

# TEXAS

## —BUSINESS—◆—REVIEW—

Bureau of Business Research • McCombs School of Business • The University of Texas at Austin

DECEMBER 2001

### Wage Inequality in Austin

#### Different Industries, Different Stories

by Elsie Echeverri-  
Carroll, Ph.D.

*Director  
Economic Development Program*

and Mayuresh  
Kshetramade

*Research Assistant  
Bureau of Business Research  
University of Texas at Austin*

The Austin Equity Commission (AEC) was created in May 2000 and charged with building a consensus around a strategic vision for long-range economic prosperity and social equity. According to the interim report of the Commission, real wage inequality increased in Austin between 1990 and 1999. Using data from the Texas Workforce Commission, the AEC reports that in 1990, the top 20 percent of workers received 38.2 percent of the area's private sector wages, but by 1999 this share has increased to 49.4 percent. During the same period, the share of the bottom 20 percent had decreased from 7.8 to 5.9 percent. The report states, "(W)e should not just examine the positive aspects of the new economy but problems created by the growing inequality of wealth and income in Austin."

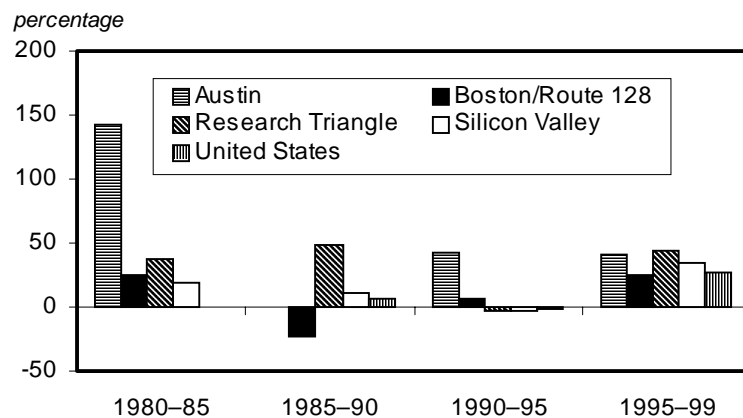
What defines this "new" Austin economy? It is the strong presence of a high-technology industry. We adopted Hecker's definition<sup>1</sup>

of high-tech industries to analyze high-tech employment in Austin and other selected high-tech regions between 1980 and 1985 (fig. 1).

Previous studies discuss wage inequalities in Austin in the context of the growth of the high-tech industry. Yet, despite the large concentration of high-tech industries, non-high-tech industries still generate most of the employment in the city. What, then, links non-high-tech industries to wage inequalities?

Using the Austin Index<sup>2</sup> and the U.S. Census of Population to compare wage and wage inequality data between 1980 and 1990,<sup>3</sup> we can compare wage and wage inequality trends in Austin during this period with other high-tech regions. Second, we can study wage inequalities in Austin before 1990, the period of fastest high-tech employment growth. Third, we can explain wage inequalities in Austin based on the relative skills of the workers. (The trade-off: we could not analyze wage inequalities

Figure 1  
Five-Year Growth Rates in High-Tech Employment



### Inside:

The High Cost of  
Texas Water  
Planning by Milton  
L. Holloway ..... 4

in the 1990s inasmuch as the required census data will not be available until 2003.)

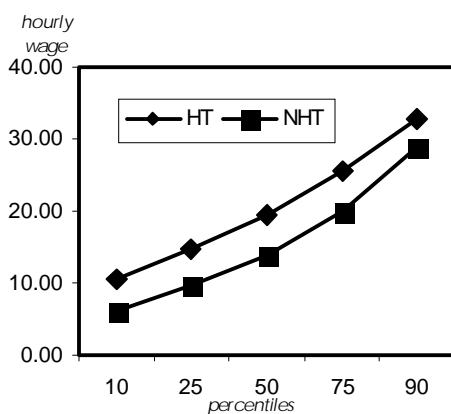
### The Old Economy and the New Economy

The growth of its high-tech industry and the industry's multiple contributions to economic development led *Forbes* magazine to rank Austin as the number one and number two place to live in the United States in 2000 and 2001, respectively.

