Examining the Impacts of Hospitals on the Colorado Economy

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Introduction

Each day, tens of thousands of Coloradans engage the state's broad network of healthcare providers for help with improving their individual and family well-being. Hospitals are an important part of this network, providing a variety of accessible acute care services across the state.

Colorado is home to 108 hospitals and health systems[1] located in 45 counties. In 2009, these hospitals provided healthcare services for more than 8.9 million patient visits.

While hospitals' most important impact is the healthcare services they provide, it is important to recognize that hospitals are also a dynamic part of the economy. In 2010, Colorado hospitals accounted for $9.8 billion of Gross State Product, a measure of all economic output statewide. Hospitals directly account for about two percent of Colorado's total output.

The economic activity of hospitals translates into jobs. In 2010 the state's General Medical and Surgical (GMS) hospitals employed approximately 71,700 workers. That's an increase of 9,400 jobs (+15.2 percent) since 2005. The ability of hospitals to continue to provide new employment opportunities to Coloradans is a remarkable achievement given the general malaise in the state and national economies.

The contributions of hospitals to the Colorado economy extend far beyond the facilities. Hospitals create thousands of spin-off jobs through their own purchases and those made by their employees with their own incomes. These spin-off jobs are known as the *multiplier effect*.

This project examines both the direct and spin-off contributions hospitals make to the Colorado economy as a whole and in specific regions across the state. The first section looks at recent trends in the state's healthcare economy, with a particular focus on hospitals. The second section features an economic impact model that quantifies the spin-off effects from hospitals, and breaks down these impacts by rural and urban regions and the state's seven congressional districts. Major findings include:

- Hospitals are important economic drivers across the state, and have played a significant role in mitigating the substantial job losses resulting from the Great Recession (which officially lasted from December 2007 through June 2009).
- Between 2007 and 2010, Colorado's hospitals added 4,935 jobs, while the overall state economy lost more than 123,000 jobs.
- Hospitals directly and indirectly generated $18.8 billion in output in 2010, or 4.2 percent of the state's total output.
- This output translates into 133,100 jobs—approximately one of every 16 in Colorado—with employee compensation per annum averaging more than $55,700.

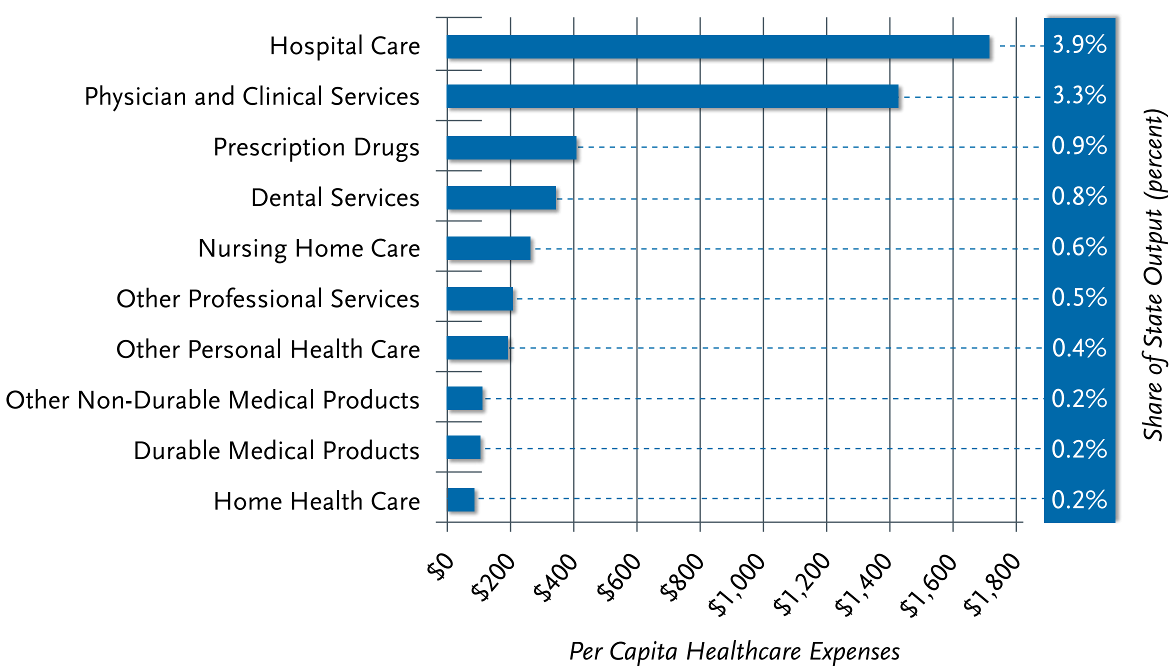
[1] For purposes of this analysis, we identified hospitals using the North American Industrial Classification System (NAICS), a numerical taxonomy that classifies businesses and organizations by their primary economic activity. NAICS is a basic framework for categorizing business entities and is a common basis for regional economic analysis. Much of the readily available economic data is based on NAICS classifications. While hospitals are included as NAICS 622, a subset of the Health Care and Social Assistance sector (NAICS 62), our analysis focuses specifically on General Medical and Surgical Hospitals (NAICS 622110), which excludes psychiatric and other specialty hospitals (e.g., rehabilitation clinics). Thus, throughout this report the phrase "hospitals" refers to GMS hospitals unless otherwise noted. See Appendix B for more information on the NAICS.

Healthcare, Hospitals and the Economy

The United Health Foundation has traditionally labeled Colorado as a "healthy" state. In 2010, the state ranked 13th nationally based on a composite index that considers behaviors, outcomes, state policy, clinical care and other factors. Although Colorado dropped five spots from 2009, its relative ranking has been fairly consistent over time. A source of pride is that Colorado has the nation's lowest obesity rate.

Despite the overall health of Colorado citizens compared to other states, healthcare is a major spending category for Colorado households. According to the U.S. Department of Health and Human Services (HHS), Colorado residents spent 11.1 percent of their per capita income—or $4,900—on health-related expenses in 2004 (the most recent data available). The chart below displays a breakdown of per capita income expenditures for health-related expenses, as well as the share of the state's total economic output for which each expense accounts.

COLORADO PER CAPITA INCOME SPENT ON HEALTHCARE



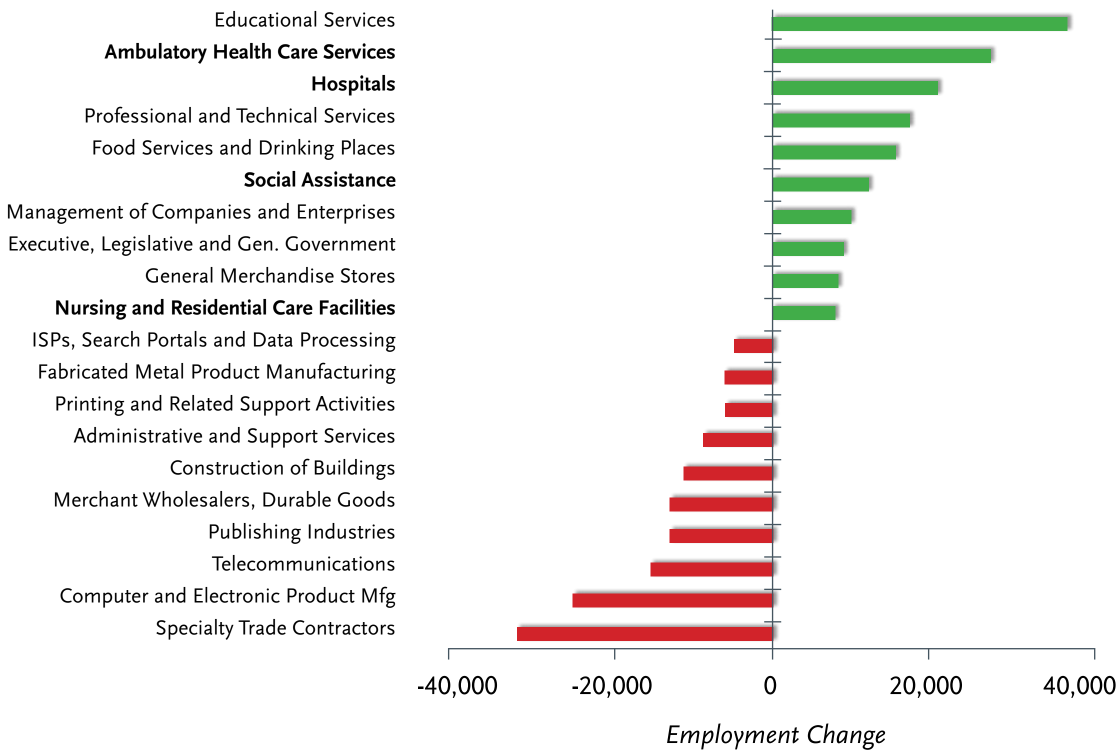
Sources: U.S. Department of Health and Human Services, Centers for Medicare & Medicaid Services; U.S. Census Bureau, 2004.

Healthcare and Job Creation

Like the nation, Colorado was wracked by economic turbulence over the past decade. The combined effects of the 2001 'dot-com' recession—which hit Colorado harder than the U.S. overall—and the more recent Great Recession[2] meant the state's economy barely nudged forward over the past 10 years. Indeed, Colorado's employment totals are essentially unchanged since July 2001.

It is not a stretch to say that the Health Care and Social Assistance sector (NAICS 62)[3] has been the state's shining star over the past decade in terms of job creation. While most industries have floundered, the sector has added 64,000 jobs since 2001. Today, the state's Health Care and Social Assistance sector providers employ more than 260,800 workers, accounting for just over one in eight jobs. The employment categories in **BOLD** below indicate those included in the Health Care and Social Assistance sector.

