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Analysis of the Economy of the First Congressional District of Tennessee with Emphasis on the Manufacturing Sector

Introduction

The First Congressional District of Tennessee includes the counties of Carter, Cocke, Greene, Hamblen, Hancock, Hawkins, Johnson, Sullivan, Unicoi, Washington, and parts of Jefferson and Sevier counties. Over the past two decades the economy in the First Congressional District has experienced a profound shift in employment patterns as jobs have declined in goods-producing sectors and risen in service sectors. This trend, also seen nationwide, has been marked in the First Congressional District by a persistent decline in manufacturing jobs and a significant upward trend in healthcare employment. Today, around 80 percent of jobs in the District are service sector jobs.

This paper examines current employment patterns in the District but, more importantly, it presents measures of the total economic impact of changes in production and employment in many different industries. This is accomplished through the utilization of economic impact multipliers for the various industries.

The paper presents an in-depth look at how changes in manufacturing activity ripple throughout the regional economy. The ripple or multiplier effects of manufacturing are particularly significant in the economy of the First Congressional District. Whether the slide in manufacturing employment continues, is stabilized, or even reversed, will have significant economic impacts for residents of the District.

Employment Patterns

The employment and wages situation is summarized in Appendix Table A.1. During the four quarters ending in Q2 2012, total employment in the District averaged around 276,000, and the average monthly wage was $ 3,109. Five industry sectors … retail trade, manufacturing, healthcare, accommodation and food services and educational services … accounted for two-thirds of total employment in the District. Average monthly wages were highest in the manufacturing sector and smallest in the accommodation and food services sector.

Economic Impact Multipliers

The Bureau of Economic Analysis (BEA) in the US Department of Commerce makes regional economic impact multipliers available through its Regional Input-Output Modeling System (RIMS II). These multipliers allow users to estimate the extent to which a one-time or a sustained change in economic activity will be supplied by industries within a region and, consequently, how this change in economy activity will affect total employment and earnings in the region.

The RIMS II multipliers are based on fixed interindustry relationships in the 2010 national input-output (I-O) accounts developed by BEA. To develop multipliers for the First Congressional District, the national I-O relationships are adjusted to reflect the industrial structure and trading patterns in the First Congressional District economy as of 2010. These adjustments are based on knowledge and assumptions about the extent to which increases in demand for intermediate goods and services will be supplied by businesses located within the District.

The employment and earnings multipliers shown in Appendix Table A.2 are total (Type II) multipliers. These multipliers include *direct, indirect* and *induced* economic impacts. Suppose 100 workers are hired to undertake a construction project (direct impact). Employment will increase by more than the 100 jobs directly tied to the project. As the materials and equipment needed to complete the project are purchased, additional jobs are created in the businesses that supply these materials and equipment (indirect impact). Lastly, as people are put to work, directly and indirectly, they purchase more consumer goods and services. This new spending creates jobs in industries that supply consumer goods and services (induced impact). The combined indirect and induced impacts are often referred to as *spillover* impacts.

Employment Multipliers: The interpretation of the employment multipliers presented in Table A.2 may be illustrated using chemical manufacturing as an example. The employment multiplier of 2.2864 for chemical manufacturing means that each chemical manufacturing job supports roughly 1.29 jobs in all other sectors of the District's economy (found as 2.2864 – 1.0) Put another way, a gain of 100 chemical manufacturing jobs would lead to the creation another 129 jobs in other sectors, for a total gain of 229 jobs. Likewise, a loss of 100 chemical manufacturing jobs would lead to a loss of 129 jobs in other sectors, for a total loss of 229 jobs. The employment multipliers for the other industries shown in Table A.2 may be interpreted in a like manner. (The industries for which multipliers are presented in Table A.2 account for most of the economic activity in the First Congressional District.)

Employment multipliers generally are larger for manufacturing industries than for service industries. For this reason, the long-term decline in manufacturing employment takes on added significance. For every manufacturing job lost, more than one job has to be created in other sectors to keep total employment from declining.

Earnings Multipliers: We will illustrate the interpretation of the earnings multipliers presented in Table A.2 by using the multiplier for hospitals. The earnings multiplier of 1.5101 means that for every dollar of earnings paid directly to hospital employees an additional $ 0.51 in earnings is paid to workers in all other industries, for total earnings of $1.51.The earnings multipliers for other industries shown in Table A.2 may be similarly interpreted.

Earnings Impact Index: The earnings impact index (EII) takes into account the earnings multiplier and the average monthly earnings paid to employees in an industry. The index values shown in Table A.2 represent the number of jobs required in a particular industry to generate $ 1,000,000 in total monthly earnings paid to workers in all industries in the First Congressional District. The EII is presented here as a new method for ranking industries in terms of their capacity to generate earnings.