The increasing specialization in high-tech employment contributes to the city's economic development in many ways. For one, high-tech firms boost economic growth both through their investments in research and development (R&D) that result in new products or processes and through the resulting knowledge spillovers. When one firm invests in the development of a new product or process, a portion of the knowledge generated may "spill over" to other local firms, which then combine this knowledge with their own to develop more new products and processes. An indicator of innovations, utility patents granted to individuals living in Austin increased at a rate of 343.7 percent between 1990 and 1999, a rate much higher than the rate of growth for utility patents issued in the United States (37.7 percent) during this period.

Also, policymakers promote the development of high-tech industries because of the positive employment effects in non-high-tech sectors of the economy and because high-tech firms pay higher wages. Estimates show that high-tech industries employed 9.3 million workers in the United States in 1996 and generated 4.9 million employments in non-high-tech industries that produce goods and services

**Figure 2**  
Percentile Wages for College Graduates in Austin, 1990

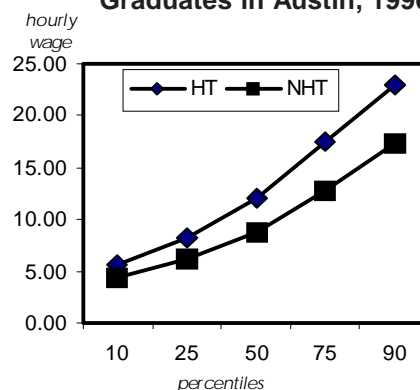


Data from the Austin Index confirm that high-tech employment accounts for a relatively small proportion of total employment, even in internationally recognized clusters of high-tech industries.

for the high-tech industry.<sup>4</sup> Regarding wages, our data show that college-educated graduates earned, on average, \$5 dollars per hour more in the high-tech industry than in a non-high tech industry in Austin in 1990. As fig. 2 shows, divergence in real wages for college-educated workers in high-tech and non-high-tech industries was prevalent at all points in their wage distribution.

Do high-tech industries also pay higher wages to low-skill workers? In 1990, high school graduates earned, on average, about \$4 dollars per hour more in the high-tech

**Figure 3**  
Percentile Wages for High School Graduates in Austin, 1990



industry than in non-high-tech industries in Austin. For this group, as for the college graduates, the divergence in real wages for workers in high-tech industries and those in non-high-tech industries is not limited to a specific part of their wage distribution (fig. 3). Industry-related wage differences are prevalent at all points in the wage distribution of high-school graduates.

The growth of non-high-technology industries receives less attention. This is surprising considering that these industries account for the largest share of employment, even in high-tech cities. Indeed, high technology represents only a small slice of the U.S. employment pie. This is also true in Texas, where high-tech employment is relatively small even in cities with an important cluster of high-tech firms, such as Austin, Fort Worth, Dallas, San Antonio, and Houston. Furthermore, data from the Austin Index confirm that high-tech employment accounts for a relatively small proportion of total employment, even in internationally recognized clusters of high-tech industries. For example, in 1990, high-tech industries accounted for only 23

Both college-educated and high school graduates (with some skills) working in high-tech firms earned relatively higher wages than those working in non-high-tech industries because of the larger demand for skilled labor in high tech.

percent of total employment in Silicon Valley, 14 percent in Research Triangle, 17 percent in Austin, and 14 percent in Route 128/Boston.

So why the fuss about high tech? The answer, of course, is because of the multiple contributions that high-tech firms make to economic development. As for non-high-tech industries, one of their most important contributions to economic development remains the large number of employment opportunities available to the population of a city or region.

### Are Wage Inequalities Larger in High-Tech than in Non-High-Tech Industries?

We found that wage inequalities in the non-high-tech industries were 9 percent higher than in high-tech industries in Austin in 1990<sup>5</sup> and even larger in the other selected high-tech regions: 14 percent in Route 128/Boston, 22 percent in Research Triangle, and 26 percent in Silicon Valley.

Studies conducted to explain the significant growth of wage inequality in the United States in the 1980s conclude that much of the increase for wage inequalities for males in the United States is not due to the increase in employee skill levels associated with years of schooling and years of labor market experience, but rather primarily to changes in the organization of production and the increasing use of computers.

