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Across the Income Divide

High-Tech Industries in Texas Metropolitan Areas

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Policymakers in high-technology cities have become increasingly concerned that large segments of their populations are not reaping the benefits of the economic growth associated with these industries. The perception that income inequality is likely to be more extreme in communities with strong high-tech has not lacked for coverage. The February 21, 2000, issue of *U.S. News & World Report*, for example, featured an article entitled "A Tale of Two Austins—How One Boomtown is Coping with the Growing Wealth Gap." In another example, the *2000 Index of Silicon Valley*, a recent report published by the nonprofit Joint Venture Silicon Valley Network, discusses the widening gap in income in that region.

It should be noted, however, that many of our perceptions of the positive correlation between income inequalities and the growth of high-tech industries result from *indirect* observations. In particular, we observe that cities with a dynamic growth in high-tech industries also experience a rapid escalation in the cost of housing. Take Austin, for instance, where the median price of a house more than doubled in only ten years, from $73,000 in 1990 to $126,500 in 1999, a period of significant growth in the city's high-tech sector.[1]

While it is important to stress again that these perceptions do not come from *direct* measures of urban income inequalities in Texas, the data considered in this article do illustrate some of the consequences of being a "high-tech city." Do such cities show greater income inequalities than non-high-tech cities? Are incomes higher in high-tech industries than in non-high-tech industries? Do income inequalities exist within education categories between high-tech and non-high-tech industries?

High Tech v. Non-High Tech

We measured income inequalities in two kinds of metropolitan areas in Texas. Group One included Austin-San Marcos, Dallas, Houston, Fort Worth-Arlington, and San Antonio, metropolitan areas in which there are important high-tech industries. Group Two includes El Paso and Brownsville-Harlingen-San Benito, metropolitan areas specializing mainly in unskilled labor-intensive industries. Most of the manufacturing industries in these cities supply maquiladora plants located in Mexico. (In El Paso, for instance, an important plastic injection molding industry has emerged, providing plastic products to maquiladoras in neighboring Ciudad Juarez.)

In each one of the Group One metropolitan areas an important cluster of industries employs engineers and scientists in numbers larger than the

U.S. average. These firms also invest heavily in research and development. (Industries that display these characteristics are defined as "high technology.") Moreover, each of these cities is known for particular high-technology industries: San Antonio, biotechnology and aircraft; Richardson, telecommunications; Austin, software, computers, and semiconductors; Fort Worth, aircrafts and parts; and Houston, petrochemicals.

Means of Measurement

There is no unique measure of income inequalities,[2] but we can gain insight into disparities in the distribution of income by using a simple measurement: the ratio of 90th percentile income to 10th percentile income. This means that an individual in the 90th percentile has an income greater than 90 percent of the population.

The data for our analysis come from the 5 percent sample of the 1990 Census of Population and Housing Public-Use Microdata Samples (PUMS) for the state of Texas.[3] Within this sample, we used male, non-self-employed workers between 16 and 54 years of age, who work full time (at least 35 hours a week). We restricted our analysis to males because women often earn less than men for the same kinds of jobs and skills. Therefore, an analysis of incomes for one group that combines data for men and women in the same group but does not account for this difference would be incorrect.

We defined high-tech industry using 3-digit SIC industry codes. An industry is identified as high technology if the proportion of research and development employment is at least equal to the average proportion in all U.S. industries. We followed this high-tech industry classification as closely as possible, but because some of the industries were consolidated in the PUMS data, we have a few extra industries.[4] Our analysis suggests a new view on an old perception.

Data indicate that urban income inequality is markedly higher in metropolitan areas–such as Brownsville and El Paso–with a small high-technology industry than in those–such as Austin, Dallas, and Fort Worth–with a large high-tech industry.

Income Inequality Q&A

Are urban income inequalities greater in cities with a large high-technology industry, such as Austin, Dallas, Fort Worth, and San Antonio than in cities with a small high-tech industry?

Data on the ratio of incomes of the 90th to the 10th percentile presented in Figure 1 indicate that urban income inequality is markedly higher in metropolitan areas—such as Brownsville and El Paso—with a small high-technology industry than in metro areas—such as Austin, Dallas, and Fort Worth—with a large high-tech industry. For instance, in 1989, full-time male workers at the top of the distribution of income (i.e., the 90th percentile) in Brownsville earned about seven times as much as those at the bottom of the distribution (10th percentile) in that city, while in cities such as Dallas, Austin, San Antonio, and Fort Worth, the workers at the top earned about five times as much at those at the bottom of the distribution.

