The Financial Value of a California Post-Secondary Education

Bruce D. Niendorf
University of Wisconsin Oshkosh

Kristine L. Beck
California State University, Northridge

Earning a post-secondary degree involves paying for tuition, fees, books, supplies, and living costs. While in school, students forgo full-time job earnings, and after earning a degree they may have student loans to pay for many years. This study examines 305 California major/school combinations to identify the remaining value after paying the costs of earning a post-secondary degree - the Education Value above and beyond what the average person earns with a high school diploma. We find the best combination delivers an additional $3,713,267 in value across a lifetime, and the least value-added bachelor's degree combination still delivers $656,100. All combinations are investments in human capital that outperform the long-term average of the U.S. stock market and may be the best investment many people ever make.

Keywords: education value, return on investment, student debt

INTRODUCTION

A 2022 article in Forbes Advisor estimated that 45.7 million Americans have borrowed more than $1.6 trillion in federal student loans to earn a post-secondary education.[1] This study finds that investing in post-secondary education may be many people's best investment. Over their lifetimes, the median recipient of a California bachelor's degree earns $1.7 million more than the average high school graduate. Society also benefits from these investments through higher tax revenues, improvements in health, higher rates of volunteering and voting, and lower levels of criminal behavior.[2] Further, Valero and Van Reenen (2019), using international data, find that the number of universities positively relates to future growth of GDP per capita in both the university region and neighboring regions. They conclude that part of that growth is due to the increased human and intellectual capital supply.

To receive benefits from post-secondary education, students face many upfront costs. The average cost of earning a four-year bachelor's degree in California ranges from $31,112 at CSU Fresno to $250,812 at the University of Southern California. If a 20-year-old invested that same amount in a retirement account instead of paying for a four-year degree, that person could anticipate an account balance of $4.5M to $36.0M by age 68.[3] These values assume, however, that a student has the cash to either invest or pay for tuition at age 20. Lacking access to this amount of money from other sources, most students pay for their education using student loans, with interest on these loans adding further cost to their education; 70% of students who earn a bachelor's degree have education debt by the time they graduate.[4]

Given the dramatic financial effects of obtaining a post-secondary education, making an informed education investment decision requires considering the upfront costs of a post-secondary degree, the forgone earnings a student could have earned during their years earning a post-secondary degree, interest costs and payments of student loans, and the resulting increased earnings, which are spread out over a lifetime. After considering these financial costs and benefits, this study finds that the median value added to a high school education by 305 California major/school post-secondary combinations is $1,683,570. Thus, after paying the costs of education, forgoing earnings while a student, and paying interest on student loans, the median California major/school combination adds value equivalent to receiving $1,683,570 upon college graduation in addition to earning what the average high school graduate earns in their lifetimes.

BACKGROUND

Student Debt

Student debt levels are increasing dramatically; U.S. student debt more than doubled from 2010 to 2020, and now totals more than $1.76 trillion owed.[5] By the end of 2022, 43.5 million students will owe an average balance of $39,590.[6] Finally, this debt has long-term financial effects. According to a 2019 study from New York Life, the average student borrower reported taking 18.5 years to pay off their student loans.

Student debt has additional effects that reach beyond immediate financial implications. Chakrabarti et al. (2020) examine the impact of college tuition on student debt and human capital accumulation. They find that an increase of $5,000 in tuition reduces the probability of graduating by 3.1% and increases student debt by $1,480. They also find that higher tuition reduces the probability of credit-constrained students obtaining an undergraduate degree. Lucca et al. (2019) identified a link between tuition and federal student loan caps, which affects all students, not just those with federal student loans. This effect is more pronounced for 2-year, for-profit, and elite institutions.

Zhang (2013) finds that college debt has a significant negative influence on graduate school attendance and that debt has no effects on early career choices for both public and private college students. Contrary to Zhang, Rothstein and Rouse (2011) argue debt causes graduates to choose substantially higher-salary jobs, and that debt affects students' academic decisions during college. Ji (2021) also finds student loans significantly affect borrowers' job search decisions. Ji determines that due to liquidity constraints under fixed repayment plans, loans significantly affect career choices, unemployment duration, and wage income.

