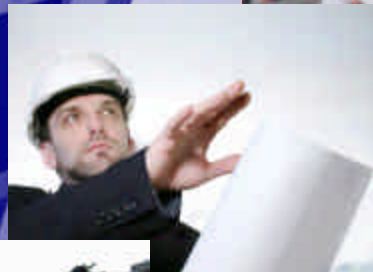


Tennessee's Workforce— Investing for Growth



Tennessee's Workforce — Investing for Growth

A Report to the Governor and Tennessee's State Workforce Development Board and Local Workforce Investment Boards

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Summary

This first annual report of Tennessee employment by the Department of Labor and Workforce Development primarily covers the period 2004 through 2014. This report finds that higher levels of skill and knowledge are necessary to alleviate current and projected occupational shortages. Technological innovations such as computers, satellites, biotechnology, and lasers have improved productivity in both service-providing and goods-producing industries. The new complexity requires skills and knowledge that are advanced, new, groundbreaking, and competitive globally. Traditional skills continue to be in demand as they are redefined in the global setting. More jobs are likely to become available in the industries providing services than in the industries producing goods. Emergent and demand occupations requiring these abilities are identified. Successful training programs will have content adequate to train employees in these skills, provide knowledge, and attract new talent.

Conditions vary in Local Workforce Investment Areas (LWIAs) by education, industry, income, and skill needs. Employment growth, higher wages, and reduced poverty are consistent with growth in skills and knowledge. This report identifies increased knowledge requirements for customer service, foreign language, physics, management, English, clerical procedures, and engineering and technology. Needed skills for growing numbers of jobs include active listening, reading comprehension, speaking, time management, critical thinking, active learning, coordination, and writing.

The report is divided into several parts, including historical employment from 1990 to 2006, projected industrial employment for 2004 to 2014; growth of key industry sectors across LWIAs; education, poverty, and unemployment and their relationship to employment across LWIAs, occupational employment projections through 2014; and critical skill and knowledge requirements for demand occupations.

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Executive Summary

The following report analyzes important trends in Tennessee's employment from 1990 through the present and includes projections through 2014. Knowledge and skills important to Tennessee's growing industries are highlighted. Projected occupational shortages are identified. Challenges that Tennessee currently faces in education, income, and in relation to emerging global trends are identified. Tennessee has developed several innovative approaches to these challenges; promising areas for future investment are described. Workforce investment is the key to Tennessee's bright economic future.

Demographic Changes (Page 9)

- Tennessee's population is growing; it will be the 15th largest state by 2030.
- Tennessee will have an advantageous proportion of working-age population past the year 2010.

Historical Employment to 2006 (Page 10)

- Shifts in Tennessee's employment from manufacturing to services during the 1990s have had a significant impact on workforce requirements.
- State and national trends are more closely linked as Tennessee becomes more integrated into the world economy.

Projected Employment to 2014 (Page 16)

- The manufacturing industries projected to maintain stable employment or grow slightly by 2014 and create more than 500 new jobs include food, wood products, paper, nonmetallic products (especially cement and concrete needed for production), machinery and transportation equipment, and miscellaneous manufacturing, including medical equipment and supplies.
- Investment in innovative technologies such as robotics, computer-assisted design, and factory automation improves productivity and creates a competitive advantage.
- Employment in the service-providing sector is expected to grow three times faster than that of the goods-producing sector. Three industry sectors will lead the way with expected above-average growth rates: professional and business services (2.7 percent annually), education and health services (2 percent), and financial activities (1.8 percent).

Key Industry Sectors and Employment, Wages, and Income in LWIAs (Page 20)

- The largest industry sectors in Tennessee, comprising 52.6 percent of total Tennessee employment, include trade, transportation, and utilities; education and health care services; and manufacturing. Although smaller, professional and business services and financial services are key industries due to their expected high growth rates.
- The LWIAs with the highest percentages of their employment in education and health care services are Area 1 (Tri-Cities), Area 7 (Cookeville area), Area 3 (Knox County), and Area 11 (including the cities of Jackson and Martin).

Emerging Industries (Page 25)

- Tennessee is strongly poised to lead in emerging energy production, especially in the biofuels, solar, and wind areas.
- With alternative energy investments increasing, science and technology education will need to be strengthened in rural areas through improved curricula, dual credits, and/or distance learning opportunities.

Education, Income, Poverty, and Unemployment Within LWIAs (Page 27)

- The percentage of poor increased from 2000 to 2004; increases were greater in Tennessee than in the United States.
- Trends of poverty increasing in relatively well-to-do LWIAs imply increasing inequality.
- Educational attainment (measured by the percentage of the population with a high school diploma) is highest in Knox County in Workforce Area 3, followed by Workforce Area 8 (including Williamson County), Davidson County (Area 9), and Shelby County (Area 13).
- State efforts to reduce dropout rates are meeting with success. The 2007 Kids Count Data Book reported that dropout rates of 15- to 19-year-olds fell from 11 percent to 7 percent from 2000 to 2005.
- Education is critical for reducing unemployment and increasing income.
- Designing comprehensive strategies to reduce poverty in conjunction with agency partners is needed.
- Reducing inequality improves health outcomes for all.

Occupational Employment to 2014 in Tennessee (Page 39)

- Occupational shortages in education, human services, science and technology, skilled craft workers, and transportation equipment operators are identified.
- As employment patterns change, career information and counseling will be increasingly required to identify areas of worker shortages and to encourage training and recruitment efforts in critical areas.

Knowledge and Skill Needs (Page 45)

- State support for expanded GED offerings, incumbent worker training, and other forms of adult learning, as well as social supports, is a positive investment in the state's workforce. Educational incentives can promote skill upgrading and reduce worker turnover.
- Expanding service sectors will require an educated workforce.
- Knowledge needs that rank high include customer service, foreign language, engineering and technology, human resources, and mathematics.
- Skills of high importance include active listening, reading comprehension, speaking, time management, critical thinking, active learning, and writing.
- Updated curricula need to reflect the skill needs of today – specialized, basic, and new science and technology skills.

Foreword

Employment in Tennessee increased an average of 1.1 percent per year from 1994 to 2004, with employment (excluding the self-employed) rising from 2,457,400 to 2,738,500. The rate of employment growth in Tennessee from 1990 to 2006 surpassed the nation, yet from 2000 to the present, it has lagged the nation slightly. It has not recovered quite as well from the 2001 slowdown as the nation¹ (Figure 1, Page 8); Center for Business and Economic Research, 2006, p. 13; Figure 5, Page 30). The unemployment rate has slightly exceeded the national rate since 2004 (Figure 5, Page 30).

- From 1990 to 2006, Tennessee employment has grown at close to the nation's rate.

The following pages describe notable changes in Tennessee's employment from 1994 to 2006 at the state and Local Workforce Investment Area (referred to as LWIA) level and projected employment trends to 2014. More extensive capability to describe and analyze Tennessee's workforce by Workforce Area, income, occupation, education, and wage levels is now possible using existing state and national data and available desktop software. Investigation of industry growth cycles can reveal strengths and weaknesses in the workforce system. Analyses of occupations growing rapidly can uncover skills and knowledge needed now for improved production and innovation.

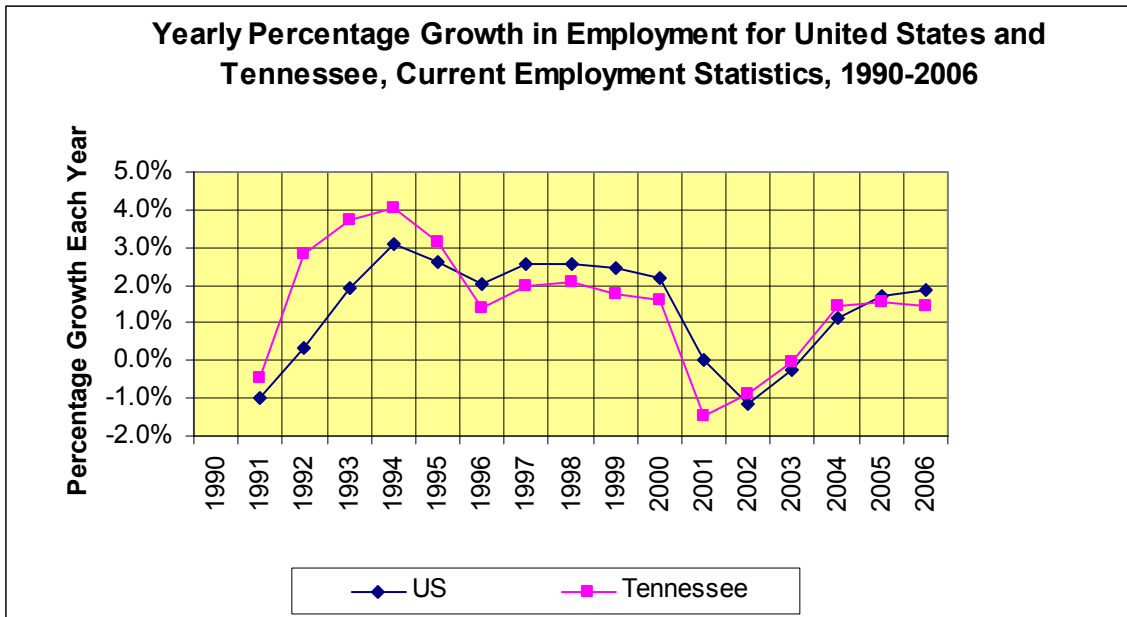


Figure 1. Yearly Percentage Growth in Employment for United States and Tennessee, 1990-2006, Derived From Current Employment Survey

Workforce area trends by industry, occupation, education, income, and poverty status are described; they interact to affect employment change. For example, it is generally accepted that employment is more secure and compensation higher for jobs requiring higher education and training.

- Social, economic, and educational factors both change and are changed by employment.

In addition to analyzing general employment trends, this report describes worker qualifications related to demand industries and occupations.

Demographic Changes: Growth and Age of Population

Tennessee, the 16th largest state in 2000, is projected to be 15th in size by 2030.² It is expected to have the 17th most rapid growth rate during the period. Population growth is two-edged, however, representing both an opportunity and responsibility — an opportunity to strengthen the workforce and a responsibility to train and allocate resources to the increased population. Their enhanced abilities will bring success to the workforce.

- A key question is: Does the Tennessee worker have the training necessary to be successful?

Tennessee is projected to have a working-age population with stable growth through 2030 with a manageable and somewhat favorable dependency ratio, according to projections by the Census Bureau (2004). Employment is likely to continue to grow along with population change and increase after 2010³.

In 2000, Tennessee was ranked 29th in percentage of population 65 and older (12.4 percent) and is projected to be 29th in 2010 (13.3 percent) and 34th in 2030 (19.2 percent).⁴ Those under 18 are projected to be 23.7 percent of the population in 2010 and 24.3 percent in 2030, down from 24.6 percent in 2000 (Table 12, Appendix B, Page 56). Tennessee will have less population under 18 well past 2010 and an advantageous proportion of working-age population past 2010. Proportions of the population over 65 will be about the same as the nation for these periods.

- Tennessee has an advantageous proportion of working-age people.

I. Historical Employment: 1990 to 2006

Industry Sectors by Employment Size

Trends of industry sectors with the largest numbers of employees are particularly important (Figure 2, Page 11) to the Tennessee economy. The three sectors of manufacturing, retail trade, and health care and social assistance in 2004 had the highest employment, each with 300,000 or more employees. Five more industry sectors have 150,000 or more but fewer than 300,000 employees – transportation, administration, education, accommodation, and public administration. The slowdown and expansion affected each of these sectors in a different way.

- Some industries have a great impact because of their size.

Slowdowns, Booms, and Trends: Cycles and Structures

Patterns of employment can be cyclical or structural.

- Cyclical patterns are usually shorter term and are followed by rebounds. A cyclical downturn is usually defined as two successive quarters of declining economic activity.
- Structural patterns or trends are longer term and tend to persist across varying economic periods. Such trends include the effects of technology and globalization.

Tennessee's employment generally increased from 1990 to 2000, except for 1991. After 2000, it decreased with the onset of a national economic slowdown. The downturn was relatively short for the nation, which regained by 2003 all its lost employment. Tennessee took until 2005 for employment to recover from its decline in 2001; unemployment increased every year until 2006, except for 2004 (Figure 5, Page 30).⁵

- Tennessee took five years to recover to year 2000 employment levels from the downturn of 2001-2002.

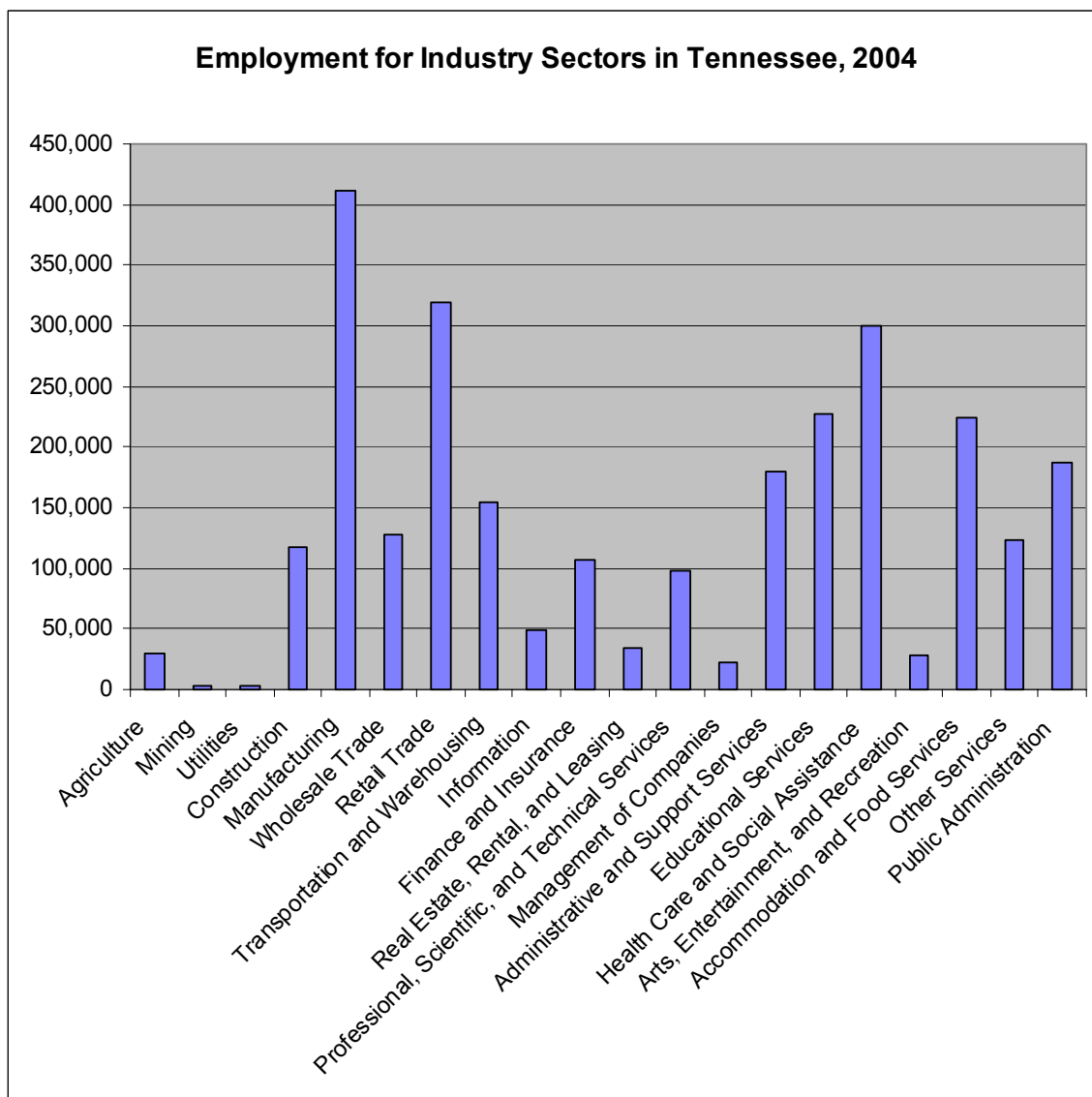


Figure 2. Employment for Industry Sectors in Tennessee, 2004

The effects of cycle and structure are clearly shown in the graph of the relative change across the decade for industries relative to their 1994 employment (Figure 3, Page 13). Industries with decisive structural patterns are those with employment lines stiffly upward such as administrative, management, and professional industries — or sharply downward, including manufacturing and mining. The administrative and management sectors, while holding strong upward structural patterns, show the influence of the downturn in the cycle of 2000-2003. Construction shows a cyclical pattern in 2001 with its employment decreasing. By 2003, it shows the first signs of rebound.

