The Racial Wage Gap (1973-2022)

Ana Estevez, Kristian Davis, Anisha Nannapaneni, Michael Stelmack, Tyeson Butler

University of North Carolina at Charlotte

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Justin Grandinetti and Marco Scipioni

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Introduction

The project aims to analyze and explore the relationship between wages and education, specifically focusing on different education and races. The dataset provides information on wages categorized by education level, gender, and race, allowing for an in-depth analysis of

factors influencing wages. By examining trends, wage gaps, and disparities, the project seeks to gain insight into social and economic inequalities to help inform policies and decision-making. The project will be outlined by researching how race and education affect income, defining our research question, creating a data visualization of the dataset, interpreting what the visualizations show, and how it correlates with our research. Using this question will help with the research process; do White people with bachelor's college degrees make more income in comparison to African Americans and Hispanic people with bachelor's degrees in the United States?

Context and Implications

While investigating this research question there is abundant information and data that has been studied about race. Everyone is born with a race and that can not be changed. However, a large portion of this research suggests that race has a big impact on how much income people will make. In one instance, “minimum wages increased wages of black workers between 16 and 64% more than among white workers and reduced the overall black-white wage gap by 10%” (Wursten and Reich, 2023). This suggests that black workers' wages previous to the establishment of the minimum wage policy were far less than white worker’s wages. So when the minimum wage was established black workers had a larger wage increase than white workers. And even after this policy, black workers still do not have equal pay in comparison to white workers. In another case, Black nurses’ income was $12.17 and generally made less than White nurses who made $12.54 (McGregory, 2013). At first glance, it seems like this isn’t a large margin. However, this difference will grow substantially over time (McGregory, 2013). Research was done in the early twentieth century to look at these racial pay gaps but those studies did not find as much concrete evidence then researchers would have thought (Carruthers and Wanamaker, 2017). This is very interesting because when looking at the data set it shows a

higher income for white races over other races even during the early twentieth century. In addition, due to increasing city size or employment density there is a larger Black-White wage gap. According to Elizabeth Ananat, “a doubling of the metropolitan area population is associated with between a 0.7 and 1.0 percentage point increase in the black-white wage gap”, which only serves as evidence that although it is a small margin, racial wage gaps are still occuring and become significant over time. This also rings true in present-day studies regarding the wage gap between Hispanic and White women. There is no statistically significant difference between the wages of Hispanic women and White women in the USA (McHenry, McInerney 2015), but this apparent lack of a wage gap is not reflected in the cost of living. On average, Hispanic women pay $995 per month on rent, while White women pay $852 per month on average. We can conclude this shows how over time the way data is studied and collected has changed what data is possible to be gathered. In addition, a report by the US Census Bureau in 2019 stated that the White median household income was $76,057 while Black annual income was $45,438 and Hispanic annual income was $56,113. This shows that whites make almost double the income of blacks and hispanics, which demonstrates the racial wage gap. In this paper, we will focus on how the education level people obtain impacts their wages. The article we will be relying on for our data was published in April 2023 as part of the “Economics of Education Review " This source is revised and updated every two years. It highlights the positive correlation between higher levels of education and higher wages. Additionally, it examines the impact of educational disparities on income inequality within cities. The support analysis of regional variations in wage disparities emphasizes the role of education in addressing income inequality and promoting social mobility (Chellman et al, 2023).

individuals with higher education tend to earn higher wages and have better job prospects. On average, “White college graduates are more likely to major in higher-paying fields, such as science, technology, engineering, mathematics, and medicine”. There are less White people in social sciences and education, which tend to make less money in comparison to STEM subjects (Cheng et al, 2019). In addition, African Americans are less likely to go for lucrative professional degrees in comparison to their white counterparts. This also explains the potential wage gap that is not only influenced by effects of racial upbringing but also by specific areas of education and educational levels. However, incorporating factors such as workforce experience and population along with education, it is still very evident that Black men who work full time still make 22% less than White men (Chattopadhyay, Bianchi 2020). In contrast, although Black immigrants experience 2% higher earnings and an increase in employment 10 years after college, Hispanic immigrants actually obtain negative earnings and educational attainment in the years after college, but the effects on employment are large and positive (Chellman et al, 2023). So essentially, Hispanic immigrants might have a larger network for employment after college, but there is no wage gain in employment than before they entered college. Overall, however, according to the US Census Bureau, the groups with the least amount of poverty are people with Bachelor’s degrees. This states that a Bachelor’s degree does hold weight and does improve the standard of income for all racial groups from obtaining this degree.