Looney and Yannelis (2019) show that increases in credit limits and availability result in rising balances, and that the share of borrowers with very large balances has surged. They also find that repayment rates slowed significantly between 1990 and 2014, with the fraction of borrowers owing more than $50,000 doubling during that period. Similarly, Schanzenbach et al. (2017) demonstrate that student financial aid has increased dramatically over the past 15 years, while state direct aid to institutions has stagnated. They also find that 90% of undergraduate borrowers borrow less than $40,000, and the vast majority of defaulters have less than $10,000 in outstanding student loan debt.

Another stream of research demonstrates that student loan debt is worse for either those who do not graduate or those who earn a degree from a lower-ranked school. Eaton et al. (2020) find private equity-owned schools are associated with lower graduation rates, loan repayment rates, and earnings among graduates. Looney and Yannelis (2015) find that student loan defaults often are due to ability to pay rather than the size of the loan – many had dropped out before graduation, or failed to find a decent job after graduation, or were economically disadvantaged before college. They also find that borrowers at for-profit schools have poor repayment outcomes and lower labor market outcomes than borrowers at more selective institutions.

Research by the Life Insurance Marketing and Research Association (LIMRA) finds other long-term consequences associated with using loans to pay for education. Holland (2015) describes several results of LIMRA's research. First, LIMRA found that $30,000 in student debt can reduce a person's 401(k) balance at retirement by as much as $325,000. LIMRA also found that student debt is associated with reduced home ownership for people in their twenties: 52.3% of people with student loan debt own homes versus 58.8% home ownership by those without student loans. Many students with debt are missing out or getting a later

start on building equity through home ownership. Finally, LIMRA found that not only students shoulder the burden of student loans. This burden is shared increasingly by people aged 55-64. LIMRA research finds that in 1989, just 4% of people aged 55-64 had education debt. By 2013, this figure had grown to 30%. Students and those that support them are willing to sacrifice and invest huge amounts in their education. The increasing long-reaching financial consequences of students' education decisions makes making a wise financial choice increasingly important.

Student debt also has a profound impact on retirement. Instead of being able to start saving for retirement early, thereby taking advantage of the most value-adding years of saving through compounding, students with debt must direct at least some of what they might otherwise have saved for their future toward paying off their past. From 1973-2022, the S&P 500 index has averaged 10.9% return per year.[7] At 10.9%, every dollar a person saves at age 22 is multiplied 117 times by retirement at age 68; thus, $1,000 saved becomes $117,000. If the average student takes 18.5 years to pay off their loans, they must wait until age 40.5 to be able to direct their loan payments into retirement savings. By age 40.5, every dollar they save is multiplied only 17 times, dramatically reducing their ability to provide for their retirements.

Student Attributes

Although all students can benefit from a post-secondary degree, the amount they benefit financially depends on their background and circumstances. Dale and Krueger (2011) examine the question of whether attending a highly selective school results in higher future earnings. For their overall sample, including more than 18,000 students, they find that returns to college selectivity are generally indistinguishable from zero when controlling for student SAT score and variables commonly controlled for such as race, gender, family income, whether a student is a student athlete, and the number of schools to which the student applied. In other words, as stated by Thompson (2018), this finding suggests that the talents and ambitions of individual students are worth more than the resources and renown of elite schools. The person you're becoming at age 18 is more important than the school you graduate from at age 22. Thus, according to Dale and Kruger, it doesn't really matter which school the average student attends.

Although earnings may not be affected by school choice for students as a whole group, there do appear to be important differences for subgroups based on gender, race, and educational attainment of a person's family. Cooper and Cohn's (1997) findings vary considerably across race-sex groups and various analytical techniques and assumptions. Although Ge et al. (2019) find no significant effect of college selectivity on earnings and family outcomes for men, the results are quite different for women. They find that attending a school with a 100-point higher average SAT score increases women's earnings by 14% and reduces their likelihood of marriage by 4%. Dale and Krueger (2011) find a significant positive effect between school selectivity and earnings for Black and Hispanic students and students from families with parents with less than 16 years of schooling, but no relationship exists between school selectivity and future earnings for white men. In summary, previous research suggests that although all students benefit financially from earning a post-secondary degree, the amount that they benefit depends, at least in part, on their race and gender.