- The 2001 downturn affected the management, administrative and support, and durable goods manufacturing sectors more than the 1990-1991 downturn. Transportation and warehousing as well as information were also affected more in 2001.

Industries are traditionally classified as either goods-producing or service-providing. Service-providing industries grew more since 1994 than goods-producing industries. Construction, a goods-producing industry, however, grew more than any other goods-producing sector (Figure 3, Page 13).

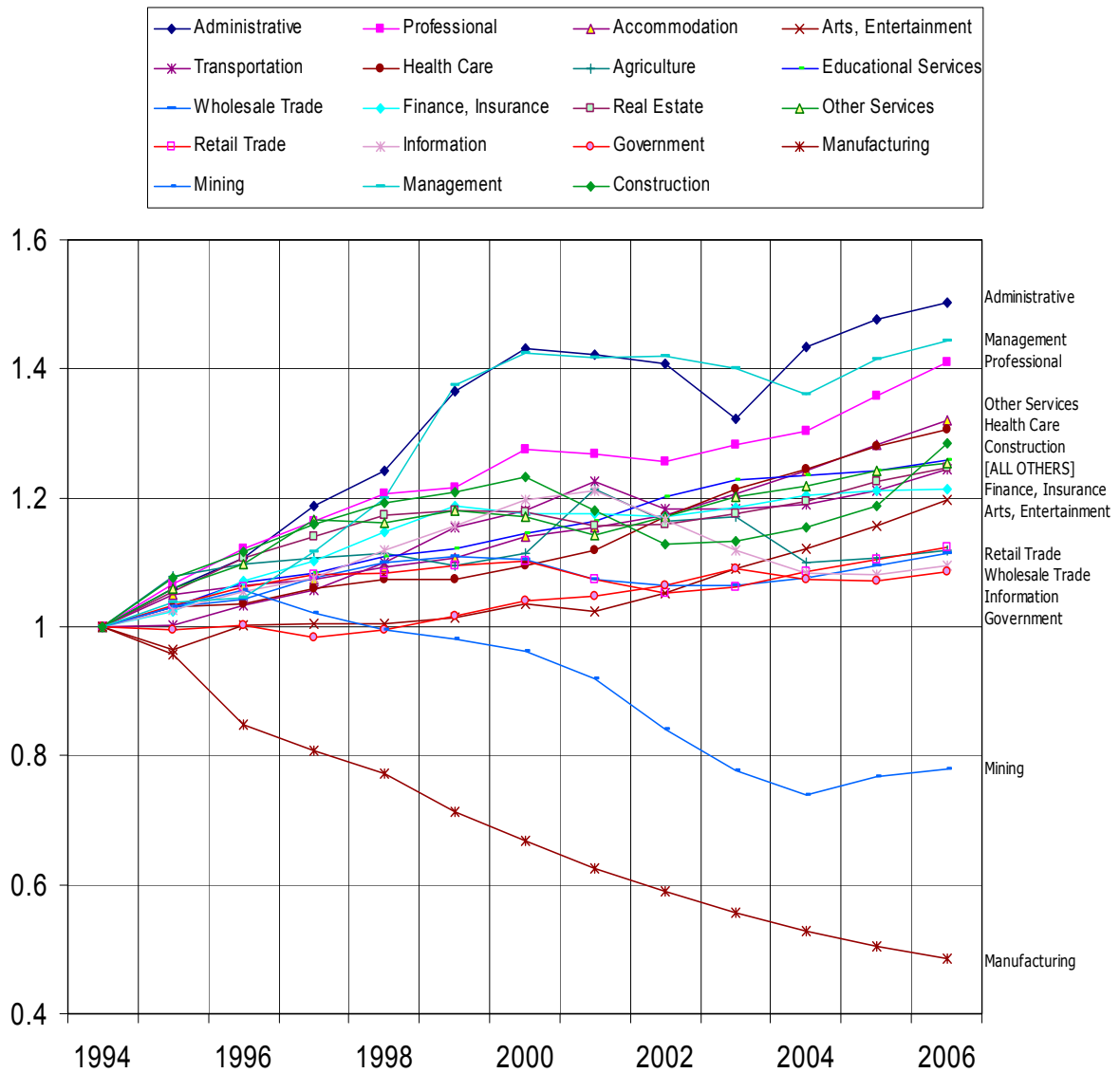


Figure 3. Relative Change* in Industry Sectors in Tennessee, 1994-2006

*Industry employment for each year is divided by its 1994 employment to show "relative employment" for each year. Manufacturing in 2006, for example, is about 50 percent of its size in 1994. The years 2005 and 2006 are included to give a contemporary perspective.

- The administrative, managerial, and professional sectors continued to grow during this period, although the administrative and managerial industries did decline during the 2001 slowdown.
- Among the goods-producing industries, manufacturing continued to decline, but construction was strong.
- Health care and other services ascended relatively undisturbed by cycles.

Goods-Producing Industries

The goods-producing industries include agriculture, construction, mining, and manufacturing. These are important jobs with good wages, and they bring new money into the state, since they usually export their products outside the state. With globalization, automation, and improvements in productivity, however, the Tennessee manufacturing workforce has continued to decline.

Manufacturing has been affected primarily by structural rather than cyclical change. Its decline in 2000-2003 (Figure 3, Page 13) was not the result of downturn but a result of persistent structural factors such as globalization, productivity, automation, and competition, which accompanied its decline for the previous decade. While durable goods manufacturing has declined less than nondurable goods, the loss of jobs in both is very significant. Nondurable goods employment peaked in 1995 but lost more than 70,000 jobs during the decade. Durable goods manufacturing lost 30,000 jobs. Primary metal and fabricated metal industries (North American Industrial Classification System, or NAICS, 331 and 332), which began employment declines in 2001, did finally experience job gains in 2006.

- Manufacturing had over 400,000 jobs in 2004.
- Manufacturing represents a significant proportion of the workforce.
- The manufacturing job losses have had a negative impact on relatively lower-income, lower-educated LWIAs, where they have had a greater presence.

Service-Providing Industries

Service-providing industries are generally defined as not goods-producing and include a multitude of industries like education, health care, hospitality, finance, and information services. Jobs in industries providing service are far more available than jobs in goods-producing industries. Service jobs are normally in local industries, but services can be extended out-of-region. If so, they are export industries.

- Service-providing industries that can export their services have a multiplier effect. These service industries can be important to LWIAs that have been traditionally dependent on goods-producing industries.

Trade, transportation, and utilities employment increased steadily from 1994 to 2001 (Figure 3, Page 13). Employment then decreased from 2001 to 2003 but started increasing in 2004. By 2005, it had reached the 2001 employment level.

Employment in the information sector increased to about 55,300 by 2001 but declined slightly in 2004, now remaining at about the 50,000 level. Employment in the finance sector, including real estate, grew through 2006, with only a slight pause in 2001 and 2002. This sector may later reflect the slowdown in the housing industry because of a significant deterioration in the subprime mortgage market, according to Federal Reserve Chairman Ben S. Bernanke (Hall, 2007; Robb, 2007).

Professional and business services grew steadily until 2002, when employment experienced a small setback; however, they have recovered and grew strongly in 2005 and 2006. Education and health services have not experienced any decrease in employment during 2001 and 2002; growth has continued at a steady pace through the present. Likewise, leisure and hospitality services have grown at a slow but steady pace from 1994 to the present. Government, excluding education and hospitals, has grown gradually through 2003, when some reductions were made.

II. Projected Industry Employment in Detail: 2004 to 2014

Growth of Next Decade Projected to be Greater Than Growth of Past Decade.

Projected employment growth for Tennessee from 2004 to 2014 is about 1.5 percent annually (Table 1, Page 17), from 2,901,010 employees in 2004 to 3,362,460 in 2014. The actual growth experienced from 1994 to 2004 of 1.1 percent is less than the projected growth of 2004 to 2014.

The decline of the goods-producing industries may be lessening (Figure 3, Page 13), but the projected slight gain is likely to mean that growth will vary area to area within the LWIAs, with variations depending on rural and urban locations and educational achievement.

- Expect some LWIAs to have declines in manufacturing from 2004 to 2014; other areas may have increases.
- Some manufacturing industries, including basic chemical (North American Industry Classification System, or NAICS, 3251), cement and concrete products (3273), and medical equipment and supplies (3391), are expected to grow significantly.

Industry Growth and LWIAs. Several specific industries in the service-providing sector are expected to provide much of the growth. Evaluation of the growth within each of the LWIAs of the state is essential to understand more fully the growth dynamics of both service-providing and goods-producing industries.

Goods-Producing Sector and its Industries

Excluding the self-employed, more than 20 percent of Tennessee's employment was in the goods-producing sector in 2004, (Figure 2, Page 11). Nearly three out of four jobs in the goods-producing sector were in manufacturing. Manufacturing and natural resources and mining are expected to have the slowest growth of all the industry sectors. However, this sector will create the third largest number of jobs as a result of its size.

The manufacturing industries projected to maintain stable employment or grow slightly by 2014 and create more than 500 jobs annually include food, wood products, paper, nonmetallic products (especially cement and concrete needed for construction), machinery and transportation equipment, and miscellaneous manufacturing, including medical equipment and supplies.

Table 1. Tennessee Industry Growth Rates and Weekly Wages

Industry Title	2004 Estimated Employ- ment	2014 Projected Employ- ment	Annual Growth in Jobs	2004-2014 Annual Growth Rate	Average Weekly Wage \$
Total Employment	2,901,010	3,362,460	46,150	1.5%	697
Goods-Producing	561,370	592,400	3,100	0.5%	
Natural Resources	32,340	34,130	180	0.5%	603
Construction	117,520	139,730	2,220	1.8%	724
Manufacturing	411,500	418,540	700	0.2%	824
Service-Providing	2,177,120	2,607,150	43,000	1.8%	
Trade, Transportation, Utilities	588,480	687,810	9,930	1.6%	692
Information	49,380	53,480	410	0.8%	839
Financial Activities	139,790	166,800	2,700	1.8%	980
Professional, Business Services	298,680	391,420	9,270	2.7%	737
Education, Health Services	525,120	641,210	11,610	2.0%	711
Leisure, Hospitality	251,970	293,260	4,130	1.5%	321
Other Services	120,810	142,460	2,160	1.7%	476
Government	202,910	230,700	2,780	1.3%	724

Employment in transportation equipment manufacturing for the next several years will depend on how well Tennessee's large auto and parts manufacturers respond to customer demand and global competition. Investment in innovative technologies, such as robotics, computer-assisted design, and factory automation, improves productivity and creates a competitive advantage. People skills and knowledge will have to match changing technologies and global needs. See Tables 9 (Page 48) and 10 (Page 50) for some ideas on strengthening skills in these industries.

Service-providing Sector and its Industries

The service-providing sector features industries with some of the most rapid growth rates and those with large numbers of jobs. Industries with higher growth rates are those in the professional and business services, education, and finance. The industry with the largest number of jobs is the trade, transportation, and utilities industry.

Highest Growth Rates. The service-providing sector, which has more than 75 percent of the state's jobs (2004), is expected to add more than 400,000 jobs to the state's employment by 2014 (Table 1, Page 17). It represents a diverse group of industries, including trade, transportation, and utilities with 588,480 employees; education and

health services with 525,120 jobs; and professional and business services with 298,680 jobs. Leisure and hospitality (251,970), government (202,910), financial activities (139,790), other services (120,810), and information (49,380) are also represented.

Overall, employment in the service-providing sector is expected to grow three times faster than that of the goods-producing sector (Table 1, Page 17). Three industry sectors will lead the way with expected above-average growth rates:

- Professional and business services is expected to be first in annual growth at 2.7 percent.
- Education and health services is likely to grow at 2 percent annually.
- Financial activities is projected to grow by 1.8 percent annually.

Professional and Business Services. The robust annual growth rate of professional and business services at 2.7 percent is a reflection of the growth of its member industries, including legal services with 4,860 new jobs by 2014 (Table 11, Appendix A, Page 51); accounting and bookkeeping (5,910); computer systems design and related employment (3,100); and management and scientific consulting (4,630). Within the administrative and support services area, employment services (including temporary help agencies) are expected to add 21,120 jobs; business support services, 6,350 jobs; investigation and security services, 6,230 jobs; and services to buildings, 13,080 jobs. Professional and business services and education and health services have average weekly wages higher than the average for Tennessee (Table 1, Page 17).

Education and Health Services. At more than 2 percent annual growth in Tennessee, this second largest employment sector is the second most rapidly growing service-providing industry. Nationally, the number of people 55 and older will be growing twice as fast as the population aged 16 and over. This, along with the advances in technologies that are increasing life expectancies, will make the health care sector an important source of overall employment growth.

The largest increase in jobs in health care to 2014 will be in nursing and residential care facilities (18,020 jobs, Table 11, Appendix A, Page 51); offices of physicians, who are doing more in-office procedures (17,240); about 4,000 jobs each expected in outpatient care facilities, dentists' offices, and offices of other health care practitioners such as chiropractors, optometrists, mental health practitioners, and other therapists; and in hospitals (13,740).

Social assistance continues to be one of the fastest growing industries in Tennessee. Through 2014, growth is expected in individual and family services (5,350 jobs), vocational rehabilitation services (2,350), and child day care services (6,230). Services for families in crisis and the elderly are being expanded, and efforts are being made to better integrate the mentally ill and physically disabled into society.

Growth in educational services is expected to create about 38,450 jobs, with nearly 70 percent in elementary and secondary schools (which are expanding preschool,

after school, and special education programs as well as just keeping up with growth) and 30 percent in four-year colleges and universities, professional schools, and community colleges. With improvement in educational performance a key priority at the state and national levels and with the population steadily growing, these trends can be expected to continue.

Financial Activities. The financial activities sector was expected to be the third fastest growing sector in Tennessee through 2014. Employment in this sector continues to increase through May 2007. Nearly 19,000 jobs are expected to be created in finance and insurance (Table 11, Appendix A, Page 51), with two-thirds in banks, credit unions, and consumer lending and nearly 5,000 in insurance. Another 8,110 were expected in real estate, rental, and leasing, with industry growth rates expected to be more than 2 percent. If the national slowdown in construction due to increasing inventories of houses and the instabilities due to subprime lending practices continue, the short-term growth in this sector could be less than expected.

Highest Number of Jobs. The trade, transportation, and utilities industries combined are the largest portion of the service-providing industries, with more than 588,000 jobs in 2004. Of these, about half the jobs are in retail trade, and one-fifth are in wholesale trade. The wholesale industry has made tremendous strides in improving productivity in recent years. With Tennessee as a distribution hub for truck, rail, water, and air, the wholesale industry remains strong. Retail trade is a large employment sector (Figure 2, Page 11), and the growth in jobs will depend on growth in consumers' incomes and expenditure patterns. For retail trade as a whole, annual growth in employment of 1.5 percent per year is expected.

III. Key Industry Sectors and Employment, Wages, and Income Within Local Workforce Investment Areas (LWIAs)

Five Key Industry Sectors Considered. Three industry sectors were identified as key, since they comprise 52.6 percent of total Tennessee employment and are expected to remain the largest sectors through 2014 (Table 1, Page 17). Two more industries are included as key on the basis of having a high number of jobs or a healthy growth rate.

The largest sectors are: (1) trade, transportation, and utilities, with 588,480 jobs; (2) education and health services, with 525,120 jobs and a high growth rate; and (3) manufacturing, with 411,500 jobs. Professional and business services is included as a key sector since it has both large employment and a high growth rate. The financial activities sector is included because it has a high growth rate.

- Trade, transportation, and utilities — numerous jobs.
- Education and health services — numerous jobs, high growth rate.
- Manufacturing — numerous jobs.
- Professional and business services — numerous jobs, high growth rate.
- Financial activities — high growth rate.

