

Private and Public Returns to Investment in Education

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Most economists agree that formal education is an important determinant of individual earnings as well as economic growth. Formal education has become more important due to recent economic trends underlying U.S. labor market demand for skilled workers. The following is a review of the importance of education to both the individuals acquiring education and the benefits received by society resulting from the increased educational attainment of individuals.

Human capital theory, a concept first introduced by Theodore W. Schultz and later developed by Gary Becker, states that individuals acquire skills and knowledge to increase their value in labor markets. In developed countries, experience, training, and education are the three most important means for acquiring human capital, with education being foremost for most individuals. Education generates new skills and knowledge that increase productivity. This increase in productivity frees up resources to create new technologies, new businesses, and new wealth, eventually resulting in increased economic growth. Education is a "private good" in as much as it benefits the individual who gains the new knowledge and job skills. But, it is also a "public good" because society also benefits from increased education.

The literature on human capital theory is so extensive that it is impossible to quickly review it in a way that satisfies demanding, critical readers. The review I will present here will only survey the landscape, painting the scene with broad strokes that suggest, but do not depict, all the subtle and important details of the impacts of education at both the micro and macro levels. This review examines the effects that increased educational attainment has had on the earnings of workers and on economic growth in the United States. A cursory review of the literature reveals a huge body of evidence concerning the financial returns and non-market effects of education. Much of the following is drawn heavily from *Investment in Education: Private and Public Returns*, by Joshua Hall.¹

I. Private Returns to Education

Earnings: The amount of education acquired by workers has an important impact on an individual's labor market experience. The most direct way that education affects the labor market experience of workers is by increasing their productivity, thus increasing their earnings. The more education individuals acquire, the better they are able to absorb new information, acquire new skills, and familiarize themselves with new technologies.² By



increasing their human capital, workers enhance the productivity of their labor and of the other capital they use at work.

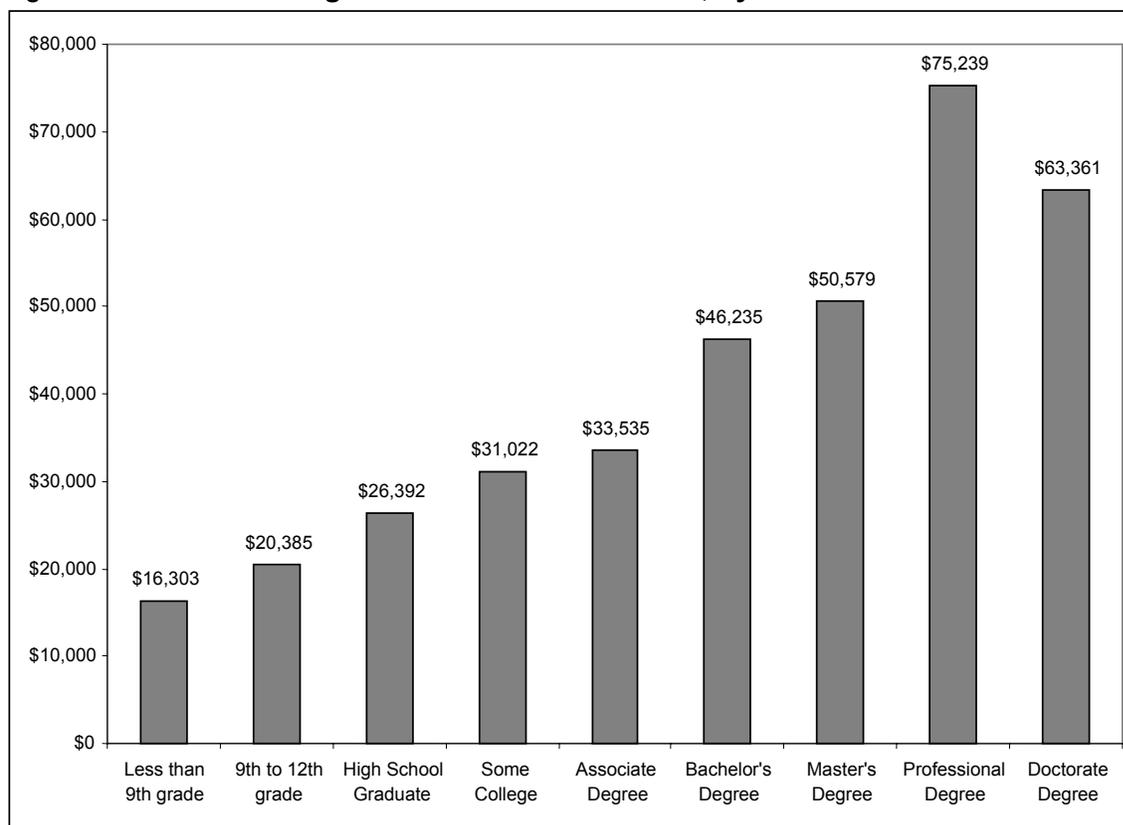
Higher levels of productivity reflect higher levels of human capital. These higher levels of human capital are primarily a result of increased education. The U.S. Census Bureau in its Current Population Reports, reports data on the earnings of all persons by educational attainment. Figure 1. shows the median money income of individuals 25 years and older who were employed full-time during all of 1998.

