

# THE Border ECONOMY

FEDERAL RESERVE BANK OF DALLAS June 2001

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*The Texas–Mexico border region has boomed during the past decade, especially in the second half under NAFTA. Texas border towns are among the fastest growing in the nation, and their sister cities south of the border are growing even faster. Like much of Texas, the border has been moving from a resource-based economy toward a more knowledge-based one. We at the Dallas Fed have been watching the effects of Tex–Mex border trends, and this publication reflects our long-standing interest in this dynamic region.*

*Free trade and a better-skilled workforce will be the key to increased prosperity along the border. One lesson is clear: As Adam Smith pointed out 225 years ago and as Frédéric Bastiat reinforced some 70 years later, the wealth of nations and the standards of living of their citizens are enhanced by freer trade. Hopefully, in the current decade, the benefits of free trade will be extended to the rest of this hemisphere.*

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# THE BORDER ECONOMY

## Introduction by Mine Yücel

The Texas border community is a complex blend of U.S. and Mexican cultures, languages and customs, with a dynamic economy that flourishes amid the diversity. The Rio Grande defines the border, stretching 1,254 miles from El Paso in the west to Brownsville on the Gulf Coast (see map on page 35). Nearly 10 percent of the Texas population lives in the border communities of Brownsville, Del Rio, Eagle Pass, El Paso, Laredo and McAllen.

The border region's economy has followed the ups and downs of the Mexican and U.S. economies. Benefiting greatly from the decade-long U.S. expansion, the region witnessed tremendous growth in the 1990s, aided by NAFTA and despite the peso devaluation. Many challenges remain, however. This study details some of those challenges, examines how the area has fared in the current economic expansion and raises issues relevant to its economic development.

Historically, the border region has been the most economically disadvantaged area of Texas. Unemployment rates have hovered in the teens, with McAllen's joblessness running above 20 percent until recently. Per capita incomes are among the lowest in the nation, ranging from 38 percent of the U.S. per capita income in Eagle Pass to 60 percent in El Paso, compared with a state average of 94 percent. Government transfers account for a large share of border income, ranging from a fifth to a third of total per capita personal income. Educational

attainment is low: 32 percent of the adult population has less than a ninth-grade education and only 13 percent has completed college, compared with 13 percent and 20 percent, respectively, for the state. A high birth rate and immigration push population growth in border cities to 1.5 to 2.5 times the state average.

During the past several years, however, the border region has benefited from a 14-year expansion of the Texas economy, increased trade with a fast-growing Mexican economy and the maquiladora boom across the border. Unemployment rates in all border cities have fallen below 10 percent except in McAllen, which nonetheless saw a dramatic 10 percentage point decline in joblessness. The region's strong job growth has surpassed Texas' growth since 1999. This growth has brought better-paying jobs but also increased demands on infrastructure, housing and services. It also has brought into focus the need for a better-educated, higher-skilled workforce.

The articles presented here explore issues important to the border region's economy. Bill Gilmer documents job growth in the region and shows that wage gains have come from an improved industrial mix—a shift to higher-wage industries. However, he notes that wage growth, diluted by higher population growth, has only managed to keep up with the nation and hasn't been able to close the gap.

Taking a different view, Lori Taylor notes that wages along the border are

significantly lower than elsewhere in Texas. However, looking only at teachers and correcting for education and experience, she finds that border area wages are anything but low, reflecting skill scarcity. Tom Fullerton studies the effect of education on per capita income and shows that the high rate of high school dropouts depresses wages by about one-fourth of border area per capita income.

Keith Phillips, Toby Cook and Ariel Cisneros document the increased demands on infrastructure. Phillips looks at strains on roads and bridges and suggests that before more money is invested in transportation infrastructure, border policies and procedures need to be closely scrutinized to ensure the current infrastructure is used efficiently. Cook finds that housing has become more affordable in border cities because incomes have risen faster than home prices. Cisneros looks at a different housing market: colonias. He shows that although additional resources have improved the colonias, increased population growth has sustained their demand.

Bill Gruben and Lucinda Vargas look at the impact of maquiladoras and NAFTA. The fast-growing Mexican and U.S. economies have led to a maquiladora plant boom that coincided with NAFTA's passage. Gruben maintains that this timing was purely coincidental, while Vargas shows that the growth in maquiladora plants across the border has created better-than-average-paying jobs on the Texas side.

Growth on both sides of the border has not lessened illegal immigration. Although illegal immigration continues, Pia Orrenius shows that tougher enforcement is having a deterrent effect while bringing relatively high-paying jobs and lower crime rates to border cities.

The Texas border region is a unique, vibrant bicultural area that has grown and changed dramatically. These changes have come with many benefits and challenges. This research sheds light on some of these challenges to help us better understand the border region's path to future prosperity.

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# TEXAS BORDER CITIES

## An Income Growth Perspective

Robert W. Gilmer, Matthew Gurch and Thomas Wang

Texas border cities are characterized by certain economic features: more transportation and distribution activity than in other U.S. cities, a relatively large retail sector and a large government sector. The six cities of Brownsville, Del Rio, Eagle Pass, El Paso, Laredo and McAllen fit this description. However, these cities also have differences that make it difficult to generalize about their future or the outcome of various policy proposals based solely on border location.

In this article, we track the progress of these cities from 1969 to 1997, focusing on their income growth compared with the rest of Texas and the nation.<sup>1</sup> We use per capita personal income to draw our comparisons because it offers the advantage of spotlighting the essential economic problem on the border—poverty.<sup>2</sup> The picture is not encouraging; it shows limited and selective progress over 28 years in raising per capita income relative to the nation as well as Texas.

### What Is a Border City?

What the six cities have in common are a Texas border location and a sister city in Mexico (Table 1). To see how common geography shapes the local economy, we compared the border cities with the United States and with Texas as a whole. The dominant factors are (1) a large transportation and distribution sector serving international traffic, (2) a retail sector inflated by serving two cities and (3) a government sector swollen by border enforcement and by public programs that address the high poverty levels.

To make these comparisons, we used 1997 employment data from *County Business Patterns* to compute location quotients.<sup>3</sup> Location quotients allow us to identify an unusual concentration of economic activity in a city or county relative to some standard for a highly

diversified place. In this case, we compared Texas and the six border cities with the United States, which is highly diversified to the extent that unusual concentrations of economic activity, such as autos in Detroit or oil in Houston, average out across the country.

The combined group of industries in *County Business Patterns* accounts for all private employment in a county. Government employment was added using data from the Bureau of Economic Analysis for the same year.<sup>4</sup>

If a sector's location quotient is 1, the sector has the same concentration as the diversified U.S. standard and its representation within the county or state is typical of what would be found across the country. If the location quotient is greater than 1, the sector is overrepresented, suggesting the region has a comparative advantage that allows it to export the overrepresented goods or services.

When we looked for a pattern of consistent industry overrepresentation in the location quotients for the six border cities and Texas, it was clear that border geography shapes these local economies. Table 2 highlights location quotients greater than 1.1, a figure we chose as a simple standard for overrepresentation. Note that except for high levels of transportation services and military employment, Texas as a whole has a smaller concentration of employment in typical border sectors.

Table 1  
**Texas Border Cities**

City	County	1998 county population	Mexican neighbor
Brownsville	Cameron	318,737	Matamoros
Del Rio	Val Verde	42,813	Ciudad Acuña
Eagle Pass	Maverick	45,763	Piedras Negras
El Paso	El Paso	688,626	Ciudad Juárez
Laredo	Webb	189,037	Nuevo Laredo
McAllen	Hidalgo	518,878	Reynosa



The high concentration of trucking and transportation services is due to international bridges and checkpoints that cause delays and require special handling of goods moving across the border. Laredo has by far the largest concentration of transportation activity, a product of its strategic location on the shortest truck route from the United States to Monterrey, Mexico's major industrial center.

The strength of border retail sales results from the throngs of Mexican shoppers who flock to the U.S. side. Brownsville and El Paso have large neighboring cities in Mexico. Laredo draws shoppers from nearby Nuevo Laredo but is best known as a destination for shoppers from the Mexican interior, particularly Monterrey.

Various sources contribute to the high government employment. Major military installations in El Paso and Del Rio provide both civilian government and military jobs. The border itself generates public sector jobs in immigration, naturalization, customs and border security. Finally, state and local governments provide unusually high levels of public assistance for income maintenance, medical care, education and training, and housing.

Transfer payments not only shape local employment patterns but also have played a large role in regional income growth since 1969. A closer look at the size and kind of transfers that flow through these communities aids understanding of their economies. Table 3 summarizes government payments made to Texas and the six cities in 1997.

The most striking feature of Table 3 is the high percentage of personal in-

Table 2

**Key Border City Characteristics**

Industry	Location quotient						
	Texas	Brownsville	Del Rio	Eagle Pass	El Paso	Laredo	McAllen
TCPU	<b>1.11</b>	.97	.59	<b>1.65</b>	.92	<b>3.26</b>	.69
Trucking/warehousing	.98	<b>1.17</b>	.95	NR	<b>1.11</b>	<b>3.52</b>	.94
Transportation services	<b>1.36</b>	<b>2.50</b>	NR	<b>5.31</b>	<b>1.63</b>	<b>26.03</b>	<b>1.42</b>
Retail	1.01	<b>1.16</b>	<b>1.12</b>	<b>1.28</b>	1.03	<b>1.26</b>	<b>1.32</b>
Building materials	.93	NR	NR	NR	NR	NR	<b>1.38</b>
General merchandise	1.08	<b>1.70</b>	<b>1.45</b>	<b>1.57</b>	<b>1.80</b>	<b>1.80</b>	<b>1.78</b>
Food stores	.96	<b>1.29</b>	<b>1.72</b>	<b>1.97</b>	<b>1.30</b>	<b>1.30</b>	<b>1.37</b>
Auto dealers	1.04	<b>1.11</b>	<b>1.38</b>	.91	<b>1.14</b>	<b>1.14</b>	<b>1.50</b>
Apparel	.98	<b>1.89</b>	NR	<b>4.31</b>	<b>2.67</b>	<b>2.67</b>	<b>2.23</b>
Furniture	.96	.92	NR	NR	<b>1.57</b>	<b>1.57</b>	<b>1.22</b>
Eating and drinking places	1.04	<b>1.13</b>	1.04	.95	1.04	1.04	<b>1.18</b>
Government	.97	<b>1.37</b>	<b>2.49</b>	<b>1.96</b>	<b>1.47</b>	<b>1.44</b>	<b>1.61</b>
Federal	.88	.73	<b>4.95</b>	<b>1.45</b>	<b>1.56</b>	<b>1.19</b>	.87
Military	<b>1.19</b>	.56	<b>5.86</b>	.74	<b>2.72</b>	.51	.61
State/local government	.95	<b>1.59</b>	<b>1.64</b>	<b>2.20</b>	<b>1.60</b>	<b>1.60</b>	<b>1.86</b>

NOTES: TCPU is transportation, communication and public utilities; NR is not reported. Quotients in boldface signify overrepresentation.

SOURCES: U.S. Census Bureau, *County Business Patterns*; authors' calculations.

come made up by government payments in all these cities. In Texas, 14.3 percent of personal income comes from government payments to individuals, while the shares for the six cities range from 22.2 percent in El Paso to 39.2 percent in Eagle Pass. We grouped the government payments into three broad categories that reflect features of border communities: poverty (P), military presence (M) and retirement benefits (R).<sup>5</sup>

Poverty-related payments include public assistance, income maintenance, unemployment insurance, and federal education and training programs. In terms of the share of such payments in personal income, all the border cities stand well above the statewide standard of 4.2 percent.

Military-related payments include military retirement, medical services (CHAMPUS), and retirements and medical payments to veterans. El Paso and Del Rio, the two cities with active military bases, are the primary beneficiaries of these payments, as significant numbers of military personnel retire in the area. The other cities have a smaller share than the state as a whole.

Retirement-related payments include civil service retirement, Social Security and Medicare for older recipients at the end of their working careers. Again, the

border cities all have a higher share of personal income stemming from this retirement income than does Texas. However, the higher share in most of these counties is probably related more to lower income levels than to a large aged population.

In addition to similarities, many differences also arise in the economic structure of these cities. Several have other important industrial niches. For example, retailing in Brownsville,

already active from border shopping, gets an additional boost from Padre Island tourism. Brownsville is the only one of the six cities with port activity and a fishing industry. It shares with McAllen a large agriculture sector (cotton, sugar cane, grain sorghum) as well as food processing and apparel factories. Some oil and gas activity is found near McAllen.

Laredo is primarily a transportation center, with several large banks that finance and complement the high volume of trade moving through the city. Substantial oil and gas extraction is associated with the South Texas oil and gas fields. Compared with the other cities, Laredo has little manufacturing or other export-related activity.

El Paso, in contrast, shows strength in a number of manufacturing sectors—apparel, leather, primary metals, and rubber and plastic. Of the six cities, it is the only one with a location quotient greater than 1 for overall manufacturing employment. El Paso also has a large personal-service sector, probably a companion to the city's vigorous retail activity. The large military presence at Fort Bliss adds 20,000 active-duty military and civilian jobs.

Del Rio is home to Laughlin Air Force Base, an air training facility providing more than 2,000 active-duty and civil-

Table 3

**Government Payments as a Share of Personal Income in Border City Economies, 1997**

Industry	Category	Percent of income						
		Texas	Brownsville	Del Rio	Eagle Pass	El Paso	Laredo	McAllen
All government payments		14.3	27.7	25.5	39.2	22.2	22.7	28.3
Retirement and disability		6.7	8.4	10.0	9.3	9.4	6.1	7.7
Military	M	.7	.5	2.1	.1	1.2	.2	.3
All other	R	6.0	7.9	7.9	9.2	8.2	5.9	7.4
Medical		5.3	12.3	8.6	18.6	7.7	9.0	13.0
Medicare	R	3.1	5.2	3.4	8.2	4.0	4.5	5.4
Public assistance	P	2.2	7.1	5.1	10.4	3.6	4.5	7.6
CHAMPUS	M	0	0	.1	0	.1	0	0
Income maintenance	P	1.5	5.6	5.3	9.9	3.5	5.2	6.3
Unemployment insurance	P	.3	.5	.5	.8	.2	.4	.6
Veteran's benefits	M	.4	.4	.7	.4	1.1	.3	.3
Federal education and training	P	.2	.5	.1	.2	.5	.4	.4
Poverty-related (P)		4.2	13.7	11.0	21.3	7.8	10.5	14.9
Military and veterans (M)		1.1	.9	2.9	.5	2.4	.5	.6
Retirement and Medicare (R)		9.1	13.1	11.3	17.4	12.2	10.4	12.8

NOTE: Dollar amounts of personal income and transfer payments from Bureau of Economic Analysis, *Regional Economic Information System*, 1969–97.

Table 4

### Per Capita Income in Texas and Six Border Cities

	Percent of U.S. per capita income			
	1969	1979	1989	1997
United States	100.0	100.0	100.0	100.0
Texas	87.7	96.7	87.9	92.6
Brownsville	51.9	56.3	49.0	51.0
Del Rio	66.6	62.7	57.9	55.3
Eagle Pass	35.1	41.6	36.2	37.7
El Paso	73.1	65.1	62.9	60.8
Laredo	51.8	51.8	46.8	52.1
McAllen	46.1	51.7	47.0	47.6

SOURCE: Bureau of Economic Analysis, *Regional Economic Information System*, 1969–97.

ian jobs. Del Rio lacks a strong transportation sector—a key trait of a typical border city—because the city center is four miles from the border, and Mexican and U.S. road networks favor other border crossings. Eagle Pass has a typical border city profile and little else to set it apart.

### Border City Income Levels

The six border cities are poor. Table 4 compares Texas and the six border cities (using county data) with the United States. Per capita personal income for Texas averaged 92.6 percent of the U.S. level in 1997, for example, while among the six cities only El Paso achieved as much as 60 percent of that level.

Texas and U.S. income levels converged rapidly in the 1970s, largely because of a major boom in oil and other natural resources. The 1980s bust virtually erased this gain, however. Since 1989, Texas has grown without interruption, gaining about 4.7 percentage points through 1997.

The picture is less encouraging for the six cities. Eagle Pass and McAllen are the only two posting gains of even 1 percent, and they have remained the poorest cities on our list since 1969. The two cities with a military presence show large relative losses over the period: El Paso, 12.3 percent, and Del Rio, 11.3 percent. Their long-term losses may result partly from the Vietnam War under way in 1969 and the post-Cold War military cutbacks in recent years. Whatever the reasons, little progress is evident relative to the state or nation.

Even in the 1990s—when NAFTA pushed these cities to prominence and maquila construction boomed in northern Mexico—the evidence remains mixed on relative improvement.

The lack of progress relative to the state or nation is disturbing because we might expect relatively low-income regions to make the most rapid gains. The long-term convergence of per capita income among the states and regions of the United States, for example, has been widely documented and studied.<sup>6</sup> To see the poorest regions of Texas fail to share in the state's relative gains points to deep-seated problems.

### What Made Income Grow?

To look more carefully at the sources of regional income growth, we divided the sources of per capita income growth into a number of categories and then asked what percentage-point contributions they had made to each city.

The categories listed in Table 5 follow standard conventions of accounting for regional income.<sup>7</sup> The first three categories—industry mix, differential regional earnings and jobs per capita—together account for total nonagricultural wage and salary income per capita. Industry mix refers to income gains from a shift of local industry to higher-wage jobs, and jobs per capita measures the local economy's ability to create jobs for local workers. The third component, differential regional earnings, is a residual that measures such advantages as location, unique resources, labor quality or institutional stability. The other-labor-income category is a companion to these wage and salary data and is primarily the value of the benefits that private employers offer their workers.

The rest of the categories are self-explanatory: agricultural wages and salaries; farm and nonfarm proprietor's

Table 5

### Three Top Factors in Income Growth for U.S., Texas and Six Border Cities, 1969–97

	U.S.	Texas	Brownsville	Del Rio	Eagle Pass	El Paso	Laredo	McAllen
<b>1969–79</b>								
Industry mix	•	•	•	•	•	•	•	•
Differential regional earnings			•					•
Jobs per capita	•	•	•		•		•	•
Other labor income	•	•		•		•		•
Agricultural wages and salaries								
Farm proprietor's income					•			
Nonfarm proprietor's income								
Property income				•				
Transfer payments						•	•	
<b>1979–89</b>								
Industry mix	•	•	•	•	•			
Differential regional earnings								
Jobs per capita	•					•	•	•
Other labor income		•		•		•	•	
Agricultural wages and salaries								
Farm proprietor's income								
Nonfarm proprietor's income								
Property income	•	•	•	•	•	•	•	•
Transfer payments			•		•			•
<b>1989–97</b>								
Industry mix	•	•	•	•	•	•	•	•
Differential regional earnings		•					•	•
Jobs per capita	•	•	•	•	•		•	
Other labor income								
Agricultural wages and salaries								
Farm proprietor's income								
Nonfarm proprietor's income		•				•		
Property income								
Transfer payments	•		•	•	•	•		•

SOURCE: Authors' calculations.

income earned by sole proprietorships, partnerships and tax-exempt corporations; property income from dividends, rent and interest; and transfer payments for no current service rendered.

Table 5 illustrates, for each region and period, which three factors were most important (which made the largest percentage-point contribution) to income growth. For all three periods, most of the action was centered on rising wages and salaries, including other labor income. Some combination of a shift to high-wage industry that improved job mix and an increased number of jobs was dominant in raising income levels.

The contribution of income growth relative to employment is a good news/bad news story. The good news is the rapid job growth, and the bad news is the rapid population growth that has offset the ability of job growth to raise per capita income. High population growth is the source of the seeming paradox between a booming job market and continued stagnation of income.

Table 6 compares job growth, population growth and the ratio of jobs per worker in the six border cities with the United States and Texas. Employment growth in the six cities is generally strong by national or Texas standards for 1969–79, mixed for 1979–89 and then strong again after 1989. The problem comes when we look at population growth in these cities. In every period, in every city, population growth always exceeds that in the United States and almost always exceeds that in Texas. The result is that the contribution of job growth to per capita income is quickly watered down. This probably explains why the ratio of jobs to population, the factor used to translate employment into a contributor to per capita income growth, typically lags the United States and Texas. Legal and illegal immigration and a high birth rate make it difficult to raise incomes in these six cities, despite what—at least from a labor market perspective—looks like solid economic progress.