Table 2 (Page 21) contains employment by LWIA (Figure 4, Page 20) for these five key industry sectors. The following facts are included in the table: (1) The distribution of key industry sector employment by LWIA and (2) Per capita income by LWIA. Comparison of Table 2 (Page 21) with Table 1 (Page 17), which contains the average weekly wages for sectors, is fruitful, as the differential impact of job loss or gain on each LWIA can be construed by comparing tables.

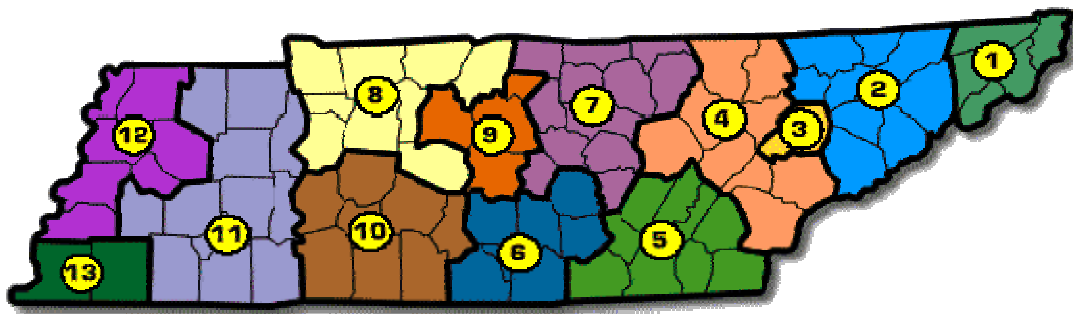


Figure 4. The 13 Local Workforce Investment Areas in Tennessee, From the Tennessee Higher Education Commission.

Table 2. Relation Between Per Capita Income and Percentage of Selected Industry Sectors Within Local Workforce Investment Areas (LWIAs), Tennessee, 2004

LWIA	Location	2004 Employment Estimate	Per Capita Income, 2005	Trade, Transportation, Utilities Services		Health, Education Services	
				2004 Employment	Percentage Within LWIA	2004 Employment	Percentage Within LWIA
State		2,901,010	\$30,970	588,480	20.3%	525,120	18.1%
	9 Davidson	595,640	\$38,110	116,860	19.6%	106,940	18.0%
	13 Shelby	564,660	\$35,930	149,640	26.5%	97,100	17.2%
	8 North West Middle	222,550	\$34,290	38,610	17.3%	40,340	18.1%
	3 Knox	244,900	\$32,820	51,550	21.0%	52,370	21.4%
	5 Hamilton	300,730	\$30,610	64,370	21.4%	47,940	15.9%
	1 Tri-Cities	159,380	\$26,960	27,230	17.1%	33,930	21.3%
	4 West of Knox	173,560	\$26,110	29,270	16.9%	30,350	17.5%
	6 West of Hamilton	88,900	\$26,090	14,440	16.2%	14,660	16.5%
	11 Jackson	150,010	\$25,410	26,330	17.6%	32,440	21.6%
	2 East of Knox	160,290	\$25,080	29,880	18.6%	25,150	15.7%
	12 North West	78,150	\$25,070	13,010	16.6%	13,280	17.0%
	10 Southwest Middle	82,870	\$24,270	13,580	16.4%	15,230	18.4%
	7 North East Middle	78,970	\$24,110	13,730	17.4%	15,380	19.5%

LWIA	Location	Manufacturing		Professional and Business Services		Finance, Accounting Services	
		2004 Employment	Percentage Within LWIA	2004 Employment	Percentage Within LWIA	2004 Employment	Percentage Within LWIA
State		411,500	14.2%	298,680	10.3%	139,790	4.8%
	9 Davidson	56,690	9.5%	74,910	12.6%	31,570	5.3%
	13 Shelby	40,810	7.2%	69,220	12.3%	29,610	5.2%
	8 North West Middle	31,470	14.1%	23,720	10.7%	14,160	6.4%
	3 Knox	17,900	7.3%	27,800	11.4%	11,910	4.9%
	5 Hamilton	49,160	16.3%	30,010	10.0%	18,910	6.3%
	1 Tri-Cities	26,270	16.5%	12,380	7.8%	6,700	4.2%
	4 West of Knox	34,000	19.6%	19,290	11.1%	6,100	3.5%
	6 West of Hamilton	23,280	26.2%	8,340	9.4%	2,360	2.7%
	11 Jackson	32,790	21.9%	9,570	6.4%	4,510	3.0%
	2 East of Knox	35,990	22.5%	9,160	5.7%	5,640	3.5%
	12 North West	22,150	28.3%	4,470	5.7%	2,690	3.4%
	10 Southwest Middle	22,510	27.2%	5,210	6.3%	3,170	3.8%
	7 North East Middle	18,500	23.4%	4,620	5.9%	2,440	3.1%

Table 2, continued

	LWIAs with above-average per capita income
	LWIAs with below-average per capita income

Correlation of Percentage with Per Capita Income*	
Trade, Transportation, Utilities	0.670
Health, Education Services	-0.041
Manufacturing	-0.889
Finance, Accounting	0.802
Professional, Business Services	0.855

*Income is generally lower for LWIAs with higher percentages of manufacturing employment; income is generally higher for LWIAs with higher employment percentages in trade, transportation, and utilities; finance and accounting; and professional and business services. There is little relationship of income with health and education services employment. The decline of manufacturing jobs, which have relatively high pay, therefore, presents a substantial monetary disadvantage for lower income LWIAs.

Trade, Transportation, and Utilities

The employment distribution for key industries varies considerably within the 13 LWIAs, with principle employment in four LWIAs. The areas with the highest percentage of their employment in trade, transportation, and utilities are LWIAs 13 (Shelby County), 5 (Hamilton County), 3 (Knox County), and 9 (Davidson County). (See Table 2, Page 21.) It is not surprising that transportation is rooted in the large cities, the centers of population, but LWIA 13 (Memphis) has the impressive lead. These LWIAs tend to have higher per capita income (Table 2, Page 21 and 22, correlation 0.670). These are leading trade and transportation hubs.

- Shelby County.
- Hamilton County.
- Knox County.
- Davidson County.

Education and Health Care Services

The LWIAs with the highest percentage of employees in education and health care services are these four: LWIA 11 (just west of the Tennessee River in West Tennessee, including Jackson, the campus of The University of Tennessee at Martin, other universities, and 12 county and additional city school districts); LWIA 3 (having The University of Tennessee at the Knoxville campus); LWIA 1 (Tri-Cities area, with five county school districts and the East Tennessee State University campus); and LWIA 7 (northeast Middle Tennessee with a likely root in Cookeville at Tennessee Technological University). The LWIAs with higher percentages of employment in education and health care services vary widely in per capita income. These are areas with the greatest proportions of their employment in education and health care services:

- LWIA 11 — includes cities of Jackson, Martin.
- LWIA 3 — Knox County.
- LWIA 1 — Tri-Cities area.
- LWIA 7 — includes Cookeville area.

Manufacturing

Employment in manufacturing in 2004 represented 14 percent of the state's employment. The LWIAs with the highest proportion of their employment in manufacturing have almost doubled this percentage. LWIA 12, at 28 percent, includes seven counties in upper West Tennessee. LWIA 10 (including Maury County) has about 27 percent of its employment in manufacturing. LWIA 6 (seven counties, including Coffee) has 26 percent in manufacturing. The highest proportions of employment in manufacturing are found in the following areas:

- Northwest Tennessee.
- South and west of Nashville.
- West of Chattanooga.

Results of Lost Manufacturing Jobs. The LWIAs with the lowest percentages of employment in manufacturing generally include the largest metropolitan areas, such as the Memphis, Nashville, and Knoxville LWIAs, which also have relatively high income (Table 2, Page 21). A statistical comparison demonstrates that the higher the percentage of manufacturing employment in the LWIA, the lower the per capita income (correlation of -0.889).

The correlation of income of LWIA with its percentage of manufacturing (Table 2, Page 21), correlation -0.889, bottom of table) suggests that manufacturing loss may have a severe impact on total wage for the LWIA. Manufacturing jobs not only have relatively high wages, but the ratio of wages to training is high. Replacement of lost jobs will require increased training, since jobs of equal wage require more education than the manufacturing jobs lost.

- Manufacturing jobs have relatively high wages.
- The wage to training ratio is high for manufacturing jobs — relatively little training for a greater wage.
- Manufacturing jobs are generally located in areas of relatively low income.
- Lost manufacturing jobs bring lost total income. The positive relationship between training and employment status suggests training could possibly remedy the loss.

Most Rapidly Growing Industries in LWIAs. An analysis of the most rapidly growing industries in the state shows employment distributed across the LWIAs (Table 2, Page 21). The three most rapidly growing sectors in the state to 2014 are expected to be professional and business services, education and health services (discussed above), and financial activities.

The fast growing occupations (Table 7, Page 38), as expected, include many occupations from the rapidly growing industries. These include the computer professions from the professional and business services, such as network systems and data communications analysts. Some, such as medical assistants, come from educational and health services.

Professional and Business Services

Professional and business services are concentrated in the urban areas, where the businesses they serve are located (Table 2, Page 21). The LWIAs with the largest proportions of employment expected in this sector include LWIAs 9 (Davidson-Rutherford area) with 12.6 percent, 13 (Shelby County area) with 12.3 percent, and 3 (Knox County) with 11.4 percent. LWIA 9 (Davidson County) includes the headquarters of several prominent corporations. Shelby County also includes corporate headquarters, where decisions are made on contract services.

- Davidson County (9)
- Shelby County Area (13)
- Knox County (3)

The distribution of employment for education and health services within the LWIAs is described above (Table 2, Page 21). This industry sector is the second most rapidly growing in Tennessee, as well as having the second largest number of jobs in the state. With more than 640,000 jobs expected by 2014, this sector is vital to the state economy.

Financial Activities

Financial activities (Table 2, Page 21), the third most rapidly growing industry sector encompassing banking and credit, investments, real estate, and insurance, are also concentrated in the urban centers. The LWIAs with the highest proportions of employment in financial activities include LWIA 8, the nine-county area including Williamson County, with 6.4 percent; LWIA 5, with significant insurance employment; and LWIA 9, including Davidson and Rutherford counties, with 5.3 percent of employment in this sector. Table 2 contains the distribution of key rapidly growing industry sector employment within the LWIAs.

- Williamson County (LWIA 8)
- Hamilton County (LWIA 5)
- Davidson County (LWIA 9)

Emerging Industries and Economic and Workforce Development

Tennessee is poised to lead the way in alternative fuels production, with the approval of funding for a proposed \$40 million ethanol plant in East Tennessee and a \$125 million grant from the United States Department of Energy for a bioenergy center at the Oak Ridge National Laboratory. Other state funding is available for developing “green islands,” or distribution centers for biofuels in Tennessee. Biofuels include ethanol and biodiesel. Biofuels can be made from corn and soybeans, and research is under way on the feasibility of developing cellulosic-based fuels from plants such as switchgrass or the tulip poplar (Owenby, 2007). Jobs related to alternative fuels production would include farmers and/or foresters needed to grow and harvest crops, refining and distribution jobs, and agricultural scientists to develop new types of fuel and refining processes.

The Tennessee Valley Authority, through the Green Power Switch program (www.greenpowerswitch.com), has added to its hydroelectric generation the capacity for wind and solar energy generation. This is partially financed through consumer checkoff on electricity bills. In addition, consumers who generate their own power through alternative means can sell excess power back to TVA through the grid.

These initiatives have the potential for creating new industries, especially in the rural areas of Tennessee where job creation is at a premium.

The labor requirements for renewable energy range from collecting fuel to manufacturing components to building and running power plants. Policy and technological advances have caused this industry to develop steadily in the past decade, providing a variety of job opportunities both at home and abroad.

Generally, there are two types of renewable energy: central-station and distributed generation. The majority of the United States’ renewable energy generation comes from

central-station plants such as wind, geothermal, and biomass. This is because the United States has, for so many decades, relied upon electricity generated by large central-station power plants connected by long transmission and distribution wires. With this infrastructure already in place, this trend is not likely to change in the near future. It is predicted in a report published by the Renewable Energy Policy Project in Washington, D.C., (Singh with Fehrs, 2001) that the following jobs will be required for the wind and solar renewable energy industry:

Wind & photovoltaics jobs

- Manufacturing of all finished parts to be incorporated in power plant
- Delivery of goods to power plant
- Construction/installation of power plant, including project management
- Operations and maintenance of power plant

Solar photovoltaic (PV) presents a strategic opportunity for skilled labor as a distributed energy technology. This system is more suited for rooftops, requiring the skills of building trades such as roofers, electricians, and sheet metal workers who previously had no role in electricity generation. Some of the major components of labor requirements for wind power generation will be in the manufacturing and assembly of wind turbine components.

In 2005, Tennessee produced 90 percent of its electricity from two sources: coal and nuclear power. Congress has recently been considering setting a renewable electricity standard, which requires electricity providers to supply a minimum percentage of their power from clean energy sources. Both a 15 and a 20 percent standard are under consideration.

A recent national study (Union of Concerned Scientists, April 2007) using a model from the United States Energy Information Administration examined the potential economic effects for Tennessee of implementing the 20 percent standard. Clean energy dollars go toward high quality jobs in manufacturing and construction, as well as jobs in operations, maintenance, finance, sales, shipping, and other industries. The 20 percent standard is expected to generate 4,300 new jobs in Tennessee, as wind, bioenergy, and solar power resources are expanded. Many of the new jobs would be in rural areas.

Tennessee would gain not only from renewable energy generating facilities but from the manufacture and assembly of components for renewable energy facilities. In meeting the national standard, 960 new long-term jobs would be created in the manufacture of components for wind turbines, solar photovoltaic panels and films, biomass facilities, and geothermal power plants, which would rank Tennessee 17th among all states and boost opportunities for exports.

In addition to creating jobs, Tennessee would reap the economic benefit of \$538 million in new capital investment in renewable energy, \$1.79 billion in new income for farmers and rural landowners, and \$21 million in new property tax revenues to help local governments fund schools and other public services.

IV. Educational Attainment, Income, Poverty, and Unemployment Within LWIAs

Most studies show that education is critical for reducing unemployment and increasing personal income. Educational attainment (measured by the percentage of the population with a high school diploma) is highest in Knox County in LWIA 3, which is followed closely north and west of Davidson County by LWIA 8 (which includes Williamson County), Davidson County in LWIA 9, and Shelby County in LWIA 13 (Table 3, Page 28). Hamilton County, LWIA 5, also ranks relatively high. Most other LWIAs are close in rank. The Upper Cumberland Mountain area north of Interstate 40, LWIA 7, is at the bottom. LWIA 7 is noted for its relatively high percentage of health and education services (Table 3, Page 28). Poverty is correlated with rural location (Center for Business and Economic Research, 2007, 47) and with unemployment.

Surprisingly, LWIA 7 shows one of the lesser increases in poverty from 2000 to 2004 (Table 4, Page 29), although it continues to be relatively impoverished. Nonintuitively, the LWIAs that tend to be leaders in educational attainment also tend to show the greatest growth in poverty from 2000 to 2004. Factors such as lack of transportation and affordable housing and housing discrimination in suburban and rural areas, as well as proximity to services, may explain this. Also, as the skill levels of jobs in urban areas increase, those without appropriate skills may end up unemployed and impoverished.

Researchers in the state show the top 10 percent share of United States income to be at historical, predepression levels (Center for Business and Economic Research: 2007, 39). The continuation of top 10 percent "income piling" (Center for Business and Economic Research: 2007, 41-42) does not bode well for the historically healthy relationship between increasing pay and workers preparing for these jobs. Salary will no longer be an encouragement. In addition, greater inequality has negative effects on the health status of a population. (Auerbach and Krimgold, 2001)

There are additional complexities. Education and salary issues may involve short-term phenomena not related to long-term needs. Relatively short-term training toward a technical degree may pay more, at least in the near term, than a four-year degree. Emphasis on higher demand occupations that are low skill and low pay may bias toward short-term preparation. This research, however, shows that skills and knowledge most in demand appear to be compatible with four-year degree programs (Table 9, Page 48. Table 10, Page 50). The four-year degree is arguably the best insurance against hurtful impacts of slow recovery from economic slowdowns (Figures 8 and 9, Page 34).

