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WORKING PAPER NO. 632

LABOR ISSUES IN A NORTH AMERICAN FREE TRADE ARE.

by

Raul Hinojosa-Ojeda
University of California at Los Angeles

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Abstract

This paper surveys work analyzing the employment and wage implications of the formation of a North American Free Trade Area (NAFTA). Three types of models have been used: (1) partial equilibrium models based on historical extrapolation or regression analysis, (2) single-country computable general equilibrium (CGE) models, and (3) multi-country CGE models. Trade theory predicts that, even without international factor mobility, there should be movement toward wage convergence after the creation of NAFTA, with Mexican unskilled wages rising and U.S. unskilled wages falling. Model results indicate that, on the U.S. side, this result is not empirically robust. The effects of NAFTA on the U.S. side are small, and existing distortions create a second-best environment in which the theoretical predictions become ambiguous. All the CGE models generated plausible scenarios in which wages rise significantly in both the U.S. and Mexico. While macro effects in the U.S. resulting from the creation of NAFTA are tiny, there are important sectoral effects. There are certainly sectoral winners and losers, and the CGE models do a good job of identifying them.

Models with international labor migration and investment generate much larger changes in wages and capital rental rates than do models which examine only changes in commodity trade. The CGE models find that, empirically, changes in factor mobility have a much greater impact on factor returns in the two countries than do changes in the volume and composition of commodity trade. The models which focus on migration issues all indicate a policy tradeoff for trade negotiators. Complete liberalization in Mexican agriculture will greatly increase the speed of outmigration from rural areas. These migrants show up in both Mexican urban and U.S. labor markets, leading to adjustment problems and social strains on both sides of the border. Liberalization, however, is good for U.S. agriculture, which greatly increases its exports to Mexico. The model results make a strong argument for allowing a long transition period for Mexican agriculture, to allow time to make needed infrastructure investments in rural areas and to smooth the process of labor absorption in the Mexican industrial sector.

I. Introduction

This paper surveys research on labor issues in a North American Free Trade Area (NAFTA, including the U.S., Mexico, and Canada). The major focus is on the possible evolution of employment, wages, and labor-related institutions, especially in the United States and Mexico. These labor issues involve much more than simply trade relations, which are the primary concern of the trilateral NAFTA negotiations and also of the Uruguay round of multilateral world trade negotiations under the GATT (General Agreement on Tariffs and Trade). The impact of NAFTA on labor must be analyzed in the context of the complex relationship between trade, investment flows, technological change, and migration, as well as labor practices and social and political institutions within and across the three countries. Ultimately, given the initial wide gap in income levels across the region, the key question concerns the potential convergence or divergence of wages and productivity across the three countries and among socioeconomic groups within them. Will the creation of NAFTA lead to a pattern of convergence based on rising Mexican productivity and wages, or will the primary result be a worsening of the distribution of income within the United States?[1] What additional resources and institutions are needed to facilitate Mexican growth and a smooth transition to a new and mutually beneficial integration arrangement?

Dramatic change has already started in Mexico because of the collapse in the 1980s of the pattern of inward-oriented, import-substituting industrialization (ISI) that had been pursued since World War II. The ISI development strategy was already largely exhausted before the large discoveries of oil in the mid-1970s, and the debt crisis of the 1980s confirmed Mexico's inability to continue on that path. From the mid-1980s, Mexico has undergone a major program of macro stabilization and structural adjustment, and has shifted to an outward-looking development strategy with trade providing the major engine of growth. This shift in strategy can potentially provide major benefits for Mexico and, with renewed growth, an expanding market for U.S. exports [Hinojosa (1992) and Hinojosa and Robinson (1991)]. Labor market problems, however, pose special difficulties for Mexico as it shifts its development strategy. Through the 1990s, Mexico faces a demographic bulge, leading to high labor-force growth just as the economy requires major restructuring.

The U.S., too, is facing a period of significant structural change. A decade of macro imbalances (including declining savings, increased government deficits, and large swings in trade deficits), slow productivity growth, unemployment problems, stagnation in real wages, and increasing inequality has created an environment of uncertainty and loss of confidence by labor, investors, and consumers. There has been major industrial restructuring, and all indications are that further changes will be required as the economy adjusts to continuing changes in the world economy and the macroeconomic environment.

In facing these changes, the United States and Mexico are finding their futures increasingly linked through an already extensive web of economic, social, and political interdependence. While this interdependence is clearly asymmetrical in many areas, the U.S.

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[1]See Bustamante, Reynolds, and Hinojosa-Ojeda (1992) for a variety of views on this issue.

and Mexico nevertheless share by far the most extensive and complex network of linkages of any two countries on opposite sides of the North-South divide. Mexico-U.S. interdependence includes the largest trade relation and the largest debtor-creditor relation between any two developed and developing countries, the largest foreign investment flows, the largest in-bond co-production relations (maquiladoras), and the longest contiguous border with the highest levels of border crossings and border commerce, both legal and illegal. Since the debt crisis erupted in 1982, and especially with the inauguration of the Salinas and Bush administrations, Mexico and the U.S. have begun a dramatic new phase of liberalized opening in the areas of trade and foreign investment, which has culminated in the NAFTA negotiation. Even before the 1980s, official observers had often noted the centrality of this relationship for the national security interest of both countries, an importance that is expected to increase with the decline of the Cold War and the rise of a multi-polar world order.[2]

Factor market linkages, especially labor flows, actually represent a more extensive linkage between the two economies than does trade. Trade and investment flows have been comparatively freer than labor flows, which have been more socially and politically sensitive and subject to more legal controls. Migration issues have explicitly been excluded from the current NAFTA negotiations. However, the future patterns and levels of labor migration will not only be an important influence on relative wages and the pattern of trade and employment, but also on the future pattern of sectoral production, productivity growth, corporate profitability, investment spending, and international competitiveness. Some U.S. and Mexican labor market segments are now so linked that employment levels, working conditions, and wages exist in a delicate balance that spans both sides of the border, and the social compacts in both countries have become intimately interdependent. Unilateral attempts to close off or penalize labor flows have not only been ineffective but usually result in perverse feedback effects in other markets, in addition to raising divisive issues of cultural diversity, national sovereignty, and regional security. Any comprehensive trade and investment agreement must at least implicitly address the likely pattern of migration, as well as its related impact on the economic interests of different groups, including the sectoral pattern of employment and the resulting patterns of income inequality, with obvious social and political feedbacks.

While there are many potential benefits from the creation of a NAFTA, successful integration of the North American economies poses a number of serious challenges for the three countries. Mexico, in particular, faces a number of special problems, given its initial position.

- There are wide disparities in the economic sizes of the three economies, with Mexican GDP (Gross Domestic Product) at less than four percent of U.S. GDP and less than forty percent of Canadian GDP (Table 1). U.S.-Mexico trade represents a much more larger share of Mexican GDP (16.9%) than of U.S. GDP (0.6%). Based on size differences alone, one expects that the effects of NAFTA, both positive and negative, will be much greater for Mexico and Canada than for the U.S.

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[2]"U.S. security without a prosperous and peaceful Mexico is inconceivable. For the U.S., only the Soviet Union compares in importance," W.D. Rogers, "Approaching Mexico," Foreign Policy, No. 72, Fall 1988, p. 196.

Table 1: U.S.–Mexico–Canada Trade, 1989

	Mexico	United States	Canada
Trade flows as share of GDP (percent)			
Total exports	16.9%	7.0%	27.8%
to Mexico	—	0.5	0.1
to U.S.	13.9	—	17.4
to Canada	0.7	1.5	—
Total imports	18.0	9.5	27.6
from Mexico	—	0.5	0.3
from U.S.	12.4	—	15.9
from Canada	0.2	1.6	—

Sources:
World Bank, World Development Report, 1991. International Monetary Fund, Direction of Trade Statistics, 1991.