The new publication from the Pew Research Center, which analyzes data from the Bureau of Labor Statistics, mentions that "white men are often used as a comparison group due to being the largest demographic group in the workforce, accounting for 33% in 2015." This highlights a major issue faced by college students and the labor industry: the disparities in the American workforce industry and wage gaps between races, such as white, black, and Hispanic

individuals with the same level of education. These wage gaps become evident over time when analyzing data sets. The purpose of this analysis is to determine the extent of unfairness experienced by minorities in the workforce and educational environment. The analysis indicates that the majority of these discrepancies can be attributed to factors such as education, work experience, occupation or industry, and other measurable factors. For example, it was found that Black and Hispanic women with a college degree earned only about 70% of the hourly wages that is $18 per hour in comparison to similarly educated white men that earned $23 per hour . For example, it was found that Black and Hispanic women with a college degree earned only about 70% of the hourly wages of similarly educated white men. This translates to approximately $18 per hour for Black women and $17 per hour for Hispanic women, compared to $23 and $22 per hour for white men. Additionally, college-educated Asian men out-earned college-educated white men by approximately $3 per hour of work. Sociologists Eric Grodsky and Devah Pager found that education and workforce experience accounted for 52% of the wage gap between black and white men working in the public sector in 1990. Adding occupational differences explained around 20% of the wage gap according to the Pew Research Center.

As we navigate the complexities of wage gaps and education, we must also consider the ethical implications for our analysis. By prioritizing fairness, transparency, and accountability, we can ensure that our analysis contributes to positive social change and addresses systemic inequalities.

Explanation of the possible stakeholders that could be impacted:

- Job Seekers and Employees: can benefit from this dataset by understanding the relationship between education and wages. It can help in making informed career choices.

Negotiating salaries, and identifying opportunities for professional development.

- Advocacy Organizations and Activities: organizations and individuals advocating for social justice, equal pay, and minority rights are stakeholders in workplace practices. The research findings can provide evidence and support their advocacy efforts, enabling them to push for policy changes and social reforms.

- Educational Institutions: schools, colleges, and universities, can benefit from this dataset by understanding the relationship between educational attainment and wages. It can help in evaluating the effectiveness of programs and guiding students in making informed decisions about their educational paths in the context of future earnings potential and career prospects.

- Society: The findings from analyzing this dataset can have a broader impact on society by shedding light on the persistent wage gaps based on education, gender and race. It can raise awareness about the need for equal pay and highlight the importance of addressing systemic inequalities in the labor market. The insights gained from this research can inform efforts and initiatives aimed to promote fairness, diversity and inclusion in the workforce.

Ethical considerations:

Harms:

There are several potential harms associated with dataset collection. One major concern is the risk of misinterpretation and misuse, which can lead to incorrect conclusions and harmful decision-making. One misconception that we should address is the potential for someone to make racist assumptions based on the data, such as assuming that a racial group making less money and being less educated proves their inferiority. The data should be used to identify disparities and promote equality, rather than perpetuate discriminatory beliefs and stereotypes.

It is crucial to ensure accurate communication and transparency of data to mitigate the potential for unintended consequences. Additionally, personal information should always be handled with consent and respect for privacy. Financial status, in particular, is considered private information that should be treated with consideration.

Benefits:

From the outcome of our research, we can see what racial groups are making less money in comparison to other racial groups at the same level of education and it shows which groups need equality with income.