Although families may not be equally cognizant of college costs, Bleemer and Zafar (2018) find that lower-income and non-college households ill-informed about college costs are responsive to information about returns to college education. They found less response to more information about the costs of college.

College Return on Investment

Several studies show positive returns from a college education. Avery and Turner (2012) conclude that college is a good investment but it is also a lottery with significant high- and low-end risk in the returns to education. Barrow and Malamud (2015) conclude college is a worthwhile investment on average. Abel and Deitz (2019) find that the average rate of return for a bachelor's degree has decreased, but still is about 14% and a good investment. They also conclude that college graduates earn a substantial wage premium which fluctuates over time but stays between $30,000 to $35,000 a year after 2000. Giani, et al. (2019) examine outcomes for Texas high school students and find that students with some colleges are more likely to be employed 15 years after high school graduation and tend to earn more than their non-college counterparts.

Other studies find varied results. Cappelli (2020) considers whether college costs are paid by the students and their families, and find return results mixed, depending on the college. Lobo and Burke-Smalley (2018) incorporate time to graduation and the financing method and find that the value of a college education is positive regardless of how a degree is financed but declines as the time-to-graduation increases. They argue that a college degree may not be a good financial decision for students at the lower end of the ability distribution and in some areas of study.

Contribution

Although there are many nonfinancial benefits of post-secondary education, the rapid growth in student debt levels and increasing competition between post-secondary education providers, including for-profit colleges, suggests that financial considerations are increasingly important. The question this study addresses is: What financial value do California students receive in return for their investment in obtaining a post-secondary degree? Rate of return and value-added are fundamental decision criteria for making any investment. Yet, thousands of California students make education investment decisions concerning potentially huge financial implications without this basic information. This study provides cost, beginning salary, total value-added, value-added per hour of study, and return on human capital investment in education for 11 different academic disciplines offered by a wide range of colleges and universities in California.

We extend Lobo and Burke-Smalley (2018) to explicitly consider costs, cost per hour of study, and benefits across different majors. Like Arias and McMahon (2001), we consider growth rates for both costs and future income. Their approach, however, focuses on national or statewide decisions of whether to invest in education at different levels rather than a student using the information to decide whether to go to college. Our focus is on determining the value-added of a college education to the student. Niendorf and Beck (2021), using a similar approach for 115 degree/school combinations in Wisconsin, found that all combinations outperformed the long-term average of the U.S. stock market.

DATA

We consider the cost of earning a bachelor's degree from colleges and universities in California. Data are collected on the cost of earning a degree for each school included in the study, the annual rate of growth in school costs, beginning salaries earned by students by school and by major, and rate of growth in salaries. Data on tuition, fees, books, and supplies are collected from the U.S. Department of Education Institute of Education Sciences National Center for Education Statistics (NCES), which provides education costs via CollegeNavigator. The cost growth rate is from Vanguard Group's College Cost Planner, salary growth rates are collected from the U.S. Bureau of Labor Statistics data on All Civilian Total compensation for All occupations, and beginning salaries are from the 2021-2022 College Salary Report on payscale.com.

Costs are total costs, not netted out by financial aid or grants for in-state students. Data are collected for all California schools available on CollegeNavigator. Where reasonably possible, we verified the costs identified on the CollegeNavigator site using costs listed on each school's website and found no significant discrepancies between the two sources.

Costs of living are not included to maintain comparability to the value obtained by someone with only a high school education because people must pay living costs regardless of whether they are working or studying. We assume living costs to be the same under both scenarios and therefore a wash. The growth rate applied to costs, 5%, is intended to reflect the expected long-term growth rate in college costs. The value is from Vanguard Group's College Cost Planner; this long-term estimate is similar to estimates from other sources.

Beginning salaries and early career pay are provided by state, school, and degree in the 2021-2022 College Salary Report on payscale.com. For each school and degree area, we use the median early career pay (first 0-5 years of work life) to represent the beginning salary earned by the average student. We use this value rather than the actual starting pay earned by the average student immediately upon graduation to avoid error due to students not working in a capacity that fully reflects their post-secondary degree

immediately upon graduation. We apply an average salary growth rate of 3.43% to reflect long-term salary growth, calculated using U.S. Bureau of Labor Statistics data on All Civilian Total compensation for all occupations for the period 1992-2022. As job markets continue to become more global, we used national average data rather than data specific to California residents. We were unable to find growth rates specific to individual majors.

