

*Created to Serve: Colorado State University's
Impact on the State's Economy*



**Colorado
State**
University

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All data, research, and economic information contained in this report was produced and provided by Martin Shields, Associate Professor, and Harvey Cutler, Professor, Department of Economics, Colorado State University, 2009, and carried out with financial assistance from the Northern Colorado Economic Development Corporation. A complete discussion of the methodology used is available from the authors.

Message from the President



Colorado State, as a land-grant university, was created to serve Colorado – a mission that takes on different meaning for different times. During the Great Depression, our Extension agents rallied state resources to aid desperate farmers on the Eastern Plains. During World War II, the campus set up military barracks and training facilities to assist the war effort. Today, we're working closely with state leaders to fully develop our region's capacity for leadership in the clean and renewable energy industry.

But in one critical aspect, our mission to serve Colorado remains constant. Colorado State University, throughout its history, has helped to generate jobs, prepare a skilled and educated workforce, and work in partnership with business and industry – all in support of a healthy and adaptable state economy. Our commitment to the economic vitality of our state can be demonstrated through clear and measurable examples, including the specific benefits derived from CSU research that is spun off into private companies and used to generate needed products and stable jobs. But the University's commitment can also be seen in ways that are less concrete but equally significant – in the enrichment of a community and region through the availability of a first-class research library, the opportunity to attend a distinguished lecture series or an inspiring program in the arts, and the preparation of an informed and capable citizenry. On this last point, CSU's contribution to the state is unquestionable, as a significant number of our graduates choose to make their homes in the state after graduation.

This report cannot examine and quantify all such benefits from higher education in Colorado, but it does present a clear and compelling picture of the important role Colorado State University continues to play in serving our state's economic and educational interests. I suspect it is a case that can also be made by other colleges and universities across the state and nation that share Colorado State's strong commitment to relevant outreach, excellent teaching, and research in the public interest. Perhaps the most important purpose of this report, then, is to demonstrate why this commitment must not be undervalued as we look to build an economically competitive, entrepreneurial state for future generations.

I want to thank Professors Harvey Cutler and Martin Shields for their extensive analysis of CSU's role in driving the statewide economy and their thoughtful and careful consideration of the many tangible and intangible ways in which Colorado State and higher education serve the people of Colorado. Their research provides the substance of this report.

Dr. Anthony A. Frank
Interim President

Introduction

A 2006 study commissioned by the Colorado Department of Higher Education documented the quantitative impact of higher education on the state's economy. According to that study, spending related to the state's higher education institutions supports 97,563 jobs and \$4.25 billion in wages and salaries. This study, while well-constructed and following an accepted methodology, did not take into account higher education's important statewide effects on household and overall economic well-being – topics that this report attempts to address.

This report does not attempt to supplant the findings of the CDHE study but to shine a more targeted spotlight on the contributions of a single institution: Colorado State University in Fort Collins. The report highlights four key ways in which Colorado State impacts the state's economy:

- **Direct Impacts** derived from spending by CSU students, employees, and research programs.
- **Alumni Impacts** from CSU alumni who graduate and become economic contributors in communities statewide.
- **Impacts on Innovation** in the form of University spin-off businesses that add jobs and revenue to the state's economy.
- **Impacts on Productivity** for industries and businesses throughout Colorado.

Among the significant findings of this analysis are the following points:

- Colorado State University and its 87,000+ Colorado-based alumni account for more than \$4.1 billion in household income, representing 3.1 percent of Colorado's total household income.
- At the state level, these earnings generate more than \$130.8 million in income tax revenue and \$50.2 million in sales tax revenue.
- In Colorado, increasing the percentage of workers with a 4-year college degree by only one percentage point (about 5,372 new college workers) increases the average earnings of all college educated workers by \$481 per year. But workers without a 4-year degree also benefit from such an increase – the same 1 percentage point increase in college educated workers increases the average earnings for high-school-only graduates by \$250 per year.
- CSU generates more than \$300 million in annual research expenditures, which translate to innovation that drives research and technology advances for Colorado business.
- CSU research results in a two-tenths of 1 percent (0.2%) increase in overall productivity for firms in Colorado, which equates to \$79.7 million annually.
- Annual student spending in Fort Collins alone is estimated at \$168 million, supporting 628 non-University jobs in the city. The total CSU effect on local Fort Collins tax revenue is \$12.9 million. (Tax revenue consists of sales, property, use, and other taxes.)
- A four-year college degree significantly reduces the likelihood a Coloradan is unemployed.

