Social and Economic Returns to College Education in the United States

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Abstract

Education correlates strongly with most important social and economic outcomes such as economic success, health, family stability, and social connections. Theories of stratification and selection created doubts about whether education actually caused good things to happen. Because schools and colleges select who continues and who does not, it was easy to imagine that education added little of substance. Evidence now tips the balance away from bias and selection and in favor of substance. Investments in education pay off for individuals in many ways. The size of the direct effect of education varies among individuals and demographic groups. Education affects individuals and groups who are less likely to pursue a college education more than traditional college students. A smaller literature on social returns to education indicates that communities, states, and nations also benefit from increased education of their populations; some estimates imply that the social returns exceed the private returns.

INTRODUCTION

College graduates find better jobs, earn more money, and suffer less unemployment than high school graduates do. They also live more stable family lives, enjoy better health, and live longer. They commit fewer crimes and participate more in civic life. With all this going for them, it is hardly surprising that college graduates are significantly more likely than high school graduates to say they are "very happy." Social science research has reproduced these patterns in many societies over many years (see, for example, Kingston et al. 2003; Fischer & Hout 2006, pp. 18–22, for reviews of US patterns).

Conventional wisdom—imparted by parents, teachers, guidance counselors, and policy makers—reads these differences as evidence that young people would improve their lives by staying in high school, graduating, going on to college, and earning a degree. Sociologists and other social scientists have been skeptical. Educated people have other advantages that may account for their good fortune. Education may merely be a manifestation of those advantages, imparting little value in and of itself. The advantages of educated people are almost as well known as their successes. They score well on ability tests; their parents bestow on them social, cultural, and economic assets that foster success; and they come to school with tacit knowledge and habits that are seldom part of the curriculum but foster success. Indeed, the correlation between education and success might be spurious.

Or maybe education benefits the educated but would not help those who have left or been thrown out. Perhaps young people, schools, and colleges make well-informed decisions about who will benefit from education and who will not. The people who go far in the educational system are those who can take advantage of schooling; the others either drop out or find themselves left out when they have nothing left to gain (Willis & Rosen 1979). If this selection is optimal, then allowing, forcing, or enticing dropouts to go on would waste their time and society's resources. In academic shorthand, the correlation between education and success might reflect positive selection bias in the educational system; schools treat those who will benefit from the treatment.

As this review shows, the conventional wisdom is mostly right this time, and social scientists' skepticism, although well worth considering, is excessive. The correlations between education and desired outcomes reflect, in surprisingly large part, the causal impact of education on those outcomes. Important new research shows that selection bias is actually negative; unlikely college students probably benefit from their education more than typical college students do (Brand & Xie 2010). Evaluation of this hypothesis continues as of this writing (Carneiro et al. 2011).

A smaller literature, mostly in economics and demography, has investigated what are called the social returns to education (Topel 1999). Billions of dollars in public money are invested in institutions and individuals on the theory that society benefits from having an educated populace. The evidence suggests that this theory is also right. To that economic evidence, political sociologists add the observation that education also reduces prejudice and intolerance while increasing support for civil liberties. This subjective social return is also valuable, although no dollar sign is attached.

Being educated is not only good in its own right (Abbott 2002); it also promotes good outcomes for individuals, their communities, and the nation as a whole.

EDUCATION AND ECONOMIC OUTCOMES FOR INDIVIDUALS

The correlation between education and economic fortunes in the United States has never been higher (Goldin & Katz 2007, pp. 71–85). The literature has dozens of studies that feature the role of education in economic outcomes (Card 1999). I illustrate the robust findings with my own calculations using the most recent data available (**Figure 1**). My calculations focus on people of prime working age, 30–54 years old,

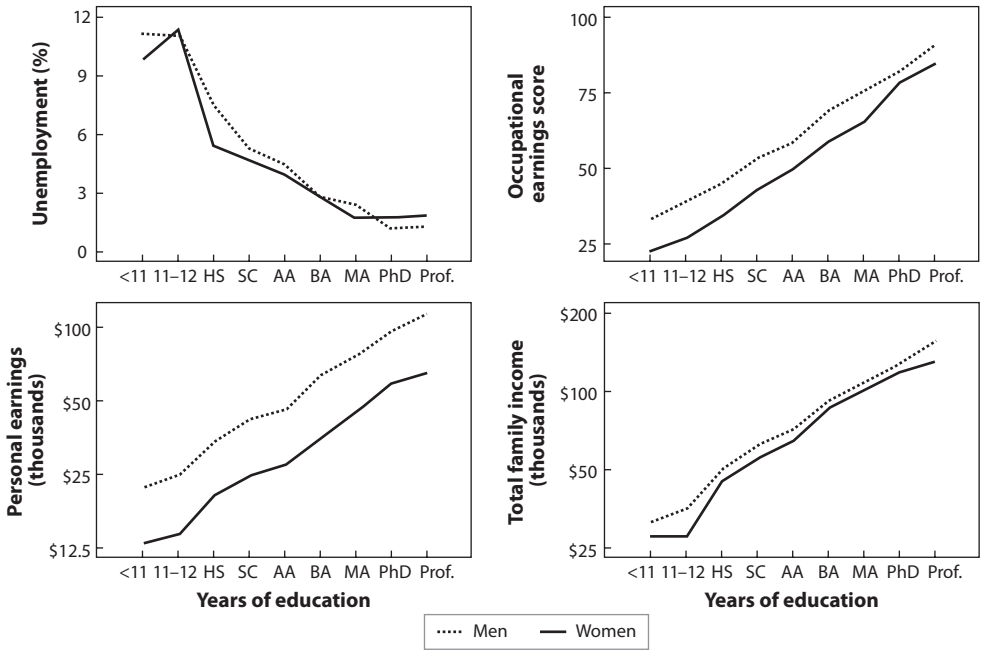

Figure 1

Occupational earnings score, personal earnings, family income, and unemployment by years of education and gender: United States, 2007–2009. Incomes were adjusted for inflation using the consumer price index for urban households (CPI-U) and are expressed in 2009 dollars on a ratio scale (i.e., doublings from $12,500 to $25,000 to $50,000 to $100,000 appear as equal intervals). Key to education labels: <11 = 0–10 years completed, 11–12 = 11 or 12 years completed but no diploma, HS = high school diploma, SC = some college, AA = two-year degree, BA = four-year degree, MA = master's degree, PhD = doctoral degree, Prof. = professional degree (e.g., JD, MD, DDS). Source: author's calculations from the US Census Bureau's *March Current Population Survey*, persons 30–54 years old (see King et al. 2010).

in order to avoid biases that could creep into the analysis because some people extended their educations after failing to find a job and others retired early in lieu of a layoff. The main patterns in descriptive data like these do not depend on which of several meaningful ways of categorizing education is used (Fischer & Hout 2006, pp. 260–61).

