Written Testimony of

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U.S. House Committee on Financial Services

Subcommittee on Diversity and Inclusion

"Closing the Racial and Gender Wealth Gap Through Compensation Equity"

April 29, 2021

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Introduction

Chairwoman Beatty, Ranking Member Wagner, and members of the Subcommittee, thank you for inviting me to testify this afternoon.

Glassdoor is a technology platform that aims to help people everywhere find a job and company they love. Since our founding in 2007, we have grown into the worldwide leader on workplace transparency and insights, serving as an online platform that allows millions of employees around the world to freely and anonymously review their employer, share information about their salary and benefits, learn about pay and working conditions, and more by reading the shared stories of other anonymous employees like them. Our business is built on the idea that transparency in the hiring market helps both employees and employers. We believe workplace transparency leads to better hires, better employee retention, and a more engaged, equitable, and productive workforce.

As the Chief Economist and Director of Research at Glassdoor, I lead our company's not-for-profit think tank. I am a Ph.D. labor economist by training, and my team's function is to conduct academic research at Glassdoor using a large database of user-submitted salaries, company reviews, benefit reviews, interview reviews, job postings and more that our platform collects as one of the world's largest hiring platforms. Today, Glassdoor reaches an audience more than 60 million unique visitors per month, with nearly 90 million employer reviews, salaries, and workplace insights covering over 1.5 million employers. All of our research is conducted independently from our business, and we do not engage in any paid external consulting work or accept employer funding for any of the research I'll share today as part of my testimony.[1]

Glassdoor operates a large online hiring market where a significant share of America's employment relationships begin. Our product, and the anonymously shared employee information on our platform, are where the rubber meets the road when it comes to hiring, pay negotiation, and employee sentiment in today's workforce. Our detailed salary and employer reviews data provide us with a unique and near-real-time vantage point on job seeker and employer behavior and overall trends in the nation's workforce — including

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[1] More information about Glassdoor's Economic Research group is available at www.glassdoor.com/research.

trends in compensation equity, diversity and inclusion (D&I), benefit availability, and more spanning a wide range of U.S. employers in more than 25 industries and 700 metro areas.[2]

Today's hearing on closing the nation's gender and racial wealth gaps with pay equity is particularly timely. As we rebuild the nation's workforce in the wake of the COVID-19 recession, we face a historically unique opportunity to put learnings to work from decades of research that addresses longstanding issues of pay inequity in America.

Over the years, my team at Glassdoor has published a robust body of research and public opinion data on the state of gender pay equity and D&I in the workforce, and our business has built a variety of technology tools that help shine the light of transparency on the nation's job market with the aim of helping employers and job seekers address the root causes of pay inequity at scale. From that work, we have learned a tremendous amount about the nuanced causes of gender and racial inequities in the workplace, and we believe this research points the way toward a set of real-world solutions that can significantly improve pay equity in America as we rebuild our economy in the post-COVID-19 era.

In my testimony today, I will outline a handful of Glassdoor's most impactful research findings on the current state of gender and racial inequities in the U.S. workforce, share what we've learned about causes of those inequities, and offer some possible directions that our research suggests can have the biggest bang-for-the-buck in terms of making real progress toward more equitable pay by gender and race in America.

How to Think About Compensation Equity
When thinking about pay equity in America's workforce, it's helpful to begin with a thought experiment. Imagine looking across a large and diverse gathering of kindergarten-age kids from all across America — all with a wide array of future possibilities laid out before them. No reasonable person would ever look across the faces of those children and say, "You will earn 86 cents on the dollar compared to your friend, because you are a Hispanic child." Or similarly, "You will earn just 71 percent of what your friend will earn, because you are a Black or African American girl."

Such predictions about a group of children would be outrageously unfair. And yet something in fact happens in America during the time between kindergarten classrooms and entering the adult U.S. workforce that generates these types of dramatic, surprising, and morally troubling patterns of compensation inequity. These patterns of racial and gender inequity have been clear in every type of workforce data I have seen in my career as an economist, including federal government labor force surveys, actual company payroll data, and user data from Glassdoor's own hiring marketplace — some of which I will share with you below. My view is that it is America's moral imperative to help identify causes of these inequities, and work to eliminate them — both through private sector and public sector action.

Some of what happens to American workers during the time between kindergarten and entering the adult workforce is due to sheer luck. Some of what happens is surely due to effort and personal choices. However, the patterns we see in the data suggest far too much of what happens is due to things we can and should correct as a society: All types of discrimination; outdated social norms that erect barriers to full participation in the economy; and other factors that lead children into different and unequal paths in school, in life, and ultimately in the workforce.

These factors include educational inequalities; inequalities in family income and status; gender and racial biases in hiring, promotion and pay; insufficient child and elder care institutions that adversely impact the gender balance in labor force participation, and of course, cases of outright discrimination that still occur in the American workforce today.

To help shed light on the state of workforce gender and racial pay equity, and what data from Glassdoor suggest we can do to improve it, I'd like to share with you some of our research findings on this subject.

Some Facts on Gender and Race Pay Equity Today
As a researcher at Glassdoor, I have published several major studies looking at gender pay equity in our online salary data, both in the United States and around the world.[3] All of this research is based on the millions of salaries that job seekers have anonymously shared through online surveys on Glassdoor that users have completed while using our platform to search for jobs or research pay and company culture. The accuracy and reliability of these data have been shown though more than 80 academic collaborations, in which independent researchers from the nation's leading universities, the Federal Reserve, and think tanks have published peer-reviewed scientific articles on pay and company culture using salary and company reviews data collected by Glassdoor.

For context, it's important to keep in mind that as recently as the early 1960s, the U.S. labor market was sharply divided by gender. Only 37 percent of women worked outside the home.[4] Newspapers routinely advertised jobs for men and women separately, often with separate pay scales. Women as a group at that time earned on average about 59 cents per dollar earned by men—giving rise to the famous equal-pay slogan "59 cents out of every dollar."[5]

After Congress passed the Equal Pay Act in 1963 aimed at eliminating overt gender discrimination in hiring and pay, female labor force participation rate rose steadily in the 1960s and 1970s, as did female enrollment in college and graduate programs. By 1990,

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[3] All of our research on gender pay gaps shared in this testimony is based on information shared by Glassdoor users who have self-identified as either male or female.
[4] Source: https://fred.stlouisfed.org/series/LNS11300002.
[5] "American Women: Three Decades of Change," Hearing before the Joint Economic Committee, U.S. Congress, November 9, 1983. Available online at https://www.jec.senate.gov/reports/98th%20Congress/Ameircan%20Women%20-%20Three%20Decades%20of%20Change%20(1257).pdf.

women as a group earned on average about 72 cents per dollar when compared to men. And by 2005 that figure had risen to about 77 cents per dollar. However, U.S. progress toward gender pay equality has stagnated in recent years, hovering between 75-80 cents per dollar on average, where it has remained for more than a decade.

How Big is America's Gender Pay Gap?
Our most recent study in 2019 examined the latest U.S. gender pay gap based on detailed salaries from more than 425,000 full-time U.S. employees.[6] Overall, we found that male employees as a group earn 21.4 percent higher base pay than women on average (or women earn 79 cents per dollar men earn). When we compared male and female workers of similar age, education and experience, that pay gap shrank to 19.1 percent. Even when we compared workers within the same job title, same employer, same location, with similar ages and experience, the U.S. gender pay gap still hovered around 4.9 percent (or 95.1 cents per dollar) — a statistically significant gap that cannot be explained by our data, despite having much more detailed information about job titles and specific employers in Glassdoor's surveys compared to publicly available data from the U.S. Bureau of Labor Statistics. To put that figure in perspective, a 4.9 percent adjusted pay gap means that at today's real median earnings for full-time working women of $47,299, that is equivalent to a pay loss of $2,318 per year or more than $69,530 over a 30-year career — despite working in similar jobs and employers, in similar locations, with similar education.[7]

Depending on different scenarios about the pace of progress toward gender pay equality, we project the "adjusted" U.S. gender pay gap is not likely to close entirely until 2035 in the best-case scenario, or until 2070 in the worst-case scenario.

Time to Close the U.S. Gender Pay Gap
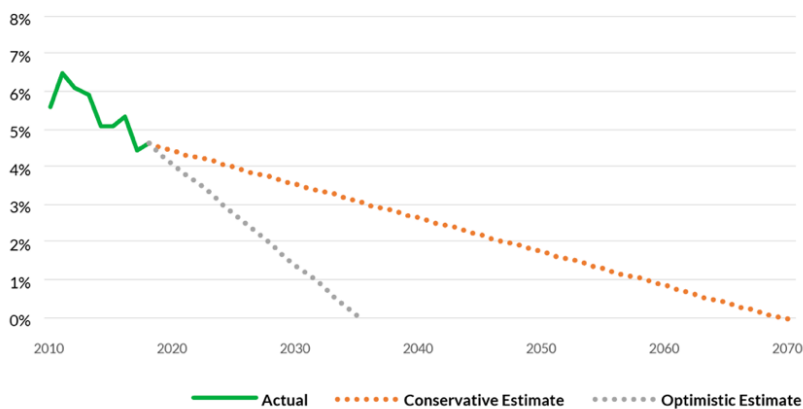
Source: Glassdoor Economic Research (Glassdoor.com/research).

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[6] Andrew Chamberlain, Daniel Zhao and Amanda Stansell (March 2019). "Progress on the Gender Pay Gap: 2019," Glassdoor Economic Research working paper. Available online at https://www.glassdoor.com/research/gender-pay-gap-2019/.
[7] Based on median female compensation figures in "Income and Poverty in the United States: 2019," U.S. Census Bureau, September 2020. Available online at: https://www.census.gov/library/publications/2020/demo/p60-270.html.

A Note on How to Interpret "Adjusted" Pay Gaps

This research highlights an important issue in how we measure and talk about gender and other pay gaps. What researchers call the raw or "unadjusted" gender pay gap is simply the average or median pay for women as a group, compared to men as a group. This is broadest measure of all of the combined social, economic and individual forces that lead to different pay for men and women in the workforce. While this measure is useful for assessing overall gender parity in the economic position of men and women, it does not shed much light on which factors are more or less important causes of gaps in pay. To fill that need, researchers calculate an "adjusted" gender pay gap, which statistically controls for all observable characteristics of male and female workers — such as what job they work in, in which industry, their geographic location, level of education and experience, and more.

"Adjusted" pay gaps are important because they help us understand how best to tackle the issue of closing the U.S. gender pay gap. They use data to objectively show which causes matter most: Education and experience, geographic location, employer discrimination, differences in male and female occupation, and so on. It's important to keep in mind that a finding of zero statistically adjusted pay gap does not imply that there is no gender inequality in the workforce — it just tells us that men and women who end up in the same jobs with the same backgrounds earn similar pay; it does not tell us whether there is bias in hiring, for example, that could lead to women being over-represented in lower-paying occupations to begin with.

A common misperception about "adjusted" gender pay gaps is that they show how much of pay gaps are due to free individual choices of men and women, compared to how much is due to employer discrimination. This is not the case: When we calculate "adjusted" pay gaps, not all statistical controls we apply represent purely voluntary choices by workers. For example, education is influenced by socioeconomic background, work experience is determined partly by balancing career and family, and the choice of job title and industry is heavily influenced by social and gender norms that discourage men and women from choosing freely between professions. Just because we can statistically control for differences between workers does not mean those differences are due to free choices by workers.

As a labor economist, my view is that policymakers' long-term goal should be to minimize the U.S. overall or "unadjusted" pay gap. It is the broadest possible measure of equality of economic access by gender to earning potential in the workforce. And we should use studies of the "adjusted" pay gap as a tool to help identify practical, short-term strategies that address causes of pay inequality between men and women, in order of economic importance, one factor at a time.

What Causes the Gender Pay Gap?

Our data at Glassdoor help us identify the most important causes of gender pay gaps today. We have consistently found in multiple studies that the main cause is the fact that men and women work in substantially different occupations in the economy. This is

something economists call "occupational sorting." For example, recent U.S. Census Bureau figures show that women make up about one-fourth of chief executives in the workforce, but account for more than 70 percent of retail cashiers.

We found this type of job sorting explains about 56.5 percent of the overall U.S. gender pay gap, the largest factor in our research by far. About 36 percent of the pay gap cannot be explained at all by the data — due to some combination of bias in how the job market rewards men and women, or other unobservable characteristics of workers we can see in the data. By comparison, differences between the education and experience of men and women can only explain about 7.9 percent of the pay gap.

This is an important finding for any discussion of long-term solutions to address America's gender pay gap. The majority of today's U.S. gender pay gap is due to a collection of forces that push men and women onto different career tracks in the economy — often beginning many years earlier in the nation's educational system. This is not a new idea: Even philosopher Adam Smith recognized in his 1776 treatise *An Inquiry into the Nature and Causes of the Wealth of Nations* that occupational sorting was the main reason individuals that appear similar as children end up in vastly different economic positions in adulthood.[8] Any long-term solution to the gender pay gap must address this issue. However, our research shows it is not the only factor: Differences in male and female experience and education matter, as do other factors, such as biases in hiring, compensation and promotion.

A few other striking findings from our 2019 study: The gender pay gap tends to grow, not shrink, as workers progress in their careers; it is largest in the Media, Construction, and Retail industries, with the gender pay gap in the Financial Services industry slightly above the U.S. average (5.6 percent adjusted pay gap in Financial Services, compared to 4.9 percent for all sectors); and it varies substantially in different countries around the world. On an overall basis, in our analysis of eight developed countries, the smallest gaps in male compared to female pay were found in France and Singapore, while the largest unadjusted gaps were found in Germany and the United States. The figure below provides country-by-country details from our research.

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[8] "The difference between the most dissimilar characters, between a philosopher and a common street porter, for example, seems to arise not so much from nature, as from habit, custom, and education. When they came in to the world, and for the first six or eight years of their existence, they were, perhaps, very much alike, and neither their parents nor play-fellows could perceive any remarkable difference. About that age, or soon after, they come to be employed in very different occupations. The difference of talents comes then to be taken notice of, and widens by degrees, till at last the vanity of the philosopher is willing to acknowledge scarce any resemblance." Adam Smith, Book I, Chapter II, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776).

The Gender Pay Gap By Country

	"UNADJUSTED" BASE GENDER PAY GAP		"ADJUSTED" BASE GENDER PAY GAP	
	Average Cents/Pence Earned by Women Per Dollar/Pound/Euro of Male Earnings	Percentage Male Pay Advantage	Average Cents/Pence Earned by Women Per Dollar/Pound/Euro of Male Earnings	Percentage Male Pay Advantage
Australia	0.85	15.1%	0.97	3.1%
France	0.88	11.6%	0.96	3.7%
Canada	0.84	16.1%	0.96	4.0%
United States	0.79	21.4%	0.95	4.9%
United Kingdom	0.82	17.9%	0.95	5.0%
Singapore	0.87	12.8%	0.95	5.2%
Germany	0.78	22.3%	0.94	6.4%
Netherlands	0.81	18.9%	0.93	6.6%

Source: Glassdoor Economic Research (Glassdoor.com/research).

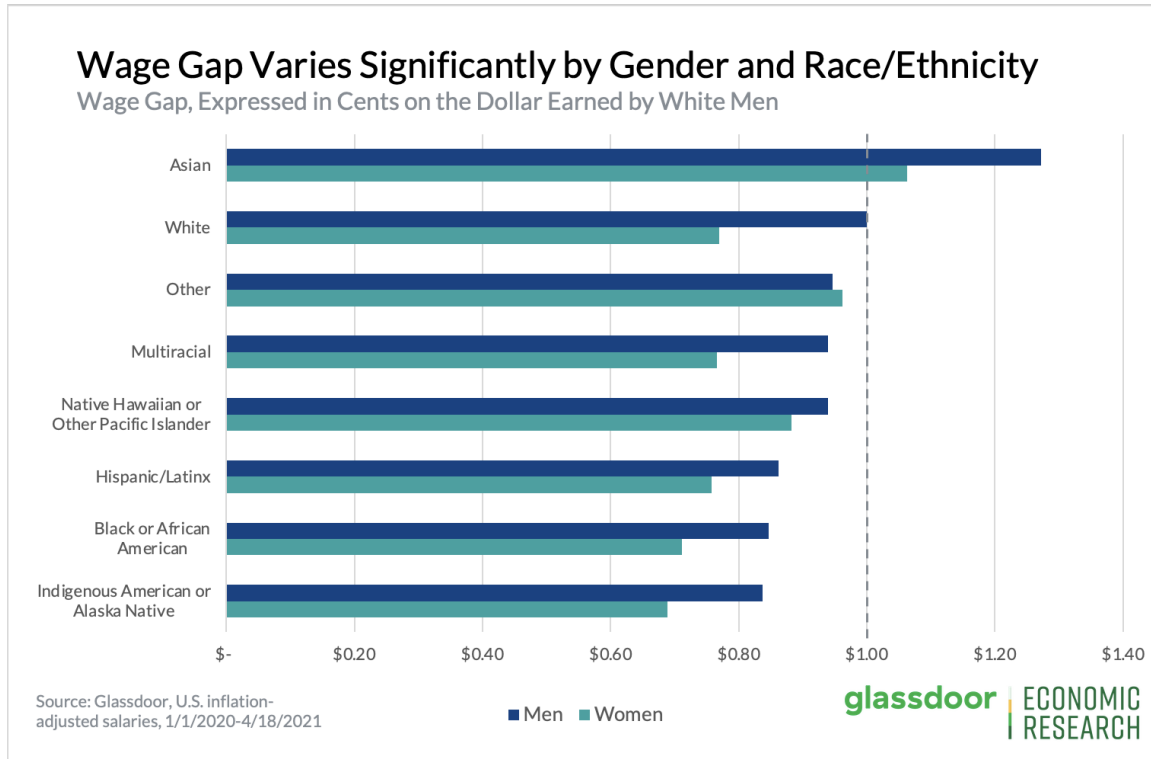### How Race and Gender Pay Gaps Interact

A well-known fact about the U.S. labor market is that there are significant pay gaps among racial and ethnic groups as well as gender, and that gender pay gaps are substantially larger among some race and ethnicity groups. We also see this pattern in the salaries anonymously reported on Glassdoor.

The figure below shows how the "unadjusted" or overall pay gap between men and women varies by different racial and ethnic groups in today's labor market. When we compare the median base pay of different groups of workers to that of self-identified white male employees (as a baseline for comparison), we see that indigenous American or Alaska Native women earn just $0.69 on average compared to $1 earned by white males; similarly, Black or African American women earn just $0.71 per dollar. These patterns are broadly consistent with what researchers have found in U.S. Census Bureau figures as well. As a researcher, I find it remarkable how persistent these pay gaps by race and gender are, regardless of whether the data are from government surveys or private sector hiring platforms like Glassdoor. These gaps are real, and they demand our attention.

U.S. Pay Gaps in Anonymous Employee Salaries Reported on Glassdoor Vary Widely by Race and Gender

Wage Gap Varies Significantly by Gender and Race/Ethnicity
Wage Gap, Expressed in Cents on the Dollar Earned by White Men

Source: Glassdoor, U.S. inflation-adjusted salaries, 1/1/2020-4/18/2021

Note: Median base pay based on anonymously reported U.S. Glassdoor salaries. Includes full-time employees only, adjusted annually for inflation, for salaries submitted from 1/1/2020 through 4/18/2021. Extreme outlier salaries below the federal minimum wage ($7.25/hour annualized) as well as above $5 million per year are omitted.
Source: Glassdoor Economic Research (glassdoor.com/research)

The Role of Higher Education in Creating Pay Gaps
Another factor that's important to understand is that the forces that create and sustain a U.S. gender pay gap begin long before Americans enter the labor force. Understanding this is key to identifying and repairing the foundational causes of America's pay equity problems. And it suggests that policy that is narrowly targeted only at current compensation practices will not be a sufficiently comprehensive approach to closing gender pay gaps.

In a 2017 study, we looked tens of thousands of real-world resumes from job seekers on Glassdoor and closely examined the connection between their college major, gender, and subsequent jobs and compensation in the early years of their careers.[9] The results were striking. The choice of a college major is a primary way by which young workers get

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[9] Andrew Chamberlain and Jyotsna Jayaraman, "The Pipeline Problem: How College Majors Contribute to the Gender Pay Gap," Glassdoor Economic Research working paper, April 2017. Available online at: https://www.glassdoor.com/research/pipeline-problem-college-majors-gender-pay-gap/.

channeled into different occupational paths in the job market. And we found that college majors are sharply divided by gender, essentially laying the groundwork for an unadjusted gender pay gap to arise following graduation.

In particular, we found many college majors that lead to today's high-paying roles in tech and engineering are male-dominated. These include Physics (81 percent male), Computer Science and Engineering (74 percent male), and Electrical Engineering (74 percent male). By contrast, majors that commonly lead to lower-paying roles, typically in the social sciences and liberal arts, tended to be more female-dominated, including Social Work (85 percent female), Anthropology (80 percent female) and Human Resources (80 percent female). Overall, we found that nine of the 10 highest paying college majors examined are male-dominated, while 6 of the 10 lowest-paying college majors are female-dominated.

Even When Graduating with the Same College Major, We Still See An Early-Career Gender Pay Gap in Many Fields

Major	MEDIAN BASE PAY (ALL JOBS IN FIRST 5 YEARS)		Gender Pay Gap %
	Male	Female	
Healthcare Administration	$51,250	$40,000	22.0%
Mathematics	$60,000	$49,182	18.0%
Biology	$46,000	$40,000	13.0%
Human Resources	$50,000	$44,222	11.6%
Health Sciences	$45,000	$40,000	11.1%
Biomedical Engineering	$60,000	$53,450	10.9%
Industrial Engineering	$65,000	$58,000	10.8%
Business	$50,000	$45,000	10.0%
Marketing	$50,000	$45,000	10.0%
Exercise Science	$44,232	$40,000	9.6%
Statistics	$60,000	$54,469	9.2%
Physics	$55,714	$50,800	8.8%
Political Science	$47,103	$43,000	8.7%
Management Information Systems	$65,000	$60,000	7.7%
Biochemistry	$48,000	$44,500	7.3%

Source: Glassdoor Economic Research (www.glassdoor.com/research).

Even more unsettling, our data show that even within the *same* college major, men and women routinely end up on different career tracks early in their careers, resulting in gender pay gaps that may follow them for a lifetime. To offer one illustrative example, consider the case of Mathematics majors. Our study shows that for male Mathematics

majors, one of the most common jobs after college was data scientist — a highly paid role. By contrast, female Mathematics majors were far more likely to end up in lower-paying data analyst and business analyst roles. On average, we found these differences resulted in an 18 percent unadjusted pay gap for men and women from Mathematics majors during the first five years after graduation. This study illustrates that, to be truly effective, any long-term solution to America's gender pay gap must address gender sorting into college majors as well as occupational sorting once workers join the labor force — in addition to addressing current compensation practices.

Pay Is Not the Only Inequality in the U.S. Workplace
While the subject of this hearing is gender and racial pay equity, our research findings also demonstrate that pay is not the only dimension on which inequities in today's workforce are being experienced. Even within the same workplaces, employees from different backgrounds routinely report significantly different views of how equitably (or not) employers are acting toward underrepresented groups. These cultural workplace inequalities (or varying perceptions thereof) can make it harder to resolve pay inequalities, and are also likely *caused* in part by the racial and ethnic group pay inequalities that we see in our data, for the simple reason that research shows employee pay and workplace satisfaction are closely linked.[10]

In a new study released this week, we find strong statistical evidence that workers from different racial and ethnic groups disagree about the current state of workplace D&I inside American companies.[11] Overall, Black or African American workers report an average D&I rating of 3.49 on a 1-to-5 scale, well below the average of 3.73 across all workers. Even after accounting for differences in employees' occupations, industries, company sizes, genders, lengths of time on the job and more, we found that Black or African American employees still rate workplace D&I nearly 8 percent lower than their white colleagues — a large and highly statistically significant gap. And despite increasingly widespread corporate investment in diversity, inclusion and equity in recent years, this pattern of markedly lower D&I opinions among Black or African American workers has actually worsened since 2019.

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[10] See for example Mario Nuñez, "Does Money Buy Happiness? The Link Between Salary and Employee Satisfaction," Glassdoor Economic Research report, June 2015. Available online at: www.glassdoor.com/research/does-money-buy-happiness-the-link-between-salary-and-employee-satisfaction/.
[11] Andrew Chamberlain, Amanda Stansell, and Daniel Zhao, "America's Workplace Diversity Crisis: Measuring Gaps in Diversity & Inclusion Satisfaction by Employee Race and Ethnicity," Glassdoor Economic Research working paper, April 2021. Available online at www.glassdoor.com/research/.

Black or African American Employees Rate Workplace D&I Significantly Lower Than Other Groups
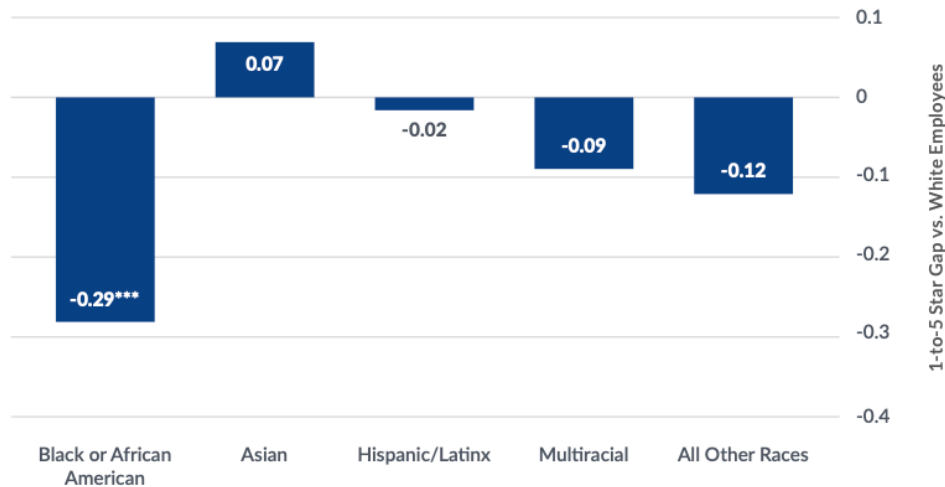
Source: Glassdoor Economic Research (www.glassdoor.com/research) Note: Statistically adjusted D&I ratings gap, relative to white employees. Includes controls for occupation, industry, company size, length of employment, full-time/part-time status, gender, metro location and year. *** denotes statistically significant at the 1 percent level.

This divergence in D&I opinion within America's workplaces is highly problematic for efforts to resolve workforce inequalities of all kinds. First, the data vividly highlights a systematic shortfall in the workplace experience for Black or African American employees. Second, it suggests that any attempt to address racial and ethnic pay equity in America must also address workplace diversity and inclusion in tandem — they are two sides of the economic coin in workplaces. Both of these dynamics must be addressed concurrently in order to create sustainable paths for every American to reach their full potential in today's economy.

Why Pay Transparency Can Help
Glassdoor was founded on the idea that people in the job market should be able to freely and anonymously share their pay information, and that doing so would empower both job seekers and employers by giving both better results in the job market — more pay equity, better job matches, enhanced employee retention, and improved workforce morale.

One pathway toward better pay equity both by gender and race and ethnicity is improved pay transparency: Employers and employees making pay data more transparent, while also being conscious of the need to protect employee privacy. Employers can take initiative within their own internal pay processes to study compensation data to ensure no gaps by race, gender, or other protected categories exist, or open up, whether intentionally or not. To help encourage more employers to do so, in 2017 we published a free tool kit and guide for employers designed to teach HR practitioners — in non-technical, plain English — how

to study their payroll data just like an academic labor economist.[12] The guide is freely available today, includes example computer code and data, and has been widely used by employers who have reached out to Glassdoor for help in measuring and addressing their own gender and other pay gaps.

We believe that if every large U.S. company were to choose to disclose their own gender and race pay information, and use the approach we have recommended to analyze those data for gaps, we could transform the American workforce at scale by creating business practices that build pay equity into corporate America's DNA. The roughly 151-million-person employed U.S. workforce is the sum of payrolls for individual employers. Building pay equity analyses into the compensation practices of employers, one by one, could go a long way toward a solution to gender and racial pay gaps in America.

Since 2016, Glassdoor itself has been taking its own recommended "medicine", conducting our own gender and race pay equity audits in order to drive and ensure internal pay transparency and equity. We have made the results and methodology publicly available.[13] In addition, we externally publish pay bands for every role in our company, as well as the specific salaries of all members of our corporate C-suite.[14] And we encourage our thousands of employer clients who use Glassdoor as a hiring platform to do the same. We believe that if every U.S. employer followed this practice, we could remove a significant barrier to achieving gender and racial pay equity by shining the light of transparency on compensation gaps and building it into the business processes of thousands of U.S. employers.

Transparency Today Can Help Solve Occupational Sorting Tomorrow
Greater pay transparency is a short-term solution that can help today's employers close pay gaps within today's workforce. However, it can also deliver long-term benefits by chiseling away at occupational sorting, thereby steadily eroding one of the most important drivers of the gender pay gap. Making a public commitment to fair pay and greater pay transparency can help to encourage women and members of underrepresented groups in the labor market to aim for more highly paid fields. A perception can be fostered that pay will be fair for them when they arrive. Indeed, a question facing many women and underrepresented workers is, "Why fight to become an accomplished, capable employee or professional if you will just get shortchanged once you arrive?" One compelling response is that enhanced pay transparency today can help deliver on the long-term promise of pay fairness tomorrow, resulting in labor supply benefits for years into the future.

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[12] Andrew Chamberlain, "How to Analyze Your Gender Pay Gap: An Employer's Guide," Glassdoor Economic Research report, March 2019 (updated). Available online at https://www.glassdoor.com/research/how-to-analyze-gender-pay-gap-employers-guide/.
[13] Amanda Stansell and Andrew Chamberlain, "Glassdoor's Annual Pay Checkup for 2020," Glassdoor Economic Research report, July 2020. Available online at: https://www.glassdoor.com/research/glassdoor-pay-checkup-2020/.
[14] See for example: https://www.glassdoor.com/blog/glassdoor-salary-ranges/.

The evidence is clear that pay transparency can have a big impact on pay equity. The most compelling piece of research we have on this comes from a 2020 study we published that examined the impact of transparent salary information on wages of employees.[15] We examined a large group of job seekers on Glassdoor who were given estimates of their market value as an employee through our "Know Your Worth" online salary calculator tool, and compared them to a similar group of employees who did not receive that information. The study found employees who were given salary information reported a subsequent statistically significant pay bump of 2.4 percent, the equivalent of being given a $1,305 annual raise. Moreover, the biggest effects were reported by younger workers between the ages of 25 and 34 years old.

America's Younger Workers Stand to Gain Most When Given Transparent Salary Information
(Percentage impact on pay from being given a personalized market salary estimate on Glassdoor)

Error bars are based on a 95% confidence interval.
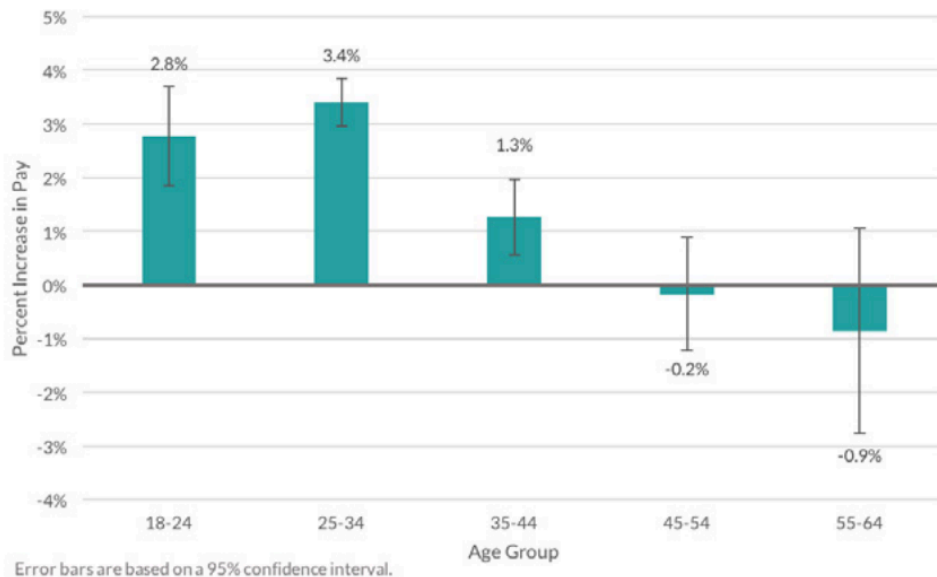
Source: Glassdoor Economic Research (www.glassdoor.com/research)

As an economist, this research makes me very optimistic about the prospects for closing America's gender and race pay gaps in part through better compensation transparency. It is critical to remember that boosting the earnings of employees at the bottom of the nation's pay scale through better pay transparency does not require pulling down pay at the top — wages are not drawn from a fixed pie in the economy. To the contrary, improved pay equity can be a pro-growth policy that helps make the nation's economy produce more efficiently by better aligning employee productivity with rewards. More transparent pay and workplace information can help boost employee productivity by promoting better job

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[15] Daniel Zhao, "Know Your Worth: The Power of Pay Transparency," Glassdoor Economic Research working paper, May 2020. Available online at: https://www.glassdoor.com/research/kyw-power-of-transparency/.

matches, while also improving the salary bargaining power of American workers. Such a policy can be a win-win-win for U.S. workers, employers, and the broader economy.

Lack of Pay Equity Can Hurt Talent Attraction and Employee Retention
In addition to our research on pay equity and transparency, Glassdoor also routinely surveys the American workforce to gather their views about a range of workplace issues, one of which is how pay equity impacts whether employees are willing to work for, and remain at, companies that fail to make good-faith efforts to address pay equity.

