After a 35-year climb, the fraction of high school graduates who go on to a two-year or four-year college appears to be leveling off. In 2013, only 65.9 percent of graduating high school seniors enrolled in college, the lowest percentage in a decade.[1] Weak enrollment growth is consistent with public opinion that questions whether college is still worth the cost.[2] These findings are surprising, given that economic studies continue to conclude that higher education remains a good investment. (Autor 2014; Avery and Turner 2012; Daly and Bengali 2014; Greenstone and Looney 2012).

Are students (and their parents) simply ill informed? In this paper, we use data from the University of California (UC) and California State University (CSU) systems to argue that the simplifying assumptions used by most economic studies of the college enrollment decision overstate the pecuniary return on college as seen by a typical high school senior.

First, most of the prior studies estimate returns among students who graduated from college with a Bachelor's degree after four years. For the typical graduating high school student in California who is considering whether to pursue college, this is an optimistic scenario. Among the roughly 34,000 freshmen who entered the CSU system in 1997, only

---

1 Floyd Norris, "Fewer U.S. Graduates Opt for College After High School," *New York Times,* April 25, 2014, http://www.nytimes.com/2014/04/26/business/fewer-us-high-school-graduates-opt-for-college.html.

2 The Heartland Voice, "Heartland Monitor XIX: The American Economy," November 22, 2013, accessed June 9, 2014, http://www.theheartlandvoice.com/insights/heartland-monitor-xix-the-american-economy.

35.3 percent earned a degree in 4 years, and only 62.8 percent earned a degree within 12 years.[3]

Second, most prior studies report a single rate of return to the college investment as though it were a risk-free rate. In reality, the rate depends on whether students graduate, whether they enter a high-paying or a low-paying field, the state of the economy, and many other factors that shape variation in post-college earnings. From the perspective of a high school senior, college is a risky investment and its economic value should be compared with investments of similar risk.

As a third simplification, the studies cited above calculate a rate of return based on pretax earnings.[4] Progressive tax brackets will disproportionately affect higher-earning college graduates and reduce the return to a Bachelor's degree as the individual sees it.

Lastly, many studies ignore that individuals who graduate from college may be workers of greater ability, and would have been more successful in the labor market even if they had not attended college..

Although simplifying assumptions may be benign when they are small and balanced, each of these simplifications potentially overstates the return to higher education and their cumulative bias could be significant.

The objective of this paper is to simulate the economic returns to a Bachelor's degree correcting for this bias using data from the UC and CSU systems. California's higher education master plan charges its nine UC campuses and twenty-three CSU

---

[3] Data come from Tables 133 and 140 in the California State University Statistical Abstract 2009–2010, available at http://www.calstate.edu/AS/stat_abstract/stat0910/index.shtml.

[4] An exception is Heckman, Lochner, and Todd 2008.

campuses with educating the top 12.5 percent and top 33 percent of California high school graduates, respectively. The UC system spends more per student and has higher average graduation rates, shorter average time to graduation, and higher average earnings than graduates at the CSU system. However, the UC system also has higher in-state tuition. We estimate returns for the UC and CSU systems separately. Our simulations correct directly for time-to-degree/dropping out, risk and tax rates. Rather than impose assumptions on ability bias, we perform a bounding exercise; we calculate how much of the gap between college and high school graduates would need to be explained by ability bias for college to be a poor investment

Because the UC and CSU systems educate a relatively large share of California's Bachelor's degree graduates (about 70 percent), and because tuition and graduation statistics are readily available, they offer a basis for estimating the return to pursuing a Bachelor's degree program both over time and in systems aimed at different levels of student achievement. Despite recent increases, in-state tuition for both systems is roughly in line with in-state tuition in other public institutions and well below the average tuition charged by private and nonprofit institutions. If pursuing a Bachelor's degree in the UC or CSU systems is a bad investment, it is likely a bad investment in many other institutions as well.

After correcting for these biases, we conclude that college remains a good economic investment for the average matriculating undergraduate in the UC system and for the average matriculating woman in the CSU system. For college to be a poor investment, ability bias would need to explain about 60% of the college wage premium, which is substantially above other published estimates. However, we find that the CSU system is a

poor investment for the average matriculating male if ability explains at least one-third of their college wage premium. This is result may help explain the lagging college attainment of men (Autor and Wasserman 2013).

Based on data from both systems, we also find the returns to college education estimated in the literature are often overstated, and that the widening variation in outcomes has increased the risk that the student loan burden will result in financial distress. Despite recent increases in the college wage premium, these factors and the rising cost of college have led to an increase in the share of students who do not recoup their investments.

I. Estimating the Individual's Economic Return to Pursuing a BA

For our calculations, we consider a student who is graduating from high school at age 18 and is deciding whether to pursue college. We assume that the student chooses to enter as an average matriculant and therefore enjoys no private information that would affect expected future earnings, including: the likelihood of completing a degree, the time to completion, and the choice of major. Figure 3 illustrates three paths.[5]

[Figure 3 about here]

- Path A: The student completes a Bachelor's degree (Probability = $P_{completion}$) in *N* years. She then works until age 65 at the after-tax earnings of a college graduate (with no graduate school). The costs of this path include *N* years of tuition and foregone earnings, while the benefits are annual college earnings after taxes.
- Path B: The senior pursues a Bachelor's degree but drops out after *M* years (Probability = $1 - P_{completion} = P_{drop\ out}$) without earning a degree. She then works until age 65 at the after-tax earnings of persons with "some college." The costs of

[5] We do not consider alternative paths, such as community college or beginning college midcareer.

this path include *M* years of tuition and foregone earnings, and the benefits are the annual after-tax earnings for persons with "some college."

- Path C: The senior foregoes college and works until age 65 at the after-tax earnings of a high school graduate. In calculating the internal rate of return (IRR), Path C is the baseline against which college attendance is compared.

In our model, the benefit from pursuing a Bachelor's degree is the expected value of two streams—Path C if the student completes a degree (weighted by the probability of completion) and Path B if the student does not (weighted by the probability of dropping out). The student compares the benefit against the stream of earnings from going directly to work. The net present value (NPV) of pursuing a Bachelor's degree rather than going directly to work can be written as follows:

(1) $NPV(BA) = (P_{completion}) \times NPV(Path\ C) + (P_{drop\ out}) \times NPV(Path\ B) - NPV(Path\ A)$,

where NPV refers to a path's net present value, the discounted sum of future benefits and costs.