Newspapers featured stories about unemployed college graduates as the 2007–2009 recession ground on, but the data in the upper left of **Figure 1** here show that the least-educated prime-age workers were almost four times more likely than college graduates to be unemployed during the recession. Prime-age workers with no credentials had an unemployment rate of 11% over the 2007–2009 period compared with 7.4% for prime-age men and 5.2% for prime-age women with high school diplomas, 2.8% for prime-age college graduates, and less than 2% for prime-age workers with advanced degrees. College graduates also had much shorter spells of unemployment (Hout et al. 2011); in past recessions, laid-off college graduates recovered more quickly (Gangl 2006).

People with more education also had more desirable jobs. I scaled occupations according to the percentage of people in the occupation who had annual earnings above the national median; the pattern would be the same if I used any reasonable score (Hauser & Warren 1997). Getting a job that paid well rose almost linearly with educational levels: 7.4 points for each rung of the educational ladder among men and

7.8 points for each rung among women.[1] Graduating from college instead of high school boosted prime-age men's occupational standing up to 69 points from a base of 45 points; it boosted prime-age women's occupational standing up to 59 points from a base of 34 points. Advanced degrees improved occupational standing beyond that achieved by college graduates.

College graduates made more money as well. Men's and women's annual earnings during their prime working ages rose roughly 20% for each educational level.[2] Further analysis shows that men's tendency and/or opportunity to work more hours explains almost half of the gender difference in annual earnings. Hourly wages were more similar for men and women; they rose 17.5% for each educational level among prime-age men and women alike.[3]

Family incomes combine educational differences in marriage and economic outcomes. That makes family income ill-suited for an analysis that seeks to parse the separate causal contributions to economic inequalities. But it also makes family income an interesting and useful summary measure of education's combined potential (Harding et al. 2004). The incomes of prime-age men's families were about 10% higher than those of prime-age women's families because 30- to 54-year-old men were slightly more likely to be currently married and because unmarried men of these ages earned slightly more than unmarried women. Family incomes rose 21% for each educational level. Among men, college graduates' family incomes were $91,800 compared with high school graduates' $50,100; among women, the comparable figures were $86,700 and $45,200. Family structure interacts with education in complex ways because each partner's education affects his or her prospect of marrying, divorcing, and remarrying as well as work hours (DiPrete & Buchmann 2006, Western et al. 2008).

Causal Inference

To say that education causes good outcomes such as the economic successes in **Figure 1** is to move beyond the descriptive statement that college graduates make more money than high school graduates. The conclusion that college actually causes the difference requires substantially more evidence than **Figure 1** provides. Specific counterfactual statements such as "this college graduate would be making less money if she had not gone on to college" or "that high school graduate would be making more money if he had only earned a college degree" would have to be true. The burden of proof is much higher in a causal statement than in a descriptive one (Gangl 2010). The first step is to base comparisons on situations in which everything but education is equal by controlling for observable differences that correlate with education.

Ability is the key to the critique and the rebuttal. Academic abilities, such as speaking and writing clearly or doing arithmetic easily, confer advantages both at school and at work. The K–12 curriculum emphasizes those skills, and college courses hone them. Teachers may try to offset preexisting differences among students, but academic aptitudes and abilities affect who earns educational credentials. Consequently, people who score highly on verbal and math tests in tenth grade are more likely to graduate from college than people who test poorly (Hauser 2002). This correlation between academic abilities and educational outcomes makes it difficult to interpret familiar correlations like those in **Figure 1** as cause-effect relationships. (Of course, similar arguments could be made about how experience, hours worked, gender, racial ancestry, local labor market conditions, industry, and any number of other factors besides ability are correlated with education

[1]These slopes are from regressions using individual observations, not from the few data points in the figures. With 96,000 men and 90,000 women in the data set, the difference of 0.4 is statistically significant at conventional levels.

[2]The slopes from the individual observations were 0.2066 for men and 0.1964 for women. The slopes are significantly different in a statistical test, but 0.0102 is a substantively trivial difference.

[3]The slopes from the individual observations were 0.1745 for men and 0.1752 for women, a statistically and substantively trivial difference.

and might also be part of the differences in **Figure 1**.) Without statistical controls or carefully chosen comparisons, it is hard to say if getting more education causes pay to increase or spuriously reflects the influence of abilities correlated with getting more education (Kaymak 2009).

Further complicating the task is the fact that abilities are only loosely coupled, as opposed to some overarching single thing (Fischer et al. 1996, Nisbett 2009). Controlling for some abilities but not others leaves doubts that everything else is really equal in the comparisons behind the resulting coefficients (Card 2001). Abilities are not even necessarily all that academic. In addition to the ability to read, write, and count with ease, the abilities to stick with a task from start to finish, to get along with others, to interpret vague instructions correctly, or to solve practical problems quickly can all contribute to success in school and on the job. These things have been termed by some (e.g., Heckman et al. 2006) as noncognitive skills, an unfortunate term because the abilities in question do require thought. They are less academic and seldom part of the formal curriculum, although even that generalization must be qualified because teachers routinely insert them into the informal curriculum (Tyson 2002, Lareau 2003). But the point for causal inference is that abilities are so diffuse yet so important that it is hard to know when statistical controls for observables have isolated the comparisons that truly gauge the impact of education.

With these problems in mind, economists turned to instrumental variables (IVs) in the 1980s. An IV is a source of natural variation that approximates the random assignment of an experiment. The random assignment breaks the connection between ability and education; everyone has his or her naturally occurring abilities (and all other attributes, too), but now the treatment group members have a random increment or decrement to their education, whereas the controls have their natural amount even though their abilities remain the same. The first such instrument researchers analyzed was compulsory schooling rules that affect people born late in the year more than people born early in the year (Angrist & Krueger 1991). Because people do not choose their birthdays, using month or quarter of birth as an IV approximates the conditions of random assignment in states that compel people with birthdays in the first half of the year to stay in school longer than they might otherwise have stayed. Other IVs include Vietnam-era draft lottery number (some people who had low lottery numbers had to leave college and join the army) (Angrist & Krueger 1992) and distance from home to the nearest college or university (a reduction in price uncorrelated with abilities) (Kane & Rouse 1995). The difference in earnings between treated and control groups later in life provided an estimate of the effect of education net of abilities without the need to make exhaustive tests of abilities (or any other confounding factor).

The IV studies produced a surprising result. Before looking at the data, economists reasoned that ordinary least squares (OLS) estimates of the effects of education were too large because they combined the education effect of interest and the contaminating influence of abilities. Yet the IV estimates in the seven leading studies were uniformly larger than the OLS estimates (Card 2001). The biggest difference was in a British study that used as IVs secondary and university reforms that took effect in 1947 and 1973 (Harmon & Walker 1995); the IV estimate was 2.5 times larger than the OLS estimate in that study.

