The Permanent Detour

Underemployment's Long-Term Effects on the Careers of College Grads

Strada Institute FOR THE FUTURE OF WORK

burningglass CAREERS IN FOCUS

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Contents

Author Credits and Acknowledgements

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Foreword

Michelle Weise, Chief Innovation Officer, Strada Institute for the Future of Work

We've teamed up with Burning Glass Technologies to begin our study—the first of a four-part series—on the evolution of learning and work and how they are becoming inseparable.

The rapidly changing world of work presents a flurry of unanswered questions for us all. Take underemployment, which refers to people working in jobs for which they are overqualified. This topic has garnered attention over the years, with researchers illuminating how one in three Americans is underemployed. The prevalence of underemployment raises the question of who is being affected and for how long. Perhaps most importantly, how might we better prepare all students to launch into careers with long-term success?

It's not easy to disentangle these questions from conversations about the skills gap, wage stagnation, and the potential effects of artificial intelligence and automation on our workforce. For this reason, we at the Strada Institute for the Future of Work hope to begin identifying some of the signals through the noise. We are committed to improving the future of learning and work through research and innovation.

Our hope is that by engaging with the implications of our exponentially growing futures, we can create a learning ecosystem that reimagines education-to-employment pathways for all working learners.

In this first report, we wanted to get a better sense of the scope of underemployment. We often hear stories about underemployed college grads, and we tend to brush them off by rationalizing that these grads will soon find their footing. Underemployment is a short-term problem, right? You'll often hear educators saying that they aren't preparing students for their first job. They're preparing them for lifelong learning and careers.

But in our research, we have found that, with the exception of some STEM disciplines like engineering, computer science, and a few others, if you start off underemployed, you have a higher likelihood of remaining underemployed five and 10 years out. For women, the odds are even worse. Underemployment is not a short-term problem; it's a long-term problem with major financial implications. Focusing on that first job is essential.

Our initial findings have sparked our desire for more information. The rest of this series will seek to illuminate further the dynamics of occupations, skills, and credentials as they relate to working learners. We will outline challenges and misalignments in the education-to-career pipeline and discuss solutions to remedy these gaps by relying on granular insights from Burning Glass' databases of jobs, skills, and careers.

We're deeply curious about how work will evolve in the coming decades, and we hope you'll join us in our exploration of the future of learning and work.

Introduction

It's a well-known stereotype. Your barista has a bachelor's degree. The rental-car clerk graduated with honors. That guy tending bar successfully defended his thesis. Holding a menial or low-skilled first job right out of college, one that makes little use of a bachelor's degree, seems practically a rite of passage for recent graduates. For many, this job is little more than a placeholder paycheck that—supplemented, perhaps, by Mom and Dad—covers the bills for a year or two before young adults figure out a direction and settle into a long-term career.

Stories of underemployed college graduates are nothing new.[1] Many parents and their children regard lackluster jobs right after graduation as a detour that will be corrected in a few months—or in the worst case—in a few years. But the long-running narrative is more prominent now in an evolving economy, where entire occupations are expanding and contracting at an alarming speed and rising college tuition prices have resulted in record levels of student debt among recent graduates.

New evidence uncovered in our study on underemployment, however, suggests that young adults, parents, and college officials shouldn't be so quick to dismiss the job choices new graduates make out of college. Many academics often say they prepare students for their fifth job, not their first. Well, the first job matters more than we previously suspected for getting that fifth job. We found that early-career underemployment is not a mere diversion but rather a potential derailment with lingering instability that can lead to problems down the road. The choice of a first job can reverberate years into the future. This is especially true for women, as well as those in fields outside most STEM (science, technology, engineering, and mathematics) fields.

In the rest of the series, we will look more closely at where education-to-employment pathways are working and where they are falling short for graduates and the employers looking to hire them.

This is the first paper in a four-part series. Our analysis that follows is designed to answer three core questions:

How big a problem is underemployment?

Is underemployment a speed bump or a permanent detour?

And who is most affected?

Although underemployment has been a well-studied phenomenon over the past decade, Strada Institute for the Future of Work partnered with Burning Glass Technologies to get a better sense of the scope of the problem. What makes our analysis unique is the approach we used to describe underemployment. Most of the previous studies on the subject have used occupational profiles developed by the federal government to find college graduates in jobs that don't require a degree. But those government descriptions are slow to update as the market evolves.

We took a different approach using job postings and resumes. First, we assessed whether a job was a college-level job by using the requirements reported by employers in job postings. If, within the past 36 months, a majority of employment ads in a particular occupation asked for a bachelor's degree, we defined it as a college-level job, even if it historically required less education.

Next, we completed the first-ever analysis of actual work histories drawn from over 4 million unique resumes to get a better sense of the scope of how underemployment among college graduates has played out over years, even decades. From this data set, we were able to determine whether workers who start out underemployed stay that way or get back on track into jobs that utilize their credentials.

1. In this report, we define underemployment as bachelor's degree holders working in jobs that do not require a bachelor's degree. Our definition differs from the Bureau of Labor Statistics, which defines underemployed workers as those who prefer full-time employment but are involuntarily working part-time.

Among the highlights of our findings:

- **The first job is critical.** Those who start out well employed rarely slide into underemployment. An overwhelming number of workers who were appropriately employed in their first job continued to hold positions that matched their levels of education five years later (87%). Almost all of those appropriately employed at the five-year mark were still at that level 10 years later (91%).

- **Those who start out behind tend to stay behind.** For the four in 10 college graduates underemployed in their first job, the cycle of underemployment becomes progressively more difficult to escape. Workers who were initially underemployed were five times more likely to remain so after five years than those who were not underemployed in their first job. Even at the 10-year mark, three-quarters of workers who were underemployed at year five remained underemployed.

- **STEM graduates are less at risk of being underemployed.** Degree holders in most STEM fields (science, technology, engineering, and mathematics) are less likely to be underemployed in the first place and, when they are, more easily escape the underemployment trap than those majoring in other disciplines.

- **The financial costs of underemployment are substantial.** We estimate that underemployed recent graduates, on average, earn $10,000 less annually than graduates working in traditional college-level jobs. This imbalance leaves underemployed graduates generally on weaker financial footing as they start their careers.

- **Women are more likely to start out behind.** Overall, women are significantly more likely to be underemployed in their first job: 47% of female college graduates are initially underemployed, compared to 37% of male college graduates. And because initial underemployment can prove so challenging to escape for most people, this gender divide persists over time with greater numbers of women stuck in underemployment.

- **Women are more likely to be underemployed regardless of major.** Women with STEM degrees are less likely to be underemployed than women from other fields but still more likely to be underemployed than men with STEM degrees.

In all, our findings underscore the critical importance of the handoff between education and the workforce. Early employment choices are a dress rehearsal for the rest of life. Young adults underemployed after graduation can't consider it just a phase that they'll escape from in a few months because a few months can easily turn into a few years and eventually an entire career.

This report is based on research that uses a novel data source—information derived from millions of resumes of people looking for work across the U.S. Resume data is a powerful tool whose full potential is still emerging. The unique value of this data is its ability to measure the actual career progressions of large segments of the workforce over time, as well as the educational experiences that led to those careers.

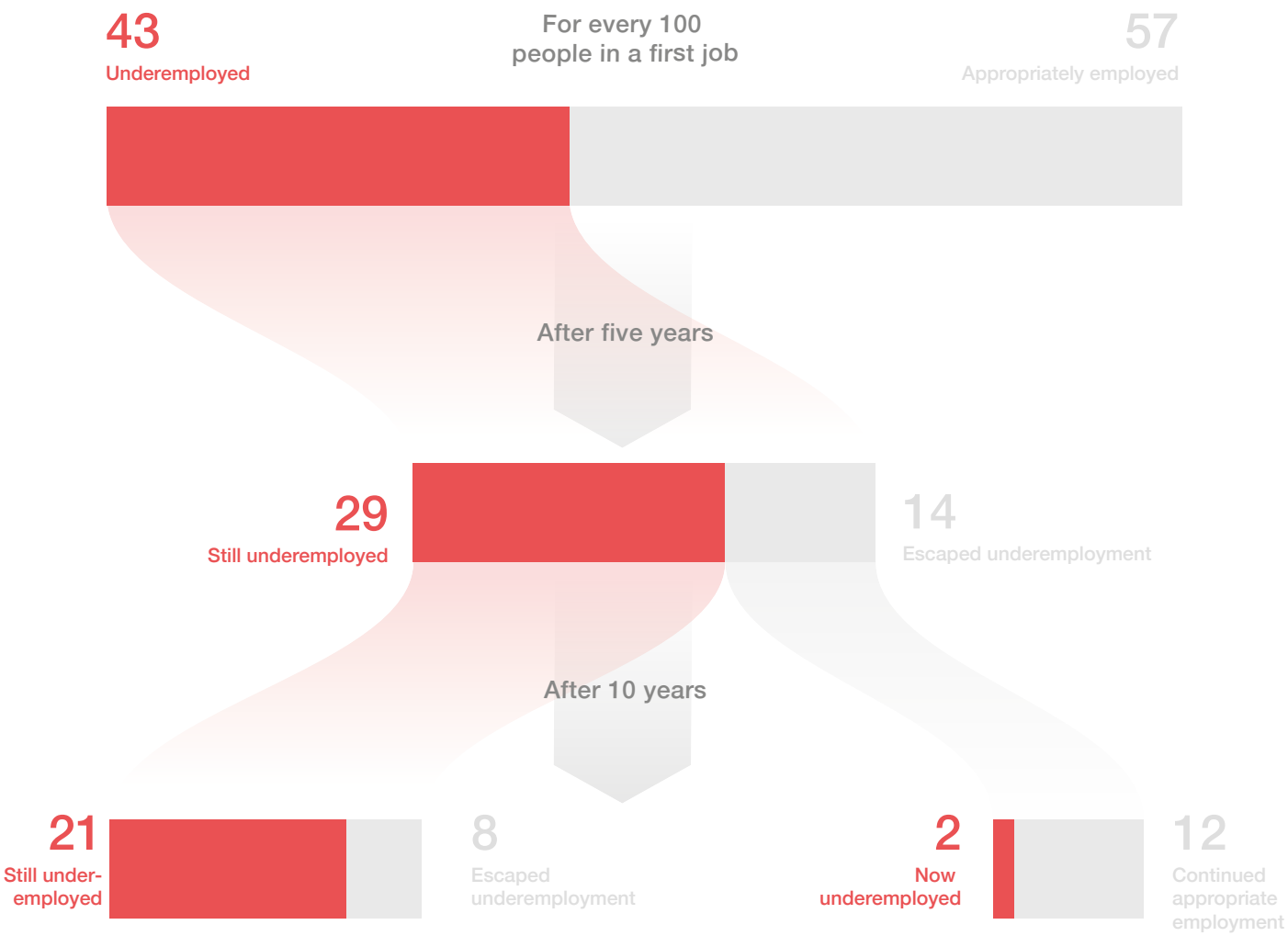
Researchers use specialized software to capture educational and employment information in aggregate from large resume databases and analyze it for trends. The methodology used data on the career path movements but no personally identifiable information.[2] A more detailed discussion of resume data appears in the Appendix.