The individual's IRR from pursuing a Bachelor's degree is the value of the discount rate that sets the net present value (Equation 1) equal to zero—the interest rate that makes the investment in college just break even.

II. Data

IRR estimates depend on expected future earnings. We assume that the high school senior's evaluation of future earnings is formed by contemporary median earnings of workers of different ages.[6]

---

[6] For example, an 18-year-old female who making her college decision in 2010 would assume that if she obtained a Bachelor's degree, her earnings at age 30 would be the same as the median earnings of 30-year-old woman with a Bachelor's degree in the

These estimates require specifying whose earnings we count in calculating the median —in particular, how we count persons who have no earnings during the year because they cannot find work, are unable to work, or are voluntarily out of the labor force.[7] For labor force participants, we estimate the median earnings of Californians who have at least $1,000 of earnings during the year and multiply that by the labor force participation rate for that combination of age, sex, and education level. The age-earnings profiles are shown in Figure 1.[8] For 1980, 1990, and 2000, the U.S. Decennial Census provides sufficient data to estimate age-earnings profiles for the California labor market. After 2000, we rely on the American Community Survey (ACS) from 2005 to 2010, a period that covers both prerecession and recession observations. To calculate differences in UC and CSU earnings, we use a Payscale.com salary survey that estimates that UC graduates earn 10 percent more than CSU graduates. We incorporate this difference into our calculations.[9]

---

year 2010. This is equivalent to assuming that there will be no economy-wide wage growth that would cause age-earnings profiles to shift upward. Based on the last two decades of data, this is a reasonable assumption for college graduate earnings and a mildly optimistic assumption for high school graduates whose earnings have fallen since 1990 (see Figure 1).

7 The data sets we use do not permit easily distinguishing among these groups.

8 We smooth the age-earnings profiles by estimating a median earnings regression with a quadratic term for age.

9 The survey was performed by Payscale.com (http://www.payscale.com/college-salary-report-2013/west-coast-schools) based on currently employed workers with a bachelor's degree (no graduate work). This should not be interpreted as a causal estimate but merely an estimation of a difference in means. The earnings difference likely reflects both UC's higher average admission standards and expenditures per student. Large variations remain in both individual outcomes within schools and school outcomes across the systems. The age-earnings profiles in Figure 1 are based on Census data and therefore are representative of bachelors' degree holders in the California labor market. Estimating an individual's IRR also requires estimating the individual's foregone earnings while in college. For students of a specific age (18, 19, etc.) and gender in a specific year (1980, 1990), we define foregone earnings as the difference between the median earnings of high school graduates who are not in school and the median (part-time) earnings of students who are in college. In this calculation, the

[Table 1 about here]

Other variables necessary to calculate the IRR are taken from reports of the UC and CSU systems and are detailed in Table 1. To simplify calculations, we equate the probability of dropping out to the probability of not earning a bachelor's degree within six years.[10] Table 1 shows the longer completion times and significantly higher dropout probabilities in the CSU system.

III. Individual's IRR of Pursuing a BA

Table 2 contains estimates of the individual real IRR for the UC and CSU systems.

[Table 2 about here]

While real IRRs are in 2010 dollars, student loan interest rates, like other commercial interest rates, are adjusted for expected inflation. Correspondingly, Table 2 also includes the *nominal* IRR—the real IRR plus the expected annual rate of inflation over the life of the investment—to allow comparisons with student loan interest rates.[11] Our estimated real and nominal IRRs are corrected for taxes paid and the probability of dropping out or taking more than four years to graduate. As a result, they are lower than most published estimates.[12]

---

median earnings of high school graduates are estimated on California data, but the median earnings of students while in college are estimated from national data because the number of observations in California is too small.

[10] For students entering the CSU system in 2000, the 10-year completion rate was about 9 percent higher than the 6-year completion rate. Our calculations also ignore a 5 percent difference between the dropout probability of men (higher) and women. See California State University, "First-Time Full-Time Freshmen," http://www.asd.calstate.edu/csrde/ftf/2009htm/sys.htm.

[11] Inflation fell sharply between 1980 and 2010. Although the nominal IRRs are fairly constant, they reflect the shifting combination of a falling inflation rate correction and (more important) a rising real IRR.

[12] As one example, Greenstone and Looney (2012) estimate a real IRR for the average U.S. college student without these corrections and show a real IRR of roughly 16

To summarize the table:

- In each year, the UC system has a higher IRR than the CSU system for both men and women.
- In each year and within each system, women have a higher IRR than men.
- Over time, real IRRs grow significantly from 1980 through 2000. They decline after 2000 but remain at fairly high levels. This pattern holds for both men and women within each system.

To understand the CSU's lower IRR, recall that the CSU system has both lower admission standards and lower instructional expenditures per student than the UC system. In our simplified model, these factors are captured in CSU's significantly higher dropout rate, its longer time to complete a bachelor's degree (for those who do complete one), and the survey that suggests that CSU graduates with a bachelor's degree earn 10 percent less than UC graduates. CSU's relatively low tuition is not large enough to offset these factors.

The higher IRR for women reflects the relatively large gap in labor force participation rate between women with bachelor's degrees and women high school graduates. Since 1980, the gap between college and high school hourly wages widened for both women and men, but the gap in *annual earnings* widened faster for women because of the large increase in hours worked among college- educated women.

The third pattern in Table 2 is the rise in the individual's IRR through 2000 and its subsequent moderate decline. The economic return to college depends on multiple factors, but the dropout rate and time to earn a Bachelor's degree have remained fairly constant within each system. As a result, changes in a system's IRR are largely the result of the

---

percent, 2 to 3 percentage points higher than the estimated IRRs in Table 2 for women and 4 to 7 percentage points higher than the estimated IRRs in Table 2 for men.

widening college earnings premium (a positive effect) and rising tuition (a negative effect). Between 1980 and 2000, UC tuition and fees more than doubled from $1,963 to $4,479, and CSU tuition and fees quadrupled from $437 to $1,865 (all figures in 2010 dollars). Nonetheless, the college earnings premium expanded so rapidly that the individual's real IRR grew substantially for both systems.

Between 2000 and 2010, this dynamic reversed as the college earnings premium grew more slowly while tuition increased sharply. The real IRR for pursuing a bachelor's degree declined by 7 percentage points for UC women and 2–4 percentage points for all other groups.