Apparently, the IV estimates contained more than just a correction for ability bias (Deaton 2010). One thought was that observed education—a self-report in each study—was measured with so much error that the OLS estimate contained more downward bias from measurement error than upward bias from unmeasured abilities. But that seemed implausible. Most studies tout the accuracy of self-reported education. Evidence from multiple sources indicates that errors occur more often from proxies stating that the person of interest has more education than she does than from errors about one's own education (Warren & Halpern-Manners 2007). The interplay of

excluded variable bias and measurement error, is, nonetheless, complex, and easy generalizations are few (Griliches 1977).

Perhaps IV estimates exceeded OLS estimates because researchers came up with flawed instruments. For example, relatively few people with low draft numbers actually served in the US Army, so that instrument was picking up something else about men in the cohorts exposed to the draft lottery. It is hard to say what the missing causal factor was though.

A third explanation—negative selection—has gained support in new research. Most statistical analyses approach observational data as if there is a single educational effect to be estimated. But intuition suggests that students who are treated with more education benefit more from receiving it than most people do. If that's true, then OLS would overestimate the average causal effect. If, against intuition, students usually excluded from advanced education would actually benefit more from it than traditional students, then OLS would underestimate the causal effect.

Educators have, for the most part, followed intuition. Policy and practice assume that high-ability students benefit more from education than do students who struggle. So, high-scoring students get to take more challenging courses in high school, and colleges insist on tests and transcripts in addition to diplomas when they decide whom to accept and whom to reject. The plan is to provide higher education to those most ready to benefit from it. Call that positive selection. Practically, it implies that an experimental assignment to more education would expose young people who could not benefit from that education to what is—for them—a worthless treatment. If positive selection succeeded, then IV estimates would be less than OLS estimates. Data reveal the opposite pattern; most IV estimates exceed OLS estimates (Card 2001, Deaton 2010). The data imply negative selection. Students who got more education than they would otherwise have received actually benefited more than their peers. Although it runs counter to intuition, this result accords well with experience. Reforms that opened universities to nontraditional students produced graduates who gained a return to the college degree as large as or larger than that of traditional college students.

Bowen & Bok (1998) studied students who gained admission to 28 of the nation's most selective liberal arts colleges and research universities (they referred to them as the College & Beyond, or C&B, schools); all the schools used some form of racially sensitive affirmative action to increase student body diversity. Compared with a nationally representative sample of college students from the same cohort, the C&B students fared as well—and on some factors better. At the C&B schools, the probability of actually graduating with a bachelor's degree was uniformly higher than in the national sample; more importantly, the probability of graduating did not depend on SAT scores at the C&B schools but rose sharply with SAT scores in the national sample. The earnings of African American men and women from C&B schools not only exceeded those of African American men and women in the national sample, but also exceeded those of white men and women in the national sample. C&B minorities earned more advanced degrees than did whites in the national sample.

Attewell & Lavin (2007) tracked women from the first cohorts of students who entered the City University of New York (CUNY) under its open admissions policy. They compared women who would have been rejected under the previous admissions policies with those who would have been admitted under those policies and with a nationally representative sample of women. After 25 years, they found that those admitted only under the open policy (referred to as open admits) appeared to gain slightly more from college than the women who would have gotten into CUNY under the 1960s admissions policies. Few differences were statistically significant, but all were positive. Interestingly, the children of open admits benefited fully from having college-educated parents, too. Thus, heritable ability differences, whatever they might be, appear to be small relative to the realized benefits of the university education.

Maurin & McNally (2008) compared French college students from the cohort of 1968 with those in cohorts before and after this year because the mass protests of May 1968 disrupted college entrance exams and allowed students who might not have done well on such exams to gain university admittance. Despite crowding in university classrooms and subsequently in the labor market, the 1968 entering cohort gained more from university than the previous and subsequent cohorts did. Furthermore, just as with the CUNY open admits, their children are indistinguishable from the children of university graduates from other cohorts.

Researchers have also simulated natural experiments by comparing college students and high school graduates who are statistically matched on the propensity to attend university. If the matches are good, then the difference between the success of people who graduated from university and those who graduated from high school is a better estimate of the causal effect of university education than ordinary estimates would be. Brand & Xie (2010) used two American data sets to make matches and estimate the effect of education this way. They found that the effect of education was biggest for students who were least likely to go to college and smallest (though still significant and substantial) for students most likely to go. Carneiro et al. (2011) question negative selection in general and critique Brand & Xie's (2010) estimates in particular. Their latent-class model found homogeneous effects of education on earnings. In unpublished new results discussed in detail in the next section, Dale & Krueger (2011) found negative selection in the form of significant college-selectivity effects for nontraditional students.

These four findings about causal heterogeneity—if they hold up under critique (Carneiro et al. 2011)—all reflect back on the puzzle of why randomly assigning people to education yielded bigger estimates of the effect of education than ordinary methods did. Bowen & Bok (1998), Attewell & Lavin (2007), and Maurin & McNally (2008) all found that admitting students who would normally be rejected resulted in larger than average effects of college (some differences were not statistically significant). The random assignments in the IV studies identified the same kinds of people: those who usually choose to leave school as soon as they can but who, surprisingly, benefit more if they are required to continue. Brand & Xie's (2010) propensity score methods showed that this is actually a fairly general pattern.

The educator's intuition may be exactly backwards. The students who benefited most from more education appear to be the last ones admitted to advanced math classes or selective universities. The ones who oozed ability did almost as well when they did not fulfill their potential for formal education as when they did. The marginal students gained the most from the opportunity to be educated. Anecdotes make for unreliable evidence, but, as food for thought, it is worth noting that several leaders of the computing industry, including Microsoft founder Bill Gates, Apple founders Steve Jobs and Steve Wozniak, and Facebook founder Mark Zuckerberg, dropped out of college to pursue business opportunities (Wozniak is the only one of the four to subsequently return to college and complete a degree). Faculty teach what they know, and Gates, Jobs, and Zuckerberg worked beyond the frontiers of established knowledge.

Research on secondary school effects shows a pattern that closely resembles negative selection. School effects on academic achievement are largest for students who score in the middle range of abilities (Hoffer et al. 1985). Students who score in the middle range on achievement tests gain more from positive school effects and suffer more from negative school effects than do students at the top and bottom of the test-score distribution.

Further corroboration comes from the summer learning literature (Fischer et al. 1996, Downey et al. 2004). Students whose parents graduated from college and students who achieved high test scores continued learning over the summer, whereas most students did not. Students whose parents had little education

and students who got low test scores actually scored worse on fall tests than on tests the previous spring, suggesting they forgot some of what they had learned the previous year. In other words, schools affected educationally disadvantaged and low-scoring students more than advantaged and high-scoring students.

