

# BENCHMARKING CONNECTICUT'S ECONOMY:

TECHNOLOGY • FINANCE • ENTREPRENEURIAL & BUSINESS VITALITY • HUMAN CAPITAL • GLOBAL LINKS

## OVERVIEW



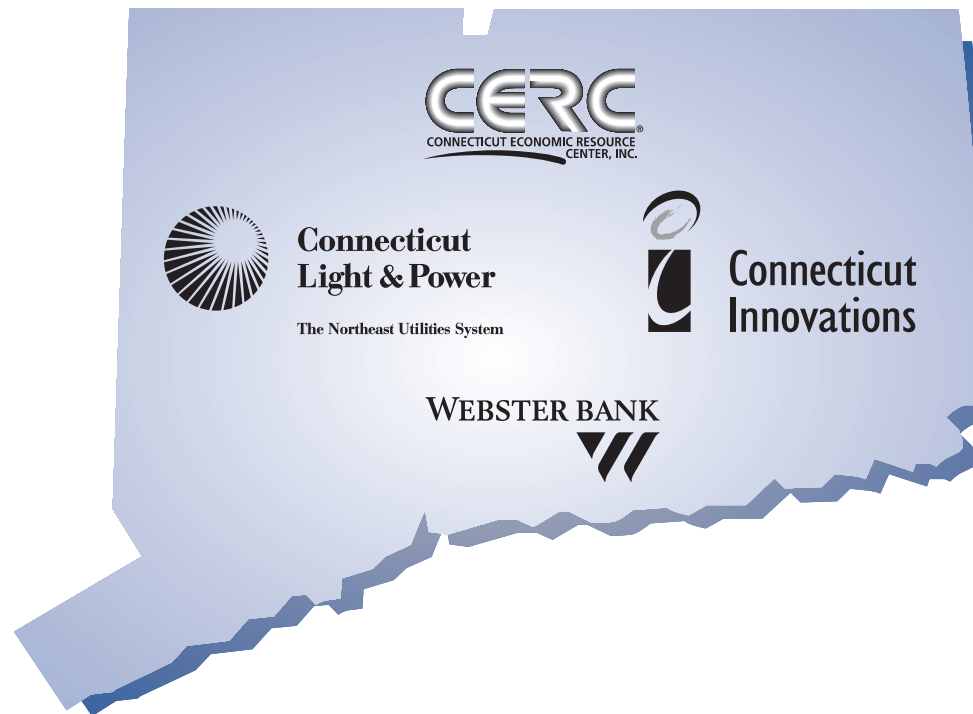
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# BENCHMARKING CONNECTICUT'S ECONOMY:

A COMPARATIVE ANALYSIS OF INNOVATION AND TECHNOLOGY

SEPTEMBER 2005

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# OVERVIEW

THIS SUMMARY PRESENTS THE KEY FINDINGS FROM THE 2005 EDITION OF THE *CONNECTICUT BENCHMARKS* REPORT—A REPORT THAT ASSESSES CONNECTICUT'S CAPACITY AND TRENDS RELATIVE TO OTHER STATES IN AREAS RELATED TO COMPETITIVENESS AND INNOVATION IN THE KNOWLEDGE ECONOMY.

**U**nderstanding Connecticut's capacity for innovation is critical because states that are leaders in technological innovation are the ones that will compete successfully and prosper in the decades to come.

**The analysis conducted for this report reveals a state that is at a critical juncture.** On the one hand, Connecticut is in an enviable position, possessing a wealth of attributes essential to innovation and global competitiveness, such as high productivity, an educated workforce and more. On the other hand, the state's long-term economic viability is threatened by several factors. Many states are outpacing Connecticut in key areas. Urban-suburban disparities; lack of business and job growth; an aging, shrinking population; and other forces are undermining our prospects for a prosperous future.

Not all of the factors negatively affecting Connecticut's competitive position are within the state's control, and will require a broader, regional response. However, it is essential that public- and private-sector leaders act upon the factors they can influence so that the Connecticut of tomorrow may offer all its citizens opportunity, prosperity and a high quality of life.

It is hoped that the analysis set forth in this report will serve as a catalyst to inform discussion, provoke dialogue, and lead to thoughtful and effective policies and programs that can help Connecticut's economy remain strong and competitive.

## REPORT STRUCTURE

This report consists of three parts. First is an analysis of long-term trends in Connecticut's technology sector. Second is a comparative analysis of the state in five benchmark categories:

- Technology Strengths
- Human Capital
- Financial Resources
- Global Links
- Business Vitality

Each of these categories contains several variables, and for each variable, we look at two dimensions of performance. The first dimension, called **concentration**, refers to the current capacity or level of a given metric, for example the percent of the adult population in 2004 with

a bachelor's degree or higher. For each variable, we report on where every state stands using the most current available data, essentially creating a snapshot of Connecticut relative to the other 49 states. The second dimension, called **growth**, examines the rate of change for a specific variable. To illustrate, in the case of adult college attainment, we look at the average annual rate of change in each state between 1990 and 2004, hence providing a moving picture of how Connecticut is changing relative to the other states.

