

*The Employment Dynamics of Regional
Economies on the U.S.-Mexico Border*

First draft

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U.S.-Mexico economic integration: The border versus the nation

A major proportion of the recent empirical research on U.S.-Mexico economic integration is focused on the national impacts of NAFTA, either in prospect (Hufbauer and Schott, 1993; Lustig, Bosworth, and Lawrence, 1992), or in retrospect (Amuedo Dorantes and Huang, 1997; Bosworth, Collins, and Lustig, 1998; Clinton Administration, 1997; Hinojosa-Ojeda, 1997; Weintraub, 1997). A central finding of this literature is that economic integration has a relatively small impact on the national U.S. economy. Part of the explanation for this conclusion stems from the observation that the GDP of the United States is much larger than Mexico's and that from the U.S. perspective, more open trade is approximately equivalent to adding an economy about the size of Florida or Illinois, a large (but not one of the largest) U.S. states. This is not to diminish the importance of the agreement since the impact on the U.S. of freer trade may grow as Mexican incomes rise, and since the institutional environment is much friendlier for cooperative solutions to common problems. Nevertheless, in terms of the national U.S. economy, the short- to medium-term effects of freer trade with Mexico are small when looked at from the standpoint of the aggregate U.S. economy.

The assertion that NAFTA (or, more generally, closer U.S.-Mexico economic ties) has a relatively small economic impact on the U.S. contrasts sharply with the largely pre-NAFTA research showing a significant and important border-region effect from growing economic integration between the U.S. and Mexico. For example, Hanson (1996, 1997) and Patrick (1990, 1996) estimate sizable positive employment effects of maquiladora growth on the U.S. MSAs located on the border. Prock (1983), Patrick and Renforth (1996) and Gerber (1999) show that cross border shopping by residents of

Mexico has widely varying but important impacts on the U.S. retail sector along the border and, by implication, significant effects on state and local finances. Spaulding (1999) and Sweedler, Ganster, and Bennett (1995) demonstrate sizable environmental impacts of closer economic ties, with significant implications for living standards and environmental clean-up costs. Clement and Zepeda (1993) and Gerber and Clement (1992) show that integration has brought important trade and economy-wide to impacts in the U.S. border region. Two points of contrast distinguish the regionally focused literature from the national. First, within the border-regions NAFTA is one more significant step in a long historical process of evolving integration between U.S. and Mexican border regions. Second, from the U.S. point of view at least, the long run trend towards closer economic ties along the U.S.-Mexico border raises a serious question as to whether or not NAFTA represents a break with the past or is simply a continuation of the pre-existing trends in cross-border economic relations.

Income and employment along the U.S. border

The difference between the national effects and the border-region effects of U.S.-Mexico economic integration is largely the result of two factors. First, as detailed in Table 1, the populations of Mexican border cities tend to be as large or larger than their U.S. metropolitan area counterparts.

[Table 1]

The sizes of the city populations in the U.S.-Mexico twin city pairings shown in Table 1 are important factors in retailing, services, and other sectors of the U.S. border cities. The U.S.'s high income (albeit not so high at the border), along with its relatively more open national economy, means that the availability and quality of goods and services has

usually been better on the U.S. side. This has encouraged a large and significant amount of cross border shopping by relatively affluent Mexicans.

A second reason for the larger impact of international economic integration on the border region is that in many parts of the border the differences between U.S. and Mexican incomes per capita are not nearly as large as the difference in national averages. Tables 2 and 3 compare per capita incomes between U.S. MSAs and Mexican states along the border. Taken together, these areas represent three-fourths of the population residing in U.S. counties with a common border with Mexico. Table 2 shows the estimated level of per capita regional products in 1996, measured in U.S. dollars and using the market exchange rate to convert from pesos. As can be seen, Mexican border state incomes are higher and U.S. border city incomes are lower than their respective national averages. Table 3 contains the ratios of U.S. border city to contiguous Mexican border state.¹ Comparing the ratio of incomes at the national level to the population weighted ratio for the border region, we see that the former is about 70 percent greater than the latter (8.77/5.15).²

[Tables 2,3]

The fact that U.S. and Mexican incomes are less different in the border region has important implications in the product markets cited above, but also in resource markets as well. Quantitatively speaking, this has not been closely examined in the existing border literature. In theory, relatively smaller income differences along the border means that

¹ Mexican border cities probably have higher average income levels than their states; this biases the estimated ratios upwards but, unfortunately, there are no city-specific estimates available for Mexico.