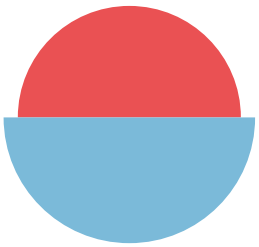
2. This report is based on aggregate career path and skills data and no personally identifiable information was used by researchers. Burning Glass Technologies has developed a database of millions of recent resumes. When a resume enters the system, the name, address, and other identifying details are encrypted so that they are not accessible to the research team. Researchers collect resumes with similar characteristics so that they can determine which types of transitions and career progressions commonly occur at a population level.

Those who start out behind tend to stay behind: Key findings and highlights from our underemployment research

Our findings revealed that 43% of workers in our sample were underemployed in their first job. And as they progressed, the cycle of underemployment became progressively more difficult to escape. Workers who were initally underemployed were five times more likely to remain so after five years than those who were not underemployed in their first job. And once in that rut, the chances of escape are slim.

Underemployment at the start of a career can leave new graduates disadvantaged





Underemployed graduates
$37,330

Appropriately employed
$47,470

The financial costs of underemployment are substantial

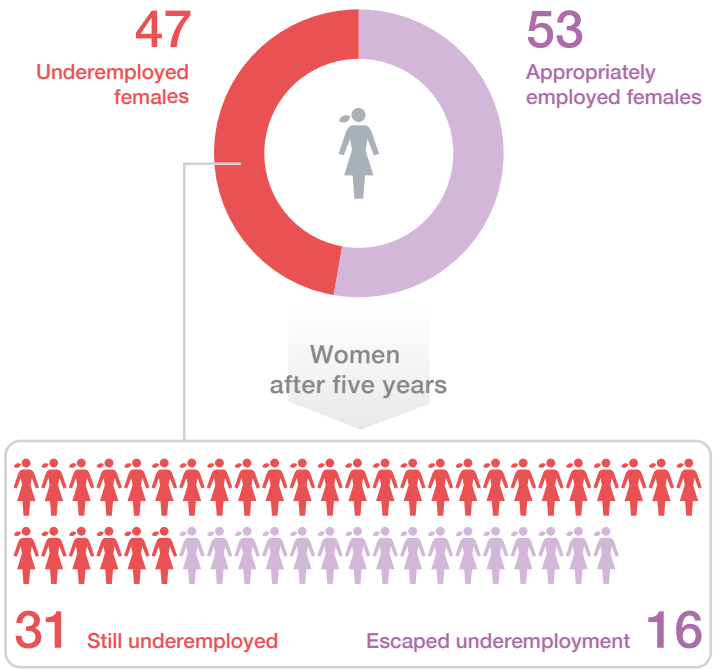
Starting in an underemployed position leaves graduates generally on weaker financial footing to start their careers.

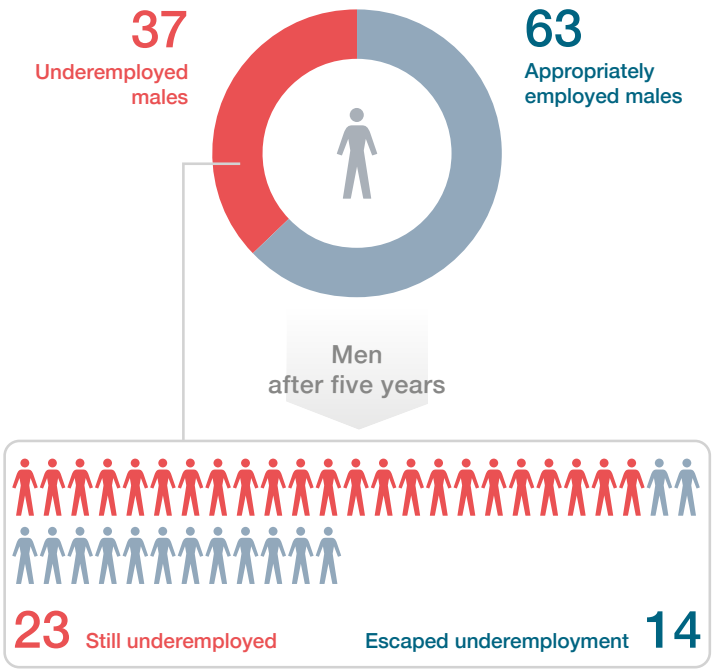
On average, underemployed recent graduates earn **~$10,000** (27%) less per year than fully employed graduates.

Female graduates are more at risk for ongoing underemployment

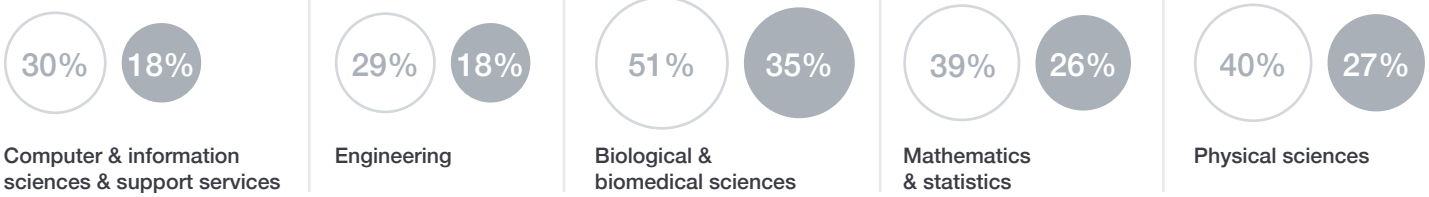
Our findings reveal that this trend persists across majors: Even in most STEM majors, females are more likely to be underemployed than men.

For every 100 people in a first job





Risk of underemployment is lowest among STEM graduates



Part One The Landscape of Underemployment

The problem of underemployment has been shaped by the economic shocks of recent years.

Even nearly a decade after the height of the Great Recession, its effects are still being felt on a whole cohort of graduates, says Tom Allison, acting director of policy and research for Young Invincibles, an advocacy group for students and recent graduates. This is the first generation of college graduates, he notes, to enter an economy where many of the new jobs are not traditional, permanent, full-time roles.

In 2016, a study by two noted economists, Lawrence F. Katz and Alan B. Krueger, concluded that all employment growth in the United States since 2005 appeared to have come from what they termed alternative work. While apps for temporary work,[3] such as Uber and TaskRabbit, get most of the attention in today's gig economy, the two found that the "offline" contract work of freelancers is actually growing the fastest, ballooning by 50% over the last decade.

Forced to settle for the jobs available in this new economy, graduates struggle to climb the employment ladder, Allison says. "They're still a step behind," he adds.

The term underemployment, however, is both overused and ill defined. Earlier studies have attempted to quantify the scope of underemployment, finding that between 33% and 45% of recent graduates are underemployed, and this trend is increasing.[4]

Previous studies on underemployment have often based their findings on the U.S. Census Bureau's American Community Survey, as well as information from O*NET (the Occupational Information Network), a Department of Labor database that contains definitions of each occupation. O*NET tracks job trends and analyzes skill level by occupation, that is, whether the skills necessary for a particular job are taught in high school, entail some college, or require a bachelor's degree or more.

The problem is that the skills required for many jobs, particularly in the technical arena, may evolve more quickly than O*NET can update them. What's more, reliance on such surveys can lead to what's known as incumbent worker bias. Because the occupational assessments are based on the skills of all workers in a field, they likely include individuals who gained on-the-job training (such as paralegals or firefighters) as well as older workers who may have entered the occupation when requirements were different from today's (like pharmacists, physical therapists, or executive assistants).[5] This bias may either over- or underestimate requirements, thus inaccurately reflecting the expectations for today's new employees.

What is clear from our research, however, is that the parameters of underemployment are in a state of flux, given the changing nature of jobs and skills and credentials required to enter them. The fluidity of underemployment is driven by two key factors. First, the skills associated with jobs are changing and becoming more complex. Take drafting positions, as an example.

Design software has automated much of the core work of a drafter, so now many firms searching for drafters are advertising for engineering graduates with four-year degrees. Second, employers are asking for bachelor's degrees even when the job skills haven't changed much, a phenomenon known as upcredentialing.

A study conducted last year by Harvard Business School that drew on Burning Glass data found more than six million jobs that don't require a bachelor's degree are at risk of credential inflation.[6] As employers demand a degree for jobs that formerly did not require one, many lower-level jobs are becoming de facto four-year degree jobs. Take, for example, executive secretaries and executive assistants. Burning Glass calculated in 2014 that 65% of postings for such jobs called for a bachelor's degree,[7] while just one in five workers currently employed in these roles has such a credential.

There is not always a bright line between why a bachelor's degree might be needed for a job as opposed to an associate's degree or a certificate. Jobs change over time, as new technologies and skill sets alter the nature of work. Some occupations also accommodate four-year college graduates and two-year college graduates at the same time. Indeed, a profession such as registered nurse, which is the largest professional occupation in the U.S. and employs one in fifty Americans,[8] has a dual-track system offering entry-level credentials at both the bachelor's and associate's level.