Finally, we conclude with a brief discussion of some of the larger structural issues and the growth outlook given the changes impacting the Northeast generally and Connecticut in particular, and offer policy questions for further dialogue.

## CONNECTICUT'S TECHNOLOGY SECTOR

Economic prosperity in the 21st century depends on a region's ability to compete in an economy in which knowledge, technological skills and innovation are critical foundations.

Technology fuels economic growth and prosperity. Technological developments were the catalysts of the Industrial Revolution, and they are critical to competing in today's global economy.

The technology sector has been defined by the U.S. Department of Labor as a set of industries in which both the concentration of scientific and technical personnel as well as research and development (R&D) expenditures are more than 50 percent higher than the average for all industries. Although this definition does not fully capture all nascent technologies, it provides a reasonable starting point for understanding sector trends and composition.

Based on this definition, employment in Connecticut's technology sector in 2003 was 227,500, or 16 percent of total employment. Connecticut ranked fourth among all states in terms of the relative size of technology sector employment. It is important to point out that most of the industries that make up the technology sector are "traditional" industries that happen to have high levels of R&D expenditures and high concentrations of scientific and technical personnel.

Employment trends in the technology sector are worrisome at both the national and state levels. Starting from a high point in 1990, technology sector employment in Connecticut has fluctuated over the past 15 years, but the overall trend is negative with a loss of more than 45,000 jobs, or 17 percent, driven primarily by weakness in the aerospace industry, which accounted for two-thirds of all technology sector job losses in the state during this period.

The decline has been pronounced since the technology bubble burst in 2000, with U.S. and Connecticut technology sector employment down by 15 percentage points. The decline in aerospace has been fairly steady over the past 15 years and appears unrelated to the technology bubble build-up or collapse. At the national level, aerospace lost 384,000 jobs, or 47 percent, during this period while Connecticut decreased by 29,000, a 50 percent decline.

There is a strong geographic or regional component to technology sector employment trends. During the study period, 1990 to 2003, Northeastern and Midwestern states lost almost 700,000 technology sector jobs, while the Southern and Western states gained 690,000 jobs. It is apparent that while overall there has been little change in national technology sector employment during this period, there have been dramatic shifts at the regional level. These data do not tell us whether this is simply an out-migration of jobs from one region to another, or if businesses are shrinking in the Northeast and Midwest and growing in the South and West, or some combination of both.

Even though technology sector employment has decreased since 1990, Connecticut's total output, or value-added, has increased by 51 percent compared to a 71 percent increase at the national level. Despite these growth differences, technology sector productivity (technology sector gross state product divided by number of technology workers) has increased 65 percent to almost \$123,000 in 2003. Since 1997 Connecticut's productivity growth has surpassed both the Northeast and the U.S. So, despite the loss of jobs and slower output growth, it appears that the industries that make up the technology sector in Connecticut have become more competitive due to rising productivity levels. High and growing productivity levels are counterbalanced by a serious loss of technology sector employment.

## BENCHMARKS: HOW DOES CONNECTICUT PERFORM?

At the moment, Connecticut is equipped to compete and succeed in the global, knowledge-based economy.

The average scores of all the variables rank the state with the seventh best overall concentration score. This means that currently Connecticut possesses a number of assets critical to meeting the challenges of the global, knowledge-driven economy.

However, Connecticut must evolve if it is to succeed in the future.

Even though Connecticut had an excellent concentration score, its overall growth score is 43<sup>rd</sup> relative to the other states. Some of Connecticut's growth trends can be attributed to the impacts of larger, structural forces that are reshaping this region of the country. If Connecticut is to maintain its competitive advantages in the long term, it must take steps to better differentiate itself and be more competitive to offset the sluggish growth characteristic of much of the Northeast.