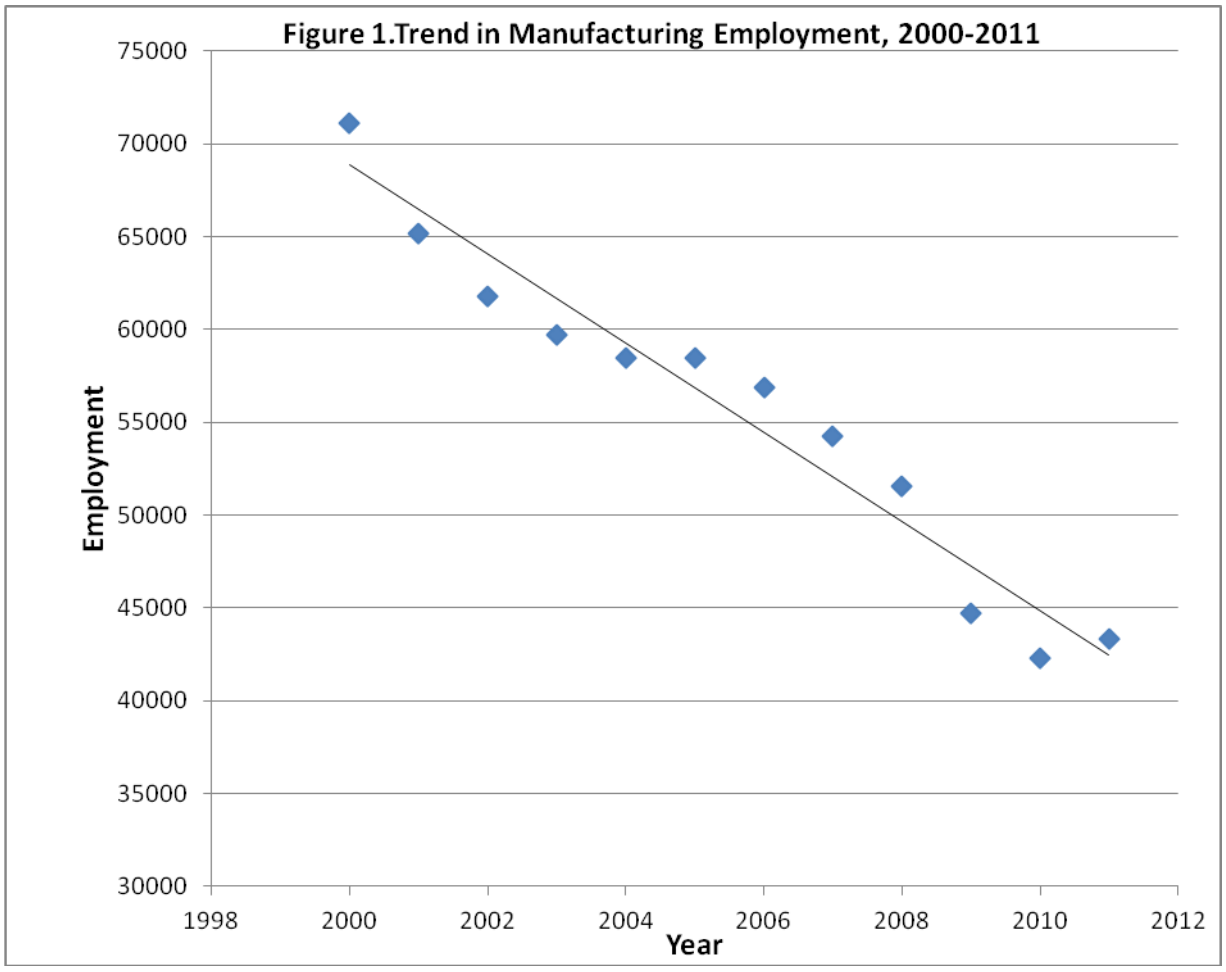
The EII values show that chemical manufacturing, requiring only 73 jobs to generate total monthly earnings of $ 1 million, ranks first among the industries shown by a wide margin. This implies that the average chemical manufacturing job generates nearly $ 13,700 in monthly earnings paid to employees in all industries in the District (found as $ 1,000,000/73). These earnings include the earnings paid directly to chemical manufacturing employees and the spillover earnings paid to workers in other industries.

By way of contrast, 330 jobs in retail trade are required to generate $ 1 million in total earnings in the District. In other words, it takes 330/73 or about 4.5 retail sector jobs to generate the total earnings associated with one chemical manufacturing job. In a like fashion, pair wise comparisons may be

calculated for any of the industries listed in Table A.2. The median for the EII values in Table A.2 is an index value of 173. Seven of the ten manufacturing industries shown in the table have EII values less than the median, demonstrating once more the significant spillover impacts of manufacturing in the District's economy.