In a 2019 survey of employed U.S. adults conducted by The Harris Poll, we found that 58% of all employees and 72% of female employees said they would not apply to work at a company where a gender pay gap exists, and two thirds of respondents (67%) stated that the gender pay gap is a serious problem in the U.S. workforce.[16] This is a common finding among similar HR surveys, with polls routinely showing that pay equity matters to prospective candidates. Some surveys even reveal that a significant share of employers believe that gender pay gaps within their organizations have negatively impacted their own talent attraction and employee retention.[17]

In our experience, most U.S. employers understand the benefits of improved hiring diversity, as well as the risks of gender and race pay inequity. We believe that most employers ultimately want to behave legally, ethically, and in a way that helps them maintain a satisfied and productive workforce. However, one barrier to greater employer action on pay equity and diversity is a lack of clear guidance on best practices — many employers are wary of taking steps that their competitors may not be also taking and of the legal implications of making missteps when being more transparent about pay. They often are simply unsure of whether or not their efforts to promote pay equity and workforce diversity are following industry best practices. This is an area where better guidance from the federal government can play a key role in setting a national baseline for what constitutes pay transparency and helping set standards for measuring and resolving pay gaps.

A 3-Pronged Strategy for Closing America's Gender and Racial Pay Gap
One clear lesson from our research is that there is no single cause of America's gender and racial pay gaps. Even if policy were able to ensure perfectly equal compensation for every similarly situated employee within every U.S. employer, it would still not be enough by itself to achieve sustained overall pay equity in the U.S. The foundational causes of U.S. gender and racial pay inequities are simply too complex for a one-dimensional approach, however well-intentioned, to succeed. Instead, our research points to the following 3-pronged approach as necessary to make lasting progress.

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[16] Full surveys results available at: https://www.glassdoor.com/about-us//app/uploads/sites/2/2019/03/Gender-Pay-Gap-Fact-Sheet-2019.pdf.

[17] See for example the *Hays Salary & Recruiting Trends 2020* guide, which found 27 percent of employers surveyed said gender pay gaps had negatively impacted staffing and retention. Source: https://www.hrmagazine.co.uk/content/news/gender-pay-gap-impacting-attraction-and-retention-of-talent.

1. Policies that Support and Give Incentives to Employers. We believe there is great promise in harnessing technology to empower employers to more easily and effectively identify and address pay gaps voluntarily. These may include:

- Establishing clear voluntary pay transparency standards, and consistent reporting guidelines and tools for employers that lower barriers to voluntary action on pay equity.

- Providing better guidance to employers as to how to monitor and cultivate recruiting pipelines that deliver candidates and employees that look more like the demographic population of the nation's workforce, *i.e.*, that help to combat the problem of occupational sorting before it occurs.

- Encouraging or incentivizing employers to voluntarily offer more flexible work hours, more widespread childcare support, and gender-neutral parental leave policies. Such an approach could help create gender-neutral workforce opportunities and help reduce occupational barriers facing women.

2. Policies that Support and Give Incentives to Employees. We believe policies that help workers better negotiate pay and break down workforce barriers for themselves can play an important role in reducing America's gender and racial pay gaps. These may include:

- Establishing clear guidelines on voluntary corporate pay transparency and employee access to salary information, empowering employers to take action on pay transparency and employees to self-advocate for pay equity and identify cases of workplace inequities more easily.

- Increasing investment in information and tools aimed at providing U.S. workers with more robust guidance about pay, skills, and future economic opportunities. This approach is designed to help break down occupational sorting — one of the most persistent factors driving the nation's gender pay gap.

- Harnessing technology that can help improve the salary bargaining position of U.S. workers. This builds on lessons obtained from Glassdoor's own free Know Your Worth tool, which has been shown to significantly boost employee wages by arming workers with credible information about market salaries for similar roles.

3. Policies that Reform Other U.S. Institutions. Solving a large and systemic problem like the gender pay gap will require policies that go far beyond employers and job seekers, to reform broader institutions that contribute indirectly to pay inequities. These may include:

- Occupational sorting is the most important cause of the overall gender pay gap, and that sorting begins in the U.S. educational system. Research shows that college majors today remain highly segregated by gender, laying a pervasive economic

foundation for gender pay gaps in the broader U.S. workforce. Without addressing the issue of gender sorting by college major, it will extremely difficult to substantially close the unadjusted gender pay gap in the United States.

- Programs that promote equal labor force participation by women can play an important role in reducing the occupational sorting driving gender pay gaps. Public sector support for more universal access to affordable child care, elder care, and gender-neutral parental leave can play an important role in reducing the gender pay gap.

Conclusion: A Path Forward on Compensation Equity

As the U.S. labor market recovers from the COVID-19 crisis, we have a unique opportunity to address long-standing inequalities in the workplace. This critical time following a recession offers an opportunity to rebuild a more equitable labor force in the United States. This is the right time to disrupt and repair calcified social and economic institutions that dissuade, deter and prevent employees from publicly sharing basic information about pay and that have long stood in the way of broader gender and racial pay equity.

Improving pay equity in the U.S. workforce is about fairness. But it is also about maximizing the potential productivity of the U.S. workforce while also strengthening employee engagement and productivity within employers. Our research at Glassdoor has shown that pay transparency and equity can be a pro-growth, pro-employer agenda for change, driving employee attraction, retention, and broader efficiencies in the labor market. Pay equity and transparency can both help America move a step closer to the ideals of equality underlying our nation's founding documents, and also make our economy work better for millions of struggling Americans.

In today's fast-changing 21st Century economy, the United States can no longer afford to leave millions of women and members of underrepresented groups sidelined in jobs that pay them unfairly, fail to fulfill their full economic potential, and stand in the way of their personal and professional growth. The key to sustaining and building a dynamic and prosperous U.S. economy into the future is to ensure that every American has a pathway to make their best possible contribution to our shared prosperity -- and to ensure they are equitably compensated for that contribution. In this way, I believe that a pay equity agenda for America can be both a driver of gender and racial fairness as well as a pro-growth policy for a stronger and more vibrant America.

On behalf of Glassdoor, I'd like to thank you for inviting me before the Subcommittee today and for your interest in the important topic of improving pay equity in the U.S. workforce. We look forward to helping you address these issues, and I look forward to answering your questions.

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Addendum 1
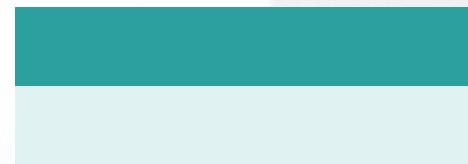
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Progress on the Gender Pay Gap: 2019

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Key Findings

This study examines how gender pay gaps around the world have changed since Glassdoor's initial study in 2016. Leveraging hundreds of thousands of salary reports, including detailed worker and job information shared voluntarily and anonymously by employees on Glassdoor, we estimate the gender pay gap in eight countries: the United States, the United Kingdom, Canada, Germany, France, the Netherlands, Singapore, and Australia.

Using Glassdoor's unique data, we project, given the current rate, how long it could take to achieve gender pay equality in the U.S. Also, we consider whether a "salary confidence gap" exists between the pay men and women seek when applying to jobs, and how this may contribute to the overall pay gap.

- **Key takeaway.** The gender pay gap persists in the United States and around the world. Men earn more than women on average in all eight countries we studied, even after applying statistical controls for worker and job characteristics to ensure an apples-to-apples comparison. Even though women do not receive equal pay for equal work yet, progress is slowly being made; the pay gap has narrowed since our last study in 2016.

- **The gender pay gap is narrowing.** The U.S. adjusted pay gap has steadily dropped from 6.5 percent in 2011 to 4.6 percent in 2018. A tighter labor market, higher labor force participation by women and greater awareness of the gender pay gap all likely contribute to this progress. However, if these trends continue at the same pace, the adjusted gender pay gap still may not fully close until the year 2070. The chart below shows two possible scenarios for how long it may take to close the U.S. gender pay gap based on the downward trend between 2010 and 2018.

Time to Close the U.S. Gender Pay Gap

Legend: Actual · Conservative Estimate · Optimistic Estimate
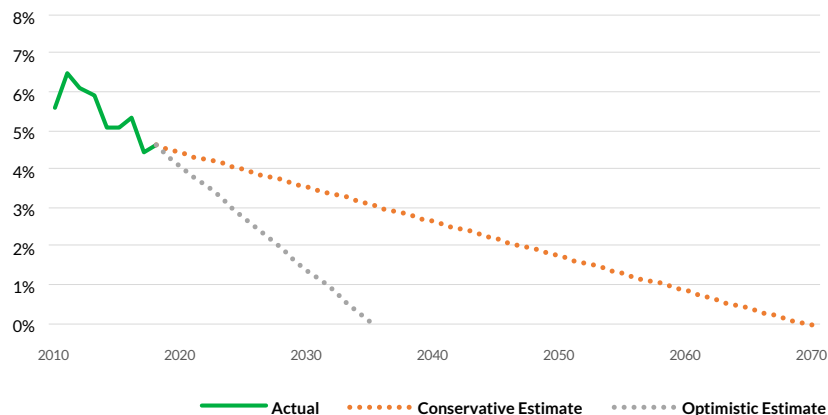
Source: Glassdoor Economic Research (Glassdoor.com/research).

- **How large is the gap right now?** Based on over 425,000 salaries shared by full-time U.S. employees on Glassdoor, men earn 21.4 percent higher base pay than women on average. However, comparing workers of similar age, education and experience shrinks that gap to 19.1 percent. Furthermore, after comparing workers with the same job title, employer and location, the gender pay gap in the U.S. falls to 4.9 percent (95.1 cents per dollar).

- **How does the pay gap compare internationally?** Across all eight countries we examined, the large unadjusted gender pay gap shrinks to a smaller adjusted pay gap once statistical controls are added. Germany has the largest unadjusted gap with women earning about 78 cents per euro men earn while France has the smallest unadjusted gap with women earning about 88 cents per euro men earn. Australia has the smallest adjusted gap with women earning 97 cents per dollar men earn, while the Netherlands has the largest adjusted gap with women earning 93 cents per euro.

The Gender Pay Gap By Country

	"UNADJUSTED" BASE GENDER PAY GAP		"ADJUSTED" BASE GENDER PAY GAP	
	Average Cents/Pence Earned by Women Per Dollar/Pound/Euro of Male Earnings	Percentage Male Pay Advantage	Average Cents/Pence Earned by Women Per Dollar/Pound/Euro of Male Earnings	Percentage Male Pay Advantage
Australia	0.85	15.1%	0.97	3.1%
France	0.88	11.6%	0.96	3.7%
Canada	0.84	16.1%	0.96	4.0%
United States	0.79	21.4%	0.95	4.9%
United Kingdom	0.82	17.9%	0.95	5.0%
Singapore	0.87	12.8%	0.95	5.2%
Germany	0.78	22.3%	0.94	6.4%
Netherlands	0.81	18.9%	0.93	6.6%

Source: Glassdoor Economic Research (Glassdoor.com/research).

What factors drive the gender pay gap? Comparing workers with similar education, experience and job characteristics like occupation or industry helps us understand what drives the overall gender pay gap and how much remains after statistical controls.

- **Industry matters.** In the U.S., the adjusted gender pay gap is largest in media; retail; and construction, repair & maintenance industries. It is smallest in biotech & pharmaceuticals; education; and aerospace & defense industries. Since 2015, non-profit; health care; and real estate industries had the largest reductions in gender pay gaps whereas restaurants, bars & food service; travel & tourism; and oil, gas, energy & utilities industries have seen the largest increase. Although many tech jobs have large gender pay gaps, the overall information technology sector falls in the middle of the pack among industries.

- **Job titles matter.** In general, many executive, tech and blue-collar jobs top the list for largest gender pay gaps. In the U.S., the adjusted gender pay gap is largest for pilot, chef, C-suite executive, deputy manager, branch manager, retail representative, and driver occupations. The gender pay gap is smallest for merchandiser, research assistant, field services, inventory specialist, social worker, logistics manager and purchasing specialist occupations. Among jobs with the largest pay gaps, computer programmer saw the most improvement in its pay gap since our 2016 study.

- **The pay gap grows with age.** Younger workers face a smaller gender pay gap than older workers. In the U.S., workers aged 18 to 24 years face a small adjusted gender pay gap of 1.4 percent. By contrast, older workers aged 55 to 64 years face a gender pay gap of 12.3 percent, over twice the national average.

- **Differences in education and experience are shrinking.** The percentage of the pay gap explained by differences in education and experience shrank from 14 percent to 7.9 percent since our last study, as women make up an increasing share of students at universities and workers gaining experience in the labor force.

- **Occupational and industry segregation continues to be the largest driver of the gender pay gap in the U.S.** The single biggest cause of the gender pay gap is the tendency of men and women to sort into jobs and industries that pay differently. In the U.S., occupational and industry sorting explains about 56.5 percent of the overall pay gap—by far the largest factor.

Does a "salary confidence gap" contribute to the gender pay gap? A confidence gap—men being more self-confident in the workplace than women—could translate into a gender pay gap if women seek lower pay than men when they apply to new jobs. In this study, we examine the salary confidence gap using real-world job applications from Glassdoor, to see whether women and men seek out equal pay for equal work.

- **Overall, men do apply to higher paying jobs than women.** Men apply to jobs that pay 18.3 percent more on average than jobs women apply to on Glassdoor. However, this is largely because women are often looking for different kinds of jobs than men, with different pay scales, and have different levels of education and experience.

- **The gap disappears when we compare similar men and women looking for jobs.** When we compare job applications from equally-qualified men and women seeking similar jobs, the "salary confidence gap" drops to less than one percent (0.7 percent). That means a gap in pay expectations between men and women doesn't likely explain much of today's gender pay gap.

- **Women and men seek the same percentage raises when switching jobs.** When aiming for new jobs, men and women both seek similar percentage pay raises on Glassdoor, about 33 percent. Since women start from a lower average base pay, that can propagate pay gaps from early in a woman's career as they advance from job to job—a key reason many policymakers are considering banning employers from asking about salary history.

How can we close the gap? Understanding key drivers of the pay gap is critical to identifying the best ways to fix it. Research shows that salary transparency and better information sharing are powerful tools in helping to achieve equal pay in the workforce.

I.

Introduction

In 2016, we released the first-ever study of the gender pay gap using Glassdoor salary data. In that study, we added to the large body of research confirming the existence of a gender pay gap, but we also used Glassdoor's unique data to explore the drivers of the pay gap by controlling for factors like education, experience, job title and industry. We showed that, even after adding statistical controls for a variety of worker and job characteristics, a persistent adjusted pay gap remains.

Since our study was released, awareness of the gender pay gap and issues affecting women in the workplace have been elevated around the world from the new laws across Europe requiring companies to disclose their pay gaps to the #MeToo movement against sexual harassment and assault. To examine whether increased awareness of the gender pay gap has translated into progress, we revisit the gender pay gap using new Glassdoor salary data collected from 2016 to 2018 to answer: **what progress has been made on the gender pay gap in the last 3 years?**

Additionally, **what is the state of the gender pay gap internationally?** We expand the countries in our analysis to include Canada, Singapore and the Netherlands on top of the five countries from our original study, the United States, the United Kingdom, Australia, Germany and France.

Lastly, we dive into a commonly discussed barrier to women's success in the workplace—the confidence gap. The conventional wisdom is that a confidence gap between men and women in the workplace exists, but it is not well understood how it may affect the gender pay gap. We explore how the confidence gap may act through a difference in the pay that men and women aim for when they apply to jobs, answering the question—**do women seek out equal pay for equal work?**

We've organized the remainder of this study as follows. Section II explains our methodology for measuring the gender pay gap and identifying factors that explain it. Section III presents our estimates of the gender pay gap in the U.S. by industry, occupation and age, and shows overall results for seven other countries: the UK, Canada, Australia, Singapore, Germany, France and the Netherlands. Section IV presents the findings of the confidence gap in salary expectations in the U.S. Finally, we conclude our findings and provide insight into: **What does this mean for job seekers, employers and policymakers?**

II.

Our Approach

In this study, we provide an update on the state of the gender pay gap in Glassdoor salary data using three approaches.

- **Measuring the Pay Gap:** First, we show how the pay gap has changed since 2015, both before and after accounting for differences in men and women's education, jobs and other factors.

- **Explaining the Pay Gap:** Second, we show how much of today's pay gap can be explained by our data, compared to how much can't be explained—either due to unobserved factors or gender bias in the workplace.

- **Measuring the Confidence Gap in Salary Expectations:** Finally, we examine real-world job applications on Glassdoor to test whether men and women systematically apply to jobs with higher or lower pay—a possible cause of gender pay differences that has never before been studied on Glassdoor.

We explain each of these three approaches.

Measuring the Pay Gap

The first step in measuring the gender pay gap is to compare male and female pay, both before and after adding statistical controls for differences in education, job titles and other factors aside from gender that affect pay.

To do this, we follow the same methodology as our previous study.[1] We use ordinary least squares (OLS) regression to measure the impact of gender on pay after we've statistically controlled for differences in education, job title, industry and other factors. Our basic estimating equation is:

$$(1)$$

$$\underbrace{Y_i}_{\text{Salary}} = \underbrace{Male_i\beta_1}_{\substack{\text{Male} \\ \text{Indicator}}} + \underbrace{X_i\beta_2}_{\substack{\text{Worker and Job} \\ \text{Characteristics}}} + \epsilon_i$$

where Y is the salary reported on Glassdoor for employee i, *Male* is a binary indicator equal to 1 for men and 0 for women, and X is a large collection of controls (known as "fixed effects") for everything we observe about workers, jobs and companies including: worker age, highest level of education, years of relevant work experience, industry, occupation, company size, year, state, job title and specific employer name. The term ε is the usual mean-zero error term for all other factors about workers and jobs we don't observe in our data.

The estimated coefficient on the male dummy term β_1 tells us the salary advantage held by men over women once we've accounted for the impact of other factors.[2] Throughout this study, we refer to the raw difference between male and female pay as the unadjusted pay gap. By contrast, once we've accounted for all other factors, we refer to the gap as "adjusted."

Explaining the Pay Gap

As a second approach, we perform a simple decomposition to show how much of the gender pay gap is explained by differences in worker characteristics, and how much is unexplained by discrimination or other factors we can't observe about workers and jobs. This is known as a Oaxaca-Blinder decomposition,[3] and is one of the most widely used methods to detect the presence of group differences in the labor market.

Our estimating equation for the decomposition is given by the following:

$$(2)$$

$$\underbrace{\bar{Y}_M - \bar{Y}_F}_{\substack{\text{Gender} \\ \text{Pay Gap}}} = \underbrace{\hat{\beta}_M(\bar{X}_M - \bar{X}_F)}_{\substack{\text{"Explained"} \\ \text{Portion}}} + \underbrace{\bar{X}_F(\hat{\beta}_M - \hat{\beta}_F)}_{\substack{\text{"Unexplained"} \\ \text{Portion}}}$$

where Y_M and Y_F are average pay for male and female workers, X_M and X_F are characteristics of male and female workers, and β_M and β_F are regression coefficients for the impact of male and female characteristics on pay.[4]

On the left side of the above equation is the difference between average male and female salaries in our data—the unadjusted pay gap. On the right, the pay gap is divided into two terms. The first shows how much of the pay gap is due to differences between male and female characteristics, X_M - X_F. This is known as the explained portion of the gap, because it is due to gaps in experience, education or other factors we can observe in our data between men and women.

The second term shows how much of the pay gap is due to differences in how the labor market rewards men and women, even when they have the same experience, education and other factors. This is called the unexplained portion of the gap, and is due to how male versus female regression coefficients differ in terms of how the job market rewards male and female workers differently even when they have the same characteristics. This may be due to discrimination, or simply to unobserved factors about workers we're not able to see in our data.

Measuring The Salary Confidence Gap

As our third approach, we analyze online job application behavior on Glassdoor to understand the "confidence gap". Past research has suggested women may suffer from a confidence gap in the workplace, but there are many ways this could translate into a gender pay gap.[5]

One way a confidence gap could contribute to the overall pay gap is if women and men with similar backgrounds apply to similar jobs but with unequal pay. In that case, men and women may be inadvertently fueling the overall pay gap by having different expectations on what salary they deserve—a phenomenon we call a "salary confidence gap" in this study.

Our research leverages Glassdoor's unique ability to answer this question. Past research on the salary confidence gap has mostly relied on surveys or self-reporting which may not accurately reflect real-world behavior.[6] Also, most other job search settings do not reveal salary to job seekers before they decide to apply. By contrast, when candidates search for jobs on Glassdoor, they are shown estimated base pay for job listings, allowing them to incorporate salary expectations into their decisions, and allowing us to see whether men and women actually apply to jobs with different pay.

An example of a typical job search on Glassdoor is shown in Figure 1. In this case, a search for project manager jobs in New York City returns many open jobs, with the employer, company rating, and Glassdoor salary estimate for the job. We then observe which jobs are applied to by men and women, allowing us to estimate the salary confidence gap before and after adding statistical controls to compare similarly-qualified candidates applying to similar jobs.

Figure 1: Example Screenshot of Glassdoor's Job Search, including Salary Estimates

Source: Glassdoor Economic Research (Glassdoor.com/research).

To estimate the salary confidence gap for job applicants, we follow the same statistical approach outlined above for measuring the pay gap. We perform a linear regression of the estimated salary for jobs applied to on a binary male-female indicator, along with a set of controls for age, education, job title and other factors. Our estimating equation is given by:

$$(3)$$

$$\underbrace{Y_i}_{\substack{\text{Estimated} \\ \text{Salary of} \\ \text{Job Applied} \\ \text{To Online}}} = \underbrace{Male_i\beta_1}_{\substack{\text{Male} \\ \text{Indicator for} \\ \text{Job Applicant}}} + \underbrace{X_i\beta_2}_{\substack{\text{Worker and Job} \\ \text{Characteristics} \\ \text{for} \\ \text{Job Applicant}}} + \epsilon_i$$

The estimated coefficient on the male dummy term β_1 tells us the approximate percentage difference between the salary for jobs applied to by men compared to women, after adding statistical controls for worker and job characteristics. The results show whether there is a salary confidence gap in real-world job applications on Glassdoor, once we've made an apples-to-apples comparison of men and women with similar education, experience and job titles.

How to Interpret Our Pay Gaps
It's conventional to use the natural logarithm of salaries in regressions rather than raw dollar amounts. Why? Because it makes for easy interpretation of statistical results.

When the log of salary is regressed on worker characteristics (as in equation 1) the estimated coefficients give the approximate percentage change in salary from a one-unit change in the explanatory factor.

Thus, the coefficient on the "male" dummy variable in equation 1 gives the approximate percentage gender pay gap between male and female pay, holding all other worker characteristics constant.[7] For this reason, we estimate all of our regressions in the log of salary.

Rather than using the approximations given in this study, some readers may want the exact percentage difference in pay between male and female workers. That's given by $e^{\wedge\beta} - 1$, where β is the estimated coefficient on the male dummy variable reported in our tables.

For simplicity, ease of interpretation, and to make our results easily comparable to past studies, we report only approximate pay gaps in this study.

III.

The Gender Pay Gap

In 2016, we released a study of the gender pay gap using Glassdoor salary data for the years 2006 through 2015. This study provides an update on what has happened with the gender pay gap around the world in the years since.

Below, we present our estimates of the gender pay gap in eight countries—the United States, the United Kingdom, Canada, Australia, Singapore, Germany, France and the Netherlands—based on Glassdoor salary data. We present results for each country separately, each in their own section, ordered from largest to smallest sample size beginning with the United States.

We focus on the three years since our original study, using a large sample of salaries shared anonymously on Glassdoor by current and former employees from 2016 through 2018.[8] In total, our U.S. sample contains 426,512 salaries reported on Glassdoor. Details for the other seven countries we examined are given below in each country's specific section.

United States

About Our U.S. Data

In recent years, the gender pay gap has gotten much more attention in the U.S. With the rise of the #MeToo movement in 2017, growing public and shareholder pressure on companies to disclose gender pay gaps,[9] and a record number of women elected to Congress in 2018, the issue of equal pay for equal work has figured prominently in media and political discussions. Has the increased attention to gender pay issues translated into progress on America's gender pay gap?

Table 1 shows summary statistics for the data used for our U.S. analysis. It consists of 426,512 salaries for full time workers between ages 17 and 92 years old (as of 2018) working in U.S. establishments between 2016 and 2018.[10] The data contain information on 71,857 unique U.S. employers, and approximately 29,843 unique job titles. The overall mean base salary is $63,289 per year, ranging from $14,500 to $800,000 per year. The mean total compensation is significantly higher at $73,370 per year.[11] In terms of gender balance, roughly 54 percent of the U.S. salaries in our sample are male, while 45 percent are female—nearly identical

to the roughly 53 percent of males in the overall U.S. workforce as of January 2019.[12]

For education, 71 percent of the sample hold a bachelor's degree, 17 percent hold a master's degree, while just 10 percent hold only a high school diploma.[13] By comparison, in the overall U.S. population roughly 21 percent hold a bachelor's degree, 12 percent hold any type of graduate degree, and 29 percent hold only a high school diploma. This over-representation of college-educated workers likely reflects different online job searching behavior between college-educated Americans and the general workforce.

In terms of age, the average age of workers in the sample is 34 years as of 2018 (those born in 1984). Workers have, on average, 5.4 years of relevant work experience. Employers in the sample have a median size of 4,134 employees (or a mean of 51,300 employees, an average skewed upward by a handful of very large employers) ranging from small single-employee companies to the largest U.S. employer with more than 2 million employees.

Table 1. Summary Statistics for the U.S. Salaries Used in Our Analysis

VARIABLE	OBSERVATIONS	MEAN	STANDARD DEVIATION	MIN	MAX
Year	426,512	n.a.	n.a.	2016	2018
Base Salary	426,512	$63,289	$38,205	$14,500	$800,000
Total Compensation	426,512	$73,370	$71,238	$14,500	$6,823,000
Gender (Male = 1)	426,512	0.54	0.50	0	1
Birth Year	426,512	1984	9	1926	2001
Years of Experience	426,512	5.4	6.0	0	60
Associate's Degree	426,512	0.01	0.11	0	1
Bachelor's Degree	426,512	0.71	0.45	0	1
High School Diploma	426,512	0.10	0.29	0	1
J.D.	426,512	0.00	0.03	0	1
Master's Degree	426,512	0.17	0.37	0	1
M.B.A.	426,512	0.01	0.09	0	1
M.D.	426,512	0.00	0.02	0	1
Ph.D.	426,512	0.00	0.06	0	1
Firm Size (# Employees)	426,512	51,300 (Median = 4,134)	190,900	1	2,300,000

Source: Glassdoor Economic Research (Glassdoor.com/research).

Comparison of U.S. Census and Glassdoor Salaries

Are Glassdoor Salaries Representative?

How accurate are Glassdoor salaries compared to federal government surveys of the U.S. labor market?

The figure to the right shows a comparison of Glassdoor salaries to official estimates from the Current Population Survey, the most widely used official source for salaries in the U.S. The top panel shows the distribution of salaries for full-time U.S. workers in calendar year 2017 from the Census Bureau. The bottom panel shows the distribution of Glassdoor full-time salaries in 2017.

The two data sources are remarkably similar, a finding that's consistent with our previous study which compared Glassdoor and Census salary data from 2014. Both follow an approximately "lognormal" distribution, with most salaries clustered toward the low end and a few very large salaries. In both panels, there is a clear overall gap between male and female pay, with the male distribution shifted to the right.

Although Glassdoor salaries are drawn from anonymous employees online, the picture they provide of the U.S. gender pay gap is very similar to what's found in surveys from the U.S Census Bureau.

Distribution of Census Salaries (2017)
Full-Time Workers

Person Earnings

■ Female   □ Male
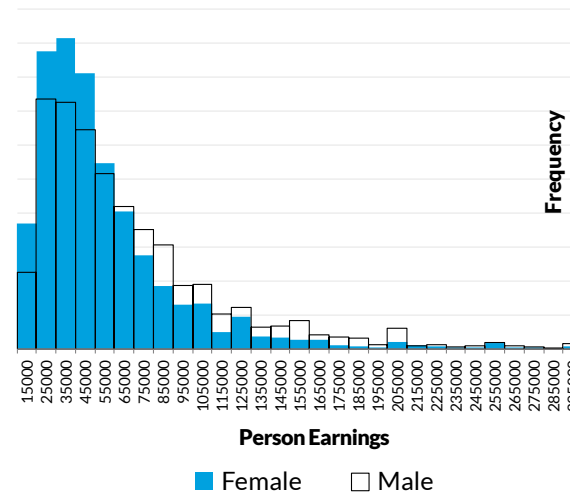
Distribution of Glassdoor Salaries (2017)
Full-Time Workers

Base Salary

■ Female   □ Male
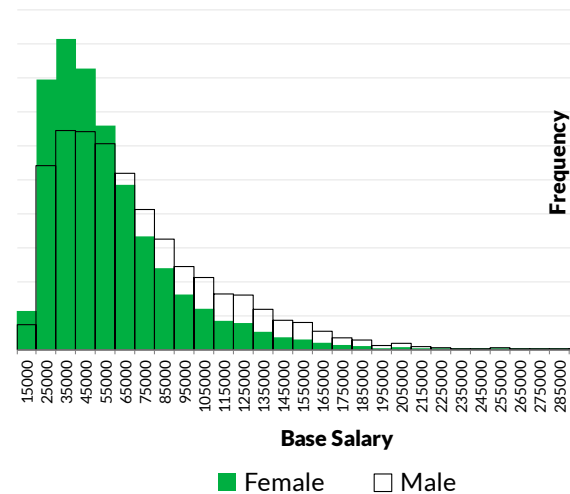
Source: U.S. Census 2018 March CPS (ASEC) file; Glassdoor Economic Research.
Notes: Salaries are for full-time workers only for calendar year 2017.

The U.S. Pay Gap Is Narrowing in Today's Strong Economy

The most striking result from our latest analysis of the U.S. gender pay gap is that we find evidence that the nation's pay gap is slowly improving over time. Figure 2 shows the adjusted gap between male and female pay each year since 2010.

After rising to a peak of 6.5 percent in 2011, the pay gap according to Glassdoor salary data has steadily improved in recent years. In 2018, it fell to just 4.6 percent, a decline of 1.9 percentage points since 2011, a significant 29 percent drop.

This recent improvement is likely due in part to today's robust economy. Recent data show women's labor force participation has been growing faster than men's in recent years, fueling recent labor market gains.[14] In addition, research shows that as the labor market has tightened in recent years, women are disproportionately taking jobs in traditionally male-dominated industries, helping break down occupational barriers for women.[15]

One of the main causes of the gender pay gap is "occupational segregation"—the fact that men and women tend to work in systematically different jobs in the economy. The recent strength in the U.S. labor market that is pulling more women into the workforce and into male-dominated fields may also be helping erode gender occupational segregation, and likely plays a role in the improved pay gap in recent years.

Figure 2. The U.S. Gender Pay Gap on Glassdoor is Slowly Improving

Adjusted U.S. Gender Gap in Base Pay Is Falling Over Time
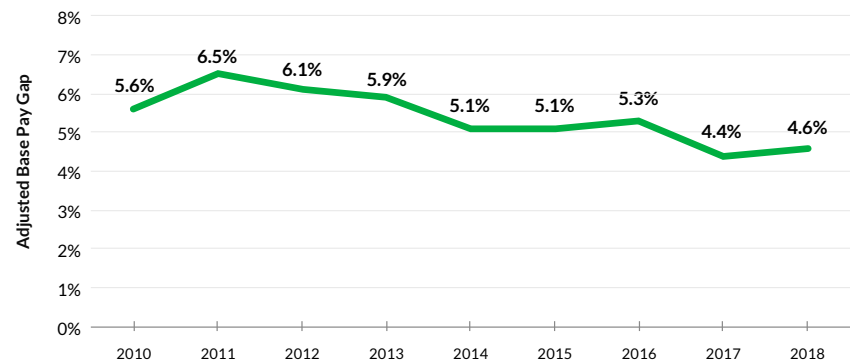
Source: Glassdoor Economic Research (Glassdoor.com/research).
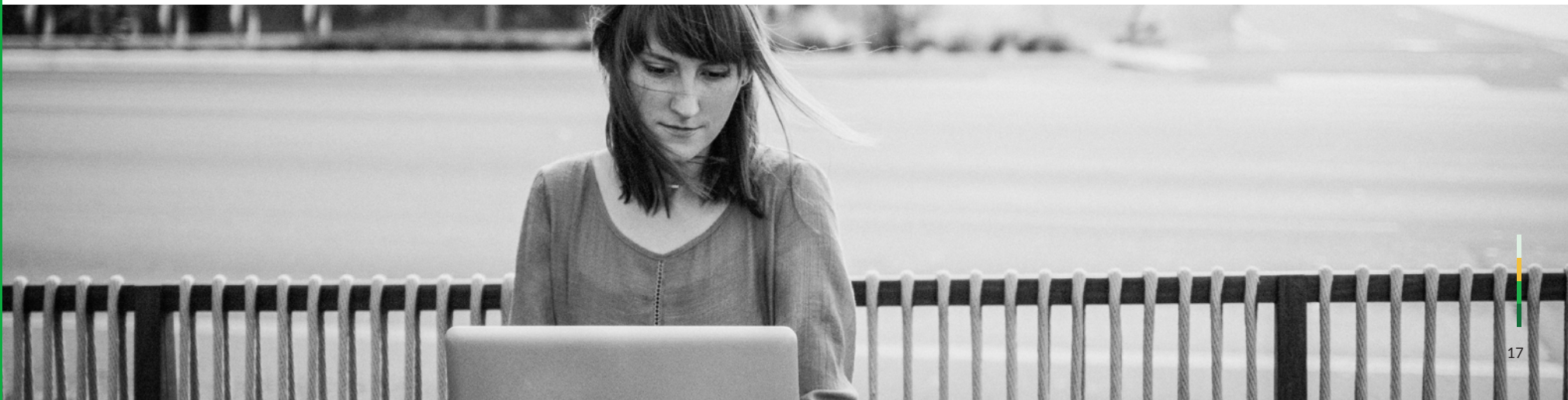
How Long to Close the Gap?