Ideally, this information would permit a high school graduate considering college to evaluate the financial return to a college education (or, behave as though he were consciously evaluating the data). As is obvious in Figure 1, the average college graduate earned nearly \$20,000 more than the average high school graduate in 1998.

Calculating the return to investment in education has intrigued economists since the early 1900s. Initial analyses of the effects of education on earnings were done by estimating tuition and foregone costs for given levels of schooling and then discounting the earnings differentials between workers at those different levels. Most estimates showed rates



Figure 1. **Median Earnings of All Full-Time Workers, by Educational Attainment: 1998**



Note: The income estimates in this table are based solely on money earnings before taxes. Non-cash benefits are not included. The population is both sexes, 25 years and over, who worked full-time all year in 1998.

SOURCE: U.S. Census Bureau, Current Population Reports, P-60 Series, Table P-06

of returns on education comparable to rates of return on investment in physical capital. For example, Becker estimated returns to white males in 1949 of 20 percent for high school graduates and 13 percent for college graduates. These results are very similar to results found independently by Martin Carnoy and Dieter Marenbach over a similar period.³

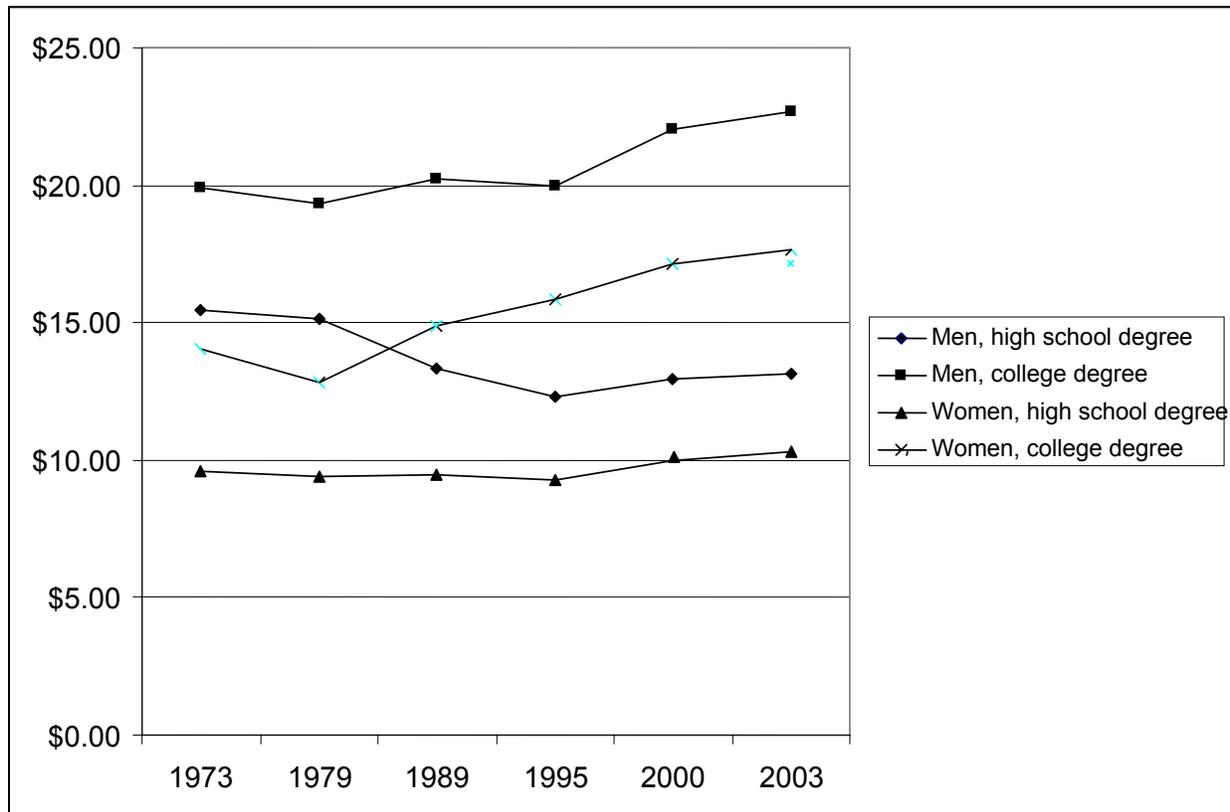
Using a different methodology, two researchers at Princeton University, Orley Ashenfelter and Cecilia Rouse, estimated the private returns to education from 1979 to 1993. Evidence presented by Ashenfelter and Rouse indicate that a tremendous increase in the value of schooling has occurred since 1979. They found that the return to an additional year of education rose from 6.2 percent in 1979 to nearly 10 percent in 1993,⁴ which suggests that the demand by firms for high levels of human capital will continue to

increase, tending to increase the future financial returns to education.⁵

As noted previously, there is an increasing wage premium paid to workers with high levels of human capital attained through skills, training, and education. Figure 2 illustrates the increasing earnings disparity between college graduates and their high school counterparts. Although real earnings have increased for both groups since 1975, the nominal earnings differential between the two groups has grown.