² Nuevo Leon, which has a relatively high per capita income is actually a better comparison for Laredo and McAllen. Tamaulipas is used, however, because it has a finger that extends along the border and cuts Nuevo Leon off from any border contact. Since Nuevo Leon's income is relatively high, and Tamaulipas' is relatively low, this biases upwards the ratios in Table 3. In addition, the exclusion of the approximately 25

there is less contrast to cross-border productivity and, by implication, that U.S. and Mexican workers are closer substitutes in the border region than they are at the national levels. This is likely to influence wage levels and the type of investment that is attracted to the border region.

While average incomes on the Mexican side of the border are higher than in the nation as a whole, the relative poverty along the U.S. side of the border has become infamous. Perhaps one of NAFTA's greatest accomplishments for the U.S. is that it has focused national (Washington, D.C.) attention on this problem and has helped create a number of institutions aimed at ameliorating conditions on the border. Institutions ranging from the environment (e.g., the Border Environmental Cooperation Commission and the NADBank), to community investment (Community Assistance Investment Program), to the newly announced comprehensive Southwest Border Initiative of the Clinton Administration are either directly or indirectly focused on improving the quality of life in U.S. communities along the U.S.-Mexico border.

Given the problem of poverty along the border, it would seem reasonable to conclude that one of the key indicators of community well-being, employment growth, must have fallen far below the national trend. In fact, just the opposite is true. Employment growth in the border MSAs has usually outstripped the national average, often by a wide margin. Table 4 shows average annual rates of employment growth in the border region from 1980 to June of 1998.³ In terms of total employment, 4 of 6 regions grew at a rate that was twice the U.S. rate (Brownsville, Imperial county, Laredo,

percent of the U.S. border population that lives outside of an MSA biases upwards the population weighted average for U.S. income and the ratio as well.

³ Growth rates were estimated using the methodology of seemingly unrelated regressions to allow for the correlation of error terms across regions within a given sector or within total employment. The purpose

and McAllen), and even the region of slowest employment growth (San Diego) exceeded the U.S. rate by 25 percent.

[Table 4]

Within the pattern of faster employment growth along the border, however, there is a significant amount of variation across regions, across economic sectors, and across time. In other words, the border population agglomerations do not represent homogeneous economies. For example, Wald tests on the restriction that growth rates are the same within each sector across regions lead to the conclusion that we should reject the hypothesis of equal growth rates. This holds for total employment and for each sector except construction. As a result, it is imperative that each region be examined separately and not be pooled to derive one set of growth rates or one set of other economic parameters. The Wald tests reported in Table 4 also lead us to conclude that there is no reason to expect that the impacts of economic integration with Mexico are the same along the entire length of the border. Indeed, this is one of the key findings of Patrick and Renforth (1996) and Gerber (1999) in their analyses of the border region effects of a decline in the value of the peso. Given the differences in sizes of the border MSAs, ranging from 175,015 in Laredo in 1996, to more than 2.5 million in San Diego, and the equally diverse structures of their economies, the economic impacts of closer economic ties between the United States and Mexico are likely to vary greatly along the border region.

Variation in employment growth across regions and sectors was significant during the last two decades. Nevertheless, three sectors stand out as major growth poles in all

behind the selection of this methodology is to take into account the spatial spillovers from the economic sector of one region to the same sector in another region.

six regions. These are the retail sector, transportation and public utilities, and government. The retail sector has benefited from cross border shoppers who enter the U.S. from Mexico, while transportation and public utilities is undoubtedly a beneficiary of increased trade along the border. The relatively extreme dependence of the border cities on government employment, along with its rapid growth, is harder to understand. It may reflect an ongoing concern at the state level with the region's relative poverty and the fact that many of these cities qualify for federal funds based on income levels and unemployment rates.

The variation in employment growth across regions and time is also significant. Given the cycles of U.S. employment, the higher potential for border regions to be affected by the variation in Mexican conditions, and the ongoing trend towards greater integration with Mexico, it is useful to divide the sample into three separate time periods. We have chosen the periods from 1980 through 1985, 1986 through 1993, and 1994 through the end of the sample in June, 1998 as the primary subperiods. Essentially, the three periods represent the before and after of Mexican policy reforms, with the after period divided into pre- and post-NAFTA. This choice is admittedly somewhat arbitrary, but it reflects our interest in the impacts on the U.S. border region of increasing international economic integration. The Mexican economy was relatively closed until 1986 when the de la Madrid presidency began implementing elements of the "Washington Consensus" which included a reduction in trade barriers and privatization (Williamson, 1992; Edwards, 1996).⁴ Shortly after the beginning of policy reforms, the Salinas presidency announced that it was seeking a free trade agreement with the United States, in part as a means of consolidating and institutionalizing the reforms that had begun