Table 3. Educational Attainment by LWIA, Tennessee, 2005

LWIA	Location	Population	Number with HS diploma	Number with BA	PCT with HS Diploma	PCT with BA
0	State	6,038,800	4,583,450	1,183,610	75.9%	19.6%
7	North East Middle	232,550	152,190	27,400	65.4%	11.8%
2	East of Knox	429,390	292,430	48,070	68.1%	11.2%
12	North West	224,440	155,300	22,720	69.2%	10.1%
6	West of Hamilton	229,670	161,120	29,460	70.2%	12.8%
11	Jackson	360,170	255,270	48,130	70.9%	13.4%
10	Southwest Middle	237,280	168,860	24,850	71.2%	10.5%
4	West of Knox	469,010	341,790	69,270	72.9%	14.8%
1	Tri-Cities	362,420	267,780	64,600	73.9%	17.8%
5	Hamilton	570,420	429,610	104,960	75.3%	18.4%
13	Shelby	947,540	761,930	235,210	80.4%	24.8%
9	Davidson	919,370	747,780	249,990	81.3%	27.2%
8	North West Middle	644,570	526,280	150,000	81.6%	23.3%
3	Knox	411,970	339,870	119,470	82.5%	29.0%

Source: US Census, http://quickfacts.census.gov/qfd/download_data.html, 2005 Data, derived and compiled by Department of Labor and Workforce Development, Research and Statistics, 6/29/2007

The data suggest some of the migration dynamics that may be occurring. There could be some exurban immigration by persons of higher income into areas surrounding the urban LWIAs and some individuals with lower income migrating into the urban areas. (Exurban refers to those who dwell well beyond the cities and the suburbs. Urban sprawl is a related phenomenon.) This research supports other research showing individuals with lower income are migrating into urban areas in the United States (Wheeler, 2007), and in Tennessee (Morgan, 2007). The growing poverty in the midst of education and abundance begs for more research. This research finds the following:

- The percentage of poor increased from 2000 to 2004.
- Poverty shows resurgence in the relatively well-to-do LWIAs, implying increasing inequality and economic polarization.
- Poverty increased more in Tennessee (from 12.6 to 15 percent) than in the United States.

Table 4. Number of Poor, LWIAs in Tennessee, 2004

LWIA	Location	2000			2004			Growth in Poverty Percent
		Number in Poverty	Percent in Poverty	Population	Number in Poverty	Percent in Poverty	Population	
7	North East Middle	33,550	15.3%	218,990	36,860	16.3%	224,390	6.3%
2	East of Knox	59,500	14.9%	399,050	68,120	16.3%	412,980	9.1%
11	Jackson	50,920	14.9%	342,510	58,530	16.9%	345,720	13.6%
13	Shelby	130,390	14.2%	915,780	175,710	18.9%	930,320	32.5%
12	North West	29,720	14.0%	211,810	34,370	15.9%	214,280	13.5%
6	West of Hamilton	29,140	13.6%	213,960	33,670	15.0%	221,030	10.4%
4	West of Knox	58,150	13.4%	434,450	67,190	14.7%	450,500	10.0%
1	Tri-Cities	45,720	13.3%	344,570	53,880	15.4%	348,550	15.9%
10	Southwest Middle	28,360	12.9%	219,480	33,260	14.5%	227,300	12.2%
5	Hamilton	67,610	12.5%	542,870	82,140	14.8%	552,490	19.1%
3	Knox	40,520	10.8%	375,190	54,650	13.8%	389,850	27.8%
9	Davidson	87,880	10.6%	832,030	118,070	13.5%	862,980	27.5%
8	North West Middle	48,110	8.4%	570,480	60,330	9.6%	606,610	14.4%
	Tennessee	709,560	12.6%	5,631,390	876,760	15.0%	5,845,090	19.0%
	United States (thousands)	31,581	11.3%	279,479	37,040	12.7%	291,652	12.4%

Source: US Census Bureau Small Area Income and Poverty Estimates, Table Created by Department of Labor and Workforce Development, Research and Statistics, Tennessee State Government, 6/26/2007

Tennessee's unemployment rate was lower than the nation's in the 1991-1992 downturn but by 1997 the rate was the same (Figure 5, Page 30). In the 2000-2001 downturn, Tennessee's unemployment paralleled the United States. Rates for 2004 through 2006, however, surpass the nation's. A look at the unemployment rate for 1990 through 2006 by LWIA emphasizes those LWIAs that are weakened most by both the 1990 and 2000 downturns (Figure 6, Page 31).

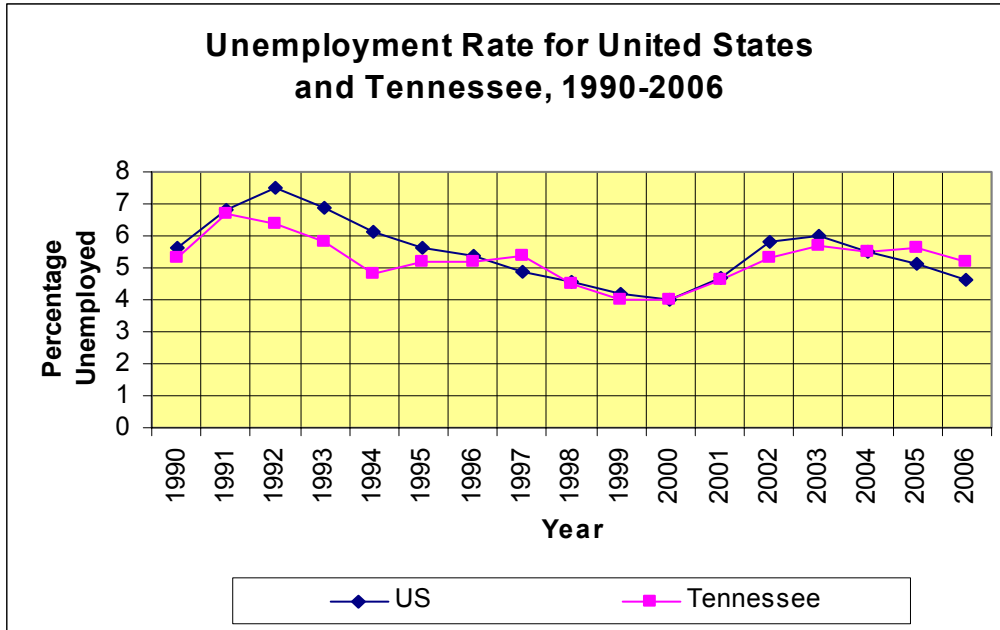


Figure 5. Unemployment Rate for United States and Tennessee, 1990-2006

Some LWIAs have lower unemployment rates than others. LWIAs for Knoxville (3), Nashville (9), and North West Middle Tennessee (8) show fairly little increase in unemployment during slowdowns, but others are more affected, including the LWIAs of South West Middle Tennessee (10), Northern Cumberland (7), North West (12), and the Eastern section of West Tennessee (11). The counties (2) just north of Knoxville can be included and also LWIAs (6) west of Chattanooga and (13) Shelby County.

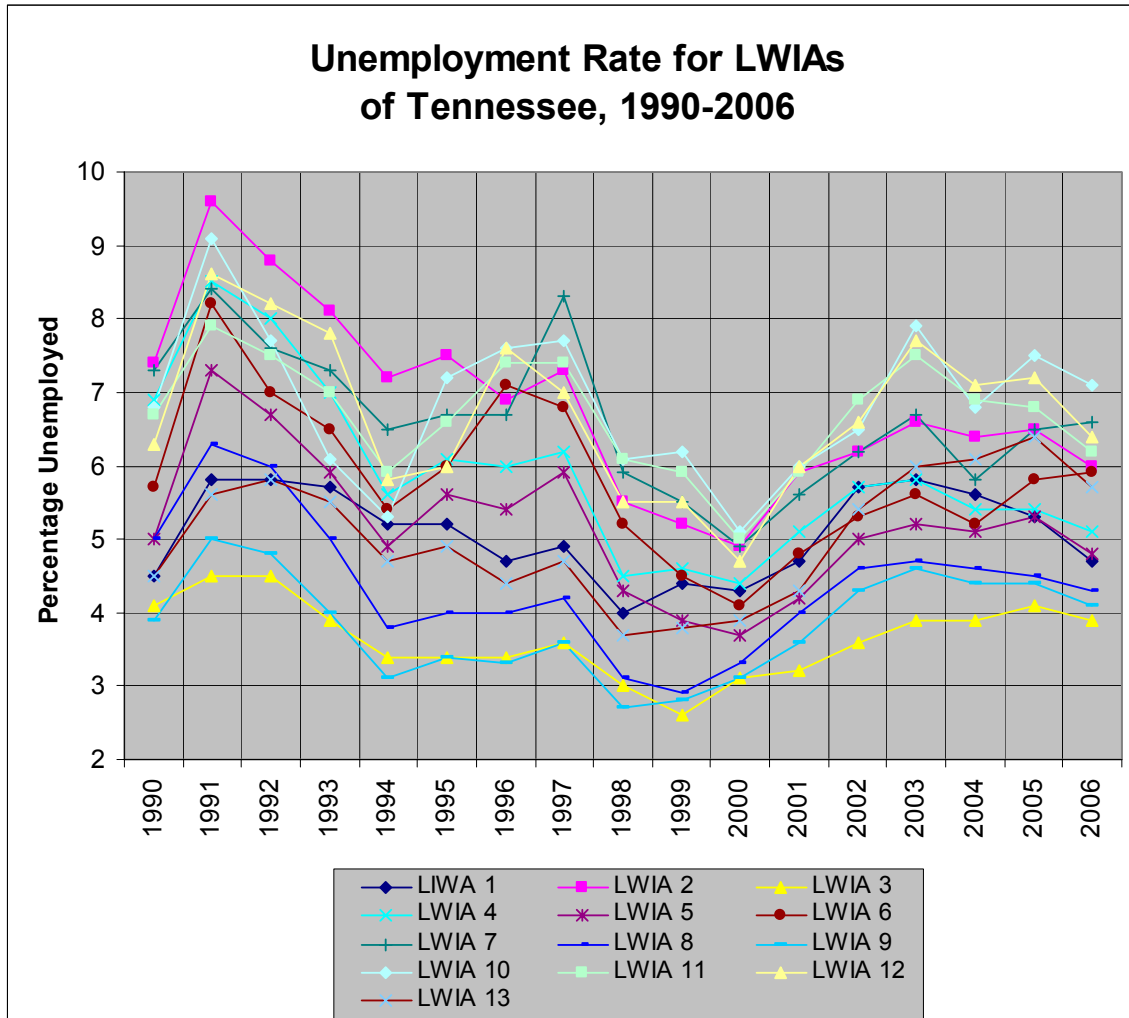


Figure 6. Unemployment Rate for LWIAs of Tennessee, 1990-2006

A look at the unemployment experience after 2000 (Figure 7, Page 32) shows more detail for the 13 LWIAs. The sharp upward increases for some LWIAs are yet to be undone by 2006. These include LWIAs 10 (South West Middle Tennessee), 12 (North West Tennessee), 7 (Northern Cumberland), and 11 (Eastern part of West Tennessee), 2 (North of Knoxville), and 6 (West of Chattanooga). All these LWIAs were at or below 5 percent unemployment in 2000 but were at 5.5 and above in 2006. However, most areas showed decreases in unemployment from 2005 to 2006.

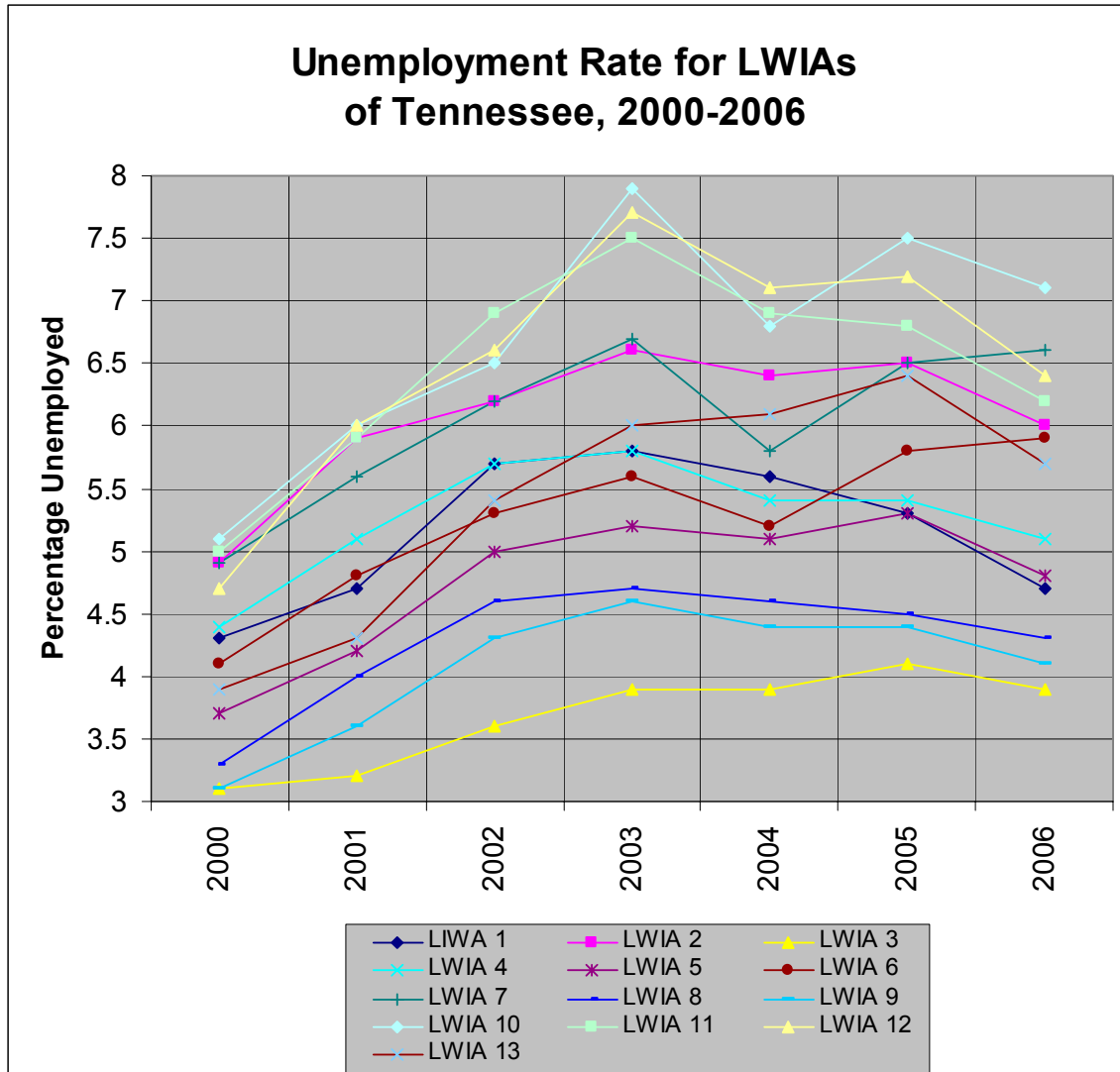


Figure 7. Unemployment Rate for LWIAs of Tennessee, 2000-2006

Table 5 (Page 33) contains comparisons of 2000 to 2006 rates for the nation, state, and LWIAs. These show LWIAs 10, 11, 12, and 13 with a greater increase in unemployment than the nation. The state did not decrease as much as the nation during the 2002 to 2003 period, but by 2006 all LWIAs' unemployment rate increases (with the exception of the Tri-Cities) are greater than the nation's. Tennessee was indeed slower to be affected by the downturn, but over the period was affected perhaps more. By April 2007, however, unemployment rates for Tennessee appear to be approaching those of the nation (Figure 10, Page 35). Tennessee is projected to have a stronger post-2010 job growth rate than the nation⁶ (Center for Business and Economic Research, 2007).