In light of these data, should the high school senior pursue a BA? At this point, we postpone the issues of risk and ability bias. If returns were certain, the student should pursue a Bachelor's degree if the nominal IRR exceeded the interest rate that the senior would pay for student loans. To illustrate this comparison, Table 2 shows the 1980 cap on PLUS loans and the unsubsidized Stafford loan interest rate for 1990–2010.[13]

In 1980 the nominal IRR for an 18-year-old male matriculating in the CSU system was 13 percent, whereas the interest rate at which the student could have borrowed was 14 percent.[14] The young man could have attained higher lifetime income by going directly to work. By 1990, the widening college wage premium reversed this relationship, making college a good investment for the average young man in the CSU system, a situation that

---

[13] The Stafford loan program was initiated in 1988. PLUS loans are secured by the dependent student's parents. On the history of both Stafford and pre-Stafford interest rates, see FinAid, "Historical Interest Rates," http://www.finaid.org/loans/historicalrates.phtml.

[14] The very high 1980 interest rate reflected the very tight money policy of the Federal Reserve board of governors (chaired by Paul Volcker) to break the inflation of the 1970s. See Levy (1998) for details.

continued through 2005–10. For young women considering the CSU system and young men and women considering the UC system, investing in college was a good investment in each of the four years.

This picture has one caveat. For all groups in Table 2, the declining return to college after 2000 narrowed the gap between the return to college and the student loan rate. Attending either the UC or CSU system remained, on average, a good investment for admitted students, but returns declined between 2000 and 2010.

Finally, a low IRR for freshmen in the less selective CSU system would be a sign that too many students were attending college. The data show that this IRR was low in 1980 but not today (Table 2). In 1980, male freshmen in the CSU system had a real IRR of 4.2 percent[15] despite the system's low tuition. By 2000, the real IRR for male CSU freshmen had increased to 11.3 percent, declining to 9.2 percent in 2010. Women in the CSU system had a real IRR of 16.4 percent in 2000, declining to 13.1 percent in 2010. The 2010 nominal IRRs—10.6 percent for men and 14.5 percent for women—were above the interest rate on student loans, indicating that pursing a Bachelor's degree was a good investment for the average high school senior admitted to the CSU system. Section V considers ability bias.

IV. Society's IRR for the Individual's Pursuit of a BA

Table 3 contains estimates of society's real IRR when an individual pursues a Bachelor's degree. On the cost side, this calculation includes the total cost of instruction rather than only the individual's tuition. On the returns side, this calculation includes pretax earnings rather than post-tax earnings.

[15] The 1980 nominal IRR is much higher (13.1 percent) than the real IRR (4.2 percent), reflecting rapid consumer price inflation during the late 1970s and in 1980.

Judging the pursuit of a Bachelor's degree from society's perspective also requires a change in the investment standard. From society's perspective, the individual's pursuit of a Bachelor's degree is a good investment if the social IRR exceeds the rate at which the larger society can borrow. We approximate this borrowing rate by an average interest rate paid on 20-year state and local bonds.[16]

[Table 3 about here]

Moving from the individual's IRR to society's IRR involves two opposing effects. Substituting the full costs of instruction for tuition lowers the estimated IRR. Substituting pretax earnings for after-tax earnings raises the estimated IRR. We find that the negative effect dominates; across all groups, college generates a real IRR for society in 2010 averaging 9.3 percent, about 3 percentage points less than the real IRR seen by the individual. This estimate, however, does not include the social benefits of human capital spillovers, lower incarceration rates, or civic participation. As a result, our exercise may yield a lower bound for the social returns to education (for a review, see Moretti 2005).

This lower bound would seem to justify society's investment. In recent years, interest rates on municipal bonds—society's borrowing rate—has been about 2–3 percentage points lower than interest rates on student loans. As a result, the pattern in Table 3 is similar to the pattern in Table 2. Men entering the CSU system were not good investments for society in 1980 or 1990 but became good investments in 2000 and 2005–10. Women entering the

[16] Data are taken from the Federal Reserve Board of Governors, http://www.federalreserve.gov/releases/h15/data.htm.

CSU system and men and women entering the UC system were good investments in society in each of the four years.[17]

V. Ability Bias

Because universities screen their applicants and students, the typical college graduate may have earned more than the typical nongraduate if he had not attended college. Rather than imposing an assumption regarding what percentage of the college earnings premium must be attributed to the individual ability, we perform a bounding exercise to examine what this share must be for college to no longer be a good investment—for the IRR to pursuing a Bachelor's degree to be reduced to the interest rate charged by student loans.

[Table 4 about here]

Table 4 shows estimates of these percentages of the college premium for men and women in both the UC and CSU systems between 1980 and 2005–10. Consider the data for 2005–10. In 2010, the unsubsidized Stafford loan rate was 6.8 percent. Women entering the CSU system faced a nominal rate of return of 13.1 percent, more than 6 percentage points above the Stafford loan rate, and therefore at least 76 percent of the college earnings premium would have to be attributed to ability for CSU to be a bad investment for the average woman in this group. Similarly, for men and women entering the higher tuition UC system, roughly 60 percent of the college earnings premium would have to be attributed to ability to make college a bad investment. These bounds are much higher than prior published estimates. For instance, Zimmerman (2013) uses admissions cutoffs to examine

[17] Recall that the individual IRR declined sharply between 2000 and 2010, in large part due to the rapid rise in tuition. The social IRR is based on the full cost of instruction per student—not just tuition. Unlike tuition, the cost of instruction per student was relatively constant during the period, which helps to explain why the social IRR did not rise.

the causal effect of college matriculation among marginal college students in Florida. This study and other research suggest that the ability bias is small (see Card 1999 for a review).[18]

Males entering the CSU system faced a nominal IRR of 10.6 percent—roughly 4 percentage points above the Stafford loan rate. If at least 36 percent of this gap reflected individual ability—a plausible fraction—attending CSU would not be a good investment for the average person in this group. The CSU's high dropout rate sharply detracts from the IRR calculation, This result is consistent with findings on both lagging college attainment for young men (Autor and Wasserman 2013) and the relative difficulty of improving young men's college completion rates (Angrist, Lang and Oreopoulus 2009).

[Table 5 about here]

Table 5 contains parallel calculations that focus on the required attribution of the college premium to ability for college to be a bad investment for society. Although society's IRR is lower than the individual's IRR, the interest rate for state and local bonds is lower than the interest rate on student loans, and therefore the numbers in Tables 4 and 5 are fairly similar.

