

**SOUTH DAKOTA BOARD OF REGENTS
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SUBJECT: Return on Investment Analysis

This analysis examines data from the US Census Bureau’s American Community Survey (ACS) program in an effort to better quantify the long-term “return on investment” associated with earning a college degree in the South Dakota region.



*** Special Data Analysis ***

Postsecondary Return on Investment

College degrees confer many benefits to their holders, not the least of which are financial benefits. Especially in the current economic climate, the monetary value-added of a postsecondary credential often is seen as an important element in the larger value proposition of higher education. But in an era of ever-rising college costs, questions continue to emerge about the long-term economic payoff of attending college. Consequently, this analysis examines data from the US Census Bureau to explore the topic of postsecondary “return on investment” in a regional context.

Background

Postsecondary education requires an immense investment of time and financial resources from students. And as one would hope, data indicate that these efforts tend to produce a substantial earnings premium. The US Census Bureau reports that bachelor’s degree holders age 25 and older in the United States reported median annual earnings of \$50,450 in 2014, about 81.4 percent higher than the amount reported by those with a high school diploma only (\$27,809).¹ A similar gap is evident in South Dakota, where bachelor’s-holding workers reported median annual earnings that were 46.9 percent higher (\$40,316) than were reported by workers with a high school diploma only (\$27,443).²

Yet despite evidence that college credentials lead to improved employment outcomes, some observers have noted that – due to the high opportunity cost of a college education – the net magnitude of this benefit is overstated. This line of thought suggests that high tuition charges, deep debt burdens, and a flooded market of young graduates combine to diminish the lifetime wage premium actually realized by college degree holders.

Recognizing the important question raised above, this analysis examines data from the US Census Bureau and other sources in an effort to better quantify the long-term “return on investment” associated with earning a college degree in the South Dakota region. It should be noted that many of the Census Bureau data used in this analysis are based on self-reported survey responses, and thus are subject to the same sampling and nonsampling error associated with any form of survey research. Accordingly, figures derived from these data should be treated as estimates, not hard counts.

¹ US Census Bureau (2015). *Table B20004: Median earnings in the past 12 months by sex by educational attainment for the population 25 years and over* [data table].

² US Census Bureau (2015) *American Community Survey 2010-2014 5-Year PUMS* [data file]; data include employed full-time workers age 25 and older.

Data Notes

The main analysis below calculates return on investment (ROI) estimates for four different degree levels: associate, bachelor's, master's, and doctoral. In this analysis, "return on investment" from a college degree is defined as the difference between the *career earnings of degree-holding workers* and the *career earnings of high school diploma-holding workers*, less the *degree cost*. For example, if graduates with a certain degree earn \$500,000 more over their lifetimes than do a comparison group of high school diploma holders – but spent \$100,000 earning their degrees – the ROI for that degree would be \$400,000. This ROI also could be described in ratio format as a "5 to 1" ROI (i.e., a \$500,000 return on a \$100,000 investment). Calculations used in this analysis are shown below. A more complete discussion of this study's delimitations is offered in Appendix A.