Direct Impacts

As the largest employer in Northern Colorado, Colorado State University has a clear and direct impact on the state’s economy in the form of household income, employment, state sales tax and state personal income. These impacts are summarized in Table 1. The University and its 87,000+ Colorado-based alumni account for more than \$4.1 billion in annual household income, representing 3.1 percent of Colorado’s total household income. At the state level, these earnings generate more than \$130.8 million in income tax revenue and \$50.2 million in sales tax revenue. Millions more are paid to local governments and school districts through local sales and property taxes. CSU’s economic reach touches every county in the state.

Table 1. CSU’s Impact on the Colorado Economy Annually

Economic Indicators	CSU Contribution	Percent of the State Totals
Household Income (Billions of \$)	\$4.1	3.1%
Employment	56,750	2.1%
State Sales Tax Revenue (Millions of \$)	\$50.2	2.5%
State Personal Income Tax Revenue (Millions of \$)	\$130.8	3.1%

The 56,750 workers directly connected to CSU can be divided into three components:

1. The University currently employs about 6,200 workers, who use their income to purchase goods and services, which results in economic growth for the state. These purchases lead to expansions in sectors such as retail, grocery stores, services, and housing, resulting in increases in household income earned, sales taxes, and personal income taxes paid to the state.
2. An estimated 50,000 CSU alumni are currently employed in the state.
3. Recent CSU spin-offs have resulted in 550 direct new jobs in Colorado.

Together, these workers generate \$50.2 million in state sales tax revenue every year through direct and indirect expenditures on goods and services. These workers also pay \$130.8 million in state personal income taxes. It is worth noting that while the CSU-related employment accounts for about 2.1 percent of state total employment, it accounts for 3.1 percent of state household income. This reflects the above-average wages and salaries earned by CSU alumni due to their higher relative skill levels.

In Northern Colorado, higher education is a significant economic driver – with four major campuses calling the region home (CSU, Front Range Community College, University of Northern Colorado, and Aims Community College). Together, these institutions employ more than 9,700 workers and provide an annual payroll in excess of \$400 million. The total employment generated by these institutions represents 4.5% of the total regional job base.

CSU employees generate 11% of household income in Fort Collins, which is approximately \$253 million annually. The combination of CSU employees and students accounts for 15.8% of total tax revenue for the City of Fort Collins. An additional 628 jobs are supported in Fort Collins alone by an estimated \$168 million in annual student spending on housing, food, entertainment, and more. The total CSU effect on local Fort Collins tax revenue is \$12.9 million. (Tax revenue consists of sales, property, use, and other taxes.)

Alumni Impacts

Colorado State is the university of choice for students from across the Centennial State, enrolling and graduating more in-state students than any other Colorado campus. Since its inception, CSU has produced more than 160,000 graduates, with approximately 87,000 currently residing in Colorado and contributing in a variety of ways to the state economy. Conservative estimates indicate that 50,000 of the Colorado-based alumni are currently working, while the remaining people are either retired or work in the home. Based on data from CSU's alumni office and estimates from the Colorado Department of Labor, it's estimated these individuals work in a variety of private and public sector jobs (the distribution is shown in Table 2).

Table 2. The Distribution of CSU Alumni Employed in Specific Sectors

Construction	4.9%
Retail	4.1%
Wholesale	4.2%
Manufacturing	2.7%
High Services – medical, legal, business and engineering consulting	57.8%
High Tech	3.5%
Finance, Insurance and Real Estate	22.9%

While the agricultural industry is not included in this table, Colorado State alumni have a significant and important presence in the many dimensions of the state's agriculture industry – and alumni from the College of Agricultural Sciences are active economic contributors in communities across the entire state.

Looking at CSU alumni data, nearly 20,000 CSU graduates from the past 15 years live in Colorado. Map 1 shows that these graduates live in every county in the state, helping contribute to the economic vibrancy of both rural and urban places.