[Table 6 about here]

To summarize, the numbers in Tables 4 and 5 indicate that for most groups—men in the CSU system are the exception—something over 60 percent of the wage gap must reflect individual ability for college to be a bad investment for either the individual or society, which prior research suggests is not likely. Although ability bias would further

[18] Nonetheless, conversations with California legislative staff in spring 2012 suggest that they believe the bias is large and that published estimates of the IRR of a bachelor's degree are significantly overstated.

reduce the returns to higher education, we conclude that this bias alone would be unlikely to make college a poor investment for men and women admitted to the UC system and women admitted to the CSU system.

VI. Individual's Risk of Financial Distress Following a BA

Most published estimates of the return to pursuing a Bachelor's degree ignore the investment's risk. They instead assume that students graduate on time and earn the average of individuals of the same age and with the same education. However, a significant fraction of freshmen leave an institution without a Bachelor's degree, many of those who earn a Bachelor's degree take more than four years to do so, and students who do earn a degree face a wide distribution of post-college earnings. Given these uncertainties, we examine the proposition that although the *mean* economic return on pursuing a Bachelor's degree exceeds the interest rate on student loans, the investment's risk has increased as tuitions have grown and as the wages of some younger workers have suffered in the recent recession (Beaudry, Green, and Sand 2013).

Here, we examine a particular form of risk: the likelihood that earnings among college graduates will be sufficiently low that these individuals would fall into financial distress. This definition of risk incorporates both wage levels and wage variation. To do so, we follow Avery and Turner's conclusion that monthly student loan repayments in the range of 10–11 percent of monthly income should be "manageable" (Avery and Turner 2012, pp. 186–87). Extending this definition, we denote financial distress as having student loan repayments in excess of 15 percent of income.

To illustrate how risk has changed, we first consider the case of a 30-year-old who enrolled in college upon graduating from high school and borrowed full tuition. Specifically:

- Whether the individual actually completed a Bachelor's degree, he/she borrowed funds equal to full tuition (but no living costs) for each year she was in college.
- While the individual was in college, his/her student loans accrued no interest. Upon graduation, the loans accrued interest at the unsubsidized student loan rate in force at that time.
- Once out of college, the individual repaid student loans using the 10-year schedule required by the Stafford student loan program.

Our measure of risk, then, is the probability that this 30-year-old individual has a loan repayment that exceeds 15 percent of her earnings—a probability that we estimate based on the variation in earnings among 30-year-olds in the year the woman turns 30.

Table 6 contains estimates of this measure for men and women in both the UC and CSU systems between 1980 and 2010.[19] For intuition, consider a 30-year-old man in 1990 who had borrowed five years' worth of tuition to earn a Bachelor's degree at a CSU campus (for the moment, we ignore the possibility that the individual dropped out). He would have left college with about $6,500 in total debt (in 2010 dollars). Assuming the individual was repaying this loan over 10 years, he would have been facing loan repayments of about $73 per month. By our 15 percent criteria, the individual would have had to be earning at least $426 per month—roughly $3 per hour in full-time work—to avoid financial distress. Given the earnings distributions of 30-year-old male college

[19] The details of the estimate are explained in Appendix A.

graduates in 1990, the chance for a working male college graduate to have earnings this low was virtually nil, and therefore the risk of experiencing financial distress was essentially zero. Adding the possibility of dropping out of college does not change the conclusion: in this calculation the lower earnings of college dropouts are largely offset by their fewer years of tuition debt.

[Table 6 here]

For students in the CSU system, the risk of financial distress remained at zero in 2000, but by 2010, the combination of increased tuition and deteriorating wages for young Bachelor's degree holders increased the probability of financial distress at age 30 to 10–11 percent.

The UC system with substantially higher tuition had zero risk of financial distress through 1990, but the risk rose significantly beginning in 2000. In 2010, under our simplified example, the probability of being in financial distress at age 30 was 38 percent for UC male freshmen and 55 percent for UC female freshmen.

The scenario in Table 6—borrowing all tuition—is an extreme assumption. For example, the Project on Student Debt indicates that in 2011, 52 percent of graduating seniors at UC Davis had debt averaging $18,386, a little less than two years' tuition.[20] In 2010, a student graduating with a debt of this size would have had an estimated probability of financial distress at age 30 of 5.4 percent for men and 12.1 percent for women. Both probabilities are significantly higher than in earlier years, and both are high enough to attract a student's attention.

[20] The Project on Student Debt: An Initiative of the Institute for College Access & Success, http://projectonstudentdebt.org/.

Both the risk probabilities in Table 6 and the risk probabilities for the UC Davis graduate illustrate an important point: the risk of investing in a Bachelor's degree can increase (and almost certainly has increased), even though the IRR of investing in a Bachelor's degree remains high. Recall that our estimates of the individual's IRR (Table 2) are based on each group's median earnings (as are virtually all published estimates). Recessions, however, affect individuals unequally, and therefore the hardest-hit college graduates have very low earnings even as the median college graduate's earnings have fallen less dramatically. Data on the distribution of usual weekly earnings indicate that between 2000 and 2010, median weekly earnings among 25- to 34-year-old men with a Bachelor's degree fell by 7 percent (adjusted for inflation), while earnings of men at the 25th percentile of the distribution fell by 13 percent and earnings of men at the 10th percentile fell by 17 percent. Thus, modest changes in median earnings obscure a growing number of recent college graduates with low earnings who may have trouble repaying loans.

At first glance, any fall in the median earnings of college graduates appears incompatible with the still-high IRR to pursuing a Bachelor's degree. Recall, however, that in recent years, the college earnings premium and the IRR have remained high because high school graduates' earnings were falling, not because college graduates' earnings were rising (e.g., see Figure 1). Because of declining earnings among high school graduates, pursuing a Bachelor's degree remains a good investment for the average admitted student

despite rising tuition. But the absence of growth in college graduates' earnings combined with rising tuition means the investment carries an increased risk of financial distress.[21]

VII. Conclusion

Public ambivalence mirrors an academic debate over the economic return to a BA—whether published estimates of the value of college are exaggerated and whether the United States is already producing too many college graduates.

