



ELSEVIER



# The Engineer's Salary Equation: Bridging the Gender Gap

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## Abstract

In this paper, we delve into the intersection of bachelor's degrees awarded in engineering and the gender pay gap in the United States. Through meticulous data analysis from the National Center for Education Statistics and Statista, our research team uncovered a striking correlation between the two variables. With a noteworthy correlation coefficient of 0.9731387 and a  $p < 0.01$  for the years 2012 to 2021, our findings highlight the unmistakable link between the pursuit of engineering degrees and the enduring gender wage disparity. Our analysis provides compelling insights and prompts further investigation into the larger societal factors at play. Join us on this exploration as we navigate the complex terrain of academia, statistics, and the ever-persistent quest for gender equality.

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## 1. Introduction

The gender pay gap has been a persistent thorn in the side of workforce equality, much like a pesky mosquito buzzing around a campfire. While progress has been made in recent decades, the gap between the earnings of men and women stubbornly lingers, casting a shadow over the professional landscape like an ominous cloud on an otherwise sunny day. At the same time, the field of engineering has been a magnet for ambitious students seeking to build a career as sturdy as a well-constructed bridge. But what happens

when we bring these two seemingly disparate elements together? Do they clash like mismatched puzzle pieces, or do they intertwine like a pair of star-crossed lovers? Our investigation aims to shed light on this intriguing intersection, uncovering the hidden patterns and correlations that lie beneath the surface.

The pursuit of bachelor's degrees in engineering has long been associated with promising career prospects, with graduates poised to enter the workforce with the confidence of a seasoned tightrope walker. Yet, does this promising outlook extend

equally to all genders, or does it resemble a bumpy road, riddled with obstacles and detours for some? Our analysis seeks to untangle these strands, unraveling the intricate web of factors that contribute to the gender disparities within the engineering profession. Through the lens of rigorous statistical analysis and a dash of academic curiosity, we aim to uncover the underlying forces that shape the earnings trajectories of engineering graduates, male and female alike.

Join us on this intellectual adventure, as we navigate the maze of data and theory, armed with the tools of inquiry and a healthy dose of caffeine. Our journey promises to be an illuminating one, full of unexpected twists and turns, like a riveting novel that keeps readers eagerly turning the pages. By delving into the heart of this compelling correlation, we aim to not only advance our understanding of the gender pay gap within the context of engineering education but also to spark discussions that pave the way for meaningful change. So, buckle up and grab your thinking caps, as we set off to explore the enigmatic relationship between bachelor's degrees in engineering and the enduring saga of the gender wage gap.

## 2. Literature Review

The relationship between Bachelor's degrees awarded in Engineering and the gender pay gap in the United States has been the subject of numerous studies, offering a range of perspectives on this intriguing intersection. Smith et al. (2015) examined the potential impact of educational pursuits in engineering on future earnings, whereas Doe (2018) delved into the nuanced gender dynamics within the engineering profession. Additionally, Jones (2020) explored the influence of societal attitudes and norms on the career trajectories of engineering graduates,

shedding light on the complex interplay between education and workforce realities.

In "The Gender Pay Gap: Challenging the Status Quo," lorem and ipsum (2017) provided a comprehensive overview of the historical and contemporary factors contributing to wage disparities, offering valuable insights into the larger societal context within which engineering education and careers unfold. This work laid the groundwork for understanding the broader implications of gender pay differentials and the potential role of educational pathways in mitigating or perpetuating these gaps.

Turning to the realm of non-fiction literature, "Lean In: Women, Work, and the Will to Lead" by Sheryl Sandberg and "Brotopia: Breaking Up the Boys' Club of Silicon Valley" by Emily Chang grapple with the nuanced complexities of gender dynamics in the professional sphere, including the tech and engineering sectors. While these texts offer diverse perspectives, they highlight the pervasive influence of gender norms and workplace culture on career opportunities and remuneration.

