

Major Matters Most

The Economic Value of Bachelor's Degrees from The University of Texas System

Anthony P. Carnevale, Megan L. Fasules, Stephanie A. Bond Huie, and David R. Troutman



2017



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McCourt School of Public Policy



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Introduction

A college education is widely recognized as a gateway to economic opportunity and intergenerational mobility in the United States.¹ Children from households with highly educated parents are three times more likely to get a Bachelor's degree than children from households in which the parents did not attend college.² Today, at least some postsecondary education is a baseline requirement for anyone who aspires to enter the middle class.³ Deeper research has demonstrated that it is not just the college degree that matters; labor market outcomes also are tightly tied to what one studies and what job one gets.⁴

This report on The University of Texas System (UT System) Bachelor's degree recipients demonstrates that college, as one of the first big investment decisions a young person makes, has lifelong economic consequences. As is the case in our national research, the major that UT System graduates pursued in college is the biggest predictor of wage outcomes. Moreover, UT System graduates earn more, on average, than Bachelor's recipients nationally, as well as those currently working in Texas.

To a lesser extent, institutional selectivity also explains some differences in earnings across the UT System. However, there is an ongoing debate about whether the institution a student attends really matters in determining future earnings.⁵ College selectivity tends to go hand in hand with higher instructional spending per student and the proportion of students with high test scores. UT System selective colleges spend more on academics and instruction per full-time equivalent (FTE) student compared to UT System open-access colleges—almost \$19,000 compared to almost \$7,500.⁶

All things being equal, UT System graduates who received Pell Grants are just as likely as more economically advantaged students to experience a wage premium after completing a Bachelor's degree. The proportion of Pell Grant recipients in the UT System ranges from 27 percent at UT Austin and UT Dallas to 80 percent at UT Brownsville.

¹ Organisation for Economic Cooperation and Development, *Divided We Stand*, 2011.

² Carnevale and Strohl, *Separate and Unequal*, 2013.

³ Carnevale and Rose, *The Undereducated American*, 2011; Carnevale and Rose, *The Economy Goes to College*, 2015; Carnevale, Jayasundera, and Gulish, *America's Divided Recovery*, 2016.

⁴ Carnevale, Cheah, and Hanson, *The Economic Value of College Majors*, 2015.

⁵ Dale and Krueger, "Estimating the Effects of College Characteristics over the Career Using Administrative Earnings Data," 2014; Dale and Krueger, "Estimating the Payoff to Attending a More Selective College," 2002.

⁶ Georgetown University Center on Education and the Workforce analysis of data from the Integrated Postsecondary Education Data System (IPEDS) and *Barron's Profiles of American Colleges*, 2014.

Latinos and Blacks⁷ are more represented and are enrolling at faster rates at selective colleges in Texas than across the United States,⁸ and collectively they represent almost 35 percent of UT System graduates. However, as is the case nationally, a wage gap between these groups and White and Asian graduates persists depending on major.

Women who earn a UT System Bachelor's degree earn more than men with the same credential three years after completing their degree, but only in majors for which women make up the majority of graduates. However, this trend disappears once women reach their thirties. In our national research we find similar outcomes for women.⁹

These findings raise more questions than are answered. Setting aside the positive effects that a UT System education provides, to what extent are these findings due to the quality of the institutions? To what extent is institutional quality about differences in institutional resources versus student preparedness? What exactly boosts the earnings of UT System graduates compared to similarly aged Bachelor's recipients in Texas and the United States? Several factors go into determining quality: institutional resources, major offerings, alumni network, college reputation, instructors, student services, access to graduate school, and others. Much more research is needed to answer these questions. Moreover, these findings indicate a need to understand better how students use available information to make decisions about college and careers, the extent to which their interests and life goals inform their decisions, and the role that social capital plays in educational and career outcomes.

Key Findings

Six key findings emerge from this research.¹⁰

A UT System education is a worthwhile investment. UT System Bachelor's degree recipients not only earn almost twice as much as similarly aged Texas high school-educated workers, but also outearn other Bachelor's degree holders within Texas and across the United States. Three years after completing college, a UT System graduate has median earnings of \$39,600, compared to those of similarly aged Texas high school-educated workers (\$20,600), all Texas workers with a Bachelor's degree (\$36,800), and all workers nationally with a Bachelor's degree (\$34,000).

Major matters most. The choice of major is the most important factor in determining UT System graduates' wages even after controlling for other UT System graduate characteristics,

⁷ In this report, we use the term Black to refer to people who identify as Black or African American and the term Latino to people who identify as Hispanic or Latino. Most of the Center's research relies on surveys that do not differentiate between these groups. Many organizations use these terms interchangeably while others embrace a single term. We use single terms—White, Black, Latino, and Asian—to alleviate ambiguity and enhance clarity. In charts and tables, we use White, Black/African American, Latino, and Asian.

⁸ Carnevale et al., *Race, Money and Public Colleges*, forthcoming.

⁹ Carnevale et al., *Women Can't Win*, forthcoming.

¹⁰ As described in Appendix 3, findings specific to UT System graduates are from UT System data and general findings about Texas and the United States are from *American Community Survey* data.

such as test scores, institutional selectivity, demographic characteristics, and family income. The median earnings of the top-earning major (architecture and engineering) are almost \$40,000 higher than those of the lowest-earning major (biology and life sciences). Moreover, UT System graduates have higher earnings in most majors compared to all similarly aged college graduates in Texas and in the United States.

Choice of major outweighs institutional selectivity. Median earnings within a major are typically higher for graduates from selective UT System colleges compared to graduates from middle-tier or open-access UT System colleges. However, graduates from open-access UT System colleges who complete degrees in high-paying majors earn more than UT System graduates at selective colleges who complete degrees in low-paying majors. For example, graduates who majored in architecture and engineering at a UT System open-access college have median earnings that are higher than 61 percent of all UT System graduates at selective colleges.

All UT System graduates earned a wage premium, including students who received Pell Grants. Overall, UT System graduates who received one or more Pell Grants have median earnings (\$37,100) less than UT System graduates who did not receive a Pell Grant (\$42,000). After controlling for major, a difference in earnings between graduates who received a Pell Grant and those who did not still remains—differences in the major distribution account for less than 20 percent of the gap in UT System graduate earnings. Only when both major and institutional selectivity are controlled for do graduates who received a Pell Grant earn similar wages to graduates who did not receive a Pell Grant.

Access to particular occupations after college matters when examining earnings disparities by race or ethnicity. Overall, Black and Latino UT System graduates make around \$6,000 less per year than White and Asian UT System graduates. This is consistent with national data. These wage gaps, however, vary within different major groups. Regardless of race or ethnicity, UT System graduates earn more on average in the high-paying majors than in the lower-paying ones, but the earnings disparities by race and ethnicity tend to be larger in higher-paying majors. A key factor in explaining this is the different careers and occupations graduates go into once they enter the labor market—17 percent of Latinos who majored in architecture and engineering still end up working in blue-collar occupations compared to 8 percent of their White peers.

Women initially outearn men in majors dominated by women, but fall behind men over time. Three years after graduation, male UT System graduates, in general, earn almost \$6,000 more than female graduates. However, women tend to earn more than men in majors where women greatly outnumber men. Women earn almost \$3,000 more than male UT System graduates in health majors in which women account for 85 percent of graduates and \$6,000 more in humanities and liberal arts majors in which they account for 70 percent of graduates. After a while, this wage advantage disappears as men and women become more established in their occupations, and eventually men earn more than women in all majors.

Data and Methodology

In this report, we examine what influences the earnings of UT System¹¹ Bachelor's degree recipients working in Texas.¹² This study utilizes data on graduates who enrolled as first-time students in college at their respective UT System campus and received their Bachelor's degrees between 2008 and 2011.¹³ The study sample consists of 50,984 UT System graduates between the ages of 21 and 25 at the time of their graduation from the UT System academic institutions. Thus, all findings are conditional on having enrolled and successfully completed a Bachelor's degree from the UT System.

Through a data sharing agreement with the Texas Workforce Commission (TWC), the UT System matched Bachelor's degree recipients to state earnings and employment data, specifically TWC unemployment insurance (UI) wage data. The occupations of graduates are a key factor in determining earnings. However, occupation information is not included in the Texas UI wage data. So we used the American Community Survey (ACS) one-year micro data files from 2011 to 2015 to examine occupational trends in the Texas workforce. ACS provides detailed information on college major that allows the comparison of all UT System Bachelor's degree recipients to all college graduates with a terminal Bachelor's degree between the ages of 24 and 28 in Texas and the United States. See Appendix 3 for more details on the data and methodology.

¹¹ The UT System is one of seven public college systems in Texas and accounts for 32 percent of enrollment at all public four-year institutions in Texas. The other six are: Texas A&M University System, Texas State University System, Texas Tech University System, University of Houston System, University of North Texas System, and Texas State Technical College, <http://www.txhighereddata.org/Interactive/Institutions.cfm>.

¹² We use regressions to analyze the relative impact of major, institutional selectivity, family income background, gender, and race and ethnicity on determining earnings of UT System graduates working in Texas three years after they completed their Bachelor's degrees. See Appendix 4.

¹³ Students who completed their Bachelor's degrees between 2008 and 2011 graduated in the heart of the recession. Thus, earnings might be lower than students who did not graduate between 2008 and 2011. However, we analyze earnings three years after graduation, between 2011 and 2014.

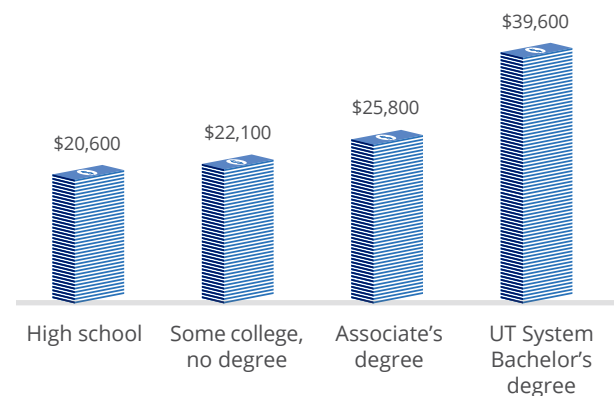
PART 1

A UT System education is a worthwhile investment—UT System graduates earn 92 percent more than high school-educated workers.

Higher educational attainment generally means higher earnings.¹⁴ This notion holds true for UT System Bachelor's degree recipients. Three years after graduation, UT System graduates earn almost twice as much as similarly aged workers in Texas with no more than a high school diploma. They also have 54 percent higher earnings than similarly aged workers with an Associate's degree (Figure 1). While obtaining a Bachelor's degree offers a more direct path to middle-class earnings, workers with less educational attainment can earn more depending on their field of study in postsecondary education and their subsequent access to occupations.¹⁵

In spite of having completed their studies during the Great Recession of 2007-09, UT System graduates have median earnings (\$39,600) above those of similarly aged Bachelor's degree recipients in the United States (\$34,000), as well as above the median of similarly aged Texas Bachelor's degree recipients as a whole (\$36,800). Texas was not as affected by the Great Recession as the rest of the nation due to a stable real estate market and high energy prices. When energy prices fell, the Texas economy declined, but later

FIGURE 1. UT System Bachelor's degree recipients, on average, have higher earnings than similarly aged workers in Texas with lower educational attainment.



Median annual earnings three years after graduation for UT System Bachelor's degree recipients and similar age-year cohort of Texas workers by educational attainment.

Note: All earnings by education level are significantly different from one another at a 0.01 significance level.

Source: Georgetown University Center on Education and the Workforce analysis of data for high school, some college but no degree, and Associate's degree from U.S. Census Bureau, *American Community Survey* (ACS), 2012-2015, and The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

¹⁴ Carnevale, Rose, and Cheah, *The College Payoff*, 2011.

¹⁵ For instance, 26 percent of similarly aged workers in Texas with an Associate's degree earn more than the median UT System graduate. Science, technology, engineering, and mathematics (STEM) occupations tend to earn more than others, regardless of education – 48 percent of STEM workers with Associate's degrees earn more than the median UT System graduate.

and slower than the nation as a whole.¹⁶ Another possible reason that UT System graduates in particular were less affected by the Great Recession has to do with the location of UT System colleges in or near major metropolitan areas – such as Austin, El Paso, McAllen, and San Antonio—that had resilient job markets during the recession.¹⁷

Not only do UT System graduates experience an immediate economic return after obtaining a Bachelor's degree, they experience increasing earnings as they progress throughout their careers. Overall, graduates who completed their degrees between 2004 and 2009 had earnings of nearly \$30,000 one year after completing their Bachelor's degree.¹⁸ Three years after graduating, UT System Bachelor's degree recipients earn about \$40,000, and, five years after graduating, they earn nearly \$50,000.

The higher earnings of UT System graduates suggest that a UT System Bachelor's degree is a high quality credential, but, as discussed above, it is unclear what exactly determines this higher quality. It might be due to institutional factors, a strong labor market for graduates, or a combination thereof. Further research is needed to determine why UT System graduates are earning more at the median than similarly aged Bachelor's degree recipients in Texas and the United States.

¹⁶ Thompson, "How Texas Is Dominating the Recession," 2010.

¹⁷ Ibid.

¹⁸ Graduates who completed their degrees between 2004 and 2009 were analyzed here in order to analyze longer term trends than were possible with graduates who completed their degrees between 2008 and 2011. See Appendix 3 for more information on methodology.

PART 2

Major has the largest impact on UT System graduates' earnings, with differences of almost \$40,000 per year.

Major is critically important to earnings. The differences in earnings between majors (\$3.4 million over a lifetime) is far greater than the difference between earnings of college and high school graduates (\$1 million over a lifetime).¹⁹ This is true nationally and in Texas. Looking at both ACS and UT System data, the highest-earning majors across the United States, Texas, and the UT System are architecture and engineering; computers, statistics, and mathematics; and health. Bachelor's degree holders in architecture and engineering typically earn over 50 percent more than the median for all Bachelor's degree holders. UT System graduates working in Texas outearn similarly aged Bachelor's degree recipients in the United States in all majors but law and public policy; psychology and social work; and biology and life sciences (Figure 2).

The most important factor that influences UT System graduates' earnings is their choice of major, even after controlling for family income and racial and ethnic background.²⁰ The earnings gap between the highest- and lowest-paying major is almost \$40,000 – the difference between graduates majoring in architecture and engineering (about \$65,000) and those majoring in biology and life sciences (about \$25,000).²¹ The top and bottom earning fields are also consistent with those of Bachelor's degree holders in Texas and the United States as a whole: architecture and engineering; computers, statistics, and mathematics; health; and business are the most lucrative, while arts; psychology and social work; and biology and life sciences are the lowest paying among the 15 major groups used in this study.²²

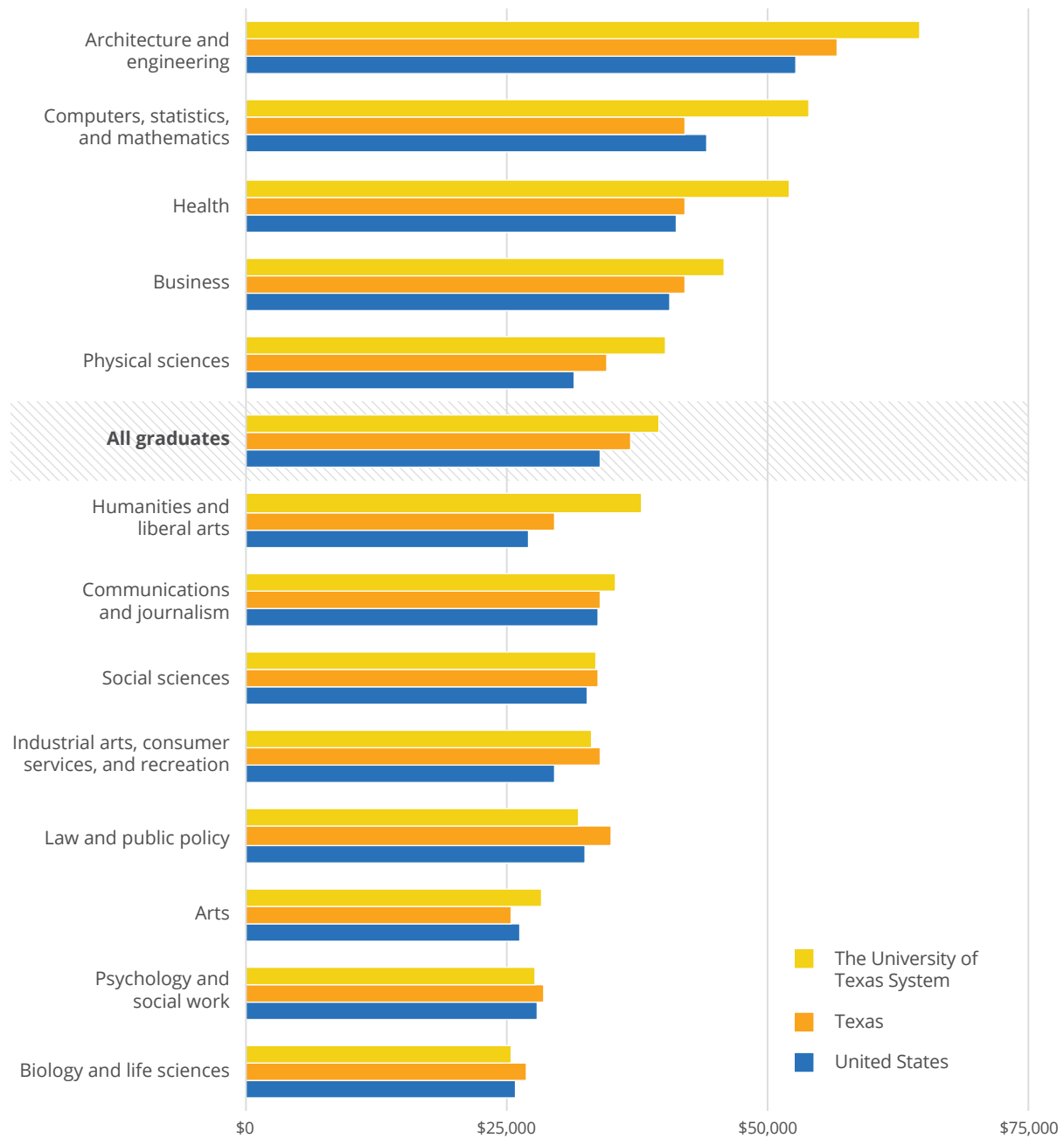
¹⁹ Carnevale, Cheah, and Hanson, *The Economic Value of College Majors*, 2015. The figure cited is the average difference in lifetime earnings between a person who gets a Bachelor's degree in petroleum engineering and one who gets a Bachelor's degree in early childhood education.

²⁰ Regression analysis confirms that one's major is a larger factor in determining earnings than family income background, test scores, or various other demographic characteristics that are included as controls. See Appendix 4 for a multivariate regression analysis.

²¹ Some majors' returns relative to one another varied in the short-term versus longer-term. In another analysis not shown here, we find that biology and life sciences is one of the lowest-earning major groups initially but moves toward the middle of the pack five years post-completion, possibly due to many students continuing on to graduate school. Conversely, health is the second-highest earning major the year after graduating, but is surpassed by computers, statistics, and mathematics and nearly equaled by business five years out. Additional examination of 10-year earnings for a single graduation cohort (2004) shows even greater shifts and highlights the need for further research.

²² The UT System uses Classification of Instructional Programs (CIP) codes to define major. In order to compare to Texas and the United States, CIP codes were converted to the major groups shown here. However, major group titles do not align perfectly with the majors offered at the UT System. For example, the UT System does not offer undergraduate degrees in law; therefore, law and public policy is primarily comprised of protective services majors. Furthermore, architecture is only offered at two campuses and typically has lower earnings than engineering majors. See Appendix 3 for more information on methodology.

FIGURE 2. UT System graduates who majored in architecture and engineering have the highest earnings, a finding also reflected among all U.S. graduates.



Median annual earnings three years after graduation for all UT System Bachelor's degree recipients and similar age-year cohort of United States and Texas terminal Bachelor's degree holders by major group.

Note: Earnings for agriculture and natural resources are not reported due to sample size limitations for the UT System. Additionally, law and education are not offered as UT System undergraduate majors.

Source: Georgetown University Center on Education and the Workforce analysis of data for Texas and the United States from U.S. Census Bureau, *American Community Survey (ACS)*, 2012-2015, and The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

Employment in high-paying majors is connected to entry into higher-paying occupations.

Earnings differences among majors are determined once graduates enter the workforce. A key factor in explaining these differences is the occupation and career pathways that graduates follow. In many cases there is a strong alignment between majors and particular occupations. Generally, working in an occupation aligned with the graduate's major results in higher earnings, but not always.²³ To estimate where UT System graduates are employed after completing their studies, ACS data are used to examine the workforce dynamics that influence the returns to different majors once students graduate and begin working.

The highest-paying majors are closely connected to specific occupational clusters that are relatively well-paying. For example, 52 percent of Bachelor's degree holders in Texas who majored in architecture and engineering and 46 percent of Bachelor's degree holders who majored in computers, statistics, and mathematics work in science, technology, engineering, and mathematics (STEM) occupations – the highest-paying occupation group. Almost 70 percent of Bachelor's degree holders who majored in health are employed in healthcare professional and technical occupations – the third highest-paying occupation group. On the other hand, college graduates in Texas who majored in humanities and liberal arts and social sciences, which are majors with median earnings below the overall UT System median of \$39,600, are employed in many different occupation groups (see Appendix 2 for full distribution of majors and occupations).

²³ Most college majors have ties with particular occupations with the exception of the roughly 20 percent of students who major in the humanities and the social sciences. Carnevale et al, *The Economic Value of College Majors*, 2015.

PART 3

UT System graduates from selective institutions have an earnings advantage.

The assumption that students will have better graduation and earnings outcomes when they enroll in higher quality colleges makes sense conceptually. However, even with some empirical evidence,²⁴ the association between labor market outcomes and college quality is hard to prove, mostly because it is unclear what exactly determines college quality.²⁵ If college quality is to be measured by graduation rates, then the more selective colleges do seem to have an advantage. Students with equivalent SAT/ACT test scores graduate at higher rates in the most selective colleges and go on to graduate school more frequently.²⁶ But there is substantial evidence to suggest that this higher graduation rate is due in large part to differences in spending and resource advantages at the more selective colleges.²⁷ Most research equates quality with selectivity even though selectivity is a much narrower concept that emphasizes a prestige hierarchy largely driven by test scores and the socioeconomic status of the students. Selectivity sorts the postsecondary system into a multitiered system differentiated by resource inputs and student test scores rather than measured outcomes, which further narrows and obfuscates the definition of quality.

In the UT System, as in the postsecondary system as a whole, test scores increase with levels of selectivity and are relatively homogenous within selectivity tiers.²⁸ We define three tiers of selectivity based on *Barron's Profiles of American Colleges*: selective colleges, middle-tier colleges, and open-access colleges.²⁹ In the UT System, UT Austin and UT Dallas are classified as selective colleges; UT Arlington, UT Pan American, and UT San Antonio are classified as middle-tier colleges; and UT Brownsville, UT El Paso, UT Permian Basin, and UT Tyler are classified as open-access colleges (Figure 3).³⁰

²⁴ Research has generally found that different indicators of college quality are associated with small increases in earnings (Witteveen and Attewell, "The earnings payoff from attending a selective college," 2017). For instance, college expenditures and tuition have been found to have a positive impact on salaries and employment of graduates.

²⁵ Dale and Krueger, "Estimating the Effects of College Characteristics over the Career Using Administrative Earnings Data," 2014; Dale and Krueger, "Estimating the Payoff to Attending a More Selective College," 2002; Long, "Changes in the returns to education and college quality," 2010.

²⁶ Carnevale et al., *Race, Money and Public Colleges*, forthcoming; Carnevale and Strohl, *Separate and Unequal*, 2013.

²⁷ Bound et al., "Why Have College Completion Rates Declined?," 2010; Bound and Turner, "Cohort crowding," 2007.

²⁸ This is consistent with research showing that the postsecondary system has become more stratified and each college has become more homogenous in its distribution of test scores (Hoxby, "The Changing Selectivity of American Colleges," 2009).

²⁹ *Barron's Profiles of American Colleges*, 2014.

³⁰ The UT Brownsville and UT Pan American campuses closed at the end of the 2015 academic year, merging to create UT Rio Grande Valley, which began enrolling students in fall 2015.



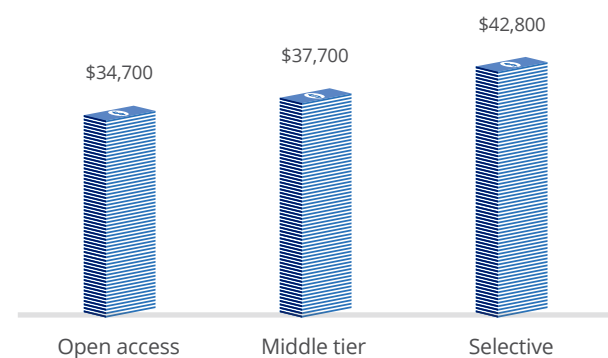
FIGURE 3. Map of the UT System by level of selectivity.

● Selective
 ● Middle tier
 ● Open access

Like selective colleges across the United States, UT System selective colleges primarily enroll students who score in the top quartile on college-entry exams.³¹ Graduates with SAT/ACT scores above the 75th percentile account for 75 percent of the graduates at UT System selective colleges compared to 18 percent and 12 percent, respectively, of the graduates at UT System middle-tier and open-access colleges. Comparatively, 50 percent and 63 percent of the UT System graduates at middle-tier and open-access colleges, respectively, have test scores below the 50th percentile.

Previous research suggests that graduating from a selective college leads to higher earnings.³² Graduates from selective UT System colleges earn \$42,800 three years after graduation, while graduates of middle-tier UT System colleges and open-access colleges earn \$37,700 and \$34,700, respectively (Figure 4). This is consistent with research that found graduates from UT Austin had significantly higher earnings than graduates from other public four-year institutions.³³ Yet, the reasons why higher selectivity is associated with higher earnings are still unclear. Other possible reasons why earnings differ by college could be the different majors that are offered, the demand for specific majors in local labor markets, or student social capital.

FIGURE 4. Graduates from selective UT System colleges earn about \$8,000 more per year than graduates from open-access UT System colleges.



Median annual earnings three years after graduation for UT System Bachelor's degree recipients by institutional selectivity.

Note: All selectivity tier earnings are significantly different from one another at a 0.01 significance level.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data and *Barron's Profiles of American Colleges*, 2014.

The difference in earnings at various tiers of selectivity fluctuates greatly with major.

Collectively, over a third of the graduates from selective UT System campuses majored in three areas: architecture and engineering; communications and journalism; and social sciences. The selective UT System colleges have a smaller percentage of business majors and humanities and liberal arts majors than across the entire UT System, even though those majors produce the most graduates system-wide. Thus, some high-paying majors – such as architecture and

³¹ The top quartile is defined as scores above 24 on the ACT, above 1170 on the SAT taken prior to 2006, and above 1160 on the SAT taken between 2006 and 2010.

³² Carnevale and Strohl, *Separate and Unequal*, 2013.

³³ Andrew et al., "Quantile Treatment Effects of College Quality on Earnings," 2016.

engineering and computers, statistics, and mathematics – are concentrated at the selective UT System colleges, but not all are, such as business and health.

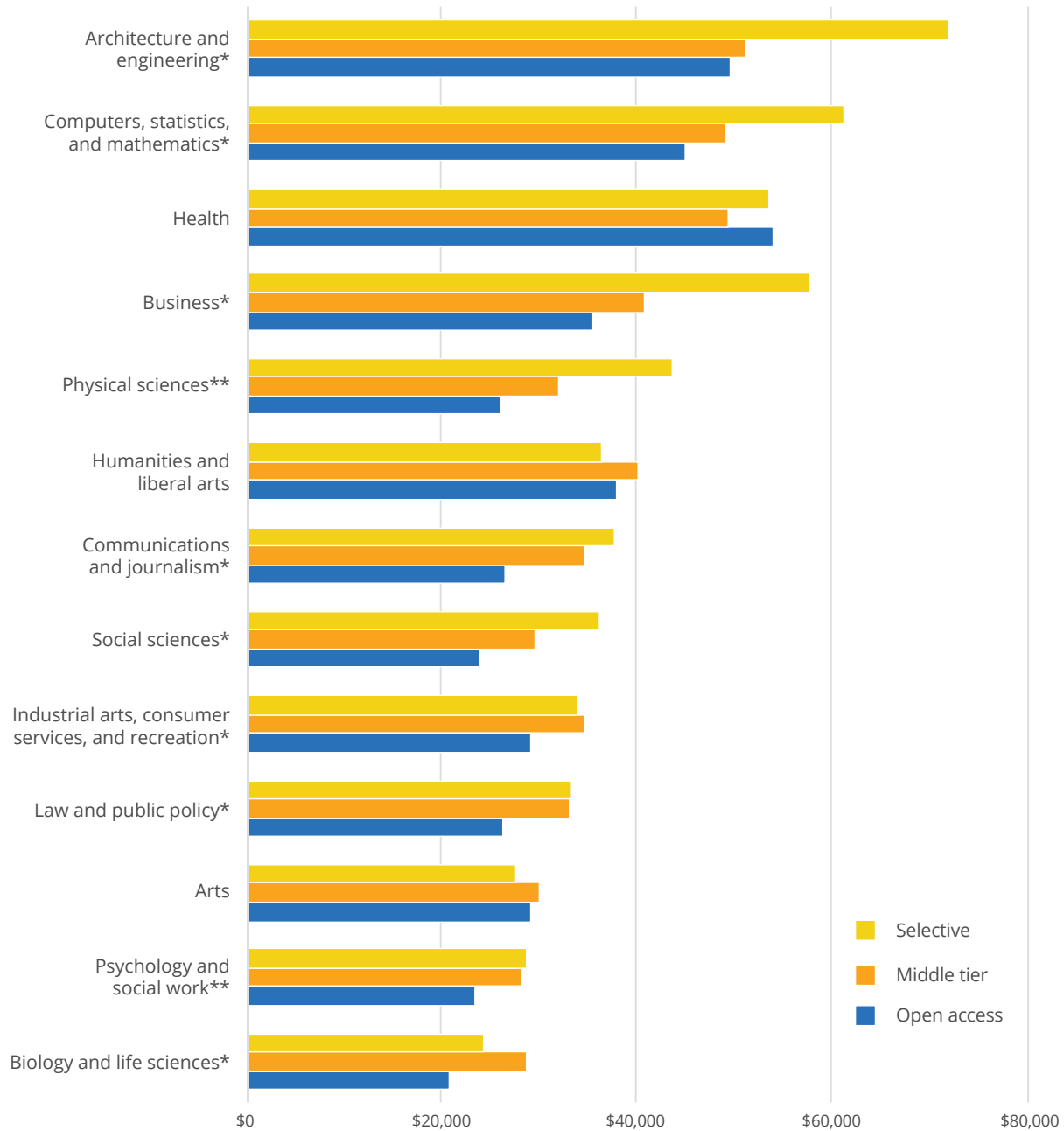
In most majors, graduates from selective UT System colleges have higher median earnings than graduates from middle-tier and open-access UT System colleges.³⁴ Architecture and engineering and business are the majors with the largest earnings differences across college selectivity. Graduates in these majors who completed their degrees at a selective UT System college earn over \$20,000 more per year than graduates who completed their degrees in the same majors at open-access UT System colleges. On the other hand, the earnings of graduates who majored in health or humanities and liberal arts are not significantly different between selective and open-access UT System colleges (Figure 5). These heterogeneous results across majors are consistent with prior research and warrant further exploration.³⁵

However, choice of major can outweigh college selectivity. Graduates from open-access UT System colleges who complete degrees in high-paying majors can earn more than UT System graduates from selective colleges. Architecture and engineering; computers, statistics, and mathematics; and health majors at both middle-tier and open-access UT System colleges have median earnings higher than the median for physical sciences; humanities and liberal arts; communications and journalism; social sciences; industrial arts, consumer services, and recreation; law and public policy; arts; psychology and social work; and biology and life sciences majors at selective UT System colleges. In fact, graduates of open-access UT System colleges who majored in architecture and engineering have median earnings greater than 61 percent of all graduates from selective UT System colleges.

³⁴ While institutional selectivity appears to be associated with higher earnings, it has also been shown not to be the largest determinant of later earnings.

³⁵ Witteveen and Attewell, "The earnings payoff from attending a selective college," 2017; Eide et al., "Is It Where You Go or What You Study?," 2015.

FIGURE 5. Graduates in architecture and engineering and business from selective UT System colleges have the largest earnings advantage over graduates in the same majors from middle-tier and open-access UT System colleges.



Median annual earnings three years after graduation for UT System Bachelor's degree recipients by major group and institutional selectivity.

Note: Earnings for agriculture and natural resources are not reported due to sample size limitations. Additionally, education is not a UT System major.

* $p = 0.01$ and ** $p = 0.05$, for the percent difference in earnings between selective UT System colleges and open-access UT System colleges being greater than 0.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data and *Barron's Profiles of American Colleges*, 2014.

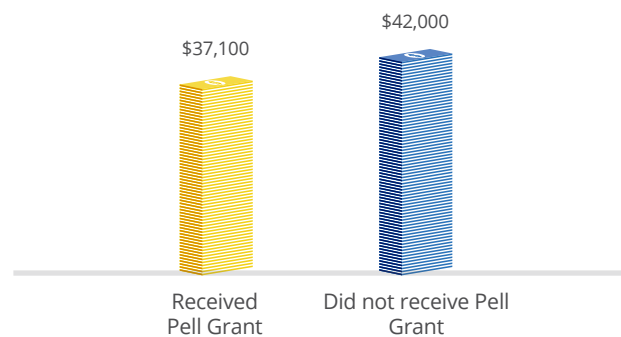
PART 4

A Bachelor's degree offers a leg up for UT System graduates from low-income backgrounds, with Pell Grant recipients earning 80 percent more than high school-educated workers.

Low-income students are less likely than other students to graduate from college, and the lack of a college degree perpetuates income inequality. Those without a degree often make far less than college graduates. Federal Pell Grants were created in 1972 to address this issue by helping low-income students pay for college. Nationally, over 70 percent of students who receive Pell Grants come from families with annual incomes of \$30,000 or less.³⁶ For this reason, Pell Grants are a widely used proxy for low-income students. Forty-four percent of UT System graduates who received Pell Grants had a family income of less than \$40,000. By comparison, 70 percent of UT System graduates who did not receive Pell Grants had family incomes of \$80,000 or greater (see Appendix 1 for full distribution).

Nationally, the average post-college earnings of students from low-income families are lower than those of students from high-income families. Students from the lowest-income families, on average, have post-college earnings that are almost 30 percentiles lower than students from the highest-income families. However, when comparing students at the same college from low-income and high-income families, the earnings gap is negligible. This suggests that, relative to family income, students from low-income families have larger gains from completing a degree compared to students from higher-income families. For example, at UT Austin, students from high-income families were in the 72nd percentile for post-college earnings, and students from low-income families were in the 67th percentile.³⁷ Similar patterns emerge with other UT System graduates.

FIGURE 6. UT System graduates who did not receive Pell Grants earn more annually than graduates who received Pell Grants.



Median annual earnings three years after graduation for UT System Bachelor's degree recipients by Pell Grant status.

Note: Non-Pell Grant and Pell Grant earnings are significantly different from one another at a 0.01 significance level.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

³⁶ Carnevale and Van Der Werf, *The 20% Solution*, 2017.

³⁷ Chetty et al., "Mobility Report Cards," 2017.

A UT System Bachelor's degree boosts graduates who received Pell Grants. They are just as likely to receive a wage premium over similarly aged individuals in Texas with a high school diploma or an Associate's degree as UT System graduates who did not receive Pell Grants. Pell Grant recipients, on average, earn 80 percent more than similarly aged workers in Texas with only a high school diploma and 44 percent more than those with an Associate's degree. However, graduates who did not receive Pell Grants tend to earn more than those who did receive such grants after completing a Bachelor's degree: almost \$5,000 more annually three years after graduating (Figure 6). But, after controlling for both institutional selectivity and choice of major in the UT System, the earnings gap between Pell Grant and non-Pell Grant graduates disappears, suggesting that earning a Bachelor's degree has the potential of reducing income inequality.

UT System graduates majoring in architecture and engineering have the highest earnings, regardless of whether they received Pell Grants.

Choice of major is the most important factor in determining the earnings of UT System graduates independent of their receiving Pell Grants. Graduates who received Pell Grants will still have the highest earnings if they majored in architecture and engineering, the highest-paying major, compared to other graduates who received Pell Grants.

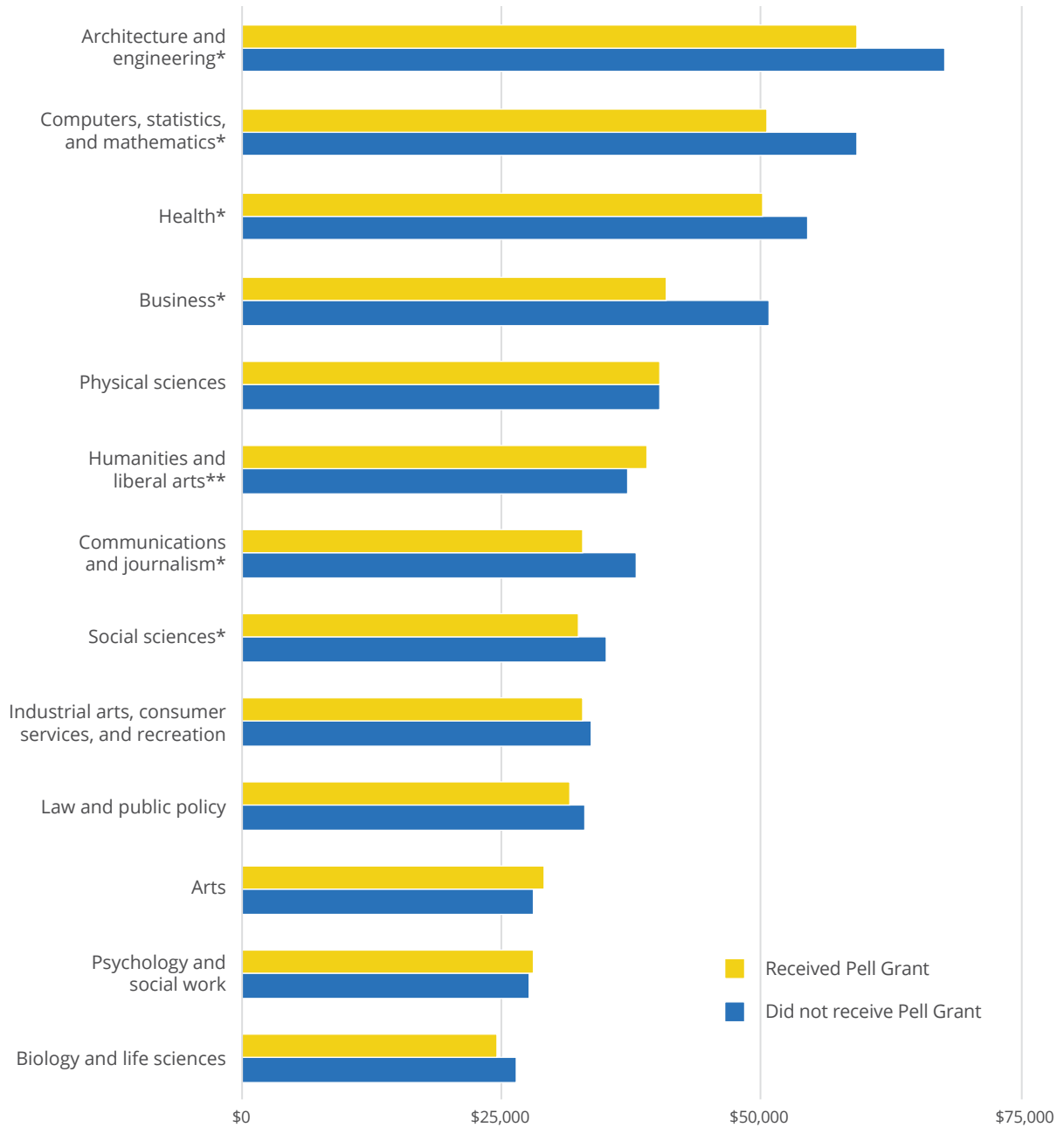
Within individual majors, graduates who received Pell Grants typically have lower earnings than UT System graduates who did not receive Pell Grants. The largest earnings gaps between UT System graduates who received Pell Grants and those who did not is among business majors—Pell recipients earn, on average, 25 percent less than UT System graduates who did not receive Pell Grants (Figure 7).

One possible explanation for this earnings disparity is that Pell Grant recipients might not have the same access to social networks or other connections with potential employers as UT System graduates from higher-income backgrounds. This lack of networks could be more pronounced for graduates majoring in business.

Choice of major could explain why graduates who received Pell Grants earn less overall than graduates who did not receive Pell Grants. UT System graduates who did not receive Pell Grants are more likely to pursue the highest-earning majors than those who were Pell Grant recipients (with the exception of those majoring in physical sciences and computers, statistics, and mathematics). For instance, 68 percent of graduates who majored in architecture and engineering did not receive Pell Grants.

At the other extreme, 68 percent of law and public policy graduates received Pell Grants. This is to say, even though architecture and engineering is the highest-paying major, students who receive Pell Grants are not as likely as students who did not receive Pell Grants to major in and complete a degree in architecture and engineering. Nonetheless, differences in what graduates

FIGURE 7. UT System graduates who did not receive Pell Grants earn more than Pell Grant recipients in the highest-paying majors, but earnings differences are small in other majors.



Median annual earnings three years after graduation for UT System Bachelor's degree recipients by major group and Pell Grant status.

Note: Earnings for agriculture and natural resources are not reported due to sample size limitations. Additionally, education is not a UT System major.

* $p = 0.01$ and ** $p = 0.05$, for the percent difference in earnings between Pell and non-Pell Grant recipients being greater than 0.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

chose to study explains less than 20 percent of the difference in earnings between UT System graduates who received Pell Grants and those who did not.³⁸

Institutional selectivity overwhelms the effect of Pell Grants.

The earnings gap between Pell Grant and non-Pell Grant graduates also decreases after accounting for institutional selectivity. This could be because the distribution of Pell Grants is different across the various tiers of selectivity. Across the nation, Pell Grant recipients are concentrated in open-access colleges. In fact, at nearly one-third of the most selective colleges, less than 20 percent of the students receive Pell Grants.³⁹ This finding holds true for the UT System, in general. UT System graduates who received Pell Grants are concentrated at middle-tier and open-access UT System colleges—57 percent of graduates from middle-tier UT System colleges and 61 percent of graduates from open-access UT System colleges received Pell Grants compared to 27 percent of graduates from selective UT System colleges.

After controlling for both institutional selectivity and choice of major, Pell Grant status does not have a significant impact on earnings of UT System graduates for most majors. Four majors (business; communications and journalism; computers, statistics, and mathematics; and psychology and social work) are associated with significantly different earnings between graduates who received Pell Grants and those who did not at selective UT colleges. At middle-tier UT colleges, business and health are associated with significantly different earnings between graduates who received Pell Grants and graduates who did not. Finally, at open-access UT colleges, health is the only major associated with significantly different earnings between graduates who received Pell Grants and graduates who did not.

A recent study puts into context the impact of college on improving student's income mobility. According to this report, the mobility rate is the percent of all students who come from families in the bottom 20 percent and reach the top 20 percent of income distribution. Students at all UT System colleges benefit from higher mobility rates than the national college average of 1.9 percent, ranging from 7.6 percent at UT Pan American to 2.1 percent at UT Tyler.⁴⁰ UT Austin and UT Dallas have the highest success rates for students coming from the bottom 20 percent of income and reaching the top 20 percent; their mobility rates are lower because they enroll fewer students from the bottom 20 percent of income.⁴¹ Research suggests that students from low-income backgrounds can be more successful if given the opportunity to attend more selective institutions, which spend more on instruction.⁴²

³⁸ While not shown here, the inclusion of major (but not selectivity) in the regression model decreases the significant earnings difference between UT System graduates who received Pell Grants and those who did not from 5.3 percent to 3.3 percent, all other things being equal.

³⁹ Carnevale and Van Der Werf, *The 20% Solution*, 2017.

⁴⁰ Chetty et al, "Mobility Report Cards," 2017.

⁴¹ Ibid.

⁴² Dale and Krueger, "Estimating the Payoff to Attending a More Selective College," 2002; Griffith and Rask, "The Effect of Institutional Expenditures on Employment Outcomes and Earnings," 2016.

PART 5

In the UT System, as in the United States generally, earnings gaps exist across race and ethnicity.

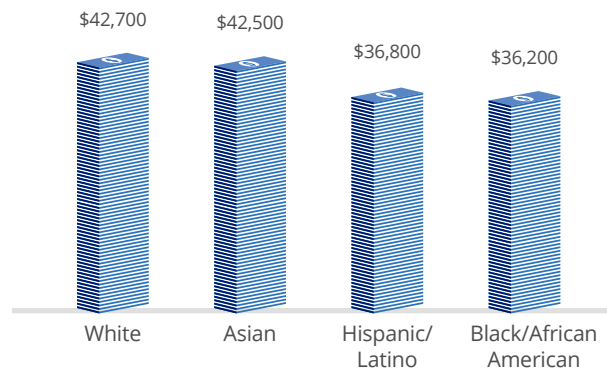
Earnings vary by the race and ethnicity of UT System graduates. Whites and Asians earn roughly the same three years after graduation. Latinos and Blacks also earn roughly the same. However, the gap between Blacks and Latinos on the one hand and Whites and Asians on the other is around \$6,000 annually three years after graduating (Figure 8).

While major still matters, career selection could be associated with the disparity in earnings across race and ethnicity.

Earnings disparities for Latinos and Blacks hold across majors. With few exceptions, Latino and Black graduates earn less than Whites and Asians. However, Latino graduates who majored in arts or humanities and liberal arts outearn the other races and ethnicities, while Black graduates who majored in law and public policy had the highest earnings among all races and ethnicities. Furthermore, Latinos and Blacks still receive the highest earnings relative to their respective race and ethnicity in the highest-earnings majors: architecture and engineering; computers, statistics, and mathematics; health; and business. Latinos who majored in architecture and engineering earn \$28,600 more than Latinos who majored in biology and life sciences, and Blacks who majored in architecture and engineering earn \$40,100 more than Blacks who majored in arts. Across race and ethnicity, the wage gap between Latinos and Whites and Blacks and Whites is greatest for architecture and engineering and business graduates (Figure 9).

Major selection might explain earnings disparities across race and ethnicity. UT System Latino and especially Black graduates are less likely to earn a degree in a STEM major compared to

FIGURE 8. The annual earnings gap between White and Asian graduates and Latino and Black graduates is around \$6,000.

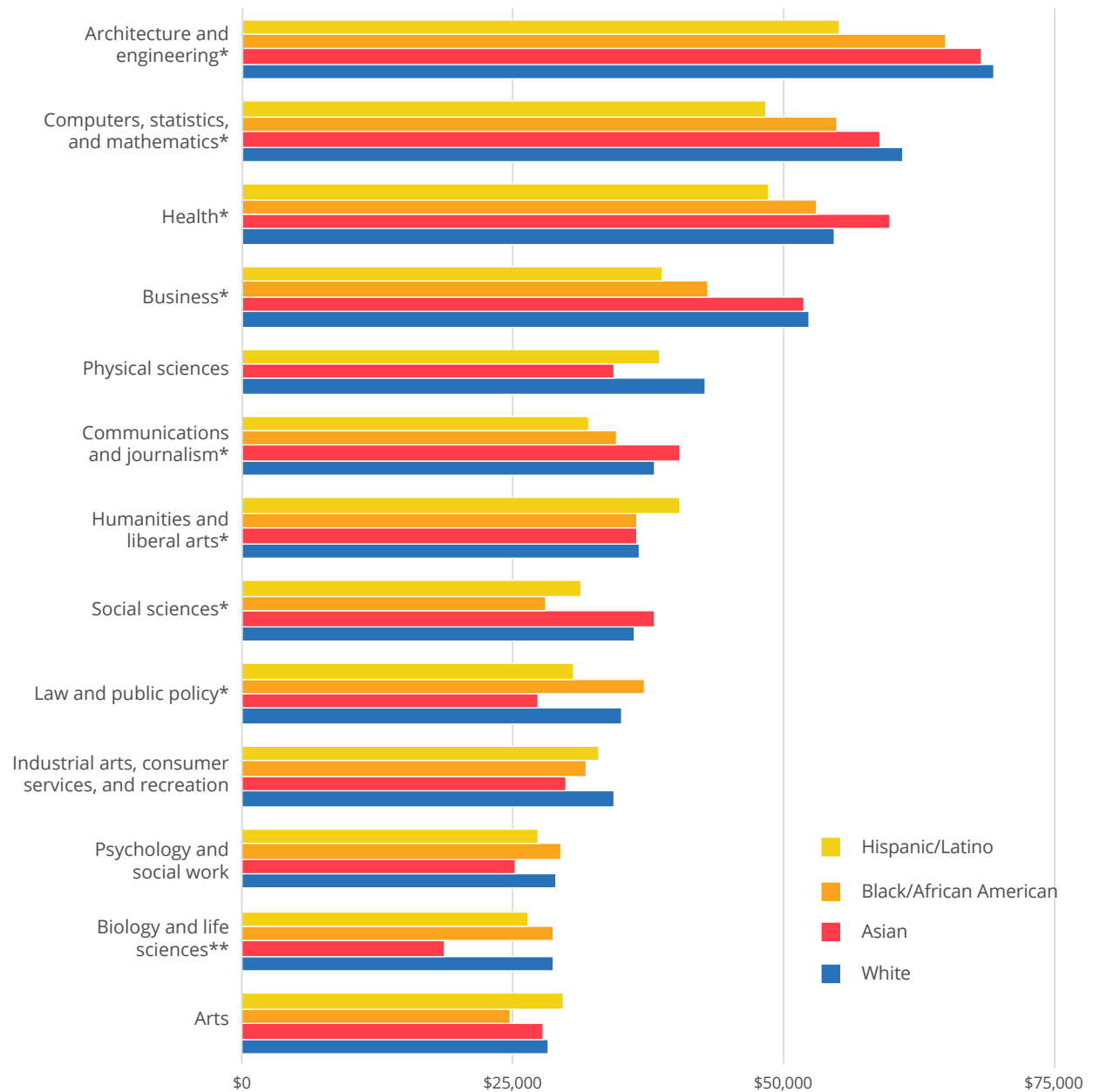


Median annual earning three years after graduation for UT System Bachelor's degree recipients by race and ethnicity.

Note: White and Asian earnings are significantly different from Latino and Black earnings at a 0.01 significance level. Latino earnings are not significantly different from Black earnings, and White earnings are not significantly different from Asian earnings.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

FIGURE 9. Within majors, the largest earnings gaps between Latinos and Whites and Blacks and Whites are in architecture and engineering and business.



Median annual earnings three years after graduation for UT System Bachelor's degree recipients by major group and race/ethnicity.

Note: Earnings for agriculture and natural resources majors and Blacks who majored in physical sciences are not reported due to sample size limitations. Additionally, education is not a UT System major.

* p = 0.01 and ** p = 0.05, for the percent difference in earnings between Whites and Latinos being greater than 0. White earnings are significantly different from Asian earnings at a 0.01 significance level for biology and life sciences and health. White earnings are significantly different from Black earnings at a 0.01 significance level for business and social sciences.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

White and Asian graduates. Five percent of Blacks and 9 percent of Latinos earned a degree in architecture and engineering compared to 11 percent of Whites and 15 percent of Asians. Latinos and Blacks are also more likely to graduate with law and public policy degrees than Whites or Asians. Yet, for the most part, all races and ethnicities are distributed similarly across majors. Therefore, it is not surprising that major distributional differences explain less than 10 percent of the earnings differences between White and Latino UT System graduates.

Career selection, on the other hand, could largely explain earnings differences because Latinos and Blacks tend to work in different occupations than Whites and Asians. Looking once again at ACS data for Texas, fewer Latinos and Blacks with a Bachelor's degree work in managerial and professional office and STEM occupations compared to Whites and Asians, regardless of major. Majoring in a high-paying major does not always translate into working in a high-paying occupation. While both Latinos and Whites who major in architecture and engineering primarily work in STEM occupations (34% of Latinos compared to 43% of Whites), Latinos in the same major are more likely than Whites to work in blue collar occupations—17 percent compared to 8 percent.

Institutional selectivity is associated with higher earnings across race and ethnicity.

In general, Latinos and Blacks are more represented and are enrolling at faster rates at selective colleges in Texas than across the United States.⁴³ At the same time, racial and ethnic divides exist for graduates across the selectivity tiers in Texas and the UT System. Lower shares of Latino and Black graduates complete their Bachelor's degree at a selective UT System college – 26 percent of Latinos and 49 percent of Blacks compared to 74 percent of Whites and 81 percent of Asians. Comparatively, Latinos are overrepresented at middle-tier and open-access UT System colleges. They account for 34 percent of all UT System graduates, but 52 percent of graduates at middle-tier UT System colleges and 67 percent at open-access UT System colleges.⁴⁴ In addition, Latino representation varies between UT System colleges, ranging from 94 percent of graduates at UT Brownsville to 6 percent at UT Tyler. Blacks, on the other hand, are underrepresented at all UT System colleges except UT Arlington, where they account for 14 percent of graduates.

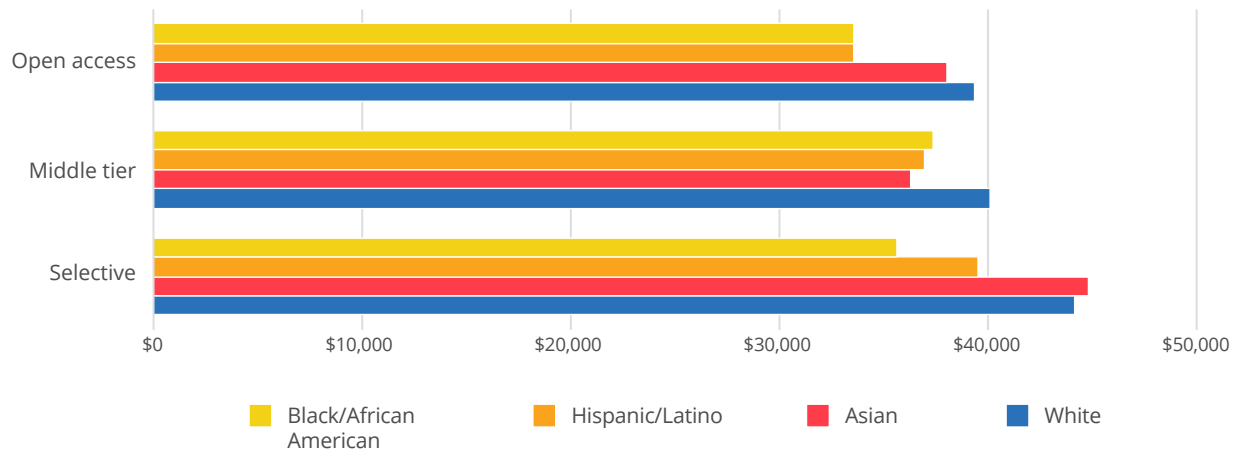
Specifically in the UT System, for White, Asian, and Latino graduates, the more selective the college, the higher the earnings will be. Asians have the largest gains—Asians who graduated from a selective UT System college earn almost \$7,000 more than Asians who graduated at an open-access UT System college. Black graduates are an exception to this rule. They experience a small gain by graduating from a selective UT System college compared to an open-access

⁴³ Carnevale et al., *Race, Money, and Public Colleges*, forthcoming.

⁴⁴ Fifty percent of Latinos and 46 percent of Blacks have test scores in the bottom 50th percentile, while only 9 percent and 10 percent of Whites and Asians, respectively, are found in the lower quartiles. Among UT System graduates with high test scores, 90 percent of Whites complete their Bachelor's degrees from a selective college, compared to 82 percent of Blacks and 69 percent of Latinos.

college, but their median earnings are highest when they graduate from a middle-tier UT System college (Figure 10). Previous studies have shown positive earnings returns for Blacks and Latinos attending selective colleges.⁴⁵

FIGURE 10. White, Asian, and Latino graduates who completed their degrees at selective UT System colleges experience higher earnings than those who completed their degrees at open-access UT System colleges.



Median annual earnings three years after graduation for UT System Bachelor's degree recipients by institutional selectivity and race/ethnicity.

Note: At selective UT System colleges, earnings for White and Asian graduates are strongly significantly different from Latino and Black graduates' earnings at a 0.01 significance level, and Black graduates' earnings are significantly different from Latino graduates' earnings at a 0.01 significance level. At middle-tier UT System colleges, earnings for White graduates are significantly different from Asian, Black, and Latino graduates' earnings at a 0.01 significance level. At open-access UT System colleges, earnings for White graduates are significantly different from Black and Latino graduates' earnings at a 0.01 significance level.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data and *Barron's Profiles of American Colleges*, 2014.

⁴⁵ Dale and Krueger, "Estimating the Effects of College Characteristics over the Career Using Administrative Earnings Data," 2014; Andrews et al., "Quantile Treatment Effects of College Quality on Earnings," 2016.

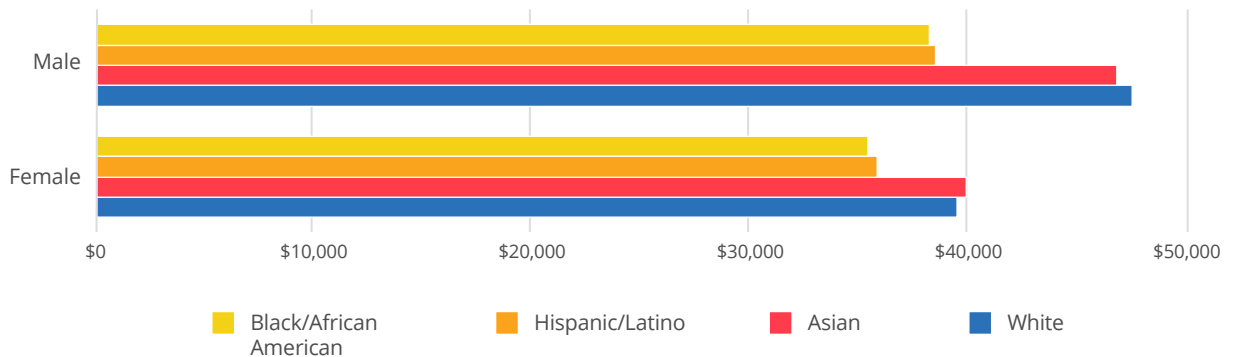
PART 6

Male UT System graduates earn, on average, \$6,000 more than female graduates three years after graduation.

The women's story in higher education is bittersweet. Women have used higher education more than any other societal institution to leverage their social and economic progress since the 1980s. Women outperform men in progression and completion at every level of higher education. Nonetheless women in Texas and elsewhere are concentrated in college majors that lead to lower paying occupations and, even in higher paying majors, they are paid less than similarly educated men. The roots of the gender gap are profound. Societal expectations and gender stereotypes have been shown to shape women's interests and values, which then form the backdrop for occupational decisions, such as working part-time rather than full-time.⁴⁶

Female UT System graduates earn less (\$37,500) than male UT System graduates (\$43,200).⁴⁷ Across race and ethnicity, these gender earnings disparities persist. White women earn less than White men just as Black women earn less than Black men. However, the wage gap by

FIGURE 11. White men earn almost 34 percent more than Latino and Black women.



Median annual earnings three years post-graduation for UT System Bachelor's degree recipients by race/ethnicity and gender.

Note: Male and female earnings are strongly significantly different across race and ethnicity at a 0.01 significance level. White and Asian earnings are strongly significantly different from Latino and Black earnings across gender at a 0.01 significance level.

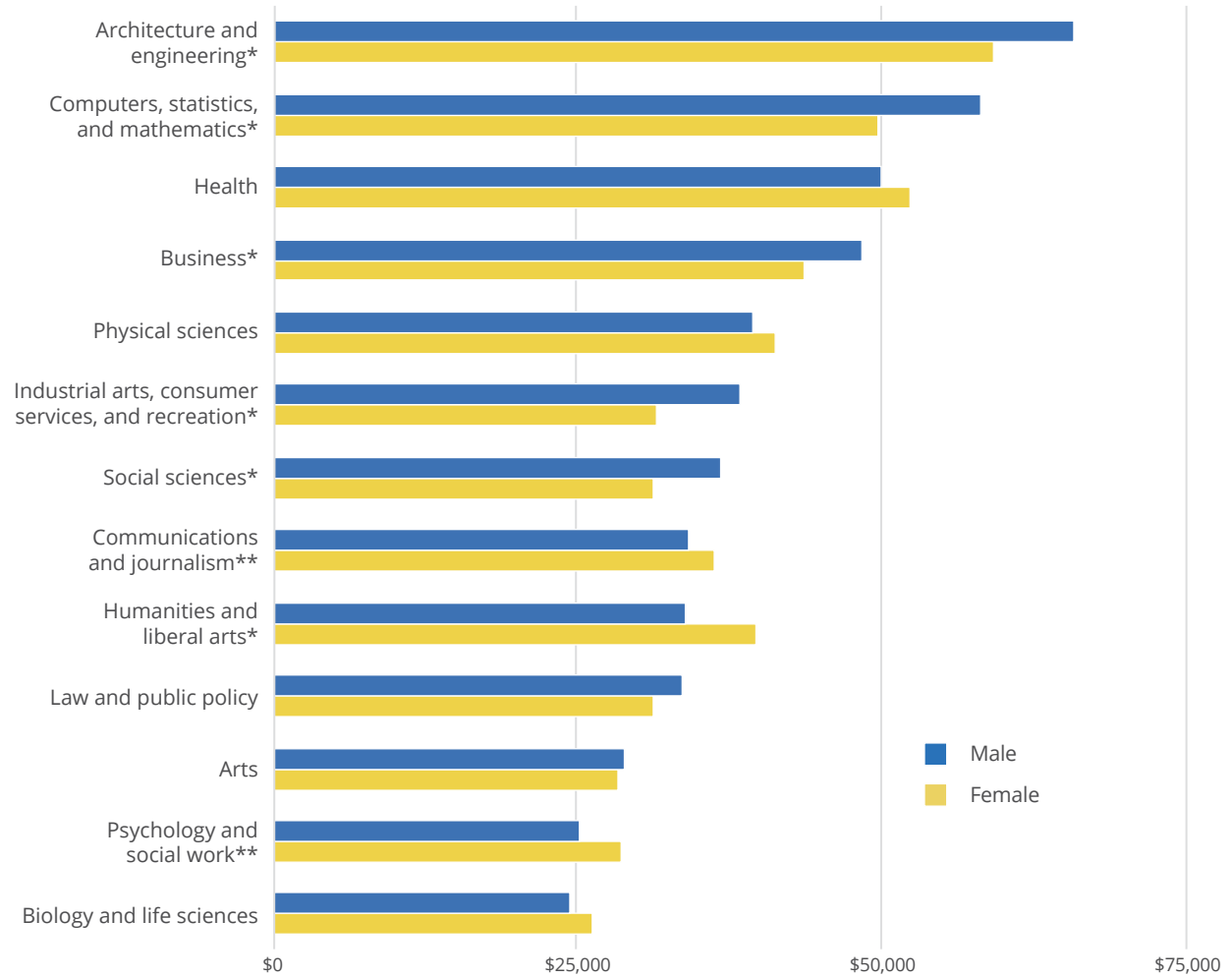
Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

⁴⁶ Eagly, "Prejudice: Toward a More Inclusive Understanding," 2004; Albert and Porter, "Children's gender-role stereotypes," 1988.

⁴⁷ Earnings for women are significantly different from earnings for men at a 0.01 significance level.

race and ethnicity among women is smaller than that among men. Latina and Black women earn approximately \$4,000 less than White and Asian women, while Latino and Black men earn approximately \$9,000 less than White and Asian men (Figure 11).

FIGURE 12. Women initially make more than men in majors where they greatly outnumber men, such as health.



Median annual earnings three years after graduation for UT System Bachelor's degree recipients by major group and gender.

Note: Earnings for agriculture and natural resources are not reported due to sample size limitations. Additionally, education is not a UT System major.

* $p = 0.01$ and ** $p = 0.05$, for the percent difference in earnings between men and women being greater than 0.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

Women initially earn more than men in majors dominated by women, but quickly lose their earnings advantage.

Female UT System graduates are overrepresented in most majors, but men are better represented in the high-paying STEM majors. Men account for 77 percent, 75 percent, and 63 percent, respectively, of graduates who majored in architecture and engineering; computers, statistics, and mathematics; and physical sciences. Women, on the other hand, account for 85 percent, 76 percent, and 70 percent, respectively, of graduates who majored in health; psychology and social work; and humanities and liberal arts. (For more information on the composition of UT System graduates, see Appendix 1.)

Overall, men tend to earn more than women across most majors. This is especially true for the highest-paying majors where men greatly outnumber women. Women earn almost \$5,000 less than men in business, \$6,000 less in architecture and engineering, and almost \$9,000 less in computers, statistics, and mathematics. On the other hand, three years after graduation, women tend to earn more or the same as men in majors that are dominated by women: women earn over \$3,000 more in psychology and social work and \$6,000 more in humanities and liberal arts (Figure 12).

Choice of major plays an important role in the earnings differences between men and women, accounting for over 50 percent of the differences. Choice of major also plays an important role in graduates' jobs and earnings in the workforce. According to ACS, women with Bachelor's degrees in Texas are more likely to have jobs in education (23% compared to 11% of men) and healthcare professional and technical occupations (10% compared to 3% of men), while men are more likely to be working in STEM occupations (18% compared to 6% of women). Men are more likely to major in architecture and engineering, while women are more likely to major in health. Women who major in architecture and engineering are just as likely as men in the same major to work in a STEM occupation. Thus, if more women completed Bachelor's degrees in STEM majors and worked in STEM occupations, they likely would receive higher earnings.

The initial female wage advantage over men holds for similarly aged workers in Texas generally. For example, ACS data show that similarly aged women with Bachelor's degrees earn more than men if they majored in health or communications and journalism. However, this trend quickly disappears when women reach their thirties. At that point, men with terminal Bachelor's degrees earn more than women across all majors. One study found that young childless women have equivalent earnings to similarly aged men, but women lose their initial wage advantage because they have a greater likelihood of working part time due to building their families.⁴⁸

⁴⁸ Dougherty, "Young Women's Pay Exceeds Male Peers," 2010.

Conclusion

Overall, UT System graduates with Bachelor's degrees have higher earnings than other college graduates working in Texas. They also tend to earn more than college graduates nationally regardless of background. Major appears to be the driving influence in determining the earnings of Bachelor's degree recipients. While other factors, such as institutional selectivity, race and ethnicity, and gender play a role in determining earnings, their effects are dwarfed by the effect of major. Graduating in a high-paying major appears to be a high-return decision for students regardless of their family or racial and ethnic background, suggesting that both high- and low-income students can do well and derive value from a UT System education.

More research is needed to understand fully the role of multiple factors in determining earnings and where and why earnings gaps emerge. For example, further research could shed light on how institutional selectivity and major seem to play an important role in the earnings of Pell Grant versus non-Pell Grant graduates. We would benefit from additional research that unpacks whether earning a Bachelor's degree in certain majors mitigates the impact of coming from a low-income background.

Career guidance on the range of occupations available to prospective students based on their majors and interests could translate to better life and career decisions for all graduates. With seekUT™, the UT System has developed a way to provide students and their families valuable information about employment, earnings, and student loan debt across majors. Students can use this information to improve alignment between their interests and the earnings they hope to receive in order to live comfortably and repay any student loans. Together, these steps along with efforts to ensure that all students can complete Bachelor's degrees will increase equity and opportunity and make sure higher education in the UT System remains a viable pathway to the middle class.

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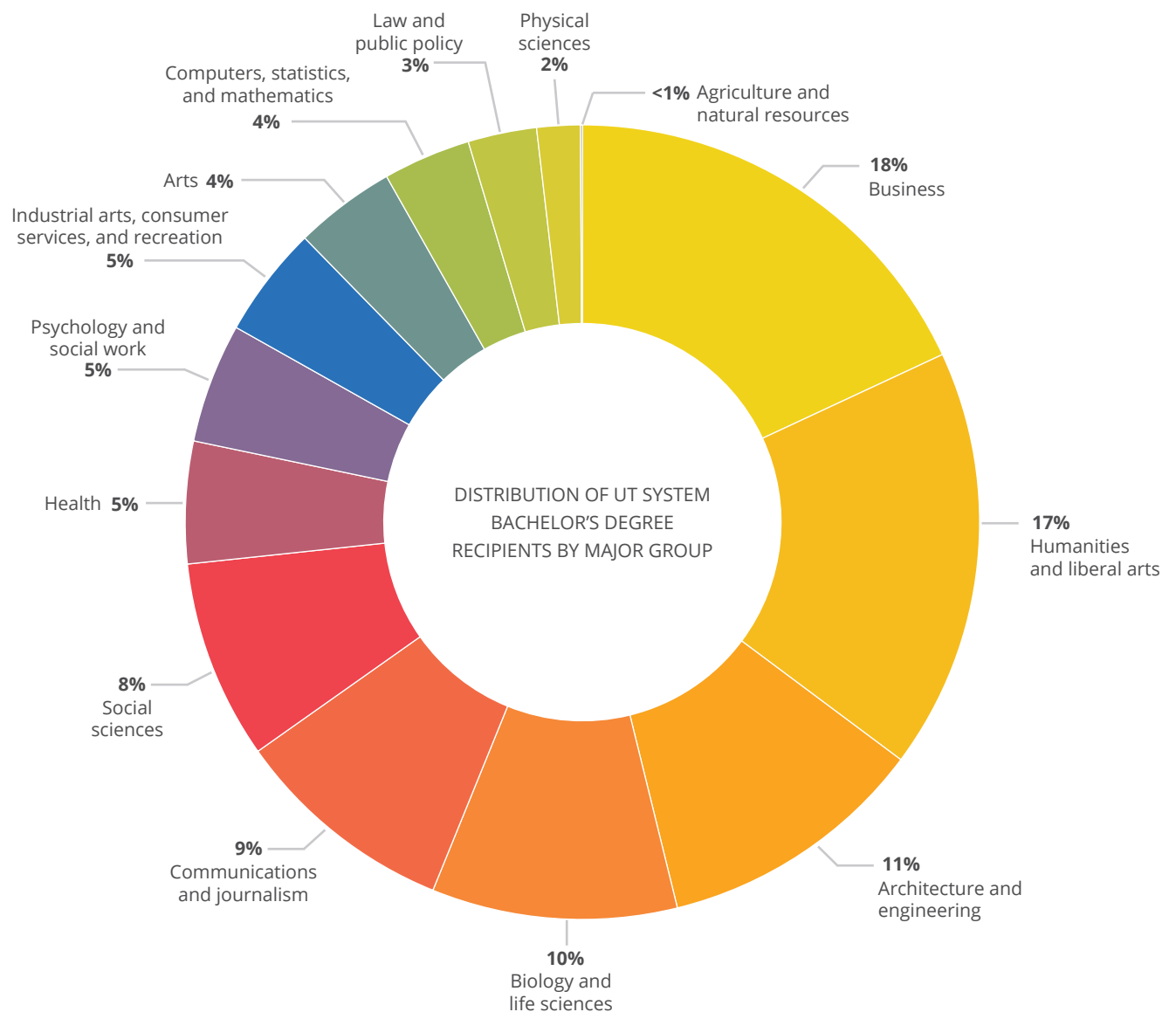
APPENDICES

APPENDIX 1

Composition of UT System Graduates

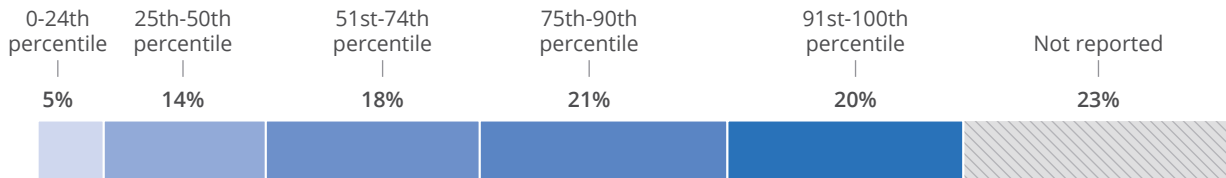
Business and humanities and liberal arts are the most common majors in the UT System, each comprising nearly 20 percent of Bachelor's degrees awarded. Architecture and engineering; biology and life sciences; communications and journalism; and social sciences are also popular with each accounting for about 10 percent of graduates (Figure 1-1).

FIGURE 1-1. The most popular majors are a mix of higher- and lower-earning majors.



Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

FIGURE 1-2. Over two-fifths of UT System graduates entered college with test scores in the top quartile.



Distribution of UT System Bachelor's degree recipients by SAT/ACT percentile.

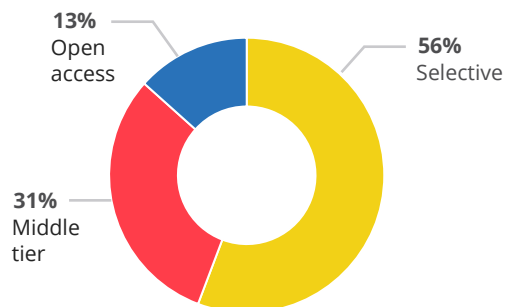
Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

Graduates with high SAT/ACT test scores make up a significant share of the UT System Bachelor's degree recipients. Over 40 percent of graduates are in the top 25th percentile nationally, while less than one-fifth fall below the national median (Figure 1-2).

Over half of Bachelor's degree recipients graduate from selective UT System colleges. Middle-tier UT System colleges account for 31 percent of graduates and open-access colleges account for 13 percent (Figure 1-3).

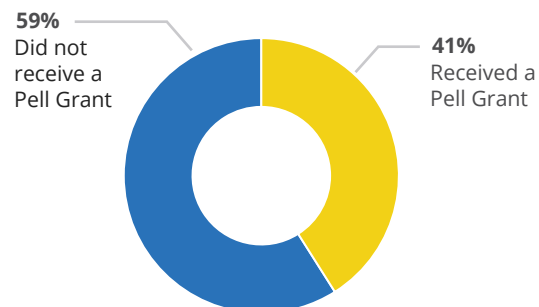
About two-fifths (41%) of UT System graduates were Pell Grant recipients (Figure 1-4). While graduates who receive Pell Grants have family incomes ranging from less than \$20,000 to over \$80,000, Pell Grant recipients are much more likely than non-Pell Grant recipients to come from low-income families (Table 1-1).

FIGURE 1-3. Over half of UT System graduates completed their Bachelor's degrees at a selective UT System institution.



Distribution of UT System Bachelor's degree recipients by institutional selectivity.

FIGURE 1-4. Forty-one percent of UT System graduates were Pell Grant recipients.



Distribution of UT System Bachelor's degree recipients by Pell Grant status.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data and *Barron's Profiles of American Colleges*, 2014.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

TABLE 1-1. UT System graduates who received Pell Grants have lower family incomes than UT System graduates who did not receive Pell Grants.

Distribution of UT System Bachelor's degree recipients by family income and Pell Grant status.

FAMILY INCOME*	PELL	PELL DISTRIBUTION	NON-PELL	NON-PELL DISTRIBUTION
Less than \$20,000	3,759	18%	459	2%
\$20,000 to \$39,999	5,476	26	672	2
\$40,000 to \$59,999	4,732	23	1,443	5
\$60,000 to \$79,999	2,681	13	2,661	9
\$80,000 and greater	4,111	20	21,158	70
Income unknown/not reported	151	1	3,681	12
Total	20,910	100	30,074	100

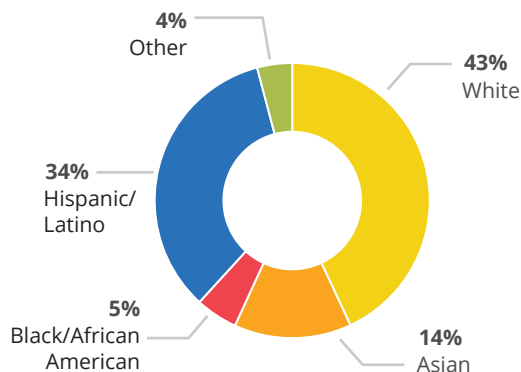
*Draws on family income from financial aid data collection first (student and spouse income only if student is independent, parental income is included as well if student is dependent). If family income data were unavailable from financial aid data collection, self-reported family income data from admissions records were used.

Note: Columns might not add to 100 percent due to rounding.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System, 2008-2011 Bachelor's degree recipients data matched with wage record data.

The UT System serves a relatively diverse student population. While approximately two-fifths of Bachelor's degree recipients are White, Latinos make up about a third of graduates (Figure 1-5). As in higher education overall, the majority of graduates are women (Figure 1-6).

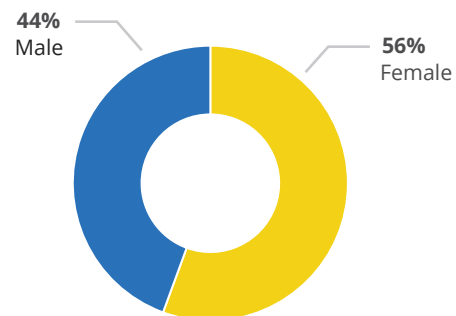
FIGURE 1-5. Over a third of UT System graduates are Latino.



Distribution of UT System Bachelor's degree recipients by race and ethnicity.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

FIGURE 1-6. Women account for the majority of UT System graduates.

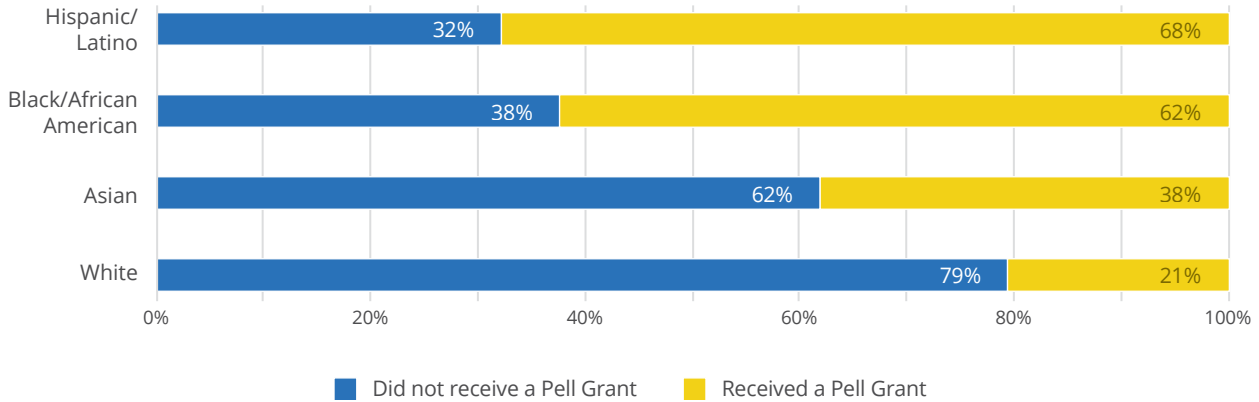


Distribution of UT System Bachelor's degree recipients by gender.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

Latino and Black graduates were more likely to receive Pell Grants than White and Asian graduates. Over 60 percent of Latinos and Blacks received Pell Grants compared to 21 percent of Whites and 38 percent of Asians (Figure 1-7).⁴⁹ Similarly, women are more likely to receive Pell Grants compared to men (Figure 1-8).⁵⁰

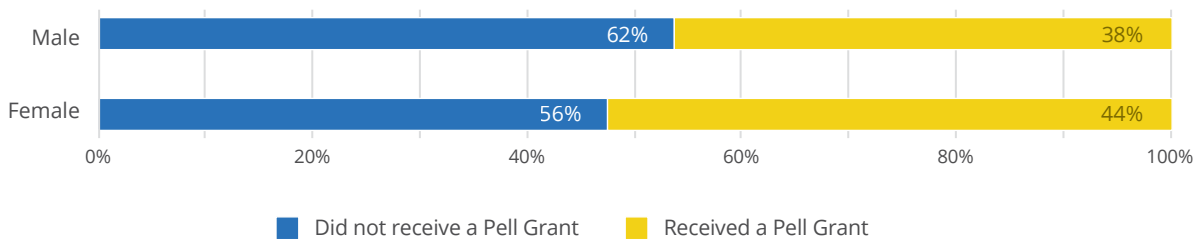
FIGURE 1-7. Over 60 percent of Latino and Black graduates received Pell Grants.



Distribution of UT System Bachelor’s degree recipients by race and ethnicity and Pell Grant status.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor’s degree recipient data matched with wage record data.

FIGURE 1-8. Female graduates are more likely to have received Pell Grants than male graduates.



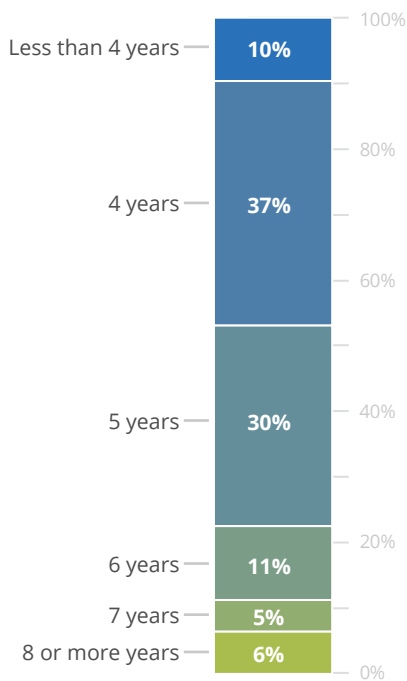
Distribution of UT System Bachelor’s degree recipients by gender and Pell Grant status.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor’s degree recipient data matched with wage record data.

⁴⁹ While Latinos and Blacks were more likely to have received Pell Grants, Latinos and Blacks earn less than Whites and Asians three years after graduation, regardless of whether they received Pell Grants.

⁵⁰ Women earn less than men whether or not they received Pell Grants, and graduates who received Pell Grants earn less than those who did not regardless of gender.

FIGURE 1-9. Most UT System graduates complete their degrees within five years.



Distribution of UT System Bachelor's degree recipients by years enrolled.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data.

Most UT System graduates (77%) completed their Bachelor's degrees within five years. Almost a quarter of graduates took six or more years to complete (Figure 1-9). Years enrolled did not have a significant effect on earnings and was not included in the final analysis. Overall, graduates who completed their degree in either four years or five years have the highest earnings. There is no consistent relationship between years to graduation and earnings across majors, institutional selectivity, or race and ethnicity. For instance, of the 15 major groups examined in this study, being enrolled four to five years results in the highest earnings for six major groups: architecture and engineering; arts; business; communications and journalism; computers, statistics, and mathematics; and humanities and liberal arts.

APPENDIX 2

Occupation by Major

Some majors, such as architecture and engineering and health, have clearer connections to specific occupation groups than other majors, such as industrial arts, consumer services, and recreation (Table 2-1).

TABLE 2-1. Distribution of 15 majors into 10 occupation groups.

	Managerial & professional office	STEM	Arts and community services	Education	Healthcare professional & technical	Healthcare support	Food and personal services	Sales and office support	Blue collar	Social sciences
Agriculture and natural resources	22%	8%	2%	13%	6%	1%	10%	24%	13%	0%
Architecture & engineering	15	52	3	7	1	0	4	10	7	0
Arts	11	4	25	18	1	1	12	24	5	0
Biology and life sciences	10	13	3	16	26	4	7	18	4	0
Business	45	6	3	6	1	0	4	31	4	0
Communications and journalism	29	4	16	9	2	1	5	31	3	0
Computers, statistics, and mathematics	12	46	4	17	1	0	4	12	4	0
Education	6	1	4	71	1	0	6	10	1	0
Health	5	2	2	7	66	3	5	8	2	0
Humanities and liberal arts	18	4	9	27	3	1	9	25	4	0
Industrial arts, consumer services, and recreation	14	4	6	23	11	3	15	18	7	0
Law and public policy	16	4	11	9	2	0	22	31	5	0
Physical sciences	10	24	2	21	13	4	6	11	7	0
Psychology and social work	17	3	20	14	5	1	9	26	3	2
Social sciences	32	6	6	12	2	1	9	27	5	1

Note: Rows might not add up to 100 percent due to rounding.

Source: Georgetown University Center on Education and the Workforce analysis of data from U.S. Census Bureau, *American Community Survey (ACS)*, 2012-2015.

APPENDIX 3

Data and Methodology

This study utilizes data on individuals who received their Bachelor's degrees from a University of Texas System (UT System) institution between 2000 and 2013.⁵¹ The main analysis is based on graduates who completed their studies from a UT System academic institution between 2008 and 2011. The years 2008 through 2011 were used because there were more complete records available. Moreover, this time period was more conducive to follow-up on labor market outcomes for at least three years after the degree was completed. Due to limited data on transfer students, the analysis is focused on all graduates who enrolled as first-time students in college at their respective UT System campus. The study sample consists of 50,984 Bachelor's degrees awarded in this period from the UT System academic institutions.⁵² UT System graduates in this study were typically between the ages of 21 and 25 at the time of graduation.⁵³

Some UT System graduates earned multiple Bachelor's degrees in this time period. In these cases, the study considered each of these awards as a separate record within the analysis as it is not possible to determine their primary award or major since some of these awards were earned on the same day. Overall, around 4 percent of graduates in the analysis sample earned two or more Bachelor's degrees. In some cases, UT System graduates went on to graduate school after obtaining their Bachelor's degrees. These graduates were still included in the analysis and could account for shifts in earnings across majors over time. About 14 percent of UT System graduates earned a graduate degree within three years of obtaining their Bachelor's degree. Robustness checks showed that excluding these graduates from the sample did not significantly change earnings.

Earnings for UT System Bachelor's degree recipients are drawn from their matched unemployment insurance (UI) wage records from 2003 to 2014 provided to the UT System by the Texas Workforce Commission (TWC) as part of a data sharing agreement. UI wage records include the total quarterly wages for each job reported by employers to state UI agencies for each employee. They do not include wages of the self-employed, military personnel, federal government workers, employees of religious orders, and most independent contractors. Furthermore, wages are not included for UT System graduates with out-of-state jobs. We focus on following graduates into their early careers by examining earnings outcomes three years

⁵¹ UT System Bachelor's degree recipient data as reported to the The Texas Higher Education Coordinating Board (THECB) for state reporting purposes.

⁵² Almost all UT System institutions had Bachelor's degree graduates between 2008 and 2011. However, very few of the health campuses enroll undergraduates as first-time students; the vast majority of graduates from these campuses are transfer students. The Brownsville and Pan American campuses are included in this analysis since they awarded Bachelor's degrees between 2008 and 2011. These institutions closed at the end of the 2015 academic year. A new institution, the University of Texas Rio Grande Valley, began enrolling students in fall 2015.

⁵³ Based on date of birth given by graduates, the full age range of graduates is 13-88. However, 92 percent of graduates are between the ages of 21 and 25 at the time of graduation.

after graduation.⁵⁴ Annual earnings three years after graduation were available for 70 percent (35,840) of 2008-2011 graduates and are inflation adjusted to 2014 dollars.⁵⁵ The findings in this report pertain to UT System Bachelor's degree recipients. As a result, all earnings outcomes are conditional on having graduated from the UT System. In order to determine if median earnings were significantly different from one another, a nonparametric K-sample equality-of-medians test was performed.

Examining graduates who completed their studies between 2008 and 2011 does not allow for analysis of earnings trends beyond three years. To compare one-year, three-year, and five-year earnings after graduation, we look at 2004-2009 graduates who are first-time students. Wages for this group are also inflation adjusted to 2014 dollars.

The data on the majors of graduates are provided using Classification of Instructional Programs (CIP) codes. In order to compare UT System data to national- and state-level data, CIP codes were converted into major groups (see Table 3-1).⁵⁶

SAT and ACT test scores were translated into national percentile brackets using published tables that were closest to the graduate's application year. Graduates with both SAT and ACT test scores were placed into the percentile group using the score that fell into the higher category (see Table 3-2). Since only 5 percent of UT System graduates had SAT/ACT test scores below the 25th percentile (see Figure 1-2), we combined the lower quartiles in our analysis, thus examining UT System graduates with test scores below the 50th percentile, between the 50th and 75th percentiles, and above the 75th percentile.

This report classifies the UT System colleges into three selectivity tiers based on *Barron's Profiles of American Colleges*: selective colleges, middle-tier colleges, and open-access colleges.⁵⁷

- Selective colleges comprise the 500 most selective colleges in the United States. These colleges admit students who score in the top 35 percent of college-entry exams. In the UT System, this group includes UT Austin and UT Dallas.
- Middle-tier colleges comprise 900 colleges that admit students who score above average on college-entry exams. In the UT System, these include UT Arlington, UT Pan American, and UT San Antonio.
- Open-access colleges admit students who demonstrate evidence of high school graduation. In the UT System, these include UT Brownsville, UT El Paso, UT Permian Basin, and UT Tyler.

American Community Survey (ACS) one-year micro data files were used to compare UT System

⁵⁴ This also allows us to conduct the analysis by SAT/ACT test score, which is substantially missing (50% or greater) from the earlier cohorts that would have allowed for longer earnings follow-up.

⁵⁵ The minimum sample size to be considered for inclusion is 30. This includes both UT System data and ACS data.

⁵⁶ ACS provides data on major field of study. Classification of major groups and subgroups can be found in *The Economic Value of College Majors*, <https://cew.georgetown.edu/cew-reports/valueofcollegemajors/>.

⁵⁷ *Barron's Profiles of American Colleges*, 2014.

TABLE 3-1. Classification of 15 major groups for two-digit CIP codes.

Major group	2-digit CIP
Agriculture and natural resources	01 – Agriculture, agriculture operations, and related sciences 03 – Natural resources and conservation
Architecture and engineering	04 – Architecture and related services 14 – Engineering 15 – Engineering technologies and engineering-related fields
Arts	50 – Visual and performing arts
Biology and life sciences	26 – Biological and biomedical sciences
Business	52 – Business, management, marketing, and related support services
Communications and journalism	09 – Communication, journalism, and related programs 10 – Communications technologies/technicians and support services
Computers, statistics, and mathematics	11 – Computer and information sciences and support services 27 – Mathematics and statistics
Education	13 – Education 25 – Library science
Health	51 – Health professions and related programs
Humanities and liberal arts	05 – Area, ethnic, cultural, gender, and group studies 16 – Foreign languages, literatures, and linguistics 23 – English language and literature/letters 24 – Liberal arts and sciences, general studies, and humanities 30 – Multi/interdisciplinary studies 38 – Philosophy and religious studies 39 – Theology and religious vocations 54 – History
Industrial arts, consumer services, and recreation	12 – Personal and culinary services 19 – Family and consumer sciences/human sciences 31 – Parks, recreation, leisure, and fitness studies 46 – Construction trades 47 – Mechanic and repair technologies/technicians 49 – Transportation and material moving
Law and public policy	22 – Legal professions and studies 43 – Homeland security, law enforcement, firefighting, and related protective services 44 – Public administration and social service professions
Physical sciences	40 – Physical sciences 41 – Science technologies/technicians
Psychology and social work	42 – Psychology
Social sciences	45 – Social sciences

TABLE 3-2. Classification of national SAT/ACT percentile brackets by application year.

	National percentile brackets	Test scores	Source
ACT	0-24	0-16	National Distributions of Cumulative Percents for ACT Test Scores: ACT-Tested High School Graduates from 2013, 2014 and 2015 http://www.act.org/content/dam/act/unsecured/documents/NormsChartMCandComposite-Web2015-16.pdf
	25-50	17-20	
	51-74	21-24	
	75-100	25-36	
SAT 1999-2005	0-24	0-880	2004: Interpreting and Using SAT Scores http://www.collegeboard.com/prod_downloads/counselors/hs/sat/resources/handbook/4_InterpretingScores.pdf
	25-50	890-1030	2005: SAT Percentile Ranks: Composite (CR+M) Percentile Ranks http://www.collegeboard.com/prod_downloads/about/news_info/cbsenior/yr2005/02_v&m_composite_percentile_ranks_0506.pdf
	51-74	1030-1170	
	75-100	1180-1600	
SAT 2006-2010	0-24	0-870	2006: SAT Percentile Ranks: 2006 College-Bound Seniors—Critical Reading + Mathematics http://www.collegeboard.com/prod_downloads/highered/ra/sat/SATPercentileRanksCompositeCR_M.pdf
	25-50	880-1020	
	51-74	1030-1160	2007-2010: CR+M only scores (1600 point scale) — inquiries@collegeboard.org and/or k12reports@info.collegeboard.org
	75-100	1170-1600	
SAT 2011	0-24	0-860	CR+M only scores (1600 point scale) — inquiries@collegeboard.org and/or k12reports@info.collegeboard.org
	25-50	870-1010	
	51-74	1020-1150	
	75-100	1160-1600	

graduates to national- and state-level data. Data from 2011 to 2015 were used in order to match the earning years of UT System graduates three years after graduation. Results on earnings were restricted to recent college graduates with only a Bachelor's degree between the ages of 24 and 28 and inflation adjusted to 2014 dollars. Since UI wage records do not provide information on occupation, ACS was also used to look at occupation trends in the Texas workforce. Occupation choice by major was analyzed for recent college graduates. However, due to sample size concerns, occupation choice by major and race and ethnicity or gender was analyzed for the prime-age Texas workforce, workers between the ages of 20 and 54.

APPENDIX 4

Regression Analysis of Earnings

The descriptive figures and statistics used in this report demonstrate how the earnings of UT System Bachelor's degree recipients differ by major, institutional selectivity, and demographics. However, in isolated cases, this approach is not accurate because of unusual and unobservable factors. For this reason, we turn to multivariate regression analysis as a more robust method for determining earnings differences. We use regression analysis to demonstrate that the results presented are accurate.

The standard regression approach is to use the log of earnings, which in this case is the total annual earnings three years after graduating. The coefficients presented in the regression represent the difference from the omitted variable. For example, the variable "female" shows how much less women make than men after controlling for other variables. In a similar fashion, the race and ethnicity variables represent the difference from White UT System graduates. Finally, the comparison group for major is those with a Bachelor's degree in architecture and engineering.

Regression analysis also differs from comparisons based on descriptive statistics because there is a test of statistical significance of how accurate the estimated effect is. In general, researchers say that a result is statistically significant if it is probable that the coefficient is different from zero at the 95 percent level of accuracy. Consequently, in the table presented below, this probability factor is denoted, and in most cases the probability is greater than 99 percent.

Table 4-1 presents the results of four simple regressions for all UT System graduates working in Texas. These regressions provide deeper understanding of the effect of UT System graduate characteristics on earnings, but more detailed research is needed to understand fully the complete effect of these variables. The first regression looks at the effect of family income and demographics on earnings and finds that Pell Grant status, race and ethnicity, and gender are significantly associated with earnings differences. Graduates who received Pell Grants earn 5 percent less than graduates who did not receive Pell Grants, all other things being equal. This is a composite number, averaging across race and ethnicity and gender. The earnings gap is larger across gender and race and ethnicity. Women earn 14 percent less than men. Earnings for Asians are 14 percent lower than Whites, earnings for Latino workers are 12 percent lower than Whites, and Black earnings are 13 percent lower than Whites.

The second regression builds on the first by adding institutional selectivity. Pell Grant status, race and ethnicity, and gender remain significantly associated with earnings differences. However, the earnings difference between graduates who received Pell Grants and those who did not decreases from 5.3 percent to 3.8 percent. Furthermore, the earnings difference between Latinos and Whites decreases from 12 percent to 7 percent. Institutional selectivity

is also statistically significant. Graduates who completed their degrees at an open-access UT System college earn 17 percent less than graduates who completed their degrees at a selective UT System college, all other things being equal. Graduates who completed their degrees at middle-tier UT System colleges earn 6 percent less than those who completed their degrees at selective UT System colleges.

The third regression adds 13 separate major variables to the previous regression model: the coefficients of these variables can be interpreted as the percentage difference from those who majored in architecture and engineering. Major is significantly associated with earnings, and is the factor that has the largest influence on earnings, explaining about 8 percent of earnings differences among graduates. For example, UT System graduates who majored in computers, statistics, and mathematics earn 11 percent less than those who majored in architecture and engineering, all other things being equal.

TABLE 4-1. Regression analysis: Earnings returns

Variable	(1)	(2)	(3)	Trimmed Outliers
Received Pell Grants	-5.3%*	-3.8%*	-1.7%	-1.5%
Race/Ethnicity				
Asian	-13.9*	-15.2*	-15.4*	-3.8*
Black/African American	-12.9*	-12.1*	-7.7*	-2.1
Hispanic/Latino	-11.5*	-7.4*	-5.9*	-5.4*
Female	-13.7*	-13.6*	-3.3*	-1.0
Institutional selectivity				
Middle-tier		-6.4*	-6.4*	-5.4*
Open-access		-17.1*	-19.3*	-12.5*
Major				
Computers, statistics, and mathematics			-11.1*	0.8
Health			-15.7*	-3.6
Business			-21.9*	-13.5*
Physical sciences			-42.4*	-31.1*
Communications and journalism			-46.2*	-33.5*
Humanities and liberal arts			-45.4*	-30.9*
Law and public policy			-48.4*	-35.7*
Social sciences			-52.0*	-37.9*
Industrial arts, consumer services, and recreation			-50.8*	-35.8*
Psychology and social work			-57.4*	-44.2*
Arts			-58.1*	-43.3*
Biology and life sciences			-66.1*	-44.9*
R2	0.0111	0.0139	0.0929	0.0954
Time trend	Yes	Yes	Yes	Yes

* $p = 0.01$, for the percent change in earnings being greater than 0.

Source: Georgetown University Center on Education and the Workforce analysis of data from The University of Texas System 2008-2011 Bachelor's degree recipient data matched with wage record data and *Barron's Profiles of American Colleges*, 2014.

While race and ethnicity and gender remain significantly associated with graduates' earnings, Pell Grant status is no longer a significant determinant of earnings once both institutional selectivity and major are accounted for.⁵⁸ Moreover, the earnings difference between men and women three years after graduation decreases by 10 percentage points, suggesting that much of the earnings difference between men and women is associated with major choice. When major is controlled for, women earn 3 percent less than men, all other things being equal.

In analysis not shown here, we also ran regressions to examine the effect of SAT/ACT test scores. However, SAT/ACT test scores are not significantly associated with a change in the earnings of UT System graduates. This is not surprising. Previous research has shown that the influence of major overwhelms the influence of test scores.⁵⁹

Unlike the descriptive analysis used in this report which looks at medians, regression analysis is based on averages. Therefore, earnings outliers might have more of an impact on regression analysis. To account for this, we remove outliers by dropping 5 percent of the observations with the highest and lowest earnings from the full regression model. Pell Grant status remains insignificant. In addition, there is no longer a significant difference in earnings between men and women three years after graduation. Setting aside the earnings difference between Whites and Latinos, which remains consistent, the differences between Whites and Asians and Whites and Blacks are the most affected by earnings outliers. Asians earn 4 percent less than Whites after controlling for outliers, and Blacks do not have significantly different earnings from Whites, all other things being equal. Overall, the impact of selectivity and major choice decreases, but still remains significant.⁶⁰ Nonetheless, major still remains the biggest determinant of UT System graduates' earnings in this model.

⁵⁸ Pell Grant status is still statistically significant when major is added to the regression model without institutional selectivity.

⁵⁹ Carnevale and Strohl, "How Increasing College Access is Increasing Inequality and What to Do about It," 2010.

⁶⁰ Computers, statistics, and mathematics and health are the exceptions.

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