3. Katz, Lawrence F., and Alan B. Krueger. *The rise and nature of alternative work arrangements in the United States, 1995-2015.* No. w22667. National Bureau of Economic Research, 2016.
4. See for example Abel, Jaison R., and Richard Deitz. "Underemployment in the early careers of college graduates following the Great Recession." In Education, *Skills, and Technical Change: Implications for Future US GDP Growth*. University of Chicago Press, 2017. and Rose, Stephen J. "How Many Workers with a Bachelor's Degree Are Overqualified for Their Jobs?." (2017).
5. In the first two cases, pharmacists and physical therapists, licensing requirements have evolved over time, whereas for executive assistants, employers have been more commonly requesting bachelor's level credentials for new hires.
6. Fuller, Joseph B., and Manjari Raman. "Dismissed by Degrees: How Degree Inflation is Undermining US Competitiveness and Hurting America's Middle Class." (2017).
7. Burning Glass Technologies (2014), Moving the Goalposts: How Demand for a Bachelor's Degree is Reshaping the Workforce. www.burning-glass.com/research/credentials-gap/.
8. US Bureau of Labor Statistics. Occupational Employment Statistics: May 2016 National Occupational Employment and Wage Estimates, United States. www.bls.gov/oes/current/oes_nat.htm

Defining Underemployment by Understanding Employer Preferences

Understanding how employers' credential requirements are changing is critical to addressing the challenge of underemployment.

Employers set job requirements and do the actual hiring. How they view jobs—and applicants—is critical to gauging underemployment accurately.

Our analysis attempted to address such shortcomings by mining the Burning Glass database of resumes and job postings. This approach allowed us to track labor market information in real time and to include changes driven by labor market conditions. To adjust for employer behavior, Burning Glass used an approach based on the levels of education requested in job postings. If more than 50% of postings for a position request a bachelor's degree or higher, we considered it a college-level job.[9]

Using this method, we shifted 45 occupations from noncollege in the O*NET classification to bachelor's or higher in our analysis. This migration of jobs from middle-skill to de facto college jobs is a phenomenon known as upcredentialing. Among the reclassified jobs are insurance adjustor, radiation therapist, and paralegal.

Some of these upcredentialed occupations are technically oriented positions, such as radiation therapists and technical writers, which increasingly call for digital and analytical skills associated with a four-year education. But employers also use the bachelor's degree as a proxy for "soft skills," such as communication, problem solving, and the ability to work in teams. Human resources specialists and event planners are examples of roles in this category. As a result, there may be a wide difference between traditional requirements for new hires and what it actually takes to get your resume read by a hiring manager today.

9. There is a disadvantage to using job postings data: Because not all openings are posted electronically, our postings database does not provide as complete job coverage as survey data. However, this vulnerability is concentrated at the low end of the job market, with little impact on bachelor's-level employment.

10. Research from Hershbein and Kahn has found that upcredentialing is partially related to the business cycle, in that credential requirements in the aggregate decrease as the labor market tightens, and partially structural, in that once an individual employer increases credentials for a role it is unlikely to lower them in the future. Additional research can help to further distinguish cyclical and structural changes in job requirements and employment prospects for recent graduates. Hershbein, Brad, and Lisa B. Kahn. *Do recessions accelerate routine-biased technological change? Evidence from vacancy postings.* No. w22762. National Bureau of Economic Research, 2016. [Forthcoming in American Economic Review]

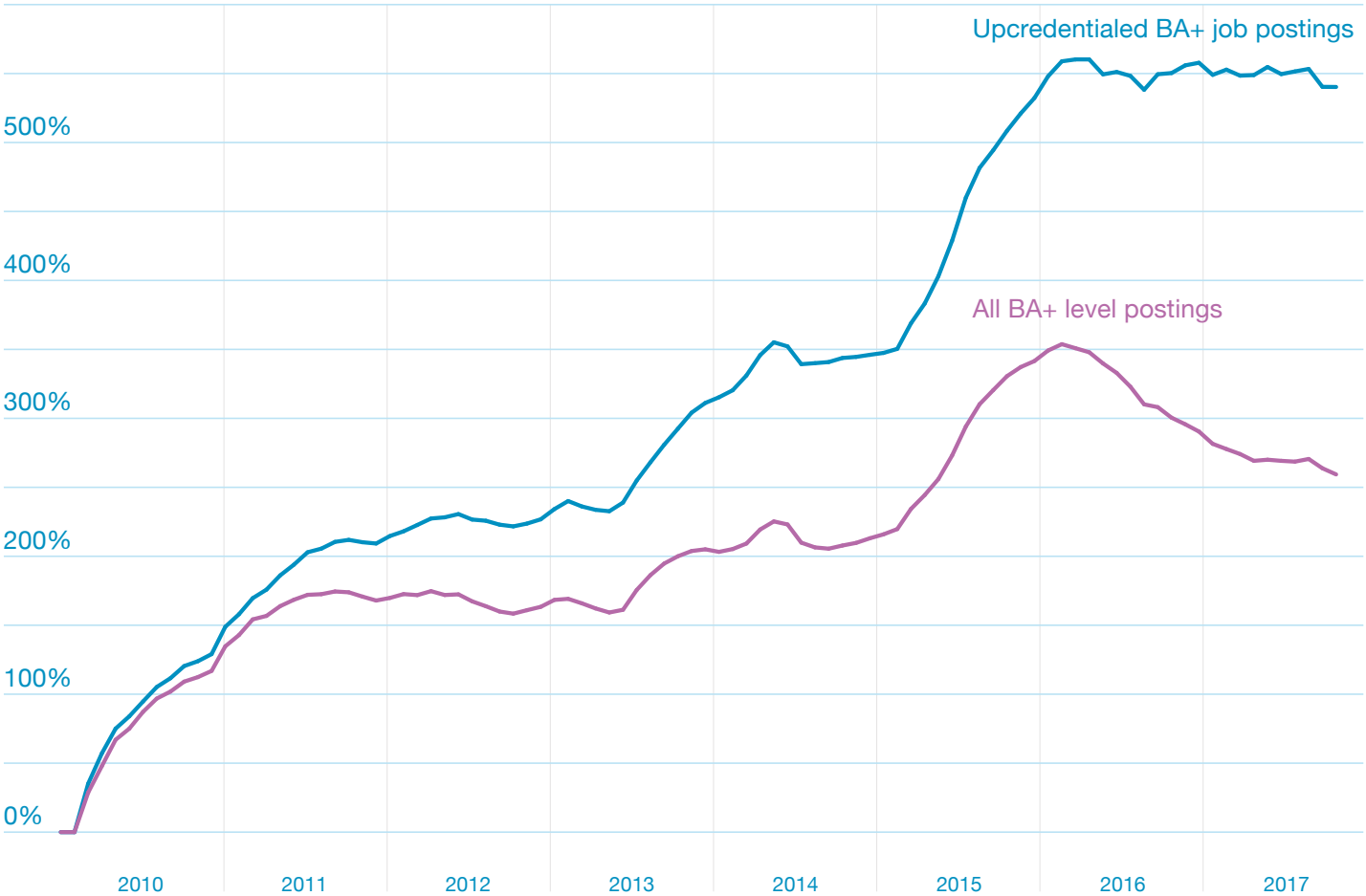
Growth in Upcredentialing Could Lead to Increased Underemployment

Analysis of employer demand shows a rapid increase in upcredentialed jobs, where employers request a bachelor's degree in occupations that we have classified as noncollege jobs.

These are postings where employers are specifically looking for candidates who would be underemployed in that role. Demand for these higher-than-traditional credentials has grown almost two times faster than the growth in all bachelor's-level jobs over the past five years.[10]

Upcredentialed postings have continued to rise over time

% Growth in postings since January 2010



Part Two

Falling Behind: The Effect of the First Job

The long-term impact of graduates with newly minted bachelor's degrees taking a first job beneath their education and skill level is downright grim: Such employment choices can dog workers for years to come.

For the underemployed, the inability to secure a job appropriate for their credentials can be reflected in their paychecks. Underemployed recent college graduates (aged 22-27) earn an average of $37,000 in the years immediately after earning their bachelor's degree.[11] By comparison, the average salary for a recent graduate employed in college-level work is more than $47,000, or a 27% differential. This substantial wage penalty is further compounded year over year because, as we show in the next section, underemployed graduates are more likely to get stuck in the rut of these lower paying roles over the long term.

The first job can be a gateway to productive employment—or it can serve as a stumbling block. People who are underemployed in their first job are five times more likely to be underemployed five years later as compared to their counterparts. By contrast, those who have a first job appropriate to their background almost never fall into underemployment.

There is a cumulative effect to starting in a job equal to a certain level of education, says Peter Cappelli, a professor of management at the University of Pennsylvania. Not only do workers acquire on-the-job skills, but they make connections that help them land future jobs. "It's not just that you get an initial bump," Cappelli says, "but that advantage accumulates."

When bachelor's degree recipients land an appropriate job after graduation, they end up boosting the chances for higher-paying work in the decades that follow. Early employment matters because young workers are gaining critical, transferrable skills in their initial jobs out of college, says Paul E. Harrington, who runs Drexel University's Center for College Affordability and Productivity.

Expected salary for underemployed worker	Expected salary for fully employed worker
$37,330	$47,470