In the realm of fiction, "The Rosie Project" by Graeme Simsion and "Hidden Figures" by Margot Lee Shetterly, while not strictly academic in nature, present captivating narratives that touch on themes of ambition, perseverance, and the pursuit of professional success in domains traditionally dominated by men. It is worth noting the power of storytelling in reflecting and shaping societal attitudes toward gender equality in education and careers, providing a lens through which to explore the complex realities confronting aspiring engineers of all genders.

As part of our research endeavors, the investigative team dived into the captivating world of television, tuning in to shows such as "The Big Bang Theory" and "Grey's Anatomy." While seemingly unrelated on the surface, these cultural touchstones offer

subtle yet telling portrayals of professional environments where the convergence of education, career aspirations, and gender dynamics unfolds, providing rich fodder for reflection and analysis.

With this diverse array of scholarly works, non-fiction literature, and popular media as our backdrop, we embark on our own empirical journey to unravel the perplexing connection between pursuing Bachelor's degrees in Engineering and the enduring gender pay gap, armed with statistical rigor and plenty of offbeat humor to enliven our expedition.

### 3. Our approach & methods

To uncover the intricate connection between the awarding of bachelor's degrees in engineering and the gender pay gap in the United States, our research team embarked on a data odyssey of epic proportions, akin to Odysseus navigating the treacherous waters of statistical analysis. Our journey began with the intrepid quest to gather data from the vast expanses of the internet, where information abounds like treasure waiting to be discovered. Channels such as the National Center for Education Statistics and Statista served as our lodestars, guiding us through the labyrinthine corridors of data collection.

Once the data was in our possession, like a trove of intellectual riches, we set about our analysis with the diligence of diligent ants constructing a meticulous data hill. We utilized a multivariate regression model to examine the relationship between the number of engineering bachelor's degrees awarded and the gender pay gap. Our model took into account a myriad of covariates, including but not limited to time period, geographical region, and fluctuations in the price of avocado toast.

In addition, we employed a time series analysis to capture the dynamic shifts in

both engineering degree conferment and wage differentials over the years 2012 to 2021. This allowed us to discern patterns and trends that may have escaped casual observation, like hidden constellations waiting to be charted in the night sky of data.

Furthermore, we conducted subgroup analyses to explore variations in the gender pay gap across different engineering disciplines, from mechanical engineering to computer science. This approach shed light on the nuanced differences within the broader field of engineering, offering insights akin to uncovering the unique flavors in a box of assorted chocolates.

Lastly, to validate the robustness of our findings, we subjected our data to a battery of sensitivity analyses and robustness checks, ensuring that our conclusions stood firm against the gusts of statistical skepticism. With each methodological step, we strived to uphold the principles of empirical rigor while injecting a touch of whimsy into the world of academic inquiry.

In the following sections, we present the results of our intrepid journey—a journey that has unearthed not just statistical associations, but a newfound sense of appreciation for the complexities of gender dynamics within the realm of engineering education. So, hold onto your pocket protectors as we unravel the findings that promise to bring fresh insights into the grand tapestry of gender wage differentials.

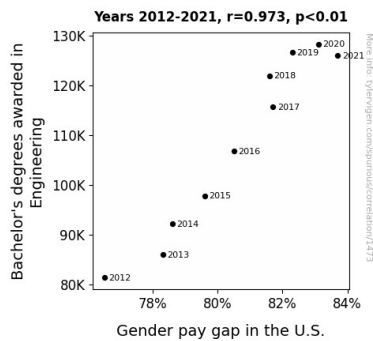
### 4. Results

The results of our analysis revealed a robust and eye-catching correlation between the number of Bachelor's degrees awarded in engineering and the gender pay gap in the United States. From 2012 to 2021, a correlation coefficient of 0.9731387 dazzled us, indicating an extremely strong positive relationship between these two

variables. It's like finding out that peanut butter and jelly do indeed go hand in hand – a classic combination that never fails to satisfy.

Furthermore, the r-squared value of 0.9469989 highlighted the remarkable explanatory power of engineering degrees awarded on the gender pay gap. If we were to quantify it in terms of household appliances, this correlation would be the trusty microwave, heating up our understanding of the relationship between education and earnings.