Analysis by Mishel, Bernstein, and Allegretto provides another perspective on recent changes in the returns to education. Their research also found evidence of an increasing wage premium. Hourly earnings rose for members of both education levels during the period and was particularly pronounced for women with a college degree. Among

Figure 2. **Median Hourly Earnings of Men and Women by Education Level: 1973-2003 (2003 dollars)**



SOURCE: Mishel, Bernstein, and Allegretto, *The State of Working America, 2004-05*, Cornell University Press, January 1, 2005.

men, those with a high school education experienced a 14.9 percent decrease in real hourly earnings from 1973 to 2003, compared to 14.1 percent increase for college graduates.⁶ Hourly earnings for women during this period followed a very different pattern, yet still showed an increasing wage premium to education. Women with only a high school degree experienced a 7.1 percent increase in real hourly earning, while women with a college degree saw an impressive 25.5 percent increase.⁷

An analysis of college graduates versus high school graduates often obscures the salary differences between major fields of study. Lewis C. Solmon and Cheryl L. Fagnano stated the reasoning behind the need for a more in-depth analysis of college graduates.

Just having a degree ignores qualitative differences between both institutions and

areas of study. Individuals receiving different degrees from the same institution face different demands for their skills. The price of labor is not only a function of the marginal physical product of the laborer but also the price that the market is paying for that labor. Thus, individuals with similar ability levels in different fields can have significantly different earnings.⁸

Data from the U.S. Department of Education support this statement. Figure 3 shows the starting salaries of 2001 college graduates by field of study. The median starting salary for an engineering or business management student was over \$40,000. Salaries of business management and engineering students are 35.3 percent above the median starting salary for all college graduates, while education majors are 22.0 percent below the median.⁹ Clearly, decisions about the sort of education to acquire are as

important as decisions concerning the amount of education to acquire.