Table 1
Calculation Definitions

Data Element	Description
<i>Career earnings of degree-holding workers</i>	<p>Career earnings of postsecondary degree holders are calculated by summing the annual median earnings of employed, full-time workers (whose highest award is a college degree) from the start of the career through age 66. This cross-sectional method results in inflation-discounted cumulative earnings totals that deflate future pay into current values.</p> <p>Career starting ages were estimated as 21 for associate degree completers (assuming years 19-20 were spent in college), 23 for bachelor's degree completers (assuming years 19-22 were spent in college), 25 for master's degree completers (assuming ages 19-24 were spent in college), and 28 for doctorate completers (assuming years 19-27 were spent in college).</p> <p>Earnings estimates are based on workers in SD, ND, MN, IA, NE, WY, and MT. All earnings data are sourced from the ACS 2010-2014 5-year PUMS dataset; dollar values are adjusted to 2014 dollars.</p>
<i>Career earnings of high school diploma-holding workers</i>	<p>Career earnings of high school diploma holders are calculated by summing the annual median earnings of employed, full-time workers (whose highest award is a high school diploma) between the ages of 19 and 66. This cross-sectional method results in inflation-discounted cumulative earnings totals that deflate future pay into current values.</p> <p>Earnings estimates are based on workers in SD, ND, MN, IA, NE, WY, and MT. All earnings data are sourced from the ACS 2010-2014 5-year PUMS dataset; dollar values are adjusted to 2014 dollars.</p>
<i>Degree cost</i>	<p>Generic degree costs are estimated as the sum of all tuition, mandatory fees, books, and supply costs paid over the entire course of study at a Regental university. Room and board costs are not included in cost estimates given that living expenses are incurred regardless of whether one is enrolled in college. Charges are based on published cost figures for resident students in AY2016-17 at USD, the system's flagship university; credit counts are estimated from typical pathways. Once calculated, these amounts are raised by 50 percent to account for students who may complete degrees less efficiently than shown below.</p> <p>Tuition and mandatory fees:</p> <ul style="list-style-type: none"> - Associate degree: 60 UG credits at \$281.90/credit - Bachelor's degree: 120 UG credits at \$281.90/credit - Master's degree: 120 UG credits at \$281.90/credit; 60 GR credits at \$356.55/credit - Doctoral degree: 120 UG credits at \$281.90/credit; 120 GR credits at \$356.55/credit <p>Books and supplies:</p> <ul style="list-style-type: none"> - Associate degree: 2 years at \$1,200/year - Bachelor's degree: 4 years at \$1,200/year - Master's degree: 6 years at \$1,200/year - Doctoral degree: 9 years at \$1,200/year

Analysis

Personal Return on Investment

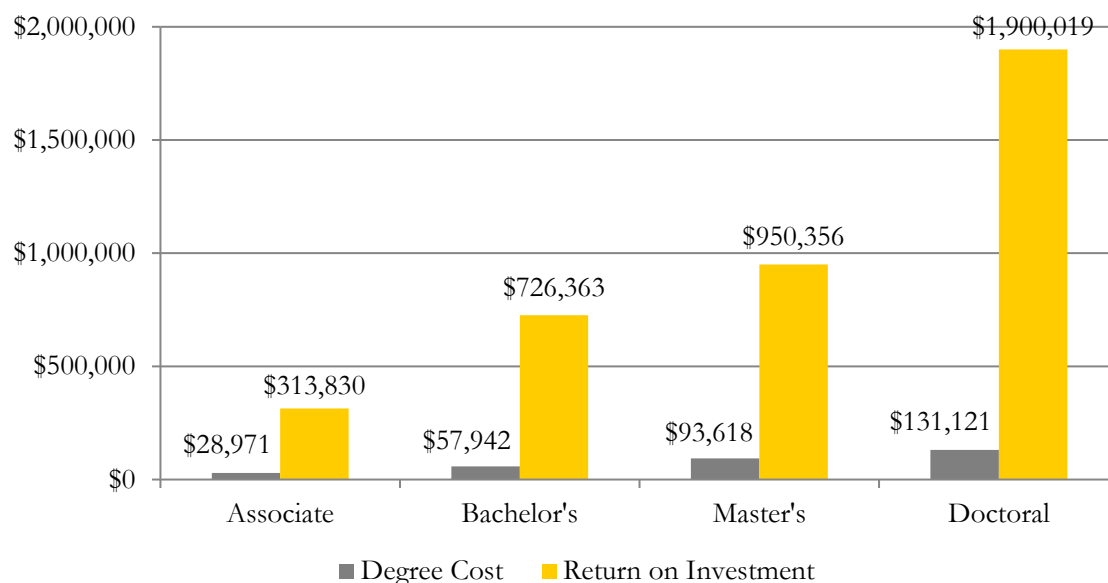
Analysis indicates that – across all degree levels – the return on investment from earning a college degree is immense. Table 2 provides a complete summary of the calculations generated from the methodology outlined above. As shown below, regional workers (those in South Dakota and six neighboring states) at all postsecondary degree levels appear to generate vastly higher career earnings than those with a high school diploma only. Those with a bachelor’s degree, for example, earn approximately \$784,305 more over a lifetime than those with no college degree. This earnings premium occurs despite the opportunity cost of spending multiple years in college rather than entering the labor force directly from high school.