Given our definition of high-tech industries as skill-intensive industries, we anticipate that the increase in the demand for skills and therefore wages for skilled workers have been relatively higher in these industries than in non-high-tech industries. In 1990, the high-tech industries in Austin employed 78 percent of the electrical and electronic engineers and mechanical engineers. The relatively larger demand for these skills explains the larger median wages paid to electrical and electronic engineers and mechanical engineers: \$7,785 and \$4,500, respectively, higher in high-tech than in non-high-tech industries in Austin.

Not all the highest paid occupations necessarily require a college degree. Indeed, one *technical* occupation, electrical and electronic technicians, lists among the highest paid positions, and both the high-tech and non-high-tech industries demand a similar proportion of these technicians. Nevertheless, these technicians typically

earned approximately \$3,100 more in the high-tech industry. Although they seemed to have similar levels of education (87 percent have a high school diploma), some of these technicians have customized skills. We base this hypothesis on the significant growth of workforce programs tailored for the high-tech industries by Austin Community College and funded mainly by high-tech industries in Austin.

### Conclusions

One of the objectives of the AEC was to track the effects of the “new economy” on wages and wage inequalities in Austin. Implicit in this analysis is that the wage inequality story is one foretold by the “new economy.” Policymakers promote high tech because these industries generate high paying jobs for college-educated workers, such as electrical and electronic engineers and computer specialists. We find, however, that high-tech firms pay higher wages not only to college graduates but also to relatively less skilled technicians.

Non-high-tech industries in Austin still generate more than 80 percent of employment in the city. They pay lower wages for all percentiles of the wage distribution. More important, *non-high tech industries employ 95 percent of individuals in the bottom 10 percent of the wage distribution in Austin.* This evidence suggests that wage inequality in Austin is a story largely foretold by the old economy or the non-high-tech industry.

*Our appreciation to Rita Wright, professional librarian and manager of the Austin Index at the Bureau of Business Research, who helped with many data requests.*

### Notes

1. Defined as those industries where employment in both R&D and all technology-oriented occupations accounted for a proportion of employment that is at least twice the average for all industries in the Occupational Employment Statistics.

2. An initiative of the Bureau of Business Research, the Austin Index (<http://www.utexas.edu/depts/bbr/austest/>) compares Austin with other U.S. high-tech regions.

3. We used 5% sample of Public Use Microdata Survey—PUMS data. Our sample inclusion criteria are: male workers, age 18-65, working full-time (at least 35 hours per week), neither self-employed nor working without pay, who have worked at least 14 weeks.

4. D. Hecker, “High-Technology Employment: A Broader View,” *Monthly Labor Review*, June 1999.

5. To determine this, we used the 90-10 wage differential (the difference between the 90th and 10th wage percentile). ♦

# The High Cost of Texas Water Planning

by Milton L. Holloway

President  
Resource Economics, Inc.  
Austin, Texas

In the new era of Texas water planning, launched by the 1997 passage of Senate Bill 1 (SB 1), sixteen regional planning groups develop long-term water supply and conservation strategies to solve perceived regional water problems, with the Texas Water Development Board (TWDB) administering the planning and developing a state plan based on the results of the regional plans. The strategies developed by this planning process are expected to give guidance to local water supply utilities concerning the projects that will likely receive political support and thus get funded and developed.

This “bottom-up” planning process requires the regional planning groups to compare alternatives and instructs the groups to consider economic and environmental impacts. By opting for the use of undiscounted, annual average costs per acre foot of water as the sole economic criterion for comparing alternatives, TWDB does not provide adequate economic guidance for making such comparisons. How does this absence of economic principles affect investment choices in long-term planning for water supplies and conservation?