Figure 2 shows that income inequalities within high-tech industries are stronger in San Antonio, El Paso, and Brownsville, the metropolitan areas in our sample that have a relatively small high-tech industry. In these three metropolitan areas in 1989, full-time male workers at the 90th percentile of the income distribution earned about five times as much as those at the 10th percentile. At the same time in the larger, more developed metropolitan areas, full-time male workers at the 90th percentile of the income distribution earned only about four times as much as those at the 10th percentile.

Are income inequalities higher in high-tech industries than in non-high-tech industries?

In other words, is the disparity of incomes between low and high income workers greater in high-tech industries than in non-high-tech industries? Data

Figure 1
Ratio of the 90th Percentile to the 10th Percentile Income (P90/P10) in All Industries

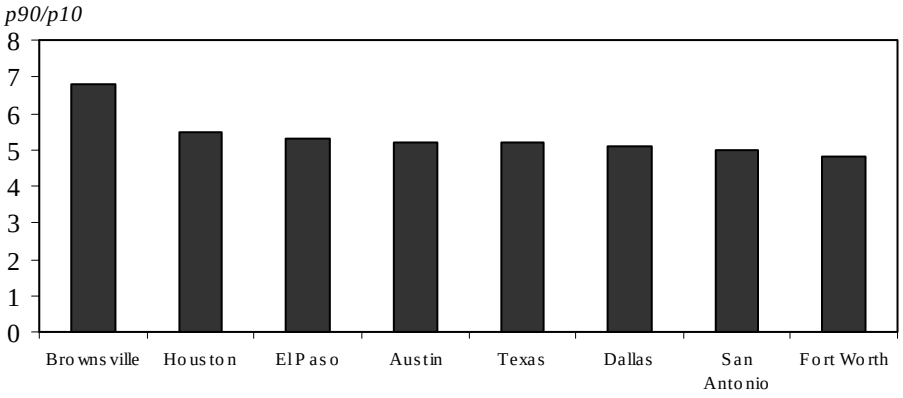
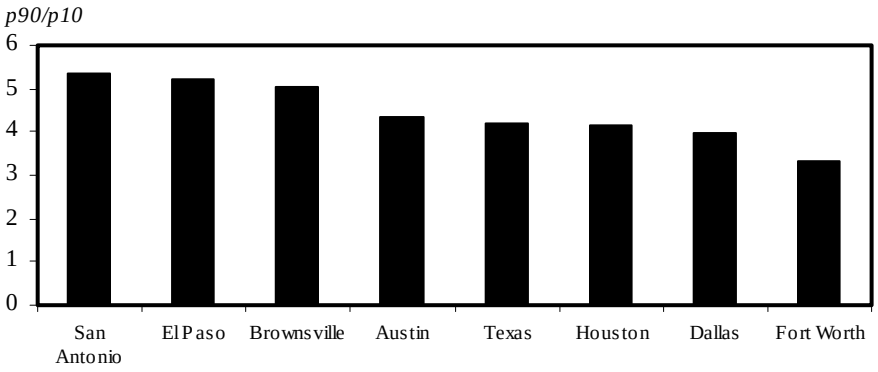


Figure 2
Ratio of the 90th Percentile Income to the 10th Percentile Income in High-Tech Industries



Source: U.S. Census Bureau, *1990 Census of Population and Housing*, Public-Use Microdata Samples.

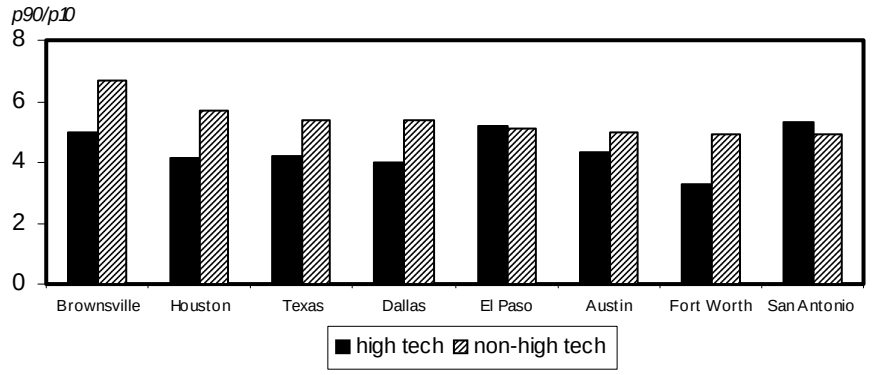
In cities with a significant high-tech cluster, income inequalities among college graduates tend to be smaller in high-tech than in non-high-tech industries.