Table 3: Mexican Contribution to U.S. Population and Labor Pool

Thousands	1940	1950	1960	1970	1980	1990
(1) Total U.S. population	132,457	151,868	179,979	203,984	227,217	249,666
(2) Total Mexican population	19,654	25,791	34,923	48,225	66,847	85,782
(3) Population of Mexican origin in U.S.	377	450	1,735	4,532	8,740	13,495
(4) U.S. labor force	41,870	63,379	71,489	84,889	108,544	126,424
(5) Mexican labor force	5,858	8,345	10,213	14,489	22,092	31,027
(6) Annual flow of legal temporary workers	0	150	420	47	20	120
(7) Cumulative stock of undocumented workers (since 1940)	0	100	200	316	1,095	2,298
(8) Cumulative stock of legal immigrant workers (since 1940)	0	46	286	673	1,230	2,172
(9) Total Mexican workers in U.S. labor force	0	296	906	1,036	2,345	4,590
(10) Total labor force in U.S. of Mexican origin	335	571	1,308	2,063	3,498	8,742
Percent shares						
(11) Mexicans working in U.S. as share of Mexican labor force	0.0	3.6	8.9	7.2	10.6	14.8
(12) Mexicans working in U.S. as share of U.S. labor force	0.0	0.5	1.3	1.2	2.2	3.6
(13) Total labor force in U.S. of Mexican origin as share of U.S. labor force	0.8	0.9	1.8	2.4	3.2	6.9

Notes:

U.S. Mexican labor force totals for 1940, 1950, 1970, 1980 and 1980 are from the census data on economically active population (including unemployed). The 1960 census figure was adjusted to correct for over-counting of rural workers (for details, see Clark W. Reynolds (1979), "A Shift-Share Analysis of Regional and Sectoral Productivity Growth in contemporary Mexico," Working Paper, International Institute for Applied Systems Analysis, Laxenburg, Austria. The estimates in row (6) are based on the number of legal temporary workers, including braceros from 1942 to 1964, H-2 from 1952, and SAW/RAW from 1986. Estimates in row (7) are of undocumented workers during the previous five-year period (one quarter of undocumented immigrants deported reduced by one-fourth for non-participants in the work force) and are adjusted by estimates published by Passel and Woodrow (1984) and Garcia y Griego (1989). Row (8) is based on the INS Yearbook of Immigration Statistics, with demographic growth calculated along with a 0.68 labor force participation rate and a 0.05 attrition rate.

Mexicans in the United States refer to all legal and undocumented immigrants from Mexico who entered this country between 1940 and the present and their progeny, regardless of place of birth. This is clearly not the same as "people of Mexican origin" as described in the U.S. Census and Current Population Survey. The magnitude of the difference (about half the current total) can be explained as arising from all legal and undocumented immigrants and their descendants who came before 1940.

- Taking advantage of the opportunities provided by increased integration in North America requires that the economies be able to reallocate labor and capital within and across sectors. To achieve these reallocations quickly and efficiently, policies are needed to minimize the adjustment costs to workers and communities that necessarily accompany displacement of labor and capital.

- Establishing an FTA is a necessary part, but only a part, of the policy package that will enable Mexico to shift its development strategy. If the new strategy is to succeed, Mexico's domestic and foreign capital needs will expand greatly. It will need to mobilize resources for a major investment effort and be able to re-enter world capital markets. The creation of an FTA should improve confidence for private investors, including Mexicans who have maintained large investments abroad during the last decade. Under existing institutional arrangements, however, and given Mexico's debt overhang, more will be needed, especially to finance large-scale social overhead investments.

The next section of the paper will discuss the demographic context within which the employment and income impacts of a NAFTA must be evaluated. Section three reviews the various types of modeling approaches that have been used to analyze the employment and income impacts of NAFTA. Section four discusses the policy and institutional context of labor issues and section five offers some conclusions.

II. Demographics and Labor Market Linkages

Historically, the U.S. and Mexican labor markets have been closely linked. Mexican migrant labor has had a large impact on the U.S. economy through increasing the supply of labor — an effect probably greater than that arising from increased U.S.-Mexican commodity trade, direct foreign investment, or financial transactions. At least 10% of the growth of the U.S. labor supply since World War II is composed of Mexican migrants and Mexicans working in the U.S. represent close to a sixth of the Mexican work force (Table 3).

Typical of a rich and a poor country, the U.S. and Mexico are at different points in their demographic transition. In the U.S., the population growth rate has declined and the population is ageing. In Mexico, the age structure is much younger, the population growth rate is higher, and the labor force growth rate is even higher (as the younger population enters the labor force). In this environment, Mexican migration has historically provided the U.S. an important source of labor, especially in the Southwest, and has also served as a safety valve for Mexico, providing employment opportunities for workers displaced by the structural changes accompanying Mexican industrialization.[5]

[5]See Cardoso (1980). The U.S. played a similar role for Europe during the 19th century, with the U.S. actually absorbing a much larger percentage of some countries' populations than has ever migrated out of Mexico [Massey (1988)].

Several writers have pointed out that Mexico and the U.S. have shown a labor market complementarity over the postwar period, due both to demographic trends and to changes in the sectoral structure of production in the two countries.[6] For a variety of reasons, the close links between the U.S. and Mexican labor markets will undoubtedly persist well into the next century, regardless of whether a free trade area is established:

- Even under the most optimistic productivity growth scenarios, the U.S. will be facing a serious shortfall in labor supply well into the next century, as its native population increasingly ages and continues to shrink [Johnson (1987)].

- Mexico, on the other hand, even under optimistic scenarios of resumed growth, will be producing a dramatic labor force surplus into the next century [Trejo Reyes (1992)].

- Deeply rooted social networks have now been established where binational codependence has become a way of life for many communities (and productive sectors) on both sides of the border. These networks will continue to operate as long as the large wage gaps persist, barring dramatic and highly unlikely changes in migration policies [Mines (1981); Massey *et al.* (1987); and Alarcon (1992)].

- The gap in relative wages across the two countries will remain quite wide for the relevant time period, regardless of any forces that would promote convergence [Reynolds (1992)].

While recognizing that social and political factors are important in determining the stock, flow, and wages of migrant workers, Alba (1992) concentrates on the economic and demographic factors affecting the demand for and supply of migrant workers. Examining the historical relation between migration and development from the 1940's and 1950s, Alba compares demographic trends forecast for Mexico and the United States up to the year 2000; trends which initially appear to indicate a harmony of interests. During the 1940s and 1950s, there was a relatively stable pattern of migration, with demand concentrated in agro-industry in the southwestern U.S. and supply originating in central Mexican rural communities. This particular "escape valve" mechanism has since undergone important changes. The demand for labor has shifted away from agriculture in the U.S., which was rapidly mechanized in the postwar period, towards the expanding service and light manufacturing sectors in U.S. cities. Meanwhile, similar structural changes in the Mexican economy, with rapid industrialization and a relative decline in agriculture, have created a supply of labor more complementary to the U.S. demand.

This apparent complementarity of changes in supply and demand conditions on both sides of the border, however, does not necessarily indicate a harmony of interests. Within the U.S, persistent macro problems have led to unemployment and slackness in labor markets, with concomitant political pressure to control immigration and use trade policy to protect domestic employment. In addition, Mexico's demographic profile, while complementary to that of the U.S., is also similar to that of Caribbean and other Latin American

[6]See, for example, Reynolds (1979), Cornelius (1992), Hinojosa and Morales (1992), Martin and Taylor (1992), and Alba (1992).

countries, which are increasingly sending migrants to the U.S. and competing with Mexican migrants.

Alba argues that the best solution for both countries is not to continue the migration process as it presently exists. Rather, he favors policies to increase trade in goods and services between the two countries. In his view, dismantling protectionist policies and encouraging trade would allow for rapid employment creation in Mexico and technological evolution in the U.S., as export industries expand.