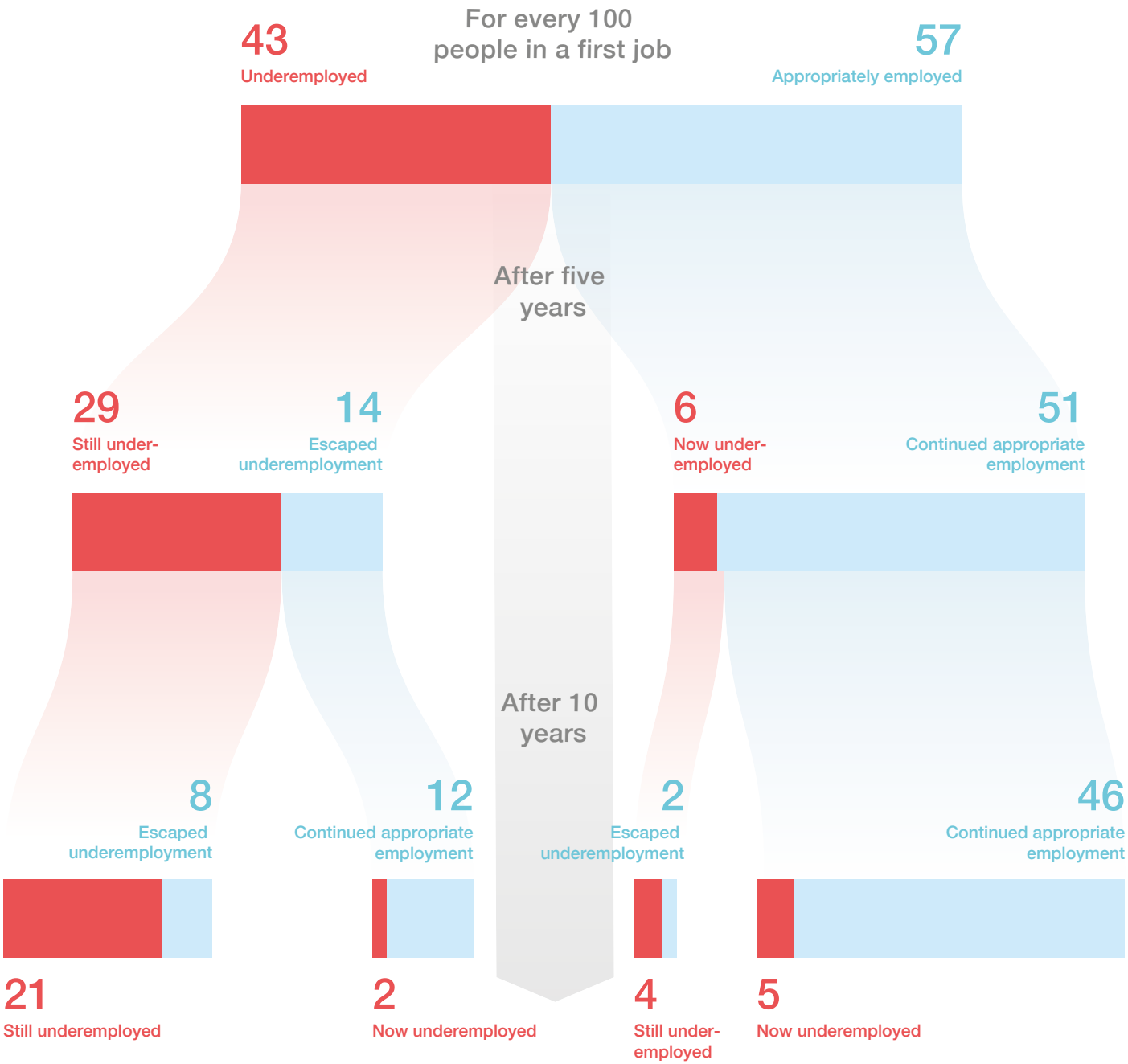
Take two graduates, for example: one goes to work in a human resources department, the other becomes a bartender. After three years, the HR staffer has learned about compensation and benefits and has skills valuable to a range of employers. The bartender has gained no such transferrable expertise. And even if he wanted to go into human resources, he would likely be competing with a recent graduate with lower salary demands, Harrington says.

"That transition out of college is very important," he says. "It sticks with you for a long time."

11. Analysis based on data from the US Census Bureau's American Community Survey. These data are based on the average salaries of bachelor's degree graduates aged 22-27. See Appendix for more details.

Underemployment at the start of a career can leave graduates disadvantaged

Employment status at the first job can leave a lasting effect. Those starting out underemployed are more likely to stay that way, even after 10 or more years of working.



Note: Numbers may not add up to 100% due to rounding

In our analysis, we found that 43% of workers were underemployed in their first job and were overwhelmingly likely to be in the same tenuous position five years later:

- Two-thirds of these workers were still underemployed after five years. Put another way, only a third of workers who are underemployed in their first job are able to recover into appropriate employment.

- Of workers who were underemployed in years 1 and 5 of their careers, 74% were still underemployed 10 years after their first job.

By comparison, 57% of workers were appropriately employed in their first job, and the career path for those graduates proved to be stable with a minimal risk of sliding backwards:

- The vast majority, 87%, were employed in college-level jobs five years later.

- After 10 years, an even higher share of those appropriately employed at year 5—91%—had a job commensurate to their education and skills.

Only a minority of workers either escape underemployment—or backslide into it from a more appropriate job. On the one hand, 33% of initially underemployed graduates managed to move into work requiring a bachelor's degree within five years and generally remained in appropriate employment thereafter. On the other hand, 13% slid from a bachelor's-level job immediately following graduation to a sub-bachelor's position five years later and then found it difficult to recover, our analysis shows. Two out of three of the backsliding workers remained underemployed at the 10-year mark.

Majors Matter

What students study while in college substantially affects their employability in the years following graduation.[12]

When we calculate the overall probability of underemployment over the first five years of a career, those majoring in homeland security, law enforcement, firefighting, and protective services and in parks, recreation, leisure and fitness studies are the most likely to be consistently underemployed. Individuals with degrees in security and law enforcement (65%), parks, recreation, leisure, and fitness studies (63%), and consumer and family sciences psychology (57%) have the highest level of underemployment in their first job and are most at risk of being trapped in long-term underemployment situations.

STEM majors are the least likely to face this problem. Only 30% of engineering and computer science majors are underemployed in their first job after graduation, and the underemployment rate for these majors falls even farther after five and 10 years. Most STEM majors are also likely to recover from a slow start in the job market. Engineering majors who start out underemployed are twice as likely to recover and get appropriate, college-level jobs after five years than security and law enforcement majors.[13] A similar, but not as pronounced, advantage, is also seen by those majoring in computer science, physical sciences, and mathematics.

Still, science and technology majors are not the only fields of study with an employment edge. Nonscience majors with lower-than-average underemployment rates include communications and journalism, social sciences, and foreign languages.

It would be tempting to conclude that there must be something inherently more employable about STEM majors, but experts who study labor markets caution against making such assumptions. While hiring in these fields is strong, they also come with a built-in advantage, says Drexel's Harrington, in that there is often a distinct pathway from college to career.

It should be noted, too, that not all STEM majors are created equal. Popular majors like biology and psychology, which in some cases are considered STEM fields, don't have the same ready-made career paths at the undergraduate levels, because many of the jobs directly in these fields—psychologist, medical doctor, research scientist—require a graduate degree. As a result, graduates in these areas face many of the same challenges in landing the right-fit job as do liberal arts majors. For example, biology majors are 51% likely to be underemployed in their first job, as compared to engineering majors who are only 29% likely to be underemployed in their first job.

12. We classify an individual's major based on the Department of Education's Classification of Instructional Program taxonomy and in this report aggregate to the 2-digit degree family (e.g. Engineering, Liberal Arts, Social Sciences, Biology, etc).
13. Of engineering graduates who are underemployed in their first job, 39% recovered and gained a college-level job by year five, compared to only 23% of security and law enforcement majors.

STEM majors are least likely to remain underemployed after graduating

A Probability of being underemployed in first job

B Probability of being underemployed in first job and five years later

C Bachelor's degree completions in 2016. Source: IPEDS

Major	A	B	C
Engineering	29%	18%	197,955
Computer and Information Sciences, and Support Services	30%	18%	111,930
Communication, Journalism, and Related Programs	39%	24%	107,261
Mathematics and Statistics	39%	26%	37,461
Foreign Languages, Literature, and Linguistics	43%	27%	30,887
Physical Sciences	40%	27%	45,446
Social Sciences	44%	28%	174,791
English Language and Literature/Letters	45%	29%	56,628
Visual and Performing Arts	45%	31%	118,513
Business, Management, Marketing, and Related Support Services	47%	31%	601,092
Biological and Biomedical Sciences	51%	35%	143,487
Education	50%	36%	276,659
Health Professions and Related Programs	49%	36%	430,320
Public Administration and Social Service Professions	53%	37%	85,478
Psychology	54%	38%	162,229
Natural Resources and Conservation	53%	38%	23,544
Liberal Arts and Sciences, General Studies, and Humanities	54%	39%	48,267
Family and Consumer Sciences/Human Sciences	57%	41%	29,793
Parks, Recreation, Leisure, and Fitness Studies	63%	47%	60,583
Homeland Security, Law Enforcement, Firefighting and Related Protective Services	65%	50%	74,800

Occupation Matters, Too

Just as certain majors have an employment edge, the fields in which graduates land their first job have strong bearing on their long-term career prospects.

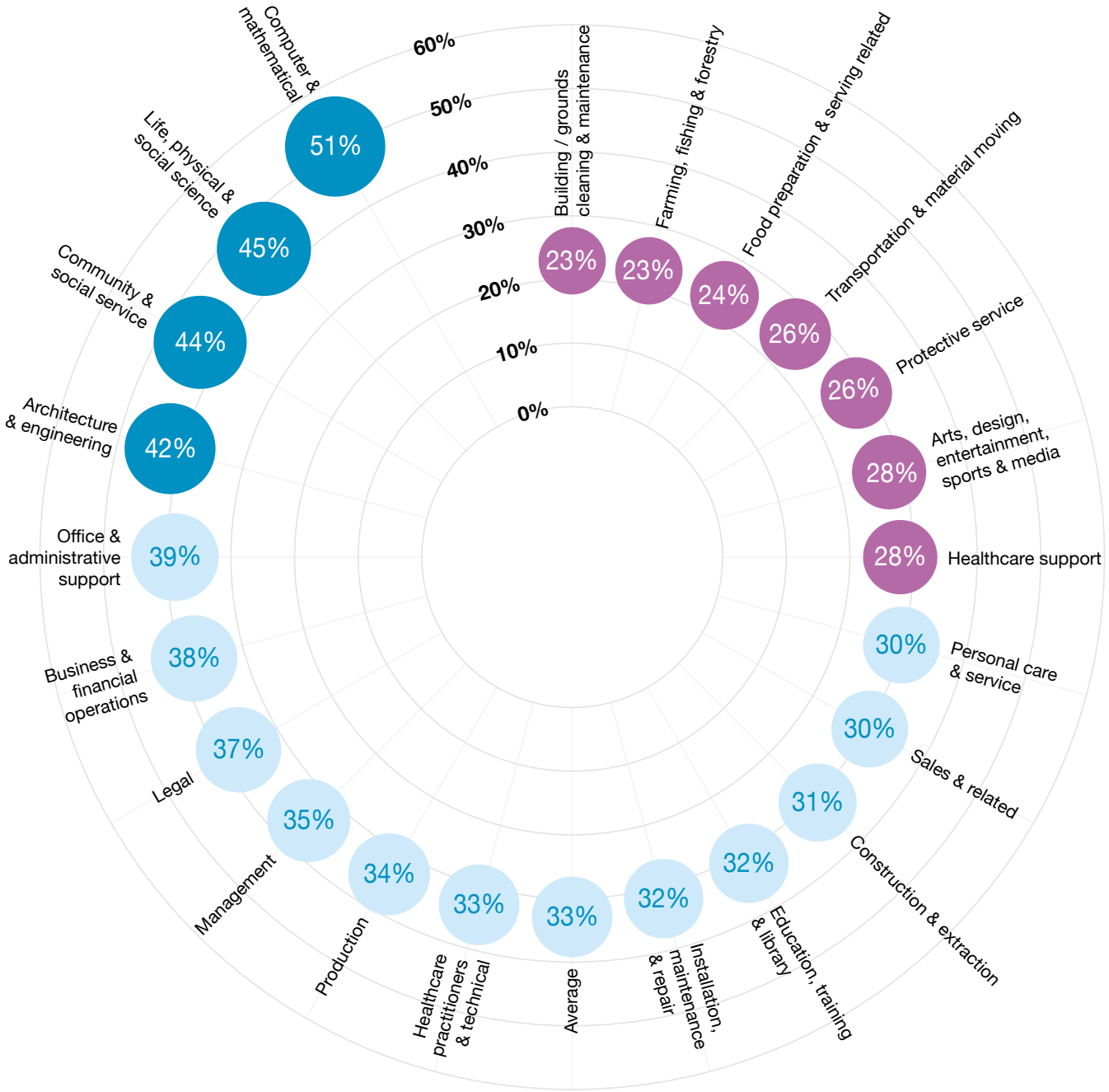
That is especially true for those who are unable to land a bachelor's-level job upon graduation. Regardless of major, students who are forced to take a "compromise job" are more likely to get back on track if that first job is in a field where there are many bachelor's-level jobs to step up into over time. For example, recent graduates working as help desk technicians or as community health workers, both noncollege jobs, have stronger long-term career outcomes than those who start as waiters and waitresses. Recent graduates who have noncollege roles in IT, the sciences, or community and social service fields are twice as likely to recover and get back on track than those who land in food preparation or in transportation.