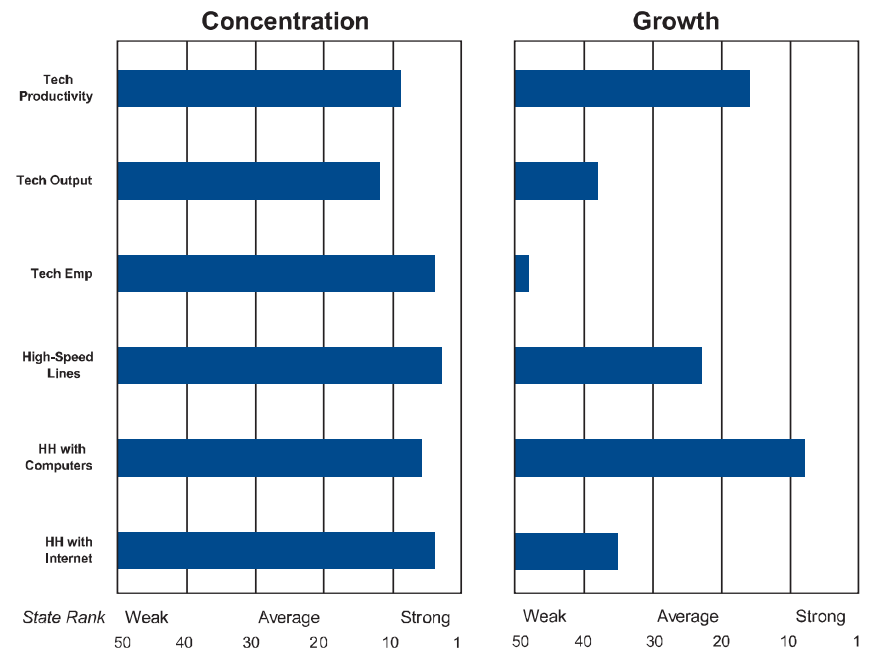
### Technology Strengths

Connecticut's overall performance in technology concentration, or level, is excellent. The state ranked second among all states on its composite technology concentration score. The state's performance in each of these indicators was uniformly strong, as illustrated by the chart to the right. The data show that Connecticut has a strong technology foundation to build on, and our households are more likely than those in other states to be connected to the World Wide Web.

The growth dimension of this category shows mixed results. Connecticut ranked 36<sup>th</sup> among the states based on its composite growth score. Some indicators posted very strong growth while others were noticeably weak. As with other indicators of growth throughout this report, older industrial states in the Northeast tend to grow more slowly than other regions of the country. While strong growth is important, productivity is key to economic competitiveness. Infrastructure elements such as high-speed

lines and households (HH) with computers suggest the state is well positioned to support future growth, though weakness in technology job growth is quite evident.

### CONNECTICUT'S TECHNOLOGY CONCENTRATION AND GROWTH RANKS



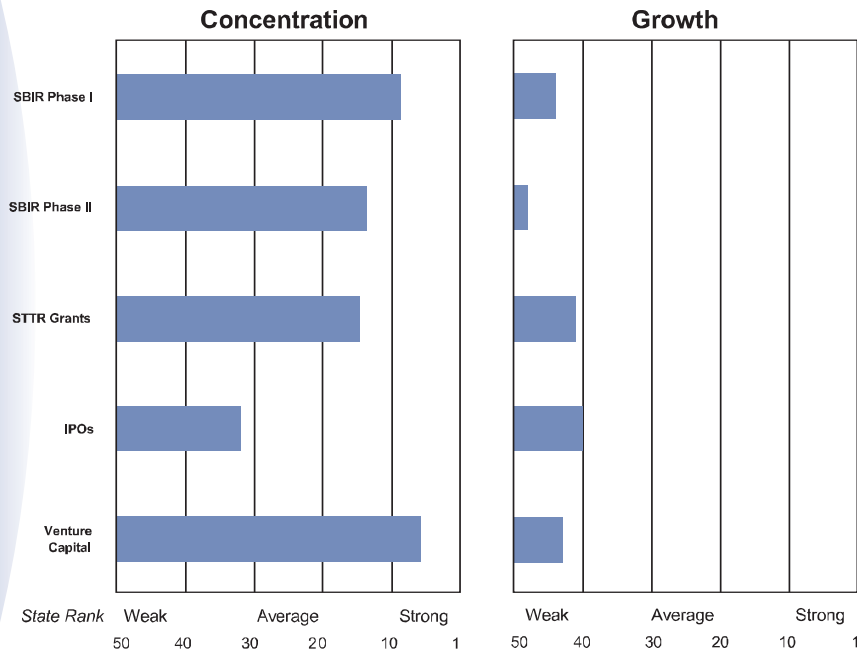
### Financial Resources

Capital is the lifeblood of businesses. Assuming a certain level of managerial skills and market demand, businesses can start, succeed, and grow—and generate jobs and wealth in a state—only if they have sufficient access to financial resources.

Connecticut's financial concentration score is high, ranking it 13<sup>th</sup> among the 50 states. Venture capital and Small Business Innovation Research (SBIR) awards are substantial in the state, and Small Business Technology Transfer

(STTR) awards are above average. However, initial public offerings are relatively small and have declined. In fact, none of the financial and capital resources are keeping pace with the nation. All of Connecticut's growth metrics are in the bottom quintile, giving the state an overall financial growth rank of 45<sup>th</sup>.