The Manufacturing Sector

Trends in Employment: The decline in manufacturing employment in the counties of the First Congressional District is aptly illustrated by Figure 1. Manufacturing employment declined by 2,400 jobs annually over the 2000-2011 period, falling from over 70,000 jobs in 2000 to around 43,000 in 2011. Declines in furniture manufacturing, apparel and textile mill products, transportation equipment, wood products, and printing and related support activities have been particularly evident over the past decade. Some manufacturing industries have held up fairly well in terms of employment, including the key chemical manufacturing industry.



Employment Multiplier Impacts: The employment impacts associated with manufacturing are presented in Table 1. Manufacturing employment directly accounts for 15.7 % of total employment in the First Congressional District. However, the 43,334 direct manufacturing jobs generate an additional 32,554 jobs in the nonmanufacturing sectors of the District's economy. Thus, 75,888 jobs or 27.5 % of all jobs in the District are attributable, directly and indirectly, to the manufacturing sector. The table also presents the employment multiplier effects for the individual manufacturing industries. The 10,752 direct jobs in chemical manufacturing, for example, generate 9,632 jobs in the nonmanufacturing sectors of the District economy.

Table 1. Manufacturing Employment, Direct and Spillover Effects, First Congressional District	Direct Employment[1]	Spillover Employment[2]	Total Employment[3]
MANUFACTURING INDUSTRY:			
Chemical	10,762	9,632	20,394
Fabricated Metal Product	4,214	2,722	6,936
Transportation Equipment	3,999	2,299	6,298
Plastics and Rubber Products	3,592	2,292	5,884
Machinery	3,441	2,364	5,805
Paper	2,725	2,744	5,469
Food	2,506	2,529	5,035
Electrical Equipment, Appliance, & Components	2,008	1,384	3,392
Nonmetallic Mineral Product	1,949	1,505	3,454
Wood Product	1,561	820	2,363
Furniture and Related Products	1,509	836	2,345
Primary Metal Manufacturing	1,369	841	2,210
Printing and Related Support Activities	1,296	839	2,135
Miscellaneous and Other	2,403	1,766	4,169
TOTAL MANUFACTURING	43,334	32,554	75,888
TOTAL FIRST CONGRESSIONAL DISTRICT	275,838		275,838
Manufacturing as a Percent of Total Employment	15.7 %		27.5 %
[1] Source: Compiled from *the Quarterly Census of Employment and Wages*, U.S. Bureau of Labor Statistics. Average quarterly employment for the four quarters ending in Q1 2012.			
[2] Indirect plus induced employment in nonmanufacturing sectors.			
[3] Sum of direct and spillover employment.			

Earnings Multiplier Impacts: The earnings impacts associated with manufacturing are presented in Table 2. Manufacturing accounts directly for 24 percent of total earnings paid to workers in all sectors of the District's economy. However, directly and indirectly, 36.5 % of total earnings may be attributed to the manufacturing sector. Recall that manufacturing accounts directly for 15.7 percent of total employment in the District. Quite remarkably, 36.5 % of total earnings paid to all workers in the District are derived from this 15.7 percent of total employment. This is vivid evidence of the large multiplier or spillover impacts associated with manufacturing activities and the relatively high average wages earned by manufacturing employees.

Table 2. Manufacturing Earnings, Direct and Spillover Effects, First Congressional District	Direct	Spillover	Total
	Earnings[1]	Earnings[2]	Earnings[3]
	Mil. $'s	Mil. $'s	Mil. $'s
MANUFACTURING INDUSTRY:			
Chemical	84.8	40.4	125.2
Fabricated Metal Product	16.8	7.6	24.4
Transportation Equipment	16.6	10.1	26.7
Plastics and Rubber Products	11.2	5.6	16.8
Machinery	14.1	6.2	20.3
Paper	12.3	7.3	19.6
Food	11.0	8.6	19.6
Electrical Equipment, Appliance, & Components	5.9	3.1	9.0
Nonmetallic Mineral Product	7.3	4.8	12.1
Wood Product	4.1	2.1	6.3
Furniture and Related Products	3.5	1.4	4.9
Primary Metal Manufacturing	5.2	3.5	8.7
Printing and Related Support Activities	4.6	2.6	7.2
Miscellaneous and Other	8.8	3.4	12.2
TOTAL MANUFACTURING	206.3	106.7	313.0
TOTAL FIRST CONGRESSIONAL DISTRICT	857.6		857.6
Manufacturing as a Percent of Total earnings	24 %		36.5 %
[1] Source: Compiled from *the Quarterly Census of Employment and Wages*, U.S. Bureau of Labor Statistics. Average monthly earnings for the four quarters ending in Q1 2012.			
[2] Indirect plus induced earnings in nonmanufacturing sectors. [3] Direct plus spillover earnings.			