The secondary school effects literature focuses on academic achievement as the outcome, whereas the selection effects literature addresses labor market outcomes. But the two literatures have converged to a consistent message: High schools and colleges matter most for students in the middle.[4]

One more piece of evidence corroborates this thread of research and supports the inference that education affects new or nontraditional students more than others. In research on American social mobility, Torche (2011) used recent data to replicate a pattern I found in data from the 1960s, 1970s, and 1980s (Hout 1984, 1988). Family background constrains the occupational achievements of people who lack college degrees but not those who have degrees. The same finding can be read this way: Education affects the occupational success of lower-origin workers more than higher-origin ones (Breen & Luijkx 2004).

These analyses of causal heterogeneity absorb and recast the concerns regarding ability bias. It now appears that education has a demonstrable causal impact on people of modest ability. It probably has a weaker effect on the most able. The literature up to this point has not asked whether education affects the pay of low- or middle-ability people more, but the school effects literature suggests that those with middle ability get bigger returns.

Scholars have been discussing these issues at least since the late 1920s (Sorokin 1927, Houthakker 1959) and actively pursuing research that would separate the effects since the 1960s (Hauser 1970). The earliest projects used multivariate statistics to separate ability and education. Research since the mid-1980s has reevaluated that whole project and led to the conclusion that ability and education cannot be separated. Rather, the correct perspective is to ask how abilities make education more or less effective in producing the desired outcomes. Young people with the most abilities may learn and ultimately earn the most, but their education augments their success less than it augments less-able people's success (in the range, roughly, from the median to the top of the ability distribution). Secondary education makes the biggest difference for people with modest abilities, and that is probably true of college, too. (Because college is so selective, we do not see many college students in the lowest quartile of test scores.)

Can the Positive Returns to Education Offset Escalating Costs?

College costs more every year; increases in the full cost of college outstripped inflation by large margins in both the public and private sectors (see **Figure 2**). The full cost of attending a private, four-year college or university—which includes tuition, fees, room, and board for full-time students who received no financial aid—averaged $31,300 in the 2008–2009 academic year, up from $13,700 in 1981; both amounts are stated in 2009 dollars so the 127% increase is on top of the average increase in the price of goods and services. Public colleges and universities were a comparative bargain at $14,100 in 2008–2009, but the rate of increase was almost identical—125% since 1981 when full cost was $6,200. Tuition hikes were the main cause of above-inflation increases for both public and private colleges and universities; room and board increased at roughly the rate of overall inflation (Kane 1999, pp. 34–36).

The full cost of private and public higher education rose more or less in tandem throughout the 30-year period. Private education's cost rose slightly faster than that of public education in the 1980s; public education's cost rose slightly faster than that of private education in

[4]The least able get little out of high school and rarely go to college; thus, we know little about the returns that the lowest propensity students might get from higher education.

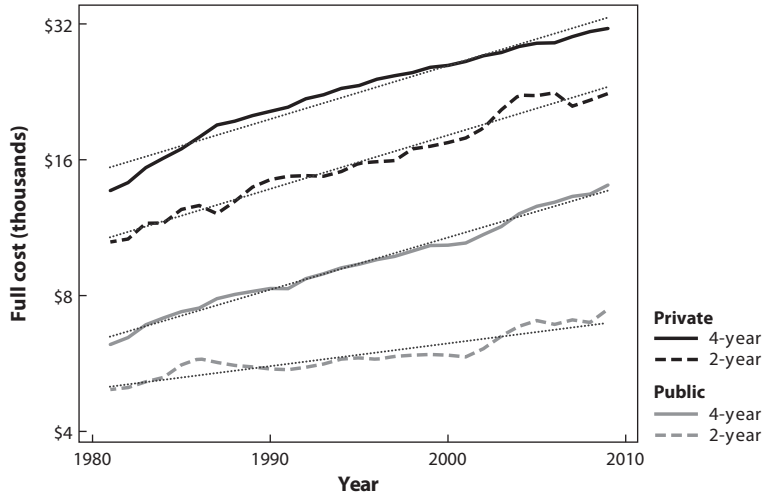

Figure 2

Full cost of attending college by year, sector, and type of institution. Notes: Full cost includes average total charges—tuition, fees, room, and board—for full-year, full-time attendance. See **Figure 1** caption for information on inflation adjustments. The dotted lines show 30-year trends at a constant rate of increase (1.16% per year for public, two-year colleges and 2.26% for the other three). Source: US Dep. Educ. 2011, table 239.

the most recent decade (**Figure 2**). Only the public, two-year (community) colleges held tuition down for a significant period; the full cost of a community college education rose only as fast as other prices for the 15 years from 1985 to 2000.

The full-cost data show what a student would pay at an average private or public college or university. As with any average, there is variation above and below it; some colleges charge substantially more, others less. But most students pay less than the stated amount for their education. Scholarships and grants based on academic performance, financial need, or both reduced the cost for 64% of recent full-time students (Natl. Cent. Educ. Stat. 2009).

Are these increases offset by the returns students can expect? Are today's full costs too much to pay up front for an uncertain increase to lifetime earnings? Academic researchers have given the difference between investment and return surprisingly little attention. Fortunately, the US Census Bureau twice published estimates of lifetime earnings differences that address these questions (Yang 2008, Julian & Kominski 2011). The latest estimates separate people by race and Hispanic ancestry and by hours worked; **Figure 3** shows the results for all persons by race/ancestry.

Even the most cautious reading of the evidence confirms that earning a college degree will pay back the cost of obtaining it several times over. In a 40-year work life, men with college degrees can expect to earn $1.1 million more than high school graduates. The difference is slightly larger than that for non-Hispanic white men and slightly less for the other three groups. Women earn substantially less than men at each level of education, mainly because fewer women than men work full-time, full-year (FTFY); the gender gap in lifetime earnings is much smaller among FTFY workers (Julian & Kominski 2011). The four racial/ancestry groups are virtually identical. Women with college degrees can expect to earn $636,000 more than high school graduates over their lifetimes.