The persistence of transfer payments as a major source of income growth in the 1990s, a period when the job market

Table 6  
**Employment and Population  
in Six Border Cities**

	Annualized percent change 1969–97		
	1969–79	1979–89	1989–97
<b>Job growth</b>			
United States	2.21	1.94	1.95
Texas	3.73	2.30	3.22
Brownsville	5.00	1.89	4.08
Del Rio	2.15	.81	1.65
Eagle Pass	5.10	1.46	4.74
El Paso	2.99	2.46	1.49
Laredo	3.26	3.40	5.15
McAllen	5.22	3.51	4.50
<b>Population growth</b>			
United States	1.10	.95	1.14
Texas	2.31	1.93	2.01
Brownsville	4.00	2.23	2.96
Del Rio	2.78	1.15	1.25
Eagle Pass	4.56	1.82	3.71
El Paso	2.59	2.09	2.25
Laredo	2.50	2.98	4.64
McAllen	2.60	3.19	4.09
<b>Jobs per worker</b>			
United States	1.11	.99	.81
Texas	1.42	.37	1.21
Brownsville	1.00	-.34	1.12
Del Rio	-.63	-.34	.40
Eagle Pass	.54	-.36	1.03
El Paso	.40	.37	-.76
Laredo	.76	.42	.51
McAllen	2.62	.32	.41

SOURCE: Bureau of Economic Analysis, *Regional Economic Information System*, 1969–97.

was booming, is one more sign of the paradox of growth without progress.

## Outlook

If history is a guide, the magnitude of problems facing the border region can be discouraging. A 1998 report from the Texas Comptroller of Public Accounts details a long list of regional ills: a poorly trained and uneducated workforce, inadequate educational and workforce development programs, substandard health and environmental conditions, and the continuing battle against illegal immigration.<sup>8</sup>

The comptroller's report also details dozens of specific recommendations to deal with the region's economic performance. Education tops the list, but there is no magic bullet, no one program that could turn the region around. Most of the proposals, however, strive

to raise the region's standards—in labor quality, infrastructure, housing, environmental conditions, public health and other key areas—and to integrate the cities' economies more fully into the high-wage U.S. labor market. Although NAFTA and free trade have moved these cities to center stage in recent years, the most direct path to significant gains for these cities still lies in broad and full participation in the economy to the north.

*Gilmer is a senior economist and vice president in the Houston Branch of the Federal Reserve Bank of Dallas. Gurch and Wang worked in Houston as interns and research assistants at the time the article was written.*

## Notes

- <sup>1</sup> Del Rio and Eagle Pass are cities located in Val Verde and Maverick counties, respectively. Brownsville, El Paso, Laredo and McAllen are one-county metropolitan statistical areas (MSAs). In all cases, we have examined county data, and the city and metro area names are used as shorthand for the reader. For a more detailed version of this article, contact the lead author.
- <sup>2</sup> Although per capita income has many shortcomings as a measure of social welfare, we broke it into enough components to give specific insight into how income growth is affected by regional wage levels, job growth and the locational advantages offered by these cities.
- <sup>3</sup> U.S., Texas and county-level data from various volumes of Department of Commerce, Bureau of the Census, *County Business Patterns*, 1996 and 1997.
- <sup>4</sup> Department of Commerce, Bureau of Economic Analysis, *Regional Economic Information System*, 1969–98.
- <sup>5</sup> The data shown are selected from much more detailed information available in Bureau of Economic Analysis, *Regional Economic Information System*, 1969–98.
- <sup>6</sup> Daniel H. Garnick, "Accounting for Regional Differences in Per Capita Personal Income Growth, 1929–79," *Survey of Current Business* 62 (September 1982): 24–34.
- <sup>7</sup> Methodology used follows that of Garnick as cited in footnote 6 and Daniel H. Garnick and Howard L. Friedenber, "Accounting for Regional Differences in Per Capita Income Growth: An Update and Extension," *Survey of Current Business* 70 (January 1990): 29–40.
- <sup>8</sup> John Sharp, *Bordering the Future* (Austin: Texas Comptroller of Public Accounts, 1998).

# THE BORDER

## Is It Really a Low-Wage Area?

Lori L. Taylor



Arbitrage is a basic tenet of economics: If prices are relatively low in one location, buyers move in and bid prices up until parity with other areas is achieved. In labor markets, arbitrage implies that firms should be drawn to low-wage areas, causing job growth to be highest where pay is lowest, as long as all other things—taxes, public services, rents, access to customers and so forth—are equal.

One interesting puzzle of the Texas border economy is the apparent disconnection between wages and job growth. Average wages are sharply lower on the border than elsewhere in Texas, yet until recently the region's job growth lagged the rest of the state. Only in 1999, when most labor markets became painfully tight, did we see the border's job growth outpacing the rest of Texas (*Chart 1*).

A possible solution to the puzzle is that the border might not be a low-wage area after all. This article explores strategies for measuring the border's labor cost and demonstrates that from various perspectives the border cannot be considered a low-wage area.

### Local Wage Variations

From a labor supply perspective, average wages might vary across Texas for two reasons. First, all types of workers may demand higher wages in some regions to make up for a higher cost of living or fewer amenities. Second, some workers, such as doctors and lawyers, expect to be paid more than other types of workers throughout the state, so areas with lots of doctors and lawyers

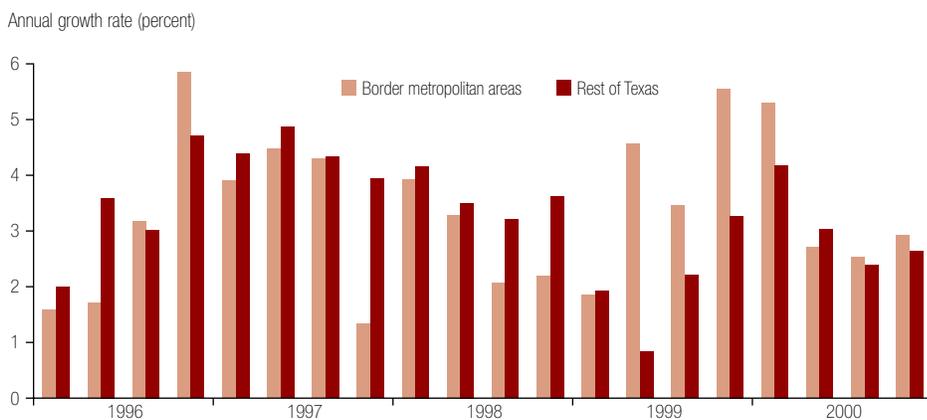
will have higher average wages than regions with relatively few, all else being equal.

The first local wage variation is common to all types of workers and would be reflected in the wages companies would have to pay; the second is limited to specific types of workers and is unlikely to be reflected in the general labor cost.<sup>1</sup>

Properly estimating the local wage level requires excluding the second source of wage variation. If all types of workers were represented uniformly across the state, such adjustments could be straightforward. First, calculate the average wage for each type, then use it to figure the local deviation from the comparable state wage. Finally, determine the local price level as the average of the local deviations from the state wage. For example, if Austin construction workers, engineers, nurses and so on were each paid 10 percent more than the average state wage for their professions, the wage level in Austin would be 10 percent above the state average.

However, some types of workers are found in only a few Texas communities. For instance, there are no rig workers where there is no oil. Therefore, the state average wage for those occupations would be a biased standard from which to compare local deviations. After all, if a particular kind of worker is found only in Austin, the city's deviation from the state average for that industry

Chart 1  
**Border Versus Texas Job Growth**  
(Total Nonfarm Employment)



would be zero—making the city’s wage level appear artificially low.<sup>2</sup>

One strategy for dealing with this problem is to pare down the sample to only the occupations found throughout Texas. Another strategy is to use regression analysis to estimate the local wage level, with indicator variables for each occupation, year and market.<sup>3</sup> I pursue both approaches.

## The Data

Data for this analysis come from two sources. First, the Bureau of Labor Statistics’ Occupational Employment Statistics Survey provides average annual salaries by metropolitan area for 670 nonagricultural occupations, ranging from purchasing managers to musicians. Although many occupations are reported for only a handful of cities, each Texas city has information on at least 143 occupations. The data were constructed by blending survey responses from 1996 through 1998. Data for 1996 and 1997 were adjusted for inflation using the national inflation rate.

Second, I focus on a benchmark occupation richly represented in all metropolitan areas: teaching. I use 1998–99 compensation rates of slightly more than 200,000 public school teachers to estimate the profession’s local wages. The data allow me to strip away wage variations that arise from local differences in teacher characteristics, such as experience, educational attain-

ment, gender and ethnicity. I also remove variations in working conditions, such as the proportion of students who have limited English proficiency.<sup>4</sup> The resulting wage index represents the predicted cost of hiring a teacher to do the same job in each of the metropolitan areas and, therefore, should reasonably measure the local compensation level.

Each approach has strengths and weaknesses. Because teacher data allow me to control for individual characteristics, estimates of the local wage level are independent of the workers’ experience and education. Given the relatively low educational attainment on the border (*Chart 2*) and the strong relationship between wages and worker education, controlling for the distribution of educational attainment is particularly desirable. In addition, the teacher data represent the population of public school teachers, making those data less subject to sampling error and other problems that may affect the Bureau of Labor Statistics data. On the other hand, teachers are a select group whose tastes and preferences may not generalize to other types of workers. Therefore, indexes based on broader data may more appropriately measure general labor cost.

## The Results

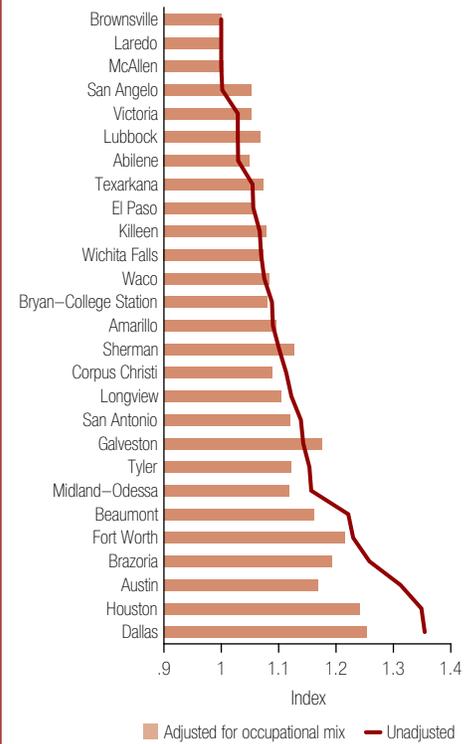
The first cut at the data is to look at average wages, unadjusted for the mix of occupations. For easier comparisons, I divide the wage level in each metropolitan area by the wage level in the metro area with the lowest pay to yield an index value for that metro area.<sup>5</sup> An index value of 1.1 indicates that the wage level in that metropolitan area is 10 percent higher than in the low-wage area.

Chart 3 presents the index of average wages, ranging from 1 in Brownsville, Laredo and McAllen to more than 1.35 in Dallas. Average wages in El Paso are more than 5 percent higher than in the other border cities but remain among the lowest in the state.

Chart 3 also shows the index as adjusted for occupational mix. The adjusted series has a much narrower range than the unadjusted, suggesting

Chart 3

### Occupational Wage Index for Texas Cities



SOURCES: Occupational Employment Statistics Survey, Bureau of Labor Statistics; author’s calculations.

that part of the high average wage in Dallas, Houston and Austin arises from concentrations of high-wage occupations.

In contrast, the adjustments don’t change the border’s index values that much, suggesting that low average wages in that area arise from low wages across many occupations, not from a general concentration of low-wage occupations.

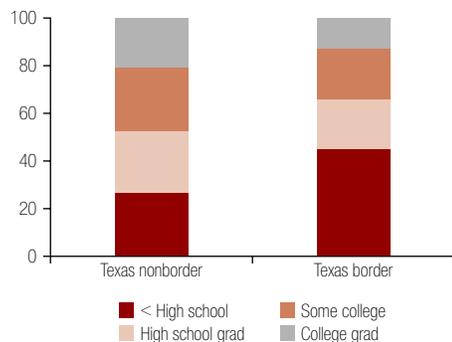
Notably, the adjustments for occupational mix widen the gap between the border and the rest of metropolitan Texas. Average wages in many cities are very close to those for Brownsville, Laredo and McAllen prior to adjustments. But after accounting for occupational mix, wages in these border cities are at least 4.5 percent lower than in any other Texas metropolitan area. Furthermore, only Brownsville, McAllen and Laredo have significantly lower wages than El Paso.

This analytic approach assumes that people from all walks of life have similar

Chart 2

### Educational Attainment in Texas Border and Nonborder Metropolitan Areas

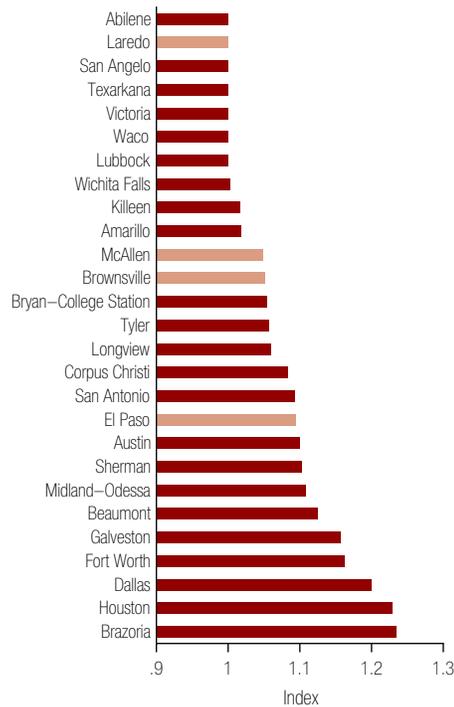
Shares of population over 25 years old (percent)



SOURCE: 1990 U.S. Census.

Chart 4

**Professional and Technical Wage Index for Texas Cities**



SOURCES: Occupational Employment Statistics Survey, Bureau of Labor Statistics; author's calculations.

tastes for local characteristics. If nurses, bank tellers and construction workers would demand a 10 percent premium to work in a particular community, so would other types of workers. However, anecdotal evidence suggests professionals and other highly skilled workers might be drawn to the bright lights of the big city more so than other types of workers.

Therefore, I estimated average local wages for professionals and technical workers, adjusting for variations in the mix of professional and technical occupations. Chart 4, which presents the index for professional, paraprofessional and technical workers, illustrates that these wages are not unusually low along the border. For example, professional wages in Brownsville and McAllen are 5 percent higher than in Waco, Texarkana and Abilene. So when we consider some of the fastest growing occupations in Texas, the border region is not a low-wage area.

In Texas, teachers make up the lion's share of professional and technical

workers. As Chart 5 illustrates, the border is a relatively high-wage area for teachers. Only Houston and Brazoria have local teacher wage levels that significantly exceed those in McAllen and Laredo.

To the extent that other professional and technical workers share similar tastes with teachers, this evidence suggests that border employers must pay a premium to hire these workers. From this perspective, border wages are anything but low.

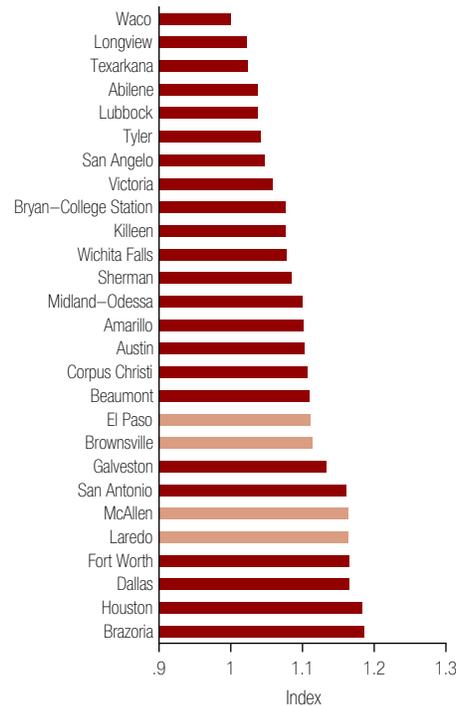
**Conclusion**

Conventional wisdom says that wages are low on the Texas border with Mexico. However, the evidence suggests that highly skilled workers are relatively scarce in the region and that, unlike other worker types, professional and technical workers are unwilling to accept less from border employers than from employers in other parts of the state.

Indeed, the border can be an expensive place to hire professional workers.

Chart 5

**Teacher Wage Index for Texas Cities**



SOURCES: "A Study of Uncontrollable Variations in the Costs of Texas Public Education," a report by the Charles A. Dana Center, University of Texas; author's calculations.

Given that much of Texas' recent growth has been in industries that rely heavily on professional and technical workers, it is not surprising that job growth on the border is only keeping pace with job growth in the rest of Texas.

*Taylor is a senior economist and policy advisor at the Federal Reserve Bank of Dallas.*

**Notes**

This research was conducted while Taylor was principal researcher for the Cost-of-Education Study at the Charles A. Dana Center, University of Texas at Austin. She thanks all involved for assistance. The article's conclusions do not necessarily reflect the positions of the center, UT or any study participant.

- Arguably, some individuals care about the local income distribution and are sensitive to a concentration of highly paid individuals, regardless of their occupations. If this is a widespread perspective, the income distribution will be a local (dis)amenity and will be capitalized into the wages paid to all types of workers.
- In this example, the "true" Austin wage level is presumed to be higher than the state average.
- Implicitly, this discussion assumes that worker types can be indexed by occupation.
- Metropolitan-area fixed effects are estimated following the framework in "A Study of Uncontrollable Variations in the Costs of Texas Public Education," a report to the Texas Legislature by the Charles A. Dana Center at the University of Texas (October 2000), [www.utdanacenter.org](http://www.utdanacenter.org). This analysis deviates from the center's study by substituting metropolitan-area fixed effects for the community characteristics in the center's study.
- To reflect measurement error in the estimated wage levels, I use the following strategy for constructing occupational indexes. The low-wage market is determined by adding two standard errors of the estimate to the estimated wage level for each metropolitan area and then using the minimum of this sum as the reference wage in constructing the index. No market's estimated local wage is significantly lower than this reference wage. Markets with an estimated wage below the reference wage are assigned an index value of 1.

# SECONDARY EDUCATION

## Its Impact on Border Income

Thomas M. Fullerton, Jr.

Many immigrants from Mexico and Central America are coming to Texas without high school degrees. What they, and native-born Texans who fail to complete high school, are finding as they settle along the border are emerging service sectors that offer high-salary jobs but generally require an advanced education. This situation sets up a potentially debilitating mismatch with important income impacts. Texas border counties adjacent to Mexico conceivably lost as much as \$3.6 billion in earnings in 1990 because so many area residents did not graduate from high school, according to our study of socioeconomic data for that year.<sup>1</sup>

Given the limited tax bases of nearly all border counties, the benefits of improving educational attainment are quite clear. Our study shows that reducing the high school dropout rate to a level equal to the rest of Texas would have potentially increased income per border resident by more than \$2,600 in 1990.

The discrepancy between educational and income levels becomes even more apparent as Texas enters the new millennium more ethnically diverse, with more immigrants from Mexico and Central America who have not graduated from high school. Simultaneously, the state's economy enters the new age with expanding service segments. In fact, earnings loss estimates would likely be much higher had we been able to perform the study using 2000 census data.

### Data and Methodology

Econometric estimates conducted at the University of Texas at El Paso measure the relationships between education and regional earnings across Texas and help examine how changes in educational attainment affect an area. Our central hypothesis is that Texas border county income is affected by educa-



tional attainment in a way similar to other regions of the United States. To test it, we collected figures for formal years of schooling, types of degrees completed and 1990 per capita income levels for all 254 counties. The figures come from the Department of Commerce's 1990 census and the Bureau of Economic Analysis' Regional Economic Information System. Using this information, we simulated what would have happened to per capita income in the border counties in 1990 if their high school completion rates had met the state average.

As in similar studies, our variables included the percentage of high school dropouts aged 25 or older in each county, high school graduates 25 or older with some college and college graduates 25 or older. Other variables included the participation rate of females in the labor force, percentage of the population 65 or older and percentage of residents 18 or younger. We also included language skills. Generally, per

capita income is higher if more residents of a county speak fluent English and have bilingual skills, while Spanish-only skills are likely to be associated with lower earnings.

Increases in the percentage of high school dropouts are expected to reduce a county's income level, and increases in the percentages of both categories of graduates are likely to improve it. Similarly, increases in female labor force participation should raise a county's income level. As the percentage of youth increases in a county, per capita income likely declines because individuals 18 or younger generally do not work or hold part-time positions. The effect of the number of retirees on a county's income is unclear because many drop out of the labor force but simultaneously begin receiving sizable transfer payments.

Variables of geography and industry mix also can play important roles in determining income performance. Large counties with 1990 populations of

more than 600,000 are expected to have higher earnings levels, while more rural border counties likely will have lower earnings. Geographic estimates also can be calculated for other regions of the state, but the border region is especially interesting because of its economic and demographic differences from Texas as a whole.