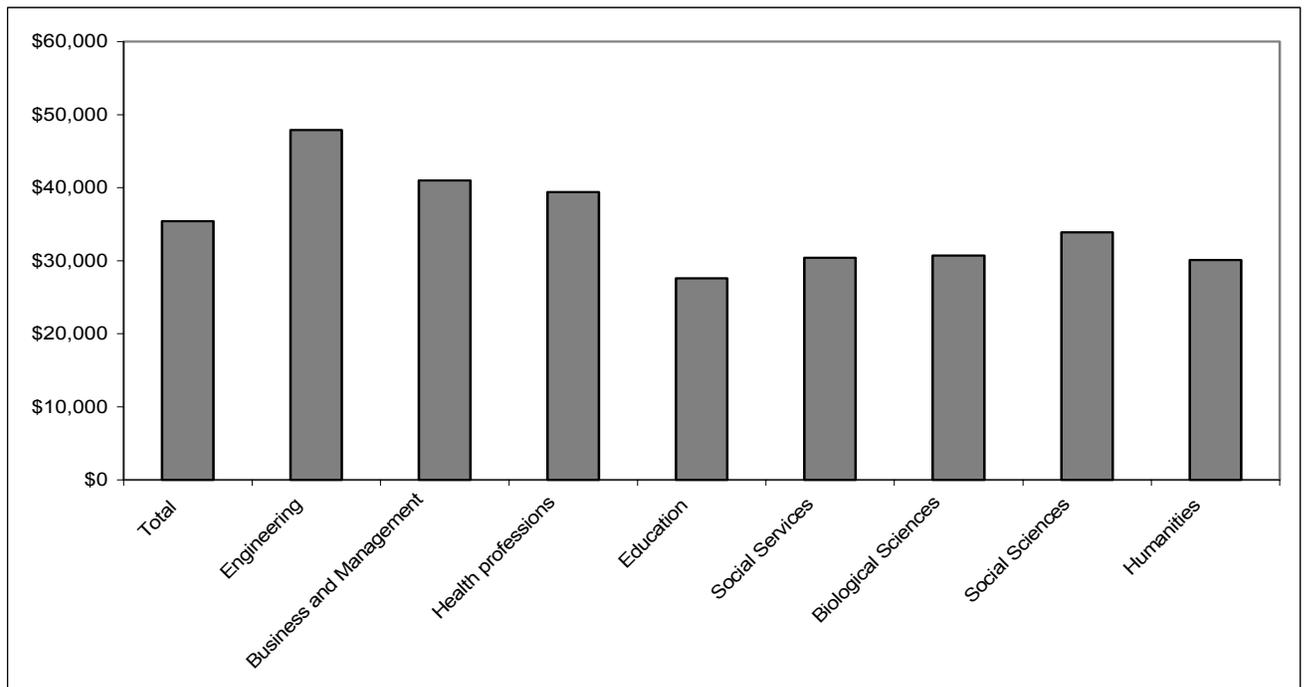
Employment: The amount of education an individual receives not only affects his earnings, but the quality of his employment as well. In his book *Studies in Human Capital*, Jacob Mincer stated that educated workers have three advantages relative to less-educated workers: higher wages, greater employment stability, and greater income.¹⁰ Increased earnings by workers with higher education levels are a result of two factors. First, as discussed earlier, increased human capital results in higher productivity that allows workers to extract higher hourly wages. Second, increased education increases labor force participation, decreases the probability of unemployment, and decreases job turnover. The result is that highly educated workers labor a greater number of hours annually for higher hourly wages than their less educated labor market competitors. According to CRS research, jobs requiring a "fairly high skill level" accounted for 3 out of every 5 new jobs created between 1994 and

2005. This trend is expected to continue.¹¹ Thus, education is becoming increasingly more important in our new information economy.