Table 1 presents the annual cost of attendance, sorted by cost, for the seventy-one California schools with data available on CollegeNavigator. The average in-state cost for tuition, books, supplies, and other costs (not including room and board) for an in-state student to attend a California post-secondary institution for the 2022-2023 academic year ranges from $7,778 per year at CSU Fresno to $62,703 per year at University of Southern California. Therefore, a student may spend between $31,112 and just over a quarter million dollars for a four-year degree in California, not including annual cost increases.

TABLE 1
ANNUAL COST OF ATTENDANCE 2022-2023 ACADEMIC YEAR

School	In-State Tuition	Books & Supplies	Total
University of Southern California	$61,503	$1,200	$62,703
Harvey Mudd College	60,703	800	61,503
Pepperdine University	59,702	1,250	60,952
Chapman University	58,634	1,600	60,234
California Institute of Technology	58,680	1,428	60,108
Occidental College	58,426	1,240	59,666
Claremont McKenna College	58,111	1,200	59,311
Scripps College	58,442	800	59,242
Pomona College	56,686	1,000	57,686
Stanford University	56,169	1,305	57,474
Santa Clara University	55,860	1,125	56,985
California Institute of the Arts	53,466	2,500	55,966
University of Redlands	54,066	1,125	55,191
Loyola Marymount University	53,526	1,125	54,651
University of San Francisco	53,472	1,130	54,602
University of San Diego	52,864	1,104	53,968
California College of the Arts	52,312	1,500	53,812
University of the Pacific	52,352	1,125	53,477
Saint Mary’s College of California	51,786	1,100	52,886
Southern Cal. Inst. of Architecture	49,016	3,150	52,166
ArtCenter College of Design	48,044	4,000	52,044
Otis College of Art and Design	50,950	840	51,790
Whittier College	49,514	1,000	50,514
Westmont College	48,660	1,600	50,260
Dominican University of California	47,910	1,126	49,036
California Lutheran University	46,012	1,125	47,137
University of La Verne	45,850	1,125	46,975
San Francisco Art Institute	45,664	400	46,064
Biola University	44,382	1,200	45,582
Azusa Pacific University	41,510	1,126	42,636
Point Loma Nazarene University	39,500	1,126	40,626
Vanguard U. of Southern California	37,700	1,120	38,820
California Baptist University	37,018	1,126	38,144

School	In-State Tuition	Books & Supplies	Total
Loma Linda University	32,736	3,676	36,412
Laguna College of Art and Design	33,600	2,030	35,630
Pacific Union College	32,103	1,125	33,228
Mills College	30,950	1,611	32,561
The Master's University	28,870	1,125	29,995
Thomas Aquinas College	26,000	0	26,000
Life Pacific University	18,300	1,125	19,425
UC San Diego	14,700	1,152	15,852
UC Davis	14,645	1,197	15,842
UC Santa Barbara	14,417	1,317	15,734
UC Berkeley	14,226	1,118	15,344
UC Riverside	13,754	1,536	15,290
UC Santa Cruz	14,070	1,180	15,250
UC Irvine	13,775	1,319	15,094
UCLA	13,258	1,405	14,663
Pacific Oaks College	11,692	2,028	13,720
Golden Gate U. - San Francisco	11,088	255	11,343
Cal. Poly State U. San Luis Obispo	10,195	909	11,104
San Diego State University	8,136	1,091	9,227
Humboldt State University	7,864	1,225	9,089
CSU Chico	7,864	1,184	9,048
Sonoma State University	7,988	1,022	9,010
San Jose State University	7,852	1,087	8,939
CSU Stanislaus	7,644	1,225	8,869
CSU Bakersfield	7,579	1,266	8,845
CSU San Marcos	7,727	1,118	8,845
CSU Northridge	7,043	1,486	8,529
CSU Sacramento	7,392	1,110	8,502
Cal. State Polytechnic U. Pomona	7,439	1,045	8,484
San Francisco State University	7,304	1,076	8,380
CSU San Bernardino	7,213	1,145	8,358
CSU Fullerton	6,976	1,203	8,179
CSU Dominguez Hills	7,060	1,100	8,160
CSU Maritime Academy	7,116	1,032	8,148
CSU East Bay	6,995	1,034	8,029
CSU Los Angeles	6,785	1,226	8,011
CSU Long Beach	6,846	1,070	7,916
CSU Fresno	6,653	1,125	7,778
Median			**$33,228**