## Empirical Results

Our study shows that improving secondary school completion rates yields striking results. The single largest gain—\$5,760 a year per resident—would come in Starr County in the Rio Grande Valley. Raising its high school graduation rate to the state average would permit Starr County to more than double its 1990 per capita income, a yearly total of more than \$210 million. In nearby Hidalgo County, income per person would rise by more than \$3,600 annually, or a total of more than \$1.26 billion. Personal incomes in Cameron, El Paso and Webb counties also would rise by more than \$400 million if their cumulative graduation rates were brought to the state average. For all border counties, nearly \$3.6 billion in forgone income results from a dropout rate that exceeds the state average.

Table 1 shows implied income losses due to high school noncompletion in 13 border counties and the region overall. Column 2 calculates the effect on per capita income of raising each county's high school graduation rate to the 1990 Texas state average of 72.1 percent. Column 3 calculates the aggregate economic impact of these lost earnings.

Furthermore, our study found that increases in the percentage of the population over 65 are associated with income gains throughout Texas. According to our findings, residency in urban areas is associated with higher per capita incomes, while the border region is linked to lower incomes. Presumably, the latter result partially reflects language and other skill shortfalls often observed in areas where recent immigrants have settled. Infrastructure gaps relative to the rest of Texas also contribute to that finding.

Table 1  
**Implied Income Losses Due to High School Noncompletion**

County	Per capita impact	Aggregate impact (in millions)
Brewster	Not calculated	Not calculated
Cameron	\$3,143	\$ 744.7
El Paso	1,195	643.8
Hidalgo	3,627	1,262.5
Hudspeth	3,413	9.2
Jeff Davis	370	.7
Kinney	2,261	6.6
Maverick	5,177	170.4
Presidio	4,011	24.5
Starr	5,760	210.2
Terrell	825	1.1
Val Verde	2,276	80.1
Webb	3,456	413.8
Zapata	3,129	26.3
Border zone	\$2,620	\$3,593.9

NOTES: All impacts calculated in dollars for 1990 relative to the Texas state average. Border zone estimate is a weighted average net of Brewster County. Brewster County impacts are not calculated because its high school graduation rate exceeds the Texas state average.

As state and national labor markets change, the implied costs of high school noncompletion may fall below their true level. Namely, service sector or education positions account for the majority of new jobs in Texas, and many of these jobs require training beyond a high school degree. Failure to graduate from high school is thus likely to impose a more severe financial penalty today than in 1990.

## Conclusion

Regional economic research has attempted to quantify the relationships between per capita incomes and socioeconomic factors. Our study, which focused on the state's 254 counties, simulated how education affects per capita income and underscored the importance of high school graduation for people in border counties. Reducing the high school dropout rate to a level commensurate with the rest of the state would have potentially increased income per border resident by more than \$2,600 annually in 1990. Collectively, that figure implies nearly a \$3.6 billion earnings loss for border county economies. Data from the 2000 census are likely to indicate an even larger income loss linked to the lack of educational attainment.

From a public policy perspective, border counties and other regions within the state will realize direct financial benefit by reducing high school dropout rates. Furthermore, border counties also may increase income performance by improving public infrastructure. More advanced transportation and communication networks with the rest of Texas will help offset the income decline partially attributable to geographic isolation and distance from other regional markets.

*Fullerton is an assistant professor and Fulbright Border Scholar in the Department of Economics and Finance at the University of Texas at El Paso.*

## Notes

The Federal Reserve Bank of Dallas provided financial support for this research. El Paso Electric Co. and the Center for Inter-American and Border Studies at the University of Texas at El Paso provided additional funding. Helpful comments were provided by Mine Yücel, Pia Orrenius and Jim Peach. David Torres and Roberto Tinajero provided econometric research assistance.

<sup>1</sup> For an in-depth discussion of the study, see Thomas M. Fullerton, Jr., "Educational Attainment and Border Income Performance," Federal Reserve Bank of Dallas *Economic and Financial Review*, forthcoming.

# TRANSPORTATION

## Infrastructure and the Border Economy

Keith Phillips and Carlos Manzanares

On a typical day, about 205,000 vehicles and 97,000 pedestrians cross the Texas–Mexico border.<sup>1</sup> The 15,000 commercial trucks and 1,220 railcars that traverse the border daily highlight the importance of international trade to this region. In addition, the many shopping malls, grocery stores and discount supercenters attest to the numbers of Mexican nationals crossing the border to buy goods ranging from pasteurized milk to expensive clothes and jewelry.

The costs of building and maintaining infrastructure to service international trade, however, remain a challenge. The increased auto and truck traffic stimulated by Mexico's entry into the General Agreement on Tariffs and Trade (GATT) in 1986 and the start of NAFTA in 1994 have placed pressure on border infrastructure. This article describes some of the costs and benefits international trade poses for Texas border counties.<sup>2</sup>

### Retail Sales a Boon to Border

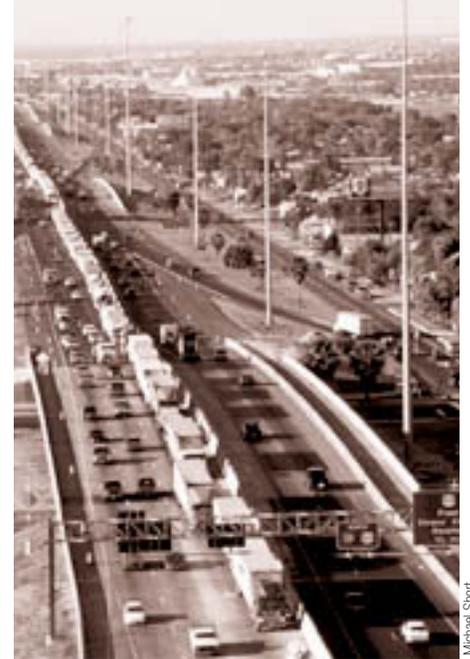
While relative per capita income along the border has stagnated at low levels, job growth has surged, particularly since Mexico entered GATT in 1986 (*Chart 1*). Although some measures,

such as earnings per job, have shown relative gains in the 1990s, significant relative income gains are unlikely until educational attainment increases.<sup>3</sup>

The retail trade industry highlights the strong job growth and low income typical of the border. Retail sector growth in the 1990s has created many new jobs well suited for the average education level of border workers. However, because the retail industry generally pays at or near minimum wage, growth in this sector suppresses average wage growth.<sup>4</sup>

In general, the retail sector is not perceived as a major economic driver because retail goods are purchased mainly by local citizens. This is not true along the border, however, since Mexican nationals purchase a significant amount of retail goods and services. One way to estimate Mexicans' retail spending in border cities is to estimate, based on border income levels, the part of retail spending that likely comes from local citizens. This local spending can be subtracted from total retail spending to determine retail sales to individuals from outside the local area.

To estimate local retail spending, we use average retail sales as a percentage of personal income for the state as a whole—in other words, the fraction of their incomes average Texans spend on retail products. From 1986 to 1998, they spent 46 percent. Using this figure as the likely amount of personal income border residents spend on retail goods, we find that exported retail sales are a substantial portion of overall retail sales on the border. Exported retail sales in 1998 ranged from \$20 million (6 percent of all retail sales) in Del Rio to \$901 million (22 percent) in McAllen (*Chart 2*). Laredo's \$643 million in exported retail sales represented the highest share of retail spending, 35 percent, of all the areas. For the six border counties in our study, exported retail sales totaled



Michael Short

about \$2.2 billion in 1998 and \$3.4 billion in 1994, the year before the peso devaluation.

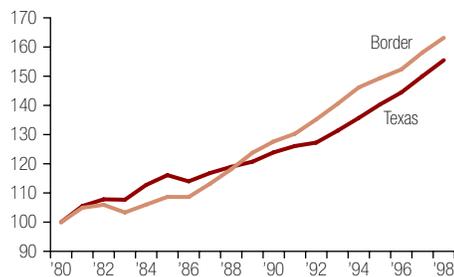
### Benefits of International Trade

The benefits of border retail exports are obvious; the advantages of numerous trucks and trains rumbling through border towns are less clear. One direct benefit from international trade is the federal jobs created in the U.S. Customs Service, the Immigration and Naturalization Service and various federal law enforcement agencies.

The presence of federal jobs along the border is easily measured using a location quotient, defined as the local share of jobs in an industry divided by the national share of jobs in the same industry. A location quotient greater than 1 implies that this industry is producing for consumers outside the local

Chart 1  
Border Job Growth

Total employment index, 1980 = 100

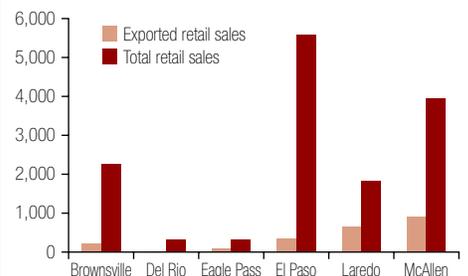


NOTE: Border is defined as the counties that include Brownsville, Del Rio, Eagle Pass, El Paso, Laredo and McAllen.

SOURCE: Bureau of Labor Statistics.

Chart 2  
Exported Retail Sales and Total Retail Sales, 1998

Millions of dollars

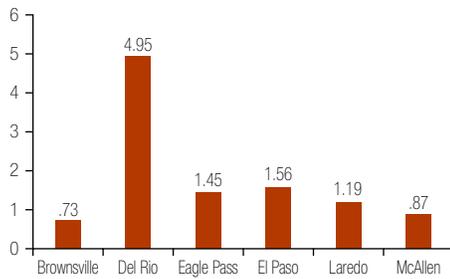


SOURCES: Texas Comptroller of Public Accounts; Bureau of Economic Analysis; authors' calculations.

Chart 3

**Border Share of Federal Civilian Jobs**  
(County Job Share/U.S. Job Share, 1997)

Location quotient



NOTE: Data are for each county that includes the listed city.  
SOURCE: Census Bureau, *County Business Patterns*.

area. As shown in Chart 3, federal civilian government accounts for a greater share of jobs in border counties than the U.S. average. (The values for Del Rio and El Paso are also influenced by the military presence at Laughlin Air Force Base and Fort Bliss, respectively.)

While the overall share of federal civilian jobs along the border remains low—about 2.3 percent in 1998—these jobs pay relatively high wages, especially when the value of employee benefits is taken into consideration. Chart 4 illustrates the large and growing disparity between border earnings per job for federal civilian workers and average border earnings per job. In 1998, average annual earnings for federal civilian workers on the border was \$62,351, while the average border worker earned \$24,427.

Another benefit of international trade is its creation of transportation and warehousing jobs. Once again, this is measured by a location quotient (Chart 5). Transportation services (which include freight-forwarding) and trucking and warehousing are important border industries. Although the large border counties all had location quotients greater than 1, Laredo far exceeded the other areas in this industry. In 1997, Laredo's employment share in transportation services was 26 times the U.S. average.

One reason for the extraordinary size of the transportation services industry in Laredo is the extensive truck traffic

through this city. In 1999, \$30 billion in U.S. exports and \$35 billion in U.S. imports flowed through Laredo. The city accounted for about 39 percent of the volume and 50 percent of the value of all land-transported trade between the United States and Mexico in 1999. The volume was twice that of the second-largest port, El Paso, which accommodated 19 percent of land-shipped trade.

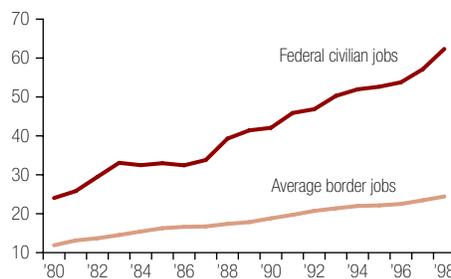
The destination of southbound shipments through Laredo also has increased the size of its transportation services industry. Nonmaquiladora shipments—which represent a greater share of the Laredo traffic than at other border ports—are subject to greater tariff restrictions and thus require more paperwork and inspection. This delay at the border creates a market for short-haulers, as it is not efficient for long-haul truckers to wait for the extra inspections and paperwork to be completed. Many maquiladora plants close to the border use their own trucks to haul products to and from warehouses on the U.S. side.

Additional freight-forwarding and transportation services jobs in Laredo result from the practices of Mexican customs brokers, who must preclear all truck cargo before it crosses into Mexico. Trucks are cleared on the U.S. side partly because warehouse and truck terminal space is lacking in Nuevo Laredo, on the Mexican side. U.S. long-haul carriers typically drop their cargo

Chart 4

**Federal Civilian Earnings Versus Average Border Earnings Per Job**

Border county annual earnings (thousands of dollars)

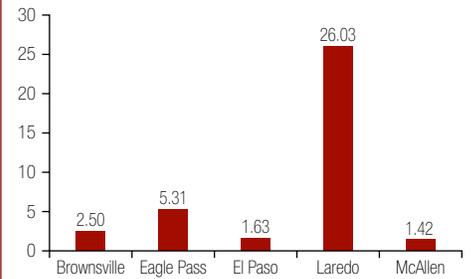


NOTE: Border is defined as the six counties that include Brownsville, Del Rio, Eagle Pass, El Paso, Laredo and McAllen.  
SOURCE: Bureau of Economic Analysis.

Chart 5

**Border Share of Transportation Services Jobs**  
(County Job Share/U.S. Job Share, 1997)

Location quotient



NOTES: Data are for each county that includes the listed city. Data for Del Rio not reported.  
SOURCE: Census Bureau, *County Business Patterns*.

at a company warehouse in Laredo. A freight-forwarding company picks up the cargo and takes it to a Mexican customs broker's warehouse in Laredo. The customs broker inspects it, collects duties and arranges for another freight-forwarding truck to transport the load across the bridge. The freight-forwarder then returns to Laredo, usually empty. Thus, the abundance of trucks passing through Laredo, their inability to legally reach the interior of Mexico, and their inspection and clearance on the U.S. side of the border by Mexican customs brokers all work together to create a large demand for warehousing and freight-forwarding in this city.

Border earnings in transportation services grew strongly in the 1990s (Chart 6). This was especially true in Laredo, where transportation services accounted for 59 percent of total border earnings from this sector in 1998. Growth in border transportation services has lifted average border earnings because this sector pays better-than-average earnings. In 1998, transportation services workers earned an average of \$29,662, versus an average of \$24,427 for all border jobs. As shown in Chart 7, Laredo topped all other border cities in earnings growth in the 1990s, most likely on the strength of its transportation services industry.

Besides producing jobs and earnings, international trade creates direct revenue for border cities through bridge tolls. Local governments own most of

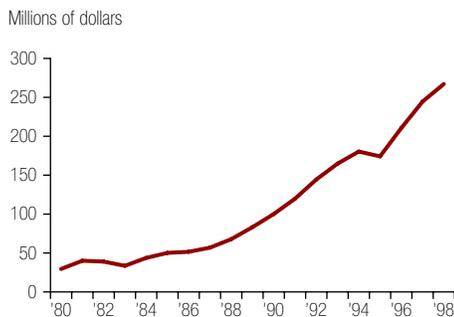
the 26 motor vehicle crossings on the Texas–Mexico border, although several are owned by the state and federal government and several are privately owned.<sup>5</sup> Southbound fees collected at the bridges accrue to U.S. public and private bridge owners and can be substantial. In 1999, the three bridges in Laredo collected \$27.2 million in tolls. City officials say about half that amount goes to direct costs associated with the bridges and the rest to the city’s general fund.

### Border Traffic Imposes Costs

The number of vehicles crossing the Texas–Mexico border has increased dramatically since the early 1990s (*Chart 8*). This is especially true in Laredo, which has seen truck crossings rise 116 percent, from 1.3 million in 1993 to 2.8 million in 1999, and overall vehicle crossings increase 21 percent, from 14.1 million in 1993 to 17.1 million in 1999. With the influx of traffic passing through the border come infrastructure and social costs. From 1993 through 2000, the Texas Department of Transportation (TXDOT) spent \$388 million on roads and highways in Laredo and is projecting to spend another \$298 million from 2001 through 2005. An important congestion cost, air pollution, is increasing in border cities, especially in El Paso, which exceeds air quality standards in many categories.

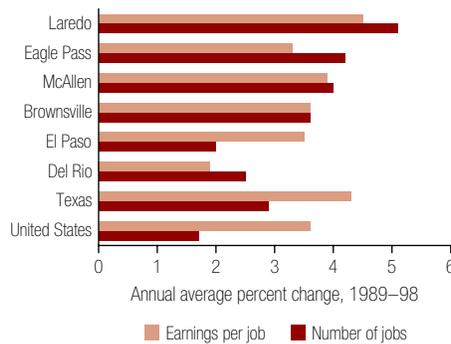
Because international bridges create a revenue stream that generally pays for their costs, border communities

Chart 6  
**Border Transportation Services Earnings Growth**



SOURCE: Bureau of Economic Analysis.

Chart 7  
**Border Job Growth Versus Earnings Per Job Growth**



SOURCE: Bureau of Economic Analysis.

invested heavily in bridges during the 1990s. In the busy port of Laredo, the modern Colombia–Solidarity Bridge was built in 1991 and the World Trade Bridge was finished in the summer of 2000. To complete the bridge quickly, the city built the U.S. Customs inspection station and leases it to the General Services Administration on a 12-year lease-to-own arrangement. The city is currently in the planning stages for a fifth bridge. Other bridges built in the 1990s include the Free Trade Bridge (Los Indios, 1992), the Pharr–Reynosa International Bridge on the Rise (Pharr, 1995), the Camino Real International Bridge (Eagle Pass, 1999) and Veterans International Bridge at Los Tomates (Brownsville, 1999). Most existing bridges along the border have been improved or expanded, including the four separate structures of the Bridge of the Americas in El Paso, which were rebuilt in 1998. In addition, as of May 2001, Presidential Permit applications were pending for four new bridges.

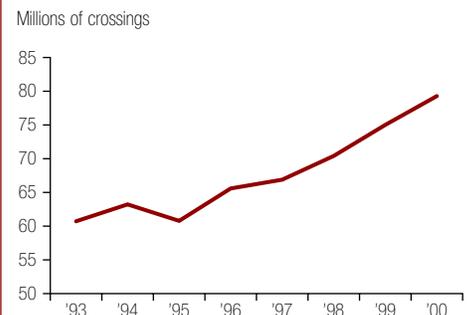
Although border cities are investing in bridges, there seems to be less incentive to build highways and interchanges. For example, although the Colombia–Solidarity Bridge was built in 1991, the roads on either side of it remained inadequate for years. The road on the U.S. side was improved in 2000 with completion of a privately built toll road connecting the bridge to Interstate 35. TXDOT is still constructing the overpass connecting I-35 to the World Trade Bridge and won’t complete

this project until August 2002. The TXDOT border districts of El Paso, Laredo and Pharr have all received higher-than-average funding per daily vehicle mile traveled. However, because of the rapid growth in truck traffic and its concentration on major arteries, the border may need even greater spending to reduce congestion and the associated social costs.

A projected funding shortfall for infrastructure is slowing progress on border roadways. While TXDOT is gaining ground in acquiring federal highway dollars to improve border infrastructure, the agency estimates it has funding for only about 36 percent of the state’s transportation needs. Texas finances highway construction with the pay-as-you-go method. Hence, a sudden increase in demand for infrastructure—such as that brought on by accelerating trade with Mexico in the 1990s—puts a strain on funding.

In a review of TXDOT in January 2001, the Texas Comptroller of Public Accounts suggested several changes to speed up funding of border infrastructure projects.<sup>6</sup> Several federal programs enacted since 1995 would allow quicker access to funds for border projects. Grant Anticipation Revenue Vehicles backed by future federal funds, called GARVEE bonds, and federal credit assistance from the Transportation Infrastructure Finance and Innovation Act of 1998 could be used to fund border

Chart 8  
**Border Vehicle Crossings in the 1990s**



NOTE: Crossings through Brownsville, Del Rio, Eagle Pass, El Paso, Harlingen, Laredo, McAllen–Hidalgo, Presidio, Progreso, Rio Grande City and Roma.

SOURCE: Texas A&M International University.

projects. In addition, the comptroller recommends that TXDOT take steps to improve its success rate in obtaining discretionary federal funds, increase the use of toll roads and expand the use of TXDOT's Texas State Infrastructure Bank. The bank was developed in 1997 to allow TXDOT to lend money at below-market interest rates for public and private investment in infrastructure.

## Improving Transport Efficiency

The extensive use of the short-haul trucking industry has stimulated relative earnings growth in Laredo and added to the city's toll revenues. However, this system raises costs to firms shipping goods to Mexico because it delays cargo from one to several days and imposes storage and freight-forwarding costs. Also, about 43 percent of cargo trucks crossing Laredo's international bridges in 1999 had either no trailer or an empty one, intensifying congestion costs and infrastructure demand. Under NAFTA's trucking provision, which by now would have allowed trucks to travel freely between countries, some of these costs could be eliminated, enhancing the efficiency of border transport but also reducing the demand for trucking and warehousing along the border.<sup>7</sup> In early 2001, President Bush announced the United States would comply with the trucking provision by January 1, 2002.