under Salinas' predecessor. Between 1990 and 1993, the reforms continued, augmented by the anticipation effects of the NAFTA agreement. Likely anticipation effects include increased investment along the border, the positioning of products in each other's markets in order to take advantage of coming freer trade, and the impacts of mergers. The size of the anticipation effects is unknown but they clearly fit within the framework of increasing openness within the Mexican economy. In addition to these effects stemming from a policy reorientation of the Mexican economy, the annual growth of real Mexican GDP varied across the three time periods. The first period included some of the worst effects of the onset of the debt crisis. According to calculations based on INEGI (1999a) data, Mexican real GDP expanded at an annual average rate of 0.9 percent from 1980 through 1985. Although 1986 was another year of recession, average growth from 1986 through 1993 was 3.4 percent per year, and from 1994 through June of 1998, it was a similar 3.5 percent (INEGI, 1999a).

[Table 5]

Table 5 divides the annual rate of employment growth into three subperiods for the six border regions and the two reference areas (Los Angeles and the United States).⁵ During the first period (1980-1985), only one of the six regions grew at twice the national, whereas in the entire sample (1980-June, 1998) four out of six did. Furthermore, three of the six grew at the same rate or slower than the nation during the first period. San Diego's exceptional growth during this period is likely the result of defense contracting during the early years of the Reagan build-up, along with the developing speculative bubble in California real estate and junk bonds.

⁴ Opponents of these policies usually use the label "neoliberalism."

In the second period, when Mexican liberalization took off and the anticipation effects of the NAFTA made themselves felt, dramatically faster growth occurred in five of the six regions. Employment growth for four of the six was faster than during any other period, and for McAllen, it is only slightly below the rate attained during the NAFTA years. For the nation, however, there is no similar up-turn in employment creation during the second period, but rather, job growth actually fell off slightly. During the sample's NAFTA period, growth fell in each of the border regions except San Diego, where recovery from the lingering California recession finally began to develop in 1994. While employment growth fell below its peak period in all but McAllen, it remained higher than in the first period in all regions except Imperial county.

[Table 6]

Employment growth across the three time periods, the six regions, and the nine sectors of the economy also varied widely. Nevertheless, it is worth noting several features of the employment growth poles, namely retail, transportation and public utilities, and government. First, in five of the six regions, retail grew fastest the early 1980s, when the Mexican economy was relatively closed. This is consistent with the idea that economic openness, beginning in 1986 in Mexico and gradually increasing thereafter, reduces the opportunities for the retail sector on the U.S. side of the border through an increase in the quality and availability of consumer goods and some intermediate goods such as building materials. Second, the transportation and public utilities sectors reached their fastest rate of employment growth in either 1986-1993 (2 regions) or during the NAFTA period (4 regions). This is consistent with the observation

⁵ Growth rates were estimated using the same methodology used to create Table 4 (see footnote 3). Each period was estimated separately, however.

that the increased volume of land-based trade between the United States and Mexico raised the rate of growth of employment in the sectors most closely associated with the movement of goods. Third, the growth of government employment is also a feature of the initial period of increasing openness. The causes of faster employment growth in the governmental sector is uncertain, but the reasons are likely to vary from region to region.

One or two words about manufacturing seem to be in order at this point. In the sample, manufacturing is divided into durable and nondurable goods sectors. As will be shown in the next section of the paper, none of the regional economies have larger than average durable goods sectors, and all but San Diego are far below average in relative size. Three regional economies (Brownsville, El Paso, and McAllen) have significant nondurable manufacturing while the remaining three regions have far smaller than average sized sectors. The fastest rates of growth of the nondurable sector occurred early during the period of the liberalization in Mexico (in one case, McAllen, growth was fastest in the 1980-1985 period). More or less the same pattern holds for durable goods manufacturing, with the exception that San Diego's durable goods sector has grown fastest in the NAFTA period. In none of the cases has nondurable manufacturing grown fastest during the NAFTA period. The absence of relatively fast manufacturing employment growth during the NAFTA period is a politically important point to which we will return in the next sections of the paper. It is worth noting here, however, that its political importance stems from the fact that much of the U.S. opposition to NAFTA and closer integration between the U.S. and Mexico has developed out of concerns about the fate of workers in manufacturing industries producing nondurable (textiles, apparel, food processing) and durable (furniture, car parts) goods.