METHODOOGY

We use Net Present Value (NPV) and the Internal Rate of Return (IRR) to evaluate the return on post-secondary degree investment.[8] NPV is calculated by netting the present value of future costs and benefits, and IRR identifies the implied rate of return on investments. We use the NPV approach because it directly measures how much value a post-secondary education is expected to provide the student. Although the total cost of attending a school is an important consideration, the investment's payoff is also important. When considering both cost and benefits, it is easily possible that a relatively expensive school adds enough to

students' future earning power that, in terms of return on investment, it far outperforms what may be smaller increased future earning power added by a relatively inexpensive school. It is critical to consider costs and benefits together to assess the financial attractiveness of the choices available to California students. The difference between costs and benefits, adjusted for time, can be thought of as time-adjusted profit and is essentially what NPV measures.

We also identify first-year cost, starting salary, and calculate IRR and Education Value, or value-added to the student by earning a degree. Education Value is value over and above what the average high school graduate would earn without a post-secondary degree. Education Value is defined as total value minus the value of a high school education – this difference represents the value the average student adds by obtaining a post-secondary degree. We also calculate the value-added per hour of study needed for a post-secondary degree.

Our approach considers both costs and future income. College costs are assumed to grow at 5% per year throughout the four years of the degree. Career income is assumed to begin in year 5 for bachelor's degrees. Future costs and cash flows are adjusted for growth, discounted to the present, and netted against each other. Cash flows are discounted to the present using a discount rate of 5.68%, the average rate of return on long-term investment-grade bonds. This rate reflects a modest amount of risk, intended to reflect the expected variability in a person's lifetime earnings stream. Data to calculate this rate was obtained from The Vanguard Group. All reported returns are compounded annually.

We assume future incomes, through age 68, will grow at 3.43% per year. The Social Security Administration currently defines the Full Retirement Age (FRA) as 67 years for those born in 1960 or later. We hedge the risk of future increases in the FRA by increasing the assumed retirement age to 68 years; variations of up to several years in the actual retirement age for today's college students make relatively small differences in Education Value.

RESULTS

In this study, we calculate the value of a bachelor's degree for majors in art, communication, computer science, education, engineering, health science, humanities, math, science, and social sciences offered by colleges and universities in California. To establish a benchmark for the post-secondary degree values, we identify the financial value of a high school degree. The current value of the earnings stream of those with a high school degree is approximately $1,037,685. To earn this value, the average California high school graduate starts working upon completing high school at a salary of $32,617 per year, which is then assumed to grow at 3.43% per year through retirement at age 68. Although the number of dollars they will earn during their work life is substantially greater than $1,037,685, the cash they will earn throughout their work life is equivalent to receiving a lump sum of $1,037,685 immediately upon graduating high school.

Table 2 shows the median value-added for students earning post-secondary degrees in each major area included in this study, and there are significant differences across majors. For example, the value of an education degree is approximately one third the value of a math degree.

TABLE 2
MEDIAN EDUCATION VALUE ADDED 2022-2023 ACADEMIC YEAR

Degree Area	Median Value
Art	$1,477,580
Communication	1,507,518
Computer Science	2,538,317
Education	882,023
Engineering	2,549,829
Health Science	1,344,602
Humanities	1,361,860
Math	2,513,752
Science	1,813,182
Social Science	1,525,491

Table 3 shows the top and bottom ten major/school combinations.[9] The top areas in terms of adding value are computer science, engineering, and math, with the top 37-degree major/school combinations adding more than $1,000,000 in lifetime value over and above a high school education. It is important to note that there are no bad financial choices on this list regarding the value-added to a student's lifetime earning capacity. The lowest ranked ten Education Value combinations add an average of $787,078 in earnings value above a high school degree and provide an average of 15.5% return on costs invested, significantly outperforming the U.S. stock market long-term. The Rate of Return represents annually compounded returns and can be compared, for example, to the long-term average return on the U.S. stock market of approximately 10.9% annually.