presented in Figure 3 show that, for most of the Texas cities in our sample, income inequalities in non-high-tech industries were higher than those in high-tech industries. For instance, in Austin's non-high-tech industries, full-time male workers at the 90th percentile of the income distribution earned about five times as much in 1989 as those at the 10th percentile. In Austin's high-tech industries, however, workers at the 90th percentile of the income distribution in 1989 earned only four times as much as those at the 10th percentile.

Are there differences in income inequalities among college graduates for high-tech and non-high-tech industries?

Results of income inequality studies among college graduates vary for the two groups of cities. In cities with a significant high-tech cluster, income inequalities among college graduates tend to be smaller in high-tech industries than in non-high-tech industries. In other words, when they work for a high-tech industry, full-time, college-educated male workers at the 90th

Figure 3
Ratio of the 90th Percentile to the 10th Percentile Income in High-Tech and Non-High-Tech Industries



Source: U.S. Census Bureau, *1990 Census of Population and Housing*, Public-Use Microdata Samples.

Economies of agglomeration create a circular process of development that we do not observe in areas with a small high-tech presence, such as El Paso and Brownsville.

percentile of the income distribution earn about three times as much as those at the 10th percentile. In contrast, full-time, college-educated male workers at the 90th percentile of the income distribution earn about four times as much as those at the 10th percentile when they work for a non-high tech industry. Thus, income inequalities among college graduates tend to be stronger in non-high-tech industries.

A reverse trend is observed in metropolitan areas with a small high-tech industry, such as El Paso and Brownsville, where income inequalities among college graduates tend to be greater in high-tech than in non-high-tech industries. Engineers and scientists are drawn to high-tech firms located in a city with a large high-tech industry presence because such a concentration offers them career mobility, i.e., they can move from company to another. Therefore, in order to attract highly specialized engineers and scientists to areas where there is a dearth of high-tech industries, companies must pay salaries well above the average salary of a college graduate in that city. Moreover, a large supply of engineers will support economies of scale in the development of specialized services such as graduate degrees targeted toward engineers working in the high-tech industry. Opportunities to expand the education of engineers serve to attract even more engineers. In short, economies of agglomeration create a circular process of development that we do not observe in areas with a small high-tech presence, such as El Paso and Brownsville.

Ratio of the 90th Percentile to the 10th Percentile Income for College-Educated Males

	All industries	High-tech industries	Non-high-tech industries
Texas	4.17	3.12	4.53
Austin	4.53	3.23	4.81
San Antonio	4.12	3.75	4.19
Houston	4.4	3.46	4.81
Fort Worth	3.75	2.68	4.29
Dallas	4.25	3.07	4.78
El Paso	3.57	4.22	3.52
Brownsville	3.33	5.60	3.23

Source: U.S. Census Bureau, *1990 Census of Population and Housing*, Public-Use Microdata Samples.

Conclusions

In recent years, business magazines and newspapers have provided an abundance of "informal" information on the widening wealth gap in cities with a large high-tech industry presence. These articles lead the reader to believe that high technology opens opportunities only for highly educated people, leaving behind those without skills. Our data show:

(1) Income inequalities are higher in cities where the high-tech industry is not a significant factor in the local economy. For instance, income inequalities are larger in metropolitan areas such as El Paso and Brownsville than in Austin and Dallas.

(2) In cities with a large high-tech industry, income inequalities are higher in non-high-tech than in high technology industries.

(3) When looking within education categories, we observe that in cities with a large high-tech industry, income inequalities among college graduates are higher in non-high tech than in high-tech industries. A similar trend (not reported here) is observed among high school graduates.