EMPLOYMENT CHANGE IN COLORADO BY INDUSTRY, 2001 – 2010



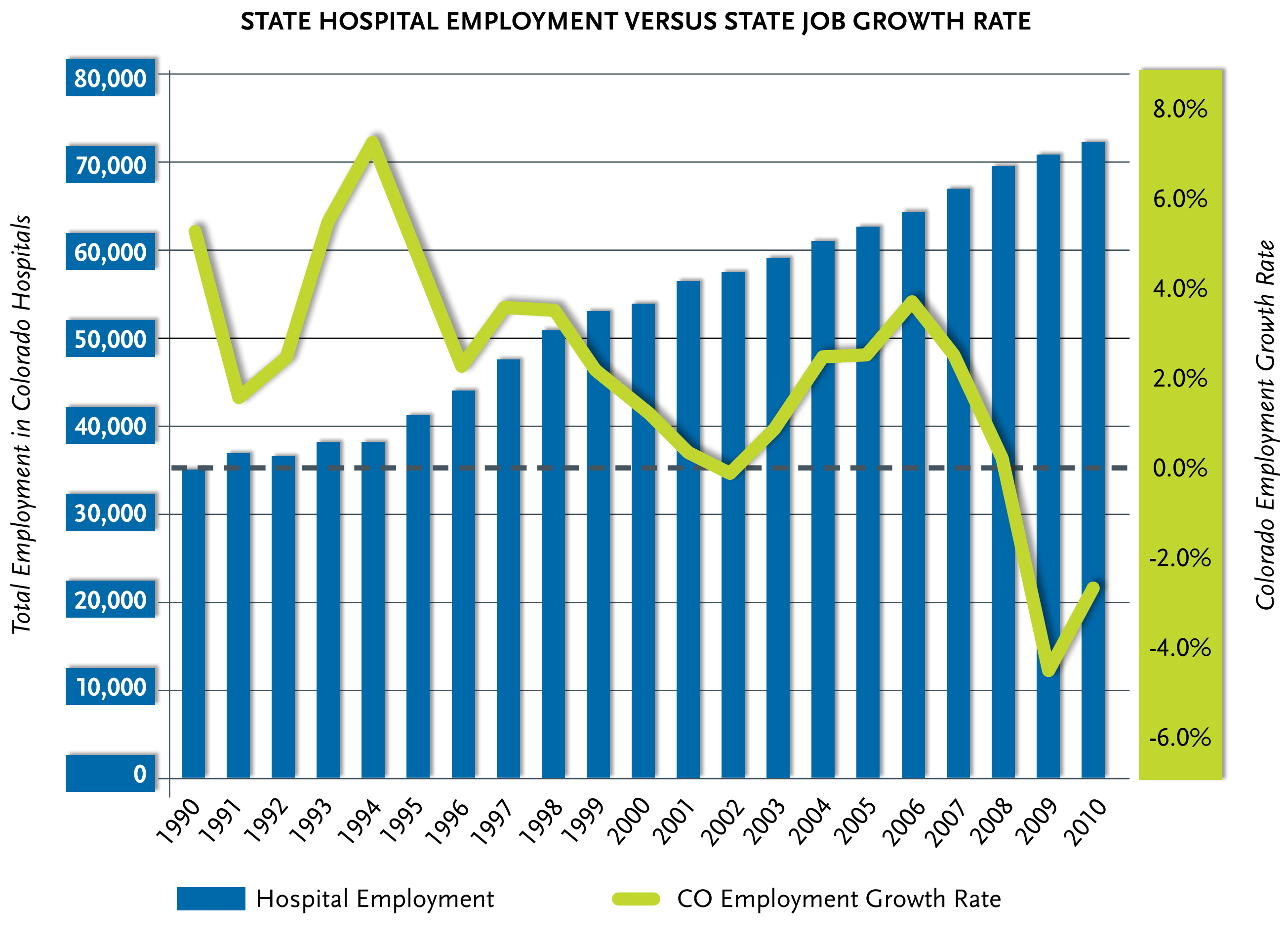
Source: Colorado Department of Labor and Employment (CDLE) – Quarterly Census of Employment and Wages (QCEW)

[2] The Great Recession officially lasted from December 2007 through June 2009.

[3] The North American Industrial Classification System (NAICS) offers a means by which industry trends can be analyzed. See Appendix B for more details.

Healthcare and Job Creation (cont.)

Reflecting overall trends in healthcare, Colorado's hospitals have enjoyed consistent and significant job gains. Since 1990, the number of hospital workers in Colorado has more than doubled, increasing from about 35,000 workers to nearly 72,000. This growth persisted through the Great Recession and beyond, with hospital employment totals growing by more than 4,900 (7.4 percent) from 2007 to 2010. Meanwhile, Colorado saw its overall job growth rate decline by about two percent per annum on average during the same time period.



Sources: CDLE-QCEW and the Bureau of Labor Statistics (BLS)

Healthcare and Job Creation (cont.)

Hospitals are a vital part of the Health Care and Social Assistance sector. A closer look shows that hospitals are the sector's second-largest job provider, trailing only ambulatory healthcare services (e.g., physician offices, dental practices, diagnostic laboratories, home health care and more). Average wages (excluding benefits) in hospitals in 2010 were $55,000, 16.9 percent higher than the state average of $46,700.

HEALTH CARE AND SOCIAL ASSISTANCE SECTOR EMPLOYMENT BREAKDOWN						
NAICS	DESCRIPTION	NUMBER OF JOBS IN 2010	SHARE OF STATE EMPLOYMENT	JOB GROWTH SINCE 2005	PERCENT GROWTH SINCE 2005	2010 AVERAGE WAGE
621	Ambulatory Health Care Services	97,500	4.4%	15,900	19.4%	$54,400
622	Hospitals	79,900	3.6%	11,400	16.6%	$55,000
623	Nursing and Residential Care Facilities	41,600	1.9%	4,400	26.2%	$30,000
624	Social Assistance	41,800	1.9%	8,700	26.2%	$23,000
THE SECTOR OVERALL						
62	Health Care and Social Assistance	260,800	11.9%*	40,300*	18.2%	$45,700

*Figures are rounded.

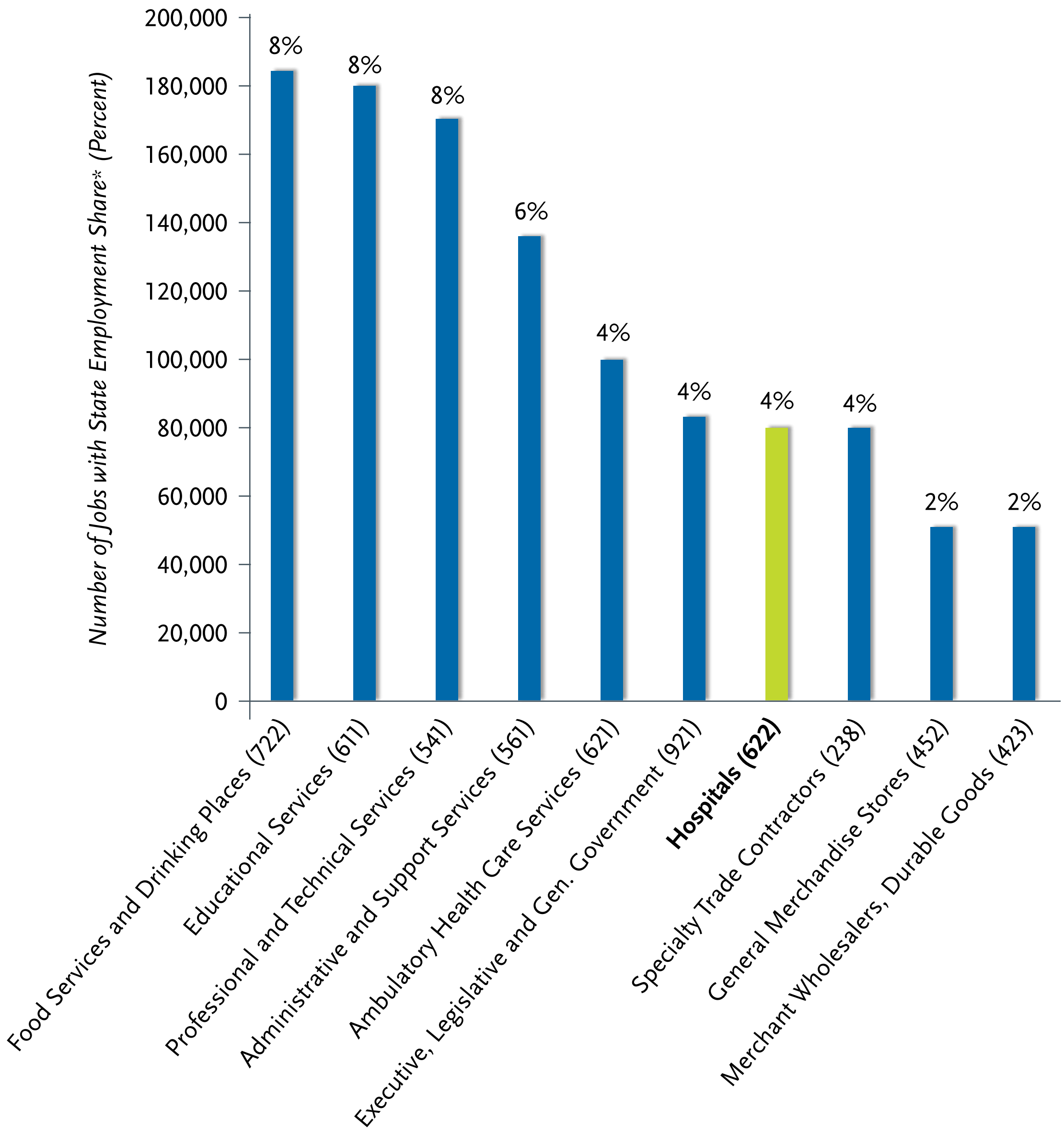
In addition to accounting for nearly 12 percent of all Colorado jobs, Health Care and Social Assistance sector employment growth since 2005 stands in stark contrast to statewide and national employment trends during the same time period. The 2010 average wage at hospitals is also significantly higher than Colorado and U.S. averages across all industries.