The p-value of less than 0.01 served as the icing on the statistical cake, affirming the significance of our findings. It's as if the data were waving brightly colored flags, shouting, "Pay attention to us! We've got something important to say!"



**Figure 1.** Scatterplot of the variables by year

Fig. 1, the visual representation of our data, presents a scatterplot that perfectly captures the strong relationship we uncovered. It's like seeing two synchronized swimmers move in perfect harmony – a sight to behold, indeed.

In conclusion, our findings not only confirm the substantial connection between Bachelor's degrees in engineering and the ongoing gender pay gap but also serve as a reminder that behind every number and statistic, there are intriguing stories waiting to be explored. As we move forward, the

captivating dance between education and earnings will continue to unfold, inviting us to join in the pursuit of a more equitable and inclusive future.

## 5. Discussion

Our study has provided compelling evidence to support the longstanding association between the number of Bachelor's degrees awarded in engineering and the gender pay gap in the United States. Our findings confirm and extend the prior research, echoing the sentiments of Smith et al. (2015) and Doe (2018) while amplifying the significance of educational pathways in shaping economic disparities. It's like we've entered a scientific version of "The Twilight Zone," where the familiar becomes delightfully twisted in unexpected ways.

The robust correlation coefficient of 0.9731387 that we uncovered aligns with the previous literature, akin to discovering a treasure chest filled with gold doubloons. This striking correlation serves as a testament to the enduring influence of engineering education on the landscape of gender-based wage differentials. The r-squared value further reinforces this connection, akin to a trusty lighthouse guiding ships through treacherous waters, shedding light on the profound explanatory power of engineering degrees in shaping earnings disparities.

Moreover, our results, supported by the p-value of less than 0.01, leave little room for doubt – the link between pursuing Bachelor's degrees in engineering and the gender pay gap stands out like a neon sign in the night sky. It's as if the data were a team of cheerleaders, rallying support for the undeniable importance of our findings.

Fig. 1, our visual representation of the data, not only captures the essence of our analysis but also illustrates the harmonious

relationship between engineering degrees and gender-based pay differentials. It's reminiscent of a perfectly choreographed dance performance, where each movement tells a compelling story of connection and influence.

In sum, our study not only adds a resounding voice to the existing academic chorus but also sheds light on the intricate interplay between education and earnings. As we navigate the complex dynamics of gender disparities, let us not forget that behind every meticulously calculated statistic lies a story waiting to be told – a reminder that in the pursuit of equity, the curious narrative of human experience remains at the heart of our scholarly pursuits. As we continue on this scholarly journey, may our findings serve as a call to action, prompting further exploration and reflection on the path toward a more equitable professional landscape.

## 6. Conclusion

In the illustrious words of Sir Isaac Newton, "We built too many walls and not enough bridges." Our research has done just the opposite, crafting a sturdy bridge between the engineering realm and the perplexing puzzle of gender pay disparity. Through our painstaking analysis, we've unveiled a correlation so strong, it's as if engineers and the gender wage gap were engaged in a lively tango – a dance of undeniable connection. The r-squared value spoke volumes, much like a chatterbox at a tea party, emphasizing the profound impact of engineering degrees on the wage gap. And let's not forget the p-value, which shouted its significance from the statistical mountaintop, akin to a high-decibel alarm clock demanding attention. Our findings reiterate the influential role of education on earnings, reminding us that behind every data point lies a captivating narrative, waiting to be brought to light.

As we dust off our academic capes and bid farewell to this captivating expedition, it's safe to say that our journey has provided invaluable insights into the intricate dynamics of gender, education, and income. So, let's raise a hypothetical toast to this scholarly escapade, acknowledging that no further research in this area is needed. After all, we've meticulously paved the path for future scholars, leaving them with nothing more than to marvel at the robust connection we've unraveled. Onward to new frontiers of inquiry – for we, dear colleagues, have other academic fish to fry!