### CONNECTICUT'S FINANCIAL CONCENTRATION AND GROWTH RANKS



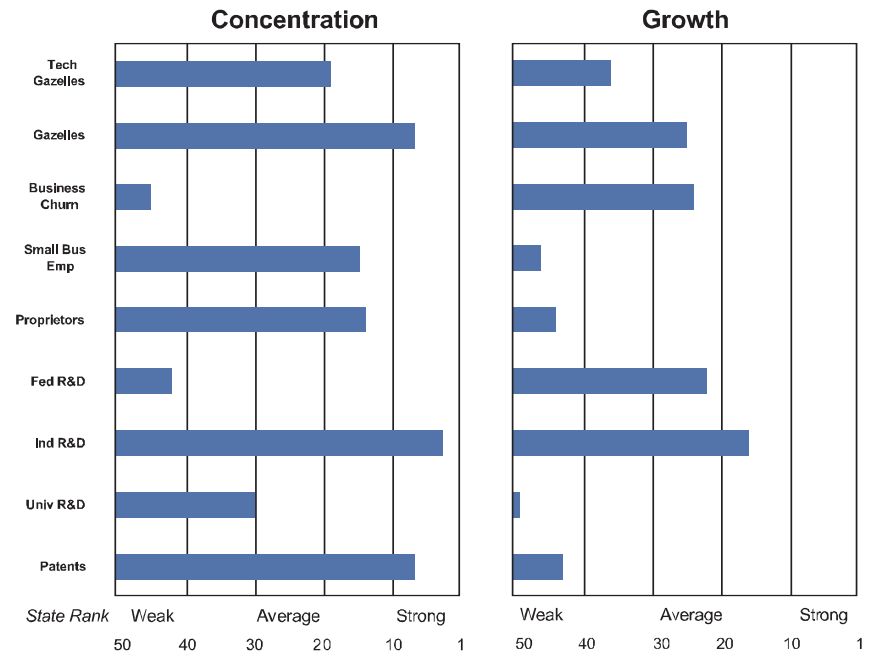
#### Entrepreneurial and Business Vitality

A business climate that is favorable for innovation and entrepreneurial activities is important for economic growth.

Connecticut has strengths in this category: Industry R&D expenditures and growth are significant, and small businesses account for more jobs in the state than the national average. The state's share of gazelle<sup>1</sup> companies and high patent level also contribute to ranking Connecticut ninth in business vitality concentration.

However, the state lags in its concentration and growth of university R&D and trails the nation in growth in small business employment and entrepreneurs. Patent growth is also weaker, but that is a result of starting with a higher base rather than an indication of a problem. The state ranks 42<sup>nd</sup> in the growth component of this category.

### CONNECTICUT'S ENTREPRENEURIAL & BUSINESS VITALITY CONCENTRATION AND GROWTH RANKS



<sup>1</sup> Gazelles are companies (filing with the Securities & Exchange Commission) with at least \$1 million in sales revenue for initial year and average annual revenue growth of 20 percent or more for four consecutive years.

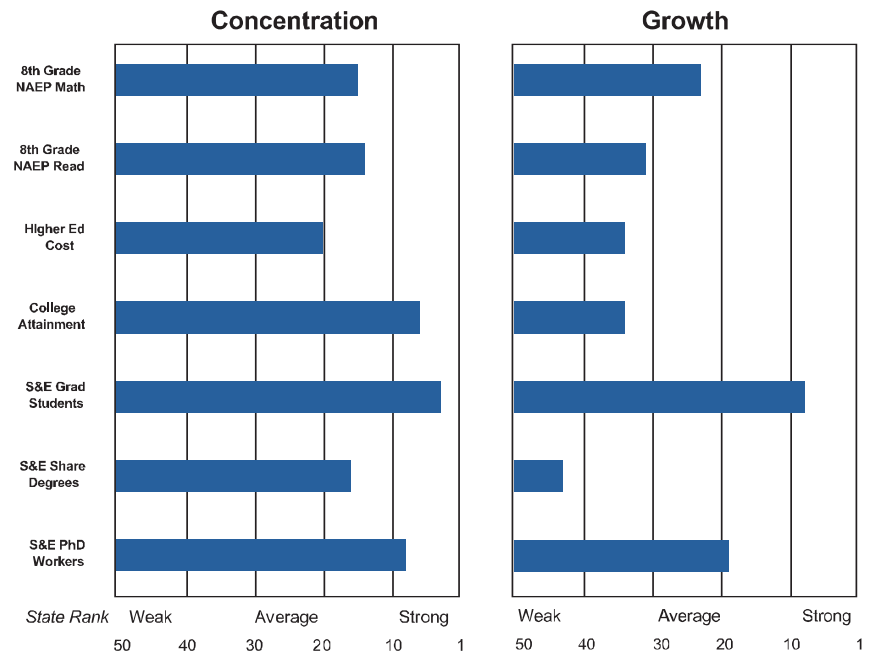
### Human Capital

The knowledge, skills, and training embedded in a regional population constitute its human capital. Human capital is one of the most important inputs and competitive advantages that any jurisdiction can have. Over time, especially in a mature economy like Connecticut's, increasing capital and labor have less of an effect on the output of the economy. However, growth in the effectiveness of the labor can lead to continuing growth in output.