To summarize our findings:

- *The Bachelor's degree is a good investment for the median student in both the UC and CSU systems, although returns for men entering the CSU are arguably near published estimates of the ability bias.* Tuition and fees have risen sharply in both systems, but the college earnings premium in the California labor market rose even faster until the early 2000s, reflecting growing demand for more educated labor. As a result, the individual's nominal IRR of investing in a Bachelor's degree rose sharply until 2000. After 2000, the IRR fell moderately but still exceeds the interest rate of unsubsidized Stafford loans after accounting for taxes, the probability of taking more than four years to complete a degree, and the probability of dropping out with no degree.
- *Returns justify society's investment.* From society's perspective, an individual pursuing a Bachelor's degree in the UC or CSU system currently generates a

[21] For similar reasons, the probability of financial distress is higher for women than for men even though women have the higher IRR. Women's higher IRR reflects the large earnings gap between women college graduates and women high school graduates. But women's earnings are lower than men's earnings, and therefore women potentially have greater difficulty than men in paying off student loans.

nominal IRR well above the interest rate on municipal bonds, one proxy for society's borrowing costs.

- *Returns are likely robust to ability bias.* For most of the groups we examine, student ability would have to account for about 60 percent of the college–high school wage premium—a very high fraction—to make college a bad investment. The exception is men in the CSU system, where the fraction is about 35 percent.
- *From the individual's perspective, however, Bachelor's degree investments are increasingly risky.* Although the IRR to pursuing a Bachelor's degree remains a good investment *on average,* the probability of having student loan problems by age 30 has increased significantly since 2000 as tuitions have risen sharply and as a growing fraction of recent college graduates have experienced very low earnings.

Given this increased risk, it is not surprising that many families regard college with greater ambivalence—particularly families who cannot afford to help heavily indebted children. Our findings also underscore why the Bachelor's degree is losing its status as "a ticket to the middle class." The degree's risk removes any guarantee, while stagnant wages for college graduates have not kept pace with the growing cost of middle-class responsibilities, including purchasing health care, educating one's children, and saving for extended years of retirement.[22]

Because labor market risk has increased, it is important that colleges reduce the part of student risk over which they have some control: the risk of non-completion or taking more

[22] See, for example, Munnell, Webb, and Golub-Sass 2009. Calculations by Anthony Webb and Francesca Golub-Sass at the Boston College Center for Retirement Research indicate that among household heads with at least one year of college, the percentage who reached age 65 with potentially inadequate retirement resources rose from 28 percent in 1983 to 44 percent in 2007.

than four years to earn a degree. Recent research suggests that better advising could help improve the returns to a college education. First, providing high quality information on earnings across majors can students' choice of major (Arcidiacono 2004; Rumberger and Thomas 1993; Wiswall and Zafar 2013). Providing such information may improve the compositional effect of high earning-majors on the rate of return for Bachelor's degrees. Second, better advising on education financing can reduce dropout rates. In 2009, the federal government introduced a variety of income-based and income-contingent student repayment plans. These plans reduce current loan repayments (and the corresponding risk of financial distress or default) while extending the repayment period beyond the standard 10 years. Many students who would benefit from this program, however, do not enroll (Chopra 2013). Here too, better advising, including at the point where the high school senior is considering college, could reduce risk—both perceived and actual—of the college investment.

College remains a good investment for both individuals and the state, but it is a stepping stone—not a ticket—to the middle class. As such, it deserves the scrutiny that an individual would give to any risky investment.

References

Altucher, James. 2010. “Seven Reasons Not to Send Your Kids to College.” Daily Finance, August 6. www.dailyfinance.com/2010/08/06/seven-reasons-not-to-send-your-kids-to-college/, accessed March 26, 2013.

Angrist, Joshua, Daniel Lang, and Philip Oreopoulos. 2009. “Incentives And Services For College Achievement: Evidence From A Randomized Trial.” *American Economic Journal: Applied Economics:1 (1): 136-63.*

Arcidiacono, Peter. 2004. "Ability Sorting and the Returns to College Major." *Journal of Econometrics*, 121(1–2): 343–75.

Autor, David H. 2014. “Skills, Education, and the Rise of Earnings Inequality among the ‘Other 99 Percent.’” *Science*, 344(6186): 843–51.

Autor, David, and Melanie Wasserman. 2013. “Wayward Sons: The Emerging Gender Gap in Labor Markets and Education.” The Third Way Foundation. http://content.thirdway.org/publications/662/Third_Way_Report_-_NEXT_Wayward_Sons-The_Emerging_Gender_Gap_in_Labor_Markets_and_Education.pdf.

Avery, Christopher, and Sarah Turner. 2012. "Student Loans: Do College Students Borrow Too Much—Or Not Enough?" *Journal of Economic Perspectives*, 26(1): 165–92.

Barrow, Lisa, and Cecilia Elena Rouse. 2005. "Does College Still Pay?” *The Economists’ Voice*, 2(4), art. 3, http://transitions.s410.sureserver.com/wp-content/uploads/2011/09/barrow-rouse.pdf.

Beaudry, Paul, David A. Green, and Benjamin M. Sand, 2013. "The Great Reversal in the Demand for Skill and Cognitive Tasks." Working Paper 18901, National Bureau of Economic Research.

Brownstein, Ron. 2012. "Struggling to Advance." *National Journal*, September 27. http://www.nationaljournal.com/magazine/winning-has-become-not-losing-20120927.

Card 1999

Chopra, Rohit. 2013. "A Closer Look at the Trillion." U.S. Consumer Financial Protection Bureau. http://www.consumerfinance.gov/blog/a-closer-look-at-the-trillion/, accessed August 5.

Daly, Mary C., and Leila Bengali. 2014. “Is It Still Worth Going to College?” FRBSF *Economic Letter* 2014-13, May 5.

Douglass, John Aubrey. 2000. *The California Idea and American Higher Education: 1850 to the 1960 Master Plan*. Stanford, CA: Stanford University Press.

Freeman, Richard B. 1976. *The Overeducated American*. New York: Academic Press.

Greenstone, Michael, and Adam Looney. 2012. "Regardless of the Cost, College Still Matters." *Brookings on Jobs Numbers* (blog), Brookings, October 5. http://www.brookings.edu/blogs/jobs/posts/2012/10/05-jobs-greenstone-looney.

Harrington, Paul E., and Andrew M. Sum. 2010. "College Labor Shortages in 2018? Part Deux." *The New England Journal of Higher Education*, December 7. http://www.nebhe.org/thejournal/college-labor-shortages-in-2018-part-two/, accessed March 9, 2012.

Heckman, James J., Lance J. Lochner, and Petra E. Todd. 2008. "Earnings Functions and Rates of Return." *Journal of Human Capital*, 2(1): 1–31.