The prevalance of college jobs within an occupational category affects the ability of overqualified workers to recover from underemployment. Occupational categories such as computer science, finance, or legal services have a high density of jobs for which higher education is a prerequisite. Even if workers are underemployed in their initial jobs, they have a chance of being promoted into a role that is a better fit for their credentials and skill level. Areas like building and maintenance or transportation, by contrast, have few college-level opportunities, leaving limited opportunities to progress.

Workers in fields with few college-level opportunities face a two-pronged challenge to get their careers back on track: First they have fewer on-the-job opportunities to develop the technical skills needed to earn a bachelor's-level job. Additionally, they may face biases by employers who disregard applicants employed in "lower-skilled" jobs, even if they have the appropriate skills and credentials.

Likelihood of escaping underemployment by job family (SOC)

Likelihood of escape: ● High / ● Medium / ● Low



Likelihood of escape is the probability that a worker who starts out underemployed will recover into appropriate employment in five years

Women are especially vulnerable

Women are falling behind, right out of the gate. Women are more likely to start behind than men and therefore more likely to stay behind for the long term.

Women are substantially more likely to be underemployed in their first job—nearly half of all female graduates are in jobs for which they are overqualified, while 37% of male graduates are underemployed.

In later years, however, the recovery rates between men and women are comparable with a relatively modest advantage to men. The likelihood of remaining underemployed after five years is at 63% for men and 66% for women. Likewise, of this group, 72% of men and 74% of women are still underemployed at the 10-year mark.

That initial stumble sets women back. Because women are more likely to be underemployed than men to start with, greater numbers of women are caught in this cycle.

These findings are notable because they undercut a long-held assumption, that female underemployment is the result of work-life tradeoffs often expected of women. Women, the conventional wisdom holds, may be forced to take jobs for which they are overqualified because they must balance caring for children or aging parents or because they step out of the workforce to raise a family.

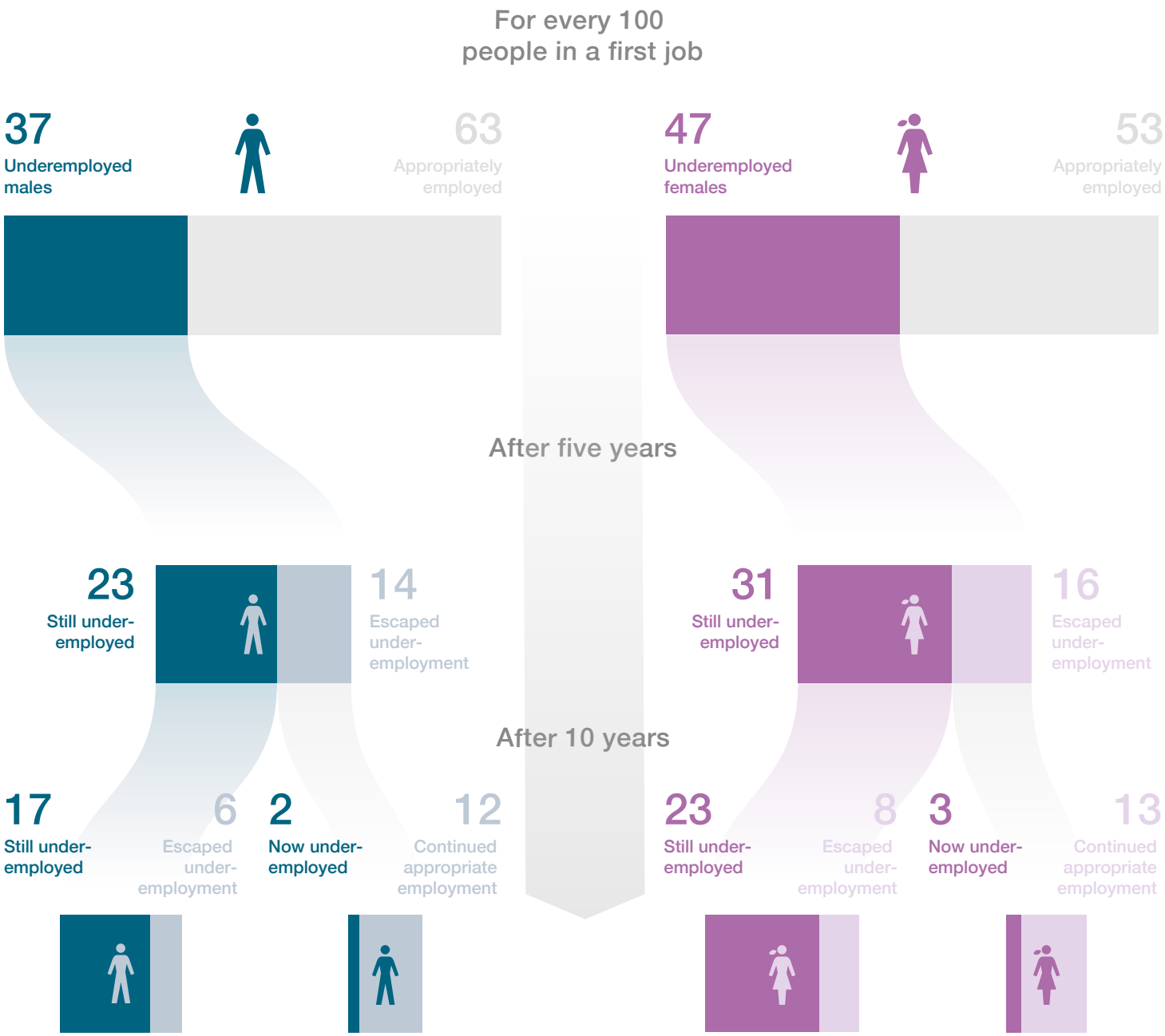
While women are more likely than men to later slip into underemployment, what is most concerning is that women fall behind at the outset of their careers, in their first jobs—at the very point when, presumably, they have the fewest familial obligations.

Such statistics may be surprising, given the strides that women have made in educational attainment in recent decades. Women today are more likely to go to college than men, and they graduate at higher rates. Sixty-two percent of women enrollees graduate with a bachelor's degree within six years, according to the U.S. Department of Education, while 58% of men do.[14]

14. McFarland, Joel, Bill Hussar, Cristobal de Brey, Tom Snyder, Xiaolei Wang, Sidney Wilkinson-Flicker, Semhar Gebrekristos et al. "The Condition of Education 2017. NCES 2017-144." *National Center for Education Statistics* (2017).

Female graduates are more at risk for ongoing underemployment

A higher proportion of underemployment in a first job leaves women consistently more disadvantaged than men.



Women are more likely to be underemployed regardless of major

One possible explanation we examined for female underemployment may be choice of major.

STEM fields, which are more resistant to underemployment, remain disproportionately male. A 2015 report from the National Student Clearinghouse found that while more women are majoring in STEM fields on an absolute basis, the actual share of degrees awarded to women has declined over the past decade.[15]

This hypothesis, however, offers only a partial explanation. Based on our analysis, **women find it more difficult to escape underemployment regardless of their college major.** We see this pattern holding true even among STEM degree holders. For example, women with computer science majors are 22% likely to be underemployed in their first job and five years later as compared to men who are 20% likely to suffer the same fate. Women with math degrees are 32% likely to be underemployed as compared to men with math degrees, only 25% likely, in their first job and five years later.

These gender differences persist in fields in which underemployment is more common. Women with degrees in homeland security, law enforcement, firefighting, and related protective services were 50% likely to be underemployed, whereas their male counterparts were 47% likely to be underemployed. Women with degrees in parks, recreation, leisure, and fitness studies were also 50% likely to be underemployed overall, while men with the same major were only 43% likely.

In fact, we see the largest gender gaps in underemployment for those who graduate with generalist degrees. Women with majors in public administration or psychology, for example, are 8% more likely than their male counterparts to be underemployed. With both of these degrees, women are 39% likely to be underemployed in their first job and five years later, as compared to men who are only 31% likely.

The only exception to the pattern is engineers, where men and women are equally likely to be underemployed in their first job and five years later. That the pattern holds across majors emphasizes how much more important it is for women to be aware of the risks and find an appropriate first job to avoid falling into the underemployment trap.