Table 5. Increase in Percentage Unemployed, United States, Tennessee, and LWIAs

LWIA		Percent Unemployed 2000	Percent Unemployed 2003	Percent Unemployed 2006	2000-2003 Change in Percent of Unemployed	2000-2006 Change in Percent of Unemployed
	United States	4.0%	6.0%	4.6%	2.0%	0.6%
	Tennessee	4.0%	5.7%	5.2%	1.7%	1.2%
1	Tri-Cities	4.3%	5.8%	4.7%	1.5%	0.4%
2	East of Knox	4.9%	6.6%	6.0%	1.7%	1.1%
3	Knox	3.1%	3.9%	3.9%	0.8%	0.8%
4	West of Knox	4.4%	5.8%	5.1%	1.4%	0.7%
5	Hamilton	3.7%	5.2%	4.8%	1.5%	1.1%
6	West of Hamilton	4.1%	5.6%	5.9%	1.5%	1.8%
7	North East Middle	4.9%	6.7%	6.6%	1.8%	1.7%
8	North West Middle	3.3%	4.7%	4.3%	1.4%	1.0%
9	Davidson	3.1%	4.6%	4.1%	1.5%	1.0%
10	Southwest Middle	5.1%	7.9%	7.1%	2.8%	2.0%
11	Jackson	5.0%	7.5%	6.2%	2.5%	1.2%
12	North West	4.7%	7.7%	6.4%	3.0%	1.7%
13	Shelby	3.9%	6.0%	5.7%	2.1%	1.8%

Source: <http://www.sourcetrn.org>, "Labor Market Analysis, Labor Force, Labor Force Employment and Unemployment, United States/Statewide/LWIA." Table created by Labor and Workforce Development, Research and Statistics, July, 2007

The unemployment rate inversely corresponds with the percentage of workers with bachelor's degrees or more. This is even stronger than the percentage with high school diplomas. LWIAs with the most education have a lower unemployment rate in the year 2000 ($R = -0.91$, $R\text{ Square} = 0.83$, Figure 8, Page 34). After the economic slowdown, there is still a correlation, but it is slightly weaker ($R = 0.84$, $R\text{ Square} = 0.70$, Figure 12, Appendix B, Page 56). The 2001 slowdown in unemployment (Figure 9, Page 34) shows that the effects vary by LWIA, with 10, 11, 12, and 13 varying by percentage of bachelor's degrees but at a different level than the other LWIAs. LWIAs in West Tennessee and the southwestern areas of Middle Tennessee are outliers from the model. They vary with education but at a higher level of unemployment. These LWIAs were affected more by the slowdown than other areas. LWIAs 10 and 12 have a high representation in manufacturing, which explains much of the outlier phenomenon.

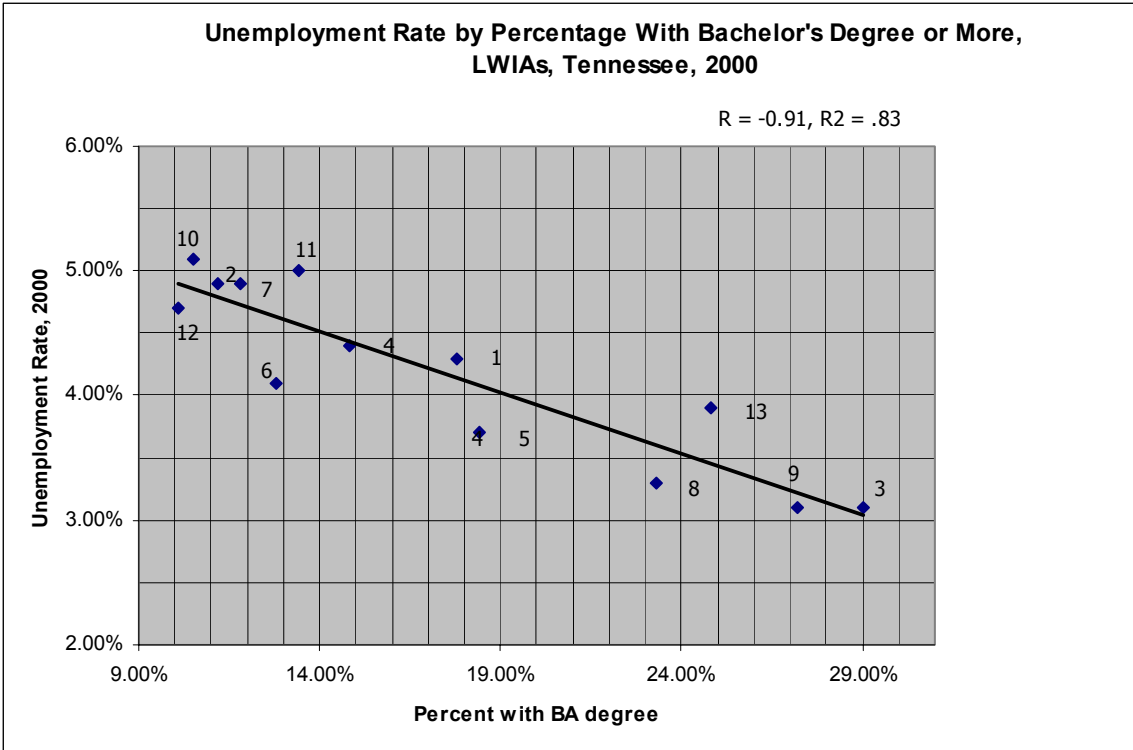


Figure 8. Unemployment Rate by Percentage With Bachelor's Degree or More, LWIAs, Tennessee, 2000

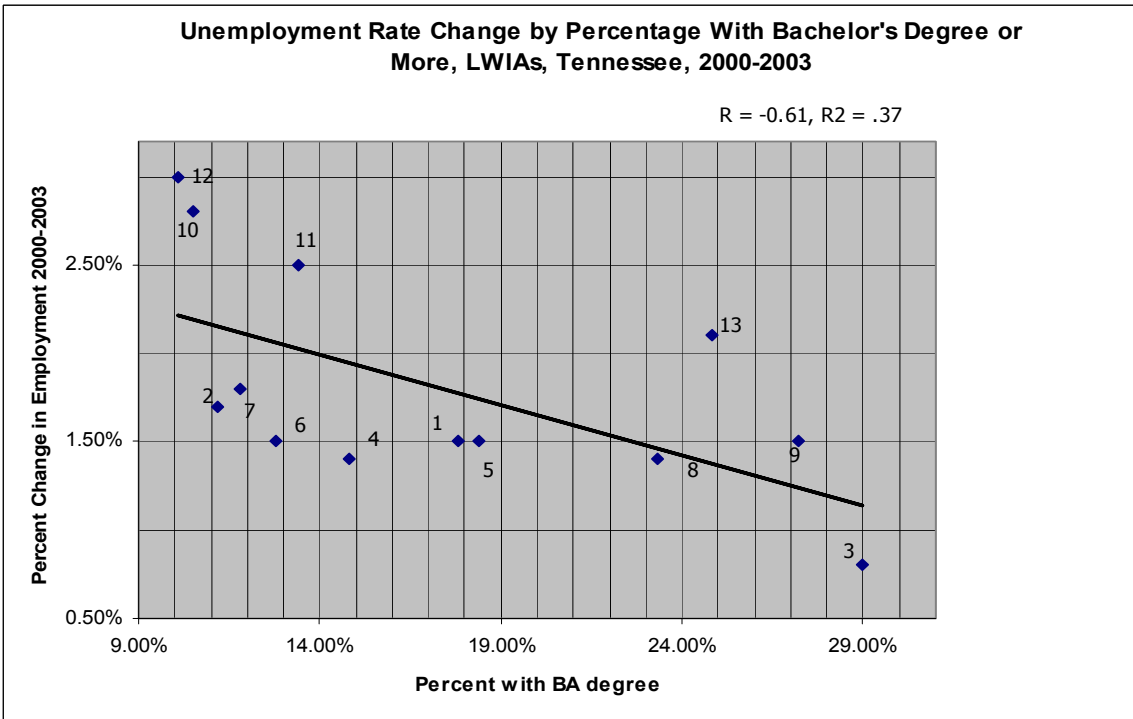


Figure 9. Unemployment Rate Change* After 2001 Slowdown by Percentage With Bachelor's Degree or More, LWIAs, Tennessee, 2000-2003

*See Figure 12, on page 56, Appendix B, for Total Rate of Unemployment in 2003.

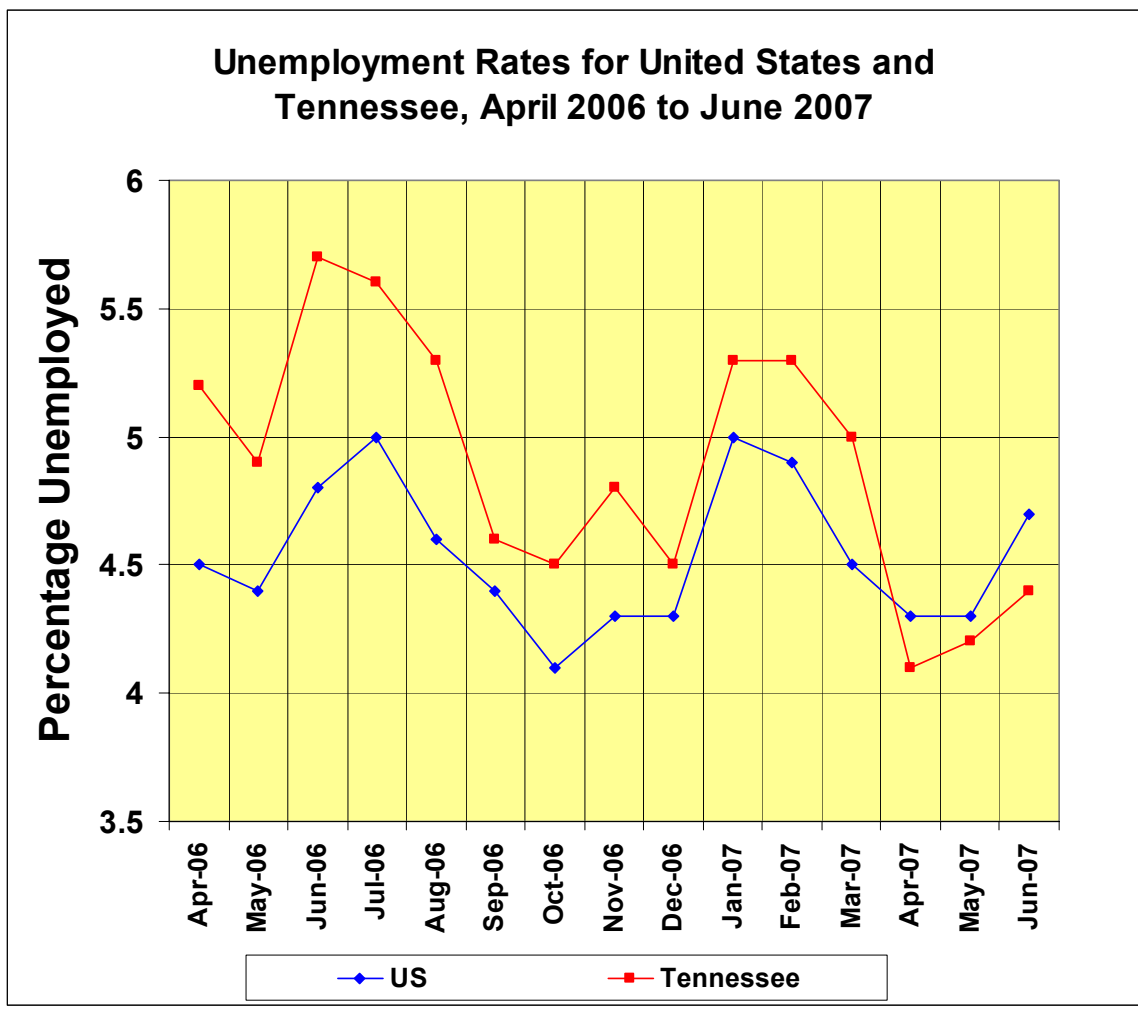


Figure 10. Unemployment Rates for United States and Tennessee, April 2006 to June 2007

The strength of business and professional services and education and health in the cities helps explain the strength of the urban LWIAs. These industries and occupations are growing in providing services, while the mining, manufacturing, and other industries primarily located in the rural areas are declining. Additionally, the urban areas have workers with more advanced training, and the occupations that are growing are those that require more education. The following statements are relevant:

- Service industries are generally located in populated areas.
- Locating exporting service industries in rural areas may help the unemployment rate there.
- Many service industries require more education.
- Advanced training could be strengthened in rural areas.
- Creating jobs in LWIAs having high unemployment can help lower the poverty rate.

Rapidly Declining Occupations

The rapidly declining occupations (Table 6, Page 37) include occupations in production (51), office and administrative (43), and transportation and material moving. These include occupations found in some declining manufacturing industries such as textiles (upholsterers and textile winding operators).

Other occupations (data entry keyers, computer operators, clerks, printing machine operators) are those whose jobs are outsourced to the distributed (personal) computers found on virtually every office desk today. Telemarketers may be squeezed with telephone ID capabilities and Internet availability. Some jobs such as various "feeders," "operators," and "butchers" have reappeared as subtasks in automated procedures under other job titles. Some occupations such as parts salespersons and electrical and electronic equipment assemblers have competition from integrated machinery that can be replaced as a whole. Competitive manufacturing costs do play a role here, with products priced low enough that they can be replaced more cheaply than to repair them with parts. These events do seem to change the occupational framework:

1. Declining manufacturing.
2. Automation, driven by productivity necessary by competition.
3. Distributed computing.
4. Integrated machinery and circuitry.

Manufacturing, computing, and circuitry results not from just domestic factors but from the competitiveness of imported machinery. This fifth factor must be added:

5. Globalization with its cost competitiveness.

Table 6. Top Declining Occupations by Rates, Tennessee, 2004-2014

SOC CODE	OCCUPATION	ANNUAL RATE OF DECLINE	2004 ESTIMATED EMPLOYMENT	2014 PROJECTED EMPLOYMENT	CHANGE
51-6093	Upholsterers	-2.6	2,718	2,078	-640
51-5011	Bindery Workers	-2.5	2,820	2,197	-623
	Textile Winding, Twisting, and Drawing Out Machine Setters, Operators, and Tenders				
51-6064	Tenders	-2.4	1,894	1,485	-409
51-5022	Prepress Technicians and Workers	-2.2	1,990	1,593	-397
43-9011	Computer Operators	-2.0	4,085	3,340	-745
	Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers				
51-6091	Synthetic and Glass Fibers	-1.8	2,491	2,079	-412
	Pressers, Textile, Garment, and Related Materials				
51-6021	Related Materials	-1.7	2,035	1,716	-319
43-9021	Data Entry Keyers	-1.6	7,159	6,065	-1,094
43-4131	Loan Interviewers and Clerks	-1.3	3,766	3,290	-476
	Electrical and Electronic Equipment Assemblers				
51-2022	Assemblers	-1.3	4,473	3,917	-556
51-3021	Butchers and Meat Cutters	-1.3	2,219	1,944	-275
	Mail Clerks and Mail Machine Operators, Except Postal Service				
43-9051	Operators, Except Postal Service	-0.9	1,811	1,659	-152
51-6031	Sewing Machine Operators	-0.8	9,609	8,824	-785
43-5081	Stock Clerks and Order Fillers	-0.8	36,814	33,918	-2,896
	Woodworking Machine Setters, Operators, and Tenders, Except				
51-7042	Sawing	-0.7	2,248	2,086	-162
51-8091	Chemical Plant and System Operators	-0.7	2,435	2,261	-174
51-7011	Cabinetmakers and Bench Carpenters	-0.7	2,356	2,195	-161
41-9041	Telemarketers	-0.6	7,531	7,087	-444
51-5023	Printing Machine Operators	-0.6	4,908	4,630	-278
53-7063	Machine Feeders and Offbearers	-0.5	4,828	4,613	-215
43-4151	Order Clerks	-0.4	5,177	4,953	-224
41-2022	Parts Salespersons	-0.3	6,618	6,403	-215
	Secretaries, Except Legal, Medical, and Executive				
43-6014	Secretaries, Except Legal, Medical, and Executive	-0.3	34,946	33,842	-1,104
	Laborers and Freight, Stock, and Material Movers, Hand				
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	-0.3	69,244	67,336	-1,908
	Mixing and Blending Machine Setters, Operators, and Tenders				
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	-0.3	3,417	3,324	-93

Source: Tennessee Department of Labor and Workforce Development, Research and Statistics, 2006