STATE AND NATIONAL EMPLOYMENT			
DESCRIPTION	JOB GROWTH SINCE 2005	PERCENT GROWTH SINCE 2005	2010 AVERAGE WAGE
Colorado	-28,411	-1.3%	$46,700
United States	-3,872,000	-2.9%	$45,200

Healthcare and Job Creation (cont.)

Looking at the more detailed three-digit NAICS industry level, the hospital industry (NAICS 622) accounts for approximately four percent of state employment and is the state's seventh-largest employing industry. This includes all hospital types.

THE 10 LARGEST THREE-DIGIT EMPLOYMENT INDUSTRIES IN COLORADO, WITH CORRESPONDING STATE EMPLOYMENT SHARE



Source: CDLE-QCEW

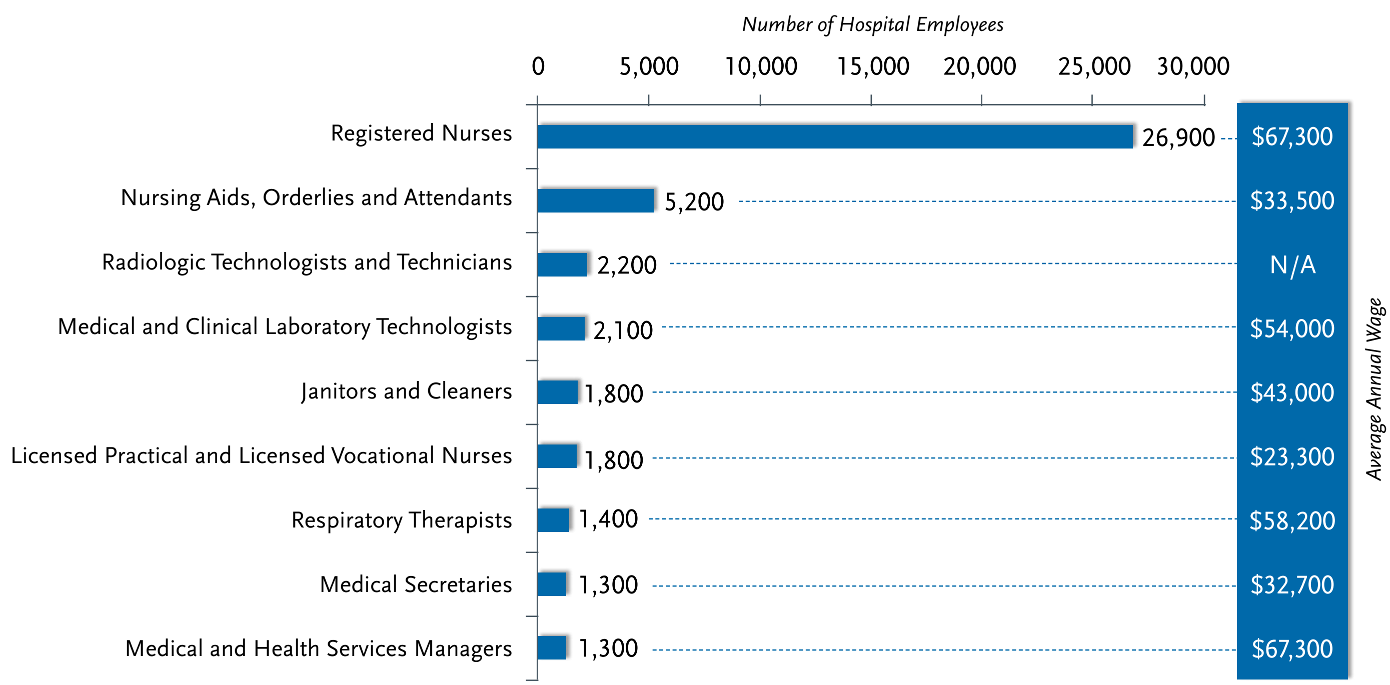
*Figures are rounded.

Healthcare and Workforce Development

The Health Care and Social Assistance sector is appealing from an economic and workforce development perspective because it offers a variety of opportunities to workers regardless of educational background. Hospitals are perfect examples; employees range from physicians with graduate degrees and years of training to service and maintenance workers with high school or GED degrees. Because hospital staffs encompass a large variety of educational, skill and experience levels, they provide good opportunities for movement along various career paths.

Despite the fact that many hospitals are adding employees while scores of other industries across Colorado are laying off workers, hospitals continue to face challenges in filling some positions. This is primarily due to shortages of qualified workers. Accordingly, the hospital sector offers promise for workforce development efforts. The following table identifies some of the top occupations in the hospital sector. Registered Nurse is the predominant occupation.

COLORADO HOSPITAL EMPLOYMENT AND AVERAGE ANNUAL WAGE BY OCCUPATION IN 2010



Source: Economic Modeling Specialists, Inc. (EMSI) and CDLE

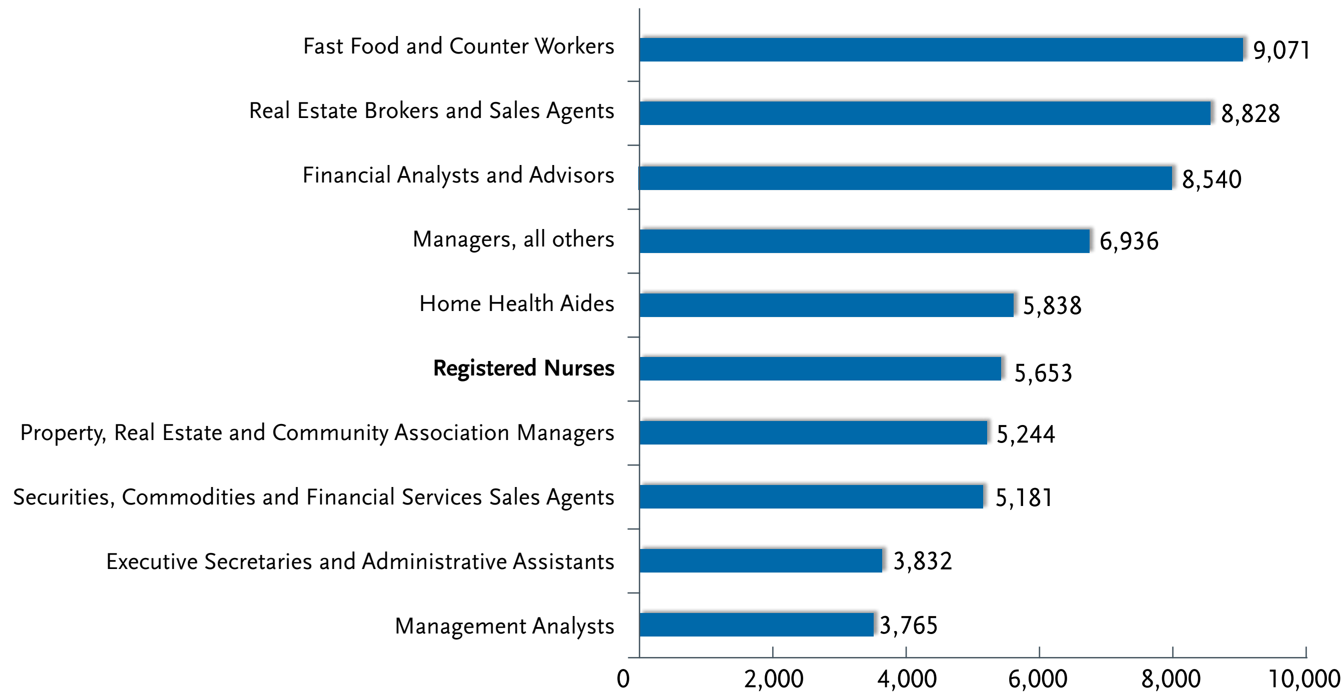
Healthcare and Workforce Development (cont.)

According to the U.S. Bureau of Labor Statistics (BLS), the national demand for registered nurses (RNs) is expected to continue to grow much faster than the average for all occupations, driven especially by an aging population and an increased emphasis on preventive care. According to state forecasts, the demand for RNs is expected to grow in Colorado as well.

Using a model from Economic Modeling Specialists, Inc. (EMSI), the number of employed RNs is expected to grow by more than 5,600 over the next five years. The **Colorado Center for Nursing Excellence** suggests the state will have difficulty meeting this need.

Typically, RNs follow one of three educational paths: a bachelor's degree, an associate's degree or a diploma from an approved nursing program. Advanced practice nurses (such as clinical nurse specialists, nurse anesthetists, nurse midwives, and nurse practitioners) typically require a master's degree.

TOP 10 OCCUPATIONS WITH THE GREATEST EXPECTED GROWTH FROM 2010 TO 2015



Source: EMSI

The Economic Impact of Colorado's Hospitals

As the previous section shows, hospitals provide a significant number of jobs to Coloradans. Yet their contribution to the state economy is more extensive than what happens at the facility. For example, Colorado hospitals rely on a highly integrated supply chain that includes equipment and service providers, laboratories, food distributors, linen and uniform services and many more. These supporting businesses provide jobs. Additionally, employees of both hospitals and their suppliers create economic activity in Colorado because they spend much of their income in the state economy. These spin-off jobs are known as the *multiplier effect*.

In this section we provide a more comprehensive examination of the impact of hospitals on the regional and state economies by quantifying these multiplier effects. Our results suggest that Colorado hospitals support $10.8 billion in value-added activity through direct and multiplier impacts. This supports 133,100 total jobs, with an average annual compensation per employee of $55,700.

Methods

We employed the **IMPLAN model** to estimate the multiplier effects of hospitals on Colorado's economy. IMPLAN (IMpact analysis for PLANning) is a widely used economic input-output model that estimates how changes in final demand (i.e. output) ultimately translate into changes in employment (i.e. input) and associated compensation.