Table 2
Return on Investment by Degree Level

	Degree Cost	Career Earnings	Earnings Above HS	ROI Amount	ROI Ratio
High school diploma	\$0	\$1,638,465	\$0	\$0	-
Associate degree	\$28,971	\$1,981,266	\$342,801	\$313,830	11:1
Bachelor’s degree	\$57,942	\$2,422,770	\$784,305	\$726,363	13:1
Master’s degree	\$93,618	\$2,682,439	\$1,043,974	\$950,356	10:1
Doctoral degree	\$131,121	\$3,669,605	\$2,031,140	\$1,900,019	14:1

Net returns on investment, then, are considerable. Workers with a bachelor’s degree earn more than \$700,000 beyond what is earned by high school diploma holders, even when accounting for the cost of the earning degree and the opportunity cost of time spent outside the labor force. Across all degree levels, ROI ratios range from 10:1 for master’s degree holders to 14:1 for doctoral degree holders. These data are further illustrated in Figure 1 below.

Figure 1
Return on Investment by Degree Level

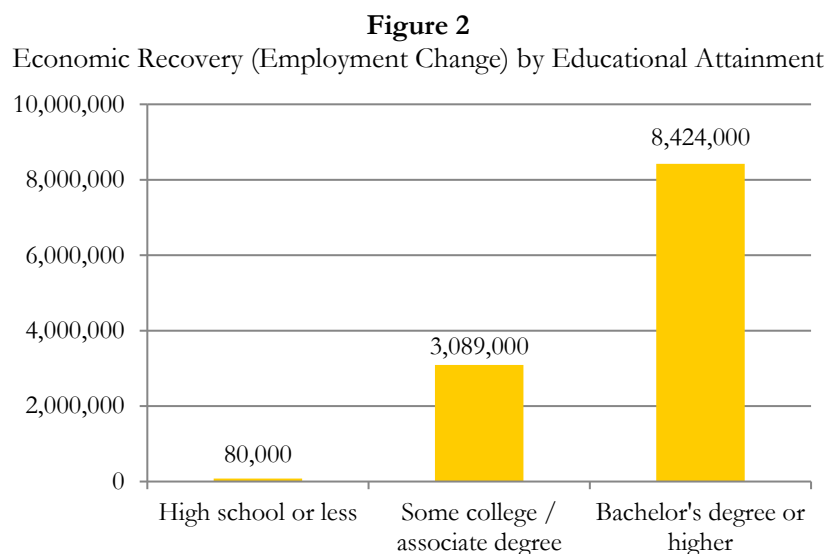


Of course, the financial “returns” from holding a postsecondary degree flow not only from higher earnings, but also from better employability. Census data show that South Dakota workers with a bachelor’s degree or higher experienced a microscopic unemployment rate of only 1.6 percent in 2014. Among workers with a high school diploma or less, the unemployment rate was nearly three times higher (4.5 percent).

Data further suggest that the employment gap between college degree holders and other less-educated workers has been exacerbated by the recent economic recession. Several new analyses of US labor data by Georgetown University’s Center on Education and the Workforce (CEW) indicate that – compared to workers with a high school diploma only – college-educated workers have fared vastly better during the recession and subsequent recovery. As published in recent CEW reports:

