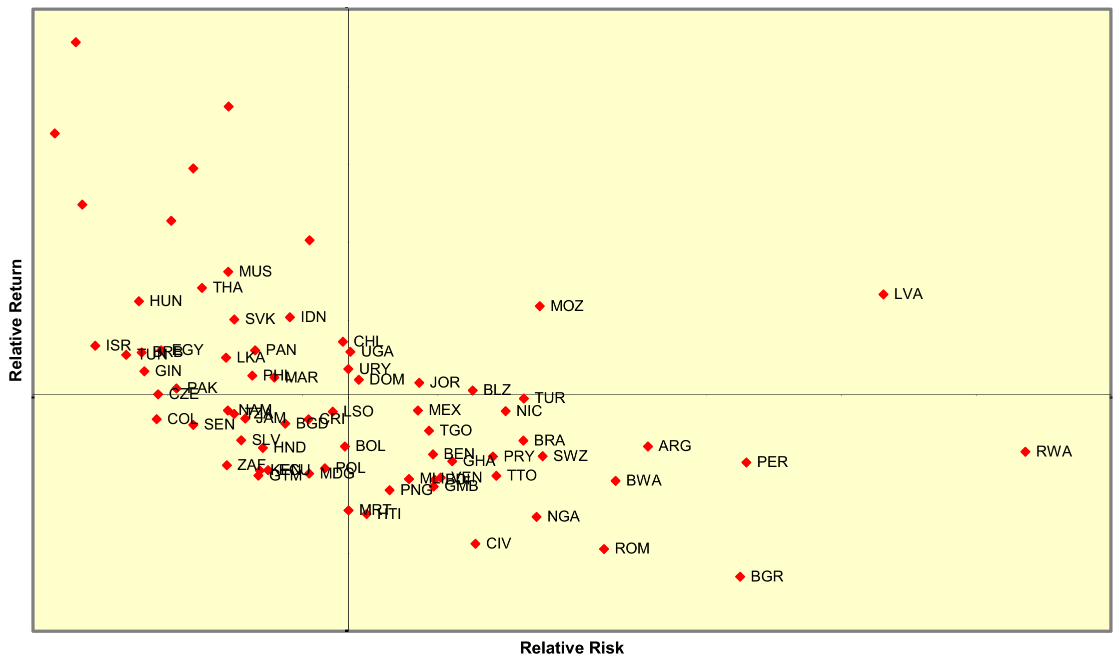

Figure 6 plots the changes in Latin American countries' differential risk and return between 1980-93 and 1994-99—i.e., before and after NAFTA. Virtually all of the region's economies managed to raise their differential return, lower their risk or both. The most dramatic change was that of Peru, which experienced the largest improvement in both dimensions, following its recovery from the period of high macroeconomic instability of the late 1990s. According to the synthetic indices, Mexico was among the countries whose relative return increased, although its relative risk did not change much. The latter fact is due to the backward-looking nature of the risk index, which reflects primarily the instability derived from the Tequila crisis, and does not allow for any forward-looking effects of increased credibility that may have resulted from NAFTA.

This synthetic framework provides another way to gauge indirectly the impact of NAFTA on FDI flows. Since the empirical framework does not incorporate explicitly the passage of NAFTA as an investment determinant, comparison between the actual patterns of FDI across countries in the post-NAFTA period and the patterns predicted by the empirical model can serve to detect any major effects of NAFTA on the allocation of FDI across the region, over and above those captured by the FDI fundamentals embedded in the risk and return indices.

Figure 6. Change in Risk and Return
Latin America and the Caribbean, 1980–93 vs. 1994–99