If today's trends in Glassdoor salary data were to continue in the future, how long would it take to close the nation's gender pay gap? In Table 2, we show two scenarios for when the adjusted U.S. pay gap would be expected to fully disappear if recent progress continues at the same pace.

In the first scenario, we show how long it may take to close the U.S. gender pay gap if the average annual pace of improvement in the adjusted gap from 2010 to 2018 were to continue each year into the future. Between 2010 and 2018, the adjusted gender pay gap in Glassdoor salary data fell by an average of -0.09 percentage points per year. If that trend continued, it would take roughly 51.8 years to fully close today's 4.6 percent adjusted gender pay gap. Under those assumptions, the nation's pay gap would not fully close until the year 2070.

Under a second scenario, we show how long it may take to close the gap if the more rapid pace of decline from the peak of 2011 to the gap in 2018 were to continue. Between 2011 and 2018, the adjusted U.S. gender pay gap shrank from 6.5 percent to 4.6 percent, a drop of -1.9 percent, or an average of -0.27 percentage points per year during the past 7 years. If that trend continued, it would take roughly 16.9 years to fully close today's 4.6 percent adjusted pay gap. Under these more optimistic assumptions, the nation's pay gap would fully close in 2035.

Table 2: When Will the U.S. Gender Pay Gap Close if Recent Trends Continue?

2018 Adjusted Pay Gap	
Current Level	4.6%
Average Annual Improvement in U.S. Pay Gap	
Conservative Estimate	-0.09%
Optimistic Estimate	-0.27%
Years to Close	
Conservative Estimate	51.8
Optimistic Estimate	16.9
Year U.S. Pay Gap Closes	
Conservative Estimate	**2070**
Optimistic Estimate	**2035**

Source: Glassdoor Economic Research (Glassdoor.com/research).

While the estimates provide some perspective on the pace of improvement in the U.S. gender pay gap, they shouldn't be considered a confident prediction about the actual future of pay equity. The above calculations are based on the unlikely assumption that recent trends in Glassdoor salary data will continue indefinitely into the future. In reality, many factors will impact the future of the U.S. pay gap, including:

- The state of the economy;
- Trends in the gender balance in college majors;
- Parental leave and other policies that impact men and women's career decisions;
- Trends in the spread of men and women across differently paying occupations, and other factors.

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Overall and Adjusted U.S. Pay Gap

Below we show our most recent estimates of the U.S. gender pay gap from Glassdoor salary data. Figure 3 shows the approximate percentage gap between male and female pay for U.S. workers on Glassdoor between 2016 and 2018, before and after statistical controls have been applied. Column 1 shows the raw or unadjusted gender pay gap with no statistical controls. Moving to the right, columns 2 through 5 show how the pay gap changes as additional statistical controls are added as we attempt to provide an apples-to-apples comparison of male and female workers.

Figure 3. New Estimates of the Unadjusted and Adjusted U.S. Gender Pay Gap from 2016 to 2018

**U.S. Gender Pay Gap,
Before and After Adding Statistical Controls**
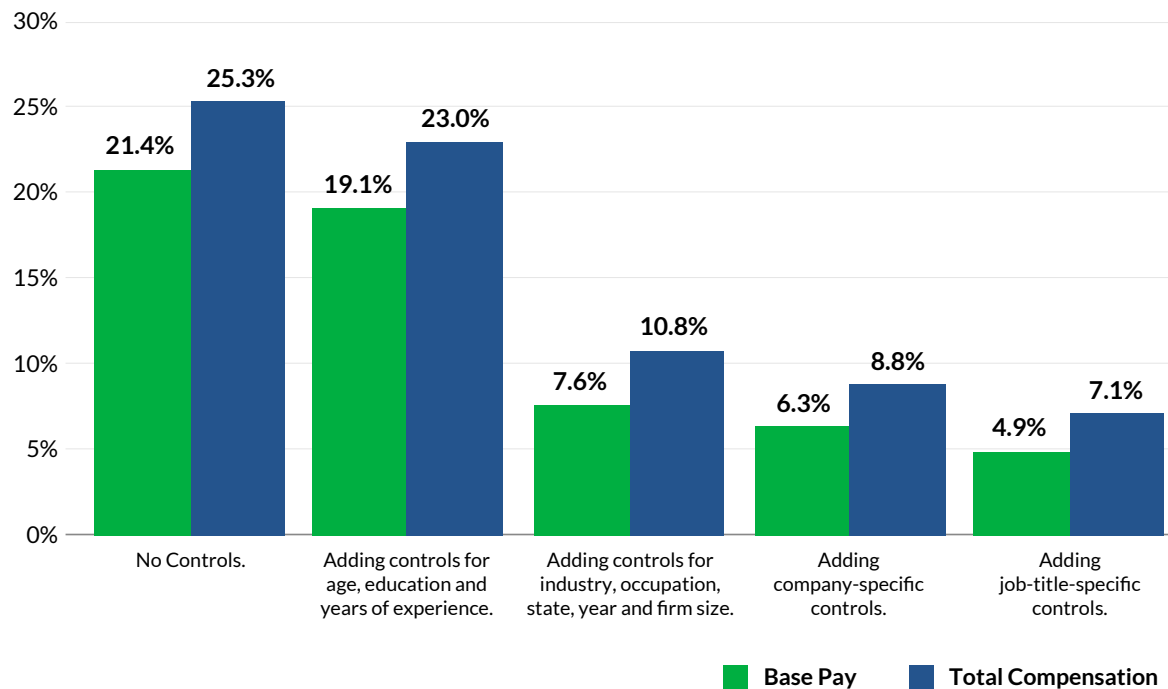
Source: Glassdoor Economic Research (Glassdoor.com/research).

For base pay, the unadjusted male-female pay gap is 21.4 percent in column 1. This means that on average, men as a group on Glassdoor from 2016 to 2018 reported earning about 21.4 percent higher base pay than women as a group. For total compensation, the unadjusted pay gap was larger at 25.3 percent.

By adding controls for age, education and years of experience in column 2, the gender pay gap shrinks to 19.1 percent for base pay and 23.0 percent for total compensation. Economists refer to these types of personal worker characteristics as "human capital," as they're often linked to productivity differences among workers. This shows that accounting for differences in education and experience for men versus women only eliminates a small part of the U.S. pay gap—about 2 percentage points of the overall 21.4 percent gap.

In column 3, we add more controls for industry, occupation, state, year, and company size. These controls help adjust for the fact that men and women tend to sort into differently paying jobs and industries in the economy, which is a well-known cause of the pay gap. For example, human resources workers in the U.S. were 69 percent female in 2018, while computer programmers were 79 percent male.[16] Adding these controls sharply reduces the U.S. gender pay gap to 7.6 percent for base pay and 10.8 percent for total compensation.

Finally, in columns 4 and 5 we show the gender pay gap after we've made our most detailed comparison of male and female employees. Using Glassdoor salary data, we are able to add powerful statistical controls for differences in job titles and employers for men and women. This lets us isolate the adjusted pay gap for men and women who work in similar jobs and companies.

In column 4, adding controls for different employers where men and women work lowers the pay gap to 6.3 percent for base pay and 8.8 percent for total compensation. Finally, in column 5 we show our most detailed estimates of the adjusted pay gap that account for differences in job titles between men and women. In that column, we see the fully adjusted U.S. gender pay gap is 4.9 percent for base pay, and 7.1 percent for total compensation.

PAY GAP IS DOWN
Across the board, the U.S. pay gap over the past three years is smaller than what we found in our 2016 study. In that study, we examined the pay gap between 2006 and 2015, finding a gender pay gap ranging from 24.1 percent for the unadjusted pay gap down to 5.4 percent for the adjusted gap. By comparison, our latest analysis of 2016 through 2018 salary data show the pay gap is down significantly, to between 21.4 percent for the unadjusted gap to 4.9 percent for the adjusted gap.

Overall, these results show that despite recent progress, there remains a persistent U.S. gender pay gap according to Glassdoor salary data—a conclusion supported by a large number of academic studies as well.

What Explains the Gap?

Figure 4 shows which factors help best explain the overall gap between male and female pay. It shows the Oaxaca-Blinder decomposition of the unadjusted pay gap into the part that is explained by differences between male and female workers, and the part that is unexplained due to gender bias or unobserved characteristics of workers we're not able to see in our data.

Figure 4. Decomposing the 2016–2018 U.S. Gender Pay Gap into Explained and Unexplained Portions

U.S. Explained and Unexplained Gender Pay Gap (Oaxaca-Blinder Decomposition)
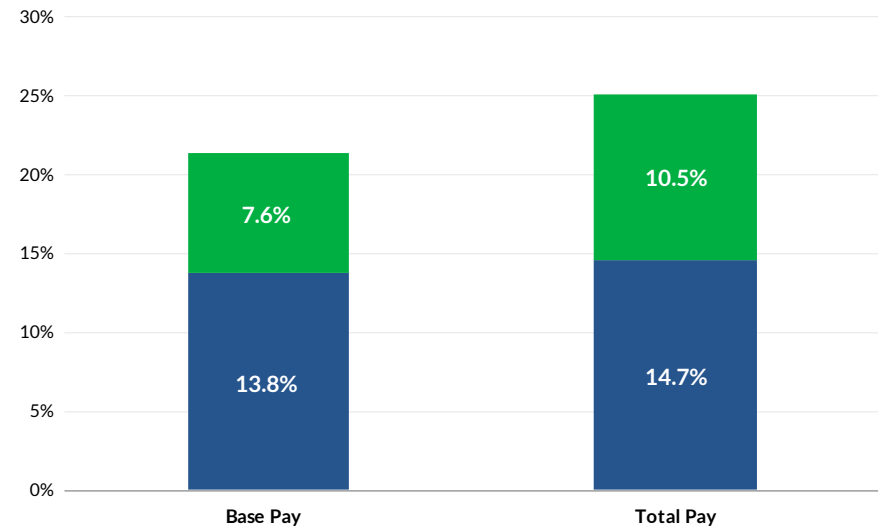
Source: Glassdoor Economic Research (Glassdoor.com/research).

Legend: ■ Unexplained ■ Explained

Base Pay: Unexplained 7.6%, Explained 13.8%
Total Pay: Unexplained 10.5%, Explained 14.7%

Of the overall U.S. gender pay gap of 21.4 percent in base pay, we find that 13.8 percent is explained by differences between male and female workers: different ages, levels of education, experience, industries, occupations, company sizes and locations. The remaining 7.6 percent of the pay gap is "unexplained," due either to factors we aren't able to observe or to gender discrimination.

This finding means that about 64 percent (13.8/21.4 = 64 percent) of the overall U.S. gender gap in base pay from 2016 to 2018 is explained by worker characteristics. The remaining 36 percent is unexplained, and due to differences in how the job market rewards men and women with the same characteristics, or unobserved employee characteristics. The results for total compensation are similar: 14.7 percent is explained while the remaining 10.5 percent is "unexplained."

Overall, these results are similar to what we found in our 2016 study. Although the gender pay gap in the U.S. has narrowed considerably since 2015, the breakdown of how much is explained or unexplained has changed little.

HOW MUCH IS EXPLAINED BY JOB SEGREGATION?
As an additional step, we looked at how much of the U.S. gender pay gap can be explained by two distinct factors: (1) differences between the education and experience of workers, or what economists call "human capital"; and (2) the sorting of men and women into different occupations and industries in the economy.

We found that only 7.9 percent of the overall gender gap in base pay can be explained by differences in education and experience between men and women in the U.S. from 2016 to 2018. That's down sharply from roughly 14 percent in our previous study. It suggests that gaps between the education and experience of men and women are narrowing over time, and are playing a smaller role than in the past. By contrast, we found that job segregation—the sorting of men and women into different jobs and industries in the economy—explains about 56.5 percent of the gap, the largest factor by far.

This is an important finding for policy solutions to address the gender pay gap. Most of today's pay gap in the U.S. is due to forces that push men and women onto different career tracks in the economy, not differences in experience and education, or other unexplained factors.

Industries with the Biggest Pay Gaps

Next we show differences in the U.S. gender pay gap among industries. To do this, we re-estimate the above regression model while including interaction terms for *male x industry*. The coefficients on those interaction terms tell us whether being male and working in a particular industry results in a statistically larger or smaller pay gap.[17]

Figure 5 shows the adjusted gender pay gap for our 22 industries.[18] Two industries are tied for the largest gender pay gap in Glassdoor salary data: media—an industry that includes book publishers, television networks, video game producers, newspapers, as well as many online media providers—and retail, both at 6.4 percent. This amounts to women earning on average 93.6 cents per dollar earned by men working in the same job title, same company, and with similar background and experience. That gap is roughly 31 percent larger than the

Figure 5: Adjusted Gender Pay Gap in U.S. Varies Widely by Industry

Adjusted Gender Gap in Base Pay by U.S. Industry (Percentage Higher Average Male Pay)

Industry	Gap
Media	6.4%
Retail	6.4%
Construction, Repair & Maintenance	6.2%
Oil, Gas, Energy & Utilities	6.2%
Insurance	5.9%
Health Care	5.7%
Arts, Entertainment & Recreation	5.6%
Finance	5.6%
Transportation & Logistics	5.5%
Information Technology	5.4%
Restaurants, Bars & Food Service	5.0%
Telecommunications	4.5%
Government	4.4%
Real Estate	4.4%
Business Services	4.2%
Accounting & Legal	4.1%
Manufacturing	4.1%
Travel & Tourism	3.9%
Non Profit	3.6%
Aerospace & Defense	2.9%
Education	2.4%
Biotech & Pharmaceuticals	2.2%

Source: Glassdoor Economic Research (Glassdoor.com/research)
Note: Only industries with at least 4,000 salary reports in our sample are reported. Includes controls for age, education, experience, state, year, job title and employer name.

U.S. average adjusted gender pay gap of 4.9 percent. The second largest gender pay gaps are found in construction, repair and maintenance (6.2 percent); oil, gas, energy and utilities (6.2 percent); insurance (5.9 percent); and health care (5.7 percent). Many of these same industries were also among those with the largest U.S. pay gaps in our previous study, suggesting the factors causing gender pay gaps we identified between 2006 and 2015 still persist in these industries today.

The smallest adjusted gender pay gaps among U.S. industries are found in the biotech and pharmaceuticals industry (2.2 percent). That amounts to women earning on average 97.8 cents per dollar earned by men in the same job title, same company, and with similar background and experience—less than half of the overall U.S. adjusted pay gap.

Other industries with adjusted pay gaps below the U.S. average include education (2.4 percent); aerospace and defense (2.9 percent); and the non-profit sector (3.6 percent). In all of these sectors, the U.S. gender pay gap is significantly below the national average. The much-discussed tech industry (information technology) falls in the middle of the pack among U.S. industries, with an adjusted gender pay gap of 5.4 percent, slightly above the national average of 4.9 percent.

Industries with Growing and Shrinking Gaps

Which U.S. industries have seen the biggest changes in gender pay gaps in recent years? Table 3 shows how our latest estimates of the gender pay gap by industry compare to our previous study. It shows estimates of the pay gap by industry from 2016–2018, along with changes since our last estimate based on 2006–2015 data.

The industry with the biggest increase in gender pay gap since our last study was restaurants, bars and food service, up 1.8 percentage points in 2016–2018 compared to our last analysis from 2006–2015. Other industries with widening pay gaps in recent years include travel and tourism (up 0.9 percentage points); oil, gas, energy and utilities (up 0.6 percentage points), and retail (up 0.5 percentage points).

By contrast, the industries with the biggest improvements in the gender pay gap since our last analysis include the non-profit sector (down 2.1 percentage points); health care (down 1.5 percentage points); real estate (down 1.4 percentage points), and business services (down 1.3 percentage points).

Table 3. Changes in Adjusted Gender Pay Gap by Industry Since our Last Study

INDUSTRY	ADJUSTED PAY GAP 2016 – 2018	ADJUSTED PAY GAP 2006 – 2015	CHANGE
Restaurant, Bars and Food Service	5.0%	3.2%	1.8%
Travel and Tourism	3.9%	3.0%	0.9%
Oil, Gas, Energy and Utilities	6.2%	5.6%	0.6%
Retail	6.4%	5.9%	0.5%
Aerospace and Defense	2.9%	2.5%	0.4%
Construction, Repair and Maintenance	6.2%	5.9%	0.3%
Manufacturing	4.1%	4.0%	0.1%
Telecommunications	4.5%	4.6%	-0.1%
Media	6.4%	6.6%	-0.2%
Government	4.4%	4.7%	-0.3%
Accounting and Legal	4.1%	4.5%	-0.4%
Information Technology	5.4%	5.9%	-0.5%
Finance	5.6%	6.4%	-0.8%
Biotech and Pharmaceuticals	2.2%	3.0%	-0.8%
Education	2.4%	3.3%	-0.9%
Arts, Entertainment and Recreation	5.6%	6.6%	-1.0%
Transportation and Logistics	5.5%	6.7%	-1.2%
Insurance	5.9%	7.2%	-1.3%
Business Services	4.2%	5.5%	-1.3%
Real Estate	4.4%	5.8%	-1.4%
Health Care	5.7%	7.2%	-1.5%
Non Profit	3.6%	5.7%	-2.1%

Source: Glassdoor Economic Research (Glassdoor.com/research)

Jobs with the Biggest Pay Gaps

Next, we show the U.S. jobs with the largest and smallest gender pay gaps according to Glassdoor salary data. To do this, we re-estimate the above regression model while including interaction terms for *male x occupation.* The coefficients on those interaction terms tell us whether being male and working in a certain occupation results in a statistically larger or smaller pay gap.

Figure 6 shows the 15 occupations with the highest adjusted gender pay gaps, after statistically controlling for differences between jobs and workers. The occupation with the highest gender pay gap was pilot, with a gap of 26.6 percent. This amounts to women earning on average 73 cents per dollar earned by men, after controlling for all differences between job titles, companies and workers. That gap is over five times larger than the U.S. average adjusted gender pay gap of 4.9 percent.

Chef was the job with the second highest gender pay gap, with a gap of 24.6 percent. They are followed by C-suite executives (24.0 percent), a finding that is broadly consistent with academic research showing a persistent gender pay gap among executive-level positions in the U.S. Other occupations with larger-than average gender pay gaps include deputy manager (17.1 percent), branch manager (12.8 percent), retail representative (12.2 percent), driver (11.7 percent) and computer programmer (11.6 percent).

Figure 6. 15 Jobs with the Largest Adjusted Gender Pay Gaps in the U.S.Study

Top 15 U.S. Occupations by Adjusted Gender Gap in Base Pay (Percentage Higher Average Male Pay)
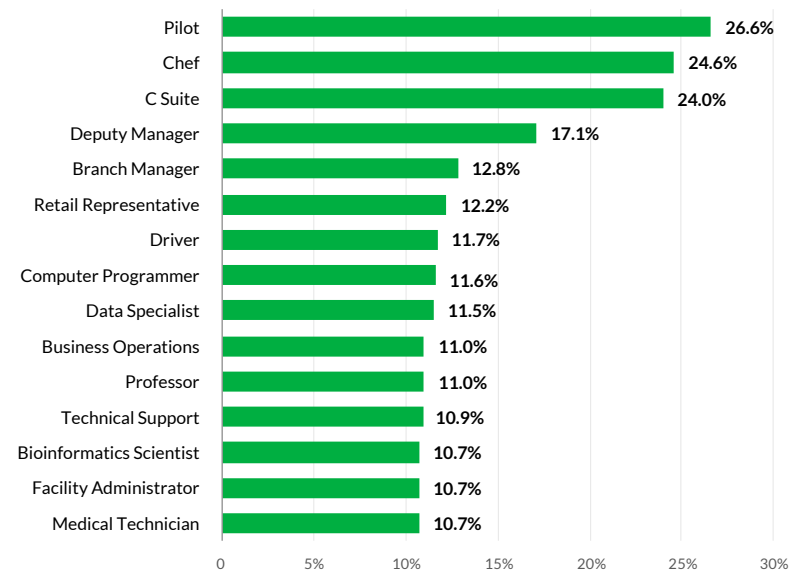
Source: Glassdoor Economic Research (Glassdoor.com/research)
Note: Only job titles with at least 200 salary reports in our sample are reported. Includes controls for age, education, experience, state, year, job title and employer name. Ambiguous or duplicative job titles are not reported.

Table 4. Changes Among the 15 Jobs with the Largest Pay Gaps (2019 vs. 2016 Study)

JOB TITLE	ADJUSTED PAY GAP 2016 — 2018	ADJUSTED PAY GAP 2006 — 2015	CHANGE
Pilot	26.6%	16.0%	10.6%
Deputy Manager	17.1%	9.9%	7.2%
Facility Administrator	10.7%	4.8%	5.9%
Bioinformatics Scientist	10.7%	7.5%	3.2%
Business Operations	11.0%	7.9%	3.1%
Branch Manager	12.8%	11.8%	1.0%
Technical Support	10.9%	10.4%	0.5%
Professor	11.0%	11.2%	-0.2%
Data Specialist	11.5%	13.6%	-2.1%
Retail Representative	12.2%	14.6%	-2.4%
Driver	11.7%	14.9%	-3.2%
Chef	24.6%	28.1%	-3.5%
Medical Technician	10.7%	14.4%	-3.7%
C Suite	24.0%	27.7%	-3.7%
Compter Programmer	11.6%	28.3%	-16.7%

Source: Glassdoor Economic Research (Glassdoor.com/research)

Table 4 shows how our latest estimates of the gender pay gap by occupation above compare to our previous study. It shows our latest estimate of the pay gap using data from 2016–2018, along with the change from our last estimate based on 2006–2015 data.

Among the 15 occupations with the largest pay gaps today, the one with the largest increase since our last study was pilot, up 10.6 percentage points in 2016–2018 compared to our last analysis from 2006–2015. Other occupations with widening pay gaps in recent years include deputy manager (up 7.2 percentage points), facility administrator (up 5.9 percentage points) and bioinformatics scientist (up 3.2 percentage points).
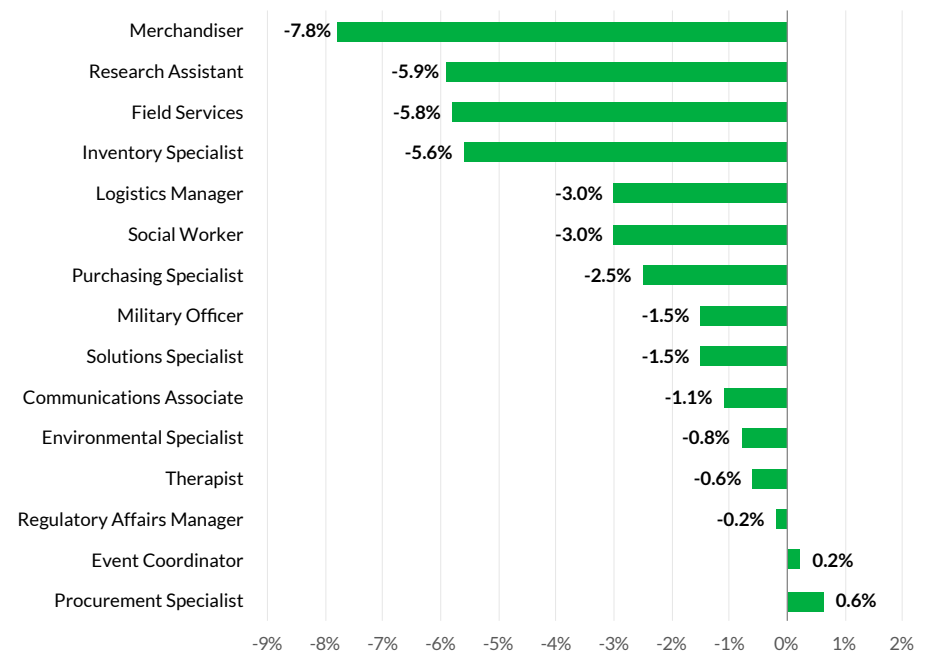
By contrast, the gender pay gap for computer programmer dropped 16.7 percentage points from our last analysis, by far the largest decrease out of these 15 occupations.

Figure 7 shows the U.S. occupations with the smallest adjusted gender pay gaps. For many of these occupations, there is a significant female pay advantage, or a "reverse" gender pay gap. The occupation with the smallest gap is merchandiser (minus 7.8 percent). This amounts to women earning on average 108 cents per dollar earned by men working the same job title, same company, and with similar background and experience. They are followed by research assistant (minus 5.9 percent)—an occupation comprised of many graduate students workers at various U.S. universities—field services (minus 5.8 percent), inventory specialist (minus 5.6 percent) and social worker (minus 3.0 percent).

Figure 7. 15 Jobs with the Smallest Adjusted Gender Pay Gaps in the U.S.

Bottom 15 U.S. Occupations by Adjusted Gender Gap in Base Pay (Percentage Higher Average Male Pay)

Occupation	Gap
Merchandiser	-7.8%
Research Assistant	-5.9%
Field Services	-5.8%
Inventory Specialist	-5.6%
Logistics Manager	-3.0%
Social Worker	-3.0%
Purchasing Specialist	-2.5%
Military Officer	-1.5%
Solutions Specialist	-1.5%
Communications Associate	-1.1%
Environmental Specialist	-0.8%
Therapist	-0.6%
Regulatory Affairs Manager	-0.2%
Event Coordinator	0.2%
Procurement Specialist	0.6%

Source: Glassdoor Economic Research (Glassdoor.com/research)
Note: Only job titles with at least 200 salary reports in our sample are reported. Includes controls for age, education, experience, state, year, job title and employer name. Ambiguous or duplicative job titles are not reported.

Table 5 shows how our latest estimates of the gender pay gap by occupation above compare to our previous study for the occupations with the smallest gender wage gaps. It shows our latest estimate of the pay gap using data from 2016–2018, along with the change from our previous estimates based on 2006–2015 data.

Among these fifteen jobs with the smallest gender pay gaps, the occupation with the biggest improvement since our previous study was logistics manager, down 14.5 percentage points in 2016–2018 compared to our last analysis from 2006–2015. Other occupations with shrinking pay gaps in recent years include regulatory affairs manager (down 10.7 percentage points), inventory specialist (down 10.4 percentage points) and solutions specialist–a common sales support role–(down 8.0 percentage points).

Table 5. Changes Among the 15 Jobs with the Smallest Pay Gaps (2019 vs. 2016 Study)

JOB TITLE	ADJUSTED PAY GAP 2016 — 2018	ADJUSTED PAY GAP 2006 — 2015	CHANGE
Logistics Manager	-3.0%	11.5%	-14.5%
Regulatory Affairs Manager	-0.2%	10.5%	-10.7%
Inventory Specialist	-5.6%	4.8%	-10.4%
Solutions Specialist	-1.5%	6.5%	-8.0%
Military Officer	-1.5%	6.5%	-8.0%
Field Services	-5.8%	1.4%	-7.2%
Environmental Specialist	-0.8%	4.5%	-5.3%
Merchandiser	-7.8%	-7.6%	-0.2%
Therapist	-0.6%	-0.5%	-0.1%
Event Coordinator	0.2%	0.2%	0.0%
Research Assistant	-5.9%	-6.6%	0.7%
Communications Associate	-1.1%	-2.2%	1.1%
Procurement Specialist	0.6%	-0.8%	1.4%
Purchasing Specialist	-2.5%	-5.5%	3.0%
Social Worker	-3.0%	-7.8%	4.8%

Source: Glassdoor Economic Research (Glassdoor.com/research)

How the Pay Gap Changes with Age

A well-known fact is that gender pay differences tend to grow with age. Older workers typically experience significantly larger gender pay gaps than younger workers—both in the U.S. and around the world. We find a similar pattern in Glassdoor salary data from 2016–2018, consistent with the findings from our previous study.

Figure 8 shows the gender pay gap by age groups, after statistically controlling for differences between workers, jobs and employers. The gender pay gap is smallest among young and early-career workers but grows steadily with age.

Workers aged 18 to 24 years experience a relatively small 1.4 percent adjusted gender pay gap, well below the U.S. average of 4.9 percent. Similarly, workers aged 25 to 34 years exhibit a 2.8 percent pay gap. By contrast, workers aged 45 to 54 years face a 10.3 percent gender pay gap, while those aged 55 to 64 years face a 12.3 percent pay gap—more than twice the U.S. average.

Why does the pay gap rise with age? For one, the gender pay gap is likely smaller among young workers because women beginning their careers today face fewer barriers than older workers faced in previous generations. Second, older women

may face age discrimination in the job market, amplifying the gender pay gap for older workers. At least some research points to this latter interpretation.[19]

Finally, our results may be due to factors we don't observe in our data, such as whether older women have spent more time out of the labor force due to childbearing responsibilities, and who may face earnings penalties not faced by men who have not left the labor force during their careers.

Figure 8. The U.S. Gender Pay Gap Grows with Age of Employee

Adjusted U.S. Gender Gap in Base Pay by Age Group (Percentage Higher Average Male Pay)
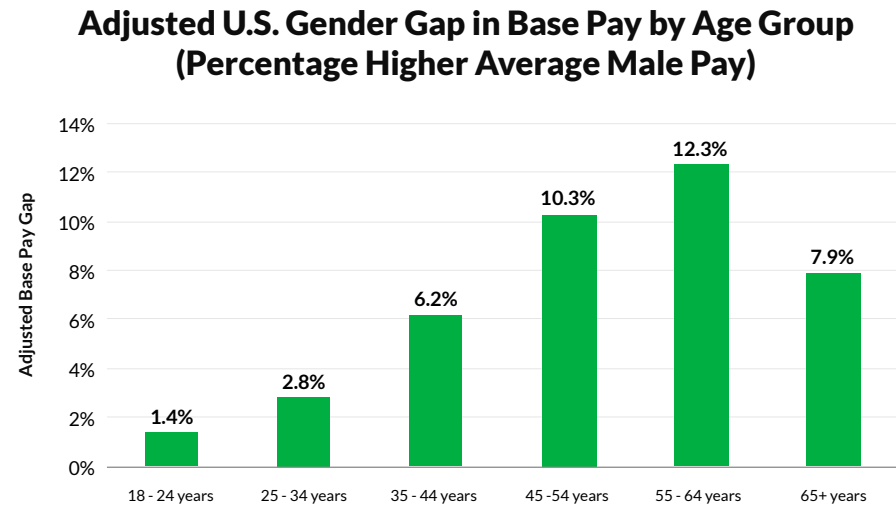
Source: Glassdoor Economic Research (Glassdoor.com/research)
Note: Includes controls for age, education, experience, state, year, job title and employer name.

United Kingdom

The Office of National Statistics estimates that the UK gender pay gap is roughly 17.9 percent in 2018.[20] In our sample of Glassdoor salary data, we find a comparable gender pay gap reported online by UK employees.

Similar to the U.S., we find that the UK's pay gap is slowly improving over time. Figure 9 shows the adjusted gap between male and female pay each year since 2014 in the UK. The adjusted pay gap has been steadily falling from 6.8 percent in 2014 to 4.3 percent in 2018.

For our analysis, we use a sample of 40,764 Glassdoor salaries reported by UK employees. As in our U.S. sample, we restrict our analysis to workers over age 16 working full time for whom we have basic demographic information such as age, education and years of experience.

In our Glassdoor UK salary sample, the average base pay was £39,740 per year for men and £32,659 for women. That amounts to a gender pay gap of £7,081 in base pay between men and women. In terms of median pay the UK gender gap is 17.9 percent. That amounts to UK women earning roughly 82p for every pound earned by men on average.The unadjusted gender pay gap for total compensation in the UK is slightly higher compared to base pay: 20.7 percent for median total pay.[21]

Figure 9. The UK Gender Pay Gap on Glassdoor is Gradually Improving

Adjusted UK Gender Gap in Base Pay is Falling Over Time
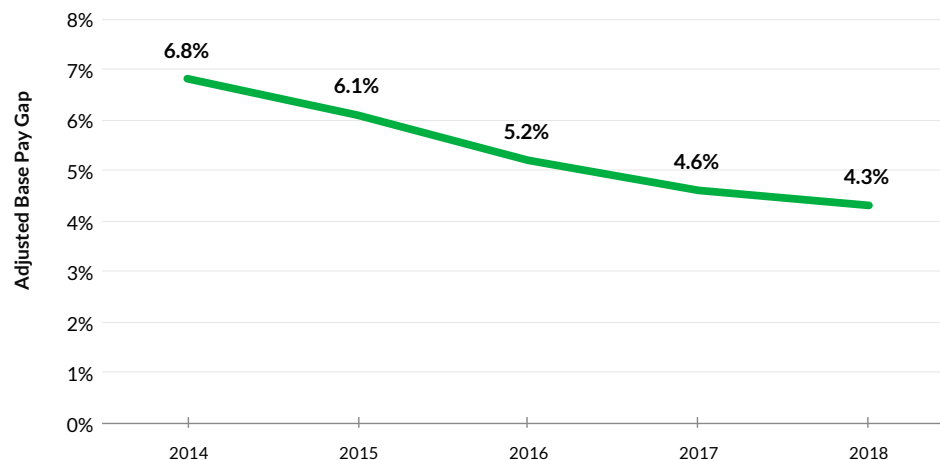
Source: Glassdoor Economic Research (Glassdoor.com/research)

Table 6 provides a summary of the UK sample used in our regression analysis. The sample contains 40,764 salaries reported from calendar years 2016 through 2018.[22] The data contains information on approximately 8,609 unique UK employers and 7,495 job titles. The average base pay in the sample was £37,122, ranging from £7,800 to a high of £816,000.[23] Average total compensation was significantly higher at £43,934. The sample is 63 percent male and 37 percent female, and the average age (as of 2018) was 32 years with 4.6 years of relevant work experience. 68 percent of the sample had bachelor's degrees, 20 percent had master's degrees, and 10 percent had only a high school diploma. The average employer size was 40,900 employees, ranging from small one person firms to employers with 2,300,000 employees.