Five years at full cost at the average private, four-year college or university works out to $156,500 (with no financial aid). The

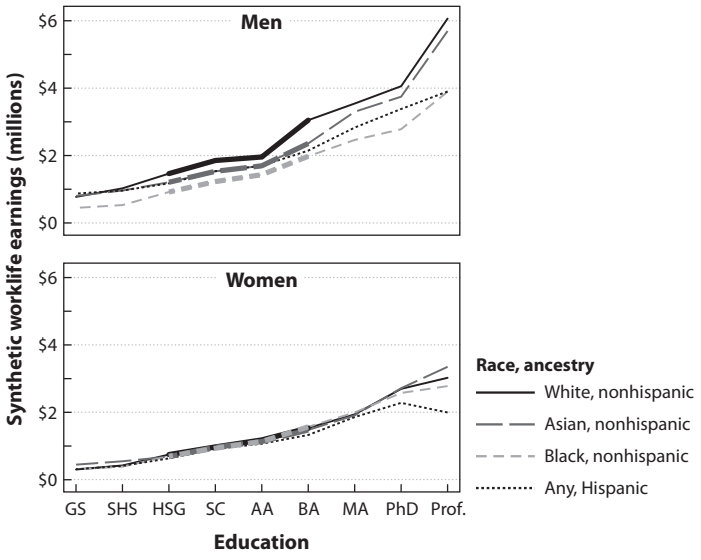

Figure 3

Work-life earnings by education, race, ancestry, and gender: United States 2006–2008. Notes: Synthetic work-life earnings were calculated from cross-sectional data pooled from American Community Surveys of 2006–2008, standardized to 2008 prices. Thicker line segments highlight the educational attainments ranging from high school diploma to bachelor's degree. Key to education labels: GS = 0–8 years completed, SHS = 10–12 years completed with no diploma, HSG = high school diploma or GED (any number of years of education completed), SC = some college with no degree, AA = two-year degree, BA = four-year degree, MA = master's degree, PhD = doctoral degree, Prof. = advanced professional degree (e.g., JD, MD, DDS). Source: Julian & Kominski 2011.

average male college graduate's degree will yield roughly 7.7 times what it might have cost; the average female college graduate's degree will yield 4.1 times what it might have cost. Financial aid reduces cost but not payoff, so the yield will be higher for the majority of graduates who receive aid. At a public university, five years at full cost works out to $70,500. That investment will pay off 18 times over for men and 10 times over for women. People who attend college lose out on work experience at first, but I have not adjusted for that. The census figures for both college graduates and high school graduates assume a 40-year work life; the time out of the labor force while in college is offset by a later retirement age for college graduates in these calculations. Kane (1999) argues for excluding room and board from calculations like these, reasoning that people have to pay for food and shelter whether they enroll or not. Removing living expenses would further increase the estimated return on educational investment.

Calculating the full return on a college investment must factor in the yield on advanced degrees as well. Master's, doctoral, and professional degrees compound the advantages of graduating from college. When the lifetime earnings of men and women with advanced degrees are figured in, earning a college degree looks even better. Quantifying the post-BA payoff is not possible from published sources, however, because comparable data on the cost of pursuing an advanced degree are not available.

The US Census Bureau's estimates have several important limitations. Lifetime earnings were extrapolated from a single year's earnings of men and women at different ages. The earnings of today's older men and women may or may not predict the earnings today's young people will have in the future. Offsetting the uncertainty is the fact that these patterns have grown clearer over the past 25 years.

In conclusion, the returns to higher education are large enough to offset even the full costs students now face. The difference between the earnings of college graduates and high school graduates has risen almost as much as tuition in the past 25 years, so the yield now is almost as large as it was when tuition was lower.

The Benefits of Elite Colleges

Students strive for famous colleges. At the most prestigious and probably throughout the range of selective colleges and universities, applications have risen rapidly, whereas the number admitted has increased much less. Consequently, admissions rates have fallen since 1980 (Bound et al. 2009). Hoxby (2009) argues that admissions rates have fallen only for the most selective. Highly selective, elite colleges offer two important benefits to students: graduation is more certain (Bowen et al. 2009) and investment per student is higher (Hoxby 2009). Hoxby calculated that the well-endowed, expensive universities actually invested $15,000 more per student each year than they charged.

Graduates entered the labor force endowed with the equivalent of a $260,000 education for which they paid, at most, $200,000. The investment in a graduate from a public university was closer to $160,000. Thus, as high as tuition was, the cost paid by the university was even higher.

Finding an effect of graduating from an elite college on earnings has been surprisingly difficult. Average SAT scores and other markers of quality and status correlate with graduates' earnings. But the literature has as many null findings as positive ones. Dale & Krueger (2002) studied college freshmen who were admitted to an elite, selective university. Freshmen who chose to enroll at a less selective university—despite admission to the elite one—subsequently earned as much as those who actually enrolled at the elite school (Dale & Krueger 2002). That is the strongest null evidence.

New unpublished work (Dale & Krueger 2011) again questions the return to selectivity. The authors compiled earnings data from administrative records, reducing measurement error substantially. Cumulative earnings were significantly higher for people who attended highly selective colleges and universities, but they were also correlated with the average SAT score at all the colleges and universities those people applied to. If earnings correlate with attributes of the schools people did not attend as well as the one they attended, then selectivity is probably telling us more about the students than their schools. Dale & Krueger (2011) interpret this pattern as evidence of unobserved student abilities. Models that include both selectivity of the college attended and average SAT scores at all colleges applied to show weak or no effect of selectivity for most students. For black and Hispanic students and for students whose parents had less education, college selectivity had a large, positive effect, consistent with the negative selection argument discussed above.

Black & Smith (2006) expanded the usual search for elite effects by using five measures of college quality. Combining measures produced an estimate of the effect of college quality on wages that was significantly higher than the estimates obtained by considering any measure alone (Black & Smith 2006). Graduates from colleges and universities that were in the top 5% of the quality distribution earned an average of 12% more per hour than graduates of average-quality universities. The 12% boost was statistically significant but disappointing next to the 56% investment advantage that they received (Hoxby 2009). And Black & Smith's (2006) results do not control for the quality of universities that students applied to but did not attend, so they could not control for unobserved abilities as surely as Dale & Krueger (2011) did.

A degree from an elite college increases marriage prospects. For women, graduating from an elite college or university increases the probability of marrying a man with a high income; for men, graduating from an elite college or university increases the probability of marrying a woman from a privileged background (Arum et al. 2008). These patterns might well increase family income, even if the elite college does not increase earnings.

Returns to Two-Year Colleges

The complement to worries that an expensive elite education will not pay off is the concern that community colleges divert nontraditional students from the lucrative academic track to lower-reward, trade-oriented courses (Brint & Karabel 1989). That does occur at some two-year colleges, especially overenrolled and underendowed public community colleges (Rosenbaum et al. 2006). But other two-year colleges, even some for-profit ones, achieve good outcomes for students by offsetting their low cultural capital and knowledge about higher education (Rosenbaum et al. 2006). To some extent, vocational education is as remedial as academic education at community colleges in the sense that some people get the same value out of well-structured secondary school vocational training as others get out of similar training at two-year colleges (Arum 1998).

In short, degrees and certificates from two-year colleges boost the earnings for the students who complete such programs and perhaps for

students who complete only part of their program (Marcotte et al. 2005). In the language of causal analysis, there is evidence of an effect of the treatment on the treated. It does not imply that every student would benefit if reassigned from their preferred course of postsecondary education to a two-year college. But for the students who go, education at a two-year college is better than no postsecondary education at all and perhaps better than a more demanding education (Marcotte et al. 2005, Stephan et al. 2009).