Map 1. CSU's Graduates from the past 15 years are spread across the state

CSU Graduates by Colorado Zip Code

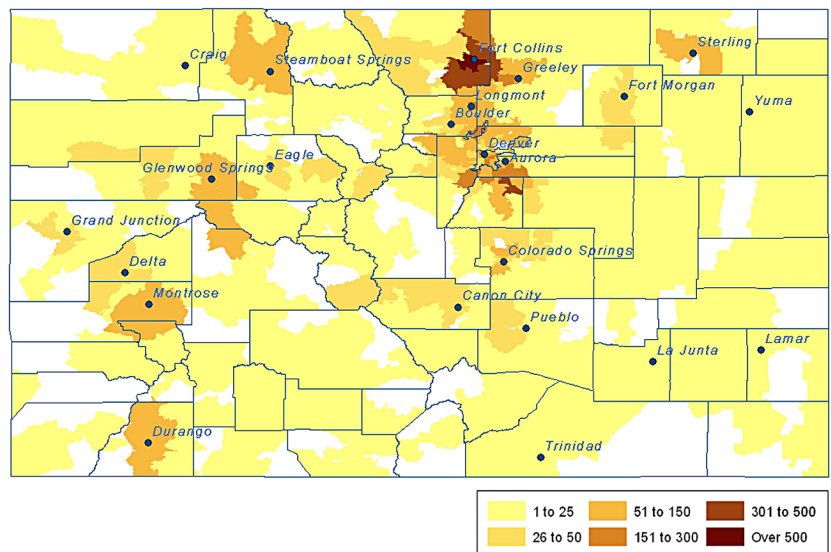
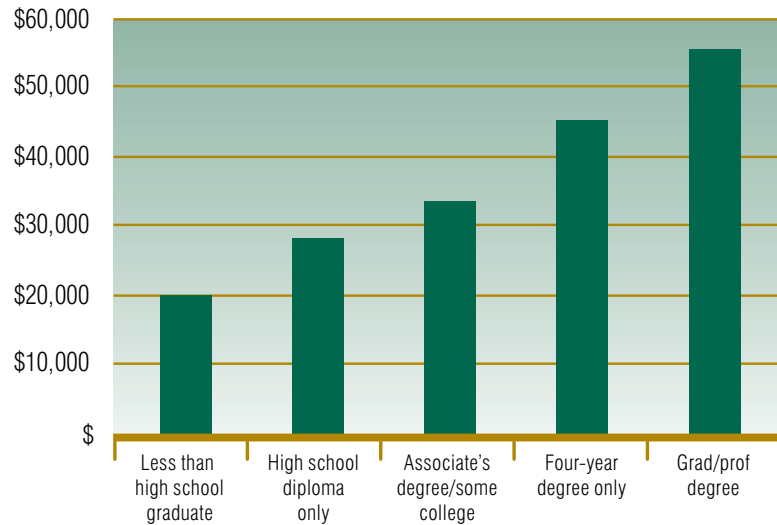


Chart 1. Median Wages Increase Substantially with Education in Colorado: 2008

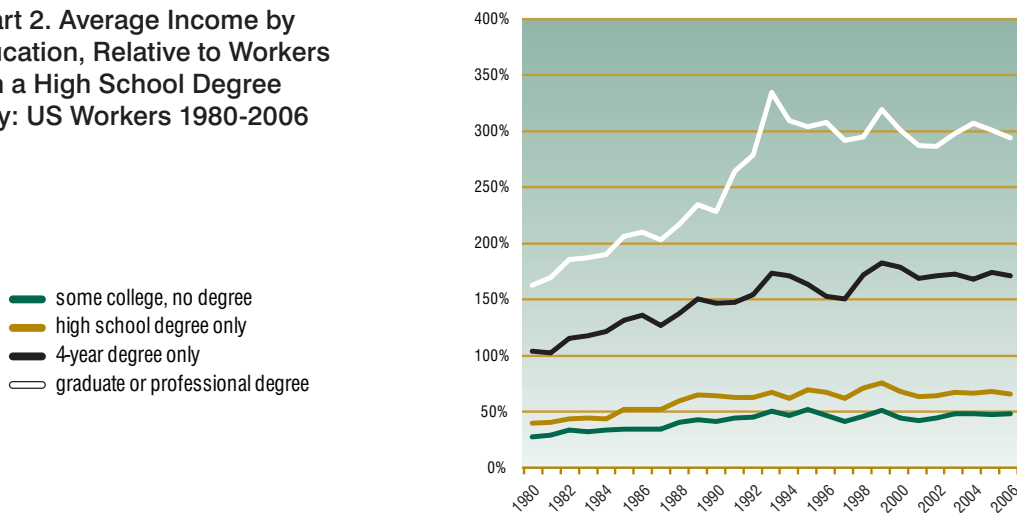
It is well documented that people with a 4-year college degree earn significantly more money than people without one. Data from the American Community Survey show that 2007 median annual earnings for Coloradans 25+ years of age with a 4-year degree only (i.e., those without graduate degrees) were \$45,392. By comparison, median earnings for state residents with a high-school degree only were \$28,237. (The median is the level of earnings at which half of workers make more and half make less.)