## The Missing Economic Principles<sup>1</sup>

The use of average annual costs of alternative projects/strategies, when combined with the use of projected water “demand” that ignores the effect of rising water costs on consumption, is apt to produce poor investment decisions for several reasons:

1. Projected water consumption paths—labeled water “demand” by TWDB<sup>2</sup>—that ignore the price effect on consumption will most certainly misrepresent the future need for water.
2. The use of only average annual costs (calculated as annual debt service plus O&M) to compare two alternatives, rather than the present value of benefits and costs, will favor high over low capital costs projects and result in the selection of the wrong alternative.
3. The use of undiscounted future costs to compare alternatives, even if the benefits of two alternatives are the same, will result in selection of the wrong alternative.
4. Ignoring differences in risk and uncertainty of alternatives will result in the

selection of high-risk and thus high-cost projects. Under TWDB rules, there is no test of benefits vs. cost for low probability drought conditions, separate from normal year conditions that are expected to occur routinely. As a result, investments in new water supply additions costing upward of \$1,500 per acre foot of treated water may be made without any test of whether benefits are even in the same ballpark. Current treated water costs in many parts of Texas are still under \$300 per acre foot.

5. Without separable benefit-cost analyses, there is no test to see if a better alternative is available by deleting project purposes that do not pass a basic economic test.

The adoption of water project/strategy economic evaluation criteria would ensure that consistent economic principles and benefit-cost analysis methods are applied in the development of state and regional plans. Such criteria should be developed as a guide for the regional planning groups in order to identify and rank priority projects that will pass an economic feasibility test for the planning group’s own edification, to assure that recommended projects will meet rational criteria for state financial assistance from the Board, and to identify those projects likely to qualify for federal funding assistance where desirable.

No apparent conflict exists between the use of benefit-cost analysis and the requirements of SB 1 or other parts of the Texas Water Code. In fact, a good case can be made that the requirements of both the Water Code and the courts cannot be achieved without following the principles underlying benefit-cost analysis.

## The Basics

The economic criteria for evaluating water resource investment decisions are detailed in the guidelines for all federal agencies seeking to put federal dollars in water development projects.<sup>3</sup> The essential elements include:

1. An evaluation of all significant *benefits and costs* even though all benefits may not be quantifiable.
2. Guidelines for the *discounting of future benefits and costs* to provide consis-

tency and enable comparison of the economic merits of alternatives within and across regions. (Commendably, TWDB adopted revised rules in July 2001 to offer such guidelines.)

3. Guidelines for the *measurement of certain non-market benefits and costs*, such as changes in recreation.
4. Guidelines for *incorporating the effects of the rising cost of new water supplies on the future demand for water*.
5. *Instructions for inclusion of risk and uncertainty* in evaluations of alternatives when high degrees of risk and uncertainty are involved, especially under future conditions of drought.

While economic criteria are not the final or only means for judging the individual merits and the ranking of projects, the economics of a proposed project is critical information for decision making

### Why Does It Matter?

It is vital that Texas communities formulate long-term plans for new water supplies and conservation. But it is also important to understand the benefits and costs of the alternatives available to solve a future problem. Most Texas water services are provided by public entities that hold the “public trust” in carrying out their duties, especially the investment of rate- and taxpayer dollars.

A number of large projects are proposed in the various regional plans and in TWDB’s Draft Texas Water Plan. The example of Region C (Dallas-Forth Worth) helps illustrate the need for benefit-cost analysis. In this instance, the planning group for Region C included a large northeast Texas reservoir as one of several new water supply projects to serve the needs of that region. The economic analysis of alternatives was based only on average annual cost-per-acre foot of water. This ignored both the effect of discounting future cost to present value and the non-market value of the reservoir (mainly positive recreation values and negative value of hardwood destruction) and assumed demand (consumption) paths over 50 years unaffected by price increases of 30 to 40 percent in real terms.

An approximation of consumption path projections, including price effects was made in a recent study,<sup>4</sup> which found price-sensitive demand would be 188,000 acre feet less than projected by the planning group/TWDB, thus eliminating demand for one of the projects. Further, the group ignored a major groundwater alternative (Mesa Water, Inc.’s groundwater project) that appears to be as good a choice as alternatives in the plan. By ignoring the economic values of recreation and environmental resources, a major part of project values are eliminated from the analysis.

### Summary

Economic principles are mostly ignored in the current Texas water planning under SB 1. Inclusion of basic economic procedures of analysis—price-sensitive demand projections, discounting of future benefits and costs, inclusion of economic benefit estimates (including measurement of non-market values), separating the analytical approach by analyzing drought problems under conditions of risk and uncertainty separately from non-drought year conditions and completing analyses of separate project purposes—would greatly inform decision making. Continued failure to address economic issues will likely lead to poor investment choices of rate- and taxpayer dollars.