Table 6. Summary Statistics for the United Kingdom Salary Sample

VARIABLE	OBSERVATIONS	MEAN	STANDARD DEVIATION	MIN	MAX
Year	40,764	n.a.	n.a.	2016	2018
Base Salary	40,764	£37,122	£24,939	£7,800	£816,000
Total Compensation	40,764	£43,934	£58,740	£7,800	£5,060,000
Gender (Male = 1)	40,764	0.63	0.48	0	1
Birth Year	40,764	1986	8	1926	2001
Years of Experience	40,764	4.6	5.4	0	60
Associate's Degree	40,764	0.01	0.12	0	1
Bachelor's Degree	40,764	0.68	0.47	0	1
High School Diploma	40,764	0.10	0.30	0	1
J.D.	40,764	0.00	0.02	0	1
Master's Degree	40,764	0.20	0.40	0	1
M.B.A.	40,764	0.00	0.07	0	1
M.D.	40,764	0.00	0.01	0	1
Ph.D.	40,764	0.01	0.08	0	1
Firm Size (# Employees)	40,764	40,900	116,805	1	2,300, 000

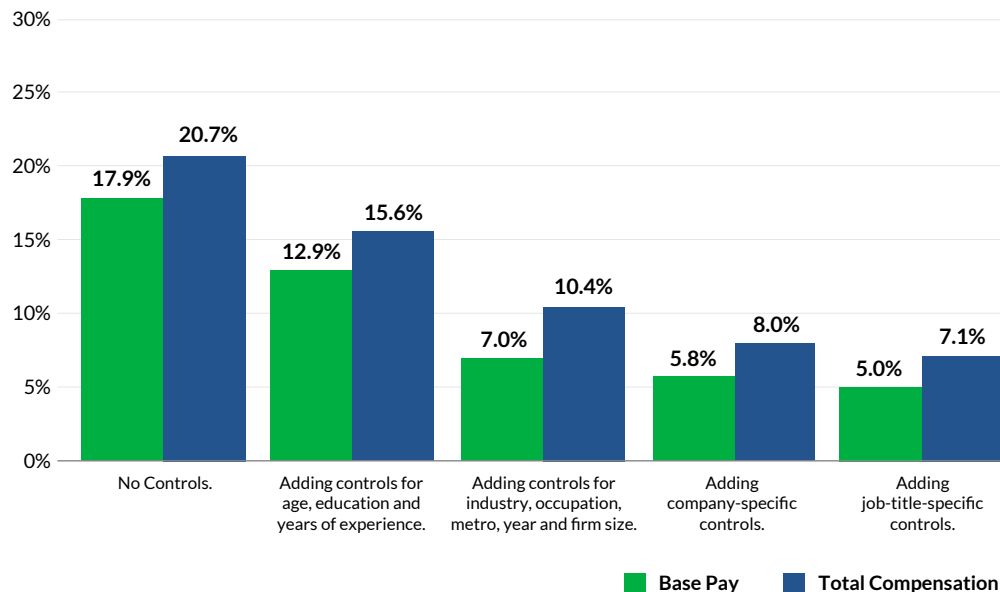*Source: Glassdoor Economic Research (Glassdoor.com/research)*

UK Gender Pay Gap

Figure 10 presents our estimates of the unadjusted and adjusted gender pay gap in UK salaries from Glassdoor. Column 1 shows the unadjusted pay gap with no statistical controls for differences between workers or jobs. Overall, there is a 17.9 percent unadjusted gap in base pay between males and females, and a 20.7 percent gender pay gap in total compensation.

Applying controls for age, education and years of experience, the gender pay gap in column 2 shrinks to 12.9 percent for base pay, and 15.6 percent for total compensation. Finally adding in a rich set of controls for company and job title, in column 5 we find an adjusted gender pay gap of 5.0 percent for base pay, and 7.1 percent for total compensation.

Figure 10. Overall UK Results: Estimates of the Unadjusted and Adjusted Gender Pay Gap for Comparable Workers

**UK Gender Pay Gap,
Before and After Adding Statistical Controls**

Source: Glassdoor Economic Research (Glassdoor.com/research)

What Explains the Gap?

Figure 11 shows the decomposition of the UK gender pay gap in Glassdoor salary data into the portion that is explained by differences in worker characteristics, and the portion that remains unexplained due either to unobserved factors or subtle forms of workplace bias and discrimination.

Of the overall 17.9 percent gender gap in base pay, 10.9 percent is explained by differences in worker characteristics, while the remaining 7.0 percent is unexplained. This finding means that about 61 percent (10.9/17.9 = 61 percent) of the overall UK gender pay gap in base pay is explained by worker characteristics. The remaining 39 percent is unexplained, and due to differences in the way the labor market rewards men and women with the same characteristics.

Of the 61 percent of the gender gap that is explained, 37 percent is due to sorting of men and women into different industries and occupations, while just 23 percent is due to differences in education and experience between males and females.[24] Put differently, individual worker characteristics explain only about one quarter of the UK gender pay gap. By contrast, the fact that men and women systematically work in different roles explains almost 40 percent.

Figure 11. Decomposing the UK Gender Pay Gap into Explained and Unexplained Portions

UK Explained and Unexplained Gender Pay Gap (Oaxaca-Blinder Decomposition)
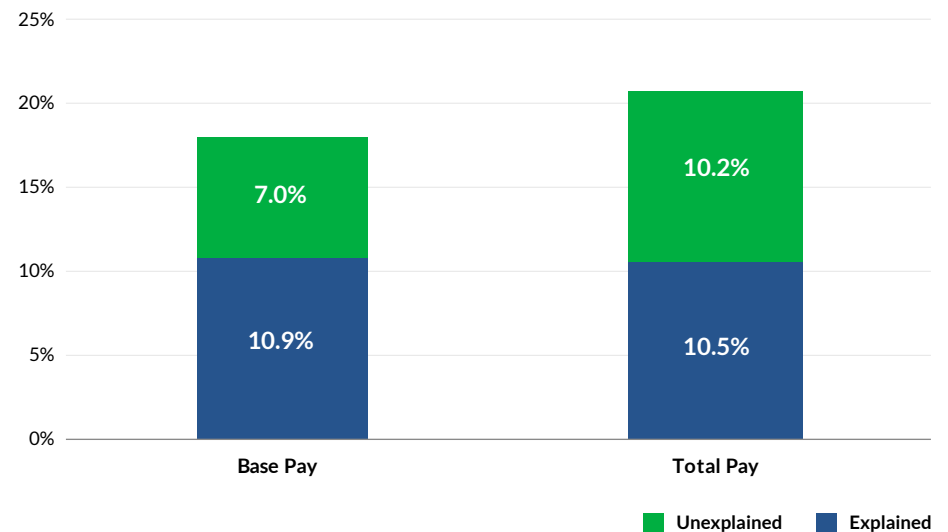
Source: Glassdoor Economic Research (Glassdoor.com/research)

Canada

The Office of National Statistics estimates that the Canadian gender pay gap is roughly 13 percent in 2017.[25] In our sample of Glassdoor salary data, we find a slightly higher gender pay gap reported online by Canadian employees.

For our analysis, we use a sample of 21,008 Glassdoor salaries reported by Canadian employees. As in our U.S. sample we restrict our analysis to workers over age 16 working full time for whom we have basic demographic information such as age, education and years of experience.

In our Glassdoor Canada salary sample, the average base pay was $64,966 per year for men and $54,740 for women. That amounts to a gender pay gap of $10,277 in base pay between men and women. In terms of median pay the Canadian gender gap is 16.1 percent. That amounts to Canadian women earning roughly 84 cents for every dollar earned by men on average. The unadjusted gender pay gap for

total compensation in Canada is slightly higher compared to base pay: 18.2 percent for median total pay.[26]

Table 7 provides a summary of the Canada sample used in our regression analysis. The sample contains 21,008 salaries reported from calendar years 2016 through 2018.[27] The data contain information on approximately 5,496 unique Canadian employers and 4,755 job titles. The average base pay in the sample was $61,085, ranging from $21,000 to a high of $672,000.[28] Average total compensation was significantly higher at $69,030. The sample is 62 percent male and 38 percent female, and the average age (as of 2018) was 33 years with 4.7 years of relevant work experience. 70 percent of the sample had bachelor's degrees, 19 percent had master's degrees, and 8 percent had only a high school diploma. The average employer size was 49,200 employees, ranging from small one person firms to employers with 2,300,000 employees.

Table 7. Summary Statistics for the Canada Salary Sample

VARIABLE	OBSERVATIONS	MEAN	STANDARD DEVIATION	MIN	MAX
Year	21,008	n.a.	n.a.	2016	2018
Base Salary	21,008	$61,085	$31,108	$21,000	$672,000
Total Compensation	21,008	$69,030	$49,717	$21,000	$1,614,000
Gender (Male = 1)	21,008	0.62	0.49	0	1
Birth Year	21,008	1985	9	1927	2001
Years of Experience	21,008	4.7	5.4	0	46
Associate's Degree	21,008	0.02	0.13	0	1
Bachelor's Degree	21,008	0.70	0.46	0	1
High School Diploma	21,008	0.08	0.27	0	1
J.D.	21,008	0.00	0.01	0	1
Master's Degree	21,008	0.19	0.39	0	1
M.B.A.	21,008	0.01	0.09	0	1
M.D.	21,008	0.00	0.01	0	1
Ph.D.	21,008	0.00	0.06	0	1
Firm Size (# Employees)	21,008	49,200	191,400	1	2,300,000

Source: Glassdoor Economic Research (Glassdoor.com/research)

Canada Gender Pay Gap

Figure 12 presents our estimates of the unadjusted and adjusted gender pay gap in Canada salaries from Glassdoor. Column 1 shows the unadjusted pay gap with no statistical controls for differences between workers or jobs. Overall, there is a 16.1 percent unadjusted gap in base pay between men and women, and a 18.2 percent gender pay gap in total compensation.

Applying controls for age, education and years of experience, the gender pay gap in column 2 shrinks to 13.6 percent for base pay, and 15.7 percent for total compensation. Finally adding in a rich set of controls for company and job title, in column 5 we find an adjusted gender pay gap of 4.0 percent for base pay, and 5.9 percent for total compensation.

Figure 12. Overall Canada Results: Estimates of the Unadjusted and Adjusted Gender Pay Gap for Comparable Workers

Canada Gender Pay Gap, Before and After Adding Statistical Controls
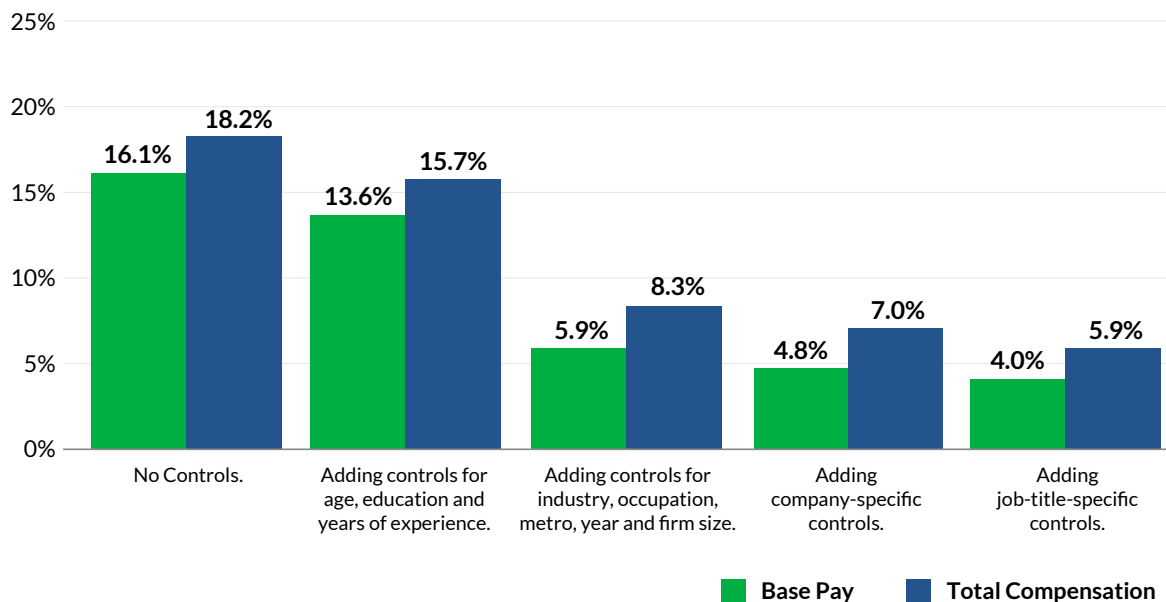
Source: Glassdoor Economic Research (Glassdoor.com/research)

What Explains the Gap?

Figure 13 shows the decomposition of the Canada gender pay gap in Glassdoor salary data into the portion that is explained by differences in worker characteristics, and the portion that remains unexplained due either to unobserved factors or subtle forms of workplace discrimination.

Of the overall 16.1 percent gender gap in base pay, 10.0 percent (or 62 percent of the total gap) is explained by differences in worker characteristics, while the remaining 6.1 percent (or 38 percent of the total gap) is unexplained. This finding means that about 62 percent (10.0/16.1 = 62 percent) of the overall Canada gender pay gap in base pay is explained by worker characteristics. The remaining 38 percent is unexplained, and due to differences in the way the labor market rewards men and women with the same characteristics.

Of the roughly 62 percent of the gender gap that is explained, 52 percent is due to sorting of men and women into different industries and occupations, while just 11 percent is due to differences in education and experience between males and females.[29] Put differently, individual worker characteristics explain only 11 percent of the Canada gender pay gap. By contrast, the fact that men and women systematically work in different roles explains 52 percent—by far the largest factor explaining gender pay differences in our sample.

Figure 13. Decomposing the Canada Gender Pay Gap into Explained and Unexplained Portions

Canada Explained and Unexplained Gender Pay Gap (Oaxaca-Blinder Decomposition)
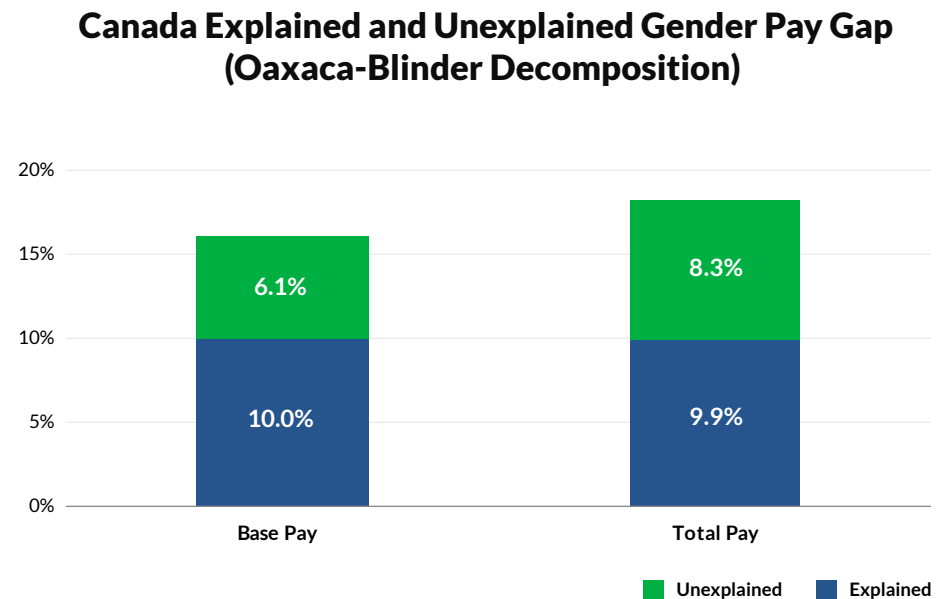
Source: Glassdoor Economic Research (Glassdoor.com/research)

Australia

The Australian Workplace Gender Equality Agency estimates that the Australian gender pay gap is roughly 16.2 percent in 2018.[30] In our sample of Glassdoor salary data, we find a somewhat smaller gender pay gap reported online by Australian employees.

For our analysis, we use a sample of 6,795 Glassdoor salaries reported by Australian employees. As in our U.S. sample we restrict our analysis to workers over age 16 working full time for whom we have basic demographic information such as age, education and years of experience.

In our Glassdoor Australia salary sample, the average base pay was A$97,719 per year for men and A$84,005 for women. That amounts to a gender pay gap of A$13,714 in base pay between men and women. In terms of median pay the Australian gender gap is 15.1 percent. That amounts to Australian women earning roughly 85 cents for every dollar earned by men on average. The unadjusted gender

pay gap for total compensation is slightly higher than for base pay: 17.4 percent for median total pay.[31]

Table 8 provides a summary of the Australia sample used in our regression analysis. It contains 6,795 salaries reported from calendar years 2016 through 2018.[32] The data contain information on approximately 1,982 unique Australia employers and 1,901 job titles. The average base pay in the sample was A$93,085, ranging from A$35,500 to a high of A$1,428,000.[33] Average total compensation was somewhat higher at A$104,559. The sample is 66 percent male and 34 percent female, and the average age (as of 2018) was 33 years with 5.5 years of relevant work experience. 68 percent of the sample had bachelor's degrees, 22 percent had master's degrees, and 8 percent had only a high school diploma. The average employer size was 43,442 employees, ranging from small two-person firms to employers with 2,300,000 employees.

Table 8. Summary Statistics for the Australia Salary Sample

VARIABLE	OBSERVATIONS	MEAN	STANDARD DEVIATION	MIN	MAX
Year	6,795	n.a.	n.a.	2016	2018
Base Salary	6,795	$93,085	$48,455	$35,500	$1,428,000
Total Compensation	6,795	$104,559	$84,969	$36,000	$4,390,000
Gender (Male = 1)	6,795	0.66	0.47	0	1
Birth Year	6,795	1985	8	1932	2000
Years of Experience	6,795	5.5	5.5	0	60
Associate's Degree	6,795	0.01	0.09	0	1
Bachelor's Degree	6,795	0.68	0.47	0	1
High School Diploma	6,795	0.08	0.27	0	1
J.D.	6,795	0.00	0.02	0	1
Master's Degree	6,795	0.22	0.41	0	1
M.B.A.	6,795	0.01	0.09	0	1
M.D.	6,795	0.00	0.00	0	1
Ph.D.	6,795	0.00	0.05	0	1
Firm Size (# Employees)	6,795	43,442	87,190	2	2,300,000

Source: Glassdoor Economic Research (Glassdoor.com/research)

Australia Gender Pay Gap

Figure 14 presents our estimates of the unadjusted and adjusted gender pay gap in Australia salaries from Glassdoor. Column 1 shows the unadjusted pay gap with no statistical controls for differences between workers or jobs. Overall, there is a 15.1 percent unadjusted gap in base pay between males and females, and a 17.4 percent gender pay gap in total compensation.

Applying controls for age, education and years of experience, the gender pay gap in column 2 shrinks to 10.5 percent for base pay, and 12.8 percent for total compensation. Finally adding in a rich set of controls for company and job title, in column 5 we find an adjusted gender pay gap of 3.1 percent for base pay, and 5.4 percent for total compensation.

Figure 14. Overall Australia Results: Estimates of the Unadjusted and Adjusted Gender Pay Gap for Comparable Workers

Australia Gender Pay Gap, Before and After Adding Statistical Controls
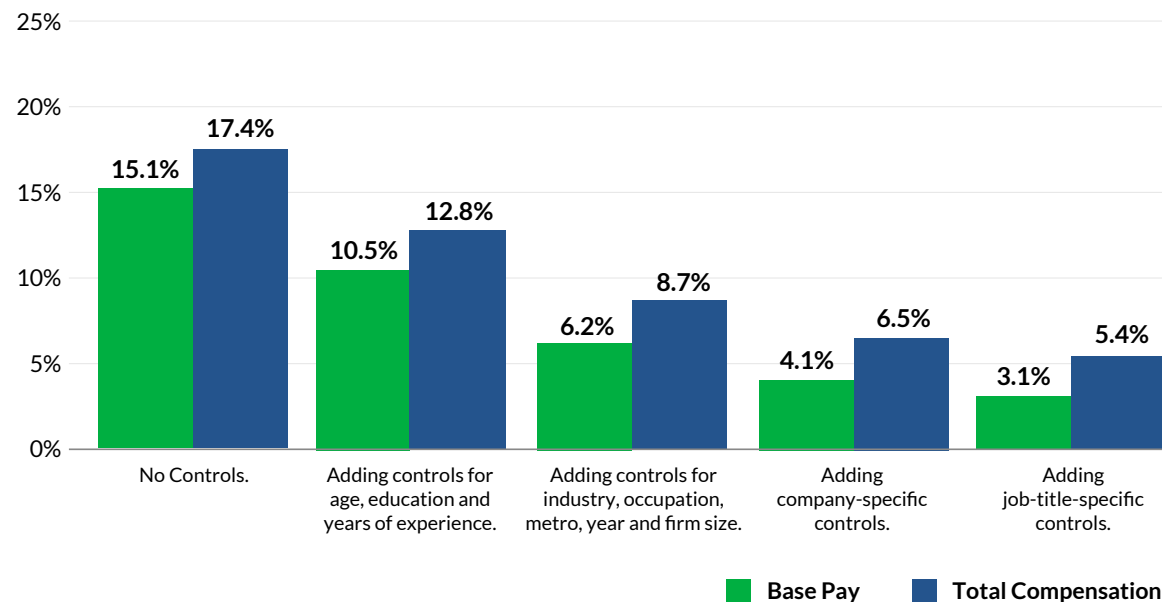
Source: Glassdoor Economic Research (Glassdoor.com/research)

What Explains the Gap?

Figure 15 shows the decomposition of the Australia gender pay gap in Glassdoor salary data into the portion that is explained by differences in worker characteristics, and the portion that remains unexplained due either to unobserved factors or subtle forms of workplace discrimination.

Of the overall 15.1 percent gender gap in base pay, 9.2 percent (or 61 percent of the total gap) is explained by differences in worker characteristics, while the remaining 5.9 percent (or 39 percent of the total gap) is unexplained. This finding means that about 61 percent (9.2/15.1 = 61 percent) of the overall Australia gender pay gap in base pay is explained by worker characteristics. The remaining 39 percent is unexplained, and due to differences in the way the labor market rewards men and women with the same characteristics.

Of the roughly 61 percent of the gender gap that is explained, 37 percent is due to sorting of men and women into different industries and occupations, while just 24 percent is due to differences in education and experience between men and women. Put differently, individual worker characteristics explain only about one-fourth of the Australia gender pay gap. By contrast, the fact that men and women systematically work in different roles explains 37 percent—by far the largest factor explaining gender pay differences in our sample.

Figure 15. Decomposing the Australia Gender Pay Gap into Explained and Unexplained Portions

Australia Explained and Unexplained Gender Pay Gap (Oaxaca-Blinder Decomposition)
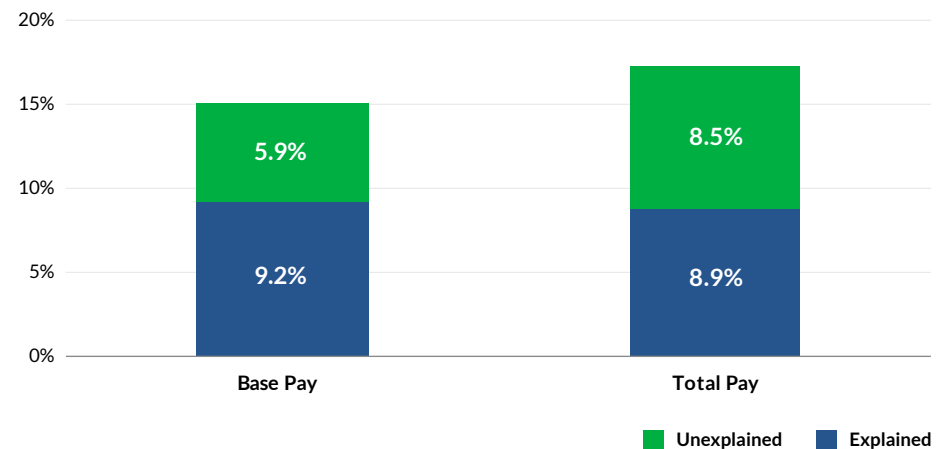
Source: Glassdoor Economic Research (Glassdoor.com/research)

Singapore

The Ministry of Manpower estimates that the Singaporean gender pay gap is 11.8 percent in 2018.[34] In our sample of Glassdoor salary data, we find a larger gender pay gap reported online by Singaporean employees.

For our analysis, we use a sample of 5,096 Glassdoor salaries reported by Singaporean employees. As in our U.S. sample we restrict our analysis to workers over age 16 working full time for whom we have basic demographic information such as age, education and years of experience.

In our Glassdoor Singapore salary sample, the average base pay was $71,631 per year for men and $61,653 for women. That amounts to a gender pay gap of $9,978 in base pay between men and women. In terms of median pay the Singapore gender gap is 12.8 percent. That amounts to Singaporean women earning roughly 87 cents for every dollar earned by men on average. The unadjusted gender pay gap for total compensation in Singapore is slightly higher than for base pay: 13.3 percent for median total pay.[35]

Table 9 provides a summary of the Singapore sample used in our regression analysis. The sample contains 5,096 salaries reported from calendar years 2016 through 2018.[36] The data contain information on approximately 1,477 unique Singaporean employers and 1,656 job titles. The average base pay in the sample was $68,391, ranging from $2,000 to a high of $864,000.[37] Average total compensation was higher at $82,925. The sample is 68 percent male and 32 percent female, and the average age (as of 2018) was 32 years with 4.8 years of relevant work experience. 67 percent of the sample had bachelor's degrees, 27 percent had master's degrees, and 4 percent had only a high school diploma. The average employer size was 51,127 employees, ranging from small two-person firms to employers with 2,300,000 employees.

Table 9. Summary Statistics for the Singapore Salary Sample

VARIABLE	OBSERVATIONS	MEAN	STANDARD DEVIATION	MIN	MAX
Year	5,096	n.a.	n.a.	2016	2018
Base Salary	5,096	$68,391	$49,189	$2,000	$864,000
Total Compensation	5,096	$82,925	$114,826	$2,000	$5,840,000
Gender (Male = 1)	5,096	0.68	0.47	0	1
Birth Year	5,096	1986	6	1928	1999
Years of Experience	5,096	4.8	4.9	0	60
Associate's Degree	5,096	0.00	0.06	0	1
Bachelor's Degree	5,096	0.67	0.47	0	1
High School Diploma	5,096	0.04	0.20	0	1
J.D.	5,096	0.00	0.00	0	1
Master's Degree	5,096	0.27	0.44	0	1
M.B.A.	5,096	0.01	0.09	0	1
M.D.	5,096	0.00	0.02	0	1
Ph.D.	5,096	0.00	0.07	0	1
Firm Size (# Employees)	5,096	51,127	91,470	2	2,300,000

Source: Glassdoor Economic Research (Glassdoor.com/research)

Singapore Gender Pay Gap

Figure 16 presents our estimates of the unadjusted and adjusted gender pay gap in Singapore salaries from Glassdoor. Column 1 shows the unadjusted pay gap with no statistical controls for differences between workers or jobs. Overall, there is a 12.8 percent unadjusted gap in base pay between males and females, and a 13.3 percent gender pay gap in total compensation.

Applying controls for age, education and years of experience, the gender pay gap in column 2 shrinks to 5.9 percent for base pay, and 6.2 percent for total compensation. Finally adding in a rich set of controls for company and job title, in column 5 we find an adjusted gender pay gap of 5.2 percent for base pay, and 6.0 percent for total compensation.

Figure 16. Overall Singapore Results: Estimates of the Unadjusted and Adjusted Gender Pay Gap for Comparable Workers

Singapore Gender Pay Gap,
Before and After Adding Statistical Controls
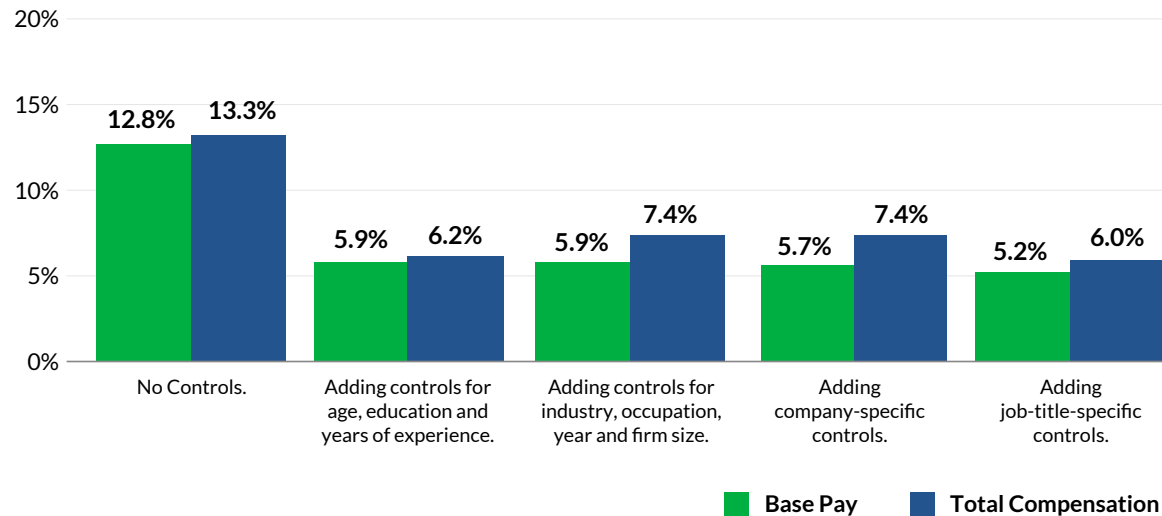
Source: Glassdoor Economic Research (Glassdoor.com/research)

What Explains the Gap?

Figure 17 shows the decomposition of the Singapore gender pay gap in Glassdoor salary data into the portion that is explained by differences in worker characteristics, and the portion that remains unexplained due either to unobserved factors or subtle forms of workplace discrimination.

Of the overall 12.8 percent gender gap in base pay, 7.7 percent (or 60 percent of the total gap) is explained by differences in worker characteristics, while the remaining 5.1 percent (or 40 percent of the total gap) is unexplained. This finding means that about 60 percent (7.7/12.8= 60 percent) of the overall Singapore gender pay gap in base pay is explained by worker characteristics. The remaining 40 percent is unexplained, and due to differences in the way the labor market rewards men and women with the same characteristics.

Of the roughly 60 percent of the gender gap that is explained, 16 percent is due to sorting of men and women into different industries and occupations, while 45 percent is due to differences in education and experience between males and females. Put differently, individual worker characteristics explain 45 percent of the Singapore gender pay gap. By contrast, the fact that men and women systematically work in different roles explains only 16 percent.

Figure 17. Decomposing the Singapore Gender Pay Gap into Explained and Unexplained Portions

Singapore Explained and Unexplained Gender Pay Gap (Oaxaca-Blinder Decomposition)
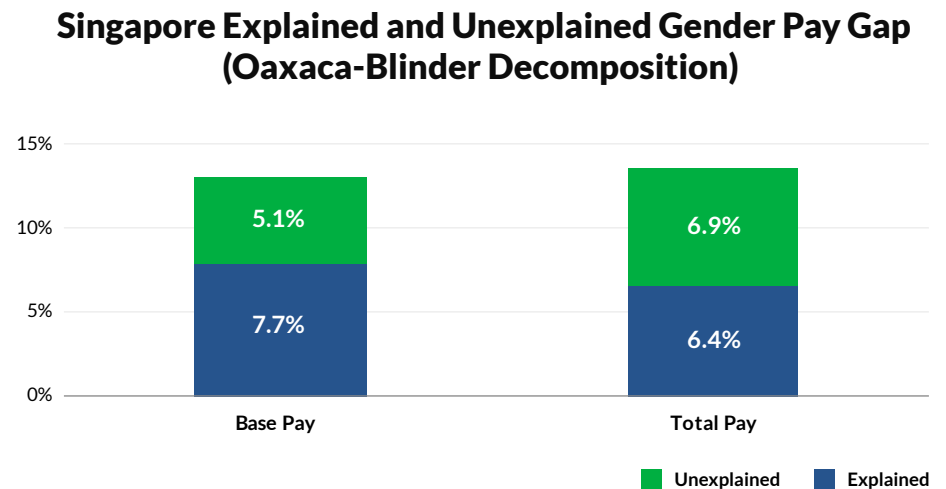
Source: Glassdoor Economic Research (Glassdoor.com/research)

Germany

Germany's Federal Statistical Office (Destatis) estimates that the German gender pay gap is roughly 21.0 percent in 2017.[38] In our sample of Glassdoor salary data, we find a slightly higher gender pay gap reported online by German employees.

For our analysis, we use a sample of 4,794 Glassdoor salaries reported by German employees. As in our U.S. sample we restrict our analysis to workers over age 16 working full time for whom we have basic demographic information such as age, education and years of experience.

In our Glassdoor Germany salary sample, the average base pay was €60,303 per year for men and €48,072 for women. That amounts to a gender pay gap of €12,231 in base pay between men and women. In terms of median pay the German gender gap is 22.3 percent. That amounts to German women earning roughly 78 cents for every euro earned by men on average. The unadjusted gender pay gap for total compensation in Germany is slightly higher than for base pay: 25.1 percent for median total pay.[39]

Table 10 provides a summary of the Germany sample used in our regression analysis. The sample contains 4,794 salaries reported from calendar years 2016 through 2018.[40] The data contains information on approximately 1,680 unique German employers and 1,420 job titles. The average base pay in the sample was €57,157, ranging from €17,040 to a high of €534,000.[41] Average total compensation was higher at €63,351. The sample is 74 percent male and 26 percent female, and the average age (as of 2018) was 33 years with 5.3 years of relevant work experience. 61 percent of the sample had bachelor's degrees, 28 percent had master's degrees, and 6 percent had only a high school diploma. The average employer size was 50,600 employees, ranging from small one-person firms to employers with 1,300,000 employees.