This category focuses on the academic success of our students and residents relative to the other states. As a whole, Connecticut appears to have an edge in terms of concentration. In fact, the state ranks fifth among all states. The state's college completion rate is one of the highest in the nation. And Connecticut has a high concentration of science and engineering graduate students, with growth that is quite strong. The share of workers with a Ph.D. in science or engineering is also a very strong indicator in the state. However, most of the variables post mediocre or sluggish growth, placing Connecticut 35<sup>th</sup> for overall growth in this category. Of particular concern is the fact that other states are outpacing Connecticut in terms of college completion rates. The state also has weak growth in the relative number of science and engineering (S&E) degrees awarded. Connecticut is also beginning to lose ground in math and reading National Assessment of Educational Progress (NAEP) scores relative to other states.

Although not presented in the results, it is worth noting the discrepancy between how Connecticut performs as a whole and what is happening within its cities. Students in Connecticut's poorest school districts are less likely to attend preschool, less likely to pass Mastery and Connecticut Academic Performance Tests (CAPT), and much more likely to drop out of high school. For example, in the most recent CAPT test only 2.3 percent of 10<sup>th</sup> graders in Hartford were able to pass all four sections.

## CONNECTICUT'S HUMAN CAPITAL CONCENTRATION AND GROWTH RANKS



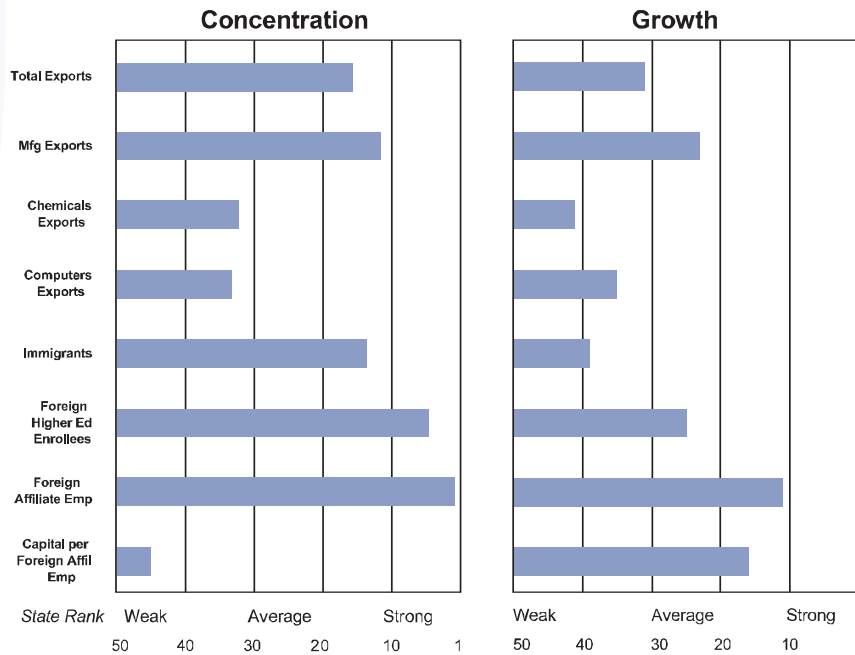
### Global Links

The importance of global links and their significance in today's economy cannot be overemphasized. Many economists consider globalization to be an integral component of today's knowledge economy. Technological improvements, especially in telecommunications infrastructure, have opened the way for people, ideas, goods and services to move more freely among cities, regions and countries. Since the advent of the Internet, the pace of globalization has increased so that every community could consider itself part of the global economy.

Connecticut has a high rank of seventh in the global concentration category. Of particular interest is Connecticut's high enrollment of foreign students, although since Sept. 11, 2001, foreign enrollment has dropped in Connecticut and across the nation. Also, employment in foreign-owned firms (foreign affiliate employment) is the highest in the nation and continues to increase at a fast pace.

Relative to global growth, Connecticut ranks 29<sup>th</sup> of 50 states. The number of immigrants has dropped significantly in the state since 1992, in part due to national policy changes beyond the state's control. Growth in total exports lags the nation.

### CONNECTICUT'S GLOBAL LINKS CONCENTRATION AND GROWTH RANKS



## STRUCTURAL CHANGE AND OTHER ISSUES

Structural change refers to fundamental shifts in our economic paradigm. These are the types of changes that are not reported in the plethora of economic and demographic reports released by federal and state statistical agencies. Structural shifts are only observed using a much wider temporal lens. Month-over-month or year-over-year changes will not inform us of these fundamental changes.