### Notes

1. An analysis of economic impacts provided by TWDB to the regional planning groups presents misleading economic analyses that will be interpreted as showing that the regional plans will produce benefits that greatly exceed their cost. See comments on the *Draft Texas Water Plan by Texas Economists*, November 12, 2001 (forthcoming with the final state water plan).

2. The term “demand” is misused by TWDB inasmuch as demand is a functional relationship between quantity purchased in the market and price, other things constant. The quantity described by TWDB is actually a consumption path over time.

3. U.S. Army Corp of Engineers, *Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G)*, ER 1105-2-100, Appendix D, 1983.

4. Milton Holloway, Ari Michelsen, James Gilley, David Willis, Ron Lacewell and Don Ethridge, *An Economic Analysis of the Mesa Water Supply Alternative for Texas Planning Regions B and C: A Report to Mesa Water, Inc.*, August 2001. ♦

*“The comparative evaluation of water project alternatives is needed for one simple reason: there is a limit to the resources available for water infrastructure and management.... If care is not taken in water planning to consider a range of alternatives and to assess carefully the comparative advantages of those alternatives, then poor choices are likely to be made and scarce resources wasted.”*

—**Dr. Charles Howe**, from chapter 1 of *Continuum of Papers on Benefit-Cost Analysis in Water Resources Planning*, by Texas Economists, Austin (draft), November 2001

*Texas Business Review* is published six times a year (February, April, June, August, October, and December) by the Bureau of Business Research, University of Texas at Austin. Subscriptions are available free upon request. Views expressed in this newsletter are those of the authors and do not necessarily reflect the position of the Bureau of Business Research.

Research and service activities of the Bureau of Business Research focus on the ways Texas industries can become nationally and globally competitive. The Bureau is policy oriented and dedicated to public service. The Bureau is located on the sixth floor of the College of Business Administration building.

**Editor:** Bruce Kellison  
**Bruce.Kellison@bus.utexas.edu**

**Managing Editor:** Sally Furgeson  
**sallyf@mail.utexas.edu**

**Sales Office:** (888) 212-4386  
(512) 471-1063 fax  
**Rita.Wright@bus.utexas.edu**

**General:** **bbr@uts.cc.utexas.edu**

**WWW:**

<http://www.utexas.edu/depts/bbr/tbr/>



BUREAU OF BUSINESS RESEARCH  
University of Texas at Austin  
21st and Speedway  
CBA 6.444  
Austin, Texas 78712

**Change Service Requested**

NONPROFIT ORG.  
U.S. Postage  
PAID  
Austin, Texas  
Permit No. 391

## A Business Bellwether *Texas Business Review* in 2001

### October

- Plugging into the Texas Electricity Market: Avoiding the Mistakes of California, *Jay Zarnikau*
- Buying Power: A Guide to the Competitive Electricity Market in Texas, *Lino Mendiola and Stephanie Kroger*

### August

- Exporting Tech from Texas, *Bianca Walker and David Luft*

### June

- "Location, Location, Location" in Cyberspace: E-Commerce and the Domain Name System, *Emerson Tiller*

### April

- Sparkling Growth and Renewal Through New Products: The Impact of Information Technology, *Vish Krishnan*

### February

- An Integrated Economic Development Budget: Putting Apples and Oranges in the Same Basket, *Dick Levine*

*Hard copy subscriptions to Texas Business Review are available free upon request, as are back issues. Send an e-mail request--and be sure to include your U.S. mail address--to [rjwright@mail.utexas.edu](mailto:rjwright@mail.utexas.edu), or call (512) 471-5180.*

## Announcement

The Bureau of Business Research and the McCombs School of Business will present a conference for currently enrolled and matriculated MBA students entitled "Women and the MBA: Opportunities and Challenges." The Friday, February 15, 2002 event will feature panels of business leaders, entrepreneurs, and managers discussing topics such as managing in the corporate environment, balancing work and home life, and working in a small high-tech firm. Registration is free but space is limited. Call (512) 475-7813 for information. ♦