Source: American Community Survey/U.S. Census Bureau

The income gap between these groups is growing. In 1980, the average income of U.S. workers with a 4-year college degree was about 60% more than that of those with only a high-school degree. In 2006, that figure rose to 82 percent.

Chart 2. Average Income by Education, Relative to Workers with a High School Degree Only: US Workers 1980-2006



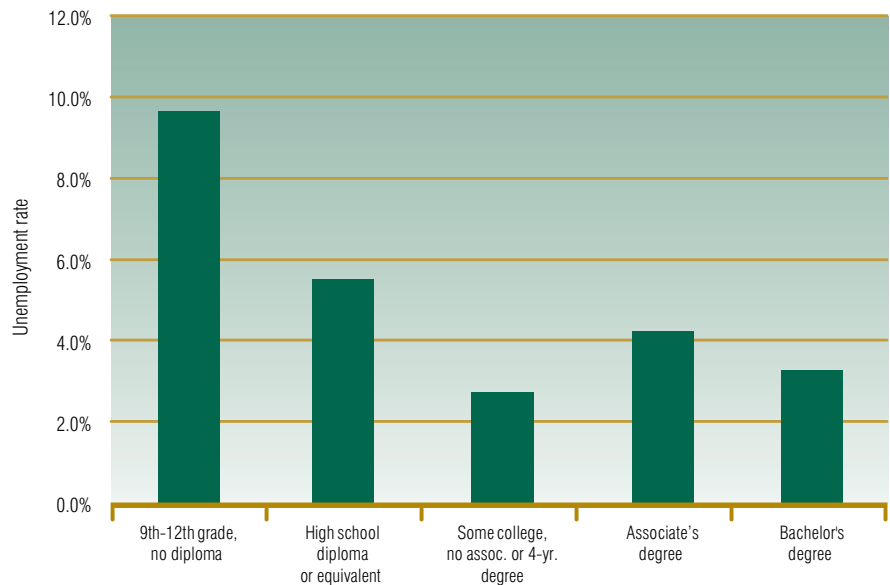
Source: U.S. Census Bureau

Over time, the growing earnings gap based on education has important implications. Projecting average annual changes in earnings from the past 5 years for each education group over the next 5 years, the gap in earnings between graduates with only a high-school degree and those with a 4-year

college degree graduates is expected to increase from \$17,155 to \$20,695. Over this relatively short time-span, the cumulative earnings of a 4-year degree holder would be more than \$94,000 greater than those of high-school only degree holders.

A four-year college degree also reduces the likelihood a Coloradan is unemployed. According to the Current Population Survey, Colorado's overall unemployment rate in March 2008 was 4.0 percent. For workers with a high-school degree only it was 5.5 percent. By comparison, unemployment rates for 4-year degree holders were 3.2 percent (Chart 3).

Chart 3. College educated workers much less likely to be unemployed: Colorado 2008



Source: Current Population Survey

The previous analysis clearly shows that higher education benefits individual economic well-being and that these impacts are seen across the state. One area less often recognized is the societal return to higher education: the benefits of an educated workforce reach far beyond individual workers and the businesses and organizations that employ them. In fact, the overall wage levels of working Coloradans – regardless of education – benefit from the state's college-educated workforce.