While the trucking provision's implementation may reduce the demand for new border transportation infrastructure, other measures also can improve transport efficiency. One example is a fee structure or agreement with shipping companies that encourages trucks to avoid the peak travel times of 11 a.m. to 2 p.m. and 4 p.m. to 8 p.m. Often the bridges have excess capacity during off-peak times. Border officials and groups such as the Mexico–Texas Bridge Owners Association have voiced concerns that the federal agencies that inspect border traffic have not increased staffing to keep up with the large increase in trade and the growing concern about illegal drugs and immigration.<sup>8</sup> Recent actions that have eased

the flow of commuters who cross the border daily to work and shop include dedicated commuter toll-tag lanes at the Stanton Bridge in El Paso and the rerouting of truck traffic in Laredo to the new World Trade Bridge.

The October 2000 completion of Laredo's Camino Colombia toll road, the first private toll road in Texas, signals that the private sector is acting to improve border transport efficiency. The road provides a direct route from I-35 to the Colombia–Solidarity Bridge, which can save time and money associated with bottlenecks and congestion. By paying a toll to use the road, the manufacturers and transporters who receive the benefits of this infrastructure also pay for its construction and maintenance. Despite light traffic on the toll road in the first several months, bridge owners say that under Mexican President Vicente Fox's administration, a new highway may be built on the Mexican side of the Colombia–Solidarity Bridge. This would likely spur use of the state-of-the-art bridge and the Camino Colombia toll road.

## Summary

The border receives many benefits from increased trade with Mexico. The expense of maintaining infrastructure to accommodate international trade, however, poses a challenge. Before significantly more dollars are spent on border infrastructure, the efficiency of the current system needs to be addressed. The implementation of the NAFTA trucking provision is a step in the right direction. Other issues to consider are peak travel times, customs manpower and Mexican customs brokers' policies. Border cities, particularly Laredo, have benefited from the strong growth in the short-haul trucking industry, however, and efforts to improve border transport efficiency may result in reduced job growth in this industry.

*Phillips is a senior economist in the San Antonio Branch of the Federal Reserve Bank of Dallas. Manzanares was a research assistant at the time the article was written.*

## Notes

The authors would like to thank Daniel Hastings, Pia Orrenius, Lucinda Vargas and Mine Yücel for helpful comments and guidance.

<sup>1</sup> Border-crossing data are from the Texas Center for Border Economic and Enterprise Development at Texas A&M International University. Truck crossing data for El Paso, which are not recorded, were estimated using trucks as a percentage of total vehicle crossings at the other border ports. For raw data, see <http://tamiu.edu/coba/bti/>.

<sup>2</sup> In this article we use county data for the six major cities along the border—Brownsville, Del Rio, Eagle Pass, El Paso, Laredo and McAllen.

<sup>3</sup> See "Border Region Makes Progress in the 1990s," Federal Reserve Bank of Dallas San Antonio Branch *Vista*, December 1999.

<sup>4</sup> It is interesting to note, however, that because minimum wages in the United States are about 10 times higher than in Mexico, border retail wages are high in comparison with many jobs in neighboring Mexico. Since many border residents immigrated from Mexico, have relatives in Mexico and may compare their wages with the lower pay in Mexico, they may believe their wages are above average.

<sup>5</sup> Twenty-three of the crossings are bridges, two are dams and one is a hand-drawn ferry. The two dams and three of the bridges are owned by the U.S. government, the ferry and three bridges are privately owned, one bridge is owned by the state of Texas and the remainder are owned by a local governmental entity such as a city or county. The Mexican federal government typically owns the Mexican portion of an international bridge.

<sup>6</sup> See *Paving the Way: A Review of the Texas Department of Transportation*, January 2001, Texas Comptroller of Public Accounts, [www.window.state.tx.us/txdot/](http://www.window.state.tx.us/txdot/).

<sup>7</sup> President Clinton, responding to perceived safety issues, delayed indefinitely the trucking provision, which would have allowed trucks access to border states by December 1995 and throughout both countries by 2000. The current restrictions barring U.S. trucks from Mexico and vice versa are not the only source of transportation delays at the border, however. The Mexican customs brokers' practice of requiring inspection on the Texas side of the border is also a factor, as it stimulates short-haul freight-forwarding and warehousing of goods. Thus, it is unclear what impact the trucking provision, when implemented, will have on the movement of goods across the border. For a more detailed discussion of border transportation inefficiencies, see "Texas to Mexico: A Border to Avoid," by James Giermanski, *Journal of Borderlands Studies*, vol. 10, no. 2, 1995, pp. 33–53.

<sup>8</sup> For example, see "More Agents for Customs Are Sought," *Wall Street Journal*, July 12, 2000, p. T1.

# HOUSING AFFORDABILITY

## Outlook Improving Along the Border

Toby Cook



In recent years the U.S. home-ownership rate has reached historic levels. The 66.8 percent recorded in 1999 is the highest since the statistic was first collected in 1965. Texas experienced a similar trend in 1999, posting the highest home-ownership rate since 1984. The most recent statistics available for Texas–Mexico border communities show home-ownership rates comparable to those of Texas as a whole. In 1990, Texas' 60.9 percent rate was only slightly above El Paso's 58.7 percent and several points below Brownsville's 64.4 percent.

However, studies suggest that a substantial percentage of border residents spend an excessive proportion of income on housing (30 percent of income is widely considered acceptable). According to a 1998 report from the Texas Comptroller of Public Accounts, housing is considered affordable to only one in three residents along the Texas–Mexico border. A study by Jorge Chapa of the University of Texas reported that from 1980 to 1990 the percentage of households paying excessive housing costs rose sharply in several border counties. Cameron County saw

an increase of 42 percent and El Paso County 23 percent. The study projected the number of households paying excessive housing costs would continue increasing through 2000 and beyond.

This article discusses trends in housing affordability along the Texas–Mexico border during the 1990s, compares affordability levels among four border communities and suggests possible reasons for any variation.

### Affordability Analysis

To determine the level of housing affordability along the border, we compare the monthly mortgage payment on the median-priced home with the monthly payment affordable to a household earning the area median income. We perform this comparison for the Brownsville, El Paso, Harlingen and McAllen metropolitan statistical areas (MSAs) for the years 1992–99.<sup>1</sup> In accordance with industrywide standards, we assume 30 percent of monthly gross income to be an affordable housing payment. We calculate monthly gross income from annual median incomes established by the Department of Housing and Urban Development.

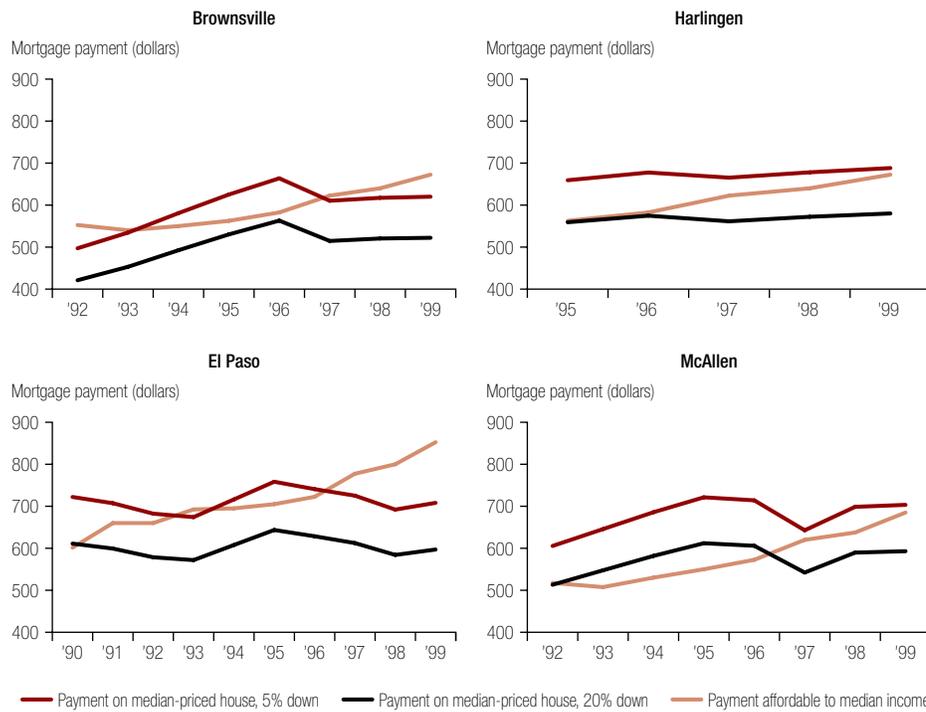
Using the annual median sales price for a single-family residence, we calculate the mortgage payment for a median-priced residence. We assume a 30-year term, the average annual mortgage interest rate, the average annual homeowner's insurance premium rate and the average statewide property tax rate. For comparative purposes, we make two calculations for each MSA for each year. One assumes a 20 percent down payment and the other 5 percent. When the latter is assumed, we add a calculation for private mortgage insurance to the formula.<sup>2</sup>

### Housing Affordability

In recent years, purchasing a house along the border has generally become more affordable (*Chart 1*). In the early 1990s, buying the median-priced house was impossible in three of the four markets examined unless a purchaser made a significant down payment, roughly 20 percent or more. By the end of the 1990s, households earning the median income could afford the mortgage payment on the median-priced house when making only a 5 percent down payment in two markets and were just a few dollars short in the other two.

Chart 1

**Housing Affordability in Border Cities**



SOURCES: See Note 2.

Table 1 shows affordability of a median-priced home in 1992 and 1999 assuming a 5 percent down payment. In 1992, the mortgage payment on the median-priced house in El Paso was \$682—\$22 above what was affordable to a median-income household. By 1999, the situation was very different: A median-income household could afford \$853 for a mortgage—\$145 more than the monthly payment on the median-priced house.

In contrast, the mortgage on the median-priced house in McAllen and Harlingen was not affordable to households earning the median income in 1999. In both communities, the monthly amount a household could afford to spend on housing was about \$15 below the payment on the median-priced home. However, like El Paso, both communities experienced an increase in affordability.

In Brownsville, a household earning the median income in 1999 could afford more for a mortgage than was necessary for the median-priced house. However, as Table 1 shows, the median-priced house was already affordable to median-income households in 1992 and was actually less affordable in 1999.

With the exception of Brownsville, increases in housing affordability in the MSAs examined exceeded the increase in affordability for the entire state. Clearly the border region has made positive gains in this arena.

**Determinants of Affordability**

Many factors contribute to housing affordability. Declining interest rates and the 1997 increase in the Texas homestead property tax exemption both boosted housing affordability throughout the state. However, the varying rates of affordability among the border MSAs suggest other factors are also in play. This section explores possible reasons for the changes in housing affordability along the Texas–Mexico border and looks at circumstances that may be responsible for the differing affordability rates in the four border MSAs.

**Income**

Much of the improvement in housing affordability along the border has occurred because the increase in income levels has outpaced the rise in home prices. As shown in Table 2, the three MSAs that recorded greater housing affordability had income growth

Table 1

**Affordability of Median-Priced Home, 1992 and 1999**

	1992			1999			Percentage point change in affordability 1992–99
	Mortgage payment	Affordable housing payment	Affordable payment as percentage of mortgage payment	Mortgage payment	Affordable housing payment	Affordable payment as percentage of mortgage payment	
Brownsville	\$497	\$553	111	\$620	\$ 673	109	–2
El Paso	682	660	97	708	853	120	23
Harlingen*	659	563	85	688	673	98	13
McAllen	605	518	86	703	685	97	11
Texas	751	910	121	927	1,145	124	3

\* Harlingen data begin in 1995.

NOTE: Calculations assume 5 percent down payment.

SOURCES: Department of Housing and Urban Development; author's calculations. See Note 2 for mortgage payment calculation.

Table 2

**Median Home Sales Price and Median Income, 1992 and 1999**

	Median sales price			Median income		
	1992	1999	Percent change	1992	1999	Percent change
Brownsville	\$50,100	\$ 68,600	37	\$22,100	\$26,900	22
El Paso	68,400	77,900	14	26,400	34,100	29
Harlingen*	66,800	75,800	13	22,500	26,900	20
McAllen	60,800	77,800	28	20,700	27,400	32
Texas	75,200	101,000	34	36,400	45,800	26

\* Harlingen data are for 1995 and 1999.

SOURCES: Texas Real Estate Center; Bureau of Economic Analysis.

larger than housing price increases. In Brownsville, the only community that did not see an increase in affordability, income growth was slower than sales price growth.

From 1992 to 1999, the median household income in El Paso grew 29 percent, more than double the 14 percent increase in the median house price. McAllen also posted a large gain in median family income—32 percent from 1992 to 1999. But unlike in El Paso, the median house price also rose dramatically, increasing 28 percent. In Brownsville, the 37 percent increase in median house price significantly outpaced the 22 percent increase in income. Harlingen experienced a 20 percent rise in income and a 13 percent rise in house prices for 1995–99.

**Population Growth**

The rapid income growth explains much of the increased housing affordability. However, the equally rapid

rise in housing prices has dampened affordability in some communities. For example, from 1992 to 1999 income levels climbed dramatically in both El Paso and McAllen; however, because of McAllen's large increase in median home prices, its increase in housing affordability significantly trailed El Paso's.

The faster increase in median house prices in McAllen and Brownsville may be partly caused by their population boom. A 1998 Census Bureau report ranks McAllen and Brownsville the fourth and 14th fastest growing MSAs in the country. Rapid population growth is likely to increase demand for houses and, hence, put upward pressure on prices.

**New Home Construction**

The volume of new construction also may affect affordability. In El Paso, for example, greater housing affordability is due to not only income growth but also the relatively minimal housing cost increases resulting from greater housing production. The number of single-family building permits is increasing in all four MSAs (*Table 3*), but the permit value has gone up only slightly during the period analyzed. This may indicate a proportional increase in the construction of less expensive homes.

**Research Model**

To quantify the effects of income, population growth and new home construction on new home prices, we perform a regression analysis using data for each of the four MSAs.<sup>3</sup> To

receive a building permit, a builder must record the estimated cost of improvements with the issuer. This makes it possible to obtain the average annual permit value, which is the dependent variable. Permit values are regressed on the annual number of single-family building permits, annual per capita income, population estimates and a trend line.<sup>4</sup> We would expect increases in both population and income to result in higher average permit values, while increases in the number of permits would correlate with decreases in permit values. We would expect controlling for income and population to result in a downward trend in permit values.

To quantify the effect of construction volume on house prices, we perform a second regression analysis on annual average single-family home sales price.<sup>5</sup> We expect the number of permits to correlate negatively with home sales price but to a lesser degree. This is because the economies of building on a larger scale should lower the price of new home construction, which, in turn, would lower existing home prices through expanded competition.

**Results**

The first regression analysis tests the relationship between the volume of new construction and the cost of new homes. An increase in the number of single-family building permits is associated with a decrease in permit values (*Table 4*). For each additional building permit issued, the permit value declines by 0.35 percent. As expected, an increase in personal income leads to an increase in permit value. However, when accounting for personal income and population, the declining trend line

Table 3

**Single-Family Building Permits, 1992–99**

	Metropolitan statistical area		
	Brownsville	El Paso	McAllen
1992	1,308	2,270	3,230
1993	1,486	2,296	5,565
1994	1,694	2,323	3,955
1995	1,642	2,259	3,761
1996	1,729	2,347	4,287
1997	1,602	2,316	4,155
1998	1,926	3,039	5,219
1999	2,017	3,472	5,069
Change 1992–99	54%	53%	57%

NOTE: Brownsville and Harlingen are in the same reporting area.

SOURCE: Texas Real Estate Center.

Table 4

**Permit Value Regression**

	Coefficient	Standard error	t statistic
Number of permits	-.352	.068	-5.14
Population	-.15	.145	-1.031
Personal income	1.056	.303	3.485
Trend	-.165	.035	-4.655

Table 5

**Home Sales Price Regression**

	Coefficient	Standard error	t statistic
Number of permits	-.009	.026	-.358
Population	.273	.055	4.907
Personal income	-.238	.115	-2.062
Trend	-.118	.013	-8.72

indicates an overall decrease in permit values.

The second regression analysis tests the relationship between new home construction and housing prices while controlling for population and income. A greater supply of housing, reflected as an increase in building permits, should result in lower prices. However, rising income and population should raise the demand for homes and push prices higher.

Table 5 shows that population correlates positively with house price, as predicted. This supports the earlier finding that housing prices are rising faster in communities with dramatic population growth, such as Brownsville and McAllen, than in border cities with slower population growth. Nick Mitchell-Bennett of Brownsville Community Development Corp., the city's largest homebuilder, confirms this conclusion: "The issue is no longer finding buyers; the problem is building to keep up with demand."

Unexpectedly, the coefficient for personal income is negative. For an additional dollar of personal income, the average house price decreases by 0.24 percent. However, by removing El Paso from the model, the coefficient for personal income becomes positive. El Paso dominates the results because of its relatively large size. In addition, the city has had one of the largest increases in income but the lowest increase in housing price.

The coefficient for permits is not statistically significant in this model. However, removing the trend line from the model results in a statistically significant coefficient. For every single-family building permit issued, the average sales price falls by 0.1 percent, less than a third of the decrease associated

with permit volume and permit value. This indicates that the rapid rise in housing construction is having a greater impact on the prices of new homes than on existing ones.

This finding may be a result of greater supply of starter homes. According to Bob Bowlen, chief executive officer of Tropicana Homes in El Paso, developers are building to an emerging niche. "We shifted to the starter market three to four years ago," he says. Pam Rodriguez, vice president of community lending at Texas State Bank in McAllen, adds, "Developers have realized there is a great need for this type of housing."

Our econometric findings are consistent with the housing affordability picture presented in Chart 1. The negative trend in both regressions supports the prediction that housing is becoming more affordable. The increased capacity of developers has led to a less expensive housing stock. "The building industry in El Paso has been capable of meeting increased demand and delivering more affordable homes," says Tropicana Homes' Bowlen.

**Conclusion**

With the exception of Brownsville, housing in the border communities studied became more affordable during the 1990s. Of the three communities in which housing affordability improved, all outpaced the increase in affordability for the state as a whole. Additionally, house prices along the border grew more slowly than in Texas as a whole. The rapid rise in single-family construction contributed to the relatively slow increase in border housing prices as developers began focusing on the starter-home market. Rapid increases in income also explain much of the gain in housing affordability. With income growth outpacing housing price increases, border residents have relatively more income available for housing.

*Cook is a community affairs specialist at the Federal Reserve Bank of Dallas.*

**Notes**

The author would like to thank Pia Orrenius for help with research.

<sup>1</sup> Data for Harlingen are only available beginning in 1995. Data for El Paso begin in 1990, but comparisons begin with 1992 data. Laredo is not included in the analysis because the median single-family home sales price is not available.

<sup>2</sup> Annual median sales price from Texas Real Estate Center; average annual mortgage interest rate from Federal Housing Finance Board Monthly Interest Rate Survey; average annual homeowner's insurance premium rate from Texas Department of Insurance; statewide average property tax rate from Texas Comptroller of Public Accounts; private mortgage insurance from *FHA Premium Reconciliation Group Procedures Manual: FHA Risk-Based Monthly Premium*. Property tax rate is a statewide average for state and local governments and school districts in 1998; historical data are unavailable.

<sup>3</sup> For data used in regression, Brownsville and Harlingen are in the same reporting area.

<sup>4</sup> Average annual permit value and annual number of single-family building permits from Texas Real Estate Center; annual per capita income from Bureau of Economic Analysis; population estimates from Census Bureau.

<sup>5</sup> Average single-family home sales price from Texas Real Estate Center.

# TEXAS COLONIAS

## Housing and Infrastructure Issues

Ariel Cisneros



The Texas colonias are unincorporated and impoverished subdivisions that flourish along the state's border with Mexico. More than 1,400 colonias dot the 1,248-mile stretch from Cameron County on the Gulf of Mexico to El Paso County in the west. The 400,000 residents of these subdivisions struggle daily with living conditions that resemble a Third World country's—ramshackle dwellings, open sewage, lack of sanitary water and drainage, dusty unpaved roads, no plumbing.

Although numerous improvements in housing and infrastructure have been made since colonias were first established 50 years ago, bettering the lives of colonia inhabitants is an ongoing—and probably never-ending—process involving people, governments and organizations working together.

This article looks at some of these conditions and what has been done during the past 10 years to improve life in the colonias, with special emphasis on Cameron County colonias, home to nearly 27,000 residents.

### Vexing Problems

In the early 1950s, colonias became a way of life for thousands of people when developers began creating sub-

divisions in unincorporated, isolated rural areas on land that had no agricultural value or that was located in a floodplain. The developers divided the property into small lots with little or no infrastructure, then sold them on contract for deed to low-income people. The residents often built their homes piecemeal with whatever materials they could find or afford.