The disparities within majors suggest women's poorer employment outcomes cannot be solely attributed to their choice of study. It may be that, even in 2018, men may have better access to job market information via informal advising or social capital networks, such as fraternities or sports teams. These sorts of "old boys' networks" may give men an advantage in finding jobs upon graduation.

A new study by the Georgetown University Center on Education and the Workforce found that, despite educational gains, women still make just 81 cents for every dollar earned by men. Whatever the forces at play, it's clear that equity gaps being faced by women persist in the earliest days of women's careers. Women are unable to keep up because they are falling behind from the very outset.

15. "Snapshot Report: Degree Attainment." National Student Clearinghouse Research Center, 2015. http://nscresearchcenter.org/snapshotreport-degreeattainment15/

16. Carnevale, Anthony P., Artem Gulish, and Nicole Smith. "Women Can't Win: Despite Making Educational Gains and Pursuing High-Wage Majors, Women Still Earn Less than Men." (2018).

The gender gap in underemployment persists across most majors.

A Probability of being underemployed in first job and five years later (Females)

B Probability of being underemployed in first job and five years later (Males)

C Gender gap

Major	A	B	C
Engineering	19%	19%	0%
Computer and Information Sciences, and Support Services	22%	20%	-2%
Communication, Journalism, and Related Programs	25%	22%	-3%
Social Sciences	31%	24%	-7%
Mathematics and Statistics	32%	25%	-7%
Foreign Languages, Literature, and Linguistics	28%	25%	-3%
English Language and Literature/Letters	30%	26%	-4%
Physical Sciences	32%	27%	-5%
Business, Management, Marketing, and Related Support Services	34%	27%	-7%
Visual and Performing Arts	34%	28%	-6%
Public Administration and Social Service Professions	39%	31%	-8%
Psychology	39%	31%	-8%
Education	38%	31%	-7%
Biological and Biomedical Sciences	39%	32%	-7%
Liberal Arts and Sciences, General Studies, and Humanities	41%	34%	-7%
Health Professions and Related Programs	39%	35%	-4%
Natural Resources and Conservation	41%	36%	-5%
Family and Consumer Sciences/Human Sciences	40%	38%	-2%
Parks, Recreation, Leisure, and Fitness Studies	50%	43%	-7%
Homeland Security, Law Enforcement, Firefighting, and Related Protective Services	50%	47%	-3%

One Step Forward: Delivering a Career Game Plan

Continued analysis in this area is critical for framing the important discussions about how students launch from college to productive careers.

More analysis will also help us build the support systems needed to ensure their degrees translate into great work and meaningful lives.

For graduates in disciplines that don't lead directly to a specific set of occupations, the prospect of underemployment can seem almost inevitable. According to a 2017 consumer insights study by Strada and Gallup, only 40% of liberal arts students feel confident that their major will lead to good jobs, and across all students, that percentage declines as they progress toward graduation.[17] And only 28% of liberal arts students reported that they felt confident that they would graduate with the skills needed to be successful in the job market.

Colleges could do more to raise students' awareness about the benefits of obtaining certain technical skills. In earlier research, we identified eight technical skills sets, including data analysis, graphic design, and social media, that can improve recent graduates' employment and earnings potential.[18] Taking the time to acquire such skills—whether in the workplace, through additional coursework, or by adding a minor—can make graduates more competitive or even open up new, and often higher-earning, occupations.

Other resources include the Launch My Career website, a consumer information tool for postsecondary institutions in Florida, Colorado, Texas, and Tennessee, which highlights the monetary value—in terms of entry-level salary—of adding specific skills to individual majors or fields of study.

Some colleges are seeking to start career counseling early to help students get a jump on job preparation. Students in the University of Minnesota's College of Liberal Arts are required to visit the career center during their very first semester on campus. The idea is to get students comfortable from the outset with the office and to give them a boost on looking for internships and jobs, says Paul Timmins, the director of career services and president of the National Career Development Association. Career counselors are also assigned to work with specific majors, acting as a resource for faculty members and academic advisers and meeting with students.

James Madison University in Virginia, for one, has merged its academic advising and career services offices to provide students with a one-stop shop to plan their academic and professional careers. Uniting the offices helps subtly reinforce the connection between curriculum and career, says Nina Stensby-Hurst, the center's associate director. A freshman who stops by to sign up for classes, for instance, will likely cross paths with a senior interviewing for a job.

"We're one of the few departments," Stensby-Hurst says, "that shakes students' hands when they first come to campus and shakes their hand again when they leave."

Internships and cooperative education are other important vehicles to provide students with real-world work experience that can help them avoid the underemployment trap after graduation. Internships can help students gain those practical or technical skills that, coupled with a liberal arts degree, give them an edge in starting their careers. Networking on the job or with alumni also can be valuable.

17. Strada Education Network and Gallup. (2018) "2017 College Student Survey: Nationally Representative Survey of Currently Enrolled Students."
18. Schneider, Mark and Sigelman, Matthew. (2018). "Saving the Liberal Arts: Making the Bachelor's Degree a Better Path to Labor Market Success." American Enterprise Institute and Burning Glass Technologies.

Conclusion

Leaders in higher education often argue that they aren't preparing students for their first job but for their fifth. What's more, a basic sense of fairness may resist the idea that the first job decision after graduation can permanently shape a career.

Experimentation—or even drift—in a graduate's first years should be tolerable; surely, early career choices should come with a margin of error.

Yet fair or not, our analysis of the resume data is unequivocal: The initial job a younger worker takes can profoundly influence the direction of a long-term career. Graduates who accept or are forced into subbachelor's-level jobs early in their careers suffer significant long-term consequences; they may be consigned to underemployment for years to come. The first job is a high-stakes decision, and both educators and graduates should treat it accordingly.

This is particularly true for women, who face a greater challenge here, as in so many other aspects of the job market. Our findings demonstrate that, contrary to conventional wisdom, women's careers are not detoured by the mommy track. Rather, they are often derailed early on, in their very first jobs.

These key insights suggest several challenges for higher education:

There is an urgent need for more research to understand the drivers of underemployment for women. The fact that more women than men are underemployed at the outset of their working lives sets far too many young women on a permanently slower career track, with all that entails for gender equality and long-term success. This holds true across majors and occupations. The fact that female underemployment occurs irrespective of major is both disturbing and should be the subject of further research. Without a better understanding of the factors that mire too many women in subcollege work, it is difficult to address the institutional mechanisms that currently promote men over women in the workplace.

A critical examination of gender and underemployment must be a priority.

Our findings also suggest it is more important than ever that students study the right things. Although it is true that students in STEM fields have lower rates of underemployment, this problem is not—and should not be—strictly about choice of major. Rather, a greater emphasis should be placed on acquiring skills and proficiencies that have value in the workplace.

We know that certain kinds of practical and technical expertise, such as marketing and computer programming, can enhance the attractiveness of applicants from liberal arts or less professionally oriented academic backgrounds. Colleges and employers alike can do more to educate students about the employment and earnings value of these skill sets.

At the same time, colleges and employers can ensure that all students have the opportunity to gain such expertise, whether through academic minors, internships, or cooperative education. Internships are critical because they are often the gateway into many first jobs. Employers increasingly use internships as a recruiting tool because

they are a way to test that college graduates have a mix of the hard and soft skills employers are looking for.

Institutions should do more to introduce students to and demystify career services offices. When students don't set foot in career offices until the second semester of their senior year, it's often far too late. Advisors, perhaps with some specialized expertise by major, can help students explore their interests and make connections between their studies and occupational options early in their college career. They can foster networking opportunities and encourage students to gain work experience prior to graduation. Clearer pathways could aid graduates in landing first jobs that are the right fit for their skills and credentials.

Too often, career services offices are unable to effectively serve those students who most need their guidance. A 2016 report based on polling from Gallup found that only one in six students found their university career services office very helpful, and students in the social sciences and humanities found their career services support to be less useful than students in business and engineering, which have more well-trodden career paths.[19]

Higher education should recognize underemployment as an avoidable risk for graduates.

A key takeaway here is intentionality. Underemployment is not inevitable, but avoiding it does require additional planning by both colleges and students.

Still, chances are that some new graduates will end up in subbachelor's-level jobs. Initial underemployment, however, shouldn't be a career killer. Right now, two out of three of workers underemployed in their first job remain so five years later. But that means one-third manage to escape underemployment. What sets these workers apart? Is it earning a specialized or technical credential? Professional networking? Making better use of their alma mater's career office?

Further study of what helps certain workers break free of the underemployment trap could offer models that others could apply.

The question of the value of higher education—and the public's perception of that value—depends heavily on career success. The failure of graduates to thrive in the job market cannot but damage that perception.

The evidence shows that there's no more pivotal moment in an individual's career than the transition from college to the workplace. A wrong move into a job that sells a graduate short can reverberate for years. Colleges must do more to make that passage both smooth and successful.

19. Gallup. (2016).Great Jobs. Great Lives. The Value of Career Services, Inclusive Experiences and Mentorship for College Graduates. www.luminafoundation.org/files/resources/great-jobs-great-livees-3-2016.pdf

About

Burning Glass Technologies

Burning Glass Technologies delivers job market analytics that empower employers, workers, and educators to make data-driven decisions.

The company's artificial intelligence technology analyzes hundreds of millions of job postings and real-life career transitions to provide insight into labor market patterns. This real-time strategic intelligence offers crucial insights, such as which jobs are most in demand, the specific skills employers need, and the career directions that offer the highest potential for workers.

For more information: www.burning-glass.com

Strada Institute for the Future of Work

Strada Institute for the Future of Work (Strada Institute) is dedicated to advancing our understanding of the future of learning and work, so that we may begin to build the learning ecosystem of the future. The Strada Institute is a part of Strada Education Network, a national nonprofit dedicated to improving lives by catalyzing more direct and promising pathways between education and employment.

For more information: www.StradaEducation.org/institute

Design: infogr8

Appendix

Part One Data Sources Used in the Report

The data used in this paper were primarily extracted from Burning Glass Technologies' unique data assets: a database of more than 800 million job postings providing a detailed view into the jobs and skills that employers demand and a database of over 80 million resumes illuminating the actual career progression of American workers. We also drew from federal surveys and administrative data sets relating to degree completion, majors, and workers' earnings.