ORIGIN, EDUCATION, AND OPPORTUNITY

The opportunity to pursue an advanced education is profoundly and persistently unequal (Blau & Duncan 1967, Mare 1981, Raftery & Hout 1993, Lucas 2001, Bailey & Dynarski 2011, Hout & Janus 2011). This fact alone has made some sociologists skeptical of the efficacy of education. But that skepticism misses a key point. Education's role in transmitting the advantages of social origins depends on inequality of educational opportunity as well as on the economic value of education (Blau & Duncan 1967, pp. 165–75). For the sake of exposition, let us strip the Blau-Duncan model to its essentials: education (E) depends on socioeconomic origins (X), abilities (A), and variation in education that is uncorrelated with either family socioeconomic status or academic ability (ζ):

$$E_i = \beta_{10} + \beta_{11} X_i + \beta_{12} A_i + \zeta_i. \quad 1.$$

Subsequently, the person's success in the form of a desirable job, salary, etc. (Y) depends on socioeconomic origins, abilities, education, and the myriad causes of success that are uncorrelated with origins, abilities, and education (ϵ):

$$Y_i = \beta_{20} + \beta_{21} X_i + \beta_{22} A_i + \beta_{23} E_i + \epsilon_i. \quad 2.$$

The correlation across generations can be expressed in terms of these relationships as follows:

$$r_{xy} = \beta_{21} + \beta_{22} r_{ax} + \beta_{23} (\beta_{11} + \beta_{12} r_{ax}). \quad 3.$$

If education has no net effect on the outcome of interest after controlling for socioeconomic origins and abilities, then $\beta_{23} = 0$, and all the terms involving education drop out of Equation 3. Thus, education is not the key to persistent inequality unless it directly affects jobs, pay, and other outcomes. Just as important, however, is the effect of origin on education (β_{11}). Without this indirect effect, the correlation between origins and destinations would depend solely on the direct effect of education and its correlation with abilities.

The substantive implication of this simple illustration continues to hold as the model is enriched with additional explanatory variables. The algebra grows more and more complex as variables are added, but the conclusion is always the same. Education disappears from the intergenerational correlation if β_{23} is zero; that is, if education does not cause success. Therefore, skepticism of education's efficacy that is based on selection is misplaced.

The other concern in the "engine of inequality" skepticism is that intergenerational correlations are rising (Karen 2002). Data show no increase in β_{11} in the past 50 years (Bailey & Dynarski 2011, Hout & Janus 2011).

Skeptics and Critics

Some serious sociologists and economists developed strong arguments in the 1970s about the limits of mass education (Berg 1970; Collins 1971, 1979; Freeman 1976). They noted how few of the skills that define academic success translate to skills used on the job. The disjuncture led them to doubt that education caused success. Instead, education represented to them a tool elites used to limit opportunity to people like them. Collins (1971) articulates it this way:

1. Society is composed of status groups that are differentiated by practices and habits informed by culture and norms.
2. Practices and habits turn into a status rank ordering through class advantages (and complementary disadvantages).

3. "The main activity of schools is to teach particular status cultures, both inside and outside the classroom. In this light, any failure of schools to impart technical knowledge (although it may also be successful in this) is not important; schools primarily teach vocabulary and inflection, styles of dress, aesthetic tastes, values and manners" (p. 1010).
4. Education allows employers to select workers deemed to be appropriate on the basis of status group membership and then teach the job skills on the job. "Educational requirements for employment can serve both to select new members for elite positions who share the elite culture and, at a lower level of education, to hire lower and middle employees who have acquired a general respect for these elite values and styles" (p. 1011).

The Credential Society (Collins 1979) extends the argument.

Berg (1970) and Freeman (1976) provoked controversy by arguing that most college graduates had more education than they needed, at least more than they needed to get their jobs done. As Smith (1986) notes, these arguments have two parts: the link between education and occupation, and differences in pay among workers within the same occupation with different amounts of education.

All this work carries the implicit assumption that the American economy somehow got the mix of high school– and college-educated labor right in the 1950s or 1960s and that subsequent increases in the fraction with a college degree represent irrationality on the part of employers, students, or both. In Collins's (1971, 1979) work, there is the nuance that employers are discriminatory or status seeking. Berg (1970) adds that colleges and universities gain at some students' expense by overpromising rewards and coming up short on delivering employable skills. Freeman (1976) focuses on the tension between individual incentives that promote more investment and the collective action that dilutes the return on that investment (also see Thurow 1975).

These arguments arose at the low point in the pay advantage of college graduates. When Collins, Berg, and Freeman were writing (1970–1976), the difference between the average earnings of college graduates and high school graduates was half of what it was in 1999 (Fischer & Hout 2006, pp. 114–20). Their concerns have been supplanted by the observation that education-based pay gaps are close to the core of rising inequality (Fischer et al. 1996, Fischer & Hout 2006, Goldin & Katz 2007). As evidence of a true causal effect of education on pay accumulates, the discussions of credentialing, training robbery, and overeducation become irrelevant. The microprocessor revolution put a premium on information, data processing, and the work of symbolic analysts (Reich 1992, Fernandez 2001). Those who know more about these things pull farther ahead, all else being equal. An educated person invents things, works around tough problems, understands directions, documents tasks, misses less work, and puts in a more nearly full day on the job—in short, educated workers possess the cognitive and noncognitive skills that employers value (Fernandez 2001, Heckman et al. 2006, Goldin & Katz 2007). Technology makes some people—predominantly college graduates—more productive and others—mostly high school graduates—redundant.

In this new context, it is important to note that education and cognitive ability affect both workers' occupational placements and their earnings in those occupations, but the effects are not additive (Carbonero 2007, Baker 2009). Returns to education and cognitive ability are significantly higher in occupations with high skill demands than in less skilled occupations. Similarly, majoring in a science, technology, engineering, or math field pays off more than majoring in the humanities (Roksa 2005, Poletaev & Robinson 2008, Pfeffer 2008, Shauman 2009).

An educational credential is substance and acquired abilities, not just status. Some of the ability may be a preexisting talent, but most people need schooling or work experience to bring that talent out (Miller

et al. 1986, Nisbett 2009, Arum & Roksa 2010).

SOCIAL RETURNS

Economists use the term "social returns" to characterize the impact of education on the whole economy (Topel 1999). All gain when more are educated. If people gain from having educated people in their neighborhood or metropolitan area, then they receive a social return on the education of others.