Saul Trejo Reyes (1992) also discusses Mexican economic policy and U.S. Mexico relations in the context of recent trends of Mexican labor force growth and employment. While population growth in Mexico has slowed from 3.4% a year during the 1970s to 2.7% in the 1980s, the labor force is still growing at about 3% a year. Given rapid industrialization and resulting internal rural-urban migration, most of Mexico's population growth has been in urban areas, with almost no net rural growth expected in the future. The shift to the cities has also been accompanied by a rapid growth in the tertiary sector. Labor force participation rates have also increased, in large part due to a rise in female participation rates.

Since the 1982 crisis, there has been a shift in employment in Mexico from large firms to the informal sector, with a large increase in open unemployment. Employment in sectors producing capital and intermediate goods has been particularly hard hit. Using a macro growth model of the Mexican economy, Trejo Reyes (1992) generates three alternative scenarios for future employment growth for the period 1985 to 2000. With optimistic assumptions, but without explicitly considering NAFTA or Mexico's shift in development strategy, he projects an annual GDP growth rate of 5%. In this scenario, there is a "deficit" in employment with respect to the existing and future labor force on the order of 8 million by the end of this period. Under the assumption that the changes in development strategy currently underway in Mexico are only moderately successful, these scenarios project increased internal pressure on urban labor growth, as well as increased pressure for undocumented migration to the U.S.

The results of these demographic studies indicates that, even if Mexico succeeds in achieving a shift in development strategy, there will be increased strains on its labor markets and increased migration pressure over the next decade. The severity of this pressure will depend largely on three factors: (1) how successful is Mexico's shift to the new, open, development strategy and its effect on the eventual structure of the economy; (2) how rapidly can Mexico restructure its economy, generate new investment, and achieve rapid growth; and (3) macro developments in the United States. The last factor is largely independent of questions relating to the formation of NAFTA, and so should be seen as an exogenous factor in any analysis of NAFTA, which is the approach taken in existing studies. The first two factors have been the focus of a number of studies.

III. Modeling the Effects of NAFTA on Labor Markets

The announcement by the Presidents of Mexico and the U.S. of their intention to negotiate a free trade agreement between their two countries sparked a veritable growth industry of economic modeling of NAFTA. Some of the policy debate over the last two years has been characterized by the selective and uncritical citing of one or another study to justify apparently pre-conceived positions on the impact of NAFTA on employment and the structure of the economies in both countries. Some of the positions have been quite strident, with few qualifications, belying President Truman's view that he wanted a one-armed economist who could not keep saying "on the other hand." In surveying empirical work on the labor-market implications of NAFTA, we will focus on differing assumptions and discuss how the various approaches are linked to different theoretical and empirical models.

Table 4 presents examples of various types of modeling approaches that have been used to analyze the impact of establishing a free trade area and have either focused on labor issues or have discussed implications for labor as part of a wider analysis. There are three types of models represented: (1) partial-equilibrium models based on historical extrapolation or regression analysis of key relationships; (2) single-country computable general equilibrium (CGE) models; (3) multi-country CGE models.

III.1 Extrapolation/Regression Models

The first model in this group is by Hufbauer and Schott (1992) for the Institute of International Economics (IIE). They have developed what they call an "historical model" which is largely based on a comparative analysis undertaken by the World Bank of thirty-one episodes of trade liberalization [Papageorgiou, Michaely, and Choksi (1991)]. This study, like many before it, indicates that developing countries which successfully shift from an inward-looking, import-substitution, development strategy to an outward-looking, trade-oriented strategy tend to do very well. While the Asian tigers represent extreme cases, the desirability of shifting to an open development strategy has become part of the conventional wisdom in development economics.

Using some rather simple, even simplistic, relationships drawn from the World Bank study, Hufbauer and Schott seek to project Mexican performance under the new strategy. In their model, they simply postulate that Mexico will rapidly increase its trade, increase the trade share in GNP, increase foreign capital inflows, and accelerate the growth rate of GNP. These assumption are not related to any specific notions of what a NAFTA will or will not include. The magnitudes are based on the experience of comparator countries and are imposed as macro trends. They then assume a fixed ratio of trade with the U.S. to total Mexican trade, and their trends generate an improvement in the U.S. trade balance. Finally, they estimate changes in employment as a function of the change in trade balance, and so get an improvement in U.S. employment of 130,000 jobs, which they note is very small compared to total U.S. employment of over 115 million.

The underlying model of employment is not spelled out, but must be some kind of Keynesian trade multiplier. The multiplier is based on "net exports," defined as additional

Table 4: Properties of NAFTA Models

Model	Model characteristics	Sectoral structure	Factor markets	Migration
Extrapolation/regression models				
Institute of International Economics (IIE) [Hufbauer and Schott (1992)]	Macro trends based on average behavior of countries which have shifted to an open development strategy. No consistency framework.	Macro only.	Employment effects based on elasticities with respect to change in net trade balance.	No migration.
Economic Strategy Institute (ESI) [Prestowitz *et al.* (1991)]	Macro trends based on assumptions about the impact of NAFTA on Mexico. New investment in Mexico assumed to increase exports to U.S. and imports from U.S. Sectoral structure and trade diversion estimates based on historical shares. Balance of trade determined from separate export and import projections.	Sectoral results for six industries.	Employment effects based on fixed employment to trade ratios. Aggregate employment effects determined by changes in balance of trade.	No migration.
Koechlin *et al.* (1991, 1992)	Cross-country econometric model to estimate increase in direct foreign investment (DFI) in Mexico from the U.S. resulting from NAFTA. Assume increase in DFI lowers aggregate U.S. investment.	Macro only.	Assume fixed aggregate capital-labor ratio. Employment change then depends on investment change.	No migration.
Leamer (1991)	Regression equations, estimating and testing various propositions from neoclassical trade theory regarding the impact of increased trade on low-skilled wages in the U.S. Two-country, two-and-three-factor, three-good theoretical models provide motivation for regression equations.	Commodities at one, two, and three-digit SIC aggregation levels.	Theoretical model distinguishes capital, skilled, and unskilled labor. Regression model relates changes in factor prices to changes in product prices.	No migration.
IERF/Almon [Interindustry Economic Research Fund (1991)]	Two-country (Mexico and U.S.), linked, economywide, multisectoral, macroeconomic regression model. The model uses fixed input-output coefficients and determines cost prices, but has no market-clearing equilibrium conditions.	Seventy-eight sectors in the U.S. model, and 74 in the Mexican model.	Labor demands, differentiated by detailed occupational categories, are determined by sectoral employment coefficients, given sectoral demand projections.	No migration.
Single-country static CGE models				
World Bank I [Levy and van Wijnbergen (1991b,c)]	Static CGE model of Mexico. Detailed treatment of agriculture, income distribution, and agricultural policies. Tradeable/non-tradeable specification.	Seven sectors, focussing on maize and agriculture. One nontraded sector, one industrial sector.	Two land types (irrigated and rainfed), capital, urban labor, and rural labor.	Rural-urban migration. Depends on real income differential between rural and urban workers.
Sobarzo (1991)	Static CGE model of Mexico. Focus on imperfect competition and economies of scale in manufacturing sectors. Armington specification. In one version, the balance of trade is fixed and the exchange rate adjusts. In two other variants, the exchange rate is fixed and the balance of trade adjusts.	Twenty-seven sectors, of which 21 are traded. One agricultural sector.	Capital and labor. Sectoral capital stocks and the wage are fixed in two versions, while in a third the wage is flexible and capital is intersectorally mobile.	Implicit rural-urban migration, as labor can move from agriculture to other sectors.
Multi-country static CGE models				
ITC [U.S. International Trade Commission (1991)]	Highly stylized, two-country (U.S. and Mexico), CGE model. Armington specification for tradeable good.	Two sectors, a tradeable and non-tradeable.	Capital and two labor categories, skilled and unskilled. Capital is sectorally fixed.	International migration of unskilled workers, using an elasticity of migration with respect to international wage differential.