Table 7. Occupations With High Growth Rates, Tennessee, 2004-2014

Code	Occupation	Median Annual Wage	Average Annual Openings	Education	Annual Growth Rates
15-1081	Network Systems and Data Communications Analysts	\$55,000	210	BA	5.1%
15-1032	Computer Software Engineers, Systems Software	\$67,200	180	BA	4.6%
15-1031	Computer Software Engineers, Applications	\$63,600	190	BA	4.1%
31-9092	Medical Assistants	\$22,975	540	Moderate Term	3.9%
15-1071	Network and Computer Systems Administrators	\$56,000	220	BA	3.9%
41-3031	Securities, Commodities, and Financial Services Sales Agents	\$62,300	170	BA	3.7%
31-9091	Dental Assistants	\$29,700	340	Moderate Term	3.7%
29-2021	Dental Hygienists	\$53,200	140	AA	3.7%
23-2011	Paralegals and Legal Assistants	\$33,800	220	AA	3.7%
21-2021	Directors, Religious Activities and Education	\$37,500	220	BA	3.7%
37-2021	Pest Control Workers	\$25,400	100	Moderate Term	3.6%
25-2011	Preschool Teachers, Except Special Education	\$16,300	480	Post Second	3.2%
21-2011	Clergy	\$36,200	460	1 Prof	3.1%
15-1051	Computer Systems Analysts	\$60,500	320	BA	3.1%
43-6012	Legal Secretaries	\$30,800	190	Post Second	3.0%
33-2011	Fire Fighters	\$33,800	390	Long Term	2.9%
25-2041	Special Education Teachers, Preschool, Kindergarten, and Elementary	\$39,200	230	BA	2.9%
21-1023	Mental Health and Substance Abuse Social Workers	\$27,500	140	MA	2.9%
13-1011	Agents and Business Managers of Artists, Performers, and Athletes	\$55,700	90	BA + Work	2.8%
49-3011	Aircraft Mechanics and Service Technicians	\$48,871	150	Post Second	2.7%
43-3011	Bill and Account Collectors	\$27,000	590	Short Term	2.7%
31-2021	Physical Therapist Assistants	\$39,900	100	AA	2.7%
31-1011	Home Health Aides	\$17,200	360	Short Term	2.7%
11-3021	Computer and Information Systems Managers	\$71,500	260	BA + Work	2.7%
21-1015	Rehabilitation Counselors	\$21,200	130	MA	2.6%

V. Occupational Employment to 2014 in Tennessee

The industry growth trends described in Sections II and III, analysis of national trends, and results from the Tennessee Occupational Employment and Wages Survey were used to project expected occupational growth trends to 2014. Figure 11 (Page 40) shows the expected annual openings for demand occupations in Tennessee.

- Demand occupations can be defined as those with more demand than supply in growing occupational areas and those requiring more than short-term training.

The three categories with the largest number of openings are service, professional and related, and office and administrative support occupations. In addition, more than 12,000 jobs are expected in the sales occupations. More than 4,000 jobs are expected in the management and business, and construction and extraction occupations as well. Many of the most rapidly growing occupations are within the professional and related occupations category.

Occupational Growth and Shortages

More than half the occupations expected to grow the fastest in Tennessee through 2014 are professional and technical occupations (Table 7, Page 38). Five occupations are in the service area, and two are in office and administrative support.

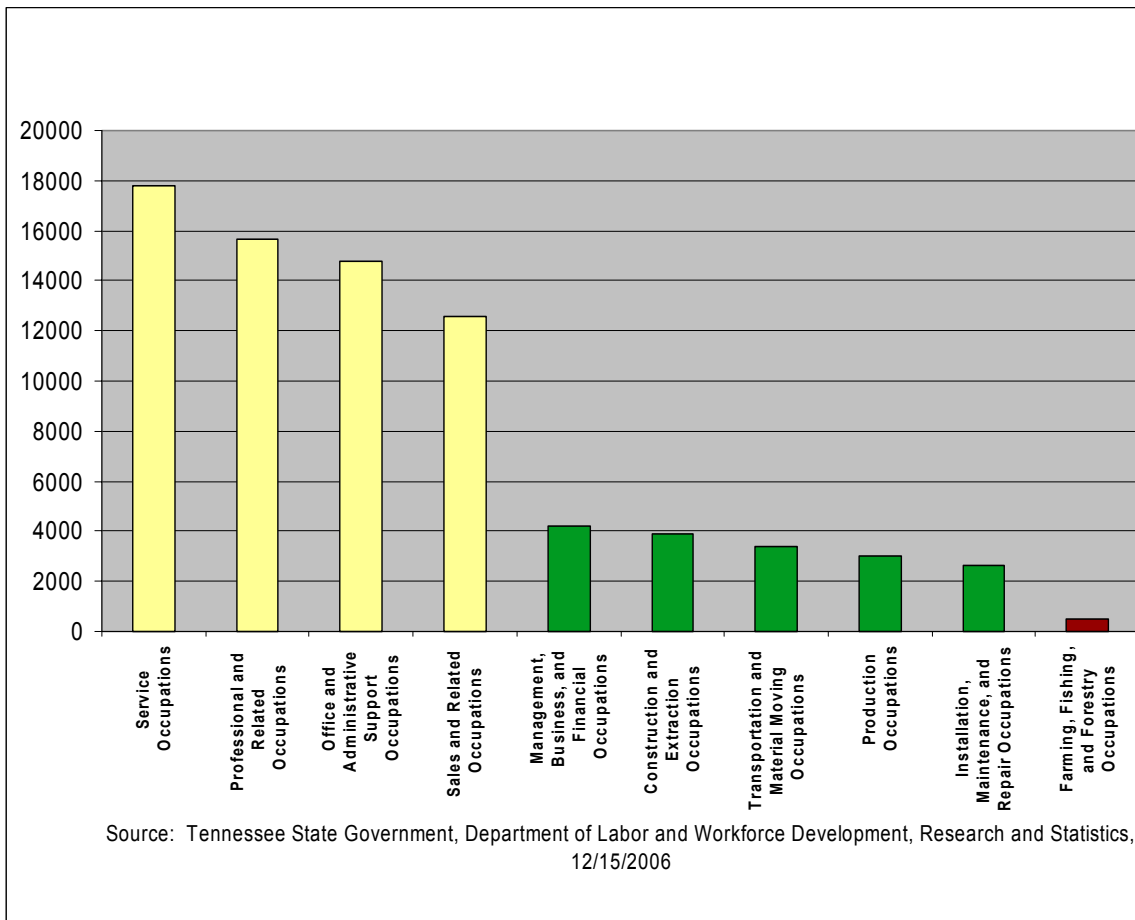


Figure 11. Annual Openings for Demand Occupations by Industry Sectors, Tennessee, 2004-2014

The industries in which these occupations are most commonly found are among the largest or fastest growing in Tennessee, such as education and health services, information, personal and business services, and transportation.

The education requirements for these fast growing and generally high wage occupations (Table 7, Page 38) are significant. All but two of these occupations (bill and account collectors and home health aides) require more than short-term training. Three require moderate-term training. About one-third, or seven of 25, require long-term, some postsecondary training, or an associate's degree. The remaining half requires a bachelor's degree or more. The importance of young adults and other job seekers obtaining education beyond high school is clear.

Clusters

Table 8 (Page 43) identifies occupational clusters in Tennessee that are expected to experience shortages of workers through the year 2014. The clusters are listed within six broad areas:

- **Administrative and Finance**
- **Health Care**
- **Hospitality and Tourism**
- **Human Services**
- **Production, Construction, and Transportation**
- **Agriculture, Science, and Engineering/Technology**

Significant shortages of workers are expected to exist in finance and administration, sales, and service but also in several areas of health care, education, human services, science, and engineering and technology. Filling many of these shortages will require continued attention to improving high school and college graduation rates, improving the transition from high school to postsecondary education, and focusing on key shortage areas to encourage programs of talent development and retention.

One area of significant concern has been the shortage of registered nurses. A recent study cited in the Vanderbilt Reporter (Rivers, 2007) estimated an expected national shortfall of 340,000 nurses by 2020, lowered from a previous shortfall of 760,000. The estimate was reduced due to large numbers of individuals in their late 20s and early 30s entering the profession. There is still, however a continuing need for trained nursing personnel in Tennessee. Meeting this need is made more difficult by the shortage in Tennessee of nursing instructors and space for operating nursing education programs (Griffith, 2007).

Another area of considerable concern has been teacher shortages. The Southern Regional Education Board (SREB), in reviewing a decade of studies on teacher shortages in Tennessee, stated that there is no such thing as a simple "teacher shortage." Shortages

are concentrated by subject, geography, and even the age of children to be taught. Shortages do exist in some areas — science, math, special education (especially visual and hearing disabilities), and foreign languages. New federal legislation passed in 2007 to provide more incentives for science and math teachers is directed at these shortages.

Urban districts may have shortages in areas that have an abundance of teachers, such as social studies. Teacher retention is as important as teacher recruitment. SREB states, “Reducing the turnover of beginning teachers is the key to reducing teacher shortages.” (Jackson, 2006). Ten of the 16 states in SREB require teachers to participate in state supported mentor programs. Tennessee’s program is voluntary; however, Tennessee has raised pay for beginning teachers in 2007.

Other shortages loom in the construction and transportation sectors. As gas prices continue to climb, public transportation ridership has increased. In Nashville, the Metropolitan Transit Authority saw passenger trips increase 16 percent from the previous year and faced continuing driver shortages – especially of operators who have effective people skills (Harless, 2007).

Concerns about shortages of industrial craft labor in the Southeast due to regional growth and utility company expansion and maintenance requirements promoted the formation of the Southeastern Manpower Tripartite Alliance in 2005 (Haskew, 2007). In October 2006, it received a report that the industrial construction sector was close to full employment and was expected to increase 25 percent in the next two years, remaining high through 2010. Shortages of painters, ironworkers, pipefitters, and insulators were forecast. New power generation capacity was expected to create shortages of electricians, insulators, and boilermakers.

Table 8. Selected Shortages in Occupational Areas, Tennessee, 2004 to 2014

Occupational Demand Clusters ^{1,2}	Annual Growth Rate	Demand Minus Trained Workers
Administrative and Finance		
Administrative Support, General	1.2%	6620
Administrative Support, Finance & Insurance	1.9%	1680
Administrative Support, Accounting	0.9%	1330
Personnel Occupations	2.2%	740
Public Administration	1.8%	340
Accounting and Financial Management	2.0%	150
Health Care		
Dental Assisting	3.7%	130
Physical Therapy Assisting	2.6%	50
Pharmacists	1.8%	30
Industrial Hygiene	1.5%	30
Hospitality and Tourism		
Travel Services	1.3%	270
Hotel/Restaurant Management	1.3%	260
Baking Occupations	0.5%	60
Human Services		
Care of Children and Youth	1.3%	1250
Elementary Teaching	1.9%	790
Secondary and Vocational Education	1.6%	760
Preschool and Kindergarten Teaching	2.8%	560
Law Enforcement	1.9%	460
Fire Control and Safety	2.7%	410
Social Work	2.1%	320
Special Education Teaching	2.7%	160
Adult and Continuing Education	1.8%	130
Human Services Workers	2.4%	80
Librarians	1.1%	40
Production, Construction, and Transportation		
Truck, Bus, And Heavy Equipment Operators	1.6%	2700
Miscellaneous Construction Trades	1.5%	1430
Building Maintenance	1.7%	1230
Machine Tool Technology	0.4%	840
Quality Control And Safety	0.5%	440
Plumbing And Pipefitting	1.8%	350
Construction Technology	1.6%	340
Electrician Occupations	1.6%	330
Chemical Technology	0.8%	190
Welding Technology	1.0%	170

Heavy Equipment Repair	1.6%	160
Water And Wastewater Technology	1.9%	140
Brick, Block, and Stonemasonry	2.3%	120
Electrical and Power Transmission Installation	1.0%	120
Electromechanical Instrument Production/Repair	0.6%	100
Diesel Engine Repair	1.9%	90
Sheet Metal	1.8%	90
Biomedical Equipment Technology	1.8%	40
Optical Technology	1.8%	30
Agriculture, Science, and Engineering/Technology		
Laboratory Technology	1.9%	150
Science Technologies	2.3%	80
Industrial Engineering	2.2%	80
Surveying and Civil Technology	1.3%	80
Laboratory Technicians	2.4%	60
Electrical and Computer Engineering	3.4%	50
Physics and Astronomy	1.3%	40
Animal Technology	3.0%	30
Agriculture and Food Science Technicians	1.4%	30
Materials Engineering	2.8%	20

¹The following clusters have significant demand, but the majority of job openings require only short-term training: Sales and Merchandising; Food Preparation and Services; Nursing Assistant; Housekeeping and Cleaning Services; Security Services; Agricultural Production; and Horticulture and Landscaping.

²Registered nurses, nursing instructors, and computer systems personnel are still considered demand occupations even though the number of persons completing training in Tennessee is close to the number of expected openings.

VI. Knowledge and Skill Needs

Current Education and Training Initiatives

More than 1.25 million Tennesseans, approximately one in six, lack a high school or a general education diploma (GED). State and federal grants have been used to expand the number of GED classes, especially in areas where major employers are closing. A \$500,000 federal grant was used in 2006 to allow more than 7,000 people to take the GED statewide (Neeley, 2007).

With the active leadership of the Governor's Jobs Council, consisting of the Tennessee Departments of Economic Development, Labor and Workforce Development, Education, and Agriculture, additional tools are available for employers to upgrade the workforce. From 2003 to 2006, the Department of Labor and Workforce Development has distributed \$5.9 million in incumbent worker training grants for private sector employers to upgrade workers' skills and possibly avoid business relocation (Cowden, 2007).

Tennessee's plan for Title I of the Workforce Investment Act of 1998 and for the Wagner-Peyser Act, for the period July 1, 2005, to June 30, 2009, was submitted on April 30, 2007, to the United States Department of Labor. Besides the above, several additional initiatives to improve Tennessee's current and future workforce are outlined. These include:

- Working to improve existing K-12 schools and expanding free pre-kindergarten programs throughout the state.
- Improving high school graduation rates by spending an additional \$120 million to cover the entire cost of at-risk students. Tennessee is having some success on this. The 2007 Kids Count Data Book reported that dropout rates of 15- to 19-year-olds fell from 11 percent to 7 percent from 2000 to 2005. (Mielczarek, 2007)
- Seeking funding for employers to be more involved in designing special community college programs that lead to jobs; intensive five-year high school, community college joint credit programs that lead to an associate's degree; and free community college education for high school graduates.
- Initiatives to more tightly connect programs of study between high schools and postsecondary institutions such as the Department of Education Career and Technical Education Division's implementation of career clusters in 2007-2008. Students and parents will be presented with extensive information on career and training options within job clusters, creating better opportunities for students to obtain high wage, high skill, and demand occupations.

Implementation of the clusters will take place along with continuing curriculum redesign.

- Continuing funding of the lottery scholarship programs.

- Submitting Workforce Innovation in Regional Economic Development grants. One grant which is currently funded includes counties in mid-central Tennessee and northern Alabama.

Measurement of Knowledge and Skill Needs

The need for specific knowledge and skills for growing occupations is calculated using importance scores from O*NET and total openings expected for occupations for the 2004-2014 growth period. The knowledge and skill needs are calculated by averaging the O*NET (Occupational Information Network, 2007) importance scores: summing the importance scores for every opening and dividing by the number of total openings. (The O*NET project is a multi-year job characteristics data collection program with approval from the Office of Management and Budget.) Scores range from 1.00 (lowest) to 5.00 (highest). Workers are selected for the O*NET project by random sampling in questionnaires asking them to rate the requirements of their own jobs.

- Knowledge is information and insight attained by prior training experience, on-the-job experience, and educational achievement.
- Skills are abilities to accomplish job tasks, enhanced through learning, practice, or native abilities.

Importance and ranking of knowledge and skills facilitate educators, trainers, and business managers in the placement of qualified workers. Skill (and knowledge) levels are averaged for all openings statewide, showing the relative importance of the skill. Levels are ordered by their importance with a color scheme.