TABLE 3
EDUCATION VALUE AND RATE OF RETURN TOP TEN AND BOTTOM TEN 2022-2023 ACADEMIC YEAR

Rank	Degree Area	School	First Year Cost	Beginning Salary	Total Value	Education Value	Per Hour of Study	Rate of Return
1	**Computer Sci**	Harvey Mudd College	$61,503	$117,700	$4,750,952	$3,713,267	$645	25.6%
2	**Computer Sci**	UC Berkeley	15,344	115,700	4,729,639	3,691,954	641	36.8%
3	**Computer Sci**	Stanford University	57,474	119,600	4,630,578	3,592,894	624	26.1%
4	**Computer Sci**	UC Santa Barbara	15,734	93,800	4,263,479	3,225,794	560	32.4%
5	**Computer Sci**	UC Santa Cruz	15,250	92,200	4,159,018	3,121,333	542	32.1%
6	**Computer Sci**	Cal. Poly State U. San Luis Obispo	11,104	92,400	4,138,123	3,100,439	538	33.6%
7	**Math**	UC Berkeley	15,344	91,000	4,087,179	3,049,495	529	31.7%
8	**Engineering**	UC San Diego	15,852	82,100	4,086,561	3,048,876	529	30.3%
9	**Computer Sci**	UC San Diego	15,852	95,800	4,084,879	3,047,194	529	32.2%
10	**Computer Sci**	UCLA	14,663	99,800	4,080,936	3,043,251	528	33.2%
295	**Education**	CSU Long Beach	7,916	47,700	1,909,136	871,452	151	18.0%
296	**Humanities**	The Master's University	29,995	40,600	1,906,046	868,361	151	14.1%
297	**Health Science**	University of La Verne	46,975	47,300	1,904,928	867,243	151	13.1%
298	**Humanities**	Life Pacific University	19,425	40,700	1,895,437	857,752	149	15.2%
299	**Education**	CSU Fresno	7,778	46,700	1,857,995	820,310	142	17.5%
300	**Education**	CSU Sacramento	8,502	45,000	1,805,184	767,500	133	16.7%
301	**Education**	CSU Los Angeles	8,011	47,100	1,797,334	759,650	132	17.0%
302	**Education**	Cal. Poly State U. San Luis Obispo	11,104	45,500	1,785,448	747,764	130	16.1%
303	**Social Science**	University of La Verne	46,975	46,300	1,760,996	723,311	126	12.2%
304	**Education**	CSU Northridge	8,529	45,700	1,756,095	718,410	125	16.3%
305	**Health Science**	Pacific Oaks College	13,720	42,000	1,693,785	656,100	114	14.5%

Table 3 also reports the Education Value per hour of study. This figure assumes the average student spends 3 hours per week per credit hour in academic activities, including studying and attending class, needed to complete their degree successfully. Assuming the average student takes 16 credit hours per semester, this amounts to a 48-hour work week. Education Value per hour of study is calculated by dividing Education Value by the total number of hours needed to complete a post-secondary degree. Assuming they complete their degree, this amount can be interpreted as the value a degree-completing student adds to their value for every hour they work toward completing their degree. Education Value per hour of study varies from $645 per hour for a computer science degree from Harvey Mudd College to $114 per hour for a health science degree from Pacific Oaks College.

Although students earning degrees from all institutions included in this study add substantial value to their lifetime earnings by earning a bachelor's degree, there are significant differences in the amount of value added based on the school from which the bachelor's degree is earned. For example, as identified in Table 3, art majors from Stanford add an average of $2,392,398 to the value of their expected earnings on top of the $1,037,685 in value the average high school graduate is expected to earn. In the process of earning their degree, Stanford art majors are adding $415 per hour of study to the value of their lifetime earnings and are earning a 20.6% return on the costs of tuition, books and supplies, and other costs they paid to get their four-year Stanford art degree. Art majors earning bachelor's degrees from Humboldt State University are at the other end of the spectrum, adding $935,430 to their lifetime earnings over and above what the average high school graduate is expected to earn. This adds $162 per hour of study to the value of their lifetime earnings. They are earning an 18.1% return (significantly outpacing the long-term average of the U.S stock market) on the costs of tuition, books, supplies, and other costs they paid to get their four-year art degree. Examination of value-added within each major area reveals substantial differences between schools for all areas of study.