Model	Model characteristics	Sectoral structure	Factor markets	Migration
KPMG/Peat Marwick (1991)	Three country CGE model (U.S., Mexico, and rest of world). Competitive markets. Armington specification.	Forty-four sectors, focussing on manufacturing. Four agricultural sectors.	Capital and labor. Fixed wage in Mexico.	Implicit rural-urban migration, as labor can move from agricultural sectors to other sectors. No international migration.
Hinojosa and Robinson (1991)	Three country CGE model (U.S., Mexico, and rest of world). Competitive markets. Policies represented by tariff, tax, and subsidy equivalents. Armington specification.	Seven sectors. One agricultural sector.	Land, capital, and four labor categories. Various assumptions about factor mobility.	Rural-urban migration within Mexico. Mexico-US migration for rural and urban unskilled labor. Migration depends on wage differentials.
Robinson *et al.* (1991)	Three country CGE model (U.S., Mexico, and rest of world). Competitive markets. Explicit modelling of agricultural and trade policies in both countries. Armington specification.	Eleven sectors, with four agricultural sectors.	Land, capital, and four labor categories. Various assumptions about factor mobility.	Rural-urban migration within Mexico. Mexcio-US migration for rural and urban unskilled labor. Migration depends on wage differentials.
Brown, Deardorff, and Stern (1992)	Five region CGE model, including U.S., Mexico, and Canada separately. Monopolistic competition and increasing returns to scale in most tradeable sectors. Goods differentiated by producer rather than by country of origin.	Thirty sectors, of which 23 are tradeable. One agricultural sector.	Capital and labor, both intersectorally mobile.	Implicit rural-urban migration, as labor can move from agriculture to other sectors. No international migration.
Roland Holst, Reinert, and Shiells (1992)	Four-country CGE model (U.S., Canada, Mexico, and rest of world). Increasing returns and average-cost pricing in some sectors. Armington specification.	Twenty-six sectors, with one agricultural sector.	Capital and labor, both intersectorally mobile. Fixed wage in all three countries.	Implicit rural-urban migration, as labor can move from agriculture to other sectors. No international migration.
Dynamic CGE models				
World Bank II [Levy and van Wijnbergen (1991d)]	Dynamic CGE model of Mexico. Model of transition period (nine years) terminating with steady-state balanced growth. Tradeable/non-tradeable specification.	Seven sectors, focussing on maize and agriculture. One nontraded sector, one industrial sector.	Two land types (irrigated and rain-fed), capital, urban labor, and rural labor.	Rural-urban migration, depending on real income differential between rural and urban workers.
Hinojosa and McCleery (1991)	Stylized, dynamic, two-country CGE model of Mexico and U.S. Tradeable/non-tradeable specification.	Two sectors. One traded, one non-traded.	Capital and two labor categories: "high wage" and "low wage." Land is included in Mexico.	Mexico-US migration depends on real income differential. Some linkage between the two labor markets within both countries.
McCleery and Reynolds (1991)	Stylized, dynamic, two-country CGE model of Mexico and U.S. Tradeable/non-tradeable specification. Capital accumulation, with investment determined by savings.	Two sectors. One traded, one non-traded.	Capital and two labor categories: "high wage" and "low wage." Land is included in Mexico.	No migration. Some linkage between the two labor markets within both countries.

exports minus additional imports of consumer goods. They assume that this multiplier is six times as high in Mexico as in the U.S.[7] In the NAFTA scenario, Mexican capital inflows increase, implying a decrease in the current account balance (and, presumably, an appreciation of the real exchange rate). However, they assume that much of the increased inflow of imports consists of capital goods, and so they manage to generate an increase in their "net export balance" measure. The result is an increase in Mexican employment of 609,000, which represents 2 percent of aggregate Mexican employment by 1995.

The IIE historical model has the virtue of applying to Mexico some rough empirical lessons gleaned from comparative work. The experience of other countries can provide some indication of the best that Mexico might expect from successfully shifting development strategy. The model, however, has no discernible roots in trade theory. The use of short-run, Keynesian, macro trade multipliers in a model seeking to analyze the long-term benefits of trade liberalization seems quite inappropriate. Since the model only involves aggregates and macro trends, it cannot capture any of the structural changes and gains from trade liberalization predicted by neoclassical trade theory. Since most of the gains and strains arising from trade liberalization will involve shifts in the sectoral structure of trade, output, and employment, predictions of the IIE model with regard to employment effects seem questionable at best.

The second extrapolation model is the Economic Strategy Institute (ESI) model by Prestowitz *et al.* (1991), chapter 3. Like the IIE model, the ESI model starts from a number of assumptions about the macro impact of the formation of FTA. They assume, for example, that Mexico will increase investment in export-oriented industries by $25-46 billion and that imports from the U.S. will expand with Mexican income, equalling 2 percent of the increase in Mexican output. They determine the composition of imports by assuming fixed shares and an assumption about the course of import substitution in Mexico in intermediate goods and components. On employment, they state (p. 47): "The potential employment effects were then estimated by using the standard economic formula holding that $1 billion worth of trade represents 30,000 jobs." Their employment relation is thus based on a fixed net-trade coefficient, similar to the treatment in the IIE model.[8] They also separately estimate the employment impact in six industries due to new capital spending in Mexico, but this analysis does not use the labor/trade deficit relation.

Two scenarios are run with the ESI model, assuming low ($25 billion) and high ($46 billion) investment increases in Mexico. They then generate growth paths to 1999, including the balance of trade (given their assumptions about export and import coefficients). In both scenarios, the U.S. runs a trade surplus with Mexico until 1996-97, when it shifts to a deficit. In the high growth scenario, in 1999 the deficit is $30 billion and, given their employment coefficients, "more than 900,000 American jobs are destroyed" (p. 48).

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[7]They state [Hufbauer and Schott (1992), p. 56] that "the multiple of six is roughly based on the 1988 differential between US and Mexican hourly compensation in manufacturing. . . . This works out to 87,000 new Mexican jobs per additional billion dollars of 'net' exports."

[8]There is evidently some variation in the "standard economic formula" used for calculating the U.S. trade and employment relation. Hufbauer and Schott (1992), for example, use a figure of "14,500 jobs per billion dollar net improvement in the U.S. trade balance" (p.55).

In economic structure, the ESI model is very similar to the IIE model. Both assume a variety of fixed-coefficient, macro relationships and are driven by exogenous trends. They differ in their assumptions about those trends and the magnitudes of the employment coefficients. The ESI model is subject to the same criticisms of the IIE model given above.

The third extrapolation/regression model is that of Koechlin *et al.* (1991, 1992).[9] This model focuses on investment and employment effects. The chain of causation is as follows. (1) NAFTA will generate increased foreign investment in Mexico. (2) Much of the increased investment will come from the U.S. (3) Increased U.S. investment in Mexico will reduce aggregate investment in the U.S. (4) Given fixed capital-labor ratios in the U.S., the decline in U.S. investment will lead to a decline in aggregate employment.

Koechlin *et al.* use cross-country data and some regression analysis to put empirical content into each of these causal links. They estimate that the establishment of NAFTA would generate an increase in U.S. investment in Mexico of $3.5-5.9 billion a year, or $31-53 billion cumulatively over the period 1992-2000. Assuming a corresponding decline in U.S. investment, and given projections of the capital-labor ratio, they estimate that between 29,000 and 49,000 jobs will be relocated in the first year of the FTA, and a total of between 290,000 and 490,000 jobs through the year 2000.[10]

While steps 1 and 2 in their chain of reasoning seem plausible, steps 3 and 4 are highly questionable.[11] $3-6 billion dollars a year is a tiny fraction of aggregate U.S. investment, and even a small fraction of the current U.S. trade deficit. Macro adjustments in the U.S. over the next decade are generally projected to be quite large, with the current account deficit projected to decline dramatically, and the projected changes in U.S. investment in Mexico are tiny compared to these shifts. From a different perspective, the changes in U.S. investment in Mexico postulated by Koechlin *et al.* represent a tiny part of the U.S. capital market, and should have a negligible effect on interest rates or returns to capital in the U.S. There is no theoretical or empirical reason to think that they will have any effect at all on aggregate investment. In fact, EC experience after Spanish and Irish accession suggests that NAFTA should increase DFI into the U.S.[12]

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[9]Faux and Spriggs (1991) and Spriggs (1991) use the same approach in their analysis of employment impact of NAFTA. The discussion here of the strengths and weaknesses of this approach thus applies to their work as well.

