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The Return to College Education in South Dakota and Surrounding States

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Theoretical Linkages Between Education and Wages

Formal education represents a human capital investment. Individuals invest in education to enhance their labor market productivity which enhances their future earnings capacity and work conditions. The increase in wages from a college degree is determined by the value of the enhanced skills in the labor market. College-educated workers earn higher wages than high-school educated workers. This earnings differential varies over time.

The U.S. Department of Education reported that the ratio of mean earnings of college to high school graduates was 1.16 in 1975 (i.e., wages of college educated workers were on average about 16% higher).¹ By the late 1990s, this ratio increased to about 1.70 (i.e., wages of college educated workers were about 70% higher than high school educated workers, on average).² Numerous economists have argued that the dramatic increase in the college-to-high school earnings differential is related to increased demand for technical skills due to increased use of computers and decreased availability of high paying blue collar jobs. The college-to-high school earnings differential also tends to increase with the age of the worker. This reflects the fact that wages of college-educated workers increase faster than wages of high-school educated workers as they gain experience. The earnings increase from a college education varies,

depending on the type of degree (vo-technical, associate of arts, bachelors, masters, PHD, professional) and the academic discipline (humanities, science, business, engineering, etc.). On average, the greater the number of years required to attain a degree, the higher the wage rate.

Acquiring a college education is a form of an investment—human capital investment. Like any investment, a college education must provide a high enough rate of return to induce an individual to make a human capital investment in a given college degree. The net return to education over an individual's life-span is the enhanced future earnings and amenities (discounted to their present value) less the opportunity costs of education. Acquiring formal education imposes opportunity costs of forgone wages based on a current earning capacity and the cost of attending school (tuition, books, supplies, etc.). Private benefits from a college education not only reflect the higher lifetime earnings capacity, but also more amenable working conditions that are obtainable by college graduates (economists refer to these as internal benefits since the private individual making the market transaction directly receives the benefits).

The return to education has a public as well as a private aspect. The public return to education reflects enhanced labor force productivity (or output per worker) that improves long-run economic growth. Countries with high stocks of human capital have greater cognitive skills, making their workers more creative and efficient learners and allowing them to design and adapt new technologies that lead to new products and more efficient production processes. A greater rate of technological change also increases labor productivity and long-run economic growth. Many economists have argued that the rapid integration of computer technology in the 1990s has led to the high economic growth rates that the U.S. economy has experienced since the mid-1990s. Given increased globalization of world markets, countries with a high rate of technological change will produce cheaper, more innovative products and

¹ For year-round, full-time college graduates (with at least four year degrees) between the ages of 25 and 34.

² U.S. Department of Education, *Digest of Education Statistics* 1999, December 1999.

will strengthen their global economic competitiveness. Countries with a high rate of long-run economic growth have a higher per-capita level of income than countries with slower long-run economic growth and have a superior standard of living for all members of the economy. Economists refer to the augmentation of long-run economic growth from a country's human capital stock as endogenous economic growth (which reflects the external or social benefits from education because the economy as a whole benefits rather than just the individual making the education investment). To the degree that human capital accumulation generates long-run economic growth, investment in education is a form of economic development. This is the typical justification for public funding for higher education.

Methodology Used to Estimate the Earnings Differential of College Education

This research estimates the college earnings differential of South Dakota and the surrounding states of Iowa, Minnesota, Montana, Nebraska, North Dakota, and Wyoming and compares the regional earnings differential to the national labor market. The Study also estimates the earnings differential for specific college degrees: two-year vo-technical and associate of arts degrees, bachelors of Arts and Science degrees, Master's degrees, PhD degrees, and professional degrees (MD, DDS, DVM, JD, etc.). The data is from the Current Population Survey (CPS) data set, pooled over the 1995, 1996, and 1997 survey years. The pooled data set contains 38005 observations.³ The CPS, compiled by the U.S. Bureau of the Census, is micro-data (individual interviews) and is conducted monthly. The data utilized for this study is from the March survey (Annual Demographic File) which includes migration information in addition to monthly labor force data on wages and employment.

The earnings differentials estimated by the Department of Education are based on a ratio of average wages for college-educated workers relative to average wages for high-school educated workers. Wage rates are affected by other human capital attributes such as labor force experience,

individual characteristics like gender and race, and the locality of a labor market. A wage regression

³ Descriptive statistics (means and standard deviations) for the total pooled data set and the individual state subsamples are available on request from the author.

model is employed to determine the college/high school education earnings differentials independent of the other factors that influence wage rates. The estimated wage model controls for human capital, individual, and specific labor market attributes.⁴ Human capital variables used in the wage model include years of labor force experience, experience squared (to control for decreasing return to additional years of experience), educational degree, and part-time versus full-time employment. Years of labor force experience improve a worker's occupational skill level, and hence productivity, and have a positive effect on wages. Since additional years of labor force experience increase wages at a decreasing rate, the square of labor force experience has a negative effect on wages. Education has a positive impact on wages and the wage effect of a given college degree is relative to a high school educated worker. High school dropouts are also included to show the value of a high school education. Part-time workers typically have fewer occupational skills than full-time workers, and part-time employment status has a negative impact on wages.

The based comparison group is nonmarried, white males. Married workers generally have higher wages than nonmarried workers (presumably reflecting the stabilizing influence of marriage and the advantage of married partners in task specialization). Female and minority workers have lower wages, on average, than male workers. Labor market specific variables include region of residence (west, midwest, south, and east) and metropolitan or nonmetropolitan labor market. The base labor market for relative comparison is a nonmetropolitan residence in the eastern region. Western, midwestern, and southern regions have lower wages than the east. Metropolitan labor markets have higher wage rates than nonmetropolitan labor markets, due to greater labor demand from a higher employment density and greater disamenities such as crime and congestion. Wage regression estimates are obtained using a generalized-least squares (GLS) regression procedure.