CONCLUSIONS

Although there are many substantial nonfinancial benefits to obtaining a post-secondary degree, rapidly increasing levels of student debt make the financial value that California students receive in return for their investment in their education increasingly important. Rate of return and value-added are fundamental decision criteria for any investment, yet many students make education investment decisions involving potentially huge financial implications without this basic investment information. This study finds that all 305-degree major/school combinations add substantial financial value to a person's ability to earn and provide an investment rate of return that outperforms the long-term average of the U.S. stock market. The highest rate of return on education cost in this study's sample is 36.8% for a bachelor's degree in computer science from UC Berkley. In contrast, a computer science degree from Harvey Mudd College adds the most value to the average recipient's future earnings – a total of $3,713,267 over and above what the value an average high school graduate is expected to earn across a lifetime. The lowest rate of return on degree cost in this sample is 12.2% for a bachelor's degree from University of La Verne, and the lowest value-added still adds well over a half million dollars in value - $656,100 for a bachelor's degree in health science from Pacific Oaks College.

This study has several shortcomings, which are also opportunities for future research. The wage growth rate we used is average across all schools and degree areas and is assumed to be constant across a person's career. Intuitively it seems unlikely that this assumption is true. Suppose actual growth rates vary a reasonable amount (within a few percentage points), from the 3.43% we calculated and used. In that case, the calculated Education Values of a post-secondary degree can vary significantly, up to $300,000. However, the relative positions of the Education Values across schools and degree areas are unchanged. In addition, but of lesser potential impact, is that the growth rate applied to costs is a national average and is the same across all types of schools.

One conclusion of this analysis is clear – although there are significant differences in Education Value and return on cost invested across schools and majors, from a financial perspective, there are no bad choices on this list. Investing time, effort, and money into a post-secondary degree is a solid investment in the

future. This is even more true given the vast array of non-financial benefits associated with earning a post-secondary degree. For many people, earning a post-secondary degree is the best investment they will ever make.

ENDNOTES

1. Forbes Advisor, Hahn, Alicia, and Jordan Tarver, "2023 Student Loan Debt Statistics: Average Student Loan Debt," Forbes Advisor, September 19, 2022.
2. https://obamawhitehouse.archives.gov/sites/default/files/page/files/20160718_cea_student_debt.pdf
3. Assumes the 50-year average of the S&P 500 index return, 1971-2020, of 10.9%, https://www.fool.com/investing/how-to-invest/stocks/average-stock-market-return/
4. https://collegeaffordability.urban.org/covering-expenses/borrowing
5. Federal Reserve Bank of St. Louis: https://fred.stlouisfed.org/series/SLOAS
6. https://educationdata.org/student-loan-debt-statistics
7. https://www.fool.com/investing/how-to-invest/stocks/average-stock-market-return/
8. This is consistent with methodologies used in other studies in this area. See, for example, Abel and Deitz (2019), Cohn and Huches (1994), Cooper and Cohn (1997), Lobo and Burke-Smalley (2018), and Wright and Ross (2021).
9. First Year Cost, Beginning Salary, Total Value, Education Value, and Rate of Return for all degree areas and all schools ranked by Education Value are available from the authors.

REFERENCES

Abel, J., & Deitz, R. (2019). Despite rising costs, college is still a good investment. *Federal Reserve Bank of New York*. Retrieved June 6, 2019, from https://libertystreeteconomics.newyorkfed.org/2019/06/despite-rising-costs-college-is-still-a-good-investment/

Arias, O., & McMahon, W. (2001). Dynamic rates of return to education in the U.S. *Economics of Education Review*, *20*(2), 121–138.

Avery, C., & Turner, S. (2012). Do college students borrow too much – Or not enough? *The Journal of Economic Perspectives*, *26*(1), 165–92.

Barrow, L., & Malamud, O. (2015). Is college a worthwhile investment? *Annual Review of Economics*, *7*, 519–555.