[10]In their testimony to the Special Trade Representative [Koechlin *et al.* (1991)], they estimated a loss of 260,000 to 439,000 U.S. jobs.

[11]For an application and discussion of a more developed methodology for calculating the direct and indirect displacement and stimulation of domestic employment due to U.S. direct investment abroad, see Glickman and Woodward (1989) who build on Frank and Freeman's (1978) original application. Their approach takes into account inter-sectoral employment effects and the effects to export stimulation due to U.S. direct foreign investment. Schoepfle and Perez-Lopez (1988) review the various approaches that have been used to estimate the U.S. employment impact of Mexican "Maquiladoras" and their elimination.

[12]Koechlin *et al.* note that Ireland and Spain experienced increased direct foreign investment after EC accession and use that data to estimate how much increased investment Mexico might expect. They neglect, however, to point out that overall direct foreign investment into the rich EC countries also rose.

Even assuming a change in investment in the U.S., the assumption of a fixed aggregate capital-labor ratio is suspicious in the short run and insupportable in the medium to long run. Even assuming limited substitution possibilities in sectoral production, which is empirically unwarranted, changes in the sectoral structure of production arising from changes in trade policy will lead to changes in the aggregate capital-labor ratio. While changes in the sectoral structure of employment are to be expected as a result of changes in trade and investment policy, the argument put forward by these authors that, in the aggregate, jobs will "relocate" from the U.S. to Mexico with an increase in commodity trade and investment flows is theoretically and empirically unsustainable.

The optimistic IIE model and the pessimistic analyses by Prestowitz *et al.* and Koechlin *et al.* are striking in their lack of theoretical underpinnings. There is, after all, a large body of neoclassical trade theory which seeks to explain what will happen when one adds or removes barriers to trade between countries. The Heckscher-Ohlin, Stolper-Samuelson, Rybczynski, and factor-price equalization theorems represent milestones in the theoretical analysis of the impact of trade on economic structure in a general equilibrium setting. One might well expect empirical work on trade liberalization to draw on this extensive and rich theoretical literature.

The final study in this group, Leamer (1991), does draw extensively on this body of theoretical work. Leamer starts from a small, neoclassical, trade-theory model and then seeks to estimate the important linkages implied by the theory. He first argues that labor and capital migration between the U.S. and Mexico will lead to a tendency toward equalization of factor prices across countries, and then draws on the factor-price equalization theorem to argue that free commodity trade should lead to equalization under a free trade agreement, even in the absence of factor mobility. The result, he argues, is that unskilled wages in the U.S. should fall, given the increase in international trade, and that this tendency will be accelerated by the creation of a U.S.-Mexico free trade area. Consistent with trade theory, he does not argue for changes in aggregate employment, but instead analyzes the impact of trade on wages.

While this approach is consistent with the long-run focus of neoclassical trade theory, the relevant empirical questions are: (1) whether the Mexican economy is big enough relative to the U.S. for changes in trade to have a significant aggregate effect on the U.S.; and (2) what are the relative sizes of indirect effects on wages and profits arising from changes in product prices compared to direct effects arising from labor and capital mobility between the two countries. While acknowledging that Mexico is very small relative to the U.S., and hence that short-term aggregate effects should be tiny, Leamer attempts to estimate the effects of an empirical scenario in which Mexico becomes much larger. Under this scenario, he assumes that (p. 52): (1) U.S. rates of protection would continue to rise for the rest of the world but would be prevented from rising vis a vis Mexico due to NAFTA; and (2) Mexico is able to rapidly increase its level of productivity to OECD levels (Italy is used as the proxy) and thus grow very rapidly and capture a large U.S. market share through trade diversion from the rest of the world.

Starting from this Mexico-becomes-Italy scenario, Leamer then goes on to analyze, using disaggregated data at the two and three-digit SIC levels, the impact of changes in relative prices on sectoral trade and production, and on wages. He extends his model to

include non-tradeables, and seeks to estimate the relationship between changes in factor returns to changes in prices (Stolper-Samuelson) and changes in output to changes in factor supplies (Rybczynski). He argues that the major differences in capital-labor ratios between the U.S. and Mexico will have an impact on factor prices with trade liberalization. In the long run, he concludes that the creation of NAFTA should increase the capital rental and the wage of skilled labor in the U.S. and lower that of unskilled labor. His empirical results generate a wide range of estimates, but he concludes that (p. 56): "Earning reductions on the order of $1000 per year [for low-skilled labor in the U.S.] seem very plausible."

Compared to the first three studies, Leamer's work has strong theoretical underpinnings. His empirical work is characteristically careful, yet is clearly speculative and highly contingent on an extreme scenario. He recognizes these problems, emphasizes the wide range of estimated effects, and describes his empirical results on factor returns as conjectural and uncertain "... both because there is econometric uncertainty in the estimates and also because the precise economic theory that underlies the computation is not compelling."[13] Given his assumptions, his empirical results are consistent with trade theory. One could probably not expect to do better theoretically without moving to a full general equilibrium model. The underlying driving scenario that Mexico becomes large relative to the U.S., however, has to be seen as a very long-run story.

A step towards the construction of a computable general equilibrium model is provided by the INFORUM (1990) model. This study is conducted with a two-country (Mexico and U.S.), linked, multisectoral, macroeconomic, regression model. The linked model uses a 78-sector input-output matrix for the U.S. and a 74-sector matrix for Mexico. Through macroeconomic projections based on an econometric macro model, the model generates output, exports, imports, consumption, and income by industry. They also estimate trends in the coefficients of the input-output matrices. The connection between the two models occurs through import-share functions. Labor requirements are determined by sectoral labor coefficients, which change over time. The model does not have any behavioral supply responses to price changes. The model is used to generate a base run scenario with the 1990 level of protection and two alternative FTA scenarios: (1) the elimination of tariffs only; and (2) no tariffs and lowered non-tariff barriers in textiles, agriculture, autos, and computers.

The INFORUM results indicate that: (a) the effects of removing tariffs are larger than the effects of removing the few non-tariff barriers they consider, and (b) the stimulus to U.S. exports is greater than to Mexican exports, both bilaterally and to the rest of the world. This latter result is implausible, is not supported by any of the other NAFTA models, and is difficult to explain in the model. The authors' explanation is (p. 3): "This extra boost to [U.S.] exports comes about because the reduction of tariffs with Mexico lowers cost of production in the U.S., which then competes more effectively in other foreign markets." It is difficult to see how this mechanism would operate in their model, which lacks profit-maximizing supply

[13]Leamer (1991), p. 55. In particular, one might question the Stolper-Samuelson links. For example, using a thirty-sector CGE model of the U.S., Hanson, Robinson, and Tokarick (1991) found virtually no change in relative factor returns in the U.S. after the imposition of across-the-board tariffs of 50 percent. Once averaged through input-output linkages, sectoral factor proportions appear not to differ enough to generate significant Stolper-Samuelson effects. This result appears again in a variety of CGE models of Mexico and the U.S. discussed below.

behavior by producers. In any case, the postulated mechanism is certainly empirically implausible. Given their result, they find that the employment effect is a slight net increase in U.S. employment and a net decrease in Mexican employment (of 0.5%).