We used the Colorado version of IMPLAN to estimate the statewide impacts and aggregate the state's counties across congressional district lines[4]. Direct impacts are benchmarked to employment and compensation figures from the Colorado Department of Labor and Employment's (CDLE) Quarterly Census of Employment and Wages (QCEW) data.

We then used the multipliers from IMPLAN to calculate the spin-off impacts. These impacts are caused by hospitals purchasing from their supply chains and the spending of employees—both hospital and supply chain—as they conduct day-to-day activities (e.g. paying the mortgage, buying groceries, etc.). Multipliers quantify the relationship between direct impacts and total impacts. For example, if 100 direct jobs support 50 spin-off jobs, then the multiplier is 1.5 [100 jobs * 1.5 = 150 jobs (direct + spinoff)]. The total impacts are simply the summation of the direct and spin-off impacts.

The following charts and tables show direct and spin-off impacts from Colorado's hospitals. First we show these total impacts for Colorado, and then break these down according to hospital location (rural and urban regions) and by congressional district. In Appendix A, we provide more detailed industry-specific impacts.

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[4] Congressional district boundaries do not exactly follow county lines. If the majority of a county is in a certain congressional district, we count the full county.

Methods (cont.)

Our analysis considers four types of impacts: output, value-added, employee compensation and total employment. *Output* is the broadest measure and is akin to total revenue; however, because hospitals pay their suppliers out of their revenue, output tends to overstate the unique impacts of hospitals, and can lead to double counting when spin-off effects are considered.

Economists also measure impact with *value-added*[5], which here considers the economic activity directly attributable to hospitals. Value-added is different from output/revenue as it is a measure of the 'value' added to a good or service during the production process—in other words, value-added is the difference between cost paid and revenue received. For example, a surgical tray of instruments might cost a hospital $1,000, but the hospital might charge a patient undergoing surgery $1,200 for the tray. Because of the surgeon's use, the hospital added $200 to the value of the surgical tray.

We also provide estimates of *employee compensation* (wages plus benefits) and *total employment* (combined full and part-time).

Statewide Impacts

Overall, Colorado's hospital sector generated $18.8 billion in output in 2010, $9.8 billion directly and an additional $9.0 billion in spin-off impacts. The value-added economic activity generated was $10.8 billion.

In employment terms, the state's 71,700 hospital jobs generate an additional 61,400 spin-off jobs in 2010 through multiplier effects. These spin-off jobs add more than $2.4 billion to Colorado payrolls. Hospital jobs compensate workers $69,900 annually on average (wages plus benefits); spin-off jobs compensate workers $39,100 annually on average.

**OUTPUT, VALUE-ADDED, EMPLOYEE COMPENSATION,
AND TOTAL EMPLOYEES: DIRECT AND SPIN-OFF FOR COLORADO HOSPITALS**

	DIRECT	SPIN-OFF	TOTAL	MULTIPLIER
Output	$9,846,083,000	$8,963,071,000	$18,809,154,000	1.9
Value-Added	$5,049,391,000	$5,727,066,000	$10,776,457,000	2.1
Employee Compensation	$5,009,880,000	$2,401,583,000	$7,411,463,000	1.5
Total Employees	71,700	61,400	133,100	1.9

[5] At the national level, the sum of value-added is the same as Gross Domestic Product (GDP).

Regional Impacts

Hospitals have important local and regional impacts across Colorado. In this section we break down the state-level impacts between rural and urban[6] hospitals, and along the state's seven congressional districts.

Rural and Urban Regions

Hospitals in rural regions around the state directly contribute $2.9 billion in economic activity and add 21,400 jobs. Through multiplier effects, this translates into $4.1 billion in total output and 30,800 jobs. These jobs compensate hospital workers $69,300 annually on average, and compensate employees in spin-off jobs $30,800 annually on average.

Urban hospitals directly account for $6.9 billion in state output and contribute about $3.6 billion to state payrolls in their 50,300 jobs. Including spin-off effects, urban hospitals add $13.2 billion to the state's output, while paying just over $5.3 billion in compensation for more than 93,000 jobs. These jobs compensate hospital workers $71,600 annually on average (wages plus benefits), and compensate employees in spin-off jobs $40,500 annually on average.

Note that only the direct employment figures (number of direct employees) may be summed across the urban, rural and congressional districts. Because of leakages at the county level, the total state impact of Colorado's hospitals will be greater than the summation of the individual regions. For example, an individual employed in Larimer County could purchase goods in Denver County, which is a leakage for Larimer County that gets counted as output for Denver County.

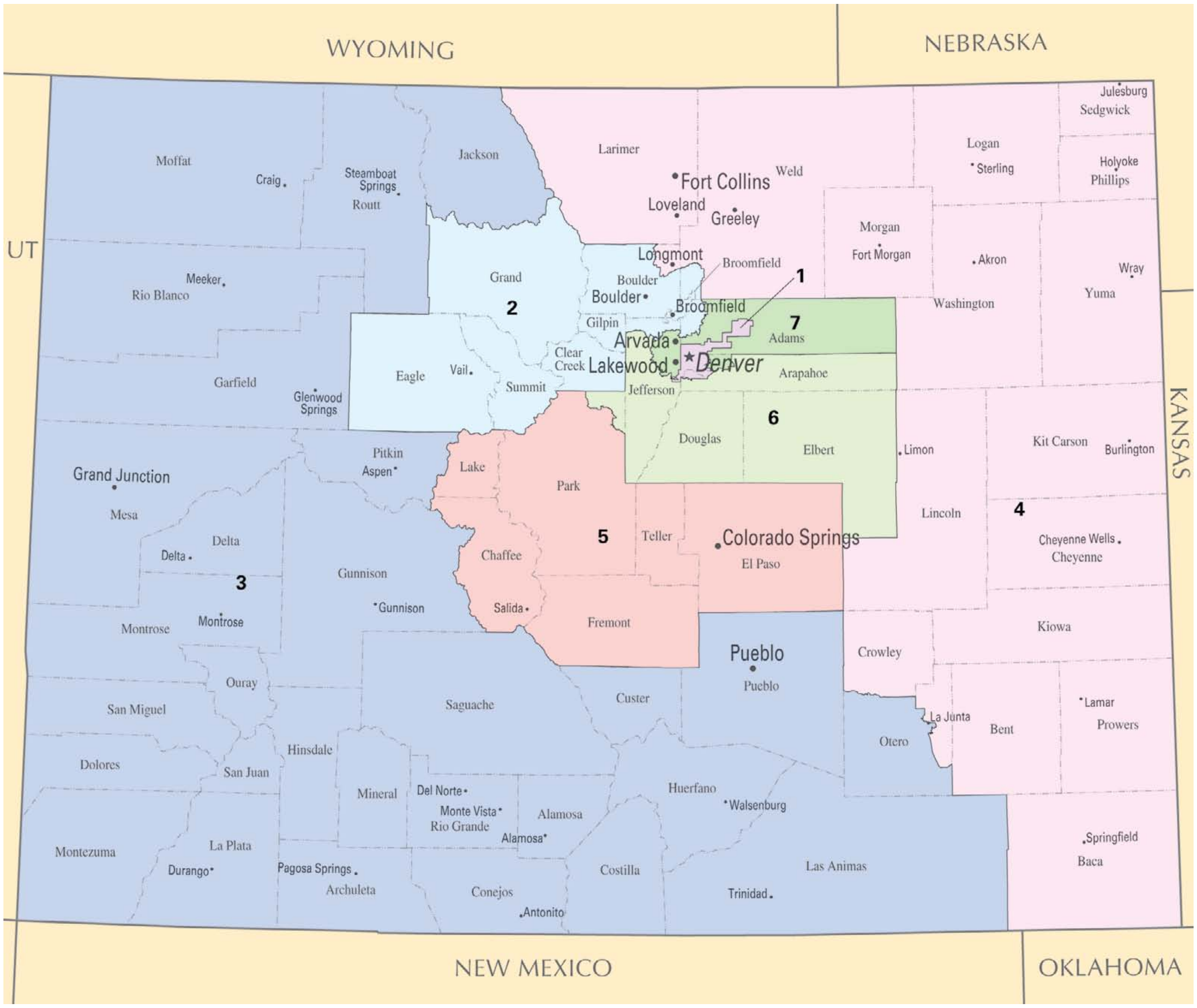
RURAL AND URBAN OUTPUT, VALUE-ADDED, EMPLOYEE COMPENSATION, AND TOTAL EMPLOYEES: DIRECT AND SPIN-OFF FOR HOSPITALS

	DIRECT	SPIN-OFF	TOTAL	MULTIPLIER
RURAL COLORADO				
Output	$2,851,383,000	$1,249,778,000	$4,101,161,000	1.5
Value-Added	$1,434,154,000	$1,611,405,000	$3,045,559,000	1.6
Employee Compensation	$1,485,706,000	$288,570,000	$1,774,276,000	1.2
Total Employees	21,400	9,400	30,800	1.5
URBAN COLORADO				
Output	$6,928,456,000	$6,271,729,000	$13,200,185,000	1.9
Value-Added	$3,599,364,000	$7,726,109,000	$11,325,472,000	2.1
Employee Compensation	$3,599,364,000	$1,736,398,000	$5,335,761,000	1.5
Total Employees	50,300	42,900	93,100	1.9

Source: Authors' calculations using CDLE-QCEW data and IMPLAN

[6] We define a hospital as 'rural' if it located in a county without a metropolitan statistical area (MSA) and define a hospital as 'urban' if it is in a county with a MSA. According to the U.S. Census Bureau, a metropolitan statistical area is an area with a core/nucleus population of 50,000 or more.