In 1996, the majority of the population out of the labor force or unemployed had lower levels educational attainment. Possession of a college degree in 1996 increased the probability of being in the labor force by nearly 23 percent over high school graduates.¹² Labor force participation is strongly associated with education even after controlling for other factors such as age and marital status.¹³ Since those with a college education have more to lose by dropping out of the labor force (due to their higher earnings) than high school graduates, they are more likely to remain in the labor force.

The results are similar for unemployment. According to BLS data, the unemployment rate among college graduates stood at 1.9 percent in January 1999.¹⁴ High school graduates with no college were unemployed at a 4.1 percent rate. The gap in employment between college and high school graduates has been widening steadily.¹⁵

Figure 3. Median Starting Salary of 2001 College Graduates by Major Field of Study.



SOURCE: U.S. Department of Education, National Center for Education Statistics, *Recent College Graduates*.

An inverse relationship between education and unemployment exists due to two factors: more efficient job searching and increased job-specific human capital among those with higher levels of education. Mincer explains why more educated workers have lower unemployment: "the more informed the job search, the more likely is a successful job match, hence the longer are workers likely to stay on the next job."¹⁶ In the same study, Mincer finds that educated workers engage in higher levels of training specific to the firm, making workers more valuable to their firms thereby reducing the probability of involuntary (i.e., non-employee initiated) job turnover.

Despite the public perception that job security is rapidly declining in today's global marketplace, the evidence does not support this view. One National Bureau of Economic Research Working Paper found that there was no systematic change in the likelihood of long-term employment in the United States.¹⁷ However, there have been changes in job tenure based on educational attainment. Men with little education are less likely to hold long-term jobs than they were twenty years ago, while female high school graduates are more likely to be in long-term jobs than they were in 1973.¹⁸

II. Economic Growth

Economists have been interested in economic growth since Adam Smith first studied the wealth of nations.¹⁹ It was not until the introduction of the concept of human capital in the 1960s that economists attempted to study the relationship between education and economic growth. The pioneering work of Becker, Schultz, Mincer, and Denison provided new information on the link between education and economic growth.

The contribution of education to economic growth occurs through two mechanisms. The first, and most highly publicized, is through the creation of new knowledge, known as Schumpeterian growth.²⁰ Schumpeterian growth is growth attributable to increases in human capital. More highly educated individuals ultimately become more scientists, analysts, technicians,

and inventors working to increase the stock of human knowledge through the development of new processes and technologies. And, it is worth noting that, technological innovation has been identified as the greatest source of economic growth.

This leads us to the second way that education affects economic growth. Education affects economic growth through the diffusion and transmission of knowledge. Schools provide the education level necessary to understand and digest new information, as well as a way to transmit new information. Increases in educational levels have helped spur invention and innovation in the computer industry over the past 30 years, yet without schools to teach how to use computers and new applications, the effect of these innovations would be reduced.



Zvi Griliches and Dale Jorgenson did some of the earliest work in growth accounting and they concluded that increased levels of human capital explained half of one percentage point of the annual growth in output.²¹ Thus, 15 to 20 percent of the annual average growth in output for the United States was explained by increases in education levels.

Other research confirmed this finding. Edward Denison undertook one of the most comprehensive studies on the effect of education on economic growth. Denison estimated that education per worker was the source of 16 percent of output growth in nonresidential business.²² In another study done for the Rand Corporation, 21 percent of the growth in output from 1940-1980 was the result of an increase in educational attainment.²³ Estimates of the effect of human capital on economic growth in the United States mostly range from 10 to 25 percent.²⁴

III. Conclusion

The belief that education benefits the individual student in terms of increased earnings is widespread. But increased education also has a measurably positive impact on society. In the information economy of the

21st century, formal education and training will become increasingly important. Investment in education will continue to contribute to enhanced labor force productivity and increased wages for individuals, as well as increased economic growth.

Notes

¹Joshua Hall, "Investment in Education: Private and Public Returns," Joint Economic Committee Study, United States Congress, January 2000.

²Ann P. Bartel and Frank R. Lichtenberg, "Technical Change, Learning, and Wages," National Bureau of Economic Research, Working Paper 2732 (September 1991).