Results reflect the general need for the skills across occupations and industries. The most needed skills have the higher scores and are likely to be needed across varied industries and occupations. Skills with lower scores are likely affiliated with declining occupations, or they may be specific — very important to some occupations but relatively unneeded in others. The effect of globalization on skill and knowledge needs is significant. Technological innovation, both a product of globalization but even more its cause, is a chief driver of skill and knowledge needs. Globalization produces competition driving productivity, technology, and innovation. Technology such as electronic communications makes the globalization possible, with energy and transportation as engines.

Knowledge Needs

Knowledge needs are often general to the workforce and also specific to given occupations. Knowledge requirements with high rank can mean widespread need across occupations, but may not be distinctly needed for high growth occupations. Some needs are inherent in top growth occupations. Table 7 (Page 38) shows the top occupations by growth rate, suggesting the kinds of knowledge needed. Knowledge (and skill)

requirements are likely to relate to data systems, medical and dental occupations, education, and accounting — all contained in the fastest growing statewide occupations for the time period.

High Importance Knowledge. The average knowledge scores are shown (Table 9 on Page 48). Customer and personal service is highest in importance. Foreign language, physics, administration and management, English, and law and government are highly important. Customer and personal service, as well as skill in English, is most important in those occupations growing 1.5 percent or more, above the average growth rate of occupations in the state.

- Knowledge needs are great in customer and personal service at all growth levels but especially at growth rates of 1.5 percent or better.
- Foreign language is a great need especially in occupations growing at 2.5 percent or higher.

Above-Average Importance. Knowledge of above-average importance to job openings includes clerical, engineering and technology, sociology and anthropology, personnel and human resources, food production, and telecommunications. These are more needed in direct relation to the growth rate of the occupations (Figure 11, Page 40, Table 8, Page 43).

- Physics, administration and management, English language, and law and government are needed at all growth levels.
- Clerical and engineering and technology have importance to growth at 2.5 percent or more.

Average Importance. Knowledge in sales and marketing, mathematics, and production and processing are needed in occupations at all growth rates. Knowledge needs that tend to increase with growth include economics and accounting, transportation, and communications and media. Design, geography, biology, building and construction, education and training, and therapy and counseling are average or just above-average knowledge needs.

Below-Average Importance. Their significance here is that computers and electronics knowledge are needed at every growth category.

Skill Needs

Skill needs can relate to openings in general or to specific occupations (see the previous discussion on “Knowledge” and Table 9 (Page 48)). Skills with high scores are likely widespread across occupations.

Table 9. Average Knowledge Scores for Total Job Openings, Tennessee, 2004-2014

Knowledge	Average	Average Scores for Knowledge					Correlation Knowledge vs. Growth
		-1% or Less	About 0%	About 1%	About 2%	3% or More	
Customer and Personal Service	3.57	2.96	3.34	3.25	3.78	3.62	0.87
Foreign Language	3.35	2.78	3.18	3.25	3.41	3.59	0.97
Physics	2.98	2.70	2.58	3.05	3.00	2.85	0.57
Administration and Management	2.89	2.70	2.65	2.74	3.01	2.88	0.77
English Language	2.79	2.24	2.53	2.68	2.88	3.01	0.99
Law and Government	2.69	2.24	2.40	2.71	2.74	2.62	0.81
Clerical	2.59	2.36	2.70	2.55	2.58	2.82	0.73
Engineering and Technology	2.48	2.20	2.61	2.40	2.46	2.93	0.76
Sociology and Anthropology	2.34	1.70	1.94	2.04	2.52	2.65	0.98
Personnel and Human Resources	2.33	1.89	2.20	2.18	2.46	2.26	0.78
Food Production	2.29	2.54	2.58	2.40	2.26	1.88	-0.92
Telecommunications	2.26	1.62	1.92	2.06	2.40	2.53	0.99
Sales and Marketing	2.26	2.19	2.16	1.97	2.47	1.99	-0.06
Economics and Accounting	2.13	1.83	2.01	2.08	2.17	2.17	0.94
Mathematics	2.11	1.94	2.11	2.24	2.06	2.01	0.13
Production and Processing	2.09	1.84	1.81	2.26	2.07	1.85	0.23
Transportation	2.09	1.72	2.06	2.01	2.12	2.28	0.91
Communications and Media	1.98	1.70	2.00	1.93	1.99	2.23	0.88
Design	1.78	1.58	1.78	1.73	1.78	2.06	0.87
Geography	1.77	1.40	1.54	1.55	1.91	1.91	0.94
Biology	1.77	1.52	1.75	1.63	1.84	1.88	0.86
Building and Construction	1.72	1.63	1.77	1.73	1.68	1.98	0.71
Education and Training	1.71	1.29	1.49	1.49	1.81	2.07	0.96
Therapy and Counseling	1.70	1.26	1.44	1.45	1.81	2.21	0.95
Medicine and Dentistry	1.62	1.40	1.47	1.59	1.65	1.67	0.98
Fine Arts	1.60	1.38	1.45	1.59	1.64	1.55	0.79
Chemistry	1.56	1.34	1.48	1.50	1.59	1.72	0.98
Mechanical	1.55	1.35	1.39	1.59	1.56	1.57	0.86
Computers and Electronics	1.53	1.34	1.33	1.41	1.67	1.23	0.11
Public Safety and Security	1.51	1.21	1.40	1.41	1.56	1.68	0.98
Psychology	1.46	1.13	1.23	1.24	1.58	1.76	0.94
Philosophy and Theology	1.34	1.17	1.28	1.28	1.38	1.43	0.98
History and Archaeology	1.24	1.13	1.19	1.20	1.25	1.36	0.96
Average, All Categories	2.09	1.80	2.01	1.96	2.15	2.19	0.69
Median, All Categories	1.86	1.54	2.24	1.92	2.37	2.22	
Knowledge Importance Ranking							90th percentile, 3.48+
5.0 Highest Importance							75th to 90th percentile, 2.69+
4.0 High Importance							50th to 75th percentile, 1.68+
3.0 Above-Average Importance							25th to 50th percentile, 1.30+
2.0 Average Importance							10th percentile, 1.04+
1.0 Lowest Importance							Important at Higher Growth
							Important at all Growth Rates

High Importance. The average skill scores for various characteristics are shown on Table 10 (Page 50). Active listening and reading comprehension are of the highest importance. Speaking, time management, critical thinking, active learning, and writing are of high importance in the occupations at above-average growth.

- Skill needs are great for active listening at all growth levels but especially at growth rates of 1.5 percent or better.
- Reading comprehension and speaking are a great need in occupations growing at 2 percent (the state average) or better.
- Time management, critical thinking, active learning, coordination, and writing are needed at all the highest growth levels.

Average Importance. Skills of above-average importance to job openings include time management, critical thinking, instructing, active learning, social perceptiveness, learning strategies, coordination, service orientation, writing, monitoring, judgment and decision making, and mathematics. All of these are more needed in direct relation to the growth rate of the occupations with the exception of mathematics, which is especially needed in jobs with low growth levels.

Below-Average Importance. There are fewer openings related to skill needs in complex problem solving, negotiation, persuasion, equipment selection, troubleshooting, management of personnel, quality control analysis, operation and control, equipment maintenance, operation monitoring, management of material, operations analysis, systems evaluation, and systems analysis. Some of these are needed relative low growth occupations, including quality control analysis, operation and control, equipment maintenance, and operation monitoring.

Lowest Importance. Repairing, technology design, installation, science, and programming are of lowest importance across all occupations. Repairing is needed regardless of occupational growth level, however, the three next three skills become more important in the faster growing occupations.

Final Word

The Internet site www.sourcetn.org, “The Source,” contains detailed information on employment for Tennessee. Information exists for industries and occupations at several levels of aggregation, to the four-digit level for industries in the North American Industry Classification System and for detailed occupations. Many of the tables can be downloaded into software spreadsheets.

Table 10. Average Skills Scores for Total Job Openings, Tennessee, 2004-2014

Skill	Average Scores for Skills						Correlation Skills vs. Growth
	Average	-0.5% or Less	About 0%	About 1%	About 2%	2.5% or More	
Active Listening	4.09	3.76	3.84	3.90	4.20	4.29	0.97
Reading Comprehension	3.75	3.46	3.70	3.57	3.81	4.14	0.89
Speaking	3.74	3.49	3.50	3.46	3.91	3.87	0.83
Time Management	3.46	3.05	3.44	3.24	3.56	3.79	0.89
Critical Thinking	3.46	3.05	3.18	3.29	3.54	3.82	0.98
Instructing	3.41	3.11	3.24	3.30	3.48	3.61	0.99
Active Learning	3.37	3.13	3.20	3.21	3.41	3.83	0.89
Social Perceptiveness	3.35	2.98	3.03	3.12	3.49	3.57	0.95
Learning Strategies	3.32	3.08	3.17	3.26	3.35	3.56	0.98
Coordination	3.32	3.12	3.08	3.17	3.38	3.68	0.90
Service Orientation	3.24	2.87	2.95	3.03	3.36	3.47	0.96
Writing	3.23	2.77	2.97	2.99	3.36	3.63	0.96
Monitoring	3.20	2.88	3.04	3.01	3.29	3.50	0.95
Judgment and Decision Making	3.18	2.80	2.85	3.00	3.27	3.52	0.97
Mathematics	3.17	3.19	2.79	3.22	3.21	2.96	-0.04
Complex Problem Solving	2.82	2.43	2.66	2.61	2.89	3.37	0.92
Negotiation	2.77	2.48	2.45	2.56	2.90	2.95	0.92
Persuasion	2.75	2.16	2.52	2.45	2.91	3.08	0.95
Equipment Selection	2.73	2.44	2.71	2.73	2.69	3.05	0.87
Troubleshooting	2.63	2.44	2.54	2.62	2.61	2.95	0.90
Management of Personnel Resources	2.61	2.37	2.40	2.45	2.72	2.67	0.91
Quality Control Analysis	2.45	2.62	2.68	2.52	2.36	2.64	-0.34
Operation and Control	2.45	2.51	2.51	2.57	2.36	2.57	-0.06
Equipment Maintenance	2.43	2.30	2.38	2.55	2.37	2.50	0.59
Operation Monitoring	2.29	2.16	2.31	2.41	2.22	2.39	0.53
Management of Material Resources	2.27	1.88	2.18	2.14	2.33	2.55	0.95
Operations Analysis	2.27	2.00	2.27	2.09	2.32	2.65	0.85
Systems Evaluation	2.25	2.01	2.11	2.11	2.30	2.51	0.94
Systems Analysis	2.21	1.97	1.97	2.16	2.24	2.47	0.96
Management of Financial Resources	2.17	1.93	1.93	2.05	2.23	2.40	0.96
Repairing	2.09	2.07	2.06	2.18	2.03	2.16	0.33
Technology Design	2.08	1.82	2.02	2.00	2.09	2.47	0.90
Installation	2.00	1.84	1.99	2.00	1.97	2.25	0.86
Science	1.96	1.53	1.77	1.72	2.05	2.41	0.94
Programming	1.53	1.41	1.59	1.53	1.49	1.84	0.74
Average, All Categories	2.80	2.55	2.69	2.66	2.85	3.06	0.74
Median, All Categories	2.74	2.44	2.62	2.54	2.80	2.95	
Skills Importance Ranking							90th percentile, 4.13+
							75th to 90th percentile, 3.63+
5.0 Highest Importance							50th to 75th percentile, 2.92+
4.0 High Importance							25th to 50th percentile, 2.11+
3.0 Average Importance							10th percentile, 1.53+
2.0 Below Average Importance							
1.0 Lowest Importance							
							Important at Higher Growth
							Important at all Growth Rates

Appendix A

Table 11. Employment Projections by Selected Industries, Tennessee, 2004-2014

Code	Industry	2004 Estimate	2014 Projection	10 Year Growth	Annual Growth Rate
000000	Total Employment, All Jobs	2901010	3362460	461,450	1.5%
110000	Agriculture, Forestry, Fishing and Hunting	29250	31680	2,430	0.8%
111000	Crop Production	16620	18320	1,700	1.0%
113000	Forestry and Logging	4400	4300	-100	-0.2%
114000	Fishing, Hunting and Trapping	30	40	10	1.7%
115000	Support Activities for Agriculture and Forestry	4100	4410	310	0.7%
210000	Mining	3100	2460	-640	-2.3%
213000	Support Activities for Mining	280	320	40	1.3%
220000	Utilities	3530	3520	-10	0.0%
230000	Construction	117520	139730	22,200	1.7%
236000	Construction of Buildings	28680	30450	1,770	0.6%
237000	Heavy and Civil Engineering Construction	16170	17950	1,780	1.0%
238000	Specialty Trade Contractors	72670	91330	18,650	2.3%
310000	Manufacturing	411500	418540	7,040	0.2%
311000	Food Manufacturing	35130	35640	500	0.1%
312000	Beverage and Tobacco Product Manufacturing	5930	6180	260	0.4%
313000	Textile Mills	6740	4880	-1,860	-3.2%
314000	Textile Product Mills	3950	3480	-470	-1.3%
315000	Apparel Manufacturing	9160	6750	-2,400	-3.0%
316000	Leather and Allied Product Manufacturing	1780	1530	-250	-1.5%
321000	Wood Product Manufacturing	17400	18800	1,400	0.8%
322000	Paper Manufacturing	18700	21110	2,410	1.2%
324000	Petroleum and Coal Products Manufacturing	1120	1280	160	1.3%
325000	Chemical Manufacturing	27870	27640	-230	-0.1%
326000	Plastics and Rubber Products Manufacturing	28390	27640	-760	-0.3%
327000	Nonmetallic Mineral Product Manufacturing	15730	17950	2,230	1.3%
331000	Primary Metal Manufacturing	12230	12330	90	0.1%
332000	Fabricated Metal Product Manufacturing	41750	38010	-3,740	-0.9%
333000	Machinery Manufacturing	34230	38900	4,680	1.3%
334000	Computer and Electronic Product Manufacturing	11190	10210	-980	-0.9%
335000	Electrical Equipment, Appliance, and Component Manufacturing	23050	21030	-2,020	-0.9%
336000	Transportation Equipment Manufacturing	61690	72230	10,540	1.6%
337000	Furniture and Related Product Manufacturing	19740	17540	-2,200	-1.2%
339000	Miscellaneous Manufacturing	16410	17500	1,090	0.6%

420000	Wholesale Trade	127470	145540	18,070	1.3%
423000	Merchant Wholesalers, Durable Goods	64720	78470	13,760	1.9%
424000	Merchant Wholesalers, Nondurable Goods	46520	49670	3,150	0.7%
425000	Wholesale Electronic Markets and Agents and Brokers	16230	17400	1,170	0.7%
440000	Retail Trade	319320	369940	50,620	1.5%
441000	Motor Vehicle and Parts Dealers	42830	53140	10,310	2.2%
442000	Furniture and Home Furnishings Stores	9690	12400	2,710	2.5%
443000	Electronics and Appliance Stores	8040	9010	970	1.1%
444000	Building Material and Garden Equipment and Supplies Dealers	25680	31980	6,300	2.2%
445000	Food and Beverage Stores	45920	45040	-890	-0.2%
446000	Health and Personal Care Stores	20080	21900	1,820	0.9%
447000	Gasoline Stations	24530	24460	-70	0.0%
448000	Clothing and Clothing Accessories Stores	29510	32330	2,820	0.9%
448100	Clothing Stores	22600	24760	2,160	0.9%
448200	Shoe Stores	4040	4420	390	0.9%
448300	Jewelry, Luggage, and Leather Goods Stores	2870	3150	270	0.9%
451000	Sporting Goods, Hobby, Book, and Music Stores	12550	16670	4,120	2.9%
451100	Sporting Goods, Hobby, and Musical Instrument Stores	7370	9780	2,420	2.9%
451200	Book, Periodical, and Music Stores	5190	6890	1,700	2.9%
452000	General Merchandise Stores	70110	84540	14,430	1.9%
452100	Department Stores	35680	32070	-3,610	-1.1%
452900	Other General Merchandise Stores	34440	52470	18,030	4.3%
453000	Miscellaneous Store Retailers	19310	24250	4,940	2.3%
453100	Florists	2030	2550	520	2.3%
453200	Office Supplies, Stationery, and Gift Stores	8310	10430	2,130	2.3%
453300	Used Merchandise Stores	3000	3760	770	2.3%
453900	Other Miscellaneous Store Retailers	5980	7510	1,530	2.3%
454000	Nonstore Retailers	11070	14240	3,170	2.5%
454100	Electronic Shopping and Mail-Order Houses	6760	10770	4,000	4.8%
454200	Vending Machine Operators	2100	1690	-410	-2.1%
454300	Direct Selling Establishments	2210	1780	-430	-2.1%
480000	Transportation and Warehousing	138160	168820	30,650	2.0%
481000	Air Transportation	6240	6520	280	0.4%
483000	Water Transportation	1870	1950	70	0.4%
484000	Truck Transportation	60650	68230	7,580	1.2%
485000	Transit and Ground Passenger Transport	5640	6970	1,330	2.1%
486000	Pipeline Transportation	350	310	-40	-1.3%
487000	Scenic and Sightseeing Transportation	370	420	50	1.3%