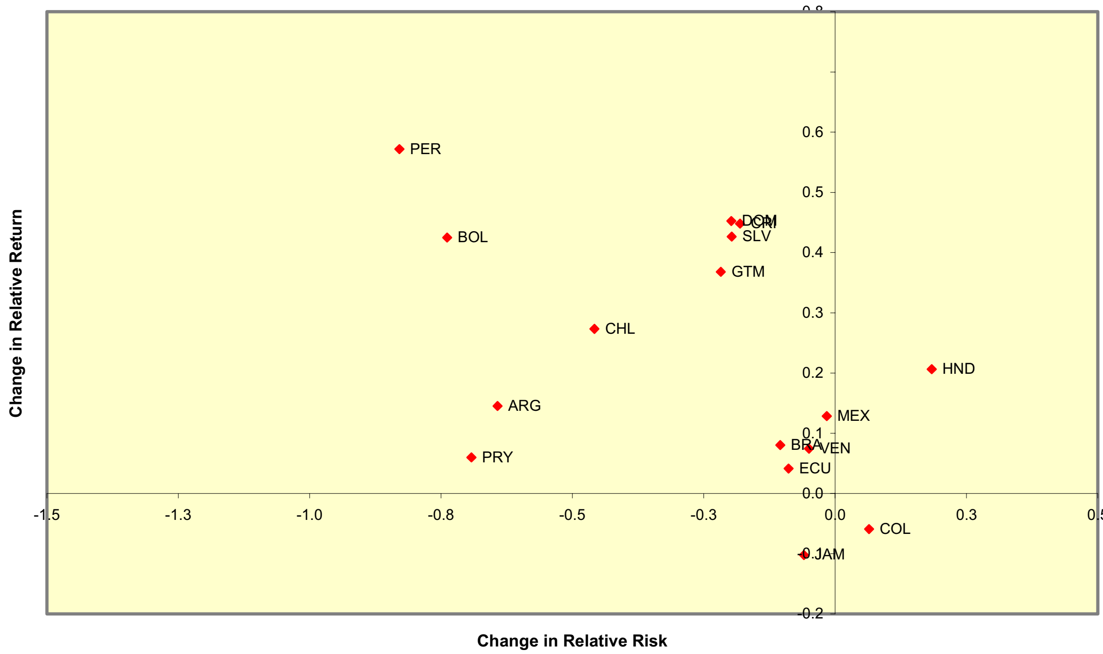

Table 8 shows the actual change in FDI inflows to LAC countries between 1980-93 and 1994-99 and compares it with the change predicted by the risk-return framework. The calculation is performed both using total FDI and excluding privatization-related FDI. In the case of Mexico, the observed change in FDI between the two subperiods (around 1.7 percent of GDP) is in both cases somewhat above that predicted by the model, likely capturing a temporary positive impact of NAFTA, as argued earlier. However, the difference relative to the model's predictions is fairly modest and statistically insignificant, implying that the changes in FDI fundamentals—some of which may themselves reflect the impact of NAFTA—account for most of the observed variation in FDI inflows to Mexico.

In turn, in South America the observed change in FDI exceeds the model's predictions by a wide margin in the case of Chile, and also in Bolivia and Peru if privatization transactions are included. However, once privatization-related FDI is excluded from the picture, the actual and predicted FDI performance are fairly close for most countries, with Chile as the single exception.

For Central America, the results are fairly diverse. The changes in relative risk and return account fairly well for the observed FDI patterns, with the main exceptions of Guatemala, which did much worse than predicted, and Jamaica which did much better. Thus, the pattern is similar to that found in Figure 4 above. Excluding privatization inflows does not alter the picture, and in fact it makes the overprediction of Guatemala's performance statistically significant. In this latter case, El Salvador also exhibits a negative residual, but it is not statistically significant.

Thus, except for the extreme cases of Guatemala and Chile, the changes in risk and return FDI fundamentals account fairly well for the observed changes in the pattern of FDI flows to most Latin American and Caribbean countries after 1993. This of course does not mean that NAFTA had no independent effects on such patterns, but rather that the effects of the treaty are largely captured by those changing fundamentals. For example, most of the increase in Mexico's return index between the pre- and post-NAFTA periods noted earlier can be traced to the increase in the economy's openness over those

Table 8. Risk and return FDI model
Explaining changes in average FDI inflows, 1994–99 vs. 1980–93

Region / Country	Change in total FDI/GDP			Change in FDI/GDP excluding privatization		
	Actual	Fitted	Residual	Actual	Fitted	Residual
Latin America	**0.0247**	**0.0163**	**0.0084**	**0.0173**	**0.0139**	**0.0034**
Mexico	0.0172	0.0140	0.0032	0.0167	0.0119	0.0049
South America	**0.0308**	**0.0169**	**0.0139**	**0.0210**	**0.0144**	**0.0066**
Argentina	0.0247	0.0185	0.0062	0.0122	0.0158	-0.0036
Bolivia	0.0646	0.0204	0.0442	0.0263	0.0174	0.0089
Brazil	0.0180	0.0144	0.0036	0.0111	0.0122	-0.0012
Chile	0.0511	0.0178	0.0333	0.0459	0.0151	0.0307
Colombia	0.0133	0.0126	0.0007	0.0084	0.0107	-0.0022
Ecuador	0.0218	0.0141	0.0076	0.0218	0.0120	0.0098
Peru	0.0425	0.0217	0.0208	0.0262	0.0185	0.0077
Paraguay	0.0133	0.0184	-0.0051	0.0133	0.0158	-0.0025
Venezuela	0.0276	0.0140	0.0136	0.0240	0.0119	0.0122
Central America	**0.0156**	**0.0154**	**0.0001**	**0.0116**	**0.0131**	**-0.0014**
Costa Rica	0.0143	0.0166	-0.0023	0.0143	0.0141	0.0003
Dominican Republic	0.0222	0.0168	0.0054	0.0164	0.0142	0.0022
Guatemala	-0.0017	0.0165	-0.0182	-0.0069	0.0140	-0.0209
Honduras	0.0135	0.0129	0.0006	0.0135	0.0108	0.0026
Jamaica	0.0284	0.0132	0.0151	0.0284	0.0113	0.0171
El Salvador	0.0167	0.0166	0.0001	0.0042	0.0140	-0.0098

Note: shaded values are statistically significant at the 10 percent level or better.

years, when it practically doubled. Such increase in openness was very likely helped by NAFTA, as argued in previous chapters.[321] But for the rest of the countries the observed changes in FDI inflows generally reflect a number of different factors, both local and global. In particular, once we control for the risk and return determinants of FDI, no systematic pattern of FDI underperformance is visible in the data for the neighboring countries of Central America and the Caribbean.