The INFORUM model is not a full general equilibrium model since it is essentially demand driven, with no market-clearing price-adjustment mechanisms. It is best seen as a sophisticated, multisectoral, essentially Keynesian, macroeconometric model. As such, it is not a good vehicle for examining trade liberalization effects which work through product and factor-price mechanisms, as described by neoclassical trade theory.

III.2 Computable General Equilibrium (CGE) Models

The trade-focused, CGE models used to analyze NAFTA are all firmly rooted in neoclassical trade theory.[14] Single-country CGE models determine relative domestic prices and a real exchange rate that clear product markets and factor markets, and also satisfy a balance-of-trade constraint. In addition to domestic relative prices, the multi-country CGE trade models also solve for relative world prices that clear world product markets for traded goods and a set of real exchange rates such that each country satisfies its balance-of-trade constraint. All market-clearing equilibrium conditions are in terms of flows. The models solve only for relative prices, with the absolute price level set exogenously by a choice of numeraire. The models have no financial variables and do not include money, assets, or asset markets. Their roots are Walrasian, not Keynesian.

All the models include tradeables and non-tradeables, and many specify imperfect substitutability between imported and domestic goods — the "Armington" assumption. The Armington specification treats all domestic goods as "semi-tradeables" and can be seen as an extension of the standard neoclassical model with non-tradeables.[15] The approach is widely used in empirical trade models because it yields a more realistic empirical picture of the links between domestic and international prices than do models which assume an extreme dichotomy between tradeables and non-tradeables.

While all are rooted in neoclassical trade theory, the CGE models developed to analyze the impact of the formation of NAFTA vary widely in their sectoral focus; treatment of labor markets, including migration; assumptions about technology and industrial organization; treatment of policy instruments; and specification of structuralist rigidities such as immobile factors, fixed wages, and barriers to migration. Our focus is on the treatment of labor and the conclusions the various models draw regarding the impact of the formation of NAFTA on labor markets.

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[14]See Shoven and Whalley (1984); Brown (1987, 1992); Robinson (1989); Burniaux *et al.* (1989); de Melo and Robinson (1989); and Devarajan, Lewis, and Robinson (1991) for discussions of trade-focused CGE models in the context of neoclassical trade theory. The latter two articles focus on the appropriate role and definition of the real exchange rate in these models.

[15]The theoretical properties of models incorporating "semi-tradeables" have recently been thoroughly studied. See the references cited above. One model [Brown, Deardorff, and Stern (1992)] differentiates products by producer rather than by country of origin.

The two single-country, static, CGE models referred to in Table 4 differ widely in their treatment of labor markets. The Sobarzo model, in some variants, assumes a fixed wage, with aggregate employment determined endogenously, and sectorally fixed capital stocks. While perhaps useful for analyzing short-run impact effects, such a model is ill-suited for analyzing the medium to long-run impact of an FTA. In the model variant with a variable wage, aggregate employment fixed exogenously, and intersectorally mobile capital, an FTA coupled with capital stock growth in manufacturing leads to a decline in agricultural labor in Mexico of around 8 percent, as the increase in manufacturing draws labor out of agriculture. Total employment is fixed by assumption, and the average real wage rises by 16 percent. Real GDP rises by 8 percent, due to the increase in aggregate capital and exploitation of economies of scale in manufacturing.

The second Mexico-specific CGE model, by Levy and van Wijnbergen (1991b,c), provides a much more detailed specification of the agricultural sectors and of rural-urban migration. They explicitly model agricultural support policies, including protection for the maize sector and food subsidies for the urban poor. They include rural-urban migration, with migration adjusting to maintain an exogenously specified real income differential between rural and urban households. They explore a number of scenarios in which the maize sector is liberalized, allowing free trade, and various compensation polices are simulated which are designed to soften the impact on the poor.

Liberalization in the maize sector leads to significant rural-urban migration, of the order of 650-700 thousand workers. Total rural employment is 6 million, of which 29 percent (or 1.7 million) are in maize. Without compensation, Levy and van Wijnbergen find the distributional effects of trade liberalization to be regressive, but it is possible to design feasible compensation packages that largely offset the income losses to the poor. They argue, based on a number of simulated scenarios, that targeted adjustment programs can be designed that achieve substantial efficiency gains from trade liberalization, but that ameliorate the regressive distributional impact of removing protection from low-income maize farmers.

In a dynamic version of their model, Levy and van Wijnbergen (1991d) explore different transition paths to free trade over a nine-year adjustment period.[16] They explore the impact of introducing trade liberalization and domestic policy changes instantaneously or more gradually, analyzing the impact of the speed of reform on migration. They find that if liberalization is done all at once, in the first year, the efficiency gains are large but that migration is also very large early on, with 700 thousand migrants from the rural sector in a single year. Such migration would seriously strain the social and political system. Under all liberalization scenarios, cumulative rural-urban migration over nine years is about the same, 1.9 million workers. A gradual liberalization scenario, however, provides a smooth time path of migration, with annual rates of about 200 thousand rural-urban migrants a year. Note that in a base scenario without liberalization, the model generates a cumulative migration of 1.2 million workers from the rural sector. Their model embodies the underlying

[16]Their dynamic model has two components. A nine-year transition period is followed by an infinite-horizon, steady-state growth path which the economy is assumed to reach at the end of the transition period. All policy changes take place during the transition period.

demographic trends discussed earlier. Mexico is facing major structural change in its labor markets, with or without trade liberalization.

Hinojosa and Robinson (1991) and Robinson *et al.* (1991) explore some of the same labor-market issues as Levy and van Wijnbergen, but in the context of a two-country, U.S.-Mexico, trade model. In particular, Robinson *et al.* use a similar breakdown of the agricultural sectors, separating out the maize sector, fruits and vegetables, and other program crops (relevant for capturing U.S. agricultural policies). They use the same type of migration function as Levy and van Wijnbergen, but differentiate the labor force by skill category and add Mexico-U.S. migration. Their results are also broadly consistent with Levy and van Wijnbergen. They find that complete trade liberalization increases bilateral trade and leads to efficiency gains for both countries, but induces large rural outmigration from Mexico. In a full liberalization scenario, over 800 thousand workers leave the rural sector, and over 600 thousand migrate to the U.S. Most of the migrants to the U.S. go to the urban labor market (*e.g.*, Los Angeles and Chicago) rather than to agriculture. Robinson *et al.* also explore a variety of partial liberalization scenarios, seeking policy packages that will provide a less socially disruptive transition path to free trade.[17] They find that it is feasible to design such transition policy packages.

Robinson *et al.* also explore how much growth is required in Mexico to absorb the labor released from agriculture, without increased migration to the U.S. For example, a 25 percent increase in the Mexican aggregate capital stock relative to the U.S. eliminates the increased Mexican-U.S. migration induced by complete trade liberalization. Such a growth differential is consistent with the experience of other semi-industrial countries which have successfully shifted to an open development strategy. The policy problem for Mexico is that trade liberalization in maize releases labor quickly, while the increased growth required to absorb that labor in industry takes longer.[18] Consistent with Levy and van Wijnbergen, these results indicate that Mexico will need a lengthy transition period and must allocate resources to agriculture during the transition. Undue haste in introducing free trade in agriculture may not be desirable for either country when the social and economic costs associated with increased migration are weighed against the benefits of increased trade growth.

Hinojosa and McCleery (1992) present a dynamic U.S.-Mexico CGE model with a game-theoretic component that implicitly takes into account the nature of socio-political institutions for the regulation of distributional conflicts between workers and capitalist in both countries. While the model is highly aggregated and stylized, it does incorporate international migration as well as rural-urban migration within Mexico. Hinojosa and McCleery use their model to develop three alternative scenarios for Mexico: a continuation

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[17]Hinojosa and Robinson (1991) and Robinson *et al.* (1991) present scenarios designed to distinguish the direct impact on employment and income of trade liberalization from the indirect impact due to migration. Some analysts have confused the two mechanisms. Hufbauer and Schott (1992) and Prestowitz *et al.* (1991), for example, report the Hinojosa and Robinson (1991) employment results from a scenario that allows for migration and large capital flows into Mexico. The "decline" of U.S. employment of 234,000 and the "increase" of Mexican employment of 273,000 which they report largely reflect the return migration of undocumented immigrants under this scenario. The "loss" of U.S. jobs in this scenario is accompanied by a loss of the workers.