Table 10. Summary Statistics for the Germany Salary Sample

VARIABLE	OBSERVATIONS	MEAN	STANDARD DEVIATION	MIN	MAX
Year	4,794	n.a.	n.a.	2016	2018
Base Salary	4,794	€57,157	€26,149	€17,040	€534,000
Total Compensation	4,794	€63,351	€36,937	€17,400	€534,000
Gender (Male = 1)	4,794	0.74	0.44	0	1
Birth Year	4,794	1985	7	1926	2001
Years of Experience	4,794	5.3	5.3	0	38
Associate's Degree	4,794	0.01	0.10	0	1
Bachelor's Degree	4,794	0.61	0.49	0	1
High School Diploma	4,794	0.06	0.23	0	1
J.D.	4,794	0.00	0.05	0	1
Master's Degree	4,794	0.28	0.45	0	1
M.B.A.	4,794	0.03	0.17	0	1
M.D.	4,794	0.00	0.03	0	1
Ph.D.	4,794	0.01	0.12	0	1
Firm Size (# Employees)	4,794	50,600	102,604	1	1,300,000

Source: Glassdoor Economic Research (Glassdoor.com/research)

Germany Gender Pay Gap

Figure 18 presents our estimates of the unadjusted and adjusted gender pay gap in German salaries from Glassdoor. Column 1 shows the unadjusted pay gap with no statistical controls for differences between workers or jobs. Overall, there is a 22.3 percent unadjusted gap in base pay between men and women, and a 25.1 percent gender pay gap in total compensation.

Applying controls for age, education and years of experience, the gender pay gap in column 2 shrinks to 15.3 percent for base pay, and 17.7 percent for total compensation. Finally adding in a rich set of controls for company and job title, in column 5 we find an adjusted gender pay gap of 6.4 percent for base pay, and 8.2 percent for total compensation.

Figure 18. Overall Germany Results: Estimates of the Unadjusted and Adjusted Gender Pay Gap for Comparable Workers

Germany Gender Pay Gap,
Before and After Adding Statistical Controls
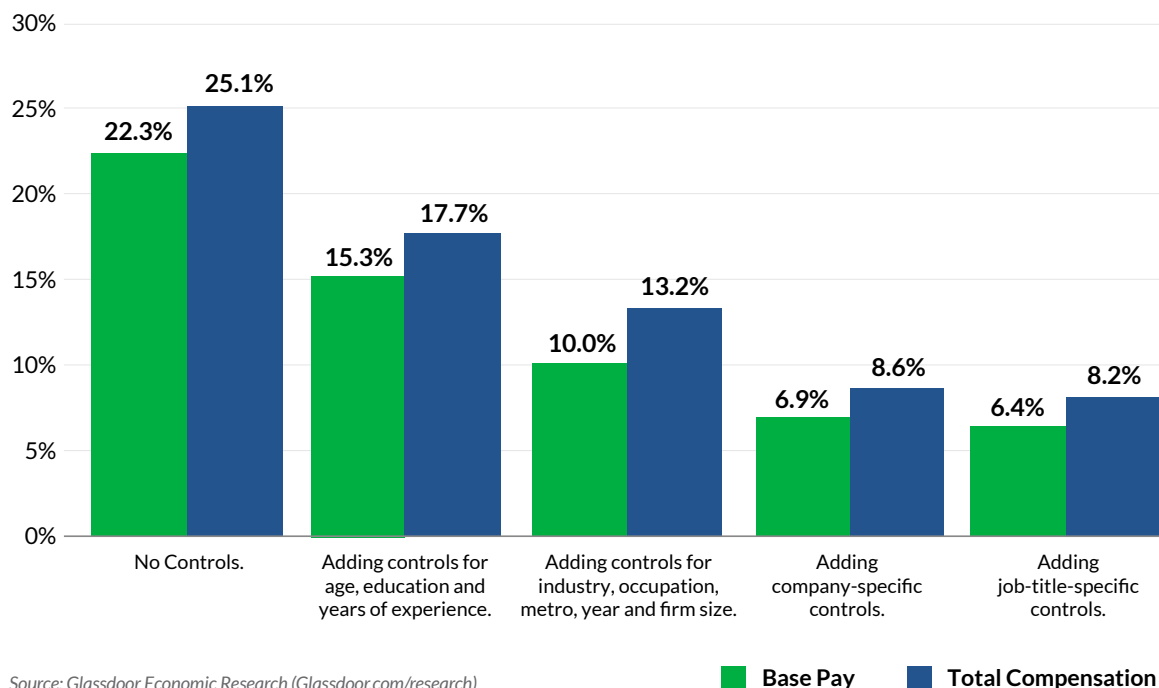
Source: Glassdoor Economic Research (Glassdoor.com/research)

What Explains the Gap?

Figure 19 shows the decomposition of the German gender pay gap in Glassdoor salary data into the portion that is explained by differences in worker characteristics, and the portion that remains unexplained due either to unobserved factors or subtle forms of workplace bias and discrimination.

Of the overall 22.3 percent gender gap in base pay, 12.3 percent (or 55 percent of the total gap) is explained by differences in worker characteristics, while the remaining 10.0 percent (or 45 percent of the total gap) is unexplained. This finding means that about 55 percent (12.3/22.3 = 55 percent) of the overall Germany gender pay gap in base pay is explained by worker characteristics. The remaining 45 percent is unexplained, and due to differences in the way the labor market rewards men and women with the same characteristics.

Of the roughly 55 percent of the gender gap that is explained, 29 percent is due to sorting of men and women into different industries and occupations, while 26 percent is due to differences in education and experience between males and females. Put differently, individual worker characteristics explain only about 26 percent of the Germany gender pay gap, comparable to our findings in the UK and Australia. By contrast, the fact that men and women systematically work in different roles explains 29 percent—the single largest factor explaining gender pay differences in our sample.

Figure 19. Decomposing the Germany Gender Pay Gap into Explained and Unexplained Portions

Germany Explained and Unexplained Gender Pay Gap (Oaxaca-Blinder Decomposition)

Source: Glassdoor Economic Research (Glassdoor.com/research)

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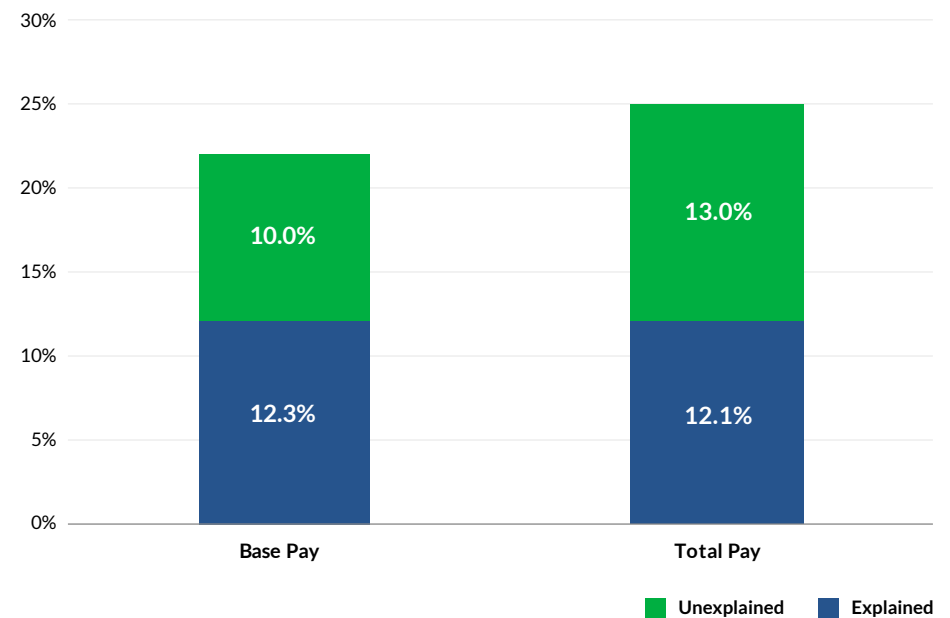
France

The European Commission's statistical office (Eurostat) estimates that the French gender pay gap was roughly 15.4 percent in 2017.[42] In our sample of Glassdoor salary data, we find a lower gender pay gap reported online by French employees.

For our analysis, we use a sample of 3,471 Glassdoor salaries reported by French employees. As in our U.S. sample we restrict our analysis to workers over age 16 working full time for whom we have basic demographic information such as age, education and years of experience.

In our Glassdoor France salary sample, the average base pay was €51,254 per year for men and €45,279 for women. That amounts to a gender pay gap of €5,974 in base pay between men and women. In terms of median base pay the French gender gap is 11.6 percent. That amounts to French women earning roughly 88 cents for every euro earned by men on average. The unadjusted gender pay gap for median total compensation in France is 12.3 percent.[43]

Table 11 provides a summary of the France sample used in our regression analysis. The sample contains 3,471 salaries reported from calendar years 2016 through 2018.[44] The data contain information on approximately 1,323 unique France employers and 1,012 job titles. The average base pay in the sample was €49,515, ranging from €19,340 to a high of €790,000.[45] Average total compensation was slightly higher at €55,272. The sample is 71 percent male and 29 percent female, and the average age (as of 2018) was 32 years with 4.9 years of relevant work experience. 51 percent of the sample had Bachelor's degrees, 42 percent had Master's degrees, and 4 percent had only a high school diploma. The average employer size was 49,500 employees, ranging from small one-person firms to employers with 627,000 employees.

Table 11. Summary Statistics for the France Salary Sample

VARIABLE	OBSERVATIONS	MEAN	STANDARD DEVIATION	MIN	MAX
Year	3,471	n.a.	n.a.	2016	2018
Base Salary	3,471	€49,515	€36,568	€19,340	€790,000
Total Compensation	3,471	€55,272	€46,941	€19,340	€950,018
Gender (Male = 1)	3,471	0.71	0.45	0	1
Birth Year	3,471	1986	7	1933	2000
Years of Experience	3,471	4.9	5.1	0	40
Associate's Degree	3,471	0.01	0.08	0	1
Bachelor's Degree	3,471	0.51	0.50	0	1
High School Diploma	3,471	0.04	0.20	0	1
J.D.	3,471	0.00	0.02	0	1
Master's Degree	3,471	0.42	0.49	0	1
M.B.A.	3,471	0.01	0.12	0	1
M.D.	3,471	0.01	0.08	0	1
Ph.D.	3,471	0.00	0.05	0	1
Firm Size (# Employees)	3,471	49,500	91,800	1	627,000

Source: Glassdoor Economic Research (Glassdoor.com/research)

France Gender Pay Gap

Figure 20 presents our estimates of the unadjusted and adjusted gender pay gap in France salaries from Glassdoor. Column 1 shows the unadjusted pay gap with no statistical controls for differences between workers or jobs. Overall, there is a 11.6 percent unadjusted gap in base pay between men and women, and a 12.3 percent gender pay gap in total compensation. Applying controls for age, education and years of experience, the gender pay gap in column 2 shrinks to 7.6 percent for base pay, and 7.7 percent for total compensation. Finally adding in a rich set of controls for company and job title, in column 5 we find an adjusted gender pay gap of 3.7 percent for base pay, and 3.8 percent for total compensation.

Figure 20. Overall France Results: Estimates of the Unadjusted and Adjusted Gender Pay Gap for Comparable Workers

**France Gender Pay Gap,
Before and After Adding Statistical Controls**
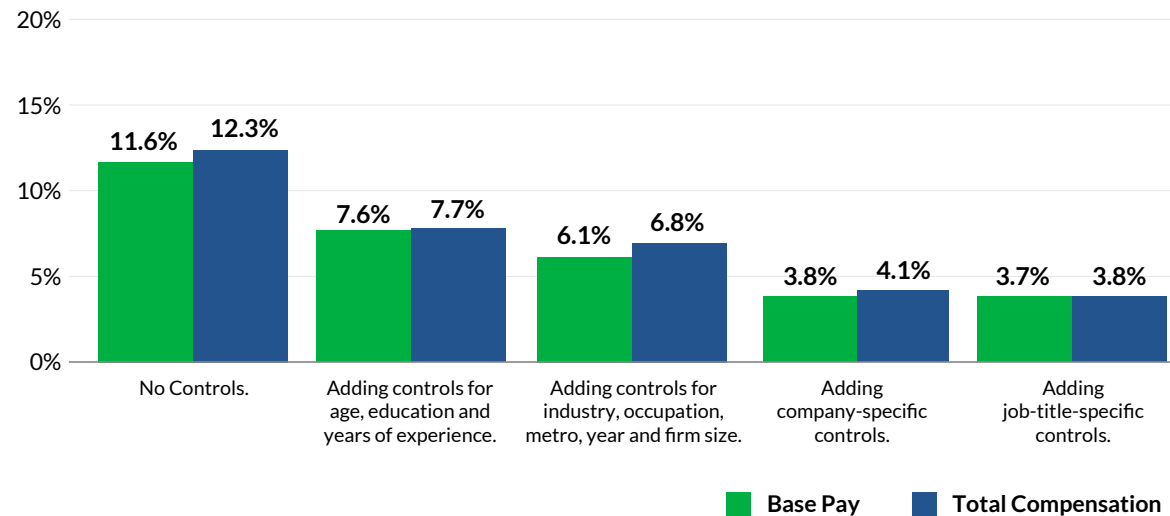
Source: Glassdoor Economic Research (Glassdoor.com/research)

What Explains the Gap?

Figure 21 shows the decomposition of the France gender pay gap in Glassdoor salary data into the portion that is explained by differences in worker characteristics, and the portion that remains unexplained due either to unobserved factors or subtle forms of workplace bias and discrimination.

Of the overall 11.6 percent gender gap in base pay, 5.4 percent (or 46 percent of the total gap) is explained by differences in worker characteristics, while the remaining 6.2 percent (or 54 percent of the total gap) is unexplained. This finding means that about 46 percent (5.4/11.6 = 46 percent) of the overall France gender pay gap in base pay is explained by worker characteristics. The remaining 53 percent is unexplained, and due to differences in the way the labor market rewards men and women with the same characteristics.

Of the roughly 46 percent of the gender gap that is explained, 16 percent is due to sorting of men and women into different industries and occupations, while 30 percent is due to differences in education and experience between men and women. Put differently, individual worker characteristics explain about 30 percent of the France gender pay gap, which is significantly larger compared to our findings in the UK and Germany. By contrast, the fact that men and women systematically work in different roles explains only 16 percent.

Figure 21. Decomposing the France Gender Pay Gap into Explained and Unexplained Portions

France Explained and Unexplained Gender Pay Gap (Oaxaca-Blinder Decomposition)
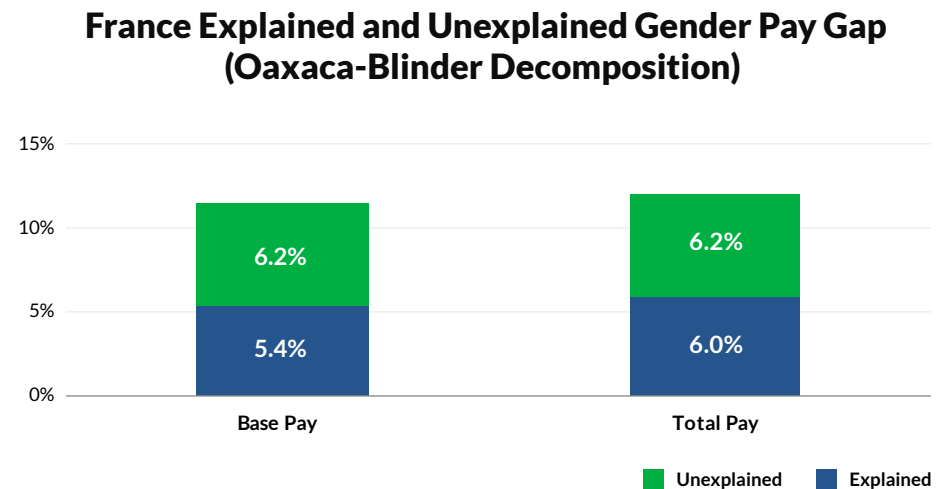
Source: Glassdoor Economic Research (Glassdoor.com/research)

The Netherlands

The European Commission's statistical office (Eurostat) estimates that the gender pay gap in the Netherlands was roughly 15.2 percent in 2017.[46] In our sample of Glassdoor salary data, we find a higher gender pay gap reported online by Dutch employees.

For our analysis, we use a sample of 2,514 Glassdoor salaries reported by Dutch employees. As in our U.S. sample we restrict our analysis to workers over age 16 working full time for whom we have basic demographic information such as age, education and years of experience.

In our Glassdoor Netherlands salary sample, the average base pay was €53,644 per year for men and €44,483 for women. That amounts to a gender pay gap of €9,161 in base pay between men and women. In terms of median base pay the Dutch gender pay gap is 18.9 percent. That amounts to Dutch women earning roughly 81 cents for every

euro earned by men on average. The unadjusted gender pay gap for median total compensation in the Netherlands is somewhat larger, at 22.9 percent.[47]

Table 12 provides a summary of the Netherlands sample used in our regression analysis. The sample contains 2,514 salaries reported from calendar years 2016 through 2018.[48] The data contains information on approximately 955 unique Dutch employers and 957 job titles. The average base pay in the sample was €51,315, ranging from €18,444 to a high of €372,000.[49] Average total compensation was slightly higher at €58,025. The sample is 75 percent male and 25 percent female, and the average age (as of 2018) was 34 years with 5.7 years of relevant work experience. 59 percent of the sample had Bachelor's degrees, 34 percent had Master's degrees, and 5 percent had only a high school diploma. The average employer size was 76,671 employees, ranging from small two-person firms to employers with 623,000 employees.
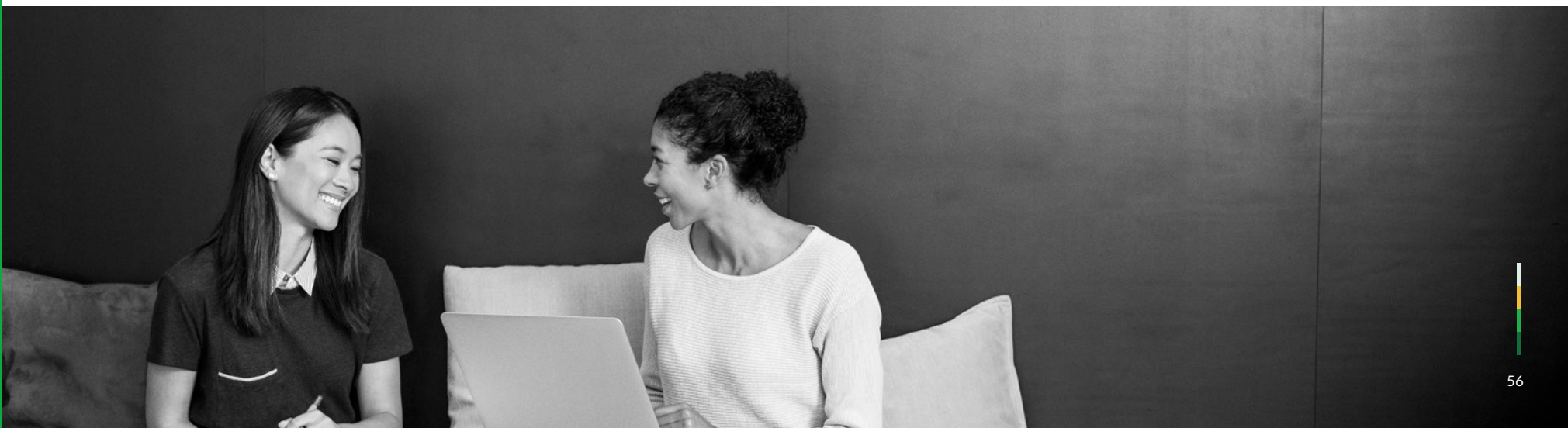
Table 12. Summary Statistics for the Netherlands Salary Sample

VARIABLE	OBSERVATIONS	MEAN	STANDARD DEVIATION	MIN	MAX
Year	2,514	n.a.	n.a.	2016	2018
Base Salary	2,514	€51,315	€26,545	€18,444	€372,000
Total Compensation	2,514	€58,025	€37,994	€18444	€565,200
Gender (Male = 1)	2,514	0.75	0.44	0	1
Birth Year	2,514	1984	8	1930	1999
Years of Experience	2,514	5.7	5.9	0	40
Associate's Degree	2,514	0.01	0.08	0	1
Bachelor's Degree	2,514	0.59	0.49	0	1
High School Diploma	2,514	0.05	0.21	0	1
J.D.	2,514	0.00	0.00	0	1
Master's Degree	2,514	0.34	0.47	0	1
M.B.A.	2,514	0.01	0.02	0	1
M.D.	2,514	0.01	0.10	0	1
Ph.D.	2,514	0.01	0.10	0	1
Firm Size (# Employees)	2,514	38,015	76,671	2	623,000

Source: Glassdoor Economic Research (Glassdoor.com/research)

Netherlands Gender Pay Gap

Figure 22 presents our estimates of the unadjusted and adjusted gender pay gap in Dutch salaries from Glassdoor. Column 1 shows the unadjusted pay gap with no statistical controls for differences between workers or jobs. Overall, there is a 18.9 percent unadjusted gap in base pay between men and women, and a 22.9 percent gender pay gap in total compensation.

Applying controls for age, education and years of experience, the gender pay gap in column 2 shrinks to 9.6 percent for base pay, and 13.4 percent for total compensation. Finally adding in a rich set of controls for company and job title, in column 5 we find an adjusted gender pay gap of 6.6 percent for base pay, and 8.0 percent for total compensation.

Figure 22. Overall Netherlands Results: Estimates of the Unadjusted and Adjusted Gender Pay Gap for Comparable Workers

Netherlands Gender Pay Gap, Before and After Adding Statistical Controls

	No Controls.	Adding controls for age, education and years of experience.	Adding controls for industry, occupation, metro, year and firm size.	Adding company-specific controls.	Adding job-title-specific controls.
Base Pay	18.9%	9.6%	8.2%	7.5%	6.6%
Total Compensation	22.9%	13.4%	12.1%	9.7%	8.0%

Source: Glassdoor Economic Research (Glassdoor.com/research)

■ Base Pay   ■ Total Compensation
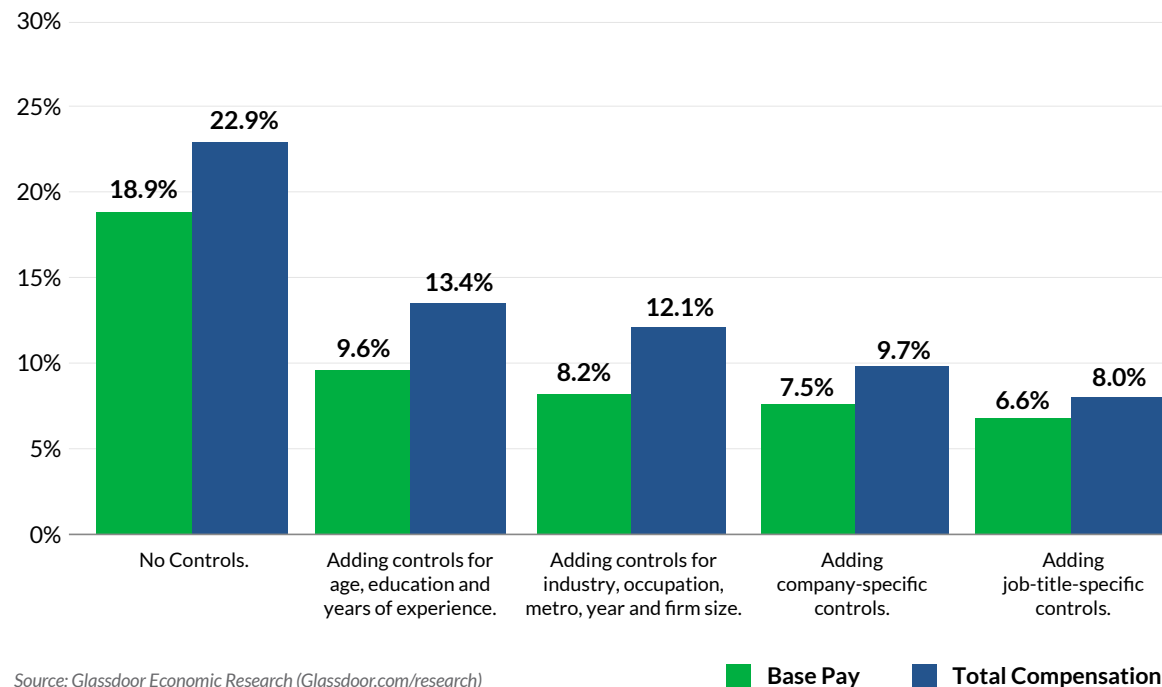
What Explains the Gap?

Figure 23 shows the decomposition of the Netherlands gender pay gap in Glassdoor salary data into the portion that is explained by differences in worker characteristics, and the portion that remains unexplained due either to unobserved factors or subtle forms of workplace bias and discrimination.

Of the overall 18.9 percent gender gap in base pay, 10.3 percent (or 54 percent of the total gap) is explained by differences in worker characteristics, while the remaining 8.6 percent (or 46 percent of the total gap) is unexplained. This finding means that about 54 percent (10.3/18.9 = 54 percent) of the overall Netherlands gender pay gap in base pay is explained by worker characteristics. The remaining 46 percent is unexplained, and due to differences in the way the labor market rewards men and women with the same characteristics.

Of the roughly 54 percent of the gender gap that is explained, 12 percent is due to sorting of men and women into different industries and occupations, while 43 percent is due to differences in education and experience between men and women. Put differently, individual worker characteristics explain about 43 percent of the gender pay gap in the Netherlands, which is significantly larger compared to our findings in the UK and Germany. By contrast, the fact that men and women systematically work in different roles explains only 12 percent. differences in our sample.

Figure 23. Decomposing the Netherlands Gender Pay Gap into Explained and Unexplained Portions

Netherlands Explained and Unexplained Gender Pay Gap (Oaxaca-Blinder Decomposition)
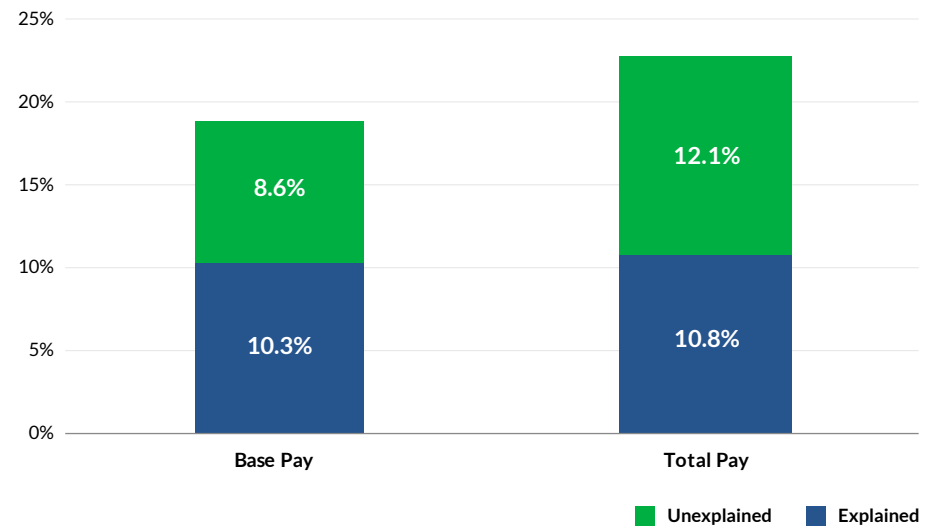
Source: Glassdoor Economic Research (Glassdoor.com/research)

Conclusion: Pay Gaps Around the World

Our latest analysis shows the gender pay gap remains real, both in the U.S. and around the world. Even after statistically comparing workers with similar job titles and employers, with comparable education, experience and locations, we still find a large and statistically significant difference between male and female pay in all eight countries we examined.

Before any statistical controls, men earn on average between 11.6 percent and 22.3 percent more than women across the eight countries we examined, ranging from the smallest unadjusted gender pay gap in France (11.6 percent) to the largest in Germany (22.3 percent).

Once we've statistically controlled for every difference we're able to observe between men and women, we still find an adjusted gender pay gap, ranging from 3.1 percent in Australia to 6.6 percent in the Netherlands. That amounts to women earning on average between 93 cents and 97 cents per dollar earned by men.

Although those gaps are smaller than appears from a simple comparison of average male and female pay, they represent a large and statistically significant gap between male and female earnings all over the world.

How do these findings compare to 2016?

The adjusted gender pay gap has narrowed in four of the five countries we analyzed in our 2016 study. In the United States, the United Kingdom, France and Australia, the gender pay gap has improved since 2016. The one exception is Germany, whose adjusted gender pay gap increased slightly from 5.5 percent to 6.4 percent.

In the U.S., the industries with the largest gender pay gap have shifted somewhat since 2016. In our last study, the health care and insurance industries were tied for largest adjusted pay gap, both at 7.2 percent. Today, we find the media and retail sectors have the largest pay gap in Glassdoor data, both at 6.4 percent. Among industries with the smallest pay gaps, aerospace & defense—which had the smallest gap in our 2016 study—saw a slight increase in pay gap from 2.5 percent to 2.9 percent. Today, the biotech & pharmaceutical industry has the smallest gap (2.2 percent) in our sample.

The biggest factor contributing to the gender pay gap in most countries continues to be occupational and industry sorting. In our 2016 study, women and men working in differently paying jobs in the economy explained 54 percent of the overall U.S. pay gap. Our updated analysis shows that percentage has increased to 56.5 percent. The percentage of the gap due to differences in education and experience has actually fallen, 14 percent to 8 percent. Societal pressures diverting women and men into different career paths remains the most important driver of the pay gap in most countries.

Despite evidence that occupational and industry sorting is a key driver of the pay gap, much popular discussion of pay equity focuses on choices individual women make in their own careers. The idea of a "confidence gap"—the notion that women could achieve more if they were more self-confident at work—is a commonly discussed barrier to pay equity today. Is there really a confidence gap? And does it show up in the salaries men and women aim for during the job search?

In the following section, we use unique data from Glassdoor to explore that issue, providing the first-ever analysis of gender pay gaps among real-world job applications on Glassdoor, and show whether that can explain much of today's gender pay gap.
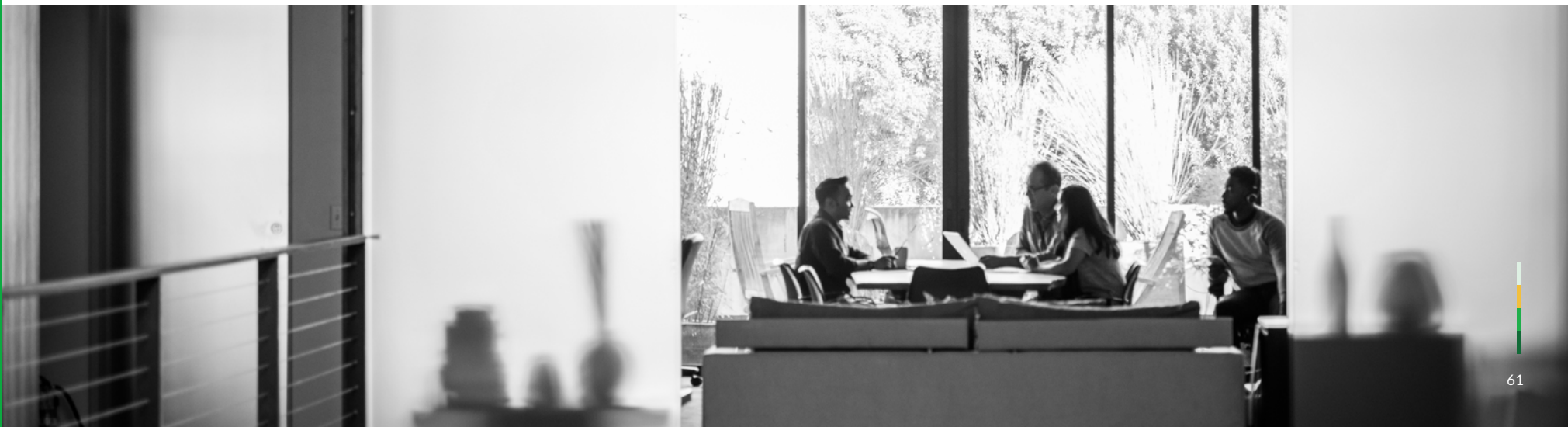
IV.

Do Women Ask for Equal Pay for Equal Work?

Introduction

In recent years, there has been much discussion of the "confidence gap" between men and women at work. But it is not well understood whether that gap–if real–may contribute to the gender pay gap. In this section, we analyze a unique data set of real-world job applications from Glassdoor to examine whether a salary confidence gap exists. Do women apply to jobs with lower salaries than men, or not?

If a salary confidence gap were real, it would be a potentially powerful mechanism by which differences in confidence between women and men could translate into a pay gap. If women are less confident about themselves as job applicants, they may avoid applying to higher-paying jobs, even if they are equally qualified. That fact alone could lead to a large pay gap over time.