Colorado's Seven Congressional Districts (as of Oct. 2010)



Source: U.S. Department of Interior

Congressional District 1 contains the City of Denver and provides the largest share of total state hospital revenues and value added. District 2 contains the City of Boulder and extends to the western edge of Eagle County. District 3 is comprised of the largest geographical area in Colorado, encompassing more than half of the western part of the state from New Mexico to Wyoming. District 4 extends from Larimer County east to Nebraska and south to Baca County. District 5 covers the center of the state and includes Colorado Springs. Districts 6 and 7 cover other Denver metro areas that are not the City and County of Denver.

Hospital Revenue, Output, and Value-Added Summary

TOTAL OUTPUT SUMMARY					
	NUMBER OF HOSPITALS	DIRECT REVENUE/OUTPUT	SPIN-OFF REVENUE/OUTPUT	TOTAL OUTPUT	OUTPUT MULTIPLIER
Colorado	108	$9,846,083,000*	$8,963,071,000*	$18,809,154,000*	1.9
District 1	24	$3,109,451,000	$2,051,221,000	$5,160,672,000	1.7
District 2	10	$833,916,000	$502,004,000	$1,335,920,000	1.6
District 3	28	$1,647,801,000	$871,166,000	$2,518,967,000	1.5
District 4	19	$1,311,972,000	$742,257,000	$2,054,229,000	1.6
District 5	13	$1,112,698,000	$720,552,000	$1,833,250,000	1.7
District 6	10	$1,297,273,000	$874,167,000	$2,171,440,000	1.7
District 7	4	$464,696,000	$237,170,000	$701,866,000	1.5
Rural	43	$2,851,383,000	$1,249,778,000	$4,101,161,000	1.5
Urban	65	$6,928,456,000	$6,271,729,000	$13,200,185,000	1.9

Source: Authors' calculations using CDLE-QCEW data and IMPLAN

TOTAL VALUE-ADDED SUMMARY					
	NUMBER OF HOSPITALS	DIRECT VALUE-ADDED	SPIN-OFF VALUE-ADDED	TOTAL VALUE-ADDED	TOTAL VALUE-ADDED MULTIPLIER
Colorado	108	$5,049,391,000*	$5,727,066,000*	$10,776,457,000*	2.1
District 1	24	$1,662,935,000	$2,531,755,000	$4,194,690,000	1.8
District 2	10	$426,846,000	$643,503,000	$1,070,349,000	1.8
District 3	28	$816,601,000	$1,129,463,000	$1,946,064,000	1.7
District 4	19	$672,902,000	$909,886,000	$1,582,788,000	1.7
District 5	13	$515,826,000	$994,180,000	$1,510,005,000	1.9
District 6	10	$683,398,000	$1,085,588,000	$1,768,987,000	1.8
District 7	4	$252,956,000	$277,971,000	$530,928,000	1.6
Rural	43	$1,434,154,000	$1,611,405,000	$3,045,559,000	1.6
Urban	65	$3,599,364,000	$7,726,109,000	$11,325,472,000	2.1

Source: Authors' calculations using CDLE-QCEW data and IMPLAN

*Because of leakages at the county level, the total state impact of Colorado's hospitals will be greater than the sum of the individual regions. For example, an individual employed in Larimer County could purchase goods in Denver County, which is a leakage for Larimer County that gets counted as output for Denver County.

Employment Summary

Congressional District 1 has the highest number of hospital employees, with nearly 22,000 workers in 2010. Spin-off impacts in the region total more than 13,700 additional jobs.

EMPLOYMENT SUMMARY					
	NUMBER OF HOSPITALS	DIRECT EMPLOYMENT	SPIN-OFF EMPLOYMENT	TOTAL EMPLOYMENT	EMPLOYMENT MULTIPLIER
Colorado	108	71,700*	61,400*	133,100*	1.9
District 1	24	21,800	13,700	35,500	1.6
District 2	10	6,200	3,300	9,500	1.5
District 3	28	12,600	6,900	19,500	1.6
District 4	19	9,700	6,100	15,800	1.6
District 5	13	9,100	5,200	14,300	1.6
District 6	10	9,300	6,000	15,200	1.7
District 7	4	3,200	1,800	4,900	1.6
Rural	43	21,400	9,400	30,800	1.5
Urban	65	50,300	42,900	93,100	1.9

Source: Authors' calculations using CDLE-QCEW data and IMPLAN

Employee Compensation Summary

Colorado hospitals provide workers with more than $5 billion in wages and benefits annually. Through multiplier effects, this totals more than $7.4 billion in direct and indirect employee compensation. Consistent with its status as the largest employer, District 1 also has the highest annual payroll of the state's seven congressional districts.

EMPLOYEE COMPENSATION SUMMARY					
	NUMBER OF HOSPITALS	DIRECT EMPLOYEE COMPENSATION	SPIN-OFF EMPLOYEE COMPENSATION	TOTAL EMPLOYEE COMPENSATION	EMPLOYEE COMPENSATION MULTIPLIER
Colorado	108	$5,009,880,000*	$2,401,583,000*	$7,411,463,000*	1.5
District 1	24	$1,666,093,000	$564,024,000	$2,230,117,000	1.3
District 2	10	$400,788,000	$131,863,000	$532,651,000	1.3
District 3	28	$818,263,000	$216,456,000	$1,034,719,000	1.3
District 4	19	$619,570,000	$185,635,000	$805,205,000	1.3
District 5	13	$629,508,000	$212,876,000	$842,384,000	1.3
District 6	10	$692,191,000	$227,680,000	$919,870,000	1.3
District 7	4	$185,002,000	$57,050,000	$242,051,000	1.3
Rural	43	$1,485,706,000	$288,570,000	$1,774,276,000	1.2
Urban	65	$3,599,364,000	$1,736,398,000	$5,335,761,000	1.5

Source: Authors' calculations using CDLE-QCEW data and IMPLAN

*Because of leakages at the county level, the total state impact of Colorado's hospitals will be greater than the sum of the individual regions. For example, an individual employed in Larimer County could purchase goods in Denver County, which is a leakage for Larimer County that gets counted as output for Denver County.

Average Employee Compensation Per Worker

Average annual compensation (wages plus benefits) per worker in the hospital sector varies across the state. It is highest in congressional districts 1 and 6 (the metropolitan Denver area), averaging in the mid $70,000 range. Although the average compensation for hospital employees is lower in Colorado's smaller metropolitan regions and rural regions, it is still higher than the average annual compensation paid in these regions among all job sectors.

EMPLOYEE COMPENSATION PER WORKER SUMMARY				
	NUMBER OF HOSPITALS	DIRECT EMPLOYEE COMPENSATION	SPIN-OFF EMPLOYEE COMPENSATION	AVERAGE EMPLOYEE COMPENSATION
Colorado	108	$69,900	$39,100	$55,700
District 1	24	$76,500	$41,200	$62,900
District 2	10	$65,100	$39,800	$56,300
District 3	28	$65,000	$31,600	$53,200
District 4	19	$64,200	$30,200	$51,000
District 5	13	$69,300	$40,800	$58,900
District 6	10	$74,800	$38,000	$60,300
District 7	4	$58,100	$32,500	$49,000
Rural	43	$69,300	$30,800	$57,500
Urban	65	$71,600	$40,500	$57,300

Source: Authors' calculations using CDLE-QCEW data and IMPLAN

Summary

Colorado's hospitals contribute substantially to the communities they serve and to the state as a whole. In 2009 the state's hospitals provided a tremendous array of services for more than 8.9 million patient visits.

Hospitals are an important economic driver statewide, employing nearly 72,000 workers as of 2010. Despite the onset of the Great Recession in late 2007, hospitals continued to add employees, helping to offset the substantial job losses that have touched almost every other industry. Many of these jobs pay above-average wages, and offer opportunities to workers across a wide spectrum of skill sets and education levels.

Additionally, the state's hospitals have an extensive supply chain in their communities and across the state, providing more employment opportunities through their purchases of goods and supporting services. Including multiplier effects, hospitals generated more than $18.8 billion in economic activity in 2010, and support nearly one in 16 jobs in Colorado. This figure represents 4.2 percent of the state's total economic output.

About the Authors

Dr. Martin Shields

Dr. Martin Shields is Associate Professor of Economics at Colorado State University. His research program focuses on the factors that influence regional economic growth, emphasizing policy options that will enhance economic opportunities and quality of life for Colorado residents. Professor Shields develops economic models to identify regional competitive advantages and manners by which these advantages are reinforced and strengthened through public-private partnerships.

In related research, Dr. Shields examines the relationship between economic growth and household income. From a policy perspective, he is interested in identifying strategies for helping workers move up through career ladders, regardless of their education.

Dr. Shields has published more than 25 scholarly articles and book chapters, and has presented his findings in hundreds of public presentations. He joined Colorado State University after working for eight years at The Pennsylvania State University.

Michael Marturana

Michael Marturana is the research economist in Colorado State University's Office of Engagement. Mr. Marturana earned his B.A. from The University of Arizona and a M.A. from Colorado State University (CSU), both in economics. He has been conducting research in his current position for CSU for over a year. Prior to entering graduate school, Mr. Marturana developed his expertise in data management as a capacity planner for American Express.

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Appendix A

The following tables show the impacts of Colorado hospitals on the state economy across congressional districts. All of the tables in Appendix A detail how GMS hospitals impact the various Colorado congressional districts, disaggregated over two-digit NAICS. The GMS hospital industry, shown in **BOLD**, is the direct effect from the hospitals in a given area.

For instance, the table on p. 20 indicates Colorado has 71,700 jobs in GMS hospitals. The effects on every other industry because of these jobs are listed in the other lines. As an example, Colorado's 71,700 jobs in hospitals support an additional 1,600 jobs in the industry of Arts, Entertainment and Recreation (primarily through employee spending). Summing across industries, we see hospitals indirectly support a total of 61,400 jobs across the state. The "total" line includes both direct and spin-off effects from Colorado hospitals, whereas the "spin-off effect total" lines are just that—the secondary impacts from hospitals.