- Of the 11.6 million jobs created during the economic recovery, 75 percent (8.4 million) have gone to workers with a bachelor’s degree or higher. A full 99 percent of new jobs (11.5 million) have gone to workers with at least some college education.³
- Of the 2.9 million *high-paying jobs* (those paying more than \$53,000 per year) created during the economic recovery, 97 percent (2.8 million) have gone to workers with a bachelor’s degree or higher.⁴
- A total of 5.6 million jobs held by high school diploma-holders were lost during the recession; only 80,000 have been replaced during the recovery. In contrast, workers with a bachelor’s degree or higher actually gained 187,000 jobs *during* the recession, and have gained another 8.4 million jobs during the recovery.⁵

These observations would seem to portend increasingly bleak employment prospects for those without a college degree. Figure 2 – also depicting Georgetown data – shows further graphic evidence of this starkly cavernous disparity.⁶



³ Carnevale, A.P., Jayasundera, T., & Gulish, A. (2016). *America’s divided recovery: College haves and have-nots*. Washington, DC: Georgetown University Center on Education and the Workforce.

⁴ Ibid. (2015). *Good jobs are back: College graduates are first in line*. Georgetown University Center on Education and the Workforce.

⁵ Ibid. (2016). *America’s divided recovery: College haves and have-nots*. Georgetown University Center on Education and the Workforce.

⁶ Ibid. This analysis defines the economic recovery period as January 2010 and later.

State-Level Return on Investment

It is important to point out that postsecondary returns on investment accrue not just to individuals, but to broader economies as well. Ample evidence exists to support the link between educational attainment and macroeconomic productivity. For instance, data from the US Census Bureau – shown in Figure 3 below – underscores this association at the state level: as degree attainment rises, so too does per capita income.⁷ Note that the gold dot in this chart (●) represents South Dakota, which falls in the lower half of the distribution.

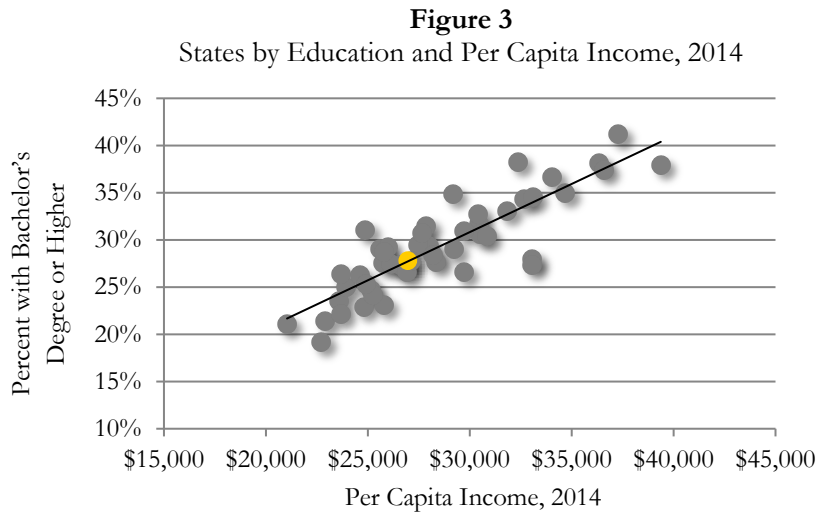
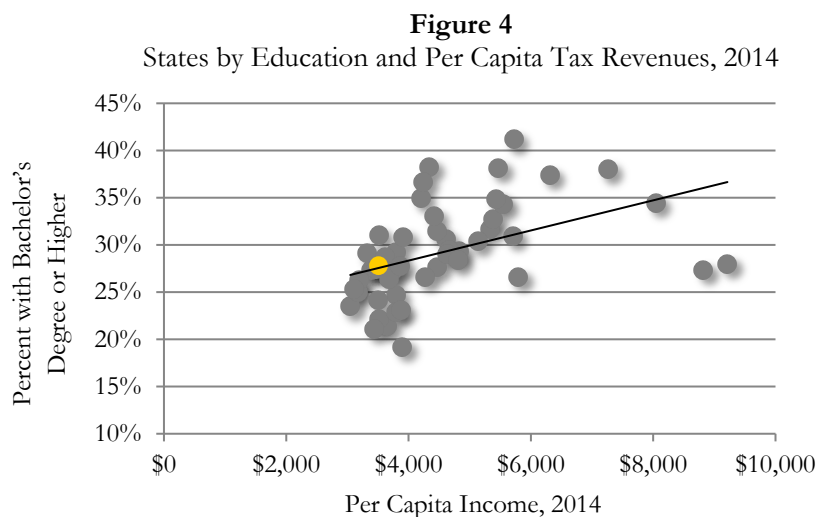