The Impact of Education on Community

Moretti (2004a, 2012) found that high school graduates' wages increased where the proportion of college graduates in the labor market increased and that high school dropouts' wages increased even more in those places. A key issue for this literature is the presence of unobservable characteristics of individuals and cities that may raise wages and be correlated with college share—an issue very familiar to sociologists interested in context effects whether they are tied to schools, locales, or other aggregations. Moretti's longitudinal model controlled for the nonrandom selection of workers among cities by using two IVs: the (lagged) city demographic structure and the presence of a land-grant college. He found that a percentage point increase in the supply of college graduates raised high school dropouts' wages by 1.9%, high school graduates' wages by 1.6%, and college graduates' wages by 0.4%. Everyone gained from the educated workforce. The least educated gained more (collectively) than the most educated, but even the college graduates received a bonus on top of their private returns to their own educations for working among other college graduates. Furthermore, data matching workers and firms indicated that the social returns came from productivity gains (Moretti 2004b).

Some of the productivity gains came from the social pressure that more productive workers (regardless of education) created and how less productive workers felt that pressure (Mas & Moretti 2009). Highly productive workers might either stimulate coworkers to lift their performance or they might make it possible for coworkers to put in less effort, yielding the same overall output. Mas & Moretti (2009) found that both occur, but that social pressure to carry one's weight plus learning-by-observing predominate. They reached that conclusion by recording the distance between the most productive person in a retail store and the other workers. Nearby workers had larger gains in productivity than workers farther away. Most tellingly, "workers exhibit[ed] cooperative behavior only when they [were] observed by coworkers and when they [were] likely to interact with them again in the future" (Mas & Moretti 2009, p. 143). This combination of social pressure and learning helps interpret the social returns to education.

If education boosts collective productivity as well as personal productivity as these papers and others like them suggest, then increasing educational attainment for a population might be a key causal factor in overall economic growth. In fact, estimated social returns to education exceed private returns (Lange & Topel 2006). Metropolitan areas, states, and nations gain from having educated populations.

States invest huge sums in education. Researchers in Texas and California have estimated the return on these public investments. In *The Texas Challenge*, Murdock et al. (2003) totaled public outlays for higher education in community colleges and state universities in Texas. They found that the combined benefits of lower use of public assistance, lower crime and incarceration, and higher payback in the form of sales, property, and state income taxes yielded Texas more than $4.00 for every $1.00 invested in higher education. In our replication of the Texas calculations, Brady et al. (2005) found a net return of $3.65 in California.

Family

In the 1990s, inequality researchers reported that family life was dividing along educational lines in ways that it had not done in the past

(Ellwood & Jencks 2004). Children were substantially more likely to live with two adults if their mother was a college graduate than if their mother was a high school dropout (**Figure 4**).

Separating causation and selection here is complicated. Few studies have sorted through the links. Becker's (1991) theories start with a very stable world of perfect foresight that enables young women to choose a lifelong trajectory of schooling, mate, and babies all at once. They cannot have it all—at least not all at the same time—so they must choose the sequence and timing of events such as graduation, marriage, and each birth, as well as the amount of education and desired number of children. The simultaneity of these strategizing decisions makes separating causal effects of schooling on fertility or vice versa very difficult.

Real life adds complexity, starting with the fact that many births are unplanned. Even in a world of effective contraception and legal abortion, errors occur. Accidental pregnancies result in extra births or births that occur sooner than planned; effectively delaying any attempts to get pregnant often results in fewer births or births that occur later than planned (Morgan & Taylor 2006).

Demographers have used data on unplanned births and miscarriages to disentangle the effects of births and education. Some early studies (Rindfuss et al. 1980) used two-equation models to explore relationships and concluded that education almost certainly affected fertility but that the reciprocal effect of fertility on education was much less certain. Since then, most analyses have been purely correlational. Now Brand & Davis (2011) have used propensity scores to estimate the effect of education on fertility. They found that entering college at age 19 reduced the total number of children ever born to those women. Entering college clearly reduced births per woman if they were unlikely to enroll in college; it was not clear if going to college mattered for those whose family background and academic achievement made college very likely.

Beyond fertility, theory predicts that educated couples will stay together longer,

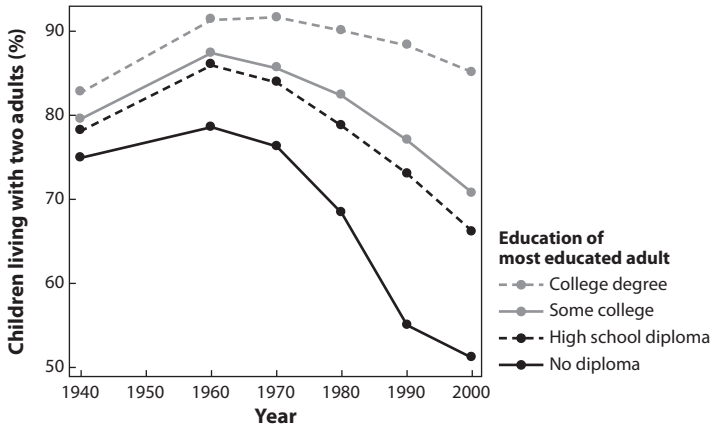

Figure 4

Children living with two adults: United States 1940–2000. Source: Fischer & Hout 2006, p. 82.

contributing to the pattern in **Figure 4**. Causal analysis has not resolved this issue, although the timing of events strongly supports the inference that education increases the stability of marriages (Schwartz 2010). Furthermore, the increase in educational homogamy reflects this greater stability, as having similar educations reduces a couple's probability of divorcing (Schwartz 2010).

Health

College graduates are decidedly healthier than others (**Figure 5**). This basic relationship has been replicated hundreds of times by researchers (Mirowski & Ross 2003). The question of causality is hard to settle, though. The relationship is not direct; many social, behavioral, and biological factors stand between attainment of a college degree and quality of health later in life (where most of the variance is). There is even some concern that healthy people might achieve more education by missing less school, concentrating better, and the like.

Lleras-Muney (2005) used state-to-state variation in mandatory schooling to identify a causal effect on mortality. Her IV estimate showed that achieving more schooling lowered the risk of premature death. Other studies

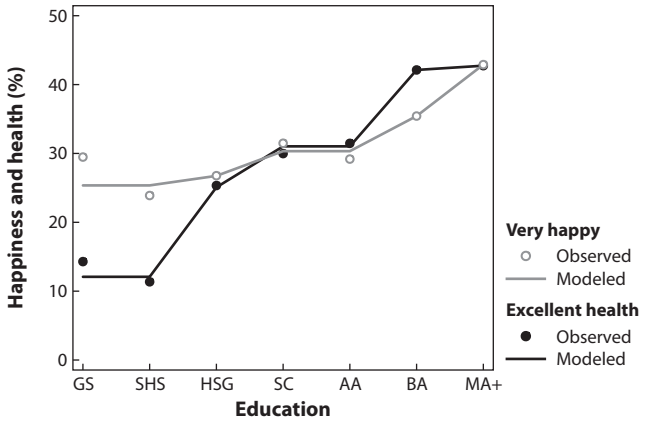

Figure 5

Happiness and health by education: United States 2006–2010. Key to education labels: GS = grade school (0–8 years completed, no diploma), SHS = some high school (9–12 years completed, no diploma), HSG = high school graduate (any number of years completed, high school diploma or GED), SC = some college, AA = degree from two-year college, BA = degree from four-year college, MA+ = advanced degree (e.g., MA, MBA, PhD, MD). Source: author's calculations from Smith et al. 2010, persons 25–64 years old, educated in the United States, 2006–2010 pooled.