Connecticut's economic performance over the past few decades has been lackluster. While it is true that there are significant regional forces at work in the Northeast that defy policy or program prescriptions from any one state or jurisdiction, it is also true that there are critical areas where thoughtful government change and intervention can have a significant impact over the long term. Conversely, it is also clear that failing to act, and, instead, taking a "business as usual" approach, will have significant negative repercussions over the next 10 to 20 years.

Connecticut, now well into its fourth century as a viable economic entity, is at a critical juncture. The state is part of a New England that was once the economic powerhouse of the nation. Connecticut companies regularly created greater wealth and added more value than the rural, agrarian economies of the South and West. Although Connecticut still has a strong and diversified economy, other regions of the country—and even parts of this region—are seeing much greater job growth, particularly in the technology sector.

Fundamental shifts in two areas, population and job growth, have had a profound impact on where Connecticut is today, and where it is likely to be in the future.

### Population Change

The state ranked 47<sup>th</sup> in relative population growth between 1990 and 2000. During the same period, Connecticut had the greatest relative loss in the 18-34 year age group of any state, with more than 200,000 fewer people in this age bracket in 2000 compared to 1990. This shift of almost

23 percent gives Connecticut the dubious distinction of having a greater decline in young adults than any other state in the nation. Connecticut is the seventh oldest state, with a median age of 37.4—almost 10 years older than Utah, the state with the youngest median age. Shifts of this magnitude obviously have significant implications for workforce growth, consumer demand, housing starts and the like. The loss of a congressional seat in 2000 was one tangible sign of Connecticut's declining economic and political clout. And the most recent state population projections from the U.S. Census show that Connecticut will grow 8 percent between 2000 and 2003, the 12<sup>th</sup> lowest state change. The continuing shift of population to the South and West is projected to cost Connecticut another seat in Congress by 2030. A continued out-migration of college freshmen and young professionals presents additional challenges in this area.

### *Job Growth*

On the jobs front the picture is similar. The Northeast and Connecticut in particular have been adding jobs at a slower rate than the rest of the country, and these differences have become more pronounced over time. On average, the Northeast has added only two jobs for every three that the U.S. has added over the past half-century.

The fundamental problem in Connecticut is that there has been no net job growth for the past 15 years. While there have been changes in the type and quality of available jobs, overall the net number of jobs has not increased. From a jobs perspective, Connecticut's economy is treading water. Absent the growth of well-paying jobs, opportunities for economic development are extremely limited.

### *Globalization*

Globalization is another issue that is affecting the economic landscape of the state. Even though there are benefits to globalization, many people are frustrated with the globalization process, particularly its economic aspects. In the United States, local workers, particularly in manufacturing, have

seen their previously well-paid and stable jobs leave for factories built in lower-cost areas. Companies want to take advantage of lower-cost labor, but many workers displaced by off-shoring are left with few opportunities for jobs at similar pay.

### *Productivity Increases: A Two-Edged Sword*

The change in trading patterns accounts for some of the troubles in the U.S. manufacturing sector, but it is surely not the only factor. Domestic changes, such as productivity and structural shifts, affect the sector as well. For example, the economy is quite efficient at producing goods such as food and cars, but it still takes about the same number of people to serve a meal in a restaurant. Productivity has soared in manufacturing, so it requires fewer people to create the same value of goods, while for the services sector, productivity has not grown by nearly as much. Over the past two decades, service jobs have grown substantially as a share of total U.S. employment, while manufacturing jobs declined. This national trend is also observed in Connecticut.

### *Urban-Suburban Disparities*

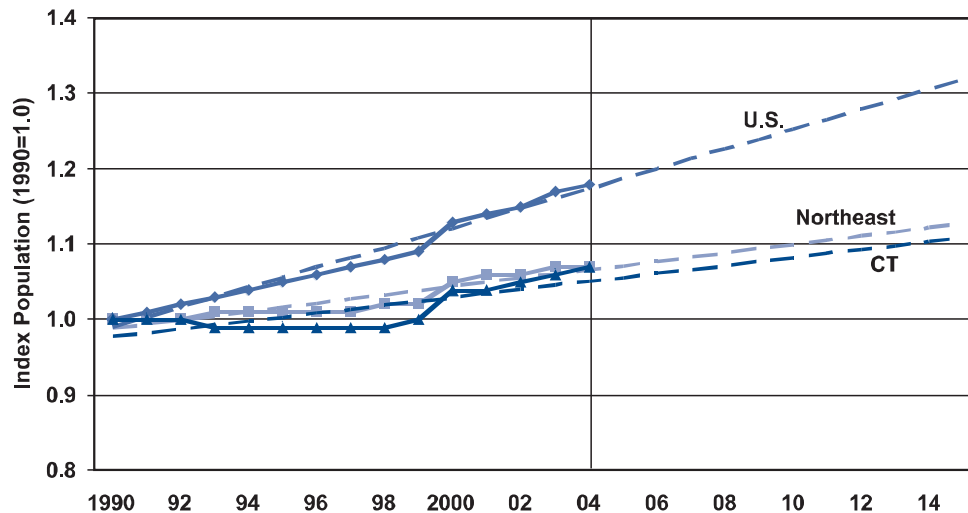
Connecticut, the most affluent state in the nation, is home to three of the poorest cities in the nation. There are a variety of complex challenges facing Connecticut's urban centers (e.g., Hartford, New Haven, Bridgeport, Waterbury, New Britain). While there has been some modest progress, the fact remains that most of Connecticut's older, industrial cities continue to face numerous impediments to growth and prosperity. Overall, these cities have experienced declines in jobs, businesses and income over the past few decades, and there is little indication of any immediate turnaround.