Johnson, Hans, and Ria Sengupta, 2009. "Closing the Gap: Meeting California's Need for College Graduates." Public Policy Institute of California. http://www.ppic.org/main/publication.asp?i=835, accessed June 13, 2014.

Lerman, Robert I. 2007. "Career-Focused Education and Training for Youth." In *Reshaping the American Workforce in a Changing Economy*, ed. Harry J. Holzer and Demetria Smith Nightingale. Washington, DC: Urban Institute Press.

Levy, Frank. 1998. *The New Dollars and Dreams: American Incomes and Economic Change*. New York: Russell Sage Foundation Press.

Martin, Andrew. 2013. "Downturn Still Squeezes Colleges and Universities." *New York Times*, January 10. http://www.nytimes.com/2013/01/11/business/colleges-expect-lower-enrollment.html, accessed June 5, 2013.

Moretti, Enrico. 2005. "Social Returns to Human Capital." Working Paper 9108, National Bureau of Economic Research.

Munnell, Alicia, Anthony Webb, and Francisca N. Golub-Sass. 2009. "The National Retirement Index: After the Crash. Issues Brief IB 9-22, October. Center for Retirement Research at Boston College. http://crr.bc.edu/briefs/the-national-retirement-risk-index-after-the-crash/.

Quinterno, John. 2012. "The Great Cost Shift: How Higher Education Cuts Undermine the Future Middle Class." Demos: An Equal Say and an Equal Chance for All, April 3. http://www.demos.org/publication/great-cost-shift-how-higher-education-cuts-undermine-future-middle-class, accessed August 29, 2013.

Rumberger, Russell W., and Scott L. Thomas. 1993. "The Economic Returns to College Major, Quality and Performance: A Multilevel Analysis of Recent Graduates." *Economics of Education Review*, 12(1): 1–19.

Samuelson, Robert J. 2012. "It's Time to Drop the College-for-All Crusade." *Washington Post*, May 27. http://www.washingtonpost.com/opinions/its-time-to-drop-the-college-for-all-crusade/2012/05/27/gJQAzcUGvU_story.html, accessed May 30, 2012.

Steinberg, Jacques. 2010. "Plan B: Skip College." *New York Times*, May 15. http://www.nytimes.com/2010/05/16/weekinreview/16steinberg.html?_r=1.

Vedder, Richard. 2004. *Going Broke by Degree: Why College Costs Too Much.* Washington, DC: AEI Press.

Webley, Kayla. 2012. "Students Bear the Burden of State Higher Ed Cuts." *Time Magazine*, January 25. http://moneyland.time.com/2012/01/25/students-bear-the-burden-of-state-higher-ed-cuts/, accessed August 29, 2012.

Wiswall, Matthew, and Basit Zafar. 2013. "Determinants of College Major Choice: Identification Using an Information Experiment." Staff Report 500, Federal Reserve Bank of New York. Available online at http://www.newyorkfed.org/research/staff_reports/sr500.pdf.

Zimmerman, Jonathan. 2012. "Are College Students Learning?" *Los Angeles Times*, January 31. http://www.latimes.com/news/opinion/commentary/la-oe-zimmerman-are-college-students-learning-20120131,0,1176778.story.

.

TABLES

TABLE 1. Parameter Values for IRR Calculations (both males and females)

	1980	1990	2000	2005-10
Six-Year Graduation Rate				
University of California	65%	75%	80%	80%
California State University	40%	42%	48%	48%
Dropout Rate				
University of California	35%	25%	20%	20%
California State University	60%	58%	52%	52%
Median Years to Completion				
University of California	5	5	4	4
California State University	5	5	5	5
Years Attended by Dropouts[1]				
University of California	2	2	2	2
California State University	2	2	2	2
Average Tax Rate[2]				
High School	20%	18%	17%	14%
Some College	22%	20%	20%	17%
Bachelor's Degree	23%	23%	23%	19%

Source: Data are from the UC Accountability Reports and CSU Statistical Reports.

[1] Data were not available; these values are assumed.

[2] Approximated using the NBER TAXSIM model, using median earnings by year and level of education.

TABLE 2. Individual's IRR of Pursuing a Bachelor's Degree

	Men				Women			
	1980	1990	2000	2005-10	1980	1990	2000	2005-10
CSU System IRR								
Real Return	4.2%	4.0%	11.3%	9.2%	9.9%	12.2%	16.4%	13.1%
Nominal Return	13.0%	10.2%	13.7%	10.6%	18.7%	18.4%	18.9%	14.5%
UC System IRR								
Real Return	10.4%	11.8%	16.3%	12.7%	11.3%	14.5%	20.7%	14.4%
Nominal Return	18.0%	18.0%	18.8%	14.1%	20.1%	20.7%	23.2%	15.8%
Unsubsidized Stafford Rate	14%	8.0%	8.2%	6.8%	14%*	8.0%	8.2%	6.8%

TABLE 3. Social IRR of Pursuing a Bachelor's Degree

	Men				Women			
	1980	1990	2000	2005-10	1980	1990	2000	2005-10
CSU System IRR								
Real Return	-2.3%	-4.9%	7.0%	7.1%	2.4%	7.8%	10.8%	10.2%
Nominal Return	6.5%	1.4%	9.5%	8.5%	11.2%	14.0%	13.3%	11.6%
UC System IRR								
Real Return	3.1%	5.2%	9.0%	9.1%	3.3%	7.2%	11.3%	10.1%
Nominal Return	11.9%	11.4%	11.4%	10.5%	12.1%	13.4%	13.7%	11.5%
Both Systems								
Nominal Interest Rate on 20-Year Municipal Bond	7.4%	7.2%	6.1%	3.75%	7.4%	7.2%	6.1%	3.7%
Nominal Interest Rate on Stafford Loans	14%*	8.0%	8.2%	6.8%	14%*	8.0%	8.2%	6.8%

TABLE 4. Percentage of College Premium Attributed to Ability for College to be Poor Individual Investment

	Men				Women			
	1980	1990	2000	2005-10	1980	1990	2000	2005-10
CSU System								
Nominal IRR	13.00%	10.20%	13.70%	10.60%	9.90%	12.20%	16.40%	13.10%
Percentage of Bachelor's Degree Premium Due to Ability to Make Bachelor's degree a Bad Investment	NA*	25.00%	48.00%	36.00%	36.00%	80.00%	74.00%	76.00%
~~CS~~UC System								
Nominal IRR	18.00%	18.00%	18.80%	14.10%	20.10%	20.70%	23.20%	15.80%
Percentage of Bachelor's Degree Premium Due to Ability to Make Bachelor's degree a Bad Investment	52.00%	75.00%	67.00%	56.00%	52.00%	83.00%	78.00%	62.00%

* CSU men in 1980 represented a bad investment even if 100 percent of the education premium was attributed to college.