These areas became known as *colonias*, Spanish for neighborhood or com-

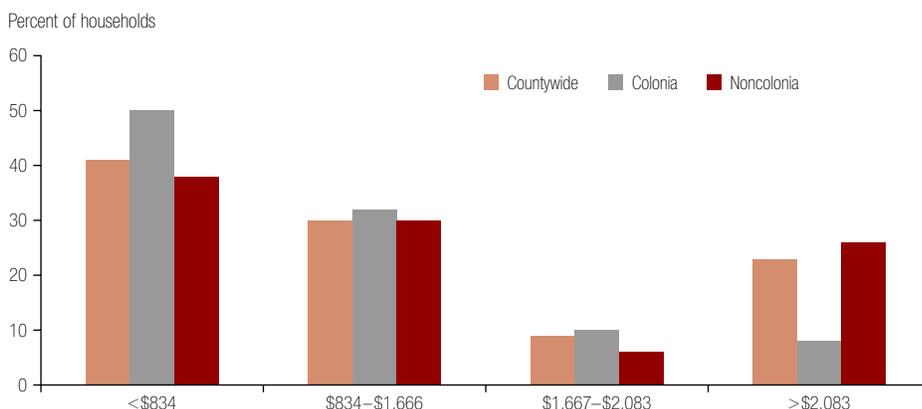
munity. Even today, for many of the Texans who live in them, the colonias are the only housing option. The residents are predominately Hispanic, nearly 65 percent of them born in the United States.

According to a random survey in June 2000 by the Texas Department of Health in 96 colonias in six border counties, almost half of the colonia households make less than \$834 a month (Chart 1). Nearly 70 percent of the residents never graduated from high school. The unemployment rate stands at 18 percent for colonia residents, compared with 11 percent for their border neighbors.

Compounding these problems is a border population that, in some counties, is growing at a rate nearly double the state average, easily outpacing the availability of safe and affordable housing. Cameron County—165 miles south of Corpus Christi—is no exception. During the 1990s, Cameron County's population grew by 25.5 percent, compared with the state average of 16.3 percent.

Inadequate or nonexistent infrastructure has long been a problem for the colonias. Of 99 colonias in Cameron County, 26 are without adequate water service and 70 lack wastewater treatment. County officials estimate they would need \$3.3 million to provide necessary water and sewer service, \$26 million for wastewater service, \$6 mil-

Chart 1  
Monthly Household Income, 2000



NOTE: Households were surveyed in six Texas border counties: Cameron, El Paso, Hidalgo, Maverick, Val Verde and Webb.

SOURCE: *Survey of Health and Environmental Conditions in Texas Border Counties and Colonias*, Texas Department of Health Office of Border Health and Public Policy Research Institute, Texas A&M University, June 2000 (draft).

lion for flood control and drainage, and \$10 million for road improvements. But those figures pale in comparison with what's needed for housing: \$72 million for repairs to 3,000 substandard units, nearly half categorized as unsuitable for repair.

Given these costs, burgeoning populations and inadequate infrastructure, cities adjacent to the colonias are reluctant to annex them and assume the large financial burden of providing services in exchange for such limited tax bases.

Throughout the colonias, housing problems have historically fallen into three groups:

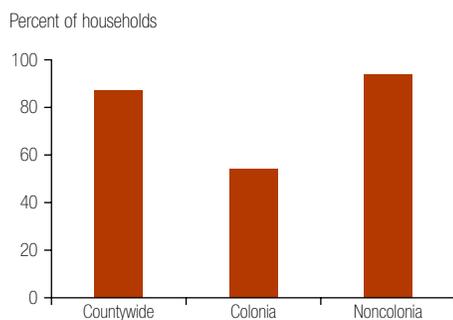
- Contracts for deed
- Inadequate infrastructure
- Substandard housing

### Contract for Deed

Many colonia inhabitants bought land on contract for deed because they had neither the credit history nor the resources to qualify for traditional financing. A contract for deed is a financing arrangement in which land ownership remains with the seller until the total purchase price is paid.

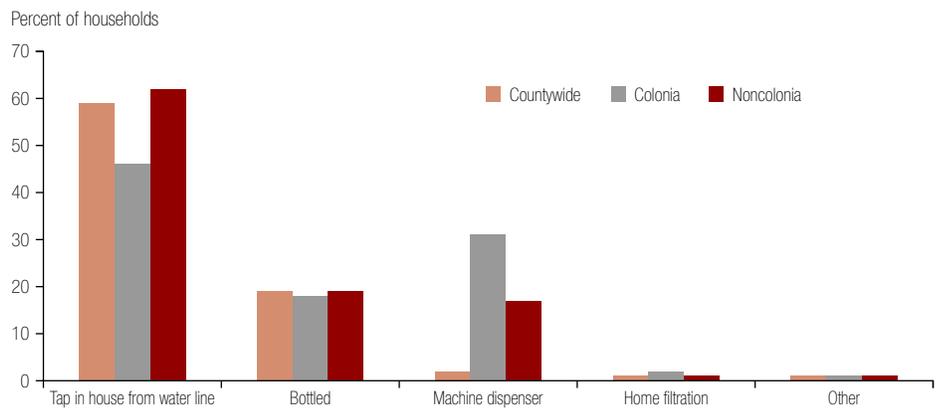
To protect the interest of people who rely on such arrangements, the state's Colonias Fair Land Sales Act of 1995 requires developers to record and counties to keep track of contracts for deed. It also requires developers to provide a

Chart 2  
**Households with a Sewer Connection, 2000**



NOTE: Households were surveyed in six Texas border counties: Cameron, El Paso, Hidalgo, Maverick, Val Verde and Webb.  
SOURCE: *Survey of Health and Environmental Conditions in Texas Border Counties and Colonias*, Texas Department of Health Office of Border Health and Public Policy Research Institute, Texas A&M University, June 2000 (draft).

Chart 3  
**Main Source of Drinking Water, 2000**



NOTE: Households were surveyed in six Texas border counties: Cameron, El Paso, Hidalgo, Maverick, Val Verde and Webb.  
SOURCE: *Survey of Health and Environmental Conditions in Texas Border Counties and Colonias*, Texas Department of Health Office of Border Health and Public Policy Research Institute, Texas A&M University, June 2000 (draft).

statement of available services, such as water, wastewater and electricity, and an annual statement of the buyer's account.

David Arizmendi, executive director of Proyecto Azteca, a nonprofit housing development organization in San Juan, Texas, says contract-for-deed sales continue in the colonias, but the properties now have infrastructure. The contracts generally carry about 14 percent interest. The sales continue because buyers can get a half-acre tract in a colonia versus a smaller lot in a city, and they aren't required to follow city building codes and restrictions. The buyers can also build and get financing as their incomes allow.

To address some of the problematic contracts for deed put in place before 1995, the Texas Department of Housing and Community Affairs' (TDHCA) Office of Colonia Initiatives has converted more than 350 into lower interest mortgages since 1998. The \$4,000 to \$30,000 loans have five- to 30-year terms at 5 percent fixed interest rates. For 2000-01, TDHCA has committed \$4.4 million for contract-for-deed conversion.

### Infrastructure

As they did 50 years ago, many of today's colonia residents still use septic tanks and cesspools. They buy water by the bucket and drum or use potentially contaminated wells. As recently

as June 2000, only 54 percent of Texas colonia residents surveyed had sewer service and more than 50 percent drank water from sources other than taps (*Charts 2 and 3*).

Even with water and sewer systems in place, many colonias residents do not have hookups because their houses can't pass inspections to qualify and the owners can't afford repairs or improvements to meet codes.

Gradually, however, infrastructure improvements are coming to the colonias. In 1989, Texas passed the first of two bond authorizations totaling \$250 million to provide water and wastewater service to colonias. Between August 1991 and March 2000, the Texas Water Development Board committed \$343 million in grants and loans for 57 infrastructure projects affecting more than 179,000 colonia residents.

In the 1,000-home Cameron Park colonia in Cameron County outside Brownsville, nearly all dwellings now have water and sewer hookups. Since June 1997, county officials have paved more than 9.5 miles of the colonia's 11 miles of roads and built a park in partnership with TDHCA, the Texas Wildlife Department and Texas A&M University.

Also during the past 10 years, the state has taken steps to improve colonia living conditions through litigation and to halt proliferation of colonias with

little or no infrastructure. The Colonia Legislation passed in 1995 prohibits developers from selling lots in existing colonias without water and wastewater treatment services, although some cities and counties lack staffing to enforce the complex law.

## Housing

Colonia houses are primarily built by residents little by little, using available materials. The houses often begin as tents or makeshift structures of wood, cardboard or other material. As their sparse finances allow, the owners add improvements; they rarely use professional builders. Houses in older colonias tends to be better developed because residents have had more time to improve them.

Cameron County is an example of where substandard dwellings flourish. A county consultant's study in January 2000 shows that nearly 1,600 substandard houses are suitable for repair—at a cost of \$28.8 million—but another 1,463 dwellings are beyond repair. The county would need \$44 million to upgrade these homes.

The housing situation, however, isn't as bleak as in previous years. For example, the nonprofit Community Development Corp. of Brownsville (CDCB) is tearing down and rebuilding homes in five colonias around Brownsville, including 100 homes in Cameron Park. The CDCB requires the colonias to have full water and sewer service and paved roads.

To offer families an alternative to colonia living, the CDCB also developed Windwood, an \$11.5 million affordable-housing development outside the colonias where the CDCB has built and sold 180 single-family units. Windwood's household income averages \$19,325; its lowest income is \$12,000. The project was financed in part by the Greater Brownsville Community Development Corp., a multibank CDC. Wells Fargo, Chase Bank of Texas, Fannie Mae and the Federal Home Loan Bank of Dallas are participating in the project.

In partnership with local lending institutions, the CDCB is currently developing another 33 acres for 150 single-

family houses. This project will have a self-help equity component in which homeowners participate in the construction. Don Currie, the executive director, says the CDCB will also buy out the homes of 30 families in a nearby colonia and move them to new homes in the new subdivision.

## Initiatives

As with the CDCB's self-help equity, the initiative and leadership to improve living conditions often come from colonia residents and programs like the Texas Natural Resource Conservation Commission's Small Towns Environment Program (STEP). STEP uses local volunteers, materials and financial resources to solve a community's water and wastewater problems. Since 1995, Texas STEP has completed nine colonia projects.

In Hidalgo County, where more than 4,000 colonia families are on a housing waiting list with Proyecto Azteca, Arizmendi plans to develop, as an alternative, \$6,000 houses with limited interior finish-out. Arizmendi says owners will put 30 percent down, get five-year loans at zero interest and make monthly payments of \$75 to \$100. They can finish the interiors as their finances allow.

To further the financing for colonia housing, regional coalitions are being established. For example, the CDCB in Brownsville helped create the Rural and Colonia Loan Program from a \$600,000 Department of Housing and Urban Development grant. The award was tied to a \$1.15 million lending commitment to the CDCB from Chase Bank of Texas, Wells Fargo, International Bank of Commerce and Texas State Bank. The grant will serve as a loan-loss reserve for the banks, allowing them to make loans to customers unable to qualify for traditional financing. The loan product will be a 20-year, 3.5 percent fixed loan with monthly payments averaging \$246, including taxes and insurance. The homes developed by participating nonprofits will sell for approximately \$30,000.

Other organizations and agencies are joining the battle to improve life in the colonias. Fannie Mae recently announced a five-year, \$1.5 billion in-

vestment plan for border communities. In addition, the Department of Agriculture/Rural Development's Water and Waste Disposal Loans and Grants Program provides 1 percent interest loans for home improvements.

In 1995, the Texas Legislature allocated 2.5 percent of the state's annual share of federal community development block grants to operate five self-help centers in five counties. The centers help colonia residents with repairs, maintenance, health care, education, employment training and counseling. The centers lend homeowners tools and offer technical assistance for home repairs and maintenance.

## Conclusion

Low incomes, high unemployment, dilapidated housing and lack of infrastructure are some of the challenges to solving colonia housing problems. Significant resources have been devoted to the colonias, and new laws protect current and future residents. Partnerships among financial institutions, nonprofit organizations, the private sector, foundations and residents have improved housing and infrastructure. Outside the colonias, new affordable-housing developments are being established as an alternative for families who would otherwise live in colonias.

However, even with significant resources, colonia housing continues to be some of the poorest in the country. For a majority of families, the question of choice is moot; housing is a necessity, and the only option they see is the colonia. With no end in sight for population growth and housing demand along the border, continued efforts are necessary to wrestle with the colonias' problems.

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# NAFTA AND MAQUILADORAS

## Is the Growth Connected?

William C. Gruben and Sherry L. Kiser



Courtesy of Tom Pappas

After Canada, Mexico and the United States adopted NAFTA in 1994, the growth of Mexican maquiladora plants soared. These plants typically import U.S. inputs, process them and ship them back to the United States. Because maquiladoras involve U.S.–Mexico trade and their growth acceleration coincided with NAFTA’s inception, many concluded that the trade agreement caused this growth. However, after examining the relationship, we find that what explains maquiladora growth before NAFTA can also explain it after NAFTA.

There is no doubt maquiladoras are an important part of Mexico’s international trade picture. Year in and year out, maquila plants are responsible for more than 40 percent of Mexico’s exports.<sup>1</sup> Over the years, with or without NAFTA, the maquiladora industry has grown substantially, but a superficial examination could suggest NAFTA made a difference. During the five years prior to NAFTA, maquiladora employ-

ment grew 47 percent. But over the first five years after NAFTA, employment growth soared 86 percent (*Chart 1*). This growth was not simply a matter of existing plants taking on more workers but of rapid expansion in the number of plants. The 1,789 in-bond plants at the end of 1990 grew to 2,143 at the end of 1993—just before NAFTA—and to 3,703 by the end of 2000.

The commentators who concluded that NAFTA made maquiladoras grow represent a broad spectrum: university professors to journalists to businesspeople. Professor Francisco Carrada-Bravo argues, “The acceleration of foreign direct investment under NAFTA also contributed to the creation of more than a half-million new employment opportunities in the U.S.–Mexico border region...tied to the expansion of the maquiladora industry.”<sup>2</sup> Journalist Nancy San Martin maintains, “NAFTA continues to drive the growth of the maquiladora industry.”<sup>3</sup> And John Balla, writing in a trade magazine focusing

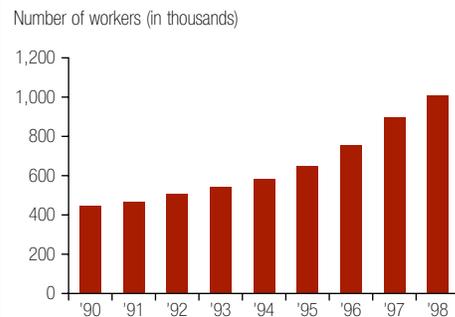
on maquiladoras, declares, “Without doubt, NAFTA has resulted in a dramatic increase in activity in the maquiladora industry.”<sup>4</sup>

### Examining the Evidence

Despite all that has been written supporting a direct correlation between maquiladora growth and NAFTA, technical literature proving a connection one way or the other is scarce. Moreover, NAFTA might have discouraged maquiladora operations in general. For example, NAFTA allows U.S.–Mexico production-sharing operations in the maquiladora mode but without the maquiladora program.

By 1999, the majority of imports that earlier had been processed under the maquiladora program for entry into the United States could enter duty-free without any connection to maquila plants. The options other than the maquiladora program include (1) NAFTA’s regular and accelerated phase-ins of tariff eliminations, (2) duty-free treatment of certain products from all most-favored-nation suppliers and (3) the Automotive Products Trade Act.<sup>5</sup> To the extent that membership in the maquiladora program involved additional paperwork, such membership in the age of NAFTA might have seemed unnecessarily costly.

Chart 1  
**Maquiladora Employment**



SOURCE: Instituto Nacional de Estadística, Geografía e Informática.

Environmental restrictions may have created another disincentive to operate under the maquiladora program. In some cases, waste-handling and treatment regulations were stricter for maquiladoras than for other Mexican plants making the same products and exporting to the United States. Manufacturing firms' ability to obtain duty-free benefits under NAFTA without additional cost or environmental restrictions—which maquila industry membership would impose—could have encouraged such firms to operate outside the maquiladora program post-NAFTA.

On the other hand, NAFTA may have encouraged maquiladora expansion by eliminating all Mexican programs that favored specific industries. When these programs disappeared, some firms had to switch to the maquiladora program to continue importing inputs duty-free to Mexico.<sup>6</sup>

By allowing duty-free treatment of textile and apparel products, NAFTA may have caused maquila growth in that sector.<sup>7</sup> More generally, some processed products—including inputs that enter Mexico under the maquiladora program post-NAFTA—are able to reenter the United States more cheaply in NAFTA's wake.<sup>8</sup> Pre-NAFTA, duties had to be paid on components not of U.S. origin that were used in the assembly of the maquila product. After NAFTA, products could contain foreign components as long as the products were classified as having a designated percentage of components of North American origin.

NAFTA also eliminated quotas, which especially impacted the textile industry. With no constraints on the amount of textiles that could be exported back to the United States, textile firms may have had an incentive to construct maquila operations in Mexico. Many observers have concluded that NAFTA's treatment of the textile/apparel sector has significantly affected the maquila growth in that industry.

## Why Maquiladora Growth?

Some factors suggest NAFTA may substantially encourage maquiladora growth. Others indicate NAFTA may

## What Is a Maquiladora?

A maquiladora is a labor-intensive assembly operation. In its simplest organizational form, a Mexican maquiladora plant imports inputs from a foreign country—most typically the United States—processes these inputs and ships them back to the country of origin, sometimes for more processing and almost surely for marketing.

The maquiladora program itself permits the inputs and the machinery used to process them to enter Mexico without payment of import tariffs. On the return to the country of origin, again most typically the United States, the shipper pays only such return import duties as are applicable to the value added by the manufacturing process in Mexico. The return trip is not under the jurisdiction of the maquiladora program. The tariff arrangements involve the law of the country to which the processed product is reshipped. Even though most Mexican maquiladora activity entails shipments from and to the United States, it is important to emphasize that other nations are permitted to operate under the maquiladora program.

have little impact. Still others suggest NAFTA may actually discourage maquiladora growth. If indeed NAFTA discourages growth, what factors could have driven such significant expansion?

In fact, recent econometric testing shows that the same factors long known to explain the ups and downs of maquiladora growth can explain post-NAFTA maquiladora employment growth as well.<sup>9</sup> If NAFTA has any influence, it is negative, not positive. Both before and after NAFTA, three factors account for the majority of fluctuations in maquiladora employment in either direction.

The first factor is the growth rate of U.S. industrial production. Maquiladoras can be seen as part of the U.S. industrial

production process: When production grows faster, maquiladora employment goes up in the same year. The effect is not only positive but also relatively quick. Rising manufacturing activity in the United States quickly results in new orders for the maquiladoras.

The last two factors that explain maquiladora employment fluctuations are Mexican-to-U.S. and Mexican-to-Asian manufacturing wage ratios. While the relationship between U.S. industrial production growth and maquiladora growth is positive, the relationship between these wage ratios and maquiladora growth is negative. In other words, when Mexican wages increase relative to foreign wages, maquila employment growth declines.

And these wage impacts occur with a lag. Maquiladora owners respond quickly to changes in U.S. industrial production, usually within a year. In contrast, it takes two years for maquiladora owners to adjust employment in response to changes in wage ratios. Devaluations play an important role in shifting the ratio of Mexican to U.S. or Asian wages. Owners wait to see how permanent the new exchange rates will be in real terms (after adjustment for inflation differences between the two countries) before they make decisions about hiring or firing. Devaluations or currency appreciations are important because U.S. firms, which dominate Mexican maquiladora activity, make cost decisions in dollar terms since their bottom lines are expressed in dollars. A long-lived change in the buying power of a dollar in Mexico—especially when the dollar is used to hire a worker—will affect a factory owner's decision to locate his operation in Mexico, the United States or Asia.

These variables have strong explanatory power for changes in maquiladora employment. However, when a variable is included to account for NAFTA's role, it has a negative, albeit insignificant, effect. Certainly NAFTA has had an important impact on Mexico-U.S. trade. But NAFTA is not responsible for the portion of such trade coming through maquiladoras, despite what so many analysts have concluded.

## Bad Predictions Make Bad Policy

Why is it relevant that these analysts have not proved their claims? The answer perhaps lies in future trade agreements. The next time the United States enters into a free trade agreement, it will be useful to have an idea of the real—rather than the alleged—impact of the last one. Likewise, when other nations enter into free trade agreements, we may want to know the impact such agreements will have on their trade. We may especially want to assess the impact if we are concerned that a new agreement to which the United States is not a party may divert trade from our nation as other countries buy more from each other. In fact, an assessment of the real impact in that case might be a motivation for trying to enter the agreement.