Glassdoor data offer a unique ability to answer this question. Glassdoor's job search product exposes salary estimates to candidates before they decide to apply, allowing them to incorporate salary expectations into their job search decisions in a way that's not possible in other job search settings. Additionally, because of the high volume of data Glassdoor collects, we are able to control for detailed user and job characteristics to estimate an adjusted salary confidence gap and answer the question: are women today seeking out equal pay for equal work?
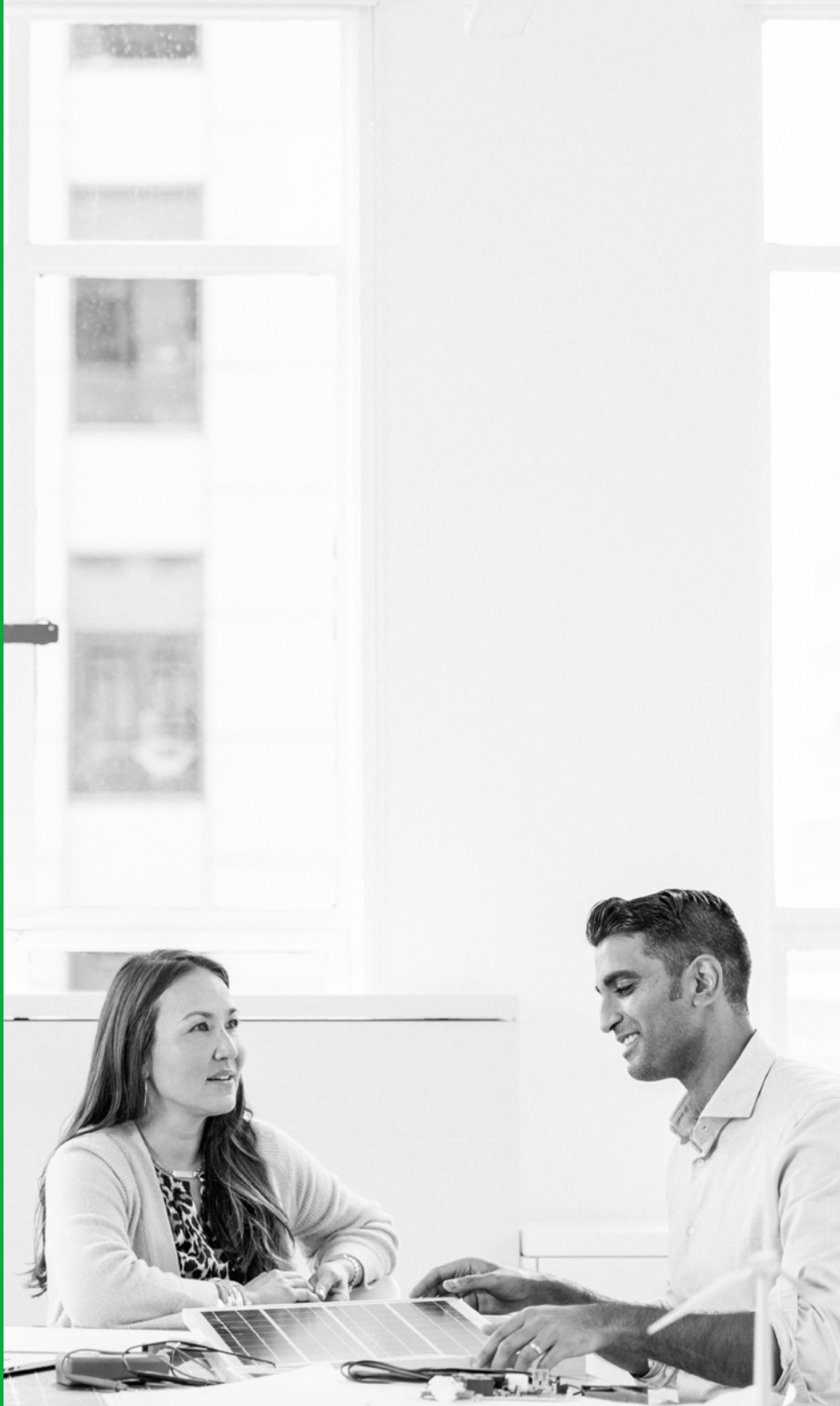
Data

As one of the world's largest jobs and recruiting sites, Glassdoor is the starting place for millions of job applications every month. For this analysis, we focus on job applications started on Glassdoor in the United States in 2018. We restrict our sample to records for which we have complete demographic information on applicants, including age, gender and education as well as information on the job listing, including job title and salary estimate. We also use user-submitted salary information to understand users' current base pay. All pay data in this analysis are for base pay only, and do not include other types of compensation.

Table 13 shows summary statistics for the data used in our analysis. It consists of 300,256 job applications started on Glassdoor. It is largely similar to the dataset of salaries used in the previous section to analyze the gender pay gap. This sample is made up of slightly more men compared to that dataset (56 percent compared to 54 percent) and has higher levels of educational attainment (23 percent hold graduate degrees compared to 18 percent). This over-representation may reflect more willingness among college-educated workers to apply to jobs online, compared to their willingness to share salary information.

In Table 13, "applied salary" refers to the salary estimate for the job that the user applied to. By contrast, "current salary" refers to the user's own self-reported salary.

Table 13: Summary Statistics for the Job Applications Used in Our Analysis

VARIABLE	OBSERVATIONS	MEAN	STANDARD DEVIATION	MIN	MAX
Applied Salary	300,256	$83,287	$37,904	$15,000	$445,000
Current Salary	300,256	$62,763	$33,898	$10,300	$570,671
Gender (Male = 1)	300,256	0.56	0.50	0	1
Age (2018)	300,256	35.2	9.8	19	79
Years of Experience	300,256	5.4	6.0	0	40
Associate's Degree	300,256	0.03	0.16	0	1
Bachelor's Degree	300,256	0.67	0.47	0	1
High School Diploma	300,256	0.08	0.26	0	1
J.D.	300,256	0.00	0.04	0	1
Master's Degree	300,256	0.20	0.40	0	1
M.B.A.	300,256	0.02	0.14	0	1
M.D.	300,256	0.00	0.02	0	1
Ph.D.	300,256	0.01	0.08	0	1
Firm Size (# Employees)	300,256	31,400	95,600	1	2,300,000

Source: Glassdoor Economic Research (Glassdoor.com/research)

Findings

In the previous section, we showed the overall U.S. pay gap is 21.4 percent, or that women earn roughly 79 cents for every dollar men earn. We find a similar gap in the salaries men and women apply to on Glassdoor. Men apply to jobs with salaries that are $13,635 higher on average, a gap of 18.3 percent. At first glance, this seems to suggest that a "confidence gap" may be a key driver of the gender pay gap, in which men seek out higher pay in new jobs. However, self-confidence is not the only driver of salary expectations: Men and women also may have different levels of education and experience, or work in different jobs and industries with different pay scales. To conclude there really is a pay gap in job applications, it's important to compare only similar men and women.

For example, the salary confidence gap between men and women varies widely based on the industry of the jobs men and women apply to. In Table 14, we show that, even though men overall apply to higher-paying jobs than women, the size of the gap varies from industry to industry. Men applying to jobs in the accounting & legal industry aim for jobs that pay $15,221 (18.6 percent) more than women, whereas men apply to jobs in the restaurant, bars & food service industry that pay only $3,565 (7.0 percent) more.

Table 14: Average Salaries Men and Women Apply to by Industry

INDUSTRY	MEN	WOMEN	UNADJUSTED GAP ($)	UNADJUSTED GAP (% OF MALE PAY)
Accounting and Legal	$81,812	$66,592	$15,221	18.6%
Finance	$86,803	$70,767	$16,036	18.5%
Health Care	$71,802	$58,741	$13,061	18.2%
Travel and Tourism	$66,594	$55,724	$10,870	16.3%
Non Profit	$67,006	$56,216	$10,790	16.1%
Retail	$64,670	$54,284	$10,387	16.1%
Media	$82,676	$69,882	$12,793	15.5%
Real Estate	$70,133	$59,468	$10,665	15.2%
Business Services	$75,850	$64,589	$11,260	14.8%
Oil, Gas, Energy and Utilities	$81,669	$69,977	$11,691	14.3%
Insurance	$76,015	$65,281	$10,735	14.1%
Education	$66,915	$57,865	$9,050	13.5%
Construction, Repair and Maintenance	$69,930	$60,619	$9,311	13.3%
Government	$69,277	$60,298	$8,980	13.0%
Telecommunications	$78,736	$68,972	$9,764	12.4%
Transportation and Logistics	$65,474	$57,425	$8,049	12.3%
Information Technology	$97,819	$86,248	$11,571	11.8%
Manufacturing	$77,579	$68,784	$8,795	11.3%
Biotech and Pharmaceuticals	$91,650	$81,287	$10,362	11.3%
Aerospace and Defense	$81,608	$72,956	$8,653	10.6%
Arts, Entertainment and Recreation	$63,836	$57,772	$6,064	9.5%
Restaurants, Bars and Food Service	$50,913	$47,348	$3,565	7.0%

Source: Glassdoor Economic Research (Glassdoor.com/research)

Overall, men make up a disproportionate share of applications to higher-paying jobs and industries, which inflates the size of the unadjusted salary confidence gap. In order to truly understand the salary confidence gap, we need to compare women and men with similar backgrounds applying to similar kinds of jobs.

In Figure 24, we show estimates for the salary confidence gap before and after statistical controls have been applied. Column 1 is the unadjusted gap, indicating that men apply to jobs with 18.3 percent higher salaries on average than women. Each subsequent column adds additional controls in order to show the size of the gap when comparing similar workers applying to similar jobs.

Overall, the apparent salary confidence gap in job applicants shrinks as we get closer to making an apples-to-apples comparison between men and women. As shown in Column 3 of Figure 24, after adding controls for "human capital" characteristics of workers like experience and education, as well as job characteristics like occupation and industry, the salary confidence gap shrinks to 3.9 percent.

Most previous research on the salary confidence gap has only had access to the types of controls in Column 3 of Figure 24, not the more detailed controls available in Glassdoor data, which may overestimate the true salary confidence gap. In Columns 4 and 5, we apply our most granular statistical controls for individual companies and job titles, which further reduces the salary confidence gap to 1.2 percent.

In Column 6, we add one final control: users' self-reported current salary on Glassdoor. There are many unobservable characteristics of workers that may affect pay, such as work effort and ability, and these characteristics are partly incorporated into workers' current salaries. After adding current salary as a control, the salary confidence gap narrows further to 0.7 percent. This can be interpreted as an upper bound on the effect of the salary confidence gap on the gender pay gap. This implies that a confidence gap in salary expectations is, at most, a small contributor to the total U.S. unadjusted gender pay gap of 4.9 percent.

Figure 24: Little Evidence of a Salary Confidence Gap after Controls

**Salary Confidence Gap,
Before and After Adding Statistical Controls**
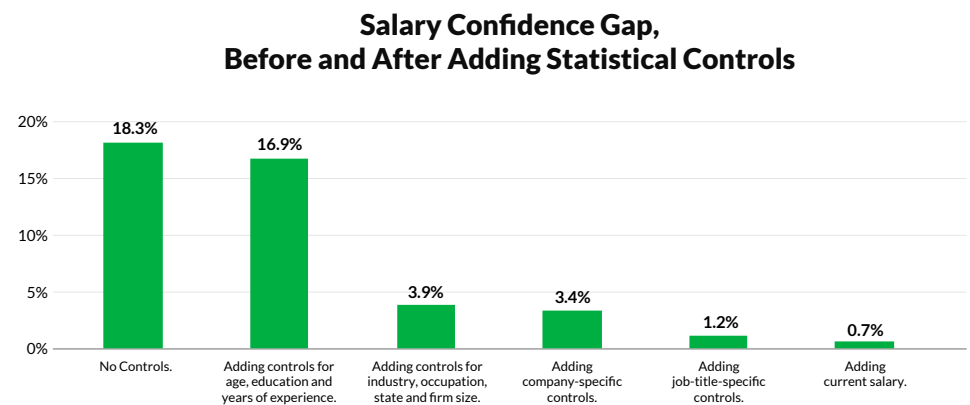
Source: Glassdoor Economic Research (Glassdoor.com/research)

Do Women Ask for Smaller Raises?

Comparing the salary workers aim for against their current salary helps us understand how women and men think about looking for pay raises. Much academic research has asked whether men are more likely to ask for raises than women,[50] but little evidence exists on whether women and men seek similarly sized raises when applying for new jobs.

Data from real-world job applications on Glassdoor show that women and men largely seek the same size percentage raises when they apply to new jobs. In Figure 25, we show that the median percentage raise men and women seek is equal—both at 33.3 percent.

Why is this important? Because similar percentage raises may imply that workers fixate on percentage raises instead of using their actual market value as their salary goal. This could propagate a gender pay gap from job to job as men and women move through their careers, turning a small pay gap early in careers into one that could last a lifetime—one reason policymakers are increasingly considering banning recruiters from asking applicants about their salary history.

Figure 25: Women and Men Seek Similar Percentage Raises for New Jobs on Glassdoor

Women and Men Seek Similar Percentage Raises for New Jobs

■ Raise ($)   ■ Raise (%)
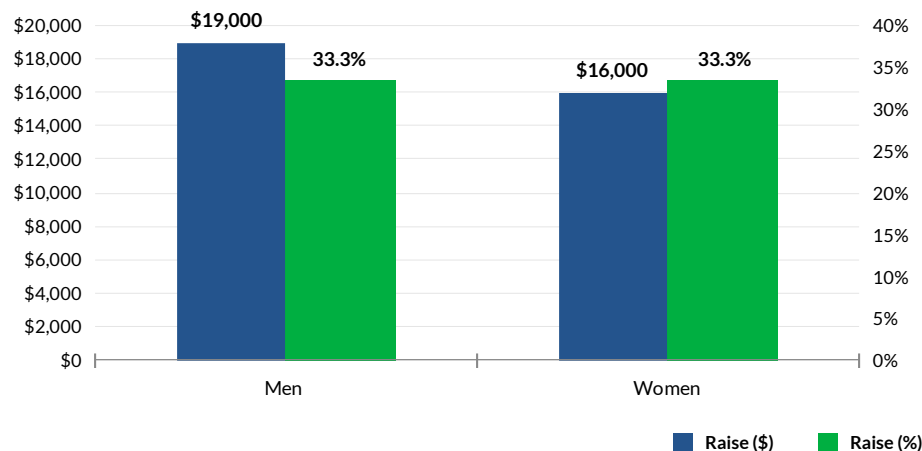
Source: Glassdoor Economic Research (Glassdoor.com/research)

Conclusion

Our analysis finds that there is a statistically significant but small 0.7 percent salary confidence gap. That is, once we compare similar men and women applying to jobs on Glassdoor, there is a less than one percent gap in pay for jobs that men versus women apply to. This effect is small, and is not likely a primary driver of the overall gender pay gap. Taken together, data from Glassdoor show that women do ask for equal pay for equal work when applying to new jobs online.

One limitation of our research is that the job search on Glassdoor may differ from the overall labor market in one important way: Glassdoor exposes salary information to job candidates before they apply to jobs. As a result, candidates in our sample may have different pay information than workers in the economy as a whole. In other words, other job search methods where pay is less transparent may suffer from a larger salary confidence gap than what we see on Glassdoor.[51] However, our findings based on data from Glassdoor suggest that whatever salary confidence gap exists between men and women isn't likely a main driver of today's gender pay gap.

V.

Conclusion

Three years have passed since our original study of the gender pay gap in Glassdoor salaries. What has changed?

We find the gender pay gap in the United States has narrowed in recent years but is still significant. In 2018, men as a group earned 21.4 percent more than women in the U.S., down from 26.6 percent in 2011. When comparing women and men with similar experience and jobs, the adjusted pay gap in America has shrunk from 6.5 percent in 2011 to 4.6 percent in 2018. Similarly, in the United Kingdom we find the adjusted pay gap has fallen to 6.3 percent in 2018, down from 9.1 percent in 2014.

While these adjusted gaps may seem small, the accumulated impact on women's lifetime earnings is very significant. Additionally, the presence of a gender pay gap is universal among all eight countries we analyzed. The unadjusted pay gap ranges from a high of 22.3 percent in Germany to a low of 11.6 percent in France, while the adjusted pay gap ranges from a high of 6.6 percent in the Netherlands to 3.1 percent in Australia.

Using unique data from job applications on Glassdoor, we also examined the salary confidence gap between men and women. We found that, after applying statistical controls, women largely ask for equal pay for equal work when applying to jobs online. Men do seek out jobs that pay a statistically significant 0.7 percent higher than those for women. However, the effect is too small to be an important driver of the adjusted U.S. pay gap of 4.6 percent.

How Can We Do Better?

The progress on the gender pay gap in the last 3 years is encouraging. But sustained action from business, government and individuals will be required to meet our most optimistic projections of closing the gap within the next twenty years.

For job seekers, the most important tool for achieving pay equity is knowledge. Understanding one's own market value helps workers seek out and negotiate higher salaries. Research shows, however, that many candidates look for salary information from people like them, or simply by using mental rules of thumb. Incomplete information or subconscious biases can result in workers inadvertently propagating the pay gap themselves. Our analysis of job applicants on Glassdoor shows there isn't a large gap in salary expectations between men and women, suggesting that pay transparency can help close the pay gap if workers take advantage of online pay information.[52] Seeking out and sharing information more widely can be a valuable way for individual workers to contribute to closing the pay gap.

For employers, a key finding of our study is that sharing salary information directly with candidates can be a powerful cultural differentiator in a tight labor market, and can also help close the pay gap. Second, although education and experience are becoming less of a factor behind the gender pay gap, occupational and industry sorting remain significant causes. That suggests that employers should be consistently re-evaluating hiring pipelines to ensure that they are attracting, hiring and retaining diverse talent pools. Finally, because occupational sorting is such an important driver of the pay gap, it's important for employers to promote workplace policies that allow flexibility in work hours and paid family leave, ensuring both men and women can balance work and family responsibilities.

For policymakers, our results offer guidance on what policies are likely to have the biggest impact on the gender pay gap. Policies that promote paid family leave and invest in educational programs to encourage women and minorities to enter STEM fields can help reduce occupational segregation of men and women into differently paying jobs. Additionally, our findings suggest that because men and women target identical percentage raises when looking for new jobs, prohibitions on asking applicants for salary history may help reduce the pay gap over time.

Ultimately, progress on the gender pay gap will require time and sustained effort. Whether through improved salary transparency, more flexible workplace policies, more comprehensive paid family leave, or company pay disclosure requirements, closing the pay gap will require action from policymakers, employers, and job seekers alike. Our hope is that this study helps draw attention to factors behind gender pay gaps around the world, and encourages a smarter dialogue on how to close those gaps for good.

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End Notes

1. Andrew Chamberlain, "Demystifying the Gender Pay Gap," Glassdoor Economic Research, March 2016.

2. We estimate equation (1) using the natural log of salaries, so β_1 has the interpretation of being the approximate percentage male-female pay gap conditional on other statistical controls contained in X. See Footnote 7 for details on how this differs from an exact calculation of percentage pay gaps.

3. See Oaxaca (1973) and Blinder (1973). For a practical overview of how the Oaxaca-Blinder decomposition is implemented by researchers at the World Bank, see O'Donnell, Owen et al. (2008).

4. We implement the Oaxaca-Blinder decomposition in Stata using the "oaxaca" command using a two-fold decomposition with 50-50 weights on male and female coefficient vectors.

5. Past research has clearly documented a gender confidence gap in education settings where Else-Quest, Hyde and Lynn (2010) found male students have higher reported self-confidence in math despite similar performance. And there is some evidence of a confidence gap in the workplace, but many different mechanisms have been proposed: Bosquet, Combes and García-Peñalosa (2018) found that female economists in France were less likely to apply for promotion, while Leibbrandt and List (2012) found female applicants to an administrative assistant job were less likely to negotiate pay than men.

6. Surveys of college students like Martin (1989), Schweitzer, Ng, Lyons and Kuron (2011) and Schweitzer, Lyons, Kuron and Ng (2014) or of job seekers like Zhang and Zheng (2019) indicate that women have lower salary expectations than men but are limited by the fact that surveys are necessarily self-reported and have little visibility into the specific occupations women and men ultimately enter.

7. Note that the regression coefficients we present here give approximate percentage male pay advantages only. The exact percentage male pay advantage— that is, the percentage pay advantage from the male dummy changing from 0 to 1 in our estimating equation—is given by e^β - 1. For additional technical detail, see https://goo.gl/t31YCJ.

8. Glassdoor salary reports are based on surveys administered to site visitors. The survey can be viewed online at http://gldr.co/1TzaIcS. It collects detailed information on job title, employer name, location, years of experience, full-time vs. part-time employment status, and base pay as well as all other forms of compensation including bonuses, tips, commissions, stock options and profit sharing. All submissions of this type of "user-generated content" are subjected to a rigorous approval process, including a combination of machine-learning and human-touch review.

9. See, for example, "Six Major U.S. Banks Take Steps on Gender Pay Gap," (February 26, 2018) CPA Practice Advisor, available at https://www.cpapracticeadvisor.com/payroll/news/12399824/six-major-us-banks-take-steps-on-gender-pay-gap.

10. Our sample is based on 426,512 salary reports shared on Glassdoor by U.S.-based, full-time workers as of February 2019. Users can report salaries from up to three calendar years in the past. For our regression estimates, we remove from the sample 2,695 individuals (0.6 percent of the sample) who misreported earnings as less than the 2016 federal minimum wage of $7.25 per hour worked full time for 2,000 hours, or $14,500 per year. We also restrict our sample to salaries with reported base salary of less than $5,000,000 per year and total compensation of less than $10,000,000 per year, which removes 13 observations from our sample. Including these individuals does not materially affect any estimates in the study. All amounts reported as hourly wages are expressed in annual terms assuming a 2,000-hour full-time work year. Amounts reported as monthly salaries are expressed as an annual figure assuming a 12-month work year.

11. Glassdoor's online salary survey collects information on base salary as well as total compensation. Base salary is a required field, but users may optionally report income from tips, bonuses, commissions and other forms of pay. Because these fields are optional, they are subject to underreporting by users. For this reason, our primary focus is on base pay, and we provide figures for total compensation as an illustration only. In general, we suggest caution in interpreting any of the figures reported in this study for total compensation, and all of our main conclusions throughout are based only on our base pay results.

12. See U.S. Bureau of Labor Statistics, "Employment Status of the Civilian Population by Sex and Age," at http://goo.gl/YjJJB.

13. See U.S. Census Bureau, "Educational Attainment in the United States: 2018," at https://goo.gl/bb4z4w.

14. See Vanessa Fuhrmans (March 1, 2019), "Female Factor: Women Drive the Labor-Force Comeback," Wall Street Journal. Available at https://www.wsj.com/articles/female-factor-women-drive-the-labor-force-comeback-11551436214?mod=e2twe

15. Jed Kolko and Claire Cain Miller (December 14, 2018), "As Labor Market Tightens, Women Are Moving Into Male-Dominated Jobs," New York Times. Available at https://www.nytimes.com/2018/12/14/upshot/as-labor-market-tightens-women-are-moving-into-male-dominated-jobs.html

16. See U.S. Bureau of Labor Statistics, "Median Weekly Earnings of Full-Time Wage and Salary Workers by Detailed Occupation and Sex, 2018" at http://gldr.co/21r9Jy7.

17. To calculate each industry's gender pay gap, we sum together the coefficient on male in the model and the coefficient on each industry's male x industry interaction term. Mathematically, the industry gender pay gaps represent $\beta_{industry} = \beta_{male} + \beta_{male \times industry}$. The statistical model for industry and occupation estimates corresponds to our full model with all controls, including age, education, experience, state, year, job title and company name.

18. We only report pay gaps for industries with at least 4,000 salary reports in our sample. Agriculture and Forestry, Consumer Services, and Mining and Mining & Metals were omitted due to insufficient data.

19. See, for example Farber, Silverman and von Wachter (2015), whose findings are summarized at http://gldr.co/1QEwVao.

20. Source: UK Office of National Statistics, at https://bit.ly/2BhYfrF.

21. As with U.S. salary data, we focus on base pay in our analysis, and provide figures for total compensation as an illustration only. We suggest caution in interpreting total compensation figures due to potentially large underreporting bias.

22. The sample was pulled from Glassdoor's salary database on March 1, 2019. Only full-time workers are included in the sample.

23. For our regression estimates, we remove from the sample 107 individuals (0.26 percent of the sample) who misreported earnings as less than the 2016 UK minimum wage of £3.87 per hour worked full time for 2,000 hours, or £7,740 per year (Source http://gldr.co/1TG55eh) or reported earnings totaling over £5,000,000 base pay per year or £10,000,000 total pay per year. Including these individuals does not materially affect any estimates in the study. All salaries reported as hourly wages are expressed in annual terms assuming a 2,000-hour full-time work year.

24. Percentages do not add to the total due to rounding of individual figures.

25. Source: Statistics Canada, at https://bit.ly/2TtWxO6.

26. As with U.S. salary data, we focus on base pay in our analysis, and provide figures for total compensation as an illustration only. We suggest caution in interpreting total compensation figures due to potentially large underreporting bias.

27. The sample was pulled from Glassdoor's salary database on March 1, 2019. Only full-time workers are included in the sample.

28. For our regression estimates, we remove from the sample 368 individuals (1.8 percent of the sample) who misreported earnings as less than the lowest Canadian jurisdiction minimum wage of $10.5 per hour worked full time for 2,000 hours, or $21,000 per year (Source https://bit.ly/2U7LdHL) or reported earnings totaling over $5,000,000 base pay per year or $10,000,000 total pay per year. Including these individuals does not materially affect any estimates in the study. All salaries reported as hourly wages are expressed in annual terms assuming a 2,000-hour full-time work year.

29. Percentages do not add to the total due to rounding of individual figures.

30. Source: Australia Workplace Gender Equality Agency, at https://bit.ly/2Tu5NgV.

31. As with U.S. salary data, we focus on base pay in our analysis, and provide figures for total compensation as an illustration only. We suggest caution in interpreting total compensation figures due to potentially large underreporting bias.

32. The sample was pulled from Glassdoor's salary database on March 1, 2019. Full-time workers only are included in the sample.

33. For our regression estimates, we remove from the sample 172 individuals (2.5 percent of the sample) misreporting earnings as less than the 2016 Australia minimum wage for full time workers, or A$35,400 per year (Source: https://ab.co/2FA0kl2) or reported earnings totaling over A$5,000,000 base pay per year or A$10,000,000 total pay per year. Including these individuals does not materially affect any estimates in this study. All salaries reported as hourly wages are expressed in annual terms assuming a 2,000-hour full-time work year.

34. Source: Singapore Ministry of Manpower, at https://bit.ly/2xoy7cA.

35. As with U.S. salary data, we focus on base pay in our analysis, and provide figures for total compensation as an illustration only. We suggest caution in interpreting total compensation figures due to potentially large underreporting bias.

36. The sample was pulled from Glassdoor's salary database on March 1, 2019. Full-time workers only are included in the sample.

37. For our regression estimates, we remove from the sample 2 individuals (.04 percent of the sample) who reported earnings totaling under $2,000 base pay per year or totaling over $5,000,000 base pay per year or $10,000,000 total pay per year. Including these individuals does not materially affect any estimates in this study. All salaries reported as hourly wages are expressed in annual terms assuming a 2,000-hour full-time work year.

38. Source: German Federal Statistical Office (Destatis), at https://bit.ly/2HF19eI.

39. As with U.S. salary data, we focus on base pay in our analysis, and provide figures for total compensation as an illustration only. We suggest caution in interpreting total compensation figures due to potentially large underreporting bias.

40. The sample was pulled from Glassdoor's salary database on March 1, 2019. Full-time workers only are included in the sample.

41. For our regression estimates, we remove from the sample 84 individuals (1.8 percent of the sample) misreporting earnings as less than the 2016 Germany minimum wage for full time workers, or €17,000 per year (Source: https://bit.ly/2HUXB7l) or reported earnings totaling over €5,000,000 base pay per year or €10,000,000 total pay per year. Including these individuals does not materially affect any estimates in this study. All salaries reported as hourly wages are expressed in annual terms assuming a 2,000-hour full-time work year.

42. Source: European Union's Eurostat, at https://bit.ly/2UbpX3M.

43. As with U.S. salary data, we focus on base pay in our analysis, and provide figures for total compensation as an illustration only. We suggest caution in interpreting total compensation figures due to potentially large underreporting bias.

44. The sample was pulled from Glassdoor's salary database on March 1, 2019. Full-time workers only are included in the sample.

45. For our regression estimates, we remove from the sample 134 individuals (3.9 percent of the sample) misreporting earnings as less than the 2016 France minimum wage of €9.67 per hour worked at 2,000 hours per year, or €19,340 per year (Source: France National Institute of Statistics and Economic Studies, at https://bit.ly/2BSiWYI). Including these individuals does not materially affect any estimates in this study. All salaries reported as hourly wages are expressed in annual terms assuming a 2,000-hour full-time work year.

46. Source: European Union's Eurostat, at https://bit.ly/2UbpX3M.

47. As with U.S. salary data, we focus on base pay in our analysis, and provide figures for total compensation as an illustration only. We suggest caution in interpreting total compensation figures due to potentially large underreporting bias.

48. The sample was pulled from Glassdoor's salary database on March 1, 2019. Full-time workers only are included in the sample.

49. For our regression estimates, we remove from the sample 48 individuals (1.9 percent of the sample) misreporting earnings as less than the 2016 Netherlands minimum wage of €18,444 per year (Source: International Labour Organization, at https://bit.ly/2Yo9NmY). Including these individuals does not materially affect any estimates in this study. All salaries reported as hourly wages are expressed in annual terms assuming a 2,000-hour full-time work year.

50. Babcock and Laschever (2003) and Bowles et al. (2007) find that women are less likely to ask for raises. In contrast, Gerhart and Rynes (1989), Belliveau (2012) and Artz, Goodall and Oswald (2018) find that men and women are equally likely to ask for raises.

51. Past research has suggested salary transparency alone may not be sufficient to close the salary confidence gap. Martin (1989) found that providing an industry-level salary estimate did not close the gap, but we argue that an industry-level estimate is too vague to be useful. In contrast, Schweitzer, Lyons, Kuron and Ng (2014) found that women rely on information from same-sex role models or comparators more than men which may propagate pay gaps and, thus, suggest that more accurate salary information may, in fact, help equalize salary expectations.

52. For an overview of research on how salary transparency affects gender pay differences, see Chamberlain (2015)

About Glassdoor

Glassdoor combines all the latest jobs with millions of reviews and insights to make it easy for people to find a job that is uniquely right for them. The company is on a mission to help people everywhere find a job and company they love. In pursuit of this mission, Glassdoor helps employers hire truly informed candidates at scale through effective recruiting solutions like job advertising and employer branding products. Launched in 2008, Glassdoor now has reviews and insights for more than 900,000 companies located in more than 190 countries. For more information, visit glassdoor.com.

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Addendum 2

The Pipeline Problem: How College Majors Contribute to the Gender Pay Gap

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and

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Executive Summary

- In the 2016 study, *Demystifying the Gender Pay Gap*, Glassdoor Economic Research found that the biggest cause of today's gender pay gap is that men and women sort into different jobs — men into higher-paying positions and women into traditionally lower-paying jobs.

- In this study, we dig deeper into this "pipeline problem" by taking a step backward in time to study how college majors affect career paths and pay later on.

- During college, men and women gravitate toward different majors, often due to societal pressures. This puts men and women on different career tracks — with different pay — after college. How does this contribute to America's gender pay gap?

- Using a unique dataset of more than 46,900 resumes shared on Glassdoor, we illustrate how men and women sorting into different college majors translates into gender gaps in careers and pay later.

- Many college majors that lead to high-paying roles in tech and engineering are male dominated, while majors that lead to lower-paying roles in social sciences and liberal arts tend to be female-dominated, placing men in higher-paying career pathways, on average.

    - The most male-dominated majors are Mechanical Engineering (89 percent male), Civil Engineering (83 percent male), Physics (81 percent male), Computer Science and Engineering (74 percent male), and Electrical Engineering (74 percent male).

    - The most female-dominated majors are Social Work (85 percent female), Healthcare Administration (84 percent female), Anthropology (80 percent female), Nursing (80 percent female), and Human Resources (80 percent female).

- Nine of the 10 highest paying majors we examined are male-dominated. By contrast, 6 of the 10 lowest-paying majors are female-dominated.

- Even within the same major men and women often end up on different career tracks, resulting in a pay gap that could follow them for a lifetime. In our sample, across the 50 most common majors, men and women face an 11.5 percent pay gap on average in the first five years of their careers.

    - Majors leading to the largest pay gaps favoring men include Healthcare Administration (22 percent pay gap), Mathematics (18 percent pay gap) and Biology (13 percent pay gap).

    - Majors leading to the largest pay gaps favoring women — a reverse pay gap — include Architecture (-14 percent pay gap), Music (-10.1 percent pay gap) and Social Work (-8.4 percent pay gap).

- Choice of college major can have a dramatic impact on jobs and pay later on. Our results suggest that gender imbalances among college majors are an important and often overlooked driver of the gender pay gap.

I. Introduction

For many people, college is a time for personal growth and exploration. However, it's also a time that affects future careers. The choice among college majors can have a dramatic impact on jobs and pay in the years after graduation. While many think of choosing a college major as an expression of personal interests and values, it's also a practical financial decision — one with implications for a lifetime of work and earnings.

Many college majors are divided by gender. For a variety of reasons, men and women tend to cluster into different fields in college. For example, in 2014 women earned 57 percent of all bachelor's degrees granted in America,[1] but earned just 9 percent of degrees in Construction Management. By contrast, women earn 89 percent of degrees in Occupational Therapy today, compared to just 11 percent earned by men.

This gender divide among college majors effectively places men and women on different career tracks early in life. Although college majors certainly don't completely determine careers, differences in skills and training imparted by different college majors clearly affects which career doors are open or closed after graduation — skills like coding, knowledge of financial principles, written communication, engineering methods, statistical theory, best practices of design, and more.

Because men and women systematically sort into different college majors, they experience different early career paths, which pay differently. These pay differences in turn reveal themselves as major contributors to the well-documented gap between male and female pay in the labor market. Because the choice of college major affects job prospects and pay later on, choosing a field of study goes far beyond an expression of personal preference; it is also a decision that affects America's persistent gender pay gap.