The extent to which the income effects of a college degree exceed their private returns can be thought of as an “educational spillover.” By increasing innovation capacity, growth in the state's college-educated workforce “spills over” to other sectors, increasing the productivity of all workers. With rising productivity, wages increase for workers of all education levels. Thus, the benefits of individual higher education extend across society.

To quantify educational spillovers, this analysis looked at how median annual worker earnings differ across states according to differences in the overall share of college graduates in the labor force. After accounting for regional, demographic, and structural economic differences, we find that a 1 percentage point increase in the labor market's share of college graduates raises the median annual wage of high-school-only graduates by \$250 (0.9 percent), and the median annual wage of 4-year-college-only graduates by \$481 (1.1 percent). In other words, people's paychecks increase simply due to the state's concentration of college-educated workers.

Impact on Innovation

Colorado State University is an epicenter of innovation. CSU professors and research scientists have started firms in areas such as engineering, high tech, biomedicine, natural resource consulting, and other consulting services that provide valuable inputs to many sectors in the state economy. In a similar manner, the employees in these companies make expenditures in a variety of different sectors that stimulate economic growth.

Among spin off companies that have built on knowledge created at CSU are:

COMPANY	LOCATION	TECHNOLOGY & PRODUCTS
Advanced MicroLabs, LLC	Fort Collins, CO	Lab-on-a-Chip Based Monitoring and Detection
ATMET, LLC	Boulder, CO	Meteorological Modeling
AVA Solar	Fort Collins, CO	CdTe-Based Solar Energy Products
Aurogen, Inc.	Fort Collins, CO	IGF Therapeutics for Neurological Disorders
Beken Learning Systems	Fort Collins, CO	Math Education Software and Programs
Brotica, Inc.	Bellevue, CO	Termite Attractants and Monitoring Systems
Cedus, Inc.	Boulder, CO	Injection-Based Animal Sterilization Products
Cytologic, Inc.	Fort Collins, CO	Biomedical-Based Treatments for Cancer
Envirofit International	Fort Collins, CO	2-Stroke Engine Retrofit Kits
Food Friends, Inc.	Fort Collins, CO	Nutrition Education Products
Heska Corporation	Loveland, CO	Animal Healthcare Products, Diagnostic Equipment And Medical Devices
Keen Ingredients, Inc.	Louisville, CO	Quinoa Materials and Products
KromaTiD, Inc.	Fort Collins, CO	Human Chromosome Painting
Numerica, Inc.	Fort Collins, CO	DOD-Based Mathematical Solutions
Optibrand Ltd., LLC	Fort Collins, CO	Retinal / GPS-based Livestock Identification and Tracking
Phytodetectors, Inc.	Fort Collins, CO	Plant-based Sensors for Environmental Monitoring Applications
Solix Biofuels	Fort Collins, CO	Algae-Based Bio-Diesel
Tolikini Tec	Fort Collins, CO	Improved Imaging Systems for Medical Applications using Hyperpolarized Krypton (and other gasses)
XY, Inc.	Fort Collins, CO	Livestock Reproductive Services; (Pre-Selection) Gender Selection

Impact on Statewide Productivity

In addition to creating a globally competitive workforce and bolstering wages statewide, Colorado's research universities conduct hundreds of millions of dollars worth of research per year within the state. An important outcome of this work is increased productivity for Colorado businesses, which benefit through new technologies, improved production processes, and a general growth in the knowledge base. CSU's research-based innovations affect the productivity of the state's businesses, including the agricultural sector, allowing them to establish world-renowned efficiency advantages that keep Colorado competitive.

Annually, Colorado State generates more than \$300 million in research expenditures, funding a variety of important and diverse sectors including engineering, biophysics, veterinary medicine, chemistry, atmospheric sciences, and business. This research has been used to develop more efficient methods to produce goods and services and to generate new products. Drawing on the extensive body of empirical work done on the impact of research at universities in terms of stimulating economic growth, this analysis (conservatively) assumes that CSU research results in a two tenths of one percent (0.2%) increase in productivity for firms in Colorado. This level of productivity effect equates to \$79.7 million annually.

Summary and Concluding Comments

This report describes the substantial economic contributions the Colorado State University makes to the state economy. Simply put, CSU is one of the state's most important economic growth engines and a cornerstone of Colorado's economic future.





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