Figure 4 extends this association to state and local tax revenues.⁸ As shown below, a similar positive relationship exists between educational attainment (i.e., the percentage of residents with a bachelor’s degree or higher) and per capita state and local tax revenues. The positive correlation illustrated in this table would be even more pronounced if not for the influence of oil-rich outlier states (see Alaska, North Dakota in the lower right of the distribution).



⁷ US Census Bureau (2015) *American Community Survey 2014 1-Year estimates*; attainment data include residents age 25 and older.
⁸ Ibid; Tax Policy Center (2016). *State and local tax revenue, per capita* [data table].

Empirical research suggests that the relationship between educational attainment and macroeconomic well-being may be causative. In 2013, the Milken Institute, a nonprofit, nonpartisan policy think tank released *A Matter of Degrees: The Effect of Educational Attainment on Regional Economic Prosperity*. In this study of 261 metropolitan areas in the US, researchers found evidence of a strong predictive relationship between postsecondary education and economic productivity. Specifically, the authors found that – after controlling for workforce age, industry composition, and other demographic factors – the addition of one year of formal schooling (after high school) among an area’s workforce led to a 17.4% increase in per capita gross domestic product (GDP).⁹ In other words, a locale that is able to deliver one additional year of postsecondary training to its workforce could expect to experience a nearly twenty percent surge in GDP. Overall, educational attainment was found to explain more than seventy percent of GDP variation in the areas included in this study. Such findings not only reinforce the positive relationship between higher education and economic prosperity, but also help to signal the potential returns that may follow from state-level postsecondary investment.

⁹ This finding applies to workers already holding at least a high school diploma.

Appendix A Limitations and Caveats

Limitations and Caveats – Return on Investment Calculations

Regarding this report’s “personal return on investment” calculations, it is important to emphasize that SDBOR does not have access to comprehensive, person-level data on actual career earnings. Consequently, the return on investment values depicted in this analysis should be understood as estimates only. In an effort to keep the project’s methodology reasonably simple, the estimation procedure used here relies on several approximations or generalizations that may introduce both systematic and unsystematic error into the estimated ROI values. Several of these approximations – as well as their possible effects on estimated values – are discussed below.

First, this analysis applies a single “college cost” value to all degree programs at a given level. This clearly is not the case in practice, as programs in the regental system vary considerably with respect to assessed fees, number of credits required, average time to completion, and other expenses. The “degree cost” term used in this analysis reflects a system-wide generic value that will understate or overstate the actual costs incurred by some students.

Next, estimates of career earnings should be treated as rudimentary approximations only. Since all workers do not follow the same earnings trajectory, it is likely that the use of a simple summative approach to tallying career earnings will systematically bias (either up or down) the results of the analysis. Career earnings estimates may be too high for some workers and too low for other workers. It also should be reiterated that the “career” earnings estimates depicted in this report are cross-sectional, not longitudinal, meaning that they summarize the current wages of workers at all ages, rather than the historic earnings of end-of-career workers.

Finally, this analysis looks only at the personal economic advantages associated with degree attainment. In this light, it is important to remember that the benefits of earning a college degree reach far beyond simply earning a larger paycheck. Better employability, improved social mobility, higher rates of civic participation, improved health outcomes, and enhanced quality of life are among the many intangible benefits that flow from increasing educational attainment.¹⁰ Consequently, readers are urged to think broadly when assessing the true “return on investment” of higher education.

¹⁰ College Board (2013). *Education pays: The benefits of higher education for individuals and society*.