³Martin Carnoy and Dieter Marenbach, "The Return to Schooling in the United States, 1939-69," *Journal of Human Resources* 10, no. 3 (Summer 1975), 320.

⁴Orley Ashenfelter and Cecilia Rouse, "Schooling, Intelligence, and Income in America: Cracks in the Bell Curve," National Bureau of Economic Research, Working Paper 6902 (January 1999), 3.

⁵For more information on the changing U.S. economy and what it potentially means to firms and workers see Richard Crawford, *In the Era of Human Capital*, (New York, NY: Harper Business, 1991).

⁶Lawrence Mishel, Lawrence, Jared Bernstein, and Sylvia Allegretto, *The State of Working America, 2004-05*, Cornell University Press, January 1, 2005.

⁷Ibid.

⁸Lewis C. Solmon and Cheryl L. Fagnano, "Quality of Higher Education and Economic Growth in the United States," in *Higher Education and Economic Growth*, eds. William E. Becker and Darrel E. Lewis (Boston, MA: Kluwer Academic Publishers, 1993), 148.

⁹U.S. Department of Education, National Center for Education Statistics, *Condition of Education 1998*, (NCES 98-013), 110.

¹⁰Jacob Mincer, "Education and Unemployment," in *Studies in Human Capital*, edited by Jacob Mincer, (Cambridge, UK: Edward Elgar, 1993), 212.

¹¹Linda Levine, "The Education/Skill Distribution of Jobs: How Is It Changing?" Congressional Research Service Report for Congress 97-764E (Washington, DC: Congressional Research Service, 1997), 5.

¹²Digest of Education Statistics 1997, Table 375 & JEC calculations.

¹³William G. Bowen and T. Aldrich Finegan, *The Economics of Labor Force Participation* (Princeton, NJ: Princeton University Press, 1969), 53-62.

¹⁴U.S. Department of Labor, Bureau of Labor Statistics, "The Employment Situation: January 1999," Press Release USDL 99-31 (February 1999), Table A-3.

¹⁵Wayne J. Howe, "The Effect of Higher Education on Unemployment Rates," in *Higher Education and Economic Growth*, edited by William E. Becker and Darrel E. Lewis (Boston, MA: Kluwer Academic Publishers, 1993), 130-31.

¹⁶Mincer, 233.

¹⁷Henry S. Farber, "Are Lifetime Jobs Disappearing? Job Duration in the United States: 1973-1993," National Bureau of Economic Research, Working Paper 5014 (February 1995).

¹⁸Ibid.

¹⁹Adam Smith, *The Wealth of Nations* (1776; reprint, Chicago, IL: University of Chicago Press, 1976).

²⁰Named after Joseph Schumpeter (1883-1950) who was the originator of the theory that economic growth was strongly influenced by cycles of innovation. Northwestern economist Joel Mokyr titled the growth attributed to innovations and increases in man's knowledge in honor of Schumpeter. Joel Mokyr, *The Lever of Riches* (New York, NY: Oxford University Press, 1990), 6.

²¹Dale W. Jorgenson and Zvi Griliches. "The Explanation of Productivity Change," *Review of Economic Studies* 34, no. 3 (July 1967): 249-283. In addition, Zvi Griliches, "Notes on the Role of Education in Production Functions and Growth Accounting," in *Education, Income, and Human Capital*, edited by W. Lee Hansen. 71-127, (New York, NY: Columbia University Press, 1970).

²²Edward F. Denison, *Trends in American Economic Growth, 1929-1982* (Washington, DC: Brookings Institution, 1985).

²³E.M. King and J.P. Smith. *Computing Economic Loss in Case of Wrongful Death* (Santa Monica, CA: The Rand Corporation, 1988).