[18]Such a differential could be achieved in about ten years, assuming a growth differential of about 2.5% a year.

of the current "neo-liberal" opening; a reversal towards neo-protectionism; or the adoption in both countries of a "managed interdependence" strategy. While the names are more evocative, the scenarios are similar to those explored in Robinson *et al.* (1991), with similar results.

The model results point to the long-term superiority of an FTA leading to increased trade, while also indicating a short-run deterioration in workers' welfare that poses serious obstacles to the neo-liberal strategy. Compared to policies directly affecting capital and labor markets, changes in trade policies generally have smaller effects on production and welfare. A free trade agreement by itself is not capable of entirely reducing the trend toward increased illegal migration, as some have claimed. Migration, in fact, will increase in the absence of significant capital inflows to increase employment and wages in Mexico. An attempt to close off either economy from exchange with the other (the protectionist alternative) emerges as the worst long-term welfare option for most workers' groups in both countries. The dilemma, however, is that, in the short run, this option is superior for those workers benefitting from direct protection. Of the three alternative scenarios, only managed interdependence can provide for continued growth, increased international exchange, and a basis for strategically agreed-upon social pacts in both countries. The key to this approach is developing a combination of debt, trade, and migration policies that maximize growth and welfare on both sides of the border.[19]

McCleery and Reynolds (1991) present a model similar to the one developed by Hinojosa and McCleery (1992), but which disables the migration equations and the Stakelberg game between workers and capitalists. The first scenario removes tariffs and again demonstrates that simply eliminating official tariffs has little effect on either economy. The new elements introduced in scenarios two through four are: (1) a consideration of endogenous capital flows in response to the reduced risk of investing in Mexico under NAFTA, (2) the possibility of more labor-intensive production in Mexico after removing factor and product market distortions, and (3) a simulation of one possible avenue of productivity growth for the U.S. economy resulting from NAFTA.

Unfortunately, a stylized, two-country, two-factor model cannot properly deal with these interesting questions. In the second scenario, capital flows to Mexico induced by NAFTA are assumed to reduce U.S. investment, thus reducing employment in the high wage (also tradeable and capital-intensive) sector in the U.S. As discussed earlier, it is implausible to assume that increased U.S. investment in Mexico will have a significant effect on the U.S. capital market or on aggregate investment. In the third scenario, a change in the mix of products produced and exported is proxied by a reduction in the (exogenous) capital-labor ratio in the tradeable sector. The approach is understandable in a two-sector model, but is not really satisfactory given that it is feasible simply to specify more sectors.

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[19]Faux and Spriggs (1991) make use of the Hinojosa and McCleery (1992) trade, capital, and migration model to simulate a scenario of large capital flows to Mexico which they assume would reduce U.S. aggregate investment. In addition to sharing the same limitations of the Koechlin *et al.* (1992) approach, the employment results of this exercise were reported without differentiating the role of return migration. Thus 70% of the U.S. employment "loss" of 550,000 high wage jobs is, in fact, the result of large scale return migration to Mexico to take advantage of rising wages there and of capital moving to the U.S. low wage sector where wages are actually rising due to the Mexican return migration.

Furthermore, there is an empirical question about the strength or even direction of the assumed effect. Trade liberalization favors labor-intensive sectors in Mexico, but new foreign investment is already increasing capital-labor ratios. Consider, for example, the recent series of extremely capital-intensive investments in the automobile sector in Mexico.[20] The fourth scenario is useful in showing that if productivity gains through learning-by-doing, increased R&D, or other spillover effects of increased capital goods production in the U.S. are present, the gains from free trade (with capital movements) will be larger and more evenly distributed between capital owners and labor income. The productivity parameter, however, is not estimated but assumed. Such issues are treated in a more satisfactory way, both theoretically and empirically, in a model by Brown, Deardorff, and Stern (1992).

While only a few of the CGE models include international migration and/or an adequate treatment of rural-urban migration within Mexico, they all include enough labor-market structure to determine the effect of trade liberalization on market-clearing wages. In general, given the wide disparity in country sizes and levels of GDP, one would expect trade liberalization to have a much larger impact on Mexico than on the U.S. As carefully discussed by Leamer, trade theory predicts that, with the removal of trade barriers, unskilled wages should fall in the U.S. and rise in Mexico, given that Mexican exports are intensive in unskilled labor. The theoretical model, however, does not predict magnitudes, and its predictions become ambiguous given pre-existing domestic distortions in both countries. The issue becomes an empirical question — how large are the various effects?

The ITC model, which is the most stylized and closest to standard trade theory, does yield a fall in the wage of unskilled labor in the U.S., and a rise in Mexico, after trade liberalization.[21] On the U.S. side, however, the effect is tiny. This empirical result is robust and is replicated in all the CGE models. In the absence of significant migration, the impact of the FTA on the aggregate U.S. labor market is insignificant. For example, Hinojosa and Robinson (1991), in an experiment designed to replicate the scenario in the ITC model, find that wages of rural and urban unskilled workers in the U.S. decline by a tenth of a percent, and that other factor returns do not change at all. The KPMG/Peat Marwick model, which has 44 sectors but only one labor category, finds that trade liberalization actually raises the real wage in the U.S., but only by 0.02 percent. If they fix the wage and, instead, generate the change in demand for workers, they find that aggregate employment in the U.S. rises by 0.04 percent, or 40,800 jobs. Roland-Holst, Reinert, and Shiels (1992), also using a model with one labor category and a fixed wage, find that trade liberalization across the U.S., Mexico, and Canada raises aggregate employment in the U.S. by only 0.09 percent. Brown, Deardorff, and Stern (1992) find that the wage gap between U.S. and Mexican workers narrows, but that U.S. workers also gain (largely through pro-competitive effects that lead to exploitation of economies of scale in major U.S. industries).

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[20]See, for example, Krueger (1983) who argues for expanding labor-intensive exports from Mexico. See also Shaiken (1990), who discusses high technology and capital intensity in automobile exports from Mexico.

[21]The ITC model is not fully documented in USITC (1991) and no technical description is available. The description here and in Table 1 is based on the sketchy published description, with some additional deduction.

Evidently, the sorts of indirect effects that drive the Stolper-Samuelson and factor-price equalization theorems are empirically quite small for the U.S., especially given that the trade policy change affects a small share of total U.S. trade. There are certainly significant price and quantity changes (winners and losers) at the sectoral level in all the models, but these do not translate into significant changes in the aggregate factor markets. Perhaps with more disaggregation of labor categories, one might find a larger effect, but the question then arises as to how valid is it to segment the labor market into many non-substitutable categories. These empirical results contrast with those from Leamer (1991) discussed above.

The models with international migration find more significant wage changes resulting from changes in trade policy. For example, Robinson *et al.* (1991) find that a full trade liberalization scenario, which yields Mexico-U.S. migration of about 600 thousand workers, leads to a decline in rural and urban unskilled wages in the U.S. of 3–4 percent. Wages are sensitive to changes in aggregate labor supplies. International movements of factors have a direct effect on factor returns that is much larger than the indirect effects working through price changes in product markets. These direct effects of migration also largely drive the results from the Hinojosa-McCleery model.