We note that only the direct employment figures (the direct number of employees) may be summed across congressional districts. Because of leakages at the county level, the total state impact of Colorado's hospitals will be greater than the summation of the seven individual congressional districts. For example, an individual employed in Larimer County could purchase goods in Denver County, which is a leakage for Larimer County that gets counted as output for Denver County.

All tables in Appendix A are based on calculations using the NAICS classification system, CDLE-QCEW data and IMPLAN.

THE ECONOMIC IMPACTS OF ALL COLORADO HOSPITALS ON THE STATE						
NAICS	INDUSTRY	OUTPUT/ REVENUE	SPIN-OFF EMPLOYMENT	EMPLOYEE COMPENSATION	AVERAGE EMPLOYEE COMPENSATION	TOTAL VALUE ADDED
11	Ag, Forestry, Fish & Hunting	$31,822,000	200	$2,590,000	$10,700	$14,044,000
21	Mining	$31,260,000	100	$4,736,000	$61,300	$15,718,000
22	Utilities	$187,826,000	300	$29,001,000	$106,100	$105,193,000
23	Construction	$43,054,000	300	$13,002,000	$37,700	$15,248,000
31	Manufacturing	$345,366,000	800	$55,503,000	$70,000	$91,599,000
42	Wholesale Trade	$477,479,000	2,400	$168,772,000	$71,600	$310,538,000
44	Retail Trade	$537,869,000	9,400	$251,379,000	$26,900	$815,249,000
48	Transportation & Warehousing	$199,623,000	1,400	$59,161,000	$43,600	$105,216,000
51	Information	$461,003,000	1,000	$87,430,000	$83,600	$256,284,000
52	Finance & Insurance	$1,290,984,000	6,000	$303,991,000	$50,300	$744,891,000
53	Real Estate & Rental	$2,582,008,000	8,600	$104,431,000	$12,100	$1,501,460,000
54	Professional, Scientific & Technical Services	$547,026,000	4,500	$261,215,000	$58,000	$261,167,000
55	Management of Companies	$344,044,000	1,400	$193,443,000	$137,700	$59,423,000
56	Administrative & Waste Services	$360,423,000	4,900	$145,324,000	$29,800	$109,816,000
61	Educational Services	$30,995,000	500	$14,840,000	$28,400	$34,883,000
62	Health & Social Services	$577,862,000	6,800	$285,163,000	$41,900	$529,541,000
622110	**Hospitals**	**$9,846,083,000**	**71,700**	**$5,009,880,000**	**$69,900**	**$5,049,391,000**
71	Arts Entertainment & Recreation	$96,276,000	1,600	$35,753,000	$22,100	$98,039,000
72	Accommodation & Food Service	$332,111,000	5,100	$112,531,000	$22,200	$277,501,000
81	Other Services	$254,163,000	3,400	$97,090,000	$28,700	$195,409,000
92	Government	$231,877,000	2,700	$176,227,000	$64,200	$185,848,000
	TOTAL	$18,809,154,000	133,100	$7,411,463,000	$55,700	$10,776,457,000
	Spin-Off Effect Total	$8,963,071,000	61,400	$2,401,583,000	$39,100	$5,727,066,000

THE IMPACTS OF HOSPITALS IN CONGRESSIONAL DISTRICT 1						
NAICS	INDUSTRY	OUTPUT/ REVENUE	SPIN-OFF EMPLOYMENT	EMPLOYEE COMPENSATION	AVERAGE EMPLOYEE COMPENSATION	TOTAL VALUE ADDED
11	Ag, Forestry, Fish & Hunting	$53,000	1	$8,000	$11,500	$45,000
21	Mining	$6,525,000	14	$969,000	$71,500	$7,107,000
22	Utilities	$44,538,000	62	$7,030,000	$113,800	$54,612,000
23	Construction	$6,023,000	46	$1,942,000	$42,600	$5,593,000
31	Manufacturing	$55,365,000	139	$7,951,000	$57,100	$29,333,000
42	Wholesale Trade	$111,882,000	539	$40,580,000	$75,300	$137,937,000
44	Retail Trade	$83,946,000	1,380	$37,091,000	$26,900	$132,332,000
48	Transportation & Warehousing	$42,114,000	238	$12,170,000	$51,200	$37,100,000
51	Information	$101,090,000	221	$19,520,000	$88,400	$109,361,000
52	Finance & Insurance	$321,685,000	1,780	$83,887,000	$47,100	$334,774,000
53	Real Estate & Rental	$636,560,000	2,732	$28,143,000	$10,300	$874,223,000
54	Professional, Scientific & Technical Services	$147,453,000	1,098	$64,797,000	$59,000	$195,318,000
55	Management of Companies	$92,687,000	370	$52,693,000	$142,400	$118,900,000
56	Administrative & Waste Services	$89,862,000	1,220	$45,452,000	$37,300	$113,114,000
61	Educational Services	$8,968,000	122	$4,627,000	$37,900	$9,963,000
62	Health & Social Services	$121,281,000	1,317	$65,892,000	$50,000	$147,170,000
622110	**Hospitals**	**$3,109,451,000**	**21,777**	**$1,666,093,000**	**$76,500**	**$1,662,935,000**
71	Arts Entertainment & Recreation	$19,971,000	354	$7,644,000	$21,600	$22,270,000
72	Accommodation & Food Service	$67,976,000	960	$23,297,000	$24,300	$70,755,000
81	Other Services	$44,277,000	574	$20,843,000	$36,300	$51,099,000
92	Government	$48,965,000	540	$39,489,000	$73,200	$80,747,000
	TOTAL	$5,160,672,000	35,482	$2,230,117,000	$62,900	$4,194,690,000
	Spin-Off Effect Total	$2,051,221,000	13,705	$564,024,000	$41,200	$2,531,755,000

THE IMPACTS OF HOSPITALS IN CONGRESSIONAL DISTRICT 2						
NAICS	INDUSTRY	OUTPUT/ REVENUE	SPIN-OFF EMPLOYMENT	EMPLOYEE COMPENSATION	AVERAGE EMPLOYEE COMPENSATION	TOTAL VALUE ADDED
11	Ag, Forestry, Fish & Hunting	$199,000	0	$6,000	$14,900	$103,000
21	Mining	$190,000	0	$22,000	$69,500	$193,000
22	Utilities	$6,214,000	12	$1,046,000	$89,500	$8,103,000
23	Construction	$3,753,000	32	$952,000	$30,200	$3,370,000
31	Manufacturing	$13,206,000	31	$2,574,000	$82,000	$8,285,000
42	Wholesale Trade	$24,280,000	110	$8,413,000	$76,500	$31,378,000
44	Retail Trade	$31,587,000	511	$14,582,000	$28,500	$52,040,000
48	Transportation & Warehousing	$3,587,000	31	$1,126,000	$36,400	$4,004,000
51	Information	$22,737,000	42	$5,079,000	$120,100	$24,738,000
52	Finance & Insurance	$53,340,000	282	$12,926,000	$45,900	$55,098,000
53	Real Estate & Rental	$184,404,000	533	$7,993,000	$15,000	$256,003,000
54	Professional, Scientific & Technical Services	$35,020,000	266	$18,570,000	$69,800	$45,250,000
55	Management of Companies	$10,530,000	43	$5,883,000	$135,700	$13,991,000
56	Administrative & Waste Services	$19,899,000	248	$8,222,000	$33,100	$24,823,000
61	Educational Services	$1,721,000	40	$727,000	$18,200	$1,903,000
62	Health & Social Services	$35,897,000	393	$16,998,000	$43,300	$42,816,000
622110	**Hospitals**	**$833,916,000**	**6,153**	**$400,788,000**	**$65,100**	**$426,846,000**
71	Arts Entertainment & Recreation	$4,772,000	59	$1,870,000	$31,900	$5,981,000
72	Accommodation & Food Service	$22,655,000	295	$8,082,000	$27,400	$24,844,000
81	Other Services	$14,395,000	207	$6,059,000	$29,200	$16,918,000
92	Government	$13,618,000	178	$10,730,000	$60,300	$23,660,000
	TOTAL	$1,335,920,000	9,467	$532,651,000	$56,300	$1,070,349,000
	Spin-Off Effect Total	$502,004,000	3,314	$131,863,000	$39,800	$643,503,000

THE IMPACTS OF HOSPITALS IN CONGRESSIONAL DISTRICT 3						
NAICS	INDUSTRY	OUTPUT/ REVENUE	SPIN-OFF EMPLOYMENT	EMPLOYEE COMPENSATION	AVERAGE EMPLOYEE COMPENSATION	TOTAL VALUE ADDED
11	Ag, Forestry, Fish & Hunting	$2,154,000	24	$235,000	$9,900	$1,312,000
21	Mining	$3,330,000	9	$617,000	$65,800	$3,138,000
22	Utilities	$31,782,000	55	$5,455,000	$98,400	$38,761,000
23	Construction	$6,211,000	50	$1,911,000	$38,500	$5,983,000
31	Manufacturing	$11,546,000	30	$1,602,000	$54,300	$5,700,000
42	Wholesale Trade	$33,127,000	214	$11,314,000	$52,900	$43,263,000
44	Retail Trade	$66,262,000	1,135	$30,972,000	$27,300	$112,813,000
48	Transportation & Warehousing	$22,781,000	159	$6,469,000	$40,600	$21,790,000
51	Information	$16,839,000	76	$3,728,000	$49,100	$17,693,000
52	Finance & Insurance	$92,642,000	532	$21,138,000	$39,700	$96,806,000
53	Real Estate & Rental	$313,446,000	909	$14,546,000	$16,000	$444,128,000
54	Professional, Scientific & Technical Services	$34,870,000	370	$12,865,000	$34,800	$46,031,000
55	Management of Companies	$11,888,000	68	$5,924,000	$87,700	$14,487,000
56	Administrative & Waste Services	$33,305,000	418	$13,522,000	$32,400	$41,582,000
61	Educational Services	$1,502,000	32	$703,000	$22,100	$1,896,000
62	Health & Social Services	$76,774,000	1,057	$36,402,000	$34,400	$93,086,000
622110	**Hospitals**	**$1,647,801,000**	**12,597**	**$818,263,000**	**$65,000**	**$816,601,000**
71	Arts Entertainment & Recreation	$9,989,000	193	$3,448,000	$17,800	$12,075,000
72	Accommodation & Food Service	$42,489,000	651	$13,922,000	$21,400	$45,343,000
81	Other Services	$32,401,000	475	$10,844,000	$22,800	$36,749,000
92	Government	$27,829,000	399	$20,838,000	$52,200	$46,829,000
	TOTAL	$2,518,967,000	19,453	$1,034,719,000	$53,200	$1,946,064,000
	Spin-Off Effect Total	$871,166,000	6,856	$216,456,000	$31,600	$1,129,463,000