Measurement

The research question was measured using a linear regression model, using race and education as independent variables, while the dependent variable is wages in USD per hour. Ultimately, the linear regression model was the best option for this project specifically, compared to logistic regression and decision trees. It would not make much sense to measure the dependent variable using logistic regression because it is numerical rather than categorical, the latter of which works better with this model. That also leaves the option of a decision tree, but measuring

the data in a decision tree would make the data look extremely messy, due to how many ways it would branch out. That left a linear regression model on the table, which had the best of both worlds, being tailored to numerical data while also being the cleanest of the three. Before making the model, it was important to conceptualize what everything meant in the research question. All abstract concepts in the question are defined as the following:

- Income: Measured in USD per hour
- Bachelor's Degree: Higher education certificate that takes four years on average to complete.
- Comparison: Whether the average income of White people is higher or lower than that of Black and Hispanic people.

Defining the terms is only half of the battle. After defining them comes the all-important question; "How will they be measured?" In the context of this research question, operationalizing the variables is fairly simple. Income in this case is measured in USD per hour and is taken as an average of all people of specific demographics over the course of a calendar year. Degrees are not that important to be measured, as everybody either does or does not have a Bachelor's degree. And the comparison is simply measured in the gap in income between the different demographics.

Data Section

The data set is sorted based on race and education. When analyzing the data it needed to be shortened so that it was easier to understand. The way this was completed is by looking at the three races white, black, hispanic with bachelor's degrees. That way the data set reflects more around the research question.

To accomplish this analysis, the following steps were taken:

The Racial Wage Gap (1973-2022)

- Data manipulation was performed to filter the dataset based on race, income and education level.
- Summary statistics were calculated to gain an overview of the income distribution among the selected groups.
- The findings from the data analysis will be explained in relation to the research question.

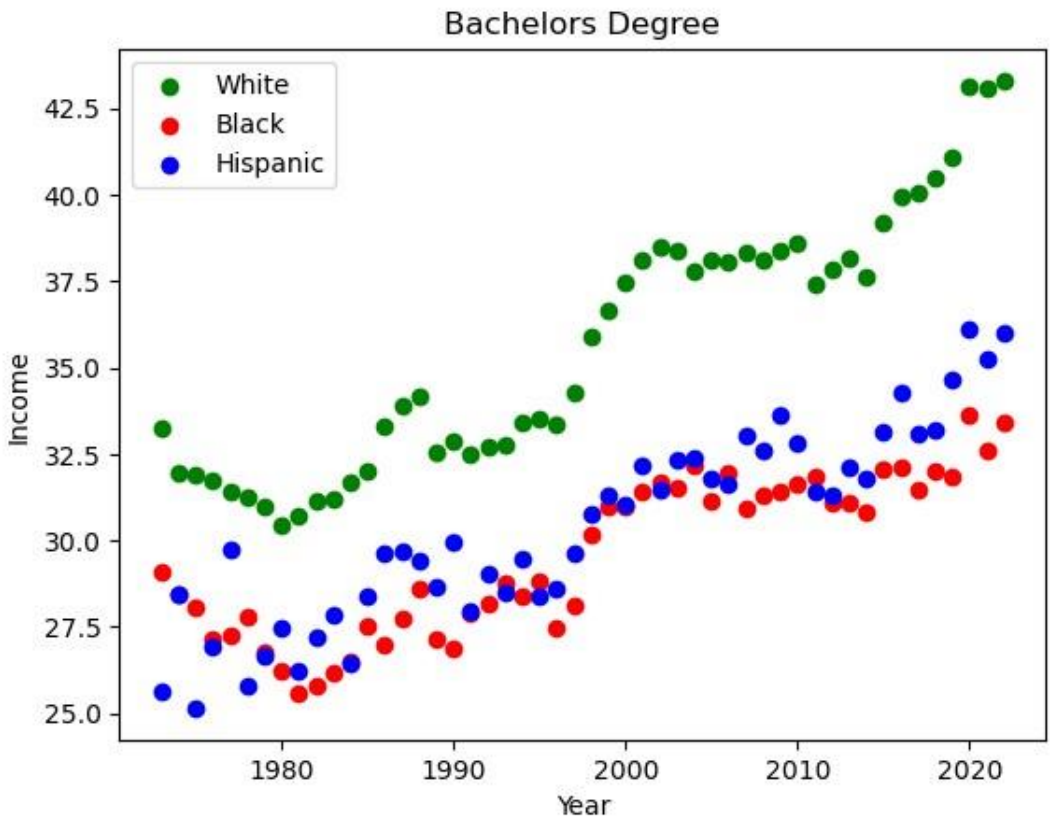
Summary Statistics

	Hispanic	White	Black
Min	25.150	30.440	25.590
25%	28.415	32.500	27.555
50%	30.380	35.070	29.635
75%	32.365	38.283	31.520
Max	36.310	43.300	33.640

Looking at surface level information that the data shows it is already abundantly clear the differences between the average sum of bachelor's degrees between the other races. The difference between max and min of each race is different. Hispanic is $11.16, White is $12.86, and Black is $8.05. All races are increasing their average salary over time. However, the linear increase is very different from each other.

Graph 1 : Bachelor's Degree races:

The Racial Wage Gap (1973-2022)



Based on the analysis of Graph 1, several key observations can be made.

To begin with, the data collection appears to span a significant time period, approximately from 1973 to 2022. This longitudinal data is likely derived from a national database that tracks income across different ethnicities and education levels. Furthermore, the scatter plot clearly indicates that the data has been segmented and cleaned. The presence of three distinct color-coded groups suggests that the data has been segmented based on ethnicity, with each group representing a specific ethnic category. Additionally, the data has been filtered to include only individuals with a bachelor's degree, further narrowing down the focus of the analysis.

The scatter plot illustrates the income trajectories of individuals with bachelor's degrees from income years between (1973-2022) and three different racial groups: **White, Black, and Hispanic**

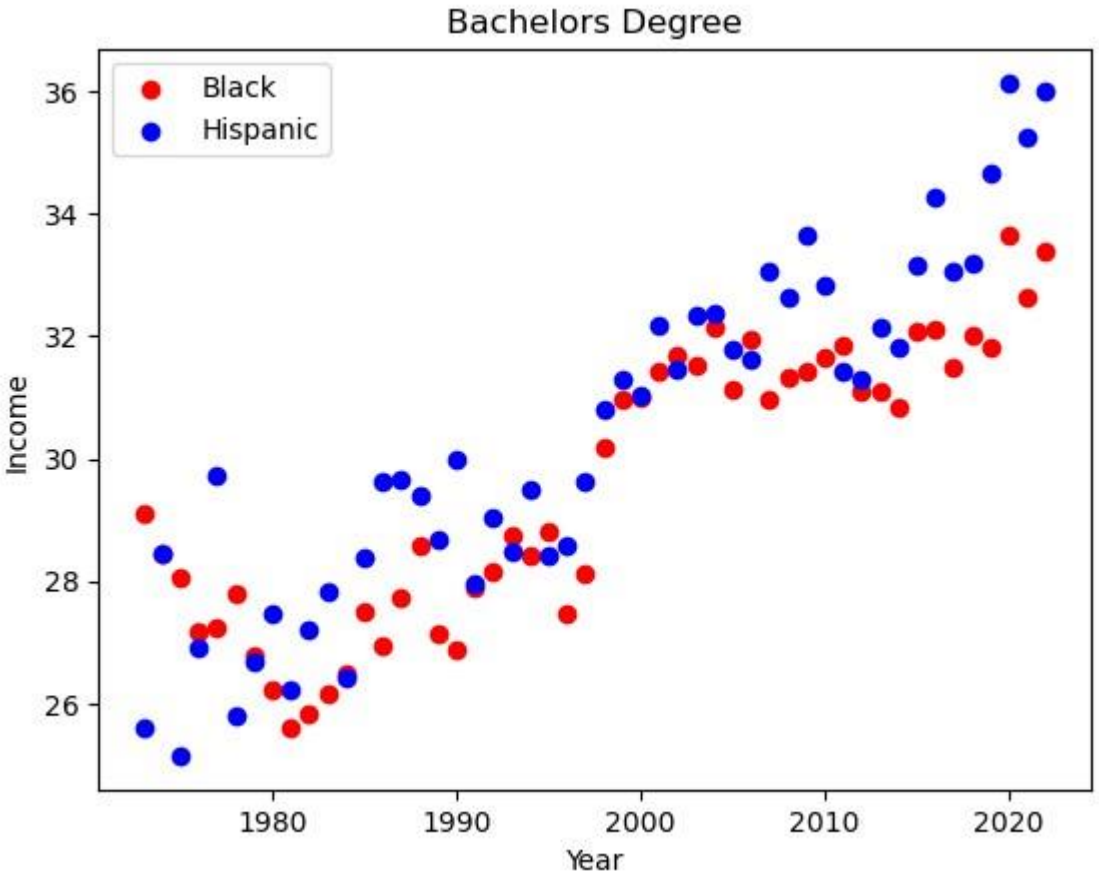
The Racial Wage Gap (1973-2022)

- **Green Dots (White)**: Starting from around 1980, the White group exhibits a consistently higher income compared to the other two groups. Their income steadily increases over time and by 2020, it significantly surpasses the other groups, indicating the highest income level throughout the entire period.
- **Blue Dots (Hispanic)**: In contrast to the White group, the Hispanic group starts with a lower income and maintains a consistent income gap throughout the observed period. Although there is an upward trend, the Hispanic group's income never surpasses that of the White group.
- **Red Dots (Black)**: The Black group begins slightly below the Hispanic group in terms of income. However, they show a similar upward trend over time. Due to the scattered nature of the data points, it is unclear if the Black group ever surpasses the income of the Hispanic group.

It is evident that there are notable patterns in income distribution among different racial groups. The higher positioning of the green dots on the income axis suggests a relatively higher mean income for White individuals, indicating an income disparity. This income gap is persistent, as observed from the vertical distance between the green dots (White), blue dots (Hispanic), and red dots (Black). Additionally, the spread of dots represents the variability or standard deviation within each group, with some years showing tighter clustering than others. Based on the data findings and critical analysis, it is clear that income disparities exist based on race among individuals with bachelor's degrees in the U.S. White individuals tend to earn more on average than Black and Hispanic individuals, indicating systemic inequalities within the labor market. However, all racial groups experience income growth over time with a bachelor's degree,

suggesting that obtaining a bachelor's degree can offer economic benefits regardless of race.

Graph 2 : Black & Hispanic Bachelor Degree



Based on the analysis of Graph 2:

The plot indicates that the data has been filtered to include only individuals with a bachelor's degree, separated into two ethnic groups: Black and Hispanic. Initially, both racial groups exhibit lower-income data points, which may be standardized to account for the recession that occurred between 1980 and 1982. During this period, these two groups were impacted by the fight against inflation, which had consequences for the manufacturing and construction industries. As a result of the recession in 1982, unemployment rose from 7.4% at the beginning of the recession to a

peak of 10.8%, the highest level seen in any modern recession (excluding 2020) having impact in different communities.

The dataset in the plot shows the visualization with the lowest point for Black and Hispanic groups in the context of income and bachelor's degrees over time. The Hispanic group appears to have a more stable and consistent income growth compared to the Black group over time. This observation suggests that there may be different factors influencing these trends, such as varying economic opportunities or access to higher-paying jobs. Further analysis and examination of the data could provide valuable insights into the underlying reasons behind these patterns. Additionally, the first graph indicates that the impact of society, economic, and political events on the white race is lesser compared to the impact on the Black and Hispanic groups.