Conclusions

Employment trends in the economy of the First Congressional District of Tennessee mirror those in the national economy. There has been a pronounced shift in employment out of goods-producing industries into the service sectors. Service sector jobs account for 80 percent of employment in the District. Employment gains in all areas of the healthcare sector and declines in manufacturing account for much of the changed mix of employment in the region.

The shift in employment from goods-producing industries to services cuts two ways. The service sector provides more stable employment than goods-producing industries. However, manufacturing jobs are on average higher paying and have greater total economic impact. The manufacturing sector directly provides about 16 percent of total employment in the District. The economic impact of manufacturing is far out of proportion to its share of total employment: the sector, directly and via its significant spillover impacts, is responsible for more than a quarter of total jobs in the District and more than a third of the earnings paid to workers in the First Congressional District.

KIRES Report No. 8 was prepared by Dr. Sam Evans, associate professor of economics at King University and Director of the King Institute for Regional Economic Studies. This report and the seven previous KIRES reports are available in electronic format at http://kires.king.edu/.

APPENDIX

Table A. 1. Employment and Wages by Industry Sector, First Congressional District		
Industry Sector (NAICS Code)	Employment[1]	Average Monthly Wage[1]
Agriculture, Forestry & Fishing (11)	428	$ 2,017
Mining, Quarrying & Oil & Gas Extraction (21)	573	3,817
Utilities (22)	1,716	4,400
Construction (23)	12,407	3,483
Manufacturing (31-33)	43,334	4,761
Wholesale Trade (42)	8,298	4,621
Retail Trade (44-45)	44,904	1,998
Transportation & Warehousing (48-49)	7,564	3,937
Information (51)	4,091	3,285
Finance & Insurance (52)	8,105	3,783
Real Estate, Rental & Leasing (53)	2,670	2,721
Prof., Scientific & Tech. Services (54)	5,755	4,098
Management of Companies & Enterprises (55)	3,188	4,083
Administrative & Support & Waste Mgmt. & Remediation Services (56)	12,384	2,589
Educational Services (61)	24,861	2,942
Healthcare & Social Assistance (62)	40,782	3,681
Arts, Entertainment & Recreation (71)	6,005	1,831
Accommodation & Food Services (72)	32,939	1,426
Services, other than Public Admin. (81)	6,796	2,164
Public Administration (92)	9,038	2,607
ALL SECTORS	275,838	3,109
[1] Average for the four quarters ending in Q1 2012.		
Source: Compiled from the *Quarterly Census of Employment and Wages*,		
U.S. Bureau of Labor Statistics.		

Table A.2. Multipliers, Selected Industries	Employment	Earnings	Earnings
First Congressional District	Multiplier[1]	Multiplier[2]	Impact Index[3]
ROW INDUSTRY:			
Chemical manufacturing	2.2864	1.735	73
Fabricated metal product mfg.	1.9563	1.6964	148
Machinery mfg.	2.0628	1.6969	144
Plastics & rubber products mfg.	2.0176	1.9201	167
Paper mfg.	2.5873	1.985	112
Transportation equipment mfg.	1.9626	2.0943	115
Food, beverage & tobacco product mfg.	2.5853	2.3811	95
Wood product mfg.	1.8081	1.8574	203
Furniture & related product mfg.	1.8036	1.6267	264
Electrical equipment & appliance mfg.	2.0264	1.8254	186
Ambulatory health care	1.7749	1.4269	149
Hospitals	1.7238	1.5101	204
Nursing & residential care facilities	1.3702	1.415	327
Social assistance	1.2302	1.4444	450
Educational services	1.336	1.4179	240
Construction	1.6259	1.5646	184
Professional & technical services	1.6466	1.3959	175
Mgmt. of companies & enterprises	1.9257	1.4304	171
Administrative & support services	1.322	1.4185	300
Accommodation	1.5698	1.7654	348
Food services & drinking places	1.2861	1.6065	527
Retail trade	1.3896	1.5159	330
Wholesale trade	1.8748	1.5438	140
Amusements & recreation	1.1924	1.5028	363
Utilities	2.0975	1.476	154
Banking & related	2.1033	1.7966	161
Telecommunications	2.0571	1.8132	149
Truck transportation	1.801	1.6893	164

[1] Total increase (decrease) in the number of jobs in all industries for each job gained (lost) in the row industry. Source: BEA

[2] Total dollar change in earnings paid to workers in all industries for each dollar of earnings paid directly to workers in the row industry. Source: BEA

[3] Number of jobs in the row industry required to generate one million dollars in monthly earnings paid to workers in all industries. Source: Calculated by author.