⁴ A complete reporting of parameter estimates and test statistics for the national and state regression models is available on request from the author.

Empirical Estimates of the Return to Specific Educational Degrees

The wage effects for specific educational degrees are compared to a high school degree (the estimated return reflects the percentage change in wages in comparison to a worker with a high school degree—holding constant all other human capital, individual, and labor market characteristics). The analysis for the national labor market yields predictable results. The percentage earnings differential of a college degree relative to a high school degree increases as the number of years required to complete the degree and the cognitive skill complexity increase. Workers with two-year degrees earn about 20% more than high-school educated workers, and workers with bachelors' degrees receive a 45% higher wage rate. Individuals with a master's, PhD, or professional degree attain the highest earnings differentials—about 70% to 80% higher than a high school graduate. Finally, high school dropouts pay about a 25% earnings penalty for not completing high school.

With respect to South Dakota and the surrounding states, Iowa, Minnesota, and Nebraska, the college earnings differential varies due to the uniqueness of an individual state's labor market.⁵ In general, the earnings differential for specific degrees in a given state follows the pattern in the national market—the differential for a bachelor's degree is higher than that for a two-year degree, and the differential for an advanced or

professional degree is higher than that for a bachelor's degree. Iowa, Minnesota, and Nebraska are the largest states in the north-central region in terms of population and have a labor market composition that fairly closely reflects the national labor market. South Dakota, like Montana, North Dakota, and Wyoming, is a smaller state where the labor market is less reflective of the national market. In these states, there are fewer managerial, professional, and technical occupations that utilize college educated employees which would imply a lower rate of return to a college degree. The earnings differential for two and four year degrees in South Dakota and North Dakota are well below the national earnings differential. In Montana and Wyoming, the earnings differential for master's degree workers is well below the national level. The earnings differential for two-year degrees is well above the national level in Montana and well below in Wyoming.

From an economic development perspective, state investment in bachelor's and advanced degrees provide the greatest social benefits. Macroeconomics demonstrates that domestic income and gross domestic product (GDP)—or from a state viewpoint, state domestic product (SDP)—are equal levels of economic activity. Any human capital investment that increases income will also raise GDP (or SDP). In the national labor market, the average return to employing a worker with a four-year bachelor's degree would be 110% greater than that from employing a worker with a two-year vo-technical or

Table 1. Educational Earnings Differential Relative to a High School Degree^a

	National	South Dakota	Iowa ^b	Minnesota ^b	Montana ^b	Nebraska ^b	North Dakota ^b	Wyoming ^b
Dropout	-25.47%	-5.57%	-12.09%	-13.64%				
Vo-technical	18.16%	10.62%	22.47%	31.69%	-5.54%	-13.56%	-22.07%	-10.01%
Associate of Arts	21.48%				30.41%	22.49%	18.40%	3.94%
Bachelors	45.12%	24.07%	51.13%	48.66%	43.25%	46.54%	28.08%	53.94%
Masters	72.46%	90.47%	58.82%	86.79%	46.48%	70.08%	61.59%	45.81%
PhD	78.66%	115.70%	77.36%	80.89%	65.65%	125.71%	N/A ^c	114.19%
Professional	86.15%							

^aSample size: 38005 observations. Two-year vo-technical and Associate of Arts and PhD and Professional degree categories are combined in the state subsamples due to data limitations.

^bState level sample observations are as follows: South Dakota, 510; Iowa, 496; Minnesota, 648; Montana, 440; Nebraska, 535; North Dakota, 524; and Wyoming, 449.

^cThe combined PhD and professional degree category for North Dakota has insufficient numbers for analysis.

⁵ Another factor is that in some of the state samples, the number of advanced and professional degree individuals is relatively small.

associate of arts degree. The average return from employing a worker with an advanced or professional degree would be 240% to 300% greater than a two-year degree. For a small state like South Dakota, the differential is even greater. The return for a bachelor's degree is 127% greater than for a two-year degree, and the return for an advanced or professional degree is 752% to 989% greater than for two-year degree. Clearly, human capital development is a critical factor in state economic development, especially support to bachelor's and advanced degree granting institutions. Economic studies have also shown that higher expenditure levels on education generate a higher degree of state economic growth.

Summary

The earnings differential for two- and four-year college degrees varies substantially across the specific states in the study due to the uniqueness of the individual state's labor market. This is also true for the return for advanced and professional degrees. In general, the wage rate of return to specific degrees for a given state follows the pattern in the national market—the return for a bachelor's degree is higher than for a two-year degree, and the return for an advanced or professional degree is higher than for a bachelor's

degree. In the national labor market, the average return to a four-year bachelor's degree is more than twice the return for a two-year vo-technical or associate of arts degree; and the return for advanced and professional degrees is approximately 60% to 90% higher than for a bachelors' degree. Specifically for South Dakota, the return for a bachelor's degree is 127% greater than for a two-year degree. The return for a master's degree is 752% greater than for a two-year degree and 276% greater than for a bachelor's degree. The relative returns for PhD and professional degrees are even higher.

This study will be extended in the near future by adding the 1998 and 1999 surveys to the pooled CPS data set. The study will also analyze migration patterns of college-educated workers, both into and out of South Dakota. The analysis will attempt to assess the determinants of in-migration (e.g., high amenities such as low crime rate or lack of congestion) and out-migration (e.g., higher wages or better weather conditions).

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