The state will find it difficult to remain competitive with disadvantaged and low-skilled urban youth constituting a significant proportion of its future labor force. In addition, Connecticut's reliance on property taxes to fund local education and other services tends to exacerbate the disparity between the urban centers and suburban municipalities.

## WHAT IF THE TRENDS CONTINUE?

If the next 10 years were to play out as the past few decades have done, what might we expect in Connecticut? We explore this critical question below through a simple extrapolation of historic data to see what Connecticut might look like in 2015 and beyond, assuming no significant deviation from recent trends.

### WHAT IF POPULATION TRENDS CONTINUE...LOOKING TO 2015



Source: U.S. Census; Calculations by CERC

### Population

Between 1990 and 2004, the population of Connecticut increased by 7 percent, while the nation as a whole grew 18 percent. If this trend continues, Connecticut will grow approximately 4 percent over the next decade while the nation will grow about 15 percent, further eroding the state's political and economic clout nationally.

The most recent long-term projections from the U.S. Census Bureau indicate Connecticut having the slowest population growth of any New England state, as shown below.

### POPULATION PROJECTIONS, 2000-2030

Geography	Percent change, 2000 to 2030
<b>United States</b>	<b>29.2</b>
New England	12.2
Maine	10.7
New Hampshire	33.2
Vermont	16.9
Massachusetts	10.4
Rhode Island	10.0
<b>Connecticut</b>	<b>8.3</b>

Source: U.S. Census

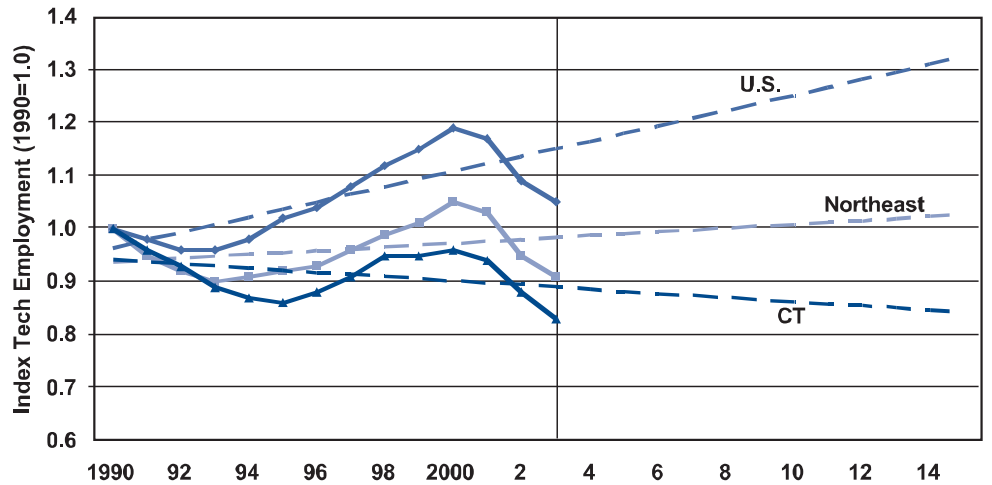
The U.S. population is expected to increase about 2.5 times more than New England and almost four times that of Connecticut.

### Jobs

Connecticut has had no net job growth for the past 15 years, although there have been employment fluctuations during that time. With respect to technology sector employment, the prospects are even less promising.

The figure on the right estimates how technology sector employment may continue for the next decade, given what has happened since 1990. The U.S. should post healthy growth, the Northeast is expected to grow slightly, and Connecticut could see decreases through 2015.