7.5 Concluding remarks

This chapter has examined trends in FDI inflows across Latin America before and after NAFTA in search for evidence of FDI diversion. On the whole, we do not find clear evidence that the FTA led to a significant slowdown in investment flows to Latin American countries in general and the neighboring countries of Central America and the Caribbean in particular. The generous investment incentives granted by most of these countries under the EPZ regime may have helped them retain their appeal as FDI hosts in the post-NAFTA environment. But the FDI performance of NAFTA's neighbors also shows a good deal of heterogeneity. While some did experience a relative slowdown in FDI inflows in the post-NAFTA years, others performed on par or even better than Mexico. This suggests that country-specific features and policies, aside from (or in addition to) NAFTA, have played a major role in the changing pattern of FDI inflows across the region. Indeed, a simple empirical framework encompassing fundamental FDI determinants—the anticipated return and perceived risk from investing in different host countries—can account for much of the FDI variation before and after NAFTA.

[321] They key role of openness for Mexico's FDI performance was already identified in Chapter 4 above.

The analysis in this chapter provides also a perspective on the potential effects on FDI inflows from a NAFTA expansion to other LAC countries and/or a future FTAA. Like in the cases of Mexico with NAFTA and Southern Europe with the EU, entry of other neighboring countries into an FTAA would likely cause an increase in their FDI inflows—although, like in those cases as well, the increase might be only temporary, reflecting a stock adjustment. The relatively low volume of FDI relative to trade in Latin America compared with the EU suggests that the FTAA offers the scope for a considerable increase in FDI to the region, both from within and outside the FTAA. It is also likely to encourage further concentration of investment in a few countries.[322]

However, the available evidence on RIAs and foreign investment also suggests that the likelihood and magnitude of an FDI increase to RIA newcomers rises with their attractiveness.[323] Unstable countries with low productivity, distorted policies and weak institutions are unlikely to draw much FDI benefit from joining a RIA. As Chapter 4 discussed, countries with strong institutions protecting investors' rights, a stable macroeconomic environment and open trade regimes are much more likely to reap large gains from FTAA membership.

Ultimately, FTAs are neither necessary nor sufficient for countries to attract increased FDI inflows. Some leading FDI hosts, such as Chile, did not need to enter into a RIA to become top investment destinations. At the other end, Greece's entry into the EU did not earn it the FDI dividends that Spain and Portugal collected. FTA membership does not make up for bad policies. It is a complement, rather than a substitute, for an investment-friendly policy and institutional environment. Thus, for countries hoping to benefit from RIA-induced investment creation, the prospect of an upcoming RIA requires renewed effort on reforms aimed at improving investment fundamentals: economic and policy stability, productivity, institutions and governance. Along some of these dimensions—the latter in particular—many Latin American and Caribbean countries still score quite poorly vis-à-vis other developing regions such as East Asia.

This strategy towards FDI stands in contrast with the alternative of engaging instead in an aggressive 'incentive race', in which countries compete with each other in terms of tax and other concessions to attract FDI flows. As already mentioned, tax concessions do have some effect on FDI location decisions, and many countries tend to combine both strategies to some extent. FDI incentives are predicated on the basis of positive externalities from foreign investment, which are hard to identify and quantify, and as a result incentives are likely to be excessive in many cases. However, the empirical evidence also suggests that FDI-specific incentives are less effective in attracting investment than investment-friendly policies and institutions, which should be the primary concern of the authorities. Any incentives offered on top of this should be rules-based, and available on equal terms to all investors irrespective of industry and nationality of investor.

In the end, for host countries the key concern is not the volume of FDI they may receive, but the benefits that it will bring to their economies. This means that reforms in anticipation of an FTAA have to focus also on the key determinants of those benefits, even if they do not directly affect the volume of FDI inflows. If, as commonly believed, FDI has beneficial effects in terms of technological and knowledge spillovers (although evidence of their existence is far from conclusive), sufficient levels of human capital and an adequate knowledge and innovation system need to be in place for the domestic economy to absorb them. [324] This means that, as argued in Chapter 5, knowledge and innovation policies are a major item in the reform agenda.

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[322] Venables and Winters (2002).

[323] Levy-Yeyati, Stein and Daude (2002).

[324] This is underscored by Blomstrom and Kokko (2003).

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