THE IMPACTS OF HOSPITALS IN CONGRESSIONAL DISTRICT 4						
NAICS	INDUSTRY	OUTPUT/ REVENUE	SPIN-OFF EMPLOYMENT	EMPLOYEE COMPENSATION	AVERAGE EMPLOYEE COMPENSATION	TOTAL VALUE ADDED
11	Ag, Forestry, Fish & Hunting	$7,155,000	44	$475,000	$10,800	$3,626,000
21	Mining	$622,000	2	$133,000	$61,100	$556,000
22	Utilities	$17,363,000	30	$2,727,000	$92,400	$19,044,000
23	Construction	$4,747,000	40	$1,297,000	$32,800	$4,285,000
31	Manufacturing	$22,294,000	47	$3,179,000	$67,600	$10,458,000
42	Wholesale Trade	$34,179,000	207	$11,761,000	$56,800	$43,327,000
44	Retail Trade	$58,071,000	1,124	$27,291,000	$24,300	$95,521,000
48	Transportation & Warehousing	$16,000,000	115	$4,192,000	$36,500	$15,766,000
51	Information	$15,129,000	60	$3,297,000	$55,400	$14,474,000
52	Finance & Insurance	$97,568,000	550	$20,716,000	$37,600	$103,147,000
53	Real Estate & Rental	$236,490,000	740	$7,717,000	$10,400	$322,452,000
54	Professional, Scientific & Technical Services	$35,587,000	314	$16,387,000	$52,100	$44,517,000
55	Management of Companies	$13,529,000	73	$6,867,000	$93,800	$16,274,000
56	Administrative & Waste Services	$30,416,000	439	$11,456,000	$26,100	$36,163,000
61	Educational Services	$1,075,000	26	$455,000	$17,700	$1,225,000
62	Health & Social Services	$60,719,000	826	$27,913,000	$33,800	$70,234,000
622110	**Hospitals**	**$1,311,972,000**	**9,658**	**$619,570,000**	**$64,200**	**$672,902,000**
71	Arts Entertainment & Recreation	$5,182,000	133	$1,421,000	$10,700	$5,310,000
72	Accommodation & Food Service	$33,563,000	606	$10,547,000	$17,400	$32,346,000
81	Other Services	$27,467,000	401	$8,793,000	$21,900	$29,190,000
92	Government	$25,101,000	368	$19,012,000	$51,700	$41,973,000
	TOTAL	$2,054,229,000	15,804	$805,205,000	$51,000	$1,582,788,000
	Spin-Off Effect Total	$742,257,000	6,146	$185,635,000	$30,200	$909,886,000

THE IMPACTS OF HOSPITALS IN CONGRESSIONAL DISTRICT 5						
NAICS	INDUSTRY	OUTPUT/ REVENUE	SPIN-OFF EMPLOYMENT	EMPLOYEE COMPENSATION	AVERAGE EMPLOYEE COMPENSATION	TOTAL VALUE ADDED
11	Ag, Forestry, Fish & Hunting	$360,000	6	$73,000	$12,700	$237,000
21	Mining	$155,000	0	$28,000	$85,300	$188,000
22	Utilities	$15,315,000	12	$1,504,000	$122,400	$13,140,000
23	Construction	$3,164,000	27	$1,224,000	$45,900	$3,129,000
31	Manufacturing	$6,698,000	18	$1,227,000	$68,300	$4,460,000
42	Wholesale Trade	$20,995,000	126	$7,876,000	$62,700	$29,471,000
44	Retail Trade	$54,416,000	1,067	$28,511,000	$26,700	$99,008,000
48	Transportation & Warehousing	$11,011,000	91	$3,973,000	$43,500	$11,610,000
51	Information	$27,836,000	72	$5,896,000	$81,600	$32,143,000
52	Finance & Insurance	$113,173,000	529	$26,632,000	$50,300	$118,721,000
53	Real Estate & Rental	$239,064,000	709	$13,236,000	$18,700	$364,152,000
54	Professional, Scientific & Technical Services	$37,590,000	329	$24,170,000	$73,500	$53,734,000
55	Management of Companies	$7,962,000	42	$4,056,000	$97,300	$10,743,000
56	Administrative & Waste Services	$30,504,000	316	$14,059,000	$44,500	$42,351,000
61	Educational Services	$3,104,000	54	$1,536,000	$28,500	$3,960,000
62	Health & Social Services	$62,539,000	715	$35,083,000	$49,000	$83,021,000
622110	**Hospitals**	**$1,112,698,000**	**9,088**	**$629,508,000**	**$69,300**	**$515,826,000**
71	Arts Entertainment & Recreation	$6,789,000	114	$2,714,000	$23,900	$8,765,000
72	Accommodation & Food Service	$30,514,000	485	$10,611,000	$21,900	$34,326,000
81	Other Services	$18,545,000	210	$8,265,000	$39,400	$19,591,000
92	Government	$30,819,000	292	$22,202,000	$75,900	$61,431,000
	TOTAL	$1,833,250,000	14,301	$842,384,000	$58,900	$1,510,005,000
	Spin-Off Effect Total	$720,552,000	5,213	$212,876,000	$40,800	$994,180,000

THE IMPACTS OF HOSPITALS IN CONGRESSIONAL DISTRICT 6						
NAICS	INDUSTRY	OUTPUT/ REVENUE	SPIN-OFF EMPLOYMENT	EMPLOYEE COMPENSATION	AVERAGE EMPLOYEE COMPENSATION	TOTAL VALUE ADDED
11	Ag, Forestry, Fish & Hunting	$149,000	3	$33,000	$9,600	$96,000
21	Mining	$312,000	1	$29,000	$32,400	$332,000
22	Utilities	$10,991,000	16	$1,854,000	$114,400	$12,869,000
23	Construction	$5,704,000	45	$1,814,000	$40,600	$5,244,000
31	Manufacturing	$15,274,000	38	$2,912,000	$77,200	$10,225,000
42	Wholesale Trade	$35,705,000	146	$12,950,000	$88,900	$45,060,000
44	Retail Trade	$55,695,000	936	$26,955,000	$28,800	$89,240,000
48	Transportation & Warehousing	$9,054,000	70	$2,682,000	$38,500	$9,098,000
51	Information	$48,207,000	105	$8,021,000	$76,500	$51,537,000
52	Finance & Insurance	$120,685,000	444	$28,302,000	$63,700	$125,018,000
53	Real Estate & Rental	$288,126,000	876	$10,408,000	$11,900	$389,833,000
54	Professional, Scientific & Technical Services	$55,273,000	461	$26,642,000	$57,700	$69,594,000
55	Management of Companies	$25,273,000	95	$14,511,000	$153,200	$33,485,000
56	Administrative & Waste Services	$50,192,000	756	$16,986,000	$22,500	$58,952,000
61	Educational Services	$4,507,000	78	$2,082,000	$26,800	$5,200,000
62	Health & Social Services	$65,502,000	731	$32,049,000	$43,900	$76,845,000
622110	**Hospitals**	**$1,297,273,000**	**9,255**	**$692,191,000**	**$74,800**	**$683,398,000**
71	Arts Entertainment & Recreation	$7,657,000	127	$2,953,000	$23,200	$8,825,000
72	Accommodation & Food Service	$30,431,000	488	$10,472,000	$21,400	$30,861,000
81	Other Services	$24,075,000	323	$9,772,000	$30,200	$28,333,000
92	Government	$21,353,000	255	$16,252,000	$63,700	$34,943,000
	TOTAL	$2,171,440,000	15,249	$919,870,000	$60,300	$1,768,987,000
	Spin-Off Effect Total	$874,167,000	5,994	$227,680,000	$38,000	$1,085,588,000

THE IMPACTS OF HOSPITALS IN CONGRESSIONAL DISTRICT 7						
NAICS	INDUSTRY	OUTPUT/ REVENUE	SPIN-OFF EMPLOYMENT	EMPLOYEE COMPENSATION	AVERAGE EMPLOYEE COMPENSATION	TOTAL VALUE ADDED
11	Ag, Forestry, Fish & Hunting	$73,000	1	$18,000	$19,400	$57,000
21	Mining	$7,000	0	$1,000	$62,300	$7,000
22	Utilities	$3,675,000	6	$704,000	$108,600	$4,458,000
23	Construction	$2,116,000	17	$705,000	$41,800	$1,859,000
31	Manufacturing	$3,165,000	5	$348,000	$75,600	$1,272,000
42	Wholesale Trade	$12,275,000	68	$4,046,000	$59,100	$14,742,000
44	Retail Trade	$18,100,000	309	$8,430,000	$27,200	$28,052,000
48	Transportation & Warehousing	$8,575,000	64	$3,103,000	$48,100	$8,816,000
51	Information	$9,768,000	24	$1,918,000	$80,300	$10,041,000
52	Finance & Insurance	$23,853,000	119	$3,400,000	$28,500	$20,821,000
53	Real Estate & Rental	$85,248,000	230	$3,877,000	$16,800	$107,649,000
54	Professional, Scientific & Technical Services	$9,704,000	106	$3,643,000	$34,500	$11,423,000
55	Management of Companies	$1,774,000	10	$893,000	$91,600	$1,998,000
56	Administrative & Waste Services	$12,327,000	153	$4,982,000	$32,600	$13,957,000
61	Educational Services	$1,079,000	15	$538,000	$34,800	$1,322,000
62	Health & Social Services	$16,798,000	218	$7,928,000	$36,300	$18,546,000
622110	**Hospitals**	**$464,696,000**	**3,182**	**$185,002,000**	**$58,100**	**$252,956,000**
71	Arts Entertainment & Recreation	$1,219,000	22	$424,000	$19,300	$1,357,000
72	Accommodation & Food Service	$10,876,000	183	$3,672,000	$20,000	$10,402,000
81	Other Services	$10,125,000	121	$3,640,000	$30,100	$11,236,000
92	Government	$6,413,000	85	$4,780,000	$56,100	$9,955,000
	TOTAL	$701,866,000	4,940	$242,051,000	$49,000	$530,928,000
	Spin-Off Effect Total	$237,170,000	1,758	$57,050,000	$32,500	$277,971,000