Resume Data

The analyses of workers' career outcomes were pulled from Burning Glass' resume database, which captures the detailed work history and education of millions of workers across the U.S. Resumes are collected from Burning Glass' partners. Resumes were included in this study if they met the following criteria: the worker has a bachelor's degree and at least five years of work experience thereafter. The analyses in this report were based on 4 million resumes that met these criteria. Further details about our treatment of the resume data are described in Part 3 of the Appendix.

This report was based on aggregate career path and skills data and no personally identifiable information was used by researchers. Burning Glass Technologies has developed a database of millions of recent resumes. When a resume enters the system, the name, address, and other identifying details are encrypted so that they are not accessible to the research team. Researchers compile resumes with similar characteristics so that they can determine which types of transitions and career progressions commonly occur at a population level.

Job Postings Data

To supplement traditional sources of labor market data with more detailed information on employer demand for jobs, skills, and specific credentials, Burning Glass mined its comprehensive database of over 800 million online job postings. Burning Glass collects job postings from close to 50,000 online job boards, newspapers, and employer sites on a daily basis and de-duplicates postings for the same job, whether it is posted multiple times on the same site or across multiple sites. Burning Glass then applies detailed text analytics to code the specific jobs, skills, and credentials requested by employers.

O*NET

O*NET[20] is a government sponsored, publicly available database containing hundreds of standardized and occupation-specific descriptors on almost 1,000 occupations covering the entire U.S. economy. O*NET tracks job trends and analyzes skill level by occupation, that is, whether the skills necessary for a particular job are taught in high school, entail some college, or require a bachelor's degree or more. The O*NET database was initially populated by data collected from occupation analysts; this information is updated by ongoing surveys of each occupation's worker population and occupation experts.

American Community Survey

The American Community Survey (ACS)[21] is an ongoing annual survey of Americans that provides data on jobs and occupations, educational attainment, and veteran status, among other topics.

20. O*NET Resource Center, "About O*NET," www.onetcenter.org/overview.html, accessed April 30, 2018
21. U.S. Census Bureau, "About the American Community Survey," www.census.gov/programs-surveys/acs/about.html, accessed April 30, 2018

Part Two Methodology to Define Underemployment

Previous studies on underemployment have often based their definitions on data from O*NET. Occupations in which greater than 50% of respondents to O*NET's surveys have a bachelor's degree or higher are classified as college-level jobs. Those in which less than 50% of respondents have at least a bachelor's degree are classified as noncollege jobs.

A weakness of this approach is that the skills and credential requirements for many jobs, particularly in technical areas, may evolve more quickly than O*NET can update them. Further, reliance on such surveys can lead to what's known as incumbent worker bias. Since the occupational assessments are based on the skills of all workers in a field, they likely include individuals who gained regular or recurrent on-the-job training (such as medical assistants or technicians) as well as older workers who may have entered the occupation when requirements were different from today's (like pharmacists, physical therapists, or executive assistants). This bias may either over- or underestimate requirements, thus inaccurately reflecting the expectations for today's new employees.

Our analysis addressed this shortcoming by using an approach based on the levels of education requested in recent job postings. If more than 50% of job postings for an occupation over the past three years (2015-2017) requested a bachelor's degree or higher, we considered it a college-level job. Using this method, we redefined 45 occupations from noncollege-level occupations in the O*NET classification to college-level occupations in our analysis. A total of 18 occupations shifted from college level to the noncollege level.

Occupations that shift from “Noncollege” to “College” based on the Burning Glass analysis.

ONET	Title
11-1021.00	General and Operations Managers
11-3011.00	Administrative Services Managers
11-3051.00	Industrial Production Managers
11-3071.01	Transportation Managers
11-9013.02	Farm and Ranch Managers
13-1031.02	Insurance Adjusters, Examiners, and Investigators
13-1071.00	Human Resources Specialists
13-1121.00	Meeting, Convention, and Event Planners
13-1199.01	Energy Auditors
13-1199.06	Online Merchants
13-2021.01	Assessors
13-2071.01	Loan Counselors
13-2072.00	Loan Officers
13-2081.00	Tax Examiners and Collectors, and Revenue Agents
15-1143.01	Telecommunications Engineering Specialists
17-3012.01	Electronic Drafters
17-3012.02	Electrical Drafters
17-3029.06	Manufacturing Engineering Technologists
17-3029.07	Mechanical Engineering Technologists
19-4031.00	Chemical Technicians
19-4092.00	Forensic Science Technicians
19-4099.01	Quality Control Analysts
23-2011.00	Paralegals and Legal Assistants
25-1194.00	Vocational Education Teachers, Postsecondary

ONET	Title
27-1013.00	Fine Artists, Including Painters, Sculptors, and Illustrators
27-1022.00	Fashion Designers
27-3042.00	Technical Writers
27-4032.00	Film and Video Editors
29-1124.00	Radiation Therapists
29-2033.00	Nuclear Medicine Technologists
29-2099.07	Surgical Assistants
33-1021.01	Municipal Fire Fighting and Prevention Supervisors
33-3021.03	Criminal Investigators and Special Agents
33-9021.00	Private Detectives and Investigators
41-1012.00	First-Line Supervisors of Non-Retail Sales Workers
41-3011.00	Advertising Sales Agents
41-4011.00	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products
41-4011.07	Solar Sales Representatives and Assessors
43-1011.00	First-Line Supervisors of Office and Administrative Support Workers
43-4011.00	Brokerage Clerks
43-4041.01	Credit Authorizers
43-6011.00	Executive Secretaries and Executive Administrative Assistants
43-9081.00	Proofreaders and Copy Markers
45-1011.07	First-Line Supervisors of Agricultural Crop and Horticultural Workers
45-2011.00	Agricultural Inspectors

Occupations that shift from "College" to "Non-college" based on the Burning Glass analysis.

ONET	Title
11-9141.00	Property, Real Estate, and Community Association Managers
13-2021.02	Appraisers, Real Estate
17-3011.01	Architectural Drafters
19-1031.03	Park Naturalists
19-4041.02	Geological Sample Test Technicians
19-4091.00	Environmental Science and Protection Technicians, Including Health
21-1094.00	Community Health Workers
25-3021.00	Self-Enrichment Education Teachers
25-3099.02	Tutors

ONET	Title
27-2022.00	Coaches and Scouts
29-1071.01	Anesthesiologist Assistants
29-1141.03	Critical Care Nurses
29-2012.00	Medical and Clinical Laboratory Technicians
29-2053.00	Psychiatric Technicians
29-9012.00	Occupational Health and Safety Technicians
39-9032.00	Recreation Workers
39-9041.00	Residential Advisors
43-4051.03	Patient Representatives

Part Three Overview of Resume Analyses

The resume data set is a Burning Glass Technologies proprietary data set, sourced from Burning Glass partners. This data set includes information about an individual's' demographics, career path, and employers.

The resume data set contains information about a candidate's location, level of educational attainment, the institutions at which the candidate studied, the major, as well as any certifications held. The data set also contains information about a candidate's career path, for example, occupation and time spent in any workplace and role, years of experience, employer name and location, and industry. In addition, a candidate may list skills and the years of experience with any particular skill.

All personally identifiable information such as name, address, and contact information is encrypted and not available to researchers.

Resume Sample Selection

To capture the work history, educational attainment, and resulting underemployment of workers over the life of their careers, Burning Glass selected a total of 4 million resumes for inclusion in this study, based on the following criteria:

1. Individuals in the selected group must have commenced their first job during or after the year 2000, where an individual's first job was classified as the first job listed on a resume.
2. The time worked in the first job must have been longer than six months to avoid internships and other short-term projects.
3. Job seekers must have occupational information about a first job and the job five years later. For a subsample of resumes, we also assessed underemployment 10 years later, where job data was available.
4. Job seekers must hold a bachelor's degree or higher. This restriction was imposed because the underemployment of workers was calculated within the sample of workers with bachelor's degrees or higher.
5. At each point in the analysis, job seekers must have had civilian employment, as military occupations have a distinct hiring system for which research on underemployment is not germane.

Coding Occupation and Education from Resumes

For this analysis, we collected information for our samples based on an individual's occupation in a first job, five years later, and 10 years later (where available). Our occupation coding is based on the occupational definitions provided by O*NET,[22] which extends the US Department of Labor's Standard Occupational Classification System.[23]

Occupation coding is conducted according to a proprietary classification system developed by Burning Glass, which includes a blend of human generated rules and machine learning systems to ensure that each job is correctly coded into the correct occupational category.

We analyzed job seekers' education by categorizing the undergraduate program of study into the National Center for Education Statistics' Classification of Instructional Programs (CIP) program.[24]

Predicting Gender in Resumes

To study the effect of gender on underemployment, we used the gender R package to determine the gender of an individual in the resume sample. The R package uses an estimated date of birth (1970-2000) and the first name from the resume to predict the gender of an individual based on historical Social Security Administration data.[25,26] Using this approach, we estimated the probability of each individual in the sample as being a particular gender and used a cutoff threshold probability of 0.6 or higher to conclude that an individual was of the predicted gender. Individuals for whom no gender prediction was possible were not included in the sample for the gender-specific analyses. The gender analysis was done prior to further analysis of the data, and the gender data available to researchers was attached to anonymized records. At no time were names or other personally identifiable information available to researchers.

Part Four Calculating Expected Salary Using Data from the American Community Survey

Since resumes do not typically include salary information, we used the Census Bureau data to estimate salary based on the occupational and demographic characteristics of each worker. We used pooled one-year samples from 2012 to 2017. We focused on individuals aged 22-27 years old (recent college graduates) and restricted the sample to those who were working and in the labor force, had at least a bachelor's degree, were not enrolled in any educational program, and worked at least 30 hours per week.[27] For these people, we looked at their gender, their major, occupation, and salary for the periods of 2012-2017. Incomes were restricted to those between $15,000 and $200,000 per year.

To estimate the cost of underemployment, we estimated the average salary of underemployed and appropriately employed workers using a weighted average based on the distribution of majors.

To account for the fact that underemployed graduates have different educational preferences, we used the proportion of graduates in each major who were underemployed to weight the salary of the appropriately employed group. The goal of this exercise was to estimate what the salary of the underemployed group would have been, if they were properly employed, based on their chosen field of study. It is important to note that this approach leads to a smaller salary gap between the underemployed and appropriately employed than if we had used the educational distribution of the appropriately employed group to estimate their average salary.