Our results suggest that high technology opens new opportunities for both groups of the population: those at the bottom and those at the top of the income distribution. In our view, the lack of affordable housing and other development bottlenecks, such as increasing traffic congestion, are present in cities where the process of economic growth has accelerated rapidly, no matter whether the engine of growth is a skill-intensive industry (e.g., high technology) or an unskilled labor-intensive industry (e.g., maquiladoras).

Do we expect different results from the 2000 U.S. Census of Population? We anticipate that between 1990 and 2000 income inequalities will have increased, for example, not only in Austin but also along the U.S.-Mexico border. Data showing that income gaps are larger in poor areas than in wealthy areas will not change, however. The contrasting income gap scenario in Austin and cities along the border resembles the scenario we observe between industrialized and developing countries.

Notes

1. Data were obtained from the Real Estate Center at Texas A&M University.

2. The most common measurements are the Gini Coefficient and the Theil Index.

3. The results presented here are part of a much larger study that compares income inequalities in high-tech and non-high-tech regions in the United States. The only data source that allows us to find compatible information for all U.S. regions is the Census of Population. Our results will be updated when the 2000 census becomes available. Moreover, we will include a time series analysis that will begin with the 1970 census data.

4. This definition is suggested by Luker and Lyons (1997), from the U.S. Department of Labor. The SIC codes for the industries we categorize as high tech are the following: 13; 21; 282; 283; 284; 285; 287; 281, 286, and 289; 291; 3334,33533355, 3363, and 3365; 3331, 3339, 3351, 3356, 3364, 3369, and 339; 3578 and 3579; 3571–3577; 355,356, 358, and 359; 365 and 366; 361, 362, 364, 367, and 369; 371; 372; 376; 381 and 382; 3827, 384, and 385; 386; 737.

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The lack of affordable housing and other development bottlenecks are present in cities where the process of economic development has accelerated rapidly, no matter whether the engine of growth is a skill-intensive industry (e.g., high tech) or an unskilled labor-intensive industry (e.g., maquiladoras).

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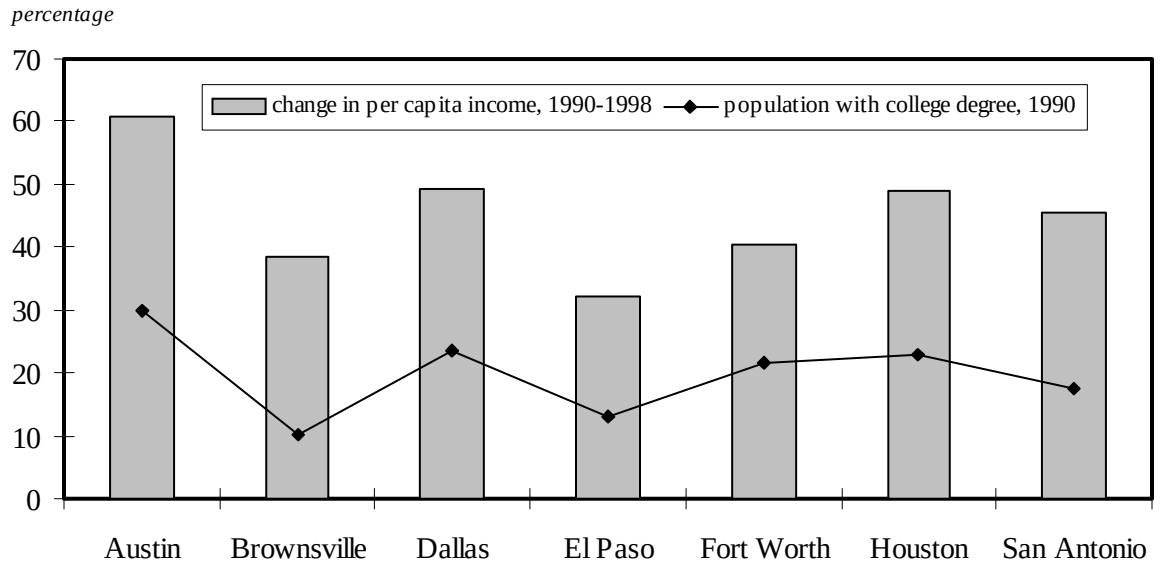
Education and Per Capita Income in Texas Metropolitan Areas



Sources: U.S. Bureau of Economic Analysis, Regional Economic Information System, and U.S. Bureau of the Census, 1990 Census of Population and Housing, General Social and Economic Characteristics, Texas.