The structure of the U.S. border economies

The regional economies along the U.S.-Mexico border are unique urban agglomerations which happen to be divided by an international border. The degree to which the twin-cities of the border region are integrated urban areas is an open question, however. On the Mexican side, the municipios have been strongly influenced by the rapid growth of Mexico's maquiladora program and the extremely rapid population growth which it has spawned. Increased openness together with the growth of the maquiladora sector which is dependent on imported intermediate goods implies that it is likely that there are significant and important spillover effects from Mexico's border economy to the cities along the US side. On the other hand, the relative absence of manufacturing in most U.S. border cities implies that they are not becoming integrated on the basis of increased manufacturing production sharing, but that the U.S. cities are more likely to function as suppliers of finished consumption goods and services. This idea is reinforced by the historically strong cross-border ties of kinship and social relations which make cross-border shopping an important border region phenomena. In addition, international integration in the border region is also likely to spawn growth in the transportation and public utilities sector, particularly those subsectors handling the increased flow of traded goods.

Increased openness in the Mexican economy should significantly change the composition of regional production, and the structure of employment along with it. As economies become more open, international trade theory teaches that the requirements for welfare maximization lead each trading partner to specialize in the production of goods and services which have the lowest opportunity costs. While it is widely

recognized that the predictions of the standard trade model (i.e., the Heckscher-Ohlin factor abundance model) are a poor guide to actual trade patterns, it is nevertheless the case that the opening of trade involves structural adjustment in each trading partner's economy. A good starting point to look for the changes wrought on the border region by closer U.S.-Mexico ties is to consider the structures of the border's urban areas, and how those structures might have changed over the last few years.

[Table 7]

Table 7 shows the location quotients (LQs) for the five border MSAs.⁶ A number greater than one implies a sector is more important in the region than in the nation, while less than one implies the opposite. As noted, the pattern for manufacturing involves a smaller durable goods sector (usually much smaller) and three regions with larger than average nondurable sectors. Table 7 shows that since the introduction of NAFTA, nondurable production has decreased in importance in each of the three sectors where it is relatively larger than the U.S. average. The changes in durable goods manufacturing employment is varied, but as noted, with the exception of San Diego, this sector is much smaller than the average for the nation.

Two of the most interesting sets of changes to occur since the implementation of NAFTA are found in the transportation and public utilities sector, and in the retail sector. The former has seen not only significant employment growth since the implementation of NAFTA (Table 6), but increases in its relative importance as well. It is logical to credit NAFTA and increasing Mexican openness for this effect, although the data presented

⁶ Location quotients are a measure of the relative importance of specific economic sectors in particular regions, using the overall national (U.S.) economy as a standard for comparison. Specifically, $LQ_r = (E_{i,r} / \sum_i E_{i,r}) / (E_{i,us} / \sum_i E_{i,us})$, where $(E_{i,r})$ is employment in sector i of region r , and $\sum_i E_{i,r}$ is the sum of all sectors in region r . The denominator is the same ratio, but for the U.S.

does not conclusively establish that as the case. Still, the increased flow of goods overland between the United States and Mexico must have led to an increased demand for transportation services and urban infrastructure to support the growing volume of trade. While the sector increased in relative importance across the border, employment is below average in this sector in three of the regions, including San Diego, the largest metropolitan area. This may partly reflect San Diego's unique location at the corner of the U.S. Mexico border and on the Pacific side outside the flow of commerce between the U.S. and Mexican industrial heartlands. It may also reflect that region's failure to invest in trade related infrastructure, as described in detail in Erie (1999).

The retail sector is above average size in every one of the border regions. This supports the idea that the retail sectors in U.S. border cities have grown in response to cross-border retailing activities. Cross border shopping by residents of Mexico is an important part of the economies of the U.S. border cities, as are the sales tax effects to local governments (Prock,1983; Patrick and Renforth,1996; and Gerber, 1999). The decline in relative importance of these sectors during the NAFTA period is entirely consistent with economic theory since, as already argued, increased openness in Mexico has increased the quality and availability of goods and services so that the retail sectors of U.S. border cities have become relatively less important. One has only to think about the Walmarts and Costcos that have penetrated the Mexican market to understand this phenomena.⁷

⁷ Given that wages tend to be lower than average in the retail sector, it is perhaps not surprising that the relative decline of retail jobs has not been mentioned by NAFTA opponents. This may also stem from the much lower rates of union activity in the retail sector. It is perhaps surprising, however, that the proponents of NAFTA have not spoken out about the relative growth of jobs in transportation and public utilities which often pay above average wages. It must also be noted that the failure of the U.S. to fully implement the NAFTA agreement with respect to trucking has limited liberalization of this sector. U.S. truck drivers and the Teamsters Union have been a significant force in preventing the further opening of trucking. Their

The pattern in the remaining industries varies greatly by region. The relative importance of the wholesale trade sector, for example, grew in El Paso, Laredo and San Diego. This may be connected to international trade along the border, since Laredo is the main port of entry and exit for U.S. Mexican trade, and Juarez (opposite El Paso) and Tijuana (opposite San Diego) have large maquiladora sectors. We would expect wholesale trade to increase in response, but it does not explain the decline in the importance of wholesale trade in Imperial county. San Diego's wholesale sector increased in importance, but as is the case with transportation and public utilities, it is far less important than the national average (LQ = 0.751). The remaining two sectors of services and the finance, insurance, and real estate sector, are less important in the border region in every regional economy except San Diego. There is a mixed pattern of growth and decline in the relative importance of these sectors.