Bleemer, Z., & Zafar, B. (2018). Intended college attendance: Evidence from an experiment on college returns and costs. *Journal of Public Economics*, *157*, 184–211.

Cappelli, P. (2020). The return on a college degree: The US experience. *Oxford Review of Education*, *46*(1), 30–43.

Chakrabarti, R., Fos, V., Liberman, A., & Yannelis, C. (2020). Tuition, debt, and human capital. *FRB of New York Staff Report, Staff Report No. 912*.

Cohn, E., & Huches, W. (1994). A benefit-cost analysis of investment in college education in the United States: 1969-1985. *Economics of Education Review*, *13*(2), 109–123.

Cooper, S., & Cohn, E. (1997). Internal rates of return to college education in the United States by sex and race. *Journal of Education Finance*, *23*(1), 101–133.

Council of Economic Advisers. (2016). *Investing in Higher Education: Benefits, Challenges, and the State of Student Debt*. Damascus, MD: Penny Hill Press.

Dale, S., & Krueger, A. (2011). Estimating the return to college selectivity over the career using administrative earning data. *Journal of Human Resources*, *49*(2), 323–358.

Eaton, C., Howell, S., & Yannelis, C. (2020). when investor incentives and consumer interest diverge: Private equity in higher education. *The Review of Financial Studies*, *33*(9), 4024–4060.

Ge, S., Isaac, E., & Miller, A. (2019). *Elite Schools and Opting In: Effects of College Selectivity on Career and Family Outcomes* [Working Paper].

Giani, M., Attewell, P., & Walling, D. (2019). The value of an incomplete degree: Heterogeneity in the labor market benefits of college non-completion. *The Journal of Higher Education*, *91*(4).
Holland, K. (2015, December 9). The long-term consequences of student loans. *CNBC*. Retrieved from https://www.cnbc.com/2015/12/08/the-long-term-consequences-of-student-loans.html
Ji, Y. (2021). Job search under debt: Aggregate implications of student loans. *Journal of Monetary Economics*, *117*, 741–759.
LIMRA Secure Retirement Institute Study Finds Student Loan Debt a Growing Concern for Retirement Saving. (2015, May 28). Retrieved from https://www.limra.com/en/newsroom/news-releases/2015/limra-secure-retirement-institute-study-finds-student-loan-debt-a-growing-concern-for-retirement-saving/
Lobo, B., & Burke-Smalley, L. (2018). An empirical investigation of the financial value of a college degree. *Education Economics*, *26*(1), 78–92.
Looney, A., & Yannelis, C. (2015). A crisis in student loans? How changes in the characteristics of borrowers and the institutions they attended contributed to rising loan defaults. *Brookings Papers on Economic Activity*, *2*, 1–89. doi: 10.1353/eca.2015.0003
Looney, A., & Yannelis, C. (2019). How useful are default rates? Borrowers with large balances and student loan repayment. *Economics of Education Review*, *71*, 135–145.
Lucca, D., Nadauld, T., & Shen, K. (2019). Credit supply and the rise in college tuition: Evidence from the expansion in Federal student aid programs. *The Review of Financial Studies*, *32*(2), 423–466.
Noendorf, B., & Beck, K. (2021). The financial value of postsecondary education. *Journal of Accounting and Finance*, *21*(5), 200–214.
Rothstein, J., & Rouse, C.E. (2011). Constrained after college: Student loans and early-career occupational choices. *Journal of Public Economics*, *95*(1–2), 149–163.
Schanzenbach, D., Bauer, L., & Breitwieser, A. (2017). *Brookings*.
Thompson, D. (2018, December 18). Does it matter where you go to college? *The Atlantic*. Retrieved from https://www.theatlantic.com/ideas/archive/2018/12/does-it-matter-where-you-go-college/577816/
Valero, A., & Van Reenen, J. (2019). The economic impact of universities: Evidence from across the globe. *Economics of Education Review*, *68*, 53–67.
Wright, A.M., & Ross, M. (2021). To college, or not to college: An individualized approach to human capital investment. *Journal of Financial Counseling and Planning*, forthcoming.
Zhang, L. (2013). Effects of college educational debt on graduate school attendance and early career and lifestyle choices. *Education Economics*, QE89, *21*, 154–175.