In any case, if maquiladora production and trade were linked to NAFTA, their importance for modeling NAFTA's impacts would be markedly different than if NAFTA did not influence a large portion of U.S.–Mexico trade. For example, if maquiladora activity is not affected by NAFTA, perhaps estimates of NAFTA's impact on U.S.–Mexico trade ought to use data that doesn't include maquiladora trade.

Also, even though as of January 1, 2001, maquiladoras have been phased out as a phenomenon separate from NAFTA, they may deserve quite different modeling and policy consideration if they are indeed linked to the agreement. We can only measure these

links while it is still statistically possible to consider maquiladoras as separate entities. Chart 2, which shows the ratio of maquiladora exports to total Mexican exports, demonstrates how important these implications may be. Trade is a complicated process. So are changes in trade policy.

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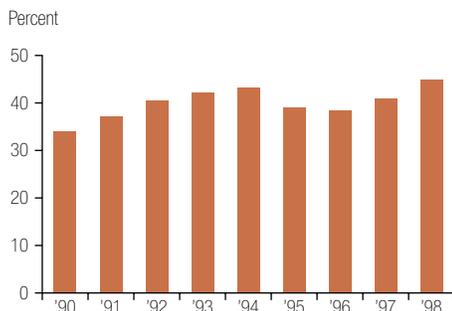
## Notes

- <sup>1</sup> Within the maquiladora industry and more generally along the U.S.–Mexico border, the terms *in-bond plant*, *maquila*, *maquiladora*, *maquiladora de exportación* and *twin plant* are treated as synonymous. We accordingly use these terms interchangeably. For a brief description of the industry, see the box titled “What Is a Maquiladora?”
- <sup>2</sup> Francisco Carrada-Bravo, “Business Education and Joint Enterprise in the NAFTA Countries,” Working Paper, Department of World Business, Thunderbird—The American Graduate School of International Management (Glendale, Ariz., 1998).
- <sup>3</sup> Nancy San Martin, “Overworked and Underage,” *Dallas Morning News*, March 5, 2000, pp. A1, A31–A33.
- <sup>4</sup> John A. Balla, “Data Transfer: What's New?” *Twin Plant News*, November 1998, pp. 55–56.
- <sup>5</sup> Ralph J. Watkins, “Implications of the North American Free Trade Agreement for Mexico's Maquiladora Industry and the Use of the Production Sharing Tariff Provision,” in *Production Sharing: U.S. Imports Under Harmonized Provisions 9802.00.60 and 9802.00.80, 1989–1992* (Washington, D.C.: U.S. International Trade Commission, 1994).
- <sup>6</sup> Elsie L. Echeverri-Carroll, “Industrial Restructuring of the Electronics Industry in Guadalajara, Mexico: From Protectionism to Free Trade,” Bureau of Business Research, University of Texas (Austin, 1999).
- <sup>7</sup> Textile and apparel products historically entered the United States under special trade restrictions. Liberalization of such trade has also had to be specific to such products. For apparel that had entered under 9802.00.80, only the value of U.S.-cut fabric pieces and U.S.-made fasteners, such as buttons and zippers, came in free of duty. Under 9802.00.90, the value added in Mexico, including labor and overhead, also enters the United States duty-free. For additional discussion, see *Production Sharing: Use of U.S. Components and Materials in Foreign Assembly Operations, 1995–1998*, USITC Publication 3265 (Washington, D.C.: U.S. International Trade Commission, December 1999).

- <sup>8</sup> Three general categories of U.S. tariff policy historically applied to imports of maquiladora products. The first (Harmonization Tariff Schedule 9802.00.60) permits the importation of “fabricated” but unfinished metal products processed abroad. Duties are assessed on the value added in Mexico rather than by levying an import tariff on the product's total value. The products are required to have been processed in the United States before being sent abroad. Products in this category must be further processed in the United States upon their return. The second of the three categories (Harmonization Tariff Schedule 9802.00.80) allows an article assembled in Mexico from U.S.-made components to be exempt from import duties on the value of these components. These products need not involve metal components. The third category is the most generous. If the goods assembled or manufactured in Mexico contain at least 35 percent Mexican content upon import into the United States, they are eligible for treatment under the U.S. Generalized System of Preferences, or GSP. Mexican GSP-eligible items may enter the United States duty-free.
- <sup>9</sup> See William C. Gruben, “Do Maquiladoras Take American Jobs?: Some Tentative Econometric Results,” *Journal of Borderlands Studies*, Spring 1990, pp. 31–45; William C. Gruben, “Did NAFTA Really Cause Mexico's Explosive Maquiladora Growth?” Federal Reserve Bank of Dallas *Economic and Financial Review*, forthcoming; and Jose Luis Hernandez and Rodolfo Navarrete Vargas, “Determinantes del crecimiento del empleo en la industria maquiladora de exportación en México,” in *Maquiladoras: Primera Reunión Nacional Sobre Asuntos Fronterizos*, ed. Arturo Garcia Espinosa (Monterrey: Asociación Nacional de Universidades e Institutos de Enseñanza Superior and the Universidad Autónoma de Nuevo Leon, 1987), pp. 221–47.

Chart 2

### Mexican Maquiladora Exports as a Percentage of Total Mexican Exports



SOURCE: Instituto Nacional de Estadística, Geografía e Informática.

# MAQUILADORAS

## Impact on Texas Border Cities

Lucinda Vargas



Mexico's maquiladora industry has become an increasingly significant component of the Mexican economy as well as an important part of U.S. corporate strategy in achieving competitively priced goods in the world marketplace.<sup>1</sup> Maquiladoras are largely concentrated in Mexican cities that border the United States. Since Texas encompasses about half the U.S.–Mexico border, maquiladoras are especially relevant to the state's economy.

To assess the maquiladoras' importance to the border economy, we must first understand how maquiladoras affect Mexico. This article looks at the maquiladora industry's performance in Mexico and then the industry's significance for Texas border cities.

### Mexico's Northern Border

The maquiladora industry has boosted job creation, exports and foreign exchange in Mexico. During 1983–2000, annual growth in maquiladora employment and exports averaged almost 14 percent and 21 percent, respectively. At about 1.3 million workers, maquiladora employment represented 29 percent of Mexico's manufacturing jobs in 2000, up from slightly more than 7

percent in 1983. Further, maquiladora exports, at \$79.4 billion in 2000, made up almost half Mexico's total exports (47.7 percent) and the majority of its manufacturing exports (54.7 percent). Maquiladoras are Mexico's top source of foreign exchange, netting almost \$18 billion last year. Table 1 summarizes the maquiladora industry's key indicators for 2000.

The maquiladora industry also has contributed significantly to Mexico's regional, technological, human capital and infrastructure development, as illustrated by what is happening at the border.

### Regional Development

In 2000, Mexican border cities represented 62 percent of overall maquiladora employment (nearly 797,000 workers) and 70 percent of production (\$50 billion). The two locations with the highest concentration of maquiladora investment are Ciudad Juárez (across from El Paso) and Tijuana (across from San Diego). Together, these two cities in 2000 represented 34 percent of Mexico's total maquiladora employment, with more than 249,500 workers in Ciudad Juárez and over 187,300 workers in Tijuana.

Before the maquiladora program's implementation, cities along Mexico's northern border had among the highest unemployment rates in the country, typically in double digits. Because of the industry's settlement in these cities and its consistent record of employment growth, these locations now have among the nation's lowest unemployment rates. In fact, maquiladoras have become so important to the border that in Ciudad Juárez, for example, the majority of all jobs in 2000—60 percent—came from the maquiladora sector. Moreover, the overwhelming majority of the city's manufacturing jobs—87 percent—were attributable to maquiladora companies last year.

### Technology and Human Capital

When Mexico's maquiladora program began in 1965, most companies were basically assembly operations requiring unskilled labor. The industry has evolved, and factories now use more sophisticated production techniques and require more skilled labor. For example, in 2000, technicians represented 12 percent of maquiladora employment, compared with 8.8 percent in 1975. In addition, the skill level of the maquiladoras' largest labor component—direct line workers—has been upgraded to suit newer technologies.<sup>2</sup>

Mexico's maquiladora companies today boast state-of-the-art production technology. Research and design centers are now part of the maquiladora landscape as well. A key example is the

Table 1  
**Maquiladora Industry Key Indicators, 2000**

	2000	Change from 1999
Plants	3,590	8.9%
Employment	1,285,007	12.7%
Raw materials (billions)		
Imported	\$53.5	19.8%
Domestic	\$ 1.8	38.5%
Total	\$55.3	20.3%
Value added (billions)	\$17.8	32.4%
Exports (billions)	\$79.4	24.3%

SOURCES: Federal Reserve Bank of Dallas El Paso Branch, with data from Instituto Nacional de Estadística, Geografía e Informática; export data are from Banco de México.

Delphi Mexico Technical Center in Ciudad Juárez. This center, which until April 1999 was part of the General Motors Corp. maquiladora production infrastructure, is dedicated to the research and design of auto parts used by the world's top auto producers. Considered the most advanced of 31 such Delphi centers around the world, it employs almost 2,000 workers, most of whom are engineers. The center opened in April 1995 and within four years had doubled capacity.

The technological evolution of the maquiladora industry would not have been possible without the required professional and skilled personnel. This increasingly skilled workforce comes, in large part, from the maquiladoras themselves through training and development at all levels. Typically, training includes in-house programs as well as visits to the company's manufacturing facilities outside Mexico. Maquiladoras also sponsor vocational programs at local technical centers and trade schools to ensure that workers' skills match those in demand by the industry.

A recent example of the maquiladora industry's efforts at educating its workforce is the Center for High Technology Training (Centro de Educación en Alta Tecnología, or CENALTEC), established in Ciudad Juárez in March 2000. This center, created through a collaborative effort between maquiladora companies

in the area and the state and federal governments, incorporates state-of-the-art infrastructure in training highly skilled technicians in manufacturing specialties. Companies award scholarships to the center's two-year training programs.

### Infrastructure Development

Though the maquiladora industry is growing at more dynamic rates in the interior of Mexico, the border's appeal is still high among new investors, and, thus, growth at the border has been sustained. For example, border employment growth averaged 7.8 percent per year during the 1990s, while the corresponding figure for the interior was 17 percent. However, since the border's employment base (nearly 797,000 workers) is higher than the interior's (488,200 workers), job growth of almost 8 percent on the border is still impressive. Moreover, during the second half of the 1990s, when the entire maquiladora industry rebounded as a result of the peso devaluation, border employment averaged double-digit growth on a yearly basis (11.1 percent).<sup>3</sup>

One outcome of the border's dynamic maquiladora growth has been infrastructure bottlenecks in the region, which have been only partly alleviated by the industry's movement to the interior. The border's growth has led to such problems as insufficient or inadequate housing for maquiladora workers.

Maquiladora companies are teaming with the Mexican government to build adequate and affordable housing for workers and to assist them with financing. Delphi Automotive launched the first such program in 1997. Other large maquiladora companies have followed with similar programs.

Maquiladoras also have participated in improving the infrastructure of their border locations. For example, in Ciudad Juárez, maquiladoras make annual contributions to the city's budget that are targeted for different purposes, such as city road improvements.<sup>4</sup> Also, maquiladoras have financially supported improvements to certain commercial bridges, which are critical to their daily production shipments across the border.<sup>5</sup>

### Texas Border Cities

The Texas border is host to the majority of the maquiladoras along the U.S.–Mexico boundary. Table 2 lists the cities across from Texas with a maquiladora presence and outlines their individual participation in the industry. In 2000, these cities' combined share of total maquiladora employment and production equaled 35.4 percent and 40.4 percent, respectively. Within the border region, their combined share represented the majority—57.1 percent in employment and 57.5 percent in production. This is equivalent to a maquiladora industry employ-

Table 2  
**Maquiladora Industry Along the Texas–Mexico Border, 2000**

	Ciudad Juárez (El Paso)	Ojinaga (Presidio)	Ciudad Acuña (Del Rio)	Piedras Negras (Eagle Pass)	Nuevo Laredo (Laredo)	Reynosa (McAllen)	Río Bravo (McAllen)	Matamoros (Brownsville)
<b>Plants</b>	308	8	56	38	54	117	13	119
Percent of total	8.6	.2	1.6	1.1	1.5	3.3	.4	3.3
Percent of border	14.3	.4	2.6	1.8	2.5	5.4	.6	5.5
<b>Employment</b>	249,509	967	32,130	14,546	22,603	66,091	3,287	66,023
Percent of total	19.4	.1	2.5	1.1	1.8	5.1	.3	5.1
Percent of border	31.3	.1	4.0	1.8	2.8	8.3	.4	8.3
<b>Raw Material Imports (millions)</b>	\$12,785	\$25	\$1,099	\$329	\$1,253	\$3,894	\$104	\$3,254
Percent of total	23.9	.0	2.1	.6	2.3	7.3	.2	6.1
Percent of border	32.6	.1	2.8	.8	3.2	9.9	.3	8.3
<b>Gross Production (millions)</b>	\$16,191	\$37	\$1,386	\$468	\$1,648	\$4,826	\$145	\$4,065
Percent of total	22.7	.1	1.9	.7	2.3	6.8	.2	5.7
Percent of border	32.4	.1	2.8	.9	3.3	9.7	.3	8.1

SOURCES: Federal Reserve Bank of Dallas El Paso Branch, with data from Instituto Nacional de Estadística, Geografía e Informática.

Table 3

**U.S.–Mexico Trade by Texas Border Port of Entry, 2000**  
(Millions of U.S. dollars)

	Exports to Mexico	Imports from Mexico	Total trade
Laredo	39,283.6	45,536.3	84,819.9
El Paso	17,520.4	22,810.6	40,331.0
Hidalgo	6,221.9	6,888.5	13,110.4
Brownsville–Cameron	6,374.1	6,049.5	12,423.6
Eagle Pass	4,283.5	3,041.1	7,324.6
Del Rio	1,156.1	1,282.6	2,438.7
Presidio	112.8	153.0	265.8
Rio Grande City	118.8	116.6	235.4
Progreso	129.0	15.6	144.6
Roma	92.4	16.1	108.5
Fabens	.9	.0	.9
<b>Total Texas ports</b>	<b>75,293</b>	<b>85,910</b>	<b>161,203</b>
Total all border ports	95,692	120,409	216,101
<b>Texas share</b>	<b>78.7%</b>	<b>71.3%</b>	<b>74.6%</b>

SOURCES: Texas Center for Border Economic and Enterprise Development, Texas A&M International University, with data from U.S. Department of Commerce.

ing more than 455,000 workers in 713 plants and with a total production value of nearly \$29 billion.

Texas border cities have reaped important benefits from their maquiladora neighbors. Transportation and customs services have flourished on the U.S. side of the border because of the maquiladora industry's large trade flows through border ports of entry (Table 3). These companies typically maintain distribution facilities and administrative offices on the U.S. side, stimulating the industrial real estate sector of Texas border cities. Maquiladoras also create jobs for the U.S. border in the legal, accounting and financial professions. Even the hotel, car rental and restaurant industries profit from maquiladoras because corporate personnel and other maquiladora visitors usually stay and eat on the U.S. side.<sup>6</sup>

Beyond the service industry, border manufacturing is increasingly benefiting from maquiladoras. Industry suppliers have been expanding or relocating their operations to cities such as El Paso to be close to their customer bases across the border. For instance, in 1999, there were 40 plastic injection molding companies in El Paso, employing more than 4,100 workers. These companies mostly serve the maquiladora industry in Ciudad Juárez in sectors that range from automotive and computers to

medical and consumer goods. Moreover, employment in plastics manufacturing in El Paso—up 101 percent since 1990—is highly skilled. From 1990 through 1999, for example, this sector's hourly compensation was, on average, nearly 21 percent higher than that of the apparel sector, El Paso's largest and most established manufacturing sector. The success of plastic injection molding in the area is also evidenced by the impressive growth of plastic product exports through El Paso, which equaled \$806 million in 1999, up more than 700 percent from the 1993 level.

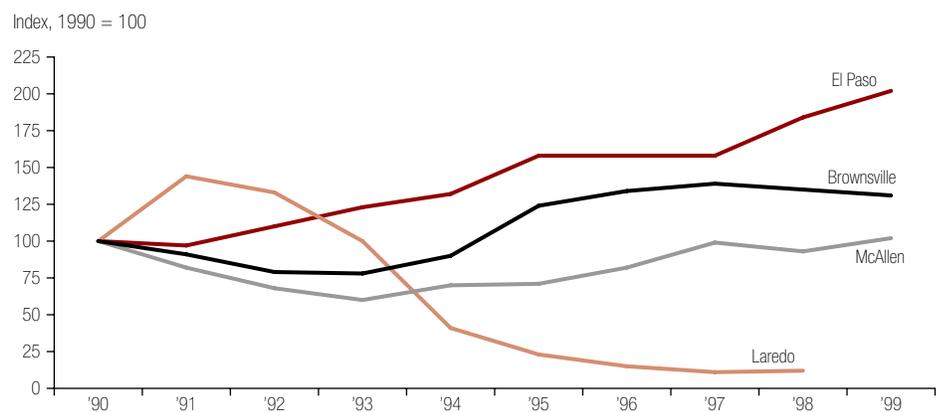
The employment link between maquiladoras and U.S. border cities is not exclusive to El Paso. Research has found a strong positive correlation between U.S. border city employment and export (maquiladora) production in the neighboring Mexican border city.<sup>7</sup> Further, results show that for larger border cities, such as El Paso, the employment effect is strongest in manufacturing, while for smaller border cities, such as Laredo, the employment effects are strongest for the transportation and wholesale trade industries.

Indeed, two of the three other major border cities in Texas—Brownsville and McAllen—are home to plastic injection molding suppliers that cater to the maquiladora industry. In addition to El Paso's 40 plastic injection molding companies, Brownsville has 11 and McAllen has 13.<sup>8</sup> Laredo, which has a minimal manufacturing presence, is the exception, with no suppliers in this category.<sup>9</sup> Chart 1 shows the growth trend of the rubber and miscellaneous plastics manufacturing subsector in all four cities for 1990–99. The only city that shows a decline is Laredo.

### Skilled-Labor Bottlenecks

Keeping El Paso from taking full advantage of the maquiladora supplier market is an insufficient pool of skilled workers. Though plastics manufacturers in El Paso have used in-house train-

Chart 1  
**Rubber and Miscellaneous Plastics Employment for Major Border MSAs**



NOTE: The rubber and miscellaneous plastics industry in Laredo reached such a small level in 1999 that data for that year were not made available.

SOURCE: Texas Workforce Commission.

## El Paso, NAFTA and Worker Retraining

Between 1994 and 2000, a total of 330,107 U.S. workers were certified to receive benefits under the NAFTA Transitional Adjustment Assistance (TAA) program. This program was created in 1994 through NAFTA to help workers affected by increased imports from Mexico and Canada or by shifts in U.S. production to those countries as a result of the agreement. El Paso has the largest number of workers certified under this program—13,450 through 2000. Nearly 8,000 of these workers (more than 59 percent) were displaced from El Paso's apparel industry.

While many point to the TAA figures as evidence of NAFTA's negative impact on El Paso, NAFTA also has created jobs for the city. Unfortunately, because no accounting system equivalent to the TAA tracks the job-growth side of the equation, an assessment of NAFTA's net impact on El Paso's employment is not possible. Since NAFTA's passage, however, El Paso has registered a net gain in employment—30,733

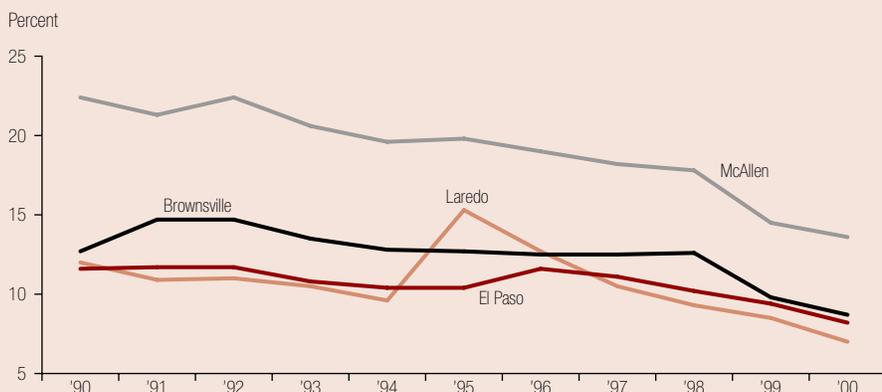
new jobs—or growth of almost 14 percent between 1993 and 2000.<sup>1</sup> NAFTA reasonably could be credited with some of this job growth in areas servicing the increased trade through the border resulting from NAFTA.<sup>2</sup> This implies new jobs in transportation and distribution services as well as in professional services such as legal, accounting, financial and customs brokerage. Finally, the unemployment rate has been on a downward trend in El Paso since NAFTA started, as it has for Texas' other major border cities (see chart).