TABLE 5. Percentage of College Premium Attributed to Ability for College to be a Bad Social Investment

	Men				Women			
	1980	1990	2000	2005-10	1980	1990	2000	2005-10
CSU System								
Nominal Social IRR	6.50%	1.40%	9.50%	8.50%	11.20%	14.00%	13.30%	11.60%
State/Local Bond Nominal Interest Rate	7.40%	7.20%	6.10%	3.80%	7.40%	7.20%	6.10%	3.80%
Percentage of Bachelor's degree Premium Due to Ability to Make BA a Bad Investment	NA	NA	40%	53%	50%	72%	68%	69%
UC System								
Nominal Social IRR	11.90%	11.40%	11.40%	10.50%	12.10%	13.40%	13.70%	11.50%
State/Local Bond Nominal Interest Rate	7.4%	7.20%	6.10%	3.80%	7.4%*	7.20%	6.10%	3.80%
Percentage of Bachelor's degree Premium Due to Ability to Make BA a Bad Investment	70%	55%	47%	60%	65%	68%	67%	67%

Table 6. Probability of Entering Financial Distress

	Year Entering College (Men)				Year Entering College (Women)			
	1980	1990	2000	2005-10	1980	1990	2000	2005-10
CSU System	0.0%	0.0%	0.0%	6.0%	0.0%	0.0%	10.0%	12.0%
UC System	0.0%	0.0%	3.0%	38.0%	0.0%	1.0%	10.0%	55.0%

Note: We define financial distress as having student loan repayments in excess of 15 percent of income at age 30.

FIGURES

Figure 1. California Male Age Earnings Profiles by Education, 1990 and 2010 (2010 Dollars)

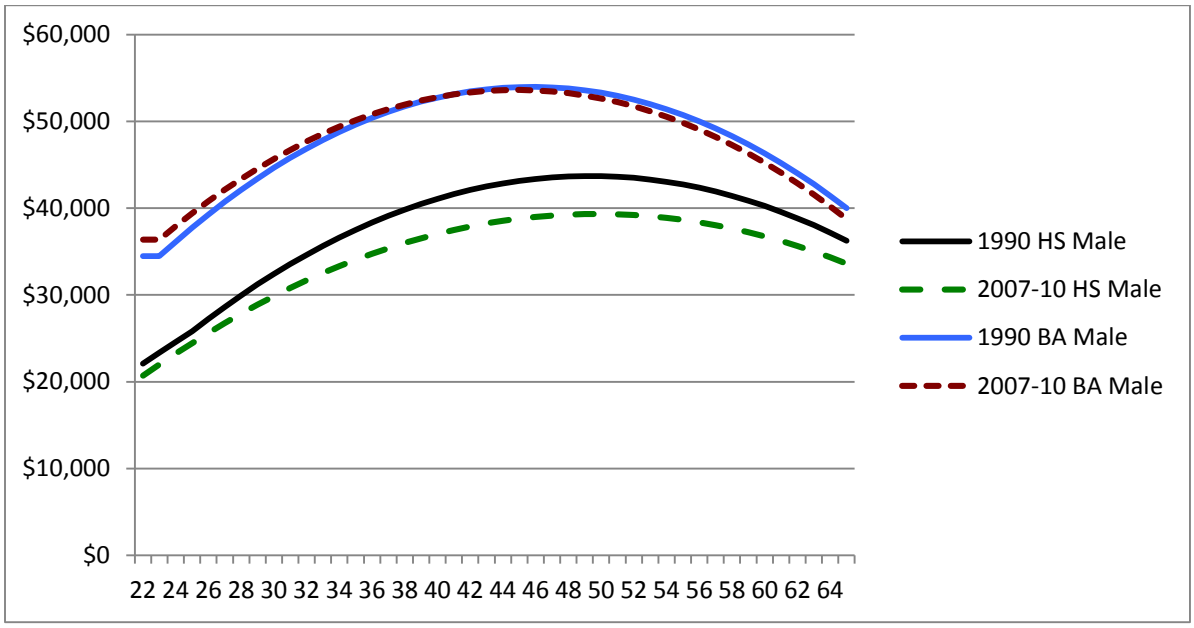


Figure 2. Tuition and Fees, Cost of Instruction: UC and CSU Systems (2010 Dollars)