IV. Policies, Politics, and Institutions

Economists tend to assume that changing incentives, such as eliminating import protection, automatically leads all the relevant actors to change supply and demand behavior, as the free market equilibrium model postulates. Actual economies are more complex. Social and political institutions are fundamental for determining whether, how, and how rapidly economies will adjust and reallocate resources in response to a major policy change such as trade liberalization. A major shift in development strategy requires active participation by all major institutional actors, whose interests must then be considered. Labor-related institutions, such as unions and governmental labor agencies, are crucial to ensure the rights of workers, their participation in bargaining for improved income distribution, and their willingness to support the policy shift. The harmonization of labor-related institutional developments across countries, and a recognition of their complementarity, is fundamental if there is to be a "high wage" convergence based on rising productivity and wages in both countries. In addition, reliance on private capital markets to conduct all elements of potential restructuring and investment is unrealistic. The need for social-overhead investment, infrastructure investment, and the existence of potential real and pecuniary externalities (including environmental externalities) imply that multilateral and public sources of investment funds have an important role to play, and can be very beneficial in the integration.

Institutional issues are difficult to integrate into a traditional economic modeling framework. Some attempts have been made, nevertheless, within a US-Mexico framework. Koechlin *et al.* (1992), for instance, incorporate a labor discipline model of wage determination into their analysis. Institutions in the labor market are conceptualized as determining the cost of job loss through wages foregone over an average period of unemployment between jobs, during which time benefits are received. These benefits, in turn, affect work effort and the wage employers are willing to pay. The U.S. equilibrium wage is also affected by the

unemployment rate and, in their analysis, is expected to increase due to U.S. investment shifts to Mexico. In Mexico, the equilibrium wage falls as labor is assumed to be displaced from agriculture in an FTA, and the fallback wage is determined by informal-sector employment rather than unemployment benefits.[22]

Hinojosa and McCleery (1992) motivate the game-theoretic elements of their model as reflecting the operation of institutions such as unions, employer associations, and the legal system. The bargaining game is seen as essential for reaching long-term, dependable (*i.e.*, credible) agreements or social pacts over wage, investment, and employment levels. The weaker the institutions, the less likely are actors to enter into accords which might allow for the more efficient reallocation of resources. If trade liberalization is not accompanied by policies to provide social "safety nets," retraining, and adjustment assistance, workers and capitalists in the losing sectors can be expected to resist politically. Even if overall social welfare may be increased and the proposed FTA passes the compensation test, it may fail in the political process if the losers are not compensated.

There have been some proposals to develop new institutions in North-America to facilitate the movement towards greater integration, assist in resource reallocation, and compensate effected communities. One proposal, which indicates the sorts of problems that need addressing, is the creation of a new institution, a regional North American Development Bank and Adjustment Fund [Fishlow, Robinson, and Hinojosa (1991)]. This institution would serve two functions: (1) as a regional investment bank, it would lend funds to finance long-term development projects, and (2) as an adjustment fund, it would provide short to medium-term assistance to facilitate the reallocation of resources required to generate productivity increases in the region.

The underlying assumption is that there will be no major shortage of private investment funds, but that there is a real need to mobilize resources for long-term investment in social overhead capital and in areas where private markets cannot work properly (*e.g.*, when there are environmental externalities). Institutions with functions similar to the proposed NADBAF were established in Europe, as the Common Market expanded to include relatively less developed countries such as Greece, Spain, Ireland, and Portugal. Institutions such as the European Regional Development Fund and the European Social Fund have been very successful in facilitating the integration of poorer new members into the European Community. North America can draw on lessons learned from the successful experience of Europe. One major difference with the European experience, however, is that the operation of NADBAF need have no aid component. The sorts of long-term investments that are needed should be socially profitable, and the issue is that the government needs to capture enough of the returns to ensure repayment.

While regional development and adjustment institutions in the European and North American context have the same ultimate goal of rising productivity and real wages in the

[22]Their specification captures the typical operation of labor markets in developing countries, where the urban informal sector acts as a labor sink. In the formal sector in Mexico, however, this is a misspecification of the operation of the labor market. While there is no government unemployment insurance, employers are required to make a substantial severance payment to any worker who is laid off.

poorer as well as the richer regions, another set of institutional proposals concentrates on the need to directly harmonize worker rights across countries as a means of raising wages and working conditions of the poorer country to the standards of the richer. Brown, *et al.*, (1992) call for the adoption of a "Social and Environmental Charter for North America" which would include some common minimum standards as well as a series of recommendations for regional governments whose implementation would "take into account different levels of national economic development but that will improve steadily with gains in productivity" (p. 326)[23]. Another set of proposals concentrate on the lack of human and labor rights within the U.S. for immigrant workers, calling for the extension of legal protection to all workers as an essential part of integration [Schey (1992) and Bosniak (1991)]. An important area of needed research concerns the interplay of regional economic activity and the method of introducing new standards and institutions.

V. Conclusion

There are a number of lessons to be learned from the rather extensive body of modelling work regarding the employment and wage implications of the formation of NAFTA.

There is wide agreement that the impact of NAFTA will be much greater on Mexico than on the U.S. At the aggregate level, the impact on wages, profits, employment, and investment in the U.S. will be tiny, much smaller than the year-to-year fluctuations typically observed historically.

Trade theory predicts that, even without international factor mobility, there should be movement toward wage convergence after the creation of NAFTA, with Mexican unskilled wages rising and U.S. unskilled wages falling. Model results indicate that, on the U.S. side, this result is not empirically robust. The effects on the U.S. side are small, and existing distortions create a second-best environment in which the theoretical predictions become ambiguous. All the CGE models generated plausible scenarios in which wages rise in both the U.S. and Mexico. Models with imperfect competition and scale economies find pro-competitive effects from trade liberalization that easily dominate Stolper-Samuelson effects, generating larger increases in wages in both countries.

While macro effects in the U.S. resulting from the creation of NAFTA are tiny, there are important sectoral effects. There are certainly sectoral winners and losers, and the CGE models do a good job of identifying them. As one dissaggregates sectors and factors, and moves toward assuming sector-specific factors (both capital and labor), then the CGE models find significant changes in factor incomes arising from NAFTA. Such observations are certainly consistent with trade theory and are also consistent with the observation that political opposition to changes in trade policy tend to be organized by sector rather than by aggregate factors (*e.g.*, steel and automobiles, rather than labor).

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[23]See Schoepfle (1990) and Child Labor Coalition (1991) for discussions of labor standards in export assembly operations in Mexico and the Caribbean.

International factor mobility is an important part of NAFTA, even though labor migration is not part of the negotiations. Models with international labor migration and investment generate much larger changes in wages and capital rental rates than do models which examine only changes in commodity trade. The CGE models find that, empirically, changes in factor mobility have a much greater impact on factor returns in the two countries than do changes in the volume and composition of commodity trade.

The models which focus on migration issues all indicate a policy tradeoff for trade negotiators. Complete liberalization in Mexican agriculture will greatly increase the speed of outmigration from rural areas. These migrants show up in both Mexican urban and U.S. labor markets, leading to adjustment problems and social strains on both sides of the border. Liberalization, however, is good for U.S. agriculture, which greatly increases its exports to Mexico. The model results make a strong argument for allowing a long transition period for Mexican agriculture, to allow time to make needed infrastructure investments in rural areas and to smooth the process of labor absorption in the Mexican industrial sector.

When seen as an important component of Mexico's attempt to shift development strategy and open its economy, NAFTA may result in large benefits for Mexico. If Mexico succeeds in shifting development strategy and achieving rapid growth, the expansion of trade with the U.S. will benefit U.S. exporters significantly. Models that examine this "success scenario," with more rapid growth in Mexico, project all incomes (including wages) to rise significantly in both countries.

The creation of NAFTA, while potentially benefitting all three countries, will also create strains, especially in Mexico. The benefits from trade liberalization are gleaned only by changing the sectoral structure of trade, production, and factor employment. CGE models tend to understate the adjustment problems, focusing on medium to long-run changes in structure without considering the adjustment process necessary to reach the new equilibrium. Policy makers can use such models to indicate where we are heading, but also must consider the political and institutional problems of facilitating adjustment and compensating those who are displaced during the process.

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