THE IMPACTS OF RURAL HOSPITALS						
NAICS	INDUSTRY	OUTPUT/ REVENUE	SPIN-OFF EMPLOYMENT	EMPLOYEE COMPENSATION	AVERAGE EMPLOYEE COMPENSATION	TOTAL VALUE ADDED
11	Ag, Forestry, Fish & Hunting	$7,970,000	65	$587,000	$9,000	$4,351,000
21	Mining	$2,438,000	7	$407,000	$62,400	$2,355,000
22	Utilities	$48,425,000	87	$8,217,000	$94,300	$58,239,000
23	Construction	$7,667,000	63	$2,196,000	$35,000	$7,148,000
31	Manufacturing	$12,546,000	31	$1,391,000	$44,700	$4,579,000
42	Wholesale Trade	$41,878,000	279	$14,080,000	$50,500	$53,769,000
44	Retail Trade	$103,026,000	1,753	$46,024,000	$26,300	$172,745,000
48	Transportation & Warehousing	$24,428,000	191	$6,204,000	$32,400	$23,359,000
51	Information	$22,697,000	97	$4,781,000	$49,200	$23,407,000
52	Finance & Insurance	$126,134,000	795	$26,218,000	$33,000	$128,612,000
53	Real Estate & Rental	$492,029,000	1,342	$24,211,000	$18,000	$688,948,000
54	Professional, Scientific & Technical Services	$45,588,000	489	$15,979,000	$32,700	$58,875,000
55	Management of Companies	$19,518,000	108	$9,868,000	$91,400	$23,721,000
56	Administrative & Waste Services	$40,088,000	426	$15,012,000	$35,300	$49,249,000
61	Educational Services	$2,013,000	42	$963,000	$22,700	$2,529,000
62	Health & Social Services	$86,328,000	1,203	$39,539,000	$32,900	$100,868,000
622110	**Hospitals**	**$2,851,383,000**	**21,453**	**$1,485,706,000**	**$69,300**	**$1,434,154,000**
71	Arts Entertainment & Recreation	$16,846,000	270	$6,236,000	$23,100	$21,032,000
72	Accommodation & Food Service	$62,796,000	843	$21,361,000	$25,300	$68,718,000
81	Other Services	$45,326,000	651	$14,024,000	$21,500	$49,754,000
92	Government	$42,038,000	639	$31,273,000	$48,900	$69,146,000
	TOTAL	$4,101,161,000	30,833	$1,774,276,000	$57,500	$3,045,559,000
	Spin-Off Effect Total	$1,249,778,000	9,380	$288,570,000	$30,800	$1,611,405,000

THE IMPACTS OF URBAN HOSPITALS						
NAICS	INDUSTRY	OUTPUT/ REVENUE	SPIN-OFF EMPLOYMENT	EMPLOYEE COMPENSATION	AVERAGE EMPLOYEE COMPENSATION	TOTAL VALUE ADDED
11	Ag, Forestry, Fish & Hunting	$12,291,000	84	$1,141,000	$13,600	$6,679,000
21	Mining	$15,596,000	38	$2,336,000	$62,200	$16,552,000
22	Utilities	$114,514,000	154	$17,468,000	$113,700	$127,297,000
23	Construction	$30,568,000	244	$9,531,000	$39,100	$28,116,000
31	Manufacturing	$236,489,000	539	$39,737,000	$73,700	$134,551,000
42	Wholesale Trade	$344,753,000	1,666	$124,768,000	$74,900	$437,477,000
44	Retail Trade	$367,354,000	6,410	$176,668,000	$27,600	$596,609,000
48	Transportation & Warehousing	$136,678,000	913	$42,044,000	$46,000	$132,375,000
51	Information	$329,573,000	730	$63,633,000	$87,100	$356,026,000
52	Finance & Insurance	$921,083,000	4,220	$223,085,000	$52,900	$956,522,000
53	Real Estate & Rental	$1,800,754,000	6,184	$71,876,000	$11,600	$2,482,542,000
54	Professional, Scientific & Technical Services	$396,516,000	3,213	$195,885,000	$61,000	$514,486,000
55	Management of Companies	$240,667,000	974	$138,475,000	$142,100	$316,596,000
56	Administrative & Waste Services	$266,704,000	3,668	$110,428,000	$30,100	$325,603,000
61	Educational Services	$24,506,000	407	$11,979,000	$29,400	$28,268,000
62	Health & Social Services	$418,098,000	4,835	$212,229,000	$43,900	$499,154,000
622110	**Hospitals**	**$6,928,456,000**	**50,255**	**$3,599,364,000**	**$71,600**	**$3,599,364,000**
71	Arts Entertainment & Recreation	$60,811,000	1,041	$23,083,000	$22,200	$70,005,000
72	Accommodation & Food Service	$220,207,000	3,470	$76,094,000	$21,900	$225,861,000
81	Other Services	$171,736,000	2,254	$69,212,000	$30,700	$193,276,000
92	Government	$162,833,000	1,849	$126,726,000	$68,500	$278,115,000
	TOTAL	$13,200,185,000	93,147	$5,335,761,000	$57,300	$11,325,472,000
	Spin-Off Effect Total	$6,271,729,000	42,892	$1,736,398,000	$40,500	$7,726,109,000

Appendix B

This section explains the North American Classification System (NAICS).

NAICS is a basic framework for categorizing establishments and is the basis for regional economic analysis. This system allows us to arrange the economy's multitude of business types into discrete industry classifications. These classifications are numerical (from two to six digits; the more digits, the more specific the industry identification) and hierarchical, with digits on the left defining major sectors and digits to their right specifying subdivisions. Today, much of the readily available economic data related to employment is based on such classifications. NAICS divides the economy into 20 major sectors and recognizes 1,170 industries.

NAICS CODE	INDUSTRY
11	Agriculture, Forestry, Fish and Hunting
21	Mining
22	Utilities
23	Construction
31-33	Manufacturing
41-43	Wholesale Trade
44-46	Retail Trade
48-49	Transportation and Warehousing
51	Information
52	Finance & Insurance
53	Real Estate and Rental and Leasing
54	Professional, Scientific and Technical Services
55	Management of Companies
56	Administrative and Support and Waste Management and Remediation Services
61	Educational Services
62	Health Care and Social Assistance
71	Arts, Entertainment and Recreation
72	Accommodation and Food Service
81	Other Service (except public administration)
91-93	Public Administration

Appendix B (cont.)

Typically, in comparative discussions of industries, the NAICS codes can be used as two-, three-, four-, five- and six-digit codes. For example, discussions about manufacturing in general use the two-digit manufacturing codes (31-33), but discussions about particular types of manufacturing use the three-digit sub-sector codes.

	EXAMPLE 1		EXAMPLE 2	
NAICS LEVEL	NAICS CODE	DESCRIPTION	NAICS CODE	DESCRIPTION
Sector	31-33	Manufacturing	51	Information
Subsector	334	Computer and electronic product manufacturing	513	Broadcasting and telecommunications
Industry group	3346	Manufacturing and reproduction of magnetic and optical media	5133	Telecommunications
Industry	33461	Manufacturing and reproduction of magnetic and optical media	51332	Wireless telecommunications carriers, except satellite
U.S. Industry	334611	Reproduction of software	513321	Paging

A Few Caveats

When using Industrial Classifications, there are a few important factors to keep in mind.

First, individual establishments are assigned an industry according to their primary economic activity. Thus, if a business produces goods that fall under two or more industries, the business is classified according to its major output.

Second, employment figures represent an industry and not an occupation. Thus, industry data does not provide a clear picture of the types of work in which employees are engaged. Many companies carry out some of their business services internally. For example, an accountant at a steel mill would be counted in the employment statistics for the steel industry (NAICS 3311), rather than the business service industry (NAICS 5412). However, if the steel mill hired an accounting firm to do their books, this employee would show up in NAICS 5412.

Finally, for confidentiality reasons, data is often not made publicly available when it will identify individual businesses. While county data is usually available at aggregated NAICS levels, confidentiality concerns often arise at more detailed levels of analysis. This is especially true in smaller economic regions, such as rural counties.

More information on the NAICS system is available at the **U.S. Census Bureau website**.

Appendix C

Methods

This analysis is based on **IMPLAN** (IMpact analysis for PLANning), an input-output model that examines transactions between businesses, government and households. Drawing on data collected by federal and state government agencies, IMPLAN uses regional industry purchasing patterns to examine how changes in one industry will affect others. The IMPLAN model has been used as the basis for thousands of economic analyses reports throughout the United States.

Employment data is drawn from two sources. First, we use public sources, such as the QCEW data series, produced by the Colorado Department of Labor and Employment (CDLE) and County Business Patterns from the U.S. Department of Commerce. Second, because of state disclosure rules that prohibit identifying individual facilities, we supplement QCEW data with IMPLAN data in some instances. Typically, disclosure problems arise in cases where a region may have only one facility, or where one facility is dominant.