In 2016, Glassdoor published a study showing a significant gender pay gap around the world.[2] In each country we examined, men earned more than women on average, both before and after adding statistical controls to make an apples-to-apples comparison between similar male and female workers, including age, education, job title, company, industry and other factors. On average, men in the U.S. earn about 24.1 percent higher base pay than women, and a gender pay gap of 5.4 percent remains even after statistically controlling for all observable differences between workers.

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[1] See National Center for Education Statistics, "Table 318.30. Bachelor's, Master's, and Doctor's Degrees Conferred by Postsecondary Institutions, by Sex of Student and Discipline Division: 2013-14." Available at https://nces.ed.gov/programs/digest/d15/tables/dt15_318.30.asp.

[2] Andrew Chamberlain (March 2016), "Demystifying the Gender Pay Gap: Evidence from Glassdoor Salary Data," Glassdoor Economic Research report. Available at https://www.glassdoor.com/research/studies/gender-pay-gap/.

What's causing that gender pay gap? In our study, we found the largest single factor that explains the 24.1 percent adjusted gender pay gap in the U.S. is *occupation and industry sorting of men and women* into different jobs that pay differently throughout the economy. For example, men tend to disproportionately work in high-paying executive roles, while women are over-represented among lower-paying retail positions. In the U.S., this type of occupational sorting explains about 54 percent of the overall gender pay gap — more than half the observed difference between men and women's pay.

In this study we examine an important part of the "pipeline" cause of the occupational sorting of men and women into different roles in the economy: Gender differences in college major. Using a large database of resumes shared on Glassdoor, we examine the gender, college major, and early career paths of more than 46,900 resumes from individuals who finished college between 2010 and 2017.[3] We then estimated pay for each post-college job using Glassdoor salary data. This provides a unique data set that shows the complete link between gender, choice of college major, and differences in male and female pay later on.

The remainder of this study is organized as follows. In Section II, we illustrate how the choice of college major affects pay with some examples. In Section III, we describe our data set. Section IV shows which college majors are most gender divided. Section V shows the most common jobs for each college major. Section VI connects career paths with pay to show the highest and lowest paying college majors. Section VII illustrates how men and women cluster into differently paying majors, fueling the gender pay gap. Section VIII notes some limitations of our data. Finally, Section IX summarizes what our results mean for job seekers, employers and universities.

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[3] All names and other personally identifying information were removed from resumes before access by our researchers. No personally identifying information of any kind was used in this research.

II. Pathways from College to Jobs

How does the choice of college major affect pay? In Figure 1, we illustrate how we think about the pipeline from college majors to jobs and compensation in this study. It illustrates a stylized choice between two popular college majors: Accounting and Communications. For each major, we've shown three of the most common jobs people go into during their first five years in the labor market after graduation, as well as the estimated median base pay for each job based on Glassdoor salary data.

For Accounting majors, common jobs during the first five years after graduation include financial analyst, accountant, and auditor. Median base pay for these jobs ranges from $54,714 to $61,853, for an average of pay of $57,242 per year. For Communications majors, typical career paths after college include social media manager, marketing coordinator, and account manager. Median base pay for these jobs ranges from $46,408 to $54,560 per year, for an average pay of $50,268 per year. Between the two majors, there's a roughly $7,000 per year difference in typical earnings.

If men and women choose Accounting and Communications majors equally in college, there will be no average difference in pay between men and women after graduation. However, if the gender balance tips in favor of one or the other, men and women are placed on different career paths with different pay. In the extreme case of *all* women majoring in Accounting while all men choose Communications, average post-graduation pay would reveal a gender gap of $6,974 or 13.9 percent in favor of women. This is the basic connection between gender, choice of college major, and pay that we examine in this study.

While the example in Figure 1 is hypothetical, research shows the impact of college majors on pay is real. In 2011, a study from the Center on Education and the Workforce at Georgetown University explored differences in earnings for 171 college majors in the U.S.[4] They found wide gaps in median pay among different college majors, ranging from $29,000 per year earned by Counseling Psychology majors to $120,000 per year earned by Petroleum Engineering majors. These vast differences in pay among college majors mean small differences in the gender balance within majors can lead to large gender pay gaps later on.

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[4] Anthony Carnevale, Jeff Strohl and Michelle Melton (2011). "What's It Worth? The Economic Value of College Majors," Center on Education and the Workforce at Georgetown University. Available at https://cew.georgetown.edu/wp-content/uploads/2014/11/whatsitworth-complete.pdf.

FIGURE 1. How College Majors Affect Career Paths and Pay

ACCOUNTING MAJOR | **COMMUNICATIONS MAJOR**

Average Pay:
$57,242

Financial Analyst
$61,853

Accountant
$54,714

Auditor
$55,159

Social Media Manager
$49,837

Marketing Coordinator
$46,408

Account Manager
$54,560

Average Pay:
$50,268
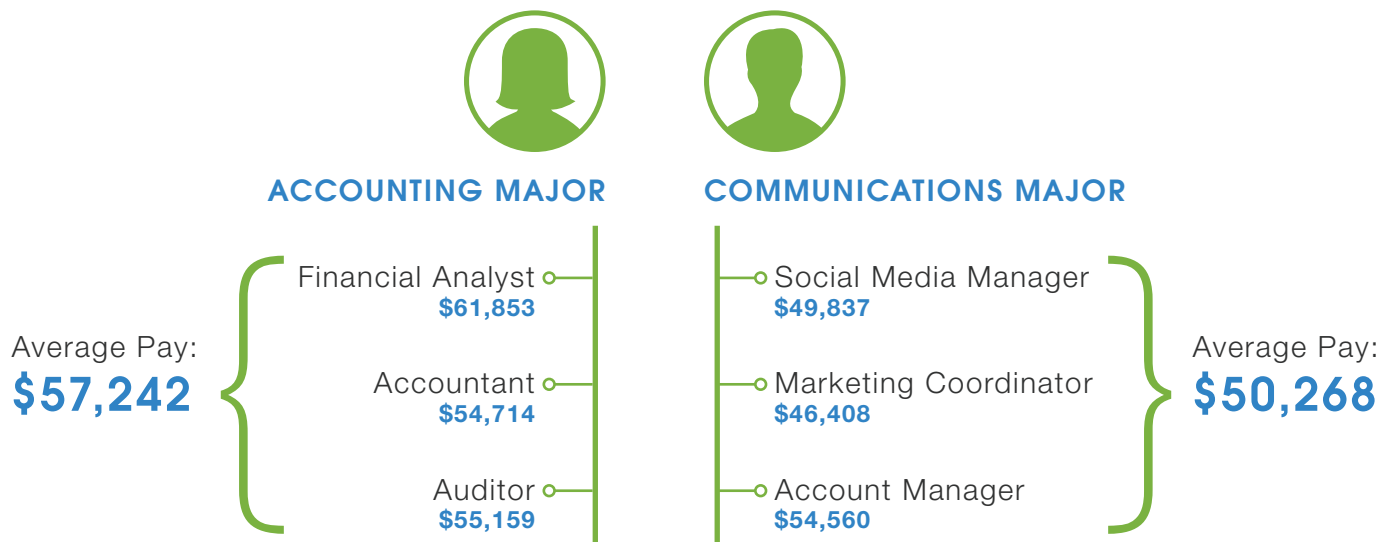
Note: Annual base salaries are as of February 2017 based on Glassdoor data.
Source: Glassdoor Economic Research (glassdoor.com/research)

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WHAT DRIVES CHOICE OF MAJOR?

One question that immediately arises is: What factors influence men and women to choose different college majors? While it may be tempting to describe the choice among college majors as a purely individual choice by students, research paints a more complex picture. Studies show that many broader social factors also influence the gender patterns we see among college majors.

For example, research shows that early academic preparation in elementary and high school has a powerful effect on the choice of college majors by men and women. A 2017 study published in the academic journal *Labour Economics* found that differences in college preparation account for many gender disparities by major, including "two-thirds of the gap in science, half of the gap in humanities, and almost half of the gap in engineering."[5]

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[5] See Jamin Speer (2017), "The Gender Gap in College Major: Revisiting the Role of Pre-College Factors," Labour Economics, Vol. 44 No.1. Available at http://www.sole-jole.org/16332.pdf.

Other research points to broader social norms as a factor driving men and women into different fields of study. A 2012 study published in the *Journal of Human Resources* found that gaining parents' approval played a key role in gender differences among majors.[6] The study also found that "males and females differ in their preferences in the workplace, with males caring about the [monetary] outcomes in the workplace much more than females." These factors are clearly influenced by broader gender norms in society, not just the personal choice of individual students.

In reality, gender differences among college majors reflect many factors beyond a simple individual choice by students. Instead, they reflect a complex mixture of pre-college preparation, social norms regarding gender and work, and the preferences of male and female students and their families.

SELECTION BIAS OR COLLEGE PREPARATION?

One criticism often made of studies that link the choice of college major to pay is that they suffer from *selection bias*.

When it comes to picking college majors, students are not randomly assigned — they sort themselves into majors. If "high ability" students cluster in certain fields, those majors will earn high pay in the labor market later. But that high pay isn't just because of the skills and training students received from their college major — it's because of the underlying high ability of the students who chose that field.

Economists call this type of bias *selection on unobservables*. It makes it difficult to study the causal impact of picking a college major on earnings, because it's not possible to untangle how the choice of college major affects pay, separately from the impact of a student's underlying ability.

In this study, we're able to partly avoid this concern by separately estimating career paths and pay. That is, first we map the jobs each person worked at after college from resumes. We then independently estimate the market value of those jobs. That helps remove some of the selection bias in pay due to unobserved high or low ability of any particular student. Although we're not able to completely overcome selection bias concerns, this approach helps to mitigate them

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[6] See Basit Zafar (2012), "College Major Choice and the Gender Gap," Journal of Human Resources, Vol. 48, No. 3. Available at http://jhr.uwpress.org/content/48/3/545.refs.

III. How We Built the Data

In this study, we focus on the labor market experiences of recent college grads in the United States. From a large database of resumes shared anonymously on Glassdoor, we extracted a sample of 46,934 individual resumes that listed at least a college degree, such as a B.A., B.S. or similar degree. We restricted our sample to individuals who completed college between January 1, 2010 and January 31, 2017, and only to jobs started within the first five years after graduation. Some students went on to grad school during this period, and some did not — we include everyone, and all the jobs they list on resumes during the first five years after college.

Using Glassdoor salary data, we then estimated the median base pay for each job along graduates' early career paths. Because our sample consists of workers with five or fewer years of experience, we only use salary reports on Glassdoor from users who reported five or fewer years of relevant work experience for our estimates. From this sample of 824 U.S. college majors, we then restricted our analysis to the top 50 most common college majors in the data.

Table 1 shows summary statistics for the data. The file contains in 78,031 observations of college major and work experience from 46,934 unique resumes, representing workers in 719 U.S. metro areas working in 2,253 job titles.

TABLE 1. Summary of the Data Used in this Study

Education Time Period	Individuals completing college between January 1, 2010 and January 31, 2017
Work Time Period	Jobs started within five years of college graduation
College Majors in Sample	824, from which 50 most common were selected
Unique Resumes in Top 50 Majors	46,934
Observations of Work and College Degree in Top 50 Majors	78,031
Unique Job Titles Represented	2,253
U.S. Metro Locations Represented	719

Source: Glassdoor Economic Research (glassdoor.com/research)

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MOST COMMON COLLEGE MAJORS

Figure 2 shows the most common college majors in the sample. According to figures from the National Center for Education Statistics, Business was the most popular U.S. college major during the 2014-15 academic year.[7] In that year, U.S. colleges and universities granted a total of 363,799 undergraduate Business degrees. Business was also the most common college major listed in our sample of resumes, comprising 11.3 percent or 8,837 observations in our sample.

The second most common major in our sample was Computer Science and Engineering, which made up 7,769 observations or 10.0 percent of our sample. That was followed by Psychology (5,880 observations or 7.5 percent), Electrical Engineering (5,206 observations or 6.7 percent), Mechanical Engineering (3,592 observations or 4.6 percent), and Communications (3,338 observations or 4.3 percent).

The least common major among the 50 we examined was Kinesiology (227 observations or 0.3 percent), followed by Music (278 observations or 0.4 percent), Statistics (316 observations or 0.4 percent), Architecture (317 observations or 0.4 percent), and Spanish (319 observations or 0.4 percent). A complete list of the 50 majors we examined in this study is available in the Appendix.

FIGURE 2. 25 Most Common College Majors in Our Sample

Major	Observations
Business	8,837
Computer Science and Engineering	7,769
Psychology	5,880
Electrical Engineering	5,206
Mechanical Engineering	3,592
Communications	3,338
Marketing	3,334
Information Technology	3,069
Economics	2,991
Finance	2,967
Accounting	2,677
Biology	2,630
English	2,361
Political Science	2,031
Criminal Justice	1,480
Sociology	1,454
Mathematics	1,334
History	1,186
Nursing	1,015
Civil Engineering	968
Chemical Engineering	862
Chemistry	851
Human Resources	806
Journalism	800
Public Relations	714

Source: Glassdoor Economic Research (glassdoor.com/research)

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7   See National Center for Education Statistics, Table 322.10, "Bachelor's Degrees Conferred by Postsecondary Institutions, By Field of Study: Selected Years, 1970-71 Through 2014-15."
    Available at https://nces.ed.gov/fastfacts/display.asp?id=37.

IV. Gender Divide by College Major

For a variety of reasons, men and women gravitate toward different college majors. In Figure 3, we show the 15 most male-dominated college majors in our sample. For each major, the percentage of males in our sample is shown in blue, while the percentage of females is shown in green.

The most male-dominated college major in our sample was Mechanical Engineering. In that major, 89 percent of bachelor's degrees were earned by men, compared to just 11 percent by women. That was followed by Civil Engineering (83 percent male, 17 percent female), Physics (81 percent male, 19 percent female), Computer Science and Engineering (74 percent male, 26 percent female), and Electrical Engineering (74 percent male, 26 percent female).

FIGURE 3. 15 Most Male-Dominated College Majors
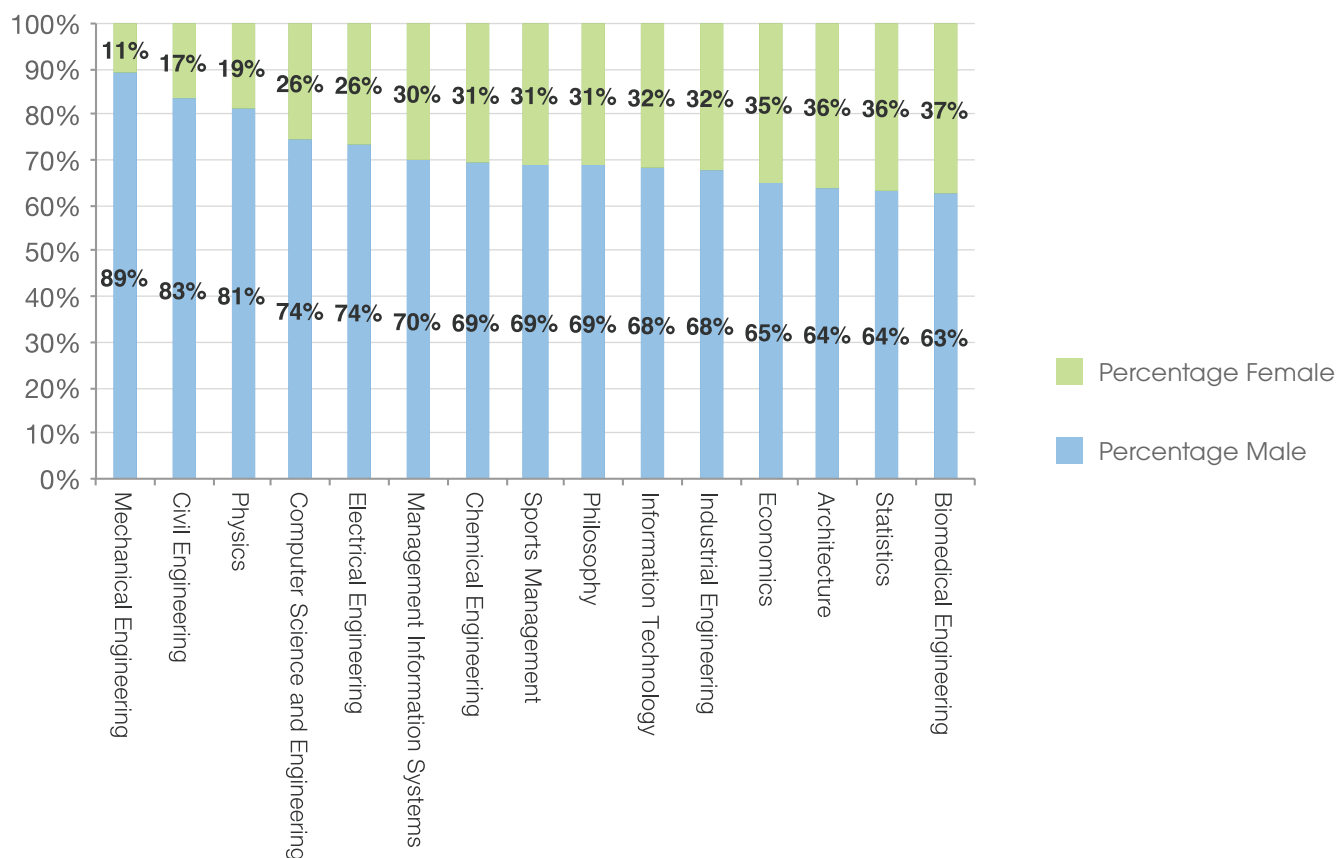
Source: Glassdoor Economic Research (glassdoor.com/research)

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In Figure 4, we show the 15 most female-dominated college majors in our sample. The college major with the largest share of women in our sample was Social Work, with 85 percent of bachelor's degrees earned by women, compared to 15 percent by men. That was followed by Healthcare Administration (16 percent male, 84 percent female), Anthropology (20 percent male, 80 percent female), Nursing (20 percent male, 80 percent female) and Human Resources (20 percent male, 80 percent female).

FIGURE 4. 15 Most Female-Dominated College Majors
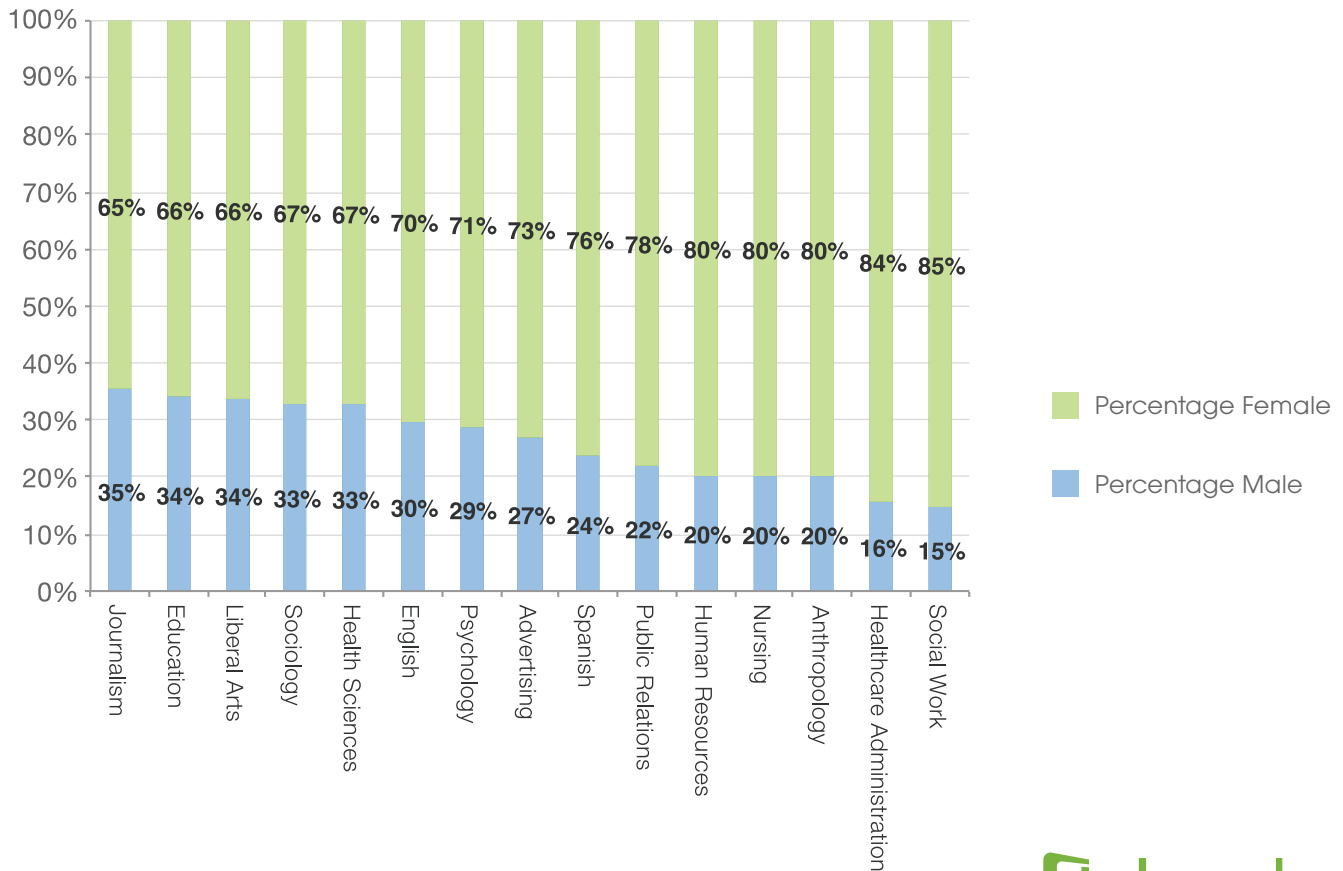
Source: Glassdoor Economic Research (glassdoor.com/research)

It is a well-known fact that women today are underrepresented in many fast-growing science, technology, engineering and mathematics (STEM) fields.[8] According to a 2010 study by the American Association of University Women (AAUW), "men outnumber women in nearly every science and engineering field, and in some, such as physics, engineering, and computer science, the difference is dramatic."

As we illustrate in the sections below, this under-representation of women among STEM majors in turn helps fuel the gender differences in jobs and pay we observe in the broader U.S. labor market.

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[8]   See for example, Catherine Hill, Christianne Corbett, and Andresse St. Rose (2010). "Why So Few? Women in Science, Technology, Engineering and Mathematics," American Association of University Women (AAUW) research report. Available at http://www.aauw.org/resource/why-so-few-women-in-science-technology-engineering-mathematics/.

V. Job Pathways by College Major

Which major we choose in college helps determine what career doors are open or closed during the early years after graduation. In this section, we show the most common jobs students from each major work in during the first five years of their careers — illustrating how choosing among different majors places workers on sharply different career tracks.

A. MOST COMMON JOBS BY MAJOR

In Table 2, we show the 25 most common college majors in our sample. For each major, the columns show the five most common job titles worked in during the first five years after graduation, along with the percentage of our sample who held each type of job.

For some majors, jobs are closely linked to college coursework. For example, the most common job for Computer Science and Engineering majors is software engineer, with 17 percent working in that role during the first five years after college. Similarly, the most common job for Nursing majors is registered nurse (31 percent), while the most common role for Human Resources majors is HR assistant (10 percent).

By contrast, some majors work in jobs not closely related to coursework. For example, the most common job for Communications majors is account executive (3 percent), which is typically a sales role. Similarly, the most common job for History majors is manager (3 percent) — a general business role — while the most common job for Sociology majors is intern (4 percent).

TABLE 2. Most Common Jobs After College for the Top 25 Majors

← **Most** Common Jobs   **Least** Common Jobs →

Major Field of Study	FIRST		SECOND		THIRD		FOURTH		FIFTH	
	Job Title	%	Job Title	%	Job Title	%	Job Title	%	Job Title	%
Business	Manager	2%	Account Manager	2%	Admin. Assistant	2%	Operations Manager	2%	Sales Associate	1%
Computer Science and Engineering	Software Engineer	17%	Software Developer	7%	Systems Engineer	4%	Teaching Assistant	4%	Research Assistant	3%
Psychology	Mental Health Counselor	2%	Intern	2%	Research Assistant	2%	Case Manager	2%	Manager	2%
Electrical Engineering	Software Engineer	8%	Research Assistant	6%	Systems Engineer	6%	Teaching Assistant	5%	Engineer	3%
Mechanical Engineering	Mechanical Engineer	9%	Research Assistant	7%	Engineer	6%	Design Engineer	6%	Teaching Assistant	4%
Communications	Account Executive	3%	Social Media Manager	3%	Admin. Assistant	3%	Account Manager	2%	Marketing Coordinator	2%
Marketing	Account Manager	3%	Marketing Coordinator	2%	Account Executive	2%	Manager	2%	Marketing Manager	2%
Information Technology	Software Engineer	9%	Software Developer	5%	Systems Engineer	4%	Web Developer	2%	Research Assistant	2%
Economics	Financial Analyst	4%	Analyst	3%	Intern	3%	Manager	2%	Research Assistant	2%
Finance	Financial Analyst	6%	Analyst	3%	Intern	3%	Accountant	2%	Associate	2%
Accounting	Accountant	15%	Tax Accountant	2%	Accounting Manager	2%	Financial Analyst	2%	Auditor	2%
Biology	Research Assistant	4%	Lab Technician	3%	Teaching Assistant	2%	Pharmacy Technician	2%	Lab Assistant	2%
English	Editor	2%	Sales Associate	2%	Social Media Manager	2%	Teaching Assistant	2%	Admin. Assistant	1%
Political Science	Law Clerk	3%	Intern	2%	Account Executive	2%	Manager	2%	Account Manager	2%
Criminal Justice	Security Officer	3%	Customer Service Rep.	3%	Case Manager	2%	Admin. Assistant	2%	Manager	1%
Sociology	Intern	4%	Manager	3%	Admin. Assistant	2%	Sales Associate	2%	Customer Service Rep.	2%
Mathematics	Teaching Assistant	6%	Research Assistant	6%	Data Analyst	5%	Intern	3%	Software Developer	2%
History	Manager	3%	Intern	2%	Sales Associate	2%	Customer Service Rep.	2%	Account Executive	1%
Nursing	Registered Nurse	31%	Nurse Practitioner	8%	Nursing Manager	5%	Case Manager	4%	Registered Nurse Case Manager	2%
Civil Engineering	Project Engineer	8%	Engineer	8%	Civil Engineer	7%	Research Assistant	6%	Structural Engineer	5%
Chemical Engineering	Process Engineer	9%	Research Assistant	8%	Teaching Assistant	6%	Engineer	4%	Project Engineer	3%
Chemistry	Research Assistant	5%	Teaching Assistant	4%	Chemist	4%	Lab Technician	3%	Researcher	3%
Human Resources	HR Assistant	10%	HR Generalist	8%	HR Coordinator	5%	Recruiter	5%	Corporate Recruiter	2%
Journalism	Editor	3%	Social Media Manager	3%	Writer	2%	News Reporter	2%	Admin. Assistant	2%
Public Relations	Account Manager	4%	PR	4%	Marketing Coordinator	4%	Intern	4%	Social Media Manager	3%

Note: Most common jobs after college are restricted to jobs held within five years of graduation.
This report uses job title normalization, which groups similar job titles.
Source: Glassdoor Economic Research (glassdoor.com/research)

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Many college majors in Table 2 list "teaching assistant" and "research assistant" as a common job on resumes during the first five years after college. Why is this?

Most of these are students who enrolled in graduate school during that period. It's common for students in Master's and Doctorate programs to work as teaching and research assistants, law clerks, or other grad-school related jobs while completing their coursework.

The college majors with the highest fraction of teaching and research assistants indicates a bigger share of those majors go on to grad school during the first five years after college. In our study, we include all jobs listed in the five years after college, and include both students who go directly to grad school and those who find jobs in the ordinary labor market.

B. NETWORKS OF JOBS AND MAJORS

One useful way of visualizing the figures from Table 2 is as a *network* between majors and jobs, showing the differences and similarities in the types of work done by different college majors.

Figure 5 shows a simple visualization of how three common engineering majors lead to different career paths: Computer Science and Engineering, Electrical Engineering, and Civil Engineering. In the figure, college majors are shown as squares. The lines connecting majors to jobs are labeled with the percentage who worked in each job in our sample.

Students who choose Computer Science and Engineer and Electrical Engineering majors have many common career paths. For example, between 14 percent and 21 percent of these majors work as software engineers and systems engineers after college. However, these types of tech roles are less common among Civil Engineering majors, who instead often work in roles like civil engineer, project engineer and structural engineer. A common theme among all three majors is they send a significant fraction of students on to graduate school, with between 6 percent and 11 percent working as research or teaching assistants after college.

FIGURE 5. Network of Most Common Jobs for Engineering Degrees

Software Developer

COMPUTER SCIENCE AND ENGINEERING

7%

Civil Engineer
Project Engineer
Structural Engineer

Software Engineer
Systems Engineer

21%

14%

7%

20%

ELECTRICAL ENGINEERING

11%

Research Assistant
Teaching Assistant

6%

Grad School

CIVIL ENGINEERING

3%

Engineer

8%
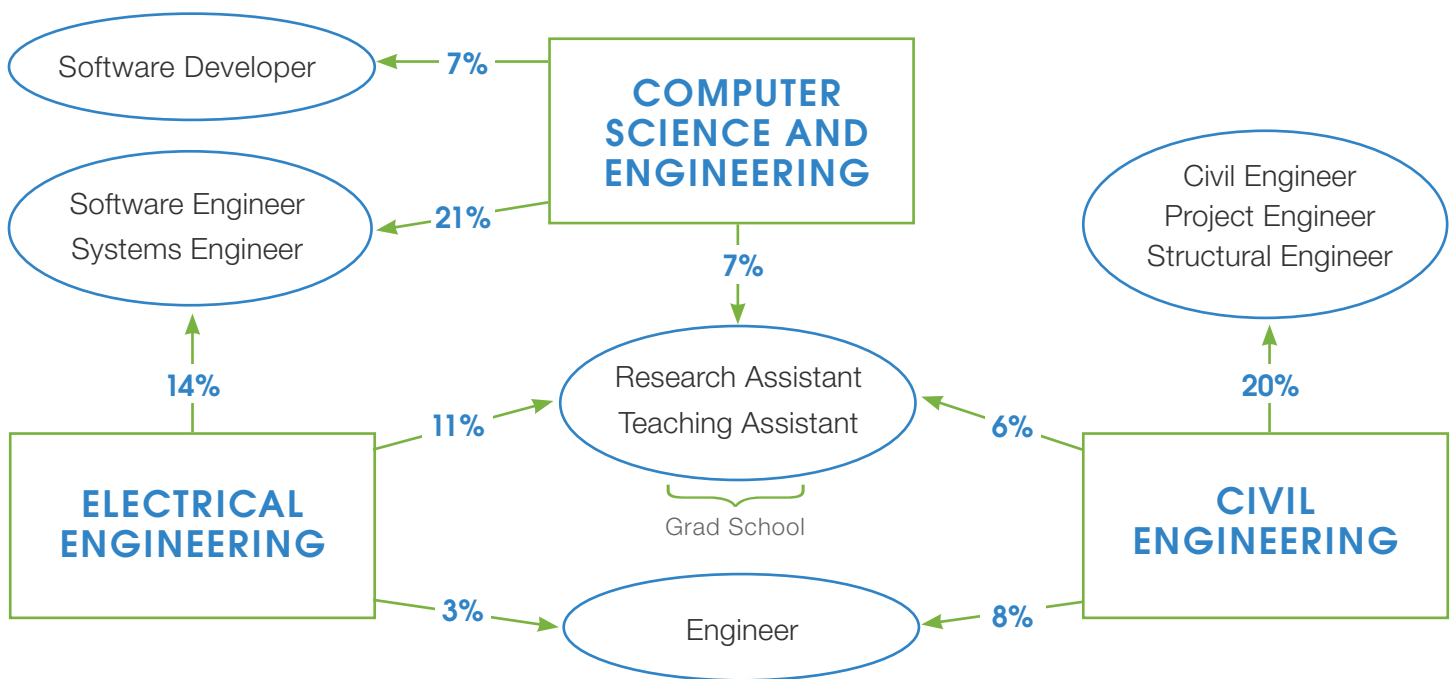
Source: Glassdoor Economic Research (glassdoor.com/research)

Figure 6 shows a similar visualization of common jobs for three non-engineering majors: Business, Psychology, and Economics. A common job path for all three majors is manager, a general business role that attracts about 2 percent of students from each. Each major has their own unique job paths as well. Among Economics majors, 7 percent work in financial occupations like financial analyst. Business majors tend to work in sales-related roles, with 7 percent working in sales associate, account manager, or other operations and administrative roles. By contrast, 4 percent of Psychology majors find jobs as mental health counselors and case managers — a role that is uncommon for the other two majors.