Interestingly, El Paso's No. 1 position in NAFTA TAA certifications in the United States has placed the city in the national spotlight, attracting funding toward retraining programs for trade-displaced workers. For example, the U.S. Department of Labor awarded El Paso, through the city's Proactive Reemployment Project or PREP, a \$45 million grant to retrain some 4,000 workers, most of them former garment industry employees. This grant is

the largest of its kind ever awarded to a city by the Labor Department. In 1998, project ARRIBA (Advanced Retraining and Redevelopment Initiative in Border Areas) was launched in El Paso with a state grant of \$1 million. ARRIBA secured additional funding totaling more than \$1.5 million from the governor's Discretionary Fund (\$600,000), the North American Development Bank (\$450,000), El Paso County (\$250,000) and El Paso Empowerment Zone Corp. (\$211,297).

Last year the El Paso Chamber of Commerce opened the Center for Worker Preparedness with a \$1.4 million grant from the U.S. Department of Commerce and a \$1 million interest-free loan from the North American Development Bank. In addition, local educational and training institutions have received funding for programs such as the El Paso Manufacturing Training Consortium at El Paso Community College. Thus, if NAFTA is to be cited as the cause of much worker displacement in El Paso, it also has contributed toward an improved worker-training infrastructure.

### Unemployment at the Texas Border (Major MSAs)



SOURCE: Texas Workforce Commission.

### Notes

<sup>1</sup> If a broader definition of employment is used, including jobs outside the Social Security system, El Paso's employment gain between 1993 and 2000 was larger, at 40,635 new jobs. See *Borderplex Economic Outlook: 2000–2002*, Border Region Modeling Project, The University of Texas at El Paso, November 2000, Business Report SR00-1.

<sup>2</sup> El Paso is the second-largest land port at the border for U.S.–Mexico trade, after Laredo. During 1994–2000, total U.S.–Mexico trade through El Paso grew 122 percent to \$40.3 billion. The trade increase was due to both maquiladora-specific and NAFTA-specific activity.

ing to develop their workers into skilled technicians, a broader effort is required to generate a continuous supply of skilled labor. Recognizing this need, the city has implemented various programs to train workers not only in plastic-

injection-molding techniques but also in metal stamping, tool and die, and other areas that complement the manufacturing processes of maquiladora suppliers. El Paso also has received multiple worker retraining grants as a

result of worker displacements in the city's apparel industry (see box titled "El Paso, NAFTA and Worker Retraining"). The goal is to transform an unskilled labor pool into the skilled workers sought by the industries coming to

town in pursuit of the maquiladora market across the border.

The state's other border cities face similar situations. Research on maquiladora market opportunities for border cities in South Texas shows that maquiladoras are willing to enhance their base of local suppliers. The companies' savings in inventory and transportation costs are obvious. However, one bottleneck is a workforce with inadequate skills.<sup>10</sup>

## Lucrative Market

El Paso has carved an important niche in serving the maquiladora industry, especially in plastic injection molding. This demonstrates that border cities such as El Paso—which have traditionally lacked a sophisticated industrial base—can nonetheless attract investments using their formidable advantage with the lucrative maquiladora market. The total maquiladora inputs or components market in Ciudad Juárez alone was worth nearly \$13 billion in 2000. The industry's components market along the Texas border—from Juárez to Matamoros—was a massive \$23 billion in 2000, roughly 42 percent of the maquiladora industry's total components market (\$55.3 billion).

Maquiladoras import 97 percent of the components they use. And 80 to 85 percent of these come from the United States, mostly from states not bordering Mexico.<sup>11</sup> As more suppliers seek to move closer to their maquiladora customer base, the border stands to benefit. The border's traditionally high unemployment rate translates into an available labor pool in the region.<sup>12</sup> However, this workforce has to be transformed into the skilled labor that high-tech maquiladora suppliers need. Should this happen, we could see industrialization of the border at a time when the rest of the country is de-industrializing, precisely because of the lack of available workers.<sup>13</sup>

For Texas border cities, the presence of maquiladoras across the border translates into more and better-paying jobs. In short, maquiladoras help the Texas border region move up the economic ladder.

*Vargas is a senior economist at the El Paso Branch of the Federal Reserve Bank of Dallas.*

## Notes

<sup>1</sup> For an overview of the maquiladora industry and its importance for the U.S. and Mexican economies, see "The Binational Importance of the Maquiladora Industry," *Southwest Economy*, Federal Reserve Bank of Dallas, Issue 6, November/December 1999, pp. 1–5.

<sup>2</sup> Direct labor represented 80.9 percent of total maquiladora employment in 2000. Although the majority of these workers (55.2 percent) were female, this share is down considerably from 78.3 percent in 1975. In fact, in the industry's top two locations—Ciudad Juárez and Tijuana—females make up just under half (49.7 percent) of the direct-labor workforce, putting them in the minority.

<sup>3</sup> Because maquiladora companies have dollar-denominated budgets but their costs are in pesos, the overnight impact of any peso devaluation is essentially a reduction in their peso-based costs. Maquiladoras have therefore responded to devaluations in Mexico by substantially expanding their operations.

<sup>4</sup> According to the Treasury Department of the city of Juárez, the voluntary contribution that each maquiladora in Juárez gives to the city each year, on a voluntary basis, is \$15 per employee and is based on each company's employment base at year-end. Not all maquiladoras contribute, but a majority (54 percent based on employment) do. Last year, maquiladora contributions to the city of Juárez equaled \$1.6 million.

<sup>5</sup> For the improvements to the Bridge of the Americas between El Paso and Juárez in 1996–98, for example, various private-sector entities in Juárez—including the maquiladora association—contributed some \$7 million.

<sup>6</sup> Delphi Automotive, until April 1999 a part of General Motors Corp., has conducted annual studies since 1996 on the total estimated economic impact on El Paso of Delphi's operations in Ciudad Juárez. Beyond including elements such as what the company pays the city in property taxes for distribution and warehousing facilities, the study also includes expenditures in El Paso on hotels, restaurants and rental cars by corporate visitors to Delphi plants. In June 1999, Delphi's total (direct and indirect) economic impact on El Paso was estimated at above \$285 million.

<sup>7</sup> The overall elasticity—or responsiveness—of U.S. border-city employment with respect to Mexican export production is between 0.11 and 0.2. In other words, a 10 percent rise in export manufacturing in a Mexican border city leads to a 1.1 to 2 percent rise in employment in the neighboring U.S. border city. See Gordon H. Hanson, "U.S.–Mexico Integration and Regional Economies: Evidence of Border-City Pairs," forthcoming in *Journal of Urban Economics*.

<sup>8</sup> Brownsville Economic Development Council and McAllen Economic Development Corp.

<sup>9</sup> In 2000, for example, only 2.6 percent of Laredo's nonfarm employment—some 1,800 workers—was working in manufacturing, compared with 15 percent in El Paso, 12 percent in Brownsville and 8 percent in McAllen.

<sup>10</sup> See J. Michael Patrick, "Maquiladoras and South Texas Border Economic Development," *Journal of Borderlands Studies*, Spring 1989, pp. 89–98. The author suggests that the situation has not changed much in the ensuing 12 years.

<sup>11</sup> A 1988 survey of maquiladora companies in Ciudad Juárez alone showed suppliers in every U.S. state except Hawaii, with a large portion in Midwestern and Northeastern states. See William L. Mitchell and Lucinda Vargas, "The Economic Impact of the Maquiladora Industry in Juárez on El Paso, Texas, and Other Sections of the United States," Grupo Bermúdez Industrial Developers, Ciudad Juárez, Chihuahua, 1989, photocopy. Current anecdotal evidence shows that maquiladoras continue to have close links with suppliers throughout the United States.

<sup>12</sup> In 2000, the weighted average unemployment rate of Texas' four major border cities was more than double the national and state unemployment averages.

<sup>13</sup> ADC Telecommunications offers an example of how cities like El Paso are developing industrially in response to the presence of maquiladoras across the border. The company manufactures telecommunications equipment at two plants in Juárez and one in Delicias, Chihuahua. Late last year, ADC opened a metal fabrication plant in El Paso to feed components to its Mexican facilities. ADC also has a distribution center in Santa Teresa, N.M., just west of El Paso.

# ILLEGAL IMMIGRATION and Enforcement Along the Southwest Border

Pia M. Orrenius



The U.S.–Mexico border region is experiencing unparalleled trade and exchange as cross-border flows of goods and people continue to reach new highs. The U.S. border economy thrives on the daily influx of tourists, shoppers, workers and immigrants from Mexico. Approximately 700,000 Mexicans cross legally into the United States every day to shop and work, returning at night to their homes in Mexico.

A much smaller number of border crossers come illegally. Illegal immigrants represent only about 0.5 percent of total south–north border crossings. Still, the continuous flow of illegal aliens over the past 35 years has contributed to an illegal immigrant population estimated at between 7 million and 9 million people—about 60 percent of them from Mexico.

As illegal immigration has increased, so has border enforcement. Between 1978 and 1999, the U.S. Border Patrol quadrupled in size. The most rapid rise came between 1992 and 1999, when the number of agents more than doubled, from 3,651 to 7,982. Not only is the number of agents greater, but time

spent patrolling the border grew from 1.9 million hours in 1985 to 8.6 million in 1999. And since 1970, as a percentage of the federal budget, enforcement funds have increased 338 percent.

Other agencies also have a heightened presence on the border. The U.S. Customs Service and the Immigration and Naturalization Service (INS) have intensified their ports-of-entry inspections. And, with the increase in drug trafficking, the Drug Enforcement Agency and the Bureau of Alcohol, Tobacco and Firearms maintain an increased presence as well.

The expansion of federal government agencies in Southwest border cities has brought both social and economic benefits. Between 1983 and 1999, for example, federal government employment increased 400 percent in Laredo and over 200 percent in both Brownsville and McAllen. The influx of federal employees has been an economic boon to areas often lacking what are described as stable, high-paying jobs.

Heightened police presence also has reduced crime rates in cities where enforcement crackdowns are centered,

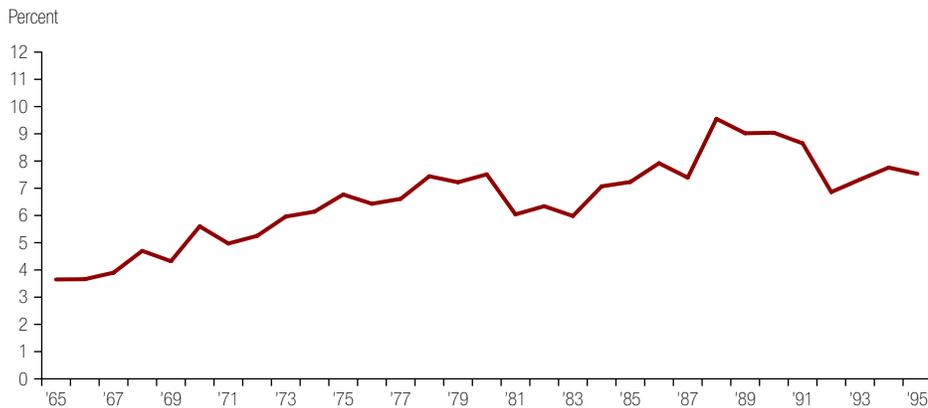
such as El Paso and San Diego. Increased policing has some negative side effects, however, and border residents say these include agents being present on private property and vehicle stops becoming routine. Courts are also clogged with an unprecedented number of criminal cases because of tougher penalties on illegal entrants and smugglers.

Despite the dramatic increase in enforcement, the impact on the volume of illegal immigration is not clear. The number of illegal alien apprehensions has not declined. Also, research shows that the majority of illegal aliens deported to Mexico continue to attempt crossings until they succeed. Some observers have concluded that border enforcement has not deterred illegal immigration. Other research, however, shows that increased enforcement traps workers in Mexican border cities and prevents them from entering the United States.<sup>1</sup>

This article examines border enforcement's effectiveness through developments in the smuggling industry. All other things the same, if enforce-

Chart 1

**Mexico–U.S. Migration Rate, 1965–95**



SOURCE: Mexican Migration Project.

ment is having an impact, there should be rising smuggler use rates and higher smugglers' fees, as well as changes in border crossing points away from heavily enforced areas.

**Rise in Illegal Immigration**

Driving Mexico–U.S. migration are the higher wages and job availability prevailing in the United States. Underdeveloped capital markets in Mexico are a contributing factor because they make borrowing difficult for most people. In surveys, migrants often cite the need for capital to start businesses, build houses, repay loans or pay for medical procedures as a main reason for migrating to the United States. The policy backdrop in the receiving country also can be important. Laws that exist but are not enforced, such as sanctions on employers who hire undocumented workers, signal acceptance of illegal immigration.

Also key to migration is information, which flows mainly through networks of family members and friends with prior migration experience. The Bracero Program, a guest-worker program in effect between 1942 and 1964, brought in about 200,000 workers annually from Mexico. Braceros established thousands of networks with U.S. recruiters and employers.<sup>2</sup> When the Bracero agreement was abandoned, no legal worker exchange was put in its place. Hence, a new era of largely illegal immigration ensued.

The new era had a slow start, in part because of the war in Vietnam and strong economic growth in Mexico in the 1960s. But by the early 1970s, Mexican migration to the United States was accelerating again. Facilitating movement to the United States during this period was the border region's increased accessibility. Infrastructure development and the growth of twin cities along the border, such as Tijuana/San Diego and Ciudad Juárez/El Paso, made the border more accessible to travelers from central Mexico.

Before 1930, no major road connected the Mexican interior with any U.S. border city. Most roads linking the interior to the border were built between 1940 and 1960. Similarly, commercial

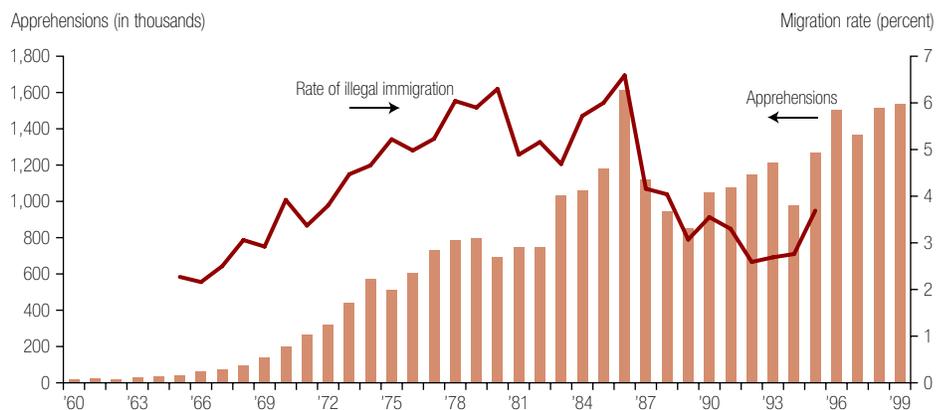
air transportation during these years expanded dramatically. With these improvements, travel times were significantly shortened, thus lowering the costs of Mexico–U.S. migration.

As a result of the factors mentioned above—including higher relative U.S. wages and the expansion of networks and infrastructure—migration rates more than doubled between 1965 and 1997. Chart 1 shows the Mexico–U.S. migration rate constructed from the Mexican Migration Project (MMP)<sup>3</sup>, a household-based survey. The migration rate, which is the ratio of migrants to the total number of migrants and non-migrants, includes both legal and illegal trips by working-age household heads. During the sample period, the likelihood of migrating rises from 3.7 percent to above 9.6 percent. Sustained increases in migration occurred in the 1970s and the mid-1980s, with an all-time peak of nearly 10 percent in 1988.

Border Patrol apprehensions data are also of interest, although changes in apprehensions reflect changes in both enforcement intensity and the number of illegal border crossings. Chart 2 shows the INS apprehensions time series along with the illegal immigration rate from the MMP data. Apprehensions increased from about 21,000 in 1960 to more than 1.5 million in 1999, with steep increases in the 1970s, in the mid-1980s leading up to passage of the Immigration Reform and Control Act

Chart 2

**Border Patrol Apprehensions and Illegal Immigration, 1960–99**

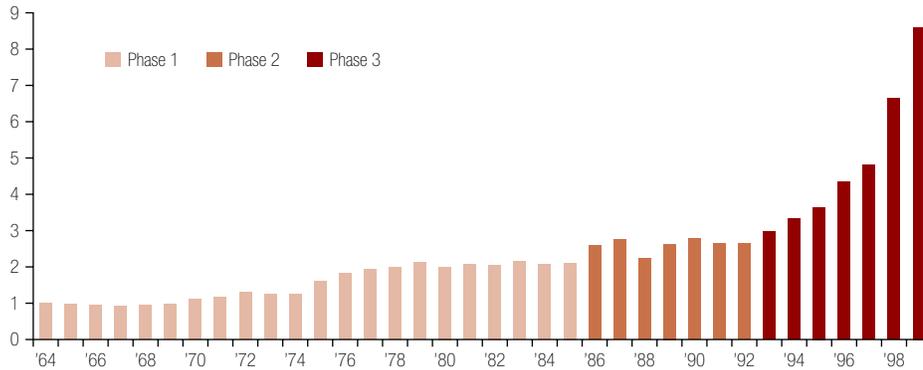


SOURCES: Immigration and Naturalization Service; Mexican Migration Project.

Chart 3

**Border Patrol Linewatch Hours, 1964–99**

Hours (in millions)



SOURCE: Immigration and Naturalization Service.

(IRCA) in 1986, and again in 1994–96. Meanwhile, the MMP rate of illegal immigration dropped sharply after IRCA, partly due to the IRCA amnesty that legalized many migrants in the MMP survey. Other data, such as those based on the U.S. Census or Current Population Survey, do not show a drop in illegal immigration until around 1991.<sup>4</sup>

**Evaluating Border Enforcement**

U.S. authorities responded to rising illegal immigration by increasing enforcement. As shown in Chart 3, border enforcement—measured by the number of hours Border Patrol agents spend on linewatch duty—grew in three phases between 1964 and 1999.<sup>5</sup> For enforcement to deter illegal immigration, it must raise the costs undocumented migrants face. This is usually done by increasing the probability of apprehension but also can occur if the migrant faces other increased risks, such as the chance of death or injury. Has the probability of being apprehended, and hence the cost and risk to the migrant, increased during the enforcement periods under study?

**Three Phases of Enforcement**

In early enforcement efforts, up until 1986, linewatch hours lagged the influx of migrants. Hours rose in the late 1970s when the Carter administration increased INS funding, but most new resources went to hardware and equipment. During the Reagan administra-

tion, IRCA’s passage took INS expansion to a new level. A large portion of the 33 percent increase in INS funding was earmarked for the Border Patrol, and the effect on linewatch hours is apparent in Chart 3.

At this time, Congress also strengthened penalties against migrant smugglers and imposed sanctions on employers of undocumented workers. Whereas penalties on smugglers and increased dollars for enforcement were intended to curtail the supply of undocumented workers, the employer sanctions were intended to limit demand by imposing fines on first offenses and criminal penalties on repeat offenses.

The third phase of enforcement started in 1993. The strategy was labor intensive and marked the biggest increase in linewatch hours. The objective was to make illegal immigration costly by diverting illegal traffic out of border cities and away from roads and buildings. Agents took up fixed positions along commonly used paths within urban areas, which, along with fencing and surveillance equipment, forced illegal entrants into the brush. Once in remote areas, they were more easily spotted and detained by the Border Patrol. The strategy was first implemented in El Paso in 1993 (Operation Hold-the-Line), then in 1994 in San Diego (Operation Gatekeeper) and Nogales, Ariz. (Operation Safeguard), and last in 1997 in southeast Texas (Operation Rio Grande).

The Illegal Immigration Reform and Immigrant Responsibility Act (IIRIRA) of 1996 followed up on some of IRCA’s provisions by increasing penalties for illegal entry, alien smuggling and document fraud. IIRIRA also mandated a doubling of the Border Patrol by 2001, imposed limited judicial review of deportation orders and established an income requirement on sponsors of legal immigrants.