488000	Support Activities for Transportation	10220	11330	1,110	1.0%
491100	Postal Service	15510	16640	1,130	0.7%
492000	Couriers and Messengers	37030	56410	19,370	4.3%
493000	Warehousing and Storage	11820	13050	1,240	1.0%
510000	Information	49380	53480	4,100	0.8%
511000	Publishing Industries	14340	16200	1,860	1.2%
512000	Motion Picture and Sound Recording Industries	8080	9130	1,050	1.2%
515000	Broadcasting (except Internet)	7460	8520	1,060	1.3%
516000	Internet Publishing and Broadcasting	200	270	70	3.1%
517000	Telecommunications	15480	14240	-1,240	-0.8%
518000	Internet Service Providers, Web Search Portals, and Data Pro	3590	4880	1,290	3.1%
519000	Other Information Services	230	250	20	0.8%
520000	Finance and Insurance	106310	125230	18,910	1.7%
521000	Monetary Authorities - Central Bank	510	530	20	0.5%
522000	Credit Intermediation and Related Activities	58860	69620	10,770	1.7%
523000	Securities, Commodity Contracts, and Other Financial Investment	8160	11160	3,010	3.2%
524000	Insurance Carriers and Related Activities	38120	43100	4,990	1.2%
524100	Insurance Carriers	21240	23740	2,500	1.1%
530000	Real Estate and Rental and Leasing	33470	41580	8,110	2.2%
531000	Real Estate	20890	25310	4,410	1.9%
531100	Lessors of Real Estate	9680	11730	2,050	1.9%
532000	Rental and Leasing Services	11690	15310	3,620	2.7%
533000	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	890	970	80	0.8%
540000	Professional, Scientific, and Technical Services	98090	126980	28,890	2.6%
541000	Professional, Scientific, and Technical Services	98090	126980	28,890	2.6%
541100	Legal Services	14450	19320	4,860	2.9%
541200	Accounting, Tax Preparation, Bookkeeping, and Payroll Service	17560	23470	5,910	2.9%
541300	Architectural, Engineering, and Related Services	17050	19310	2,260	1.3%
541400	Specialized Design Services	1310	1750	440	2.9%
541500	Computer Systems Design and Related Services	9200	12300	3,100	2.9%
541600	Management, Scientific, and Technical Consulting Services	13750	18370	4,630	2.9%
541700	Scientific Research and Development Services	9100	12160	3,060	2.9%

541800	Advertising and Related Services	6030	7430	1,400	2.1%
541900	Other Professional, Scientific, and Technical Services	9630	12870	3,240	2.9%
550000	Management of Companies and Enterprises	23020	28000	4,980	2.0%
551000	Management of Companies and Enterprises	23020	28000	4,980	2.0%
560000	Administrative and Support and Waste Management and Remediation	177570	236440	58,870	2.9%
561000	Administrative and Support Services	169950	226430	56,480	2.9%
561100	Office Administrative Services	6070	8690	2,620	3.7%
561200	Facilities Support Services	3430	4910	1,480	3.7%
561300	Employment Services	88080	109190	21,120	2.2%
561400	Business Support Services	14710	21070	6,350	3.7%
561500	Travel Arrangement and Reservation Services	2430	3490	1,050	3.7%
561600	Investigation and Security Services	14430	20670	6,230	3.7%
561700	Services to Buildings and Dwellings	30280	43360	13,080	3.7%
561900	Other Support Services	10520	15070	4,550	3.7%
562000	Waste Management and Remediation Service	7620	10010	2,390	2.8%
562100	Waste Collection	1650	2170	520	2.8%
562200	Waste Treatment and Disposal	2580	3390	810	2.8%
562900	Remediation and Other Waste Management Services	3390	4460	1,070	2.8%
610000	Educational Services	225840	264300	38,450	1.6%
611100	Elementary and Secondary Schools	156730	183410	26,690	1.6%
611200	Junior Colleges	9690	11340	1,650	1.6%
611300	Colleges, Universities, and Professional Schools	52470	61400	8,930	1.6%
611400	Business Schools and Computer and Management Training	1180	1380	200	1.6%
611500	Technical and Trade Schools	2040	2380	350	1.6%
611600	Other Schools and Instruction	3100	3630	530	1.6%
611700	Educational Support Services	640	750	110	1.6%
620000	Health Care and Social Assistance	299280	376920	77,640	2.3%
621000	Ambulatory Health Care Services	100630	131900	31,280	2.7%
621100	Offices of Physicians	48840	66080	17,240	3.1%
621200	Offices of Dentists	12740	17240	4,500	3.1%
621300	Offices of Other Health Practitioners	10040	13590	3,550	3.1%
621400	Outpatient Care Centers	11610	15710	4,100	3.1%
621500	Medical and Diagnostic Laboratories	4030	5450	1,420	3.1%
621600	Home Health Care Services	9180	8160	-1,020	-1.2%
621900	Other Ambulatory Health Care Services	4200	5680	1,480	3.1%

622000	Hospitals	110360	124100	13,740	1.2%
622100	General Medical and Surgical Hospitals	97100	109200	12,090	1.2%
622200	Psychiatric and Substance Abuse Hospitals	5470	6150	680	1.2%
623000	Nursing and Residential Care Facilities	50150	68170	18,020	3.1%
623100	Nursing Care Facilities	31410	42700	11,290	3.1%
623200	Residential Mental Retardation, Mental Health and Substance Abuse Facilities	8710	11840	3,130	3.1%
623300	Community Care Facilities for the Elderly	8230	11190	2,960	3.1%
623900	Other Residential Care Facilities	1800	2450	650	3.1%
624000	Social Assistance	38140	52740	14,600	3.3%
624100	Individual and Family Services	13980	19330	5,350	3.3%
624200	Community Food and Housing, and Emergency and Other Relief Services	1750	2420	670	3.3%
624300	Vocational Rehabilitation Services	6140	8500	2,350	3.3%
624400	Child Day Care Services	16270	22500	6,230	3.3%
710000	Arts, Entertainment, and Recreation	28720	33700	4,990	1.6%
711000	Performing Arts, Spectator Sports, and Related Industries	8370	9600	1,230	1.4%
712000	Museums, Historical Sites, and Similar Institutions	2800	3450	650	2.1%
713000	Amusement, Gambling, and Recreation Industries	17540	20650	3,110	1.6%
720000	Accommodation and Food Services	223250	259560	36,310	1.5%
721000	Accommodation	33360	30330	-3,030	-0.9%
722000	Food Services and Drinking Places	189890	229230	39,340	1.9%
810000	Other Services (Except Government)	120810	142460	21,650	1.7%
812000	Personal and Laundry Services	25080	24900	-190	-0.1%
813000	Religious, Grantmaking, Civic, Professional, and Similar Org	51080	69200	18,120	3.1%
814000	Private Households	22590	20810	-1,770	-0.8%
900000	Government	202910	230700	27,790	1.3%
910000	Total Federal Government Employment	50590	52620	2,020	0.4%
919999	Federal, Excluding Post Office	35080	35970	890	0.3%
920000	State, Excluding Education and Hospitals	42240	46140	3,900	0.9%
930000	Local, Excluding Education and Hospitals	110080	131940	21,860	1.8%
999200	State Government, Excluding Education and Hospitals	42240	46140	3,900	0.9%
999300	Local Government, Excluding Education and Hospitals	110080	131940	21,860	1.8%

Source: Tennessee Department of Labor and Workforce Development, Research and Statistics, July 2007

Table 12. Age Distribution for Tennessee and United States, 2000, 2010, 2030

Age Cohort	Tennessee			United States		
	2000	2010	2030	2000	2010	2030
Under 18	24.6	23.7	24.3	25.7	24.1	23.6
18-65	63.0	63.0	56.5	61.9	62.9	56.7
65 and Over	12.4	13.3	19.2	12.4	13.0	19.7

Table derived from <http://www.census.gov/population/www/projections/projectionsagesex.html>

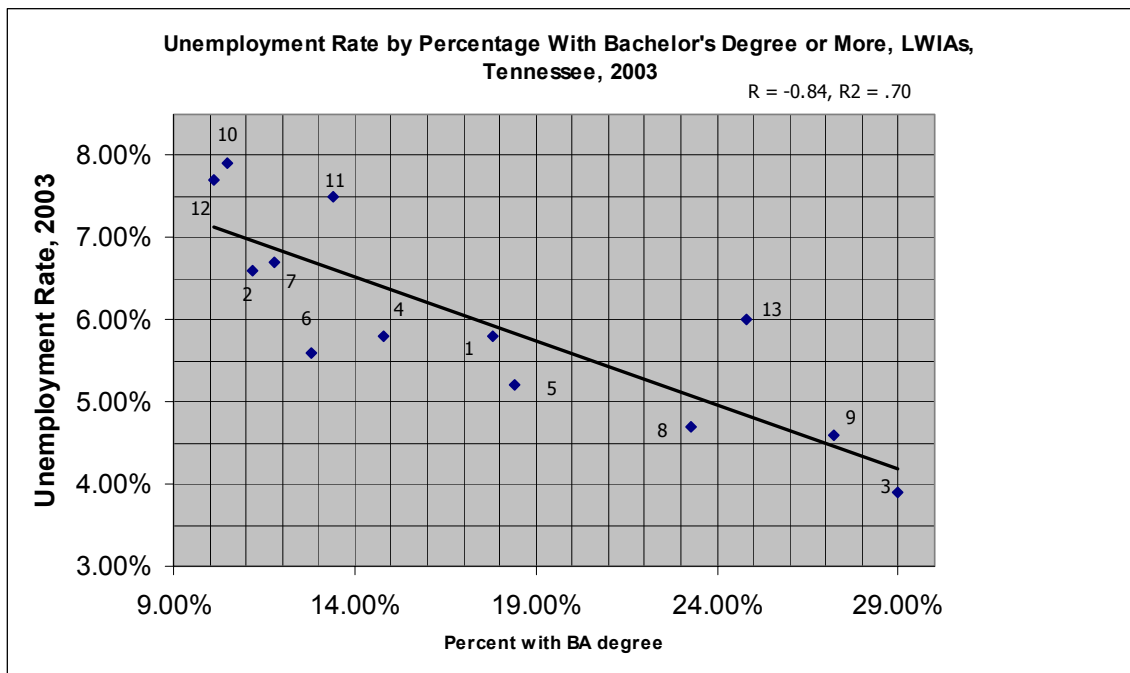


Figure 12. Unemployment Rate by Percentage With Bachelor's Degree or More, LWIAs, Tennessee, 2003

References

- Auerbach, James and Krimgold, Barbara (2001) *Income, Socioeconomic Status and Health*. Washington: National Policy Association.
- Center for Business and Economic Research (CBER) (2006) *An Economic Report to the Governor of the State of Tennessee*. January. The University of Tennessee. Knoxville
- Center for Business and Economic Research (CBER). (2007) *An Economic Report to the Governor of the State of Tennessee*. January. The University of Tennessee. Knoxville.
- Cowden, Susan (2007) *Strengthening Tennessee's Workforce*. Tennessee Business, 16: no. 2.
- Hall, Kevin G (2006) *The Rich are Getting Much Richer, Much Faster Than Everyone Else*, McClatchy Newspapers. November 2, in <http://www.realcities.com/mld/kwashington/15912820.htm?template=contentModules/printstory.jsp>.
- Hall, Kevin G (2007) Bernanke: *Housing slump weakens United States growth*. July 18, in <http://www.mcclatchydc.com/homepage/v-print/story/18113.htm>.
- Harless, Bill. (January 2007). *MTA Addresses Metro Bus Driver Shortage*. City Paper. January 2, 2007, p. 4.
- Griffith, Amy. (January 2007). *Professor: Nursing Shortage Crisis Looms*. City Paper. January 10, 2007, p. 9.
- Haskew, Barbara S. (2007). *Southeastern Manpower Tripartite Alliance: Construction Craft Labor*. Tennessee Business. Vol. 16, No. 2, pp. 26-28.
- Jackson, Jenny. August 2006. *SREB States Take Action to Support Beginning Teachers*. Southern Regional Education Board. Retrieved from http://www.sreb.org/main/Goals/Publications/06E14_Support_Beginning_Teachers.pdf
- Morgan, John G. (2007) *Immigration Issues in Tennessee*. Tennessee Comptroller of the Treasury, Office of Research. August.
- Mielczarek, Natalia. (2007) *Emphasis on dropout prevention pays off*. Tennessean, July 25, Page 9A.
- Neeley, Jim (2007) *Tennessee's Changing Labor Force*. Tennessee Business, 16, No. 2. Occupational Information Network (O*NET) (2007) <http://online.onetcenter.org>.

- Owenby, David (2007) *Tennessee Department of Environment and Conservation*. Jan.18.
- Rivers, Kathy. (January 2007). *New Study Lowers Nurse Shortage Estimate*. Vanderbilt Reporter. January 12, 2007, p. 3.
- Robb, Greg (2007) *Core Inflation likely to edge a bit lower: Bernanke*. July 18, in <http://www.marketwatch.com/news/story/bernanke-foresees-moderate-2007-growth/story.aspx?guid=%7BFED1A306%2D9818%2D4A52%2D8022%2D7B38996586BC%7D&siteid=bnb>
- Singh, Virinder with Fehrs, Jeffrey (2001) *Renewable Energy Policy Project: Research Report*, November, no. 13, Washington, DC.
- Tennessee State Government, Department of Labor and Workforce Development (2007) Site presents annual not seasonally adjusted labor force, employment and unemployment data in United States, Tennessee, and LWIAs. <http://www.sourcetn.org>. Select tabs and icons as in this order "Labor Market Analysis, Labor Force, Labor Force Employment and Unemployment, United States/Statewide/Workforce Area (accessed July 6, 2007).
- Tennessee State Government, Department of Labor and Workforce Development (2007) Site has employment, income, population, and other data for Tennessee, its counties, and nation. <http://www.sourcetn.org>
- Union of Concerned Scientists. (2007) *Cashing in on Clean Energy: A National Renewable Electricity Standard will benefit Tennessee's Economy and the Environment*.retrieved from http://www.ucsusa.org/clean_energy/clean_energy_policies/cashing-in.html, select Tennessee
- United States Census (2004) *State Interim Population Projections by Age and Sex: 2004 – 2030*.<http://www.census.gov/population/www/projections/projectionsagesex.html>
- United States Census (2005) Quickfacts. Contains counts and percentages by county for all counties in United States. At http://quickfacts.census.gov/qfd/download_data.html,2005 Data.
- United States Census (2007) US Census Bureau Small Area Income and Poverty Estimates.
- Wheeler, Christopher H. (2007) *Trends in Neighborhood – Level Unemployment in the United States: 1980 to 2000*. Federal Reserve Bank of St. Louis Review. March/April, pp 123-142.

Endnotes

¹ The Center for Business and Economic Research at the University of Tennessee shows that the national economy performed better than the Tennessee economy in 2005 (CBER, 13).

² See [Table 1](#): Ranking of census 2000 and projected 2030 state population and change in <http://www.census.gov/population/projections/projectionsagesex.html>.

³ Tennessee is expected to have stronger growth after 2010 (CBER, 2007, p. 36).

⁴ See [Table 3](#): Ranking of states by projected percentage of population age 65 and over: 2000, 2010, and 2030 in <http://www.census.gov/population/www/projections/projectionsagesex.html>.

⁵ The Source at <http://www.sourcetn.org> has a record of employment and unemployment by year.

⁶ The significance of the downturn in unemployment in the months just previous to and including April 2007 hints that the revitalization expected after 2010 could be beginning.

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