(Cutler & Lleras-Muney 2006) have replicated the finding in Europe.

Mirowski & Ross (2003) argued for education as learned effectiveness. They carefully specified the direct and indirect paths from education to positive health outcomes and concluded that the statistical associations are robust because in acquiring formal education people learn things that promote good health. Recent evidence shows that education does more to suppress the onset of health problems than to aid recovery (Herd et al. 2007).

Social Capital and Morale

College graduates participate more fully in civil society and politics (Verba et al. 1995, Nie et al. 1996, Putnam 2000). The question is whether education actually increases participation or perhaps educated people just have an attribute that increases both their education and their participation. Milligan et al. (2003) produced IV estimates that imply that education increased voter registration, knowledge, and turnout in the United States. Hauser (2000) studied academic abilities and concluded that education had a far stronger effect on young people's social capital than their verbal and quantitative abilities. Brand (2010) found that a college degree raised the civic participation of unlikely college graduates more than it raised participation among traditional college graduates when participation consisted of volunteering to do unpaid work for community organizations and charities. College graduates also had prosocial attitudes toward civil liberties and minorities (Kingston et al. 2003).

Happiness research has had a renaissance in psychology, sociology, and economics in the past two decades. Much of that work centers on the role of money in subjective well-being. But sociologists have given education an equal amount of attention. **Figure 5** shows the simple association between the General Social Survey happiness question and education along with data on subjective health. Sophisticated analyses (e.g., Yang 2008) show that educational differentials are robust with respect to happiness, but I know of no attempts to identify the causal effect.

CONCLUSION

Education makes life better. People who pursue more education and achieve it make more money, live healthier lives, divorce less often, and contribute more to the functioning and civility of their communities than less educated people do. We would expect some of these patterns to emerge even if schools and colleges do little more than certify who is smart and who is not. But the evidence reviewed here points to a more substantive role for education in America. Most recent evidence supports the proposition that education improves people in ways that matter later in life. Some of those are skills that they could, in principle, pick up at home, on the job, or elsewhere. For example, most people learn to read in school. The fact that some learn at home suggests that others could, too. But education works for these kinds of widespread, general skills because the results are more sure and the process is more efficient

in the school setting. It is also more egalitarian; acquiring the skill does not depend on parents and siblings mastering it and passing on their mastery (Downey et al. 2004).

Other skills are much harder to acquire outside school. Specific skills such as how to calculate the forces on a weight-bearing wall, the elements of the periodic table, the formula for compound interest, or how to make sense of Shakespeare, Nieztsche, or Matisse come to mind. Then come broader skills such as how to marshal facts and rhetoric to craft a reasoned argument, or how to discipline oneself to see a task through from beginning to end. Many people learn these things at home, but schools counter the inequality that home-learning fosters. Inequality of educational opportunity persists (Lucas 2001, Lareau 2003, Hout & Janus 2011), but it would be even more unequal without schools (Downey et al. 2004, Pfeffer 2008).

For all the advances in establishing the causal role of education, we have learned surprisingly little about what exactly the educational treatment is (Arum & Roksa 2010). The research suggests that a mix of academic knowledge and useful habits makes people better employees, patients, and citizens. And although having talent or potential can accelerate the learning that goes on in school, it is, demonstrably, the schooling itself that separates the promising from the accomplished young person. How high schools and colleges accomplish that is far less clear. Researchers need to look more closely at the variety of educational experiences. Accomplishing these next steps will not be easy. The problems of selection and heterogeneity compound as we move from the causal impact of education to the causal mechanisms of education. Take selective women's colleges as a case in point. The young women who choose women's colleges are hardly a random draw from the population of young women. Almost all of them have high school academic and social accomplishments that make them strong prospects for admission to equally selective coeducational colleges. Some have chosen the women's college for reasons such as a better financial aid package or being near home. But most choose a women's college over a comparable coeducational one because the women's college is the right fit—their personal return is likely bigger than that for women who go somewhere else would have been.

Probably the biggest surprise in recent research concerns the interaction of ability and schooling. Evidence from both high school and college research implies that the young people who benefit most from education are not the most talented but rather those who have skills and abilities in the middle of the range. It appears that the most talented students do well on their own and the least talented ones do not prosper anywhere. The broad middle range of roughly average talent respond most to variation in the schooling treatment. This is a crucial policy point. It means that throughout the history of American higher education we have seen appreciable gains by pushing the frontier of opportunity further up the achievement ladder and further down the selection ladder (Goldin & Katz 1999). Continuing so that the nation can see half its young people succeed in college—the Obama administration's goal—will yield even greater returns because the expansion will embrace precisely the segment of the population most likely to benefit from it.

Stevens et al. (2008) characterized American higher education as (*a*) sieve, (*b*) incubator, (*c*) temple, and (*d*) hub. The research reviewed here underscores all four. The functions overlap; there is no adjudicating among them. They refer to the ways higher education (*a*) stands between the home environment of childhood and adult achievement; (*b*) creates the world-apart of the residential college and, for those who commute, offers a respite from noneducational responsibilities; (*c*) collectively and simultaneously produces new knowledge and legitimates some forms of knowing but not others; and (*d*) is the field on which the interests of family, industry, and the state coalesce. All four depend on and support the effects of education enumerated in this review. If higher education were not tied to economy and society by the causal relationships identified in recent research, then it

would not be sieve, incubator, temple, or hub. It would still be the finishing school it once was for the offspring of elites who showed an interest in the arts and sciences.

Throughout this review, I have taken the pragmatist's point of view by asking what education is good for. I nonetheless recognize the truth of what Abbott (2002) told an audience of freshmen in September 2001: The pragmatic view undersells education. Knowledge is better than ignorance, even if we never find use for what we know. But if the topic is public investment in education—and the United States is in the unenviable position of investing a lot but not enough—then education has to justify itself on pragmatic grounds. The research reviewed here shows that education yields both personal and social returns on investment. Education pays off because, in addition to sorting and certifying America's young people, it adds value. In the nation's colleges and universities, students acquire new skills and new perspectives that make them better workers, life partners, and citizens. The universities do not merely identify the young people who fit the desired profile, they disseminate skills and foster values. Higher education causes good things to happen.

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