**Smuggler Use Rates and Fees**

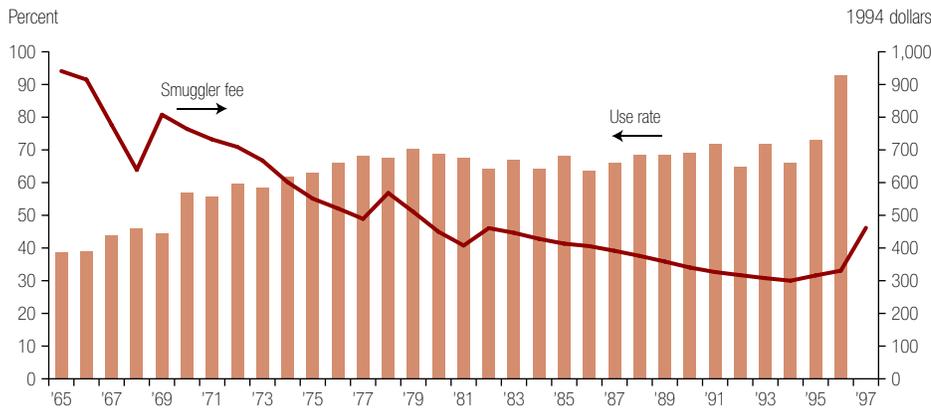
We cannot directly measure changes in apprehension probability because the total number of illegal immigrants crossing the Southwest border is unknown. Instead, we can look at illegal immigrants’ tendency to hire smugglers, also known as “coyotes,” and the evolution of coyote prices over time. Migrants are more likely to hire coyotes when they perceive a higher chance of apprehension were they to attempt a crossing on their own. If coyotes are more in demand or if risks increase, as is the case when criminal penalties on smuggling are increased, then we expect coyote use and prices to rise.

Coyote use rates provide some evidence that despite the increasing volume of illegal immigration, migrants’ costs were rising during the two earlier enforcement phases. Chart 4 plots the percentage of illegal immigrants hiring coyotes in each year. Coyote use rates increased in 1970 and trended upward for the rest of that decade. By 1979, more than 70 percent of illegal immigrants in the sample were hiring coyotes. After softening in the early 1980s, coyote use rates leveled off at a high level during the IRCA years (1986–90). New highs were then hit throughout the 1990s.

Chart 4 also shows that despite increasing coyote use rates, coyote prices were in steep decline until 1994. Median reported smugglers’ fees fell from \$941 in 1965 to \$300 in 1994 (constant dollars), suggesting that increases in the supply of smugglers outpaced the increase in demand. Several factors contributed to the rise in smuggler supply. First, the border’s improved accessibility through the building of roads and expansion of bus, rail and airway

Chart 4

**Smuggler Use Rates and Fees, 1965–97**



SOURCE: Mexican Migration Project.

service significantly lowered transportation costs. Second, free entry into the industry by experienced migrants also increased supply. Third, the growth of the illicit drug trade during the 1980s attracted more smugglers as well.

As Chart 4 shows, not until the mid-1990s did coyote prices reverse their downward trend. This reversal coincides with the third phase of border enforcement, seemingly the most successful to date. Moreover, linewatch hours (Chart 3) and coyote use rates (Chart 4) are at record highs, and apprehensions (Chart 2) are on the rise. For the first time, widespread anecdotal evidence reveals that border crossers are being apprehended with such frequency that they turn back, giving up on their hopes of reaching the United States. There is also evidence of migrants trapped in Mexican border cities, unable to cross into the United States.

**The New Enforcement Strategy**

Another telling sign that recent border crackdowns are working is the disruption of long-standing border-crossing patterns. Today, immigrants favor crossing points in Texas and Arizona rather than once-popular spots in California. Within states, change is also noticeable. In California, migrants choose to cross the harsh deserts of El Centro rather than risk a crossing near San Diego. In Texas, migrants are less likely to attempt an El Paso crossing, preferring to enter the United States farther

south through Laredo, McAllen, Brownsville and, most recently, Del Rio.

**Interstate Reallocation of Migrants.**

From the survey data in Chart 5, we can see that one-half to three-fourths of all border crossings between 1965 and 1990 were into California. Following IRCA, the fraction of California crossings declined and the propensity to cross into Texas increased. These trends were intensified after Operation Gatekeeper's 1994 implementation in San Diego, which also led to increased crossings into Arizona, although that effect is not evident in the survey data for these years. The trends suggest that with the passing of IRCA and later the implementation of Operation Gatekeeper, border enforcement in Cali-

fornia became more effective relative to Texas. Border crossers responded by shifting to Texas.

**Intrastate Reallocation of Migrants.**

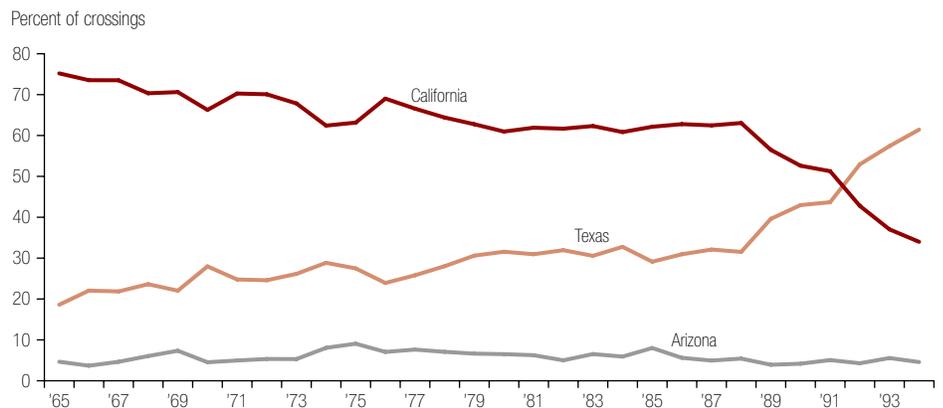
Within Texas the changes are equally striking. Chart 6 shows that the increase in Texas crossings beginning in 1990 was almost entirely concentrated around El Paso. The resumption of crossings in El Paso influenced the decision to implement Operation Hold-the-Line in 1993. The crackdown resulted in a 75 percent decrease in the number of El Paso apprehensions within one year. Consequently, apprehensions in McAllen, Laredo and Del Rio rose steeply during 1995–97. This evidence suggests migrants switched from heavily enforced crossing points like El Paso to places farther south, where they could cross with relative ease.

**Border-Crossing Deaths.**

The new border enforcement strategy was intended to eliminate illegal alien traffic from city centers. The consequence has been to divert migrants into more sparsely populated areas. Illegal immigrants today cross through inhospitable terrain and expose themselves to dangerous climatic extremes to a much larger extent than they did 10 or 20 years ago. Critics of the border offensives claim that injuries and deaths along the border are at an all-time high as a result. The number of crossing-related deaths in 1999 was an estimated 324, up from single digits before 1995. Deaths in 2000 are

Chart 5

**Border Crossings by State, 1965–94**

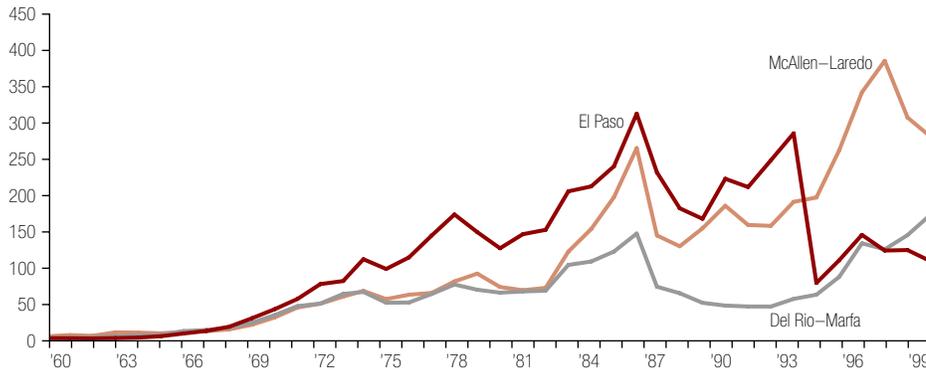


SOURCE: Mexican Migration Project.

Chart 6

**Border Patrol Apprehensions by Texas Sectors, 1960–99**

Apprehensions (in thousands)



SOURCE: Immigration and Naturalization Service.

believed to have numbered 388. The Mexican estimate is 430.

**Conclusion**

In the post-World War II era, boundaries between Mexico and the United States have diminished. A hundred years ago, the wage differences were as large as they are today, yet there was little migration between the two countries. Exchange of people and goods was limited by distance, the lack of roads and transportation, a scarcity of information, and language and cultural differences. After 50 years of large-scale migration and settlement, today’s scenario is vastly different. U.S.–Mexico trade and migration have grown significantly. Illegal immigration and the resultant border enforcement have been the natural outcome of an integrated labor market divided by an international boundary.

In the face of increasing illegal immigration, enforcement efforts have had mixed results. Early efforts in the 1970s and 1980s were largely ineffectual. They succeeded in raising coyote use rates among migrants, which created a flourishing smuggling industry offering steadily decreasing fees. The more recent enforcement initiatives have been more successful, driving up coyote prices and possibly discouraging more migrants from trying to cross the border. Additional evidence is the change in migrants’ crossing patterns. When the Border Patrol has cracked down on

one area, migrants have responded by crossing elsewhere. Unfortunately, as border-crossing options have been reduced, migrants are risking more to make it to the United States, resulting in more crossing-related deaths than ever before.

The controversy over illegal immigration and tougher border enforcement is being played out along the Southwest border. While the national economy benefits from the influx of workers, the border economy deals with many of the costs associated with illegal immigration. Along with the benefit from increased enforcement through the influx of relatively high-paying government jobs and reduced crime rates comes the price tag associated with detaining and prosecuting large numbers of illegal immigrants and smugglers. An agreement allowing the temporary yet legal inflow of Mexican labor would not end enforcement on the border but would let authorities concentrate more on drug interdiction and less on undocumented workers.

*Orrenius is an economist at the Federal Reserve Bank of Dallas.*

**Notes**

<sup>1</sup> Gordon H. Hanson, Raymond Robertson and Antonio Spilimbergo (1999), “Does Border Enforcement Protect U.S. Workers from Illegal Immigration?” NBER Working Paper Series no. 7054 (Cambridge, Mass.: National Bureau of Economic Research, March). This paper, in studying the effects of illegal

immigration on wages in border states, found no effect of border enforcement on U.S. wages but did find an effect on wages of young males in Tijuana. This finding suggests that border enforcement may be having an impact, trapping would-be migrants on the Mexican side.

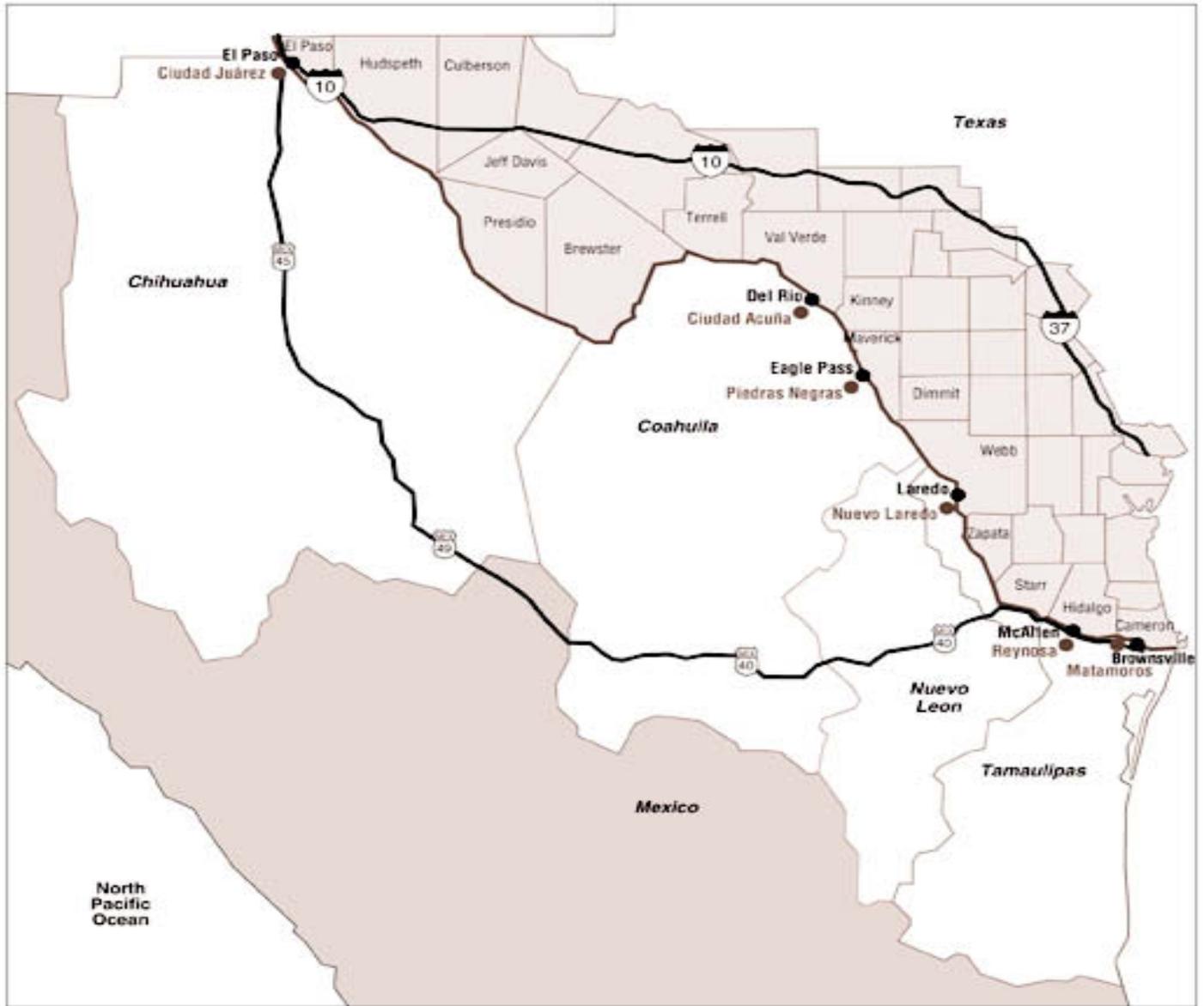
<sup>2</sup> Douglas S. Massey, Rafael Alarcón, Jorge Durand and Humberto González (1987), *Return to Aztlan: The Social Process of International Migration from Western Mexico* (Berkeley: University of California Press).

<sup>3</sup> The Mexican Migration Project (MMP) interviewed 5,878 households in nine states in western Mexico between 1987 and 1997. Family, job and migration histories were collected, including information on all U.S. trips—network, legal status, mode and location of border crossing, whether a smuggler was hired and, if so, the smuggler’s fee. The data are publicly available: Mexican Migration Project (1999), Population Studies Center, University of Pennsylvania, Philadelphia, [www.pop.upenn.edu/mexmig/welcome.html](http://www.pop.upenn.edu/mexmig/welcome.html)

<sup>4</sup> For estimates of illegal immigration between 1987 and 1997, see the report titled “Annual Estimates of the Unauthorized Immigrant Population Residing in the United States and Components of Change: 1987–1997,” available on the Internet at [www.house.gov/lamarsmith](http://www.house.gov/lamarsmith), as cited in the Oct. 12, 2000, press release on illegal immigration.

<sup>5</sup> See also Timothy Dunn (1996), *The Militarization of the U.S.–Mexico Border, 1978–1992* (Austin: CMAS Books, University of Texas Press).

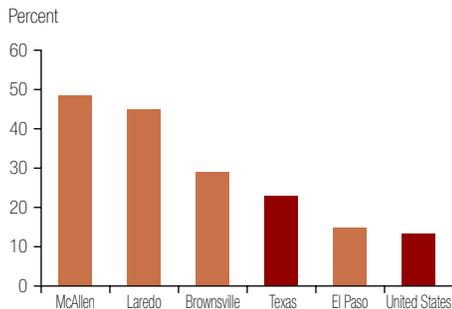
## The Texas–Mexico Border Region



SOURCES: Texas Comptroller of Public Accounts; U.S. Census Bureau.

### Population and Employment Statistics for Border Cities, 2000

#### Border Region Surpasses Texas and U.S. in Population Growth in Past Decade (Percent change, 1990 to 2000)



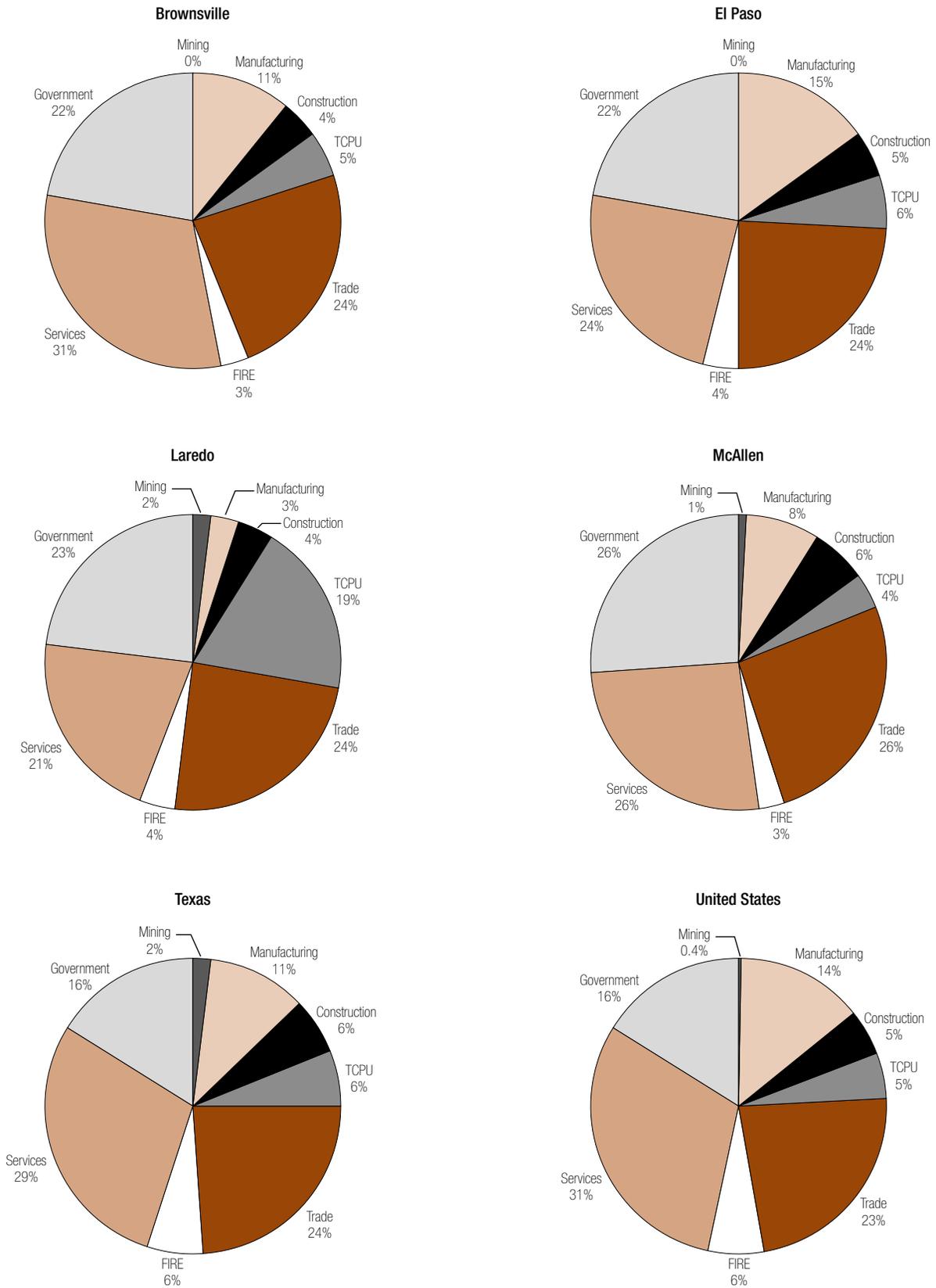
SOURCE: U.S. Census Bureau.

	Population	Workforce*	Employment*	Unemployment
El Paso	679,622	278,083	198,967	8.2%
Ciudad Juárez, Chihuahua	1,218,817	483,469	479,771	.8%
McAllen	569,463	203,900	116,550	13.6%
Reynosa, Tamaulipas	420,463	168,926	167,138	1.1%
Brownsville	335,227	130,083	84,267	8.7%
Matamoros, Tamaulipas	418,141	165,214	163,280	1.2%
Laredo	193,117	74,208	53,192	7.0%
Nuevo Laredo, Tamaulipas	310,915	116,674	115,669	.9%

\*In Mexico, the data are derived from considering as employed anyone who may have worked at least one hour during the unemployment survey week. However, even when considering broader definitions of unemployment, border cities have lower rates than the rest of the nation.

SOURCES: Texas population from U.S. Census Bureau (county data); all other Texas data from Bureau of Labor Statistics. Mexico numbers from Federal Reserve Bank of Dallas El Paso Branch, with data from XII Censo General de Población y Vivienda 2000; Instituto Nacional de Estadística, Geografía e Informática.

**Sectoral Employment Shares in Border Cities Versus Texas and the United States, 2000**



NOTE: TCPU is transportation, communication and public utilities; FIRE is finance, insurance and real estate.  
 SOURCE: Bureau of Labor Statistics.

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