An Index of Specialization

Calculation of a specialization index offers a more general view of the structural change in the border economies. It also offers a way to check the predictions of trade theory that increased trade flows will lead economies to differentiate themselves to a greater degree as they follow their comparative advantages more closely. A specialization index is calculated as

$$S_i^r = (1/2) * (\sum_i | p_i^r - p_i^{us} |)$$

where

$$p_i^r = e_i^r / \sum_i e_i^r,$$

assumption that further liberalization might change the pattern of employment for their part of the sector is perhaps not far off the mark.

where e_i^r is employment in sector i and region r at time t , and $\sum_i e_i^r$ is the sum over all sectors in the same region at the same time. This index has a theoretical minimum of 0, occurring when the regional and US economies have identical employment distributions. The theoretical maximum is 1, occurring if the regional economy is completely specialized in a single industry.⁸

Next consider a partial adjustment model in which the desired or optimal level of specialization in region r at time t is defined as S_t^{r*} :

$$S_t^{r*} = \alpha_0 + \alpha_1 us_t + \alpha_2 m_t + \varepsilon_t,$$

where us_t and m_t are the percentage change in US and Mexican employment, and ε_t is a random error term. The rationale for putting the growth rates of US and Mexican employment into the equation is that as the two national economies expand employment relatively more rapidly, it alters the level of specialization that we expect to find in a particular region. Rapid U.S. growth implies a cyclical upturn and more rapid structural change at the regional level. Mexican employment growth would have a similar impact insofar as there are spillovers from the Mexican economy to the border regions. In addition, however, more rapid growth in Mexico is assumed to intensify the desired structural changes in the border region that economies must experience in order to pursue their comparative advantages. This assumes that employment growth in Mexico is not neutral with respect to the composition of production. In order to capture the border effect of Mexican growth, we use maquiladora employment in the Mexican twin city for m_t .⁹

⁸ Note that this formulation uses the national economy as the base for comparison. Consequently, the theoretical maximum cannot be obtained.

⁹ This limits the sample for Laredo and McAllen to 1992-1998. For San Diego, the sample is from 1980 to 1998, and for the other regions it covers 1983-1998.

Given that structural adjustment happens slowly over time, we assume that the gap between the optimal level of specialization and the actual level cannot be closed instantaneously. Instead, it closes with a lag and with some random shocks. If a fraction of the gap is closed each period, then specialization at time t depends on time $t-1$, plus an adjustment, plus a random component:

$$S_t^r = S_{t-1}^r + \lambda(S_t^* - S_{t-1}) + v_t,$$

which implies that

$$\begin{aligned} S_t^r &= \alpha_0\lambda + (1-\lambda)S_{t-1}^r + \alpha_1\lambda us_t + \alpha_2\lambda m_t + \eta_t, \\ &= \beta_0 + \beta_1 S_{t-1}^r + \beta_2 us_t + \beta_3 m_t + \eta_t, \end{aligned}$$

where $\beta_0 = \alpha_0\lambda$, $\beta_1 = (1-\lambda)$, $\beta_2 = \alpha_1\lambda$, $\beta_3 = \alpha_2\lambda$. One dummy variable is added to test for the effect of NAFTA. The NAFTA variable is 1 in January, 1994, and thereafter, but 0 prior to then. This makes the final model as follows:

$$S_t^r = \beta_0 + \beta_1 S_{t-1}^r + \beta_2 us_t + \beta_3 m_t + \beta_4 \text{NAFTA}_t + \eta_t,$$

[Table 8]

Table 8 show the results from the above regression for the five MSAs and Imperial county. The estimates were obtained using seemingly unrelated regressions in order to take into account the spatial spillover effects from one region to another. Tests for an autoregressive error structure were insignificant. Several patterns emerge from the regression results. First, growth of the maquila industry in each region's Mexican twin city resulted in a decrease in the specialization index. The only exception is Brownsville. Another way to state this result is that growth in the maquiladora industries has generally been associated an increased similarity (decline in the difference) between the structure of the border economies and the nation as a whole. Second, in two of the

three regions where the impact of the maquila industry is statistically insignificant, the NAFTA dummy is significant and negative. In other words, NAFTA and the growth of the maquila industry in Mexico appears to have reduced the differences between the structures of the border region economies and the national economy. Imperial county, the only non-MSA in the sample, is an exception. In its case, NAFTA is associated with increasing specialization, relative to the national economy. Why this might be the case is unknown.