### WHAT IF TECHNOLOGY EMPLOYMENT TRENDS CONTINUE...LOOKING TO 2015

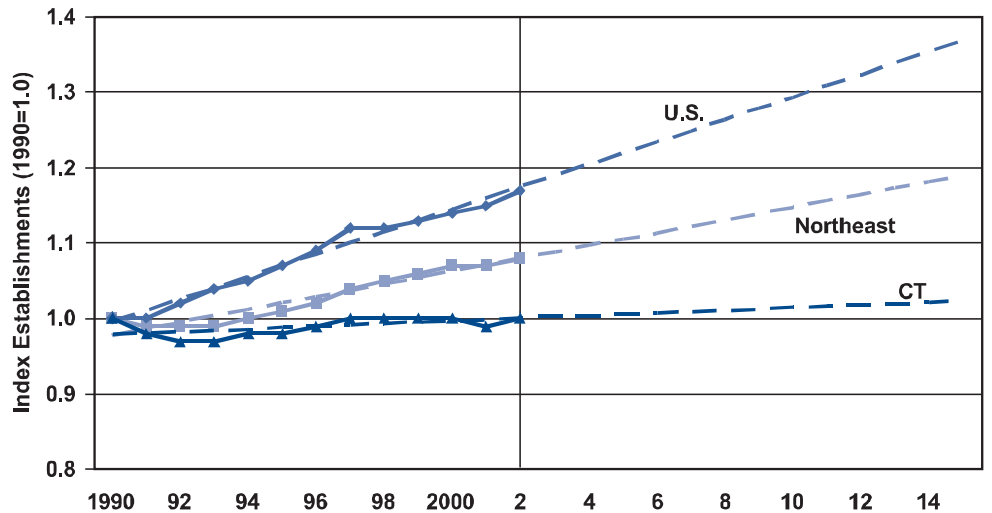


Source: Economy.com; Calculations by CERC

### Businesses

While there has been appreciable growth in the net number of new businesses in both the Northeast and nation, there has been no discernible business growth in Connecticut since at least 1990. If this trend is left unabated, Connecticut may not experience any business growth over the next 10 years while the Northeast and the U.S. see stronger growth. This trend does not bode well for Connecticut's ability to grow or maintain an entrepreneurial culture.

### WHAT IF ESTABLISHMENT TRENDS CONTINUE...LOOKING TO 2015



Source: U.S. Census; Calculations by CERC

## POLICY QUESTIONS

The findings from this study lead to numerous policy questions that should be considered and debated by private- and public-sector leadership. Following 15 years of no net job growth and no net business growth, and lacking a long-term economic development strategy, the state is at some risk over the next 10 to 20 years of seeing continued erosion in its competitiveness and overall quality of life. While the data show the state performing well today, they also reveal trends that, over time and without intervention, could undermine Connecticut's prosperity and erode its ability to compete successfully in the global economy.

The facts presented in this report suggest that complacency is not a viable economic development strategy. While perhaps not cause for alarm, they are surely a call to action.

The policy and research questions below, although not exhaustive, represent the types of issues that require everyone's focus. They are designed to stimulate discussion among business and government leaders on decisions and steps Connecticut should consider to ensure continued, long-term competitiveness.

- Why is Connecticut's technology sector employment declining more quickly relative to other areas? What does that portend for the state's long-term competitiveness? Does it matter if we are losing jobs as long as output continues to rise?
- What are the roles of government, business and universities in supporting innovation? How can these institutions interact with each other to enhance this process?
- Why have there been no net job growth and no net business growth in Connecticut over the past 15 years?
- What role do business costs play in this problem? What are potential solutions? Should incentives play any role?
- How can the state's entrepreneurial climate be reactivated to reverse the state's trend of flat business growth? Are there reasonable steps that can be taken to stem the outflow of population, particularly among college freshmen, and young professionals and families?
- How can Connecticut increase interest in science, math and engineering among K-12 students and increase the number of college students majoring in these fields?
- Will Connecticut have sufficient, skilled workers available to enter the workforce in 2020 given that 40 percent of new entrants are projected to come from its urban areas?
- Can Connecticut realistically hope to compete for jobs and businesses when its students in the two largest cities have average SAT scores 200 points lower than the lowest state?
- In light of larger structural forces re-shaping this region of the country, what state policy tools can differentiate Connecticut to help mitigate or overcome this regional disadvantage?
- Given that a number of demographic trends are not unique to Connecticut but characteristic of the Northeast, should the state collaborate with neighboring states to develop regional approaches or otherwise enhance its competitive positioning?
- What steps can be taken to enable Connecticut to maintain and further develop strong links in the global economy?



## NEXT STEPS

- 1. Develop a comprehensive strategy** — Work collaboratively with the public and private sector on a state-level economic development strategy, consistent with these new economic realities, with a focus on strengthening Connecticut's economic future.
- 2. Create regional awareness** — Build understanding throughout the Northeast regarding its declining regional competitiveness and slow growth, and establish a forum with business and government leaders to develop regional policy and program solutions.

**The full report is available online at [www.cerc.com/benchmarks](http://www.cerc.com/benchmarks)**



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