²⁴In contrast to the studies cited here, Robert J. Barro finds that while initial levels of schooling were important to economic growth, changes in the estimated levels of schooling did not contribute to growth over the 1960-1985 period. Robert J. Barro, "Economic Growth in a Cross Section of Countries," *Quarterly Journal of Economics* 106, no. 2 (May 1991): 407-433. Zvi Griliches put forth a reason why no relationship between changes in human capital and changes in output was found in Barro's work. Griliches noted that much of the growth in human capital in the economies studied by Barro was absorbed into the public sector and that the bureaucracy present in those public sectors may have blunted expected productivity gains. Zvi Griliches, "Education, Human Capital, and Growth: A Personal Perspective," *National Bureau of Economic Research, Working Paper 5426* (January 1996).

An Alternative Perspective

There is a strong consensus that college graduates earn much more than high school graduates, and the gap has been widening for several decades. The conclusions seem obvious. In a high-tech world, with specialized skills in acute shortage, we'd all be better off if more Americans went to college. According to some researchers this conclusion may be incorrect.

Economist Daniel Hecker of the Labor Department demolishes the notion that there is a scarcity of college graduates and that sending more Americans to college will auto-

matically create a more productive economy. Just because you've got a degree doesn't mean you can get a good job.

In 1980, a full-time male worker (25 years or older) with four years of college had median earnings of \$25,849, compared with the \$19,469 earned by a worker with a high school diploma. That's a premium of 33 percent. In 1990, the full-time worker with four years of college was earning \$42,524; his high school counterpart was earning \$26,515. The college premium had grown to 60 percent. By 2002, the full-time worker with four years of college was earning \$51,194; his high school counterpart was earning \$27,280. The college premium had declined slightly to about 53 percent.

However, as Hecker shows, the facts are correct, but the explanation is wrong. The reason that college graduates seem to do so well is that high school graduates are doing miserably. Adjusted for inflation, the median wages of college graduates remained almost constant from 1980 to 2002. However, during this same period, high school graduates' wages dropped about 29 percent. Employers aren't bidding up the wages of college graduates (which would be the case if there were a shortage of college graduates); instead, something has been depressing the wages of high school graduates for at least two decades.

In his study, Hecker found that about one fifth of college graduates went into jobs that did not usually require a college degree (store sales workers, for instance). Hecker's findings hardly indicate a scarcity of college graduates. In fact, Hecker argues, if more people had gone to college over the past two decades, they would have competed mostly for lower-wage jobs that usually don't require a college degree.

Likewise, sending more people to college won't automatically make the economy more productive. If that were true, then productivity would be exploding. The following

Table 1. Education Levels of U.S. Workforce

Level of Education	Percent of U.S Workers		
	1969	1990	2002
College (4 yrs.+)	12.6	23.2	26.7
College (1-3 yrs.)	12.6	21.3	25.3
High School Graduate	38.4	39.4	32.1
High School Dropout	36.4	16.2	15.4

SOURCE: U.S. Census Bureau, *Current Population Survey* data.

table shows the average education of U.S. workers. Since 1969, the share of college graduates has more than doubled, while the share of high school dropouts has declined by more than half. Yet productivity has advanced only slowly (averaging 2.1 percent annually from 1969 to 1995, but a robust 3.9 percent annually from 1995 to 2000) and real wages have been stagnant or fallen over this period.

We really don't know what is depressing the wages of high school graduates. Some suggest that the widespread use of computers (which require new skills that older workers with only high school degrees don't possess) and foreign competition are creating this effect. Nor do we know why productivity and real wage growth lagged during the 80s and 90s. But, more schooling, by itself, may not necessarily be the remedy to these problems.

A study by Sabot and Wakeman-Linn of eight top colleges and universities revealed that grade inflation was rampant. U.S. college diplomas and degrees aren't worth what they once were. Skills aren't as high as school attendance rates imply, because schools at all levels have become less rigorous. Another interesting thought presented in the Sabot and Wakeman-Linn study was that exceptionally easy grading in social sciences and humanities may be luring students away from science and engineering, where grading is tougher. Perhaps we have both a surplus of college degrees and a scarcity of skills.

The message here is emphatically not that college doesn't matter—either for individuals or for society. It does matter. But, what counts is not only how many students go to college but what they study, how hard they work and what they actually learn. The same is true of all our schools. What we may need to improve most is quality, not the number of degrees we produce.