It is worthwhile to briefly reflect on the meaning of specialization in this context. If we begin with the assumption that the differences between the U.S. and Mexican border economies are smaller than the difference between the U.S. and Mexico, it appears that manufacturing growth along the border inside Mexico, together with the increased openness brought forward by NAFTA, have resulted in structural change inside the U.S. border region economies which has made them more like the U.S. economy and, presumably, less like Mexico. In terms of the location quotients, this has shown up as a decline in the relative importance of the retail sector and the nondurable goods manufacturing sector in those economies where it was unusually large. And it has also resulted in an increase in the transportation and public utilities sectors of the border regions, most of which (Laredo is the exception) were relatively much smaller than in the rest of the U.S. We can only speculate what the eventual effects of these changes might be for regional incomes which lag behind the national average by a considerable margin.

Conclusions

Analysis of the employment data for six U.S. border economies over the last two decades has highlighted several features of the U.S. border communities. First, in spite of

the rapid growth of employment, income levels remain far below the U.S. national average except in San Diego, where they are only slightly below average. Two, in some respects the border economies are similar. For example, all have above average (in terms of relative employment) retail trade and governmental sectors, average or below average wholesale trade sectors, and below average durable goods manufacturing, finance insurance and real estate and services sectors (San Diego is the exception in finance insurance and real estate, and services). While these features are similar, as are the lower than average incomes and the faster than average employment growth, the individual experiences of the border economies over the last two decades have been quite different. There is significant variation in the importance of nondurable and durable goods manufacturing, transportation and public utilities, and government employment. Furthermore, the growth of employment in the various sectors has varied across time and regions.

In each of the border economies, it appears that NAFTA and/or the growth of the maquila industry in Mexico has encouraged a structural change in the composition of economic sectors which has led these economies towards greater similarity to the national economy. Retail sectors have shrunk, transportation has grown, and manufacturing has moved towards a configuration that is closer to the U.S. as a whole. Given the lower incomes and productivity in the border region, and assuming that technology moves freely through the United States, it seems reasonable to expect that economic integration with Mexico and the increased openness of the Mexican economy will eventually lead to the convergence of relative incomes. This has not happened yet, however, and depends additionally on a number of demographic and human capital factors which are not

considered here. Nevertheless, the re-organization of border economies along the lines of the composition of the national economy should be positive in the long run.

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Table 1
Population in the "twin cities," 1995

<i>U.S. MSA</i>	<i>Population, 1995</i>	<i>Mexican municipio</i>	<i>Population, 1995</i>
San Diego, CA	2,641,006	Tijuana	991,593
El Paso, TX	671,855	Ciudad Juarez	1,011,787
Laredo, TX	170,394	Nuevo Laredo	275,060
McAllen-Edinburg-Mission, TX	476,697	Reynosa	337,052
Brownsville-Harlingen-San Benito, TX	304,285	Matamoros	363,486

Sources: Bureau of Economic Analysis, 1999; INEGI, 1999c.

Table 2
Per capita incomes along U.S.-Mexico border¹⁰

<i>Region</i>	<i>Per capita Gross Regional Product (US\$), 1996</i>
Mexico	3,283
Baja California	4,400
Coahuila	4,549
Chihuahua	4,529
Nuevo Leon	5,527
Sonora	3,955
Tamaulipas	3,552
United States	28,794
Brownsville-Harlingen-San Benito, TX MSA	14,527
El Paso, TX MSA	17,164
Imperial County, CA	16,983
Laredo, TX MSA	14,498
McAllen-Edinburg-Mission, TX MSA	13,576
San Diego, CA MSA	28,101

Sources: Bureau of Economic Analysis, 1998, 1999; Census Bureau, 1999. Federal Reserve Board, 1999; INEGI, 1999a, 1999b;

¹⁰ Estimated population for Mexican states are interpolations for 1996 using INEGI values for 1992 and 1997 to fit an exponential growth function of the form: Population 1997 = population 1992(e^{rt}) where r is the growth rate and t is the number of years (1992 to 1997). This gives a growth rate which is then used to estimate 1996 population. Estimated U.S. border MSA's gross regional product are calculated as the ratio of US GDP to US personal income (1.1756) times individual MSA personal income.