FIGURE 6. Network of Most Common Jobs for Business, Economics and Psychology
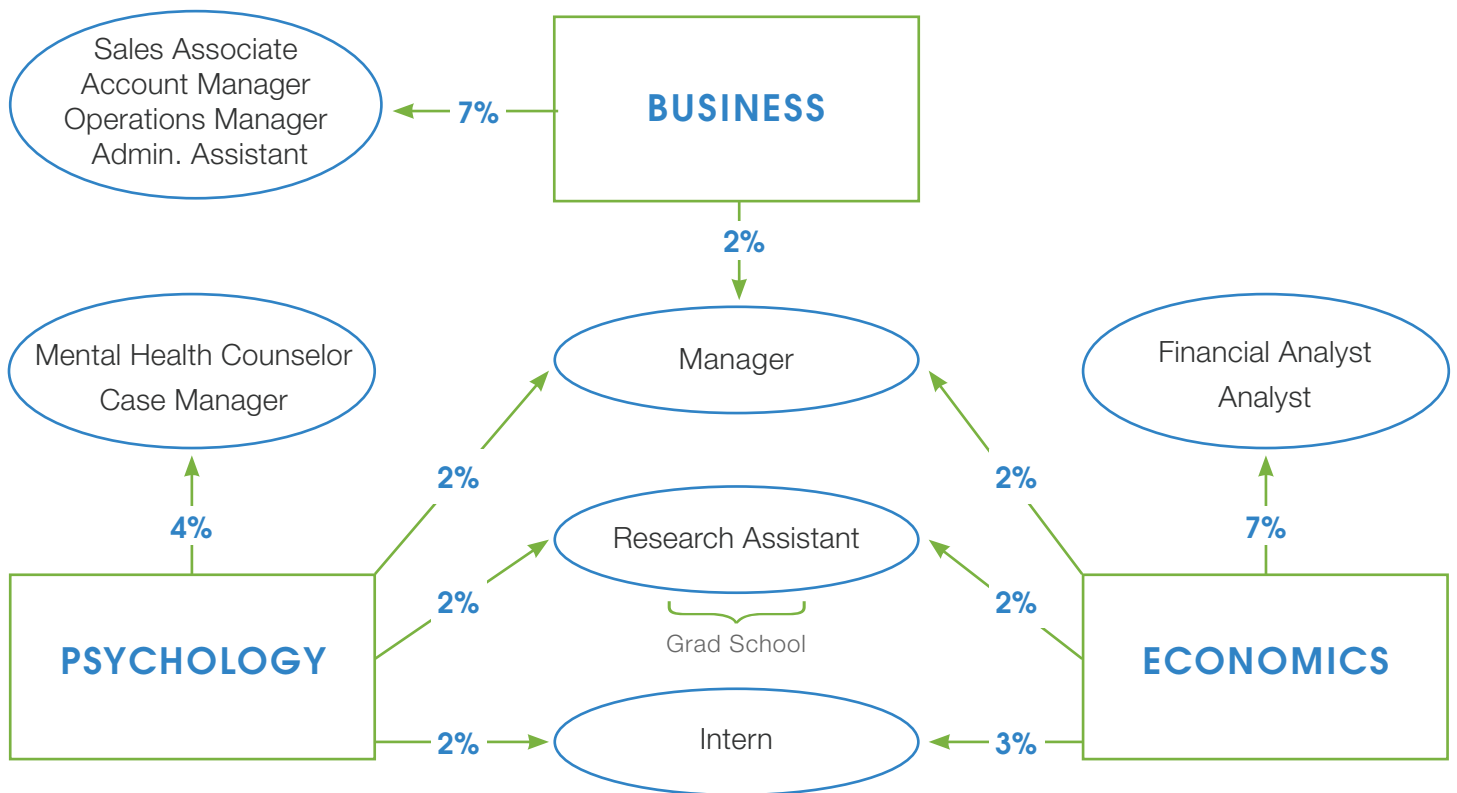
Source: Glassdoor Economic Research (glassdoor.com/research)

C. MOST SPECIALIZED COLLEGE MAJORS

As is clear from the previous section, some college majors are specialized and prepare students for a few narrow jobs after graduation. Others are more general, with students working in a variety of jobs after graduation. To quantify this idea, we calculated an index of the most and least "clustered" college majors in terms of the variety of jobs students are likely to work in after graduation.[9]

This can be thought of as a measure of "uncertainty" facing students about their post-graduation career paths and pay. If college majors are tightly clustered into just a few jobs, students can be fairly sure what they'll end up doing for work after college. If instead majors are widely spread among many types of jobs, there is more uncertainty after college about what your career path and pay will be.

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[9] The degree of concentration of college degree holders among jobs is measured using a standard Herfindahl-Hirschman index (HHI). More information about HHI indices is available at https://www.justice.gov/atr/herfindahl-hirschman-index.

In Figure 7, we show the 15 most "job concentrated" college majors in our sample. The most concentrated major is Nursing, with students disproportionately working in directly related jobs such as registered nurse, nurse practitioner and nursing manager. The second most concentrated major was Graphic Design, with most students working in related jobs like graphic designer, web designer and art manager. Other concentrated majors with relatively clear career paths include Computer Science and Engineering, Civil Engineering and Statistics.

FIGURE 7. 15 College Majors with the Clearest Career Paths
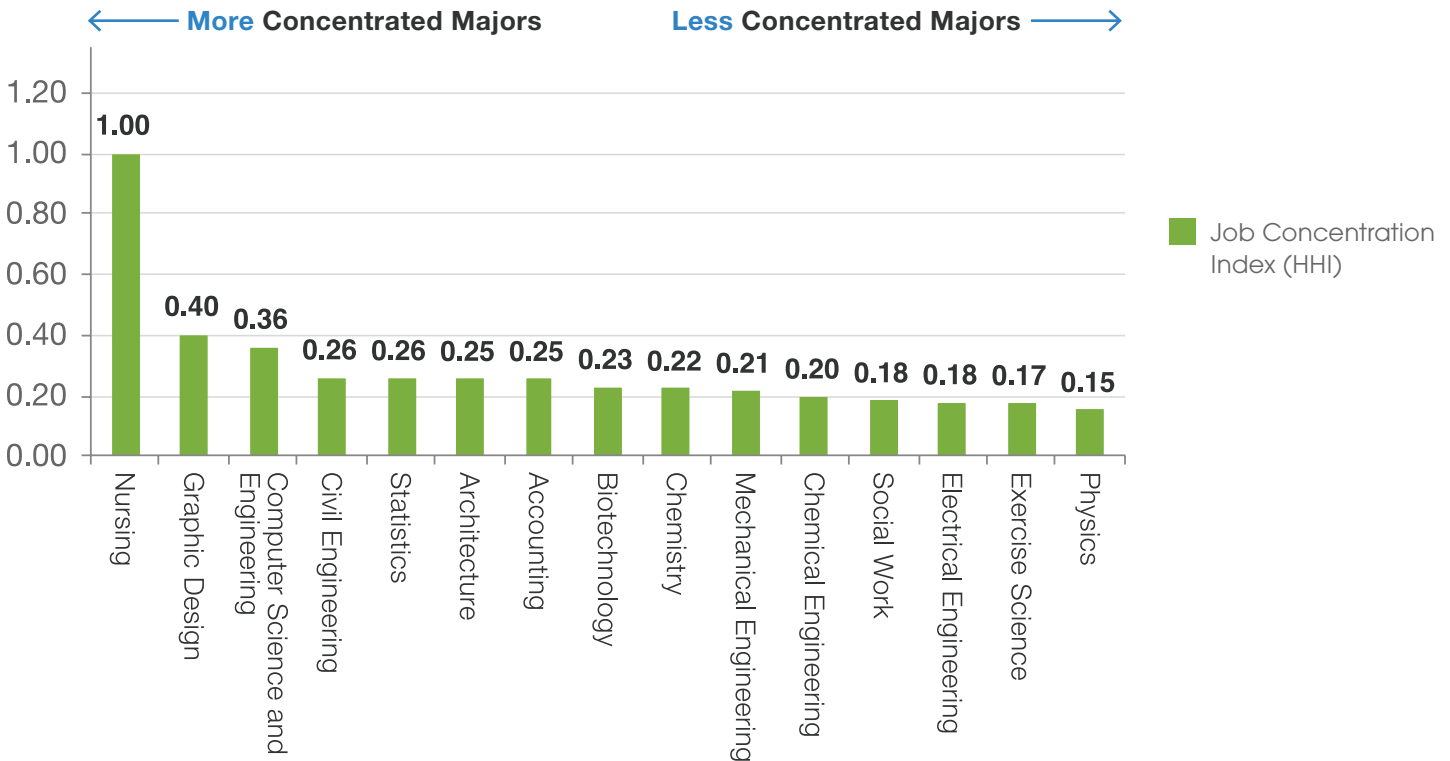
⟵ **More** Concentrated Majors   **Less** Concentrated Majors ⟶

Nursing	Graphic Design	Computer Science and Engineering	Civil Engineering	Statistics	Architecture	Accounting	Biotechnology	Chemistry	Mechanical Engineering	Chemical Engineering	Social Work	Electrical Engineering	Exercise Science	Physics
1.00	0.40	0.36	0.26	0.26	0.25	0.25	0.23	0.22	0.21	0.20	0.18	0.18	0.17	0.15

Job Concentration Index (HHI)

Note: Concentration index is based on a Herfindahl-Hirschman index with the scale normalized such that Nursing = 1.0.
Source: Glassdoor Economic Research (glassdoor.com/research)

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In Figure 8, we show the least concentrated college majors. The least concentrated was Philosophy, followed by English, Business, History and Sociology. In each case, graduates from these majors worked in a wide variety of jobs after college — likely reflecting the general nature of most coursework in these degree programs — rather than clustering in a few related occupations. From the standpoint of future careers and pay, these college majors present a lot of uncertainty to students.

FIGURE 8. 15 College Majors with the Least Clear Career Paths

More Concentrated Majors ⟵   Less Concentrated Majors ⟶

	■ Job Concentration Index (HHI)

Criminal Justice — 0.04
Marketing — 0.04
Journalism — 0.03
Anthropology — 0.03
International Relations — 0.03
Communications — 0.03
Political Science — 0.03
Liberal Arts — 0.03
Healthcare Administration — 0.03
Psychology — 0.02
Sociology — 0.02
History — 0.02
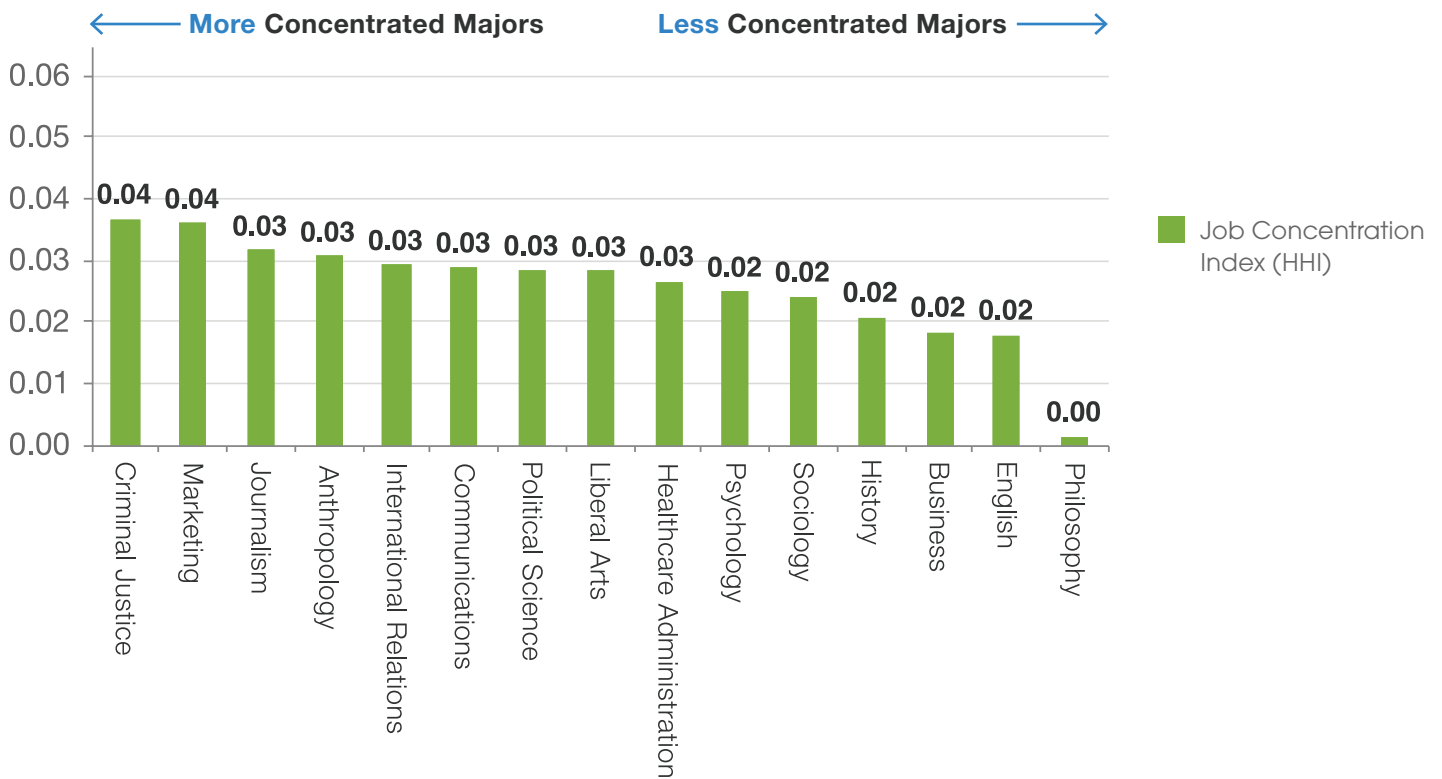Business — 0.02
English — 0.02
Philosophy — 0.00

Note: Concentration index is based on a Herfindahl-Hirschman index with the scale normalized such that Nursing = 1.0.
Source: Glassdoor Economic Research (glassdoor.com/research)

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D. WHAT MAJORS LEAD TO EACH JOB?

Just as some college majors lead to a few specific jobs, some jobs attract most candidates from specific majors. This is important for students to understand upfront — if aiming for a particular career path after college, it's helpful to know which college major is mostly likely to lead to it.

In Table 3, we show a list of 25 popular jobs and the most common college majors found in each. In some cases, the pathway into jobs is clearly linked to the choice of college major. For registered nurse jobs, 75 percent of our sample held a degree in Nursing. Similarly, for jobs as mechanical engineers, 70 percent held Mechanical Engineering degrees, while 48 percent of jobs as software engineers were held by those with degrees in Computer Science and Engineering. For those looking for careers in these in-demand roles, the choice of college major really matters.

By contrast, some jobs in Table 3 are open to a variety of college majors. Those working as teachers in our sample were drawn relatively evenly from Psychology, English, Mathematics, and other majors. Similarly, jobs as sales associate were common for Business, Marketing, Biology and many other majors. In these roles, because job requirements are not closely linked to specialized skills from a particular major, the choice of college major plays a minor role.

TABLE 3. Most Frequent College Majors Working in 25 Common Jobs

← **Most** Common Majors   **Least** Common Majors →

Job Title	FIRST		SECOND		THIRD		FOURTH		FIFTH	
	Major	%	Major	%	Major	%	Major	%	Major	%
Accountant	Accounting	50%	Business	11%	Finance	8%	Economics	4%	English	1%
Admin. Assistant	Business	11%	Psychology	7%	Communications	5%	Biology	3%	English	3%
Business Analyst	Computer Science and Engineering	9%	Business	9%	Electrical Engineering	8%	IT	6%	Finance	5%
Consultant	Computer Science and Engineering	10%	Business	7%	Economics	6%	IT	5%	Finance	5%
Data Scientist	Computer Science and Engineering	18%	Mathematics	11%	Electrical Engineering	9%	Statistics	5%	Economics	4%
Editor	English	20%	Journalism	10%	History	3%	Creative Writing	3%	Journalism and Media Studies	2%
Financial Analyst	Finance	26%	Economics	15%	Business	11%	Accounting	9%	Mathematics	2%
Graphic Designer	Graphic Design	22%	Visual Communications	4%	Computer Science and Engineering	2%	Illustration	2%	Studio Art	2%
HR Manager	Business	19%	Human Resources	10%	Psychology	8%	Accounting	4%	English	2%
Lab Technician	Biology	21%	Chemistry	11%	Chemical Engineering	4%	Biochemistry	4%	Environmental Science	2%
Manufacturing Engineer	Mechanical Engineering	48%	Industrial Engineering	5%	Manufacturing Engineering	3%	Production Engineering	2%	Materials Science	2%
Marketing Coordinator	Marketing	16%	Business	11%	Communications	10%	Public Relations	5%	Psychology	3%
Mechanical Engineer	Mechanical Engineering	70%	Aerospace Engineering	3%	Mechanical Engineering Technology	2%	Engineering Mechanics	1%	Thermal Energy and Power Engineering	1%
Medical Assistant	Biology	14%	Business	11%	Nursing	8%	Psychology	7%	Healthcare Admin.	4%
Personal Trainer	Exercise Science	11%	Business	5%	Kinesiology	5%	Psychology	4%	Communications	3%
Pharmacy Technician	Biology	23%	Chemistry	5%	Psychology	4%	Biomedical Science	4%	Business	3%
PR	Communications	12%	Public Relations	10%	Business	5%	Marketing	4%	Journalism	3%
Project Manager	Business	10%	Marketing	5%	Civil Engineering	3%	Mechanical Engineering	3%	Economics	3%
Recruiter	Business	11%	Human Resources	9%	Communications	8%	Psychology	7%	Marketing	7%
Registered Nurse	Nursing	75%	Psychology	4%	Nursing Science	2%	Exercise Science	1%	Accounting	1%
Sales Associate	Business	8%	Psychology	6%	Marketing	3%	English	3%	Biology	3%
Social Media Manager	Communications	14%	Marketing	8%	English	7%	Public Relations	4%	Journalism	4%
Software Engineer	Computer Science and Engineering	48%	Electrical Engineering	15%	IT	10%	Mechanical Engineering	1%	Information Science	1%
Teacher	Psychology	8%	English	4%	Mathematics	3%	Business	3%	Marketing	2%
Web Developer	Computer Science and Engineering	35%	IT	12%	Electrical Engineering	10%	Business	3%	Mathematics	2%

Note: Similar job titles are grouped or "normalized" using a proprietary machine-learning algorithm.
Source: Glassdoor Economic Research (glassdoor.com/research)

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VI. College Majors and Pay

Because college majors affect career paths, they also affect pay. In this section we connect the dots from college majors to compensation by estimating the "market value" of each job people in our sample worked in after graduation. That allows us to aggregate these pay estimates by college major into a median base pay for each of the 50 majors we examined.

In Table 4, we show the 25 highest-paying college majors in our sample. These estimates take into account the pay for each job held by graduates in our sample from each college major during the first five years after graduation. It includes all workers in our sample — including those who go straight to work after college, those who go onto grad school during this period, and all other work and life circumstances.

The highest paying major in our sample is Computer Science and Engineering with a median base pay of $70,000 per year. Other high-paying majors include Electrical Engineering ($68,438 per year), Mechanical Engineering ($66,040 per year), Chemical Engineering ($65,000 per year), and Information Technology ($63,500 per year) — all relatively specialized STEM majors featuring heavy quantitative requirements including mathematics, programming and statistics.

TABLE 4. 25 Highest-Paying College Majors

Major Field of Study	Median Base Pay (All Jobs in First 5 Years)
Computer Science and Engineering	$70,000
Electrical Engineering	$68,438
Mechanical Engineering	$66,040
Chemical Engineering	$65,000
Information Technology	$63,500
Civil Engineering	$63,000
Nursing	$63,000
Industrial Engineering	$62,270
Management Information Systems	$60,960
Statistics	$60,000
Biomedical Engineering	$57,200
Economics	$55,000
Finance	$55,000
Physics	$52,500
Accounting	$51,562
Mathematics	$51,250
Architecture	$50,000
Biotechnology	$48,442
Biochemistry	$46,406
Philosophy	$46,328
Business	$46,302
Marketing	$46,000
Political Science	$45,000
International Relations	$45,000
History	$45,000

Source: Glassdoor Economic Research (glassdoor.com/research)

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In Table 5, we show the 25 lowest-paying college majors. The lowest paying major is tied between Criminal Justice and Kinesiology — the study of mechanics of body movements, a major closely related to Exercise Science — both with a median base pay of $40,000 per year. That's followed by Exercise Science ($40,640 per year), Healthcare Administration ($41,000 per year) and Social Work ($41,000 per year). A common theme between these low-paying majors is that all are relatively non-technical majors, which typically involve limited quantitative requirements and few job-specialized skills.

Tables 4 and 5 paint a clear picture of the connection between choice of college major and pay. Majors with the highest estimated median base pay in our sample are drawn almost exclusively from engineering, technology, and scientific fields that offer specific technical training applicable to today's fast-growth STEM careers in tech, engineering, biotechnology, and healthcare. By contrast, the college majors with the lowest estimated pay are typically less technical, more general, and do not offer a direct career path into today's highest-paying roles in the labor market.

TABLE 5. 25 Lowest-Paying College Majors

Major Field of Study	Median Base Pay (All Jobs in First 5 Years)
Criminal Justice	$40,000
Kinesiology	$40,000
Exercise Science	$40,640
Healthcare Administration	$41,000
Social Work	$41,000
Education	$41,203
Liberal Arts	$41,250
Music	$41,290
Psychology	$41,500
Biology	$42,000
Anthropology	$42,116
Sociology	$42,200
Health Sciences	$42,500
Chemistry	$43,040
Spanish	$43,040
Hospitality Management	$43,306
Public Relations	$43,500
Communications	$43,576
Journalism	$43,576
Sports Management	$43,576
English	$43,688
Environmental Science	$43,925
Human Resources	$45,000
Graphic Design	$45,000
Advertising	$45,000

Source: Glassdoor Economic Research (glassdoor.com/research)

VII. Gender, College Majors, and the Gender Pay Gap

Because men and women are not equally represented among college majors, America's system of colleges and universities effectively places men and women on different career tracks early in life, with different pay. This phenomenon is a key driver of the gender pay gap we observe in the overall U.S. labor market.

In Figure 11, we gather the findings from previous sections to illustrate the clear link between choice of college major and the gender pay gap. It shows a scatterplot of the gender balance in each college major in our sample, along with the estimated base pay for each. Each dot represents one college major. The horizontal axis shows the percentage male in each major, and the vertical axis shows median base pay by major for the first five years after graduation.[10]

The overall pattern in Figure 11 is clear. Among the 10 highest-paying majors in our sample, women are under-represented in all but one: Nursing. In each other case, the gender balance among the remaining nine highest-paying majors ranged from 64 percent male in Statistics to 89 percent male in Mechanical Engineering. This gender imbalance means colleges and universities are effectively feeding men into today's highest paying jobs at a greater rate than women, boosting the average gender pay gap.

FIGURE 11. Men & Women Sort Into Different Majors, Affecting Base Pay Later
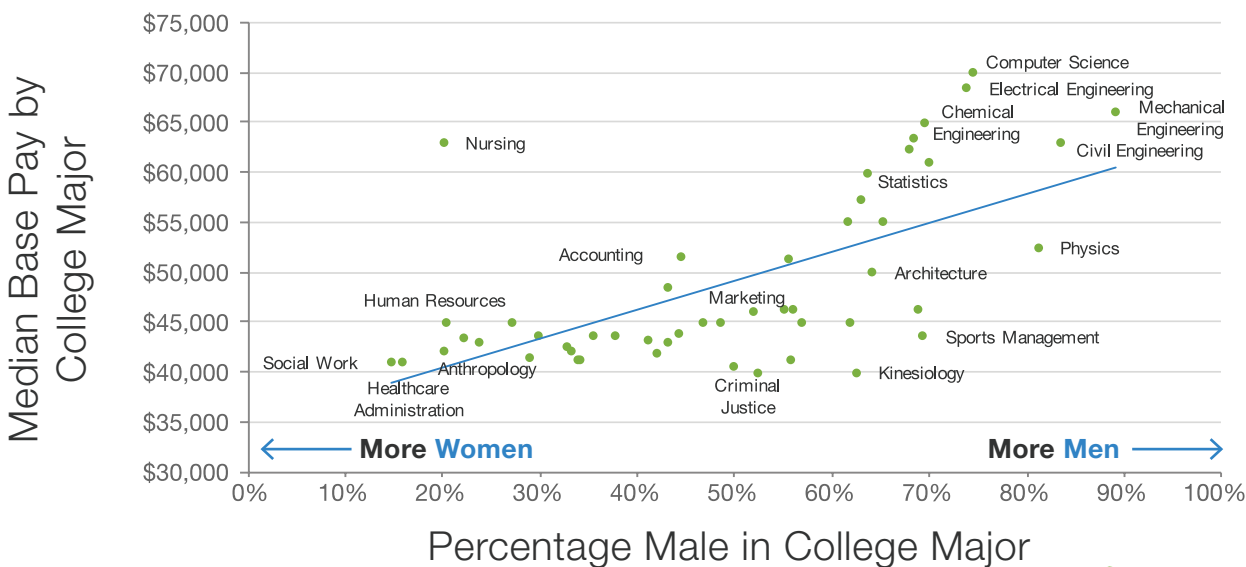
Source: Glassdoor Economic Research (glassdoor.com/research)

[10] For a complete table of gender balance and pay for all 50 majors we examined, please see the Appendix.

By contrast, women are over-represented in 6 of the 10 lowest-paying college majors in our sample, with a gender balance ranging from 58 percent female in Biology to 85 percent female in Social Work. This imbalance has the effect of feeding a disproportionate share of women into today's relatively lower-paying jobs, putting downward pressure on average female wages relative male wages in the U.S. labor market.

In Glassdoor's 2016 study of the gender pay gap in Glassdoor salary data, we found this type of occupational sorting of men and women into differently paying jobs explains about 54 percent of the overall pay gap between men and women in the U.S.[11] Figure 11 illustrates starkly how the academic pipeline from America's colleges and universities helps contribute to gender segregation in the workforce and the nation's persistent gender pay gap.

GENDER PAY GAPS BY COLLEGE MAJOR

One surprising finding is that even *within the same college major*, men and women tend to sort into different jobs — which pay differently — after college. This leads to a gender pay gap after college, even for students who major in the same subject.

For example, among women who major in Biology, the most common three jobs after college are lab technician, pharmacy technician, and sales associate. By contrast, the three most common jobs for male Biology majors are lab technician, data analyst, and manager. The fact that men are more likely to work as higher-paying data analysts or managers, while women are more likely to work in lower-paying roles as pharmacy technicians and sales associates creates a gender pay gap, even for students with the same college major.

For our sample overall, men across all college majors earned on average a median base pay of $56,957 per year, while women earned $50,426 per year. That amounts to an overall gender pay gap of $6,531 per year or 11.5 percent of male pay. Table 6 shows the 15 college majors in our sample with the biggest gender pay gaps due to occupational sorting of men and women into different types of jobs after graduation.

The largest gender pay gap was found in Healthcare Administration majors, with men working in jobs that paid $11,250 per year more on average than women, about 22 percent of male pay. For those majoring in Healthcare Administration, the three most common jobs after college for women are administrative assistant, customer care representative, and intern. For men, the three most common jobs are higher-paying roles as implementation consultant, quality specialist and data consultant. This pattern is what's behind the large pay gap between men and women from that major.

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[11] Andrew Chamberlain (March 2016), "Demystifying the Gender Pay Gap: Evidence from Glassdoor Salary Data," Glassdoor Economic Research report. Available at https://www.glassdoor.com/research/studies/gender-pay-gap/.

The second-highest gender pay gap is found in Mathematics (18 percent pay gap). For female Mathematics majors, the three most common jobs after college (ignoring grad-school jobs like teaching and research assistants) are data analyst, analyst, and business analyst. For men, the three most common jobs are (ignoring grad-school jobs) analyst, data analyst, and data scientist. The larger share of male math majors working as highly-paid data scientists is the primary factor driving this male-female pay gap after college.

Other college majors with large gender pay gaps due to occupational sorting are Biology (13 percent pay gap), Human Resources (11.6 percent pay gap) and Health Sciences (11.1 percent pay gap). In all of these fields, women on average tend to work in lower-paying roles after college compared to men, despite having the same college major.

TABLE 6. 15 Largest Gender Pay Gaps Within College Majors (Due to Occupational Sorting by Men and Women)

Major	MEDIAN BASE PAY (ALL JOBS IN FIRST 5 YEARS)		Gender Pay Gap %
	Male	Female	
Healthcare Administration	$51,250	$40,000	22.0%
Mathematics	$60,000	$49,182	18.0%
Biology	$46,000	$40,000	13.0%
Human Resources	$50,000	$44,222	11.6%
Health Sciences	$45,000	$40,000	11.1%
Biomedical Engineering	$60,000	$53,450	10.9%
Industrial Engineering	$65,000	$58,000	10.8%
Business	$50,000	$45,000	10.0%
Marketing	$50,000	$45,000	10.0%
Exercise Science	$44,232	$40,000	9.6%
Statistics	$60,000	$54,469	9.2%
Physics	$55,714	$50,800	8.8%
Political Science	$47,103	$43,000	8.7%
Management Information Systems	$65,000	$60,000	7.7%
Biochemistry	$48,000	$44,500	7.3%

Source: Glassdoor Economic Research (glassdoor.com/research)

In Table 7, we show the 15 college majors with the smallest gender pay gaps due to occupational sorting. In two-thirds of these majors, women actually worked in higher paying roles than men from the same major after college — a "reverse" gender pay gap. The smallest gap is in Architecture, with women earning an $7,000 more per year on average than men, or a -14 percent pay gap. That's followed by Music (-10.1 percent pay gap), Social Work (-8.4 percent pay gap), Advertising (-8.1 percent pay gap) and Environmental Science (-6.8 percent pay gap).

TABLE 7. 15 Smallest Gender Pay Gaps Within College Majors
(Due to Occupational Sorting by Men and Women)

Major	MEDIAN BASE PAY (ALL JOBS IN FIRST 5 YEARS)		Gender Pay Gap %
	Male	Female	
Architecture	$50,000	$57,000	-14.0%
Music	$40,000	$44,020	-10.1%
Social Work	$37,500	$40,640	-8.4%
Advertising	$43,020	$46,500	-8.1%
Environmental Science	$44,000	$47,000	-6.8%
Chemical Engineering	$60,480	$63,770	-5.4%
Kinesiology	$41,000	$43,000	-4.9%
Mechanical Engineering	$66,040	$68,000	-3.0%
Sports Management	$42,000	$42,672	-1.6%
Anthropology	$40,640	$41,250	-1.5%
Accounting	$51,562	$51,562	0.0%
Finance	$55,000	$55,000	0.0%
Nursing	$63,000	$63,000	0.0%
Graphic Design	$45,000	$45,000	0.0%
Civil Engineering	$60,000	$60,000	0.0%

Source: Glassdoor Economic Research (glassdoor.com/research)

The key takeaway from Tables 6 and 7 is that although gender differences in the choice of college major is an important cause of today's gender pay gap, it's not the complete story. College majors alone don't completely determine the career destiny of men and women. Instead, we find that even within the same college major men and women often find themselves on different career tracks early in their working lives — a complex phenomenon that helps drive apart male and female pay in the U.S. labor market.

VIII. Limitations

All data have limitations, and the resume data used for this study are no exception. Here are the key limitations to keep in mind when thinking about the results of this study.

- **REPRESENTATIVENESS:**
  Our study is based on anonymized resumes from Glassdoor for which users reported having earned a college degree between 2010 and 2017. We do not examine those with less than a college degree, and we examine both workers who went on to grad school during the first five years after college, as well as those who did not. Our sample may not be representative of all college graduates during this time period, or of the broader U.S. workforce.

- **ACCURACY:**
  Individuals don't always report their college and work experience accurately on resumes. By using college majors and jobs from resumes, we rely the job information provided by those individuals, which cannot be independently verified.

- **"PIPELINE" FACTORS BEYOND COLLEGE MAJOR:**
  This study examines how differences in college major help drive the gender pay gap. It does not examine why men and women sort into different majors, or how many other conscious and unconscious biases in hiring, pay and promotion may help amplify the gender pay gap we observe in the labor market. While many factors other than college major affect career paths and pay, they are beyond the scope of this study.

IX. Conclusion

In recent decades, there's been significant progress toward gender equality in America. As recently as 1982, women in the U.S. earned roughly 62 cents per dollar earned by men on average.[12] By 2016, that gap had receded to women earning 82 cents per dollar on average earned by men.[13] But closing this remaining gender pay gap has proven a stubborn challenge.

In this study, we examine a key driver of the gender pay gap: Gender differences in the choice of college major, and how these differences drive men and women into different early career paths, with different pay.

Based on an analysis of more than 46,900 resumes shared anonymously on Glassdoor, we find dramatic differences in gender balance among college majors. On average, men are sharply over-represented among high-paying engineering and technical majors. This in turn places men disproportionately on career tracks for high-paying roles in tech, finance, health care, biotechnology and engineering — helping fuel the average pay gap between men and women observed in the labor market over time.

Even within the same college major, our analysis shows men and women routinely end up working in different roles — with different pay — in the years after graduation. This highlights how America's system of colleges and universities plays a complex role in the persistent gender pay gap we observe in the labor market.

While the choice of college major partly reflects an individual choice by students, research shows that broader social factors heavily influence men and women's choice of major — including pre-college preparation, gender norms regarding work and family, and more.

For employers, these findings suggest that hiring candidates based on skills — rather than strictly based on college majors — may be a useful strategy to prevent gender imbalances among majors from translating into gender biases at work. And for students, our findings emphasize the critical importance of researching how fields of study are linked to jobs and pay later on, before choosing among majors.

America has made considerable progress toward gender pay equality in recent decades, but much work remains. Our findings suggest that solutions to today's remaining gender pay gap must go beyond examining current pay practices among employers. Instead, they must also address pipeline issues — including the choice of college major — that help drive men and women into different career paths and pay.

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[12] See "American Women: Three Decades of Change" (November 9, 1983). Hearing before the Joint Economic Committee of the United States. Available at https://www.jec.senate.gov/reports/98th%20Congress/Ameircan%20Women%20-%20Three%20Decades%20of%20Change%20(1257).pdf.
[13] See "Women's Median Earnings 82 Percent of Men's in 2016" (March 8, 2017). The U.S. Bureau of Labor Statistics The Economics Daily. Available at https://www.bls.gov/opub/ted/2017/womens-median-earnings-82-percent-of-mens-in-2016.htm.