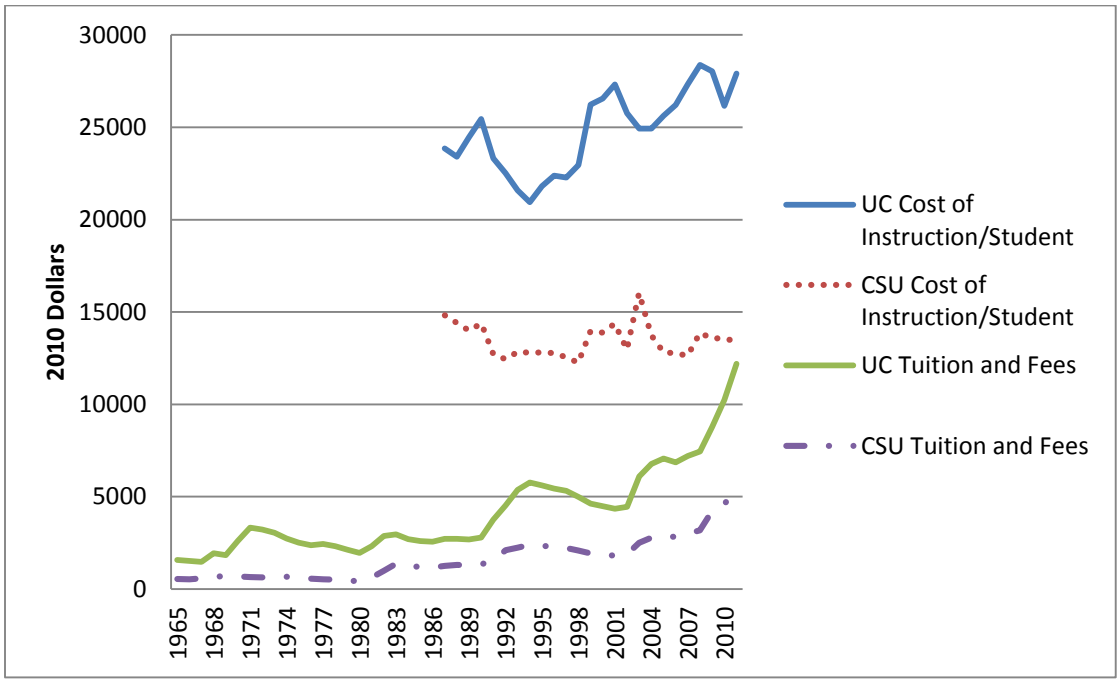
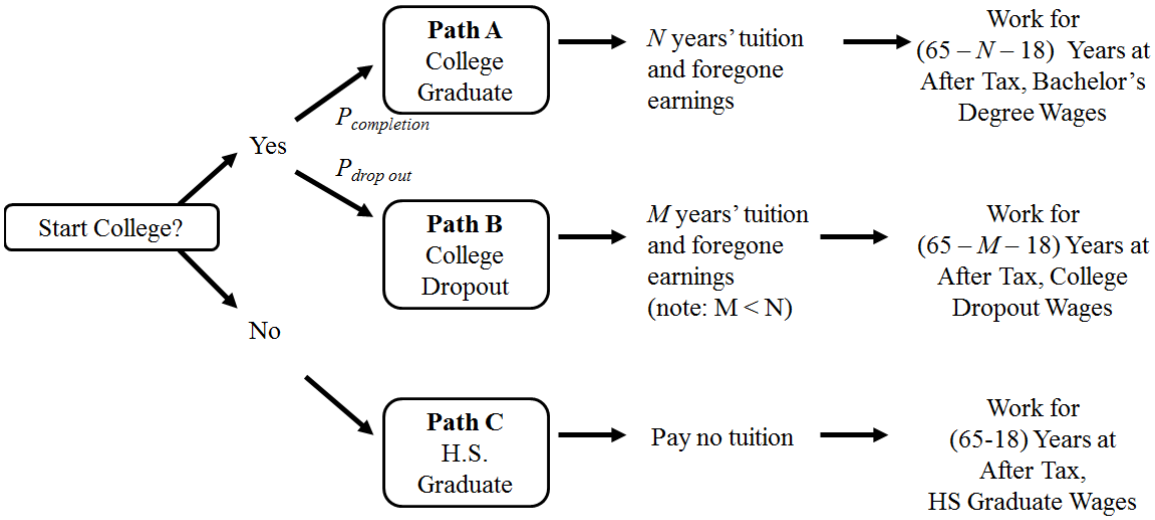


Figure 3. The Decision to Pursue a Bachelor's Degree



Appendix A

Benefits to a Having a Bachelor's degree Not Considered in the Analysis

By focusing our analysis on the college earnings premium, we have excluded from consideration other monetary and nonmonetary benefits to receiving a Bachelor's degree that have been discussed in the literature.

For example, earning a Bachelor's degree is associated with lower rates of incarceration as well as lower rates of receiving welfare, Supplemental Security Income, Food Stamps, and so on (Hout et al. 2005). The savings from the reduced likelihood of incarceration belongs in society's IRR because the provision and operation of jails consumes resources. Data limitations prevented us from being able to include these (relatively small) savings in our estimate.[23]

We also excluded the nonpecuniary benefits of a college education, potentially including those aspects of improved social skills not captured in wages. We do not adjust for the health and longevity benefits that prior research attributes to Bachelor's degree attainment (Lleras-Muney 2005; Heckman et al. 2011). We do not adjust for how Bachelor's degree attainment is associated with higher spousal earnings (Goldin 1997). We do not adjust for the option value of a college education as a stepping stone to graduate degrees, which is almost certainly rising in value (Lindley and Machin 2011).

---

[23] Savings from reduced receipt of Food Stamps and other benefit programs do not belong in society's IRR because these items represent transfers of resources from one person to another rather than resources consumed (e.g., prison guard salaries). These savings are important in a calculation of California's IRR, but data limitations prevented us from calculating the state's IRR in this paper. Hout et al. (2005) contains an extensive discussion of California's return on its higher education investment.

We have focused on the college earnings premium in the hope of providing an accurate analysis that may help students and policy makers evaluate the current merit of a Bachelor's degree as an economic investment. Because of these omitted benefits, the true IRR is likely higher than our estimated values.

Appendix B

Estimating the Risk of Investing in a BA

As noted in the main text, we define economic distress as a condition in which the required loan payment exceeds 15 percent of income. Because of the data requirements of this exercise, our measure of income is weekly earnings as reported in the Current Population Survey Monthly Outgoing Rotation Group (MORG) files. These files give us a sufficient number of individual observations for our purposes.[24]

For each year we examine, we use these data to estimate a log-normal distribution of weekly earned income for four groups: 25- to 34-year-old men with a Bachelor's degree, 25- to 34-year-old men with "Some College," 25- to 34-year-old women with a Bachelor's degree, and 25- to 34-year-old women with "Some College." For earnings regressions, we restrict our sample to individuals with at least $50 of earnings per week, a rough equivalent to the sample restriction of at least $1,000 per year that we impose on annual data used in all other estimations. We use the earnings distributions of persons ages 25–34 as a rough approximation to an individual's earnings at age 30.

Our risk scenario assumes that an individual has borrowed full tuition for each year in college. Correspondingly, for each year and university system, we compute two debt burdens—one assuming the student dropped out, which is based on two years of tuition, and a second based assuming that the student graduates, which is based on the median number of years required to earn a Bachelor's degree in that system in that year. We then

[24] Not all of these individual observations will be from California, however.

convert each debt burden to an equivalent weekly payment, assuming that the student is paying off the loan in 10 years (the current standard repayment schedule) at the interest rate in effect when the student is in college.

Combining these numbers for a given year, system, and gender, we calculate the probability that, for example, a male who dropped out of the CSU system in the 1980s will, at age 30, have weekly earnings that fall below (weekly loan payment/.15) and a parallel probability that assumes that he earned a Bachelor's degree.

These conditional probabilities of financial distress are then weighted by the probability of dropping out and the probability of graduating, respectively, to determine the overall risk of being in financial distress at age 30.