Table 3
Per capita income ratios

<i>Comparison</i>	<i>Ratio of per capita regional products, 1996</i>
U.S./Mexico	8.77
Brownsville/Tamaulipas	4.09
El Paso/ Chihuahua	3.79
Imperial County/Baja California	3.86
Laredo/Tamaulipas	4.08
McAllen/Tamaulipas	3.82
San Diego/Baja California	6.39
Average	4.33
Population weighted average:	5.53

Source: Table 2.

Table 4
Growth rates of employment, 1980-June, 1998¹¹

	<i>Total Employment</i>	<i>Construction</i>	<i>Durables</i>	<i>Nondurables</i>	<i>Finance, Insurance, and Real Estate</i>
<i>Border Communities:</i>					
<i>Brownsville</i>	0.039	0.010	0.024 ^b	0.015 ^b	0.010
<i>El Paso</i>	0.026	0.019 ^a	0.012	0.005	0.009
<i>Imperial County</i>	0.036 ^b	0.001 ^b	0.031 ^b	0.027 ^b	0.034 ^b
<i>Laredo</i>	0.049	0.038	0.000 ^b	-0.024 ^b	0.032
<i>McAllen</i>	0.038	0.037	0.006 ^b	0.014 ^b	0.026
<i>San Diego</i>	0.025	0.026	-0.018	0.039	-0.015
<i>Reference areas:</i>					
<i>Los Angeles</i>	0.003	0.001	-0.041	0.004	-0.058
<i>United States</i>	0.020	0.018	-0.001	-0.001	0.015
<i>Wald test for equality of growth rates among border communities:</i>					
χ^2	25.90	3.23	15.40	91.98	80.72
(Prob.)	(0.00)	(0.6647)	(0.0087)	(0.0000)	(0.0000)

(cont.)

¹¹Growth rates estimates are based on a continuous growth function: $E_{r,t} = E_{r,0}(1+g)^t$, where $E_{r,t}$ is employment in region r at time t . Taking logs, $\ln(E_{r,t}) = \ln(E_{r,0}) + t*\ln(1+g) = \beta_{r,0} + \beta_{r,1}t$, where $\beta_{r,0} = \ln(E_{r,0})$ and $\beta_{r,1} = \ln(1+g)$. Therefore, $g = \exp(\beta_{r,1}) - 1$. Given that the dataset is monthly observations, the annual rate of growth is $(1+g)^{12} - 1 = \exp(\beta_{r,1}*12) - 1$.

Table 4 (cont.)

	<i>Retail</i>	<i>Wholesale</i>	<i>Services</i>	<i>Transportation and Public Utilities</i>	<i>Government</i>
<i>Border Communities :</i>					
<i>Brownsville</i>	0.034 ^b	0.024 ^b	0.066	0.021	0.035
<i>El Paso</i>	0.033 ^b	0.017 ^b	0.046	0.023	0.030
<i>Imperial County</i>	0.035 ^b	0.018 ^b	0.018 ^b	0.050 ^b	0.046 ^b
<i>Laredo</i>	0.046 ^b	0.069 ^b	0.059 ^b	0.085	0.048
<i>McAllen</i>	0.047 ^b	0.000 ^b	0.072	0.041	0.042
<i>San Diego</i>	0.028	0.002	0.049	0.020	0.022
<i>Reference Areas:</i>					
<i>Los Angeles</i>	0.005	-0.004	0.024	0.004	0.010
<i>United States</i>	0.024	0.015	0.042	0.015	0.014
<i>Wald test for equality of growth rates among border communities:</i>					
χ^2	37.34	46.55	94.98	49.72	584.29
(Prob.)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Source: Author's calculations based on monthly data from the Bureau of Labor Statistics, 1999a, 1999b; California Employment Development Department, 1999c.

^a1980-1987

^b1983-June, 1998

Table 5
Employment growth in three periods

	<i>1980-1985</i>	<i>1986-1993</i>	<i>1994-1998.6</i>
<u>Border communities</u>			
<i>San Diego</i>	0.040	0.010	0.034
<i>Brownsville</i>	0.006	0.045	0.027
<i>El Paso</i>	0.019	0.031	0.021
<i>Imperial County</i>	0.026	0.049	0.007
<i>Laredo</i>	0.008	0.070	0.032
<i>McAllen</i>	0.027	0.040	0.047
<u>Reference areas</u>			
<i>Los Angeles</i>	0.012	-0.015	0.018
<i>United States</i>	0.018	0.014	0.026

Source: See Table 4.

Table 6
Periods of fastest growth, by sector

	<i>1980-1985</i>	<i>1986-1993</i>	<i>1994-1998.6</i>
<i>Border communities</i>			
<i>San Diego</i>	fire, retail, services, wholesale	nondurables, government	construction, durables, tpu
<i>Brownsville</i>	fire, retail	nondurables, durables, wholesale, government	construction, services, tpu
<i>El Paso</i>	durables, retail, wholesale	nondurables, government	services, tpu
<i>Imperial County</i>	construction, nondurables, services	durables, fire, retail, wholesale, government	tpu
<i>Laredo</i>	durables, retail, services	nondurables, tpu, wholesale, government	construction, fire
<i>McAllen</i>	nondurables, durables, fire, retail, services	tpu, government	construction, wholesale
<i>Reference areas</i>			
<i>Los Angeles</i>	fire, services, wholesale	government	construction, nondurables, durables, retail, tpu
<i>United States</i>	fire, retail	nondurables, government	construction, durables, services, tpu, wholesale

Source: See Table 4.

Table 7
Location quotients , 1993 and 1997

<i>Region</i>	<i>Durables</i>	<i>Non-Durables</i>	<i>Trans and Pub Util</i>	<i>Whlsl Trade</i>	<i>Retail Trade</i>	<i>Fin, Ins, and RE</i>	<i>Services</i>	<i>Govt</i>
Brownsville								
1993	0.572	1.366	0.838	0.786	1.253	0.662	0.878	1.355
1997	0.558	1.210	0.858	0.778	1.118	0.650	0.961	1.454
Difference	-0.015	-0.157	0.020	-0.008	-0.135	-0.012	0.083	0.099
El Paso								
1993	0.669	2.032	0.971	0.978	1.060	0.611	0.770	1.271
1997	0.703	1.848	1.051	1.001	1.015	0.677	0.765	1.367
Difference	0.034	-0.184	0.079	0.023	-0.046	0.065	-0.005	0.096
Imperial								
1993	0.194	0.466	0.891	1.008	1.327	0.617	0.538	2.055
1997	0.224	0.488	1.139	0.907	1.192	0.526	0.545	2.504
Difference	0.030	0.022	0.249	-0.101	-0.136	-0.091	0.007	0.449
Laredo								
1993	0.190	0.221	3.002	0.940	1.429	0.600	0.616	1.292
1997	0.117	0.226	3.196	0.948	1.222	0.654	0.607	1.472
Difference	-0.073	0.005	0.195	0.009	-0.207	0.054	-0.009	0.181
McAllen								
1993	0.244	1.260	0.630	0.991	1.390	0.585	0.694	1.625
1997	0.250	1.206	0.664	0.925	1.270	0.622	0.772	1.674
Difference	0.006	-0.053	0.035	-0.066	-0.120	0.036	0.077	0.048
San Diego								
1993	0.975	0.480	0.719	0.776	1.098	1.075	1.112	1.111
1997	0.942	0.513	0.751	0.783	1.044	1.003	1.099	1.150
Difference	-0.033	0.033	0.033	0.007	-0.054	-0.072	-0.013	0.039

Source: Author's calculations based on data from the Bureau of Labor Statistics, 1999a, 1999b; California Employment Development Department, 1999c.

Table 8
Specialization Indices

	<i>Brownsville</i>	<i>El Paso</i>	<i>Imperial County</i>	<i>Laredo</i>	<i>McAllen</i>	<i>San Diego</i>
Dependent variable: S_t , Regional specialization index						
Constant	0.0103*** (2.838)	0.0017 (0.990)	0.0473*** (4.718)	0.0431*** (2.596)	0.0145** (2.303)	0.00298** (2.173)
S_{t-1}	0.9249*** (33.802)	0.9906*** (73.451)	0.8013** (18.888)	0.8338*** (12.968)	0.9288*** (31.126)	0.9652*** (61.69)
Maquila $_{t-1}$	-0.0077 (0.461)	-0.0179* (1.948)	-0.0202 (0.970)	-0.0321* (1.665)	0.0051 (0.484)	-0.0107*** (2.647)
U.S. emp $_{t-1}$	-0.1175*** (3.207)	-0.0414 (1.618)	-0.0889 (1.153)	0.0332 (0.750)	-0.0802*** (2.604)	-0.0257* (1.646)
NAFTA	-0.0013* (1.914)	-0.0004 (0.688)	0.0079*** (3.741)	-0.0012 (1.281)	-0.0015* (1.688)	-0.0006 (1.506)
Adj. R ²	0.869	0.974	0.844	0.745	0.970	0.971
Obs.	185	185	184	72	72	220

Source: Author's calculations based on data from the Bureau of Labor Statistics, 1999a, 1999b; California Employment Development Department, 1999c.

***, **, and * denote significance at the 1%, 5% and 10% levels.