We found that on average, underemployed graduates made $37,330, while those appropriately employed made $47,470, a difference of approximately 27%.

22. O*NET Resource Center, "The O*NET-SOC Taxonomy," www.onetcenter.org/taxonomy.html, accessed April 30, 2018
23. Bureau of Labor Statistics, "Standard Occupational Classification," www.bls.gov/soc/, accessed April 30, 2018
24. See www.nces.ed.gov/ipeds/cipcode/Default.aspx?y=55 for more information. For the purpose of this analysis, we merge CIP code 14 (Engineering Technologies and Engineering-Related Fields) and CIP code 15 (Engineering) and treat them as a single major.
25. This R package uses historical data sets from the U.S. Social Security Administration, the U.S. Census Bureau (via IPUMS USA), and the North Atlantic Population Project to provide predictions of gender for first names for particular countries and time periods. https://cran.r-project.org/web/packages/gender/gender.pdf
26. Blevins, Cameron, and Lincoln Mullen. "Jane, John... Leslie? A Historical Method for Algorithmic Gender Prediction." DHQ: Digital Humanities Quarterly 9, no. 3 (2015).
27. Here, we follow the same selection criteria as in Abel, Jaison R., and Richard Deitz. "Underemployment in the early careers of college graduates following the Great Recession." *In Education, Skills, and Technical Change: Implications for Future US GDP Growth.* University of Chicago Press, 2017.

Part Five Supplemental Data Tables

Underemployment by Major (2-digit CIP code)

Ⓐ Underemployed in First Job

Ⓑ Underemployed Five Years Later

Ⓒ Probability of Being Underemployed in First Job and Five Years Later

CIP Code	Major CIP Title	Ⓐ	Ⓑ	Ⓒ
01	Agriculture, Agriculture Operations, and Related Sciences	55%	71%	39%
03	Natural Resources and Conservation	53%	71%	38%
04	Architecture and Related Services	41%	65%	26%
05	Area, Ethnic, Cultural, Gender, and Group Studies	47%	61%	29%
09	Communication, Journalism, and Related Programs	39%	62%	24%
10	Communications Technologies/Technicians and Support Services	39%	67%	26%
11	Computer and Information Sciences, and Support Services	30%	61%	18%
12	Personal and Culinary Services	81%	86%	70%
13	Education	50%	72%	36%
14	Engineering	29%	61%	18%
16	Foreign Languages, Literature, and Linguistics	43%	63%	27%
19	Family and Consumer Sciences/Human Sciences	57%	72%	41%
22	Legal Professions and Studies	47%	65%	31%
23	English Language and Literature/Letters	45%	65%	29%
24	Liberal Arts and Sciences, General Studies, and Humanities	54%	73%	39%
25	Library Science	34%	62%	21%
26	Biological and Biomedical Sciences	51%	69%	35%
27	Mathematics and Statistics	39%	68%	26%
28	Military Science, Leadership, and Operational Art	50%	73%	36%
29	Military Technologies and Applied Sciences	67%	100%	67%

A Underemployed in First Job

B Underemployed Five Years Later

C Probability of Being Underemployed in First Job and Five Years Later

CIP Code	Major CIP Title	A	B	C
30	Multi/Interdisciplinary Studies	53%	73%	39%
31	Parks, Recreation, Leisure, and Fitness Studies	63%	74%	47%
36	Leisure and Recreational Activities	53%	70%	37%
38	Philosophy and Religious Studies	43%	64%	28%
39	Theology and Religious Vocations	49%	70%	34%
40	Physical Sciences	40%	68%	27%
41	Science Technologies/Technicians	50%	100%	50%
42	Psychology	54%	70%	38%
43	Homeland Security, Law Enforcement, Firefighting, and Related Protective Services	65%	77%	50%
44	Public Administration and Social Service Professions	53%	71%	37%
45	Social Sciences	44%	64%	28%
46	Construction Trades	55%	83%	45%
47	Mechanic and Repair Technologies/Technicians	35%	65%	23%
49	Transportation and Materials Moving	61%	76%	46%
50	Visual and Performing Arts	45%	69%	31%
51	Health Professions and Related Programs	49%	74%	36%
52	Business, Management, Marketing, and Related Support Services	47%	66%	31%
54	History	49%	64%	32%
60	Residency Programs	55%	88%	48%

Underemployment by Major (2-digit CIP code) and Gender

A Gender

B Underemployed in First Job

C Underemployed Five Years Later

D Probability of Being Underemployed in First Job and Five Years Later

CIP Code	Major CIP Title	A	B	C	D
01	Agriculture, Agriculture Operations, and Related Sciences	Female	61%	71%	43%
01	Agriculture, Agriculture Operations and Related Sciences	Male	49%	66%	33%
03	Natural Resources and Conservation	Female	58%	71%	41%
03	Natural Resources and Conservation	Male	51%	70%	36%
04	Architecture and Related Services	Female	44%	64%	28%
04	Architecture and Related Services	Male	41%	65%	27%
05	Area, Ethnic, Cultural, Gender, and Group Studies	Female	49%	60%	29%
05	Area, Ethnic, Cultural, Gender, and Group Studies	Male	43%	57%	25%
09	Communication, Journalism, and Related Programs	Female	41%	60%	25%
09	Communication, Journalism, and Related Programs	Male	37%	60%	22%
10	Communications Technologies/Technicians and Support Services	Female	39%	64%	25%
10	Communications Technologies/Technicians and Support Services	Male	44%	53%	24%
11	Computer and Information Sciences, and Support Services	Female	36%	62%	22%
11	Computer and Information Sciences, and Support Services	Male	33%	60%	20%
12	Personal and Culinary Services	Female	78%	83%	64%
12	Personal and Culinary Services	Male	85%	88%	74%
13	Education	Female	54%	71%	38%
13	Education	Male	46%	69%	31%
14	Engineering	Female	31%	60%	19%
14	Engineering	Male	31%	62%	19%
16	Foreign Languages, Literature, and Linguistics	Female	46%	62%	28%
16	Foreign Languages, Literature, and Linguistics	Male	41%	62%	25%

		A Gender	B Underemployed in First Job	C Underemployed Five Years Later	D Probability of Being Underemployed in First Job and Five Years Later
CIP Code	**Major CIP Title**	**A**	**B**	**C**	**D**
19	Family and Consumer Sciences/Human Sciences	Female	58%	70%	40%
19	Family and Consumer Sciences/Human Sciences	Male	57%	66%	38%
22	Legal Professions and Studies	Female	50%	65%	33%
22	Legal Professions and Studies	Male	42%	63%	27%
23	English Language and Literature/Letters	Female	47%	64%	30%
23	English Language and Literature/Letters	Male	42%	63%	26%
24	Liberal Arts and Sciences, General Studies, and Humanities	Female	58%	72%	41%
24	Liberal Arts and Sciences, General Studies, and Humanities	Male	48%	70%	34%
25	Library Science	Female	38%	66%	25%
25	Library Science	Male	37%	60%	22%
26	Biological and Biomedical Sciences	Female	56%	69%	39%
26	Biological and Biomedical Sciences	Male	48%	67%	32%
27	Mathematics and Statistics	Female	46%	69%	32%
27	Mathematics and Statistics	Male	37%	67%	25%
28	Military Science, Leadership, and Operational Art	Female	57%	75%	43%
28	Military Science, Leadership, and Operational Art	Male	51%	64%	33%
29	Military Technologies and Applied Sciences	Male	67%	100%	67%
30	Multi/Interdisciplinary Studies	Female	59%	71%	42%
30	Multi/Interdisciplinary Studies	Male	47%	72%	33%
31	Parks, Recreation, Leisure, and Fitness Studies	Female	67%	74%	50%
31	Parks, Recreation, Leisure, and Fitness Studies	Male	59%	72%	43%

Underemployment by Major (2-digit CIP code) and Gender

Ⓐ Gender

Ⓑ Underemployed in First Job

Ⓒ Underemployed Five Years Later

Ⓓ Probability of Being Underemployed in First Job and Five Years Later

CIP Code	Major CIP Title	Ⓐ	Ⓑ	Ⓒ	Ⓓ
36	Leisure and Recreational Activities	Female	53%	68%	36%
36	Leisure and Recreational Activities	Male	52%	69%	36%
38	Philosophy and Religious Studies	Female	45%	62%	28%
38	Philosophy and Religious Studies	Male	42%	62%	26%
39	Theology and Religious Vocations	Female	53%	69%	37%
39	Theology and Religious Vocations	Male	48%	66%	32%
40	Physical Sciences	Female	48%	67%	32%
40	Physical Sciences	Male	40%	67%	27%
42	Psychology	Female	57%	68%	39%
42	Psychology	Male	47%	66%	31%
43	Homeland Security, Law Enforcement, Firefighting, and Related Protective Services	Female	67%	75%	50%
43	Homeland Security, Law Enforcement, Firefighting, and Related Protective Services	Male	63%	76%	47%
44	Public Administration and Social Service Professions	Female	56%	70%	39%
44	Public Administration and Social Service Professions	Male	46%	66%	31%
45	Social Sciences	Female	49%	64%	31%
45	Social Sciences	Male	40%	61%	24%
46	Construction Trades	Female	75%	100%	75%
46	Construction Trades	Male	48%	92%	44%
47	Mechanic and Repair Technologies/Technicians	Female	32%	60%	19%
47	Mechanic and Repair Technologies/Technicians	Male	36%	66%	24%

		A Gender	B Underemployed in First Job	C Underemployed Five Years Later	D Probability of Being Underemployed in First Job and Five Years Later
CIP Code	**Major CIP Title**	**A**	**B**	**C**	**D**
49	Transportation and Materials Moving	Female	74%	71%	52%
49	Transportation and Materials Moving	Male	59%	74%	44%
50	Visual and Performing Arts	Female	50%	68%	34%
50	Visual and Performing Arts	Male	40%	69%	28%
51	Health Professions and Related Programs	Female	54%	72%	39%
51	Health Professions and Related Programs	Male	49%	71%	35%
52	Business, Management, Marketing, and Related Support Services	Female	52%	65%	34%
52	Business, Management, Marketing, and Related Support Services	Male	44%	63%	27%
54	History	Female	48%	60%	29%
54	History	Male	49%	67%	33%
60	Residency Programs	Female	57%	85%	49%
60	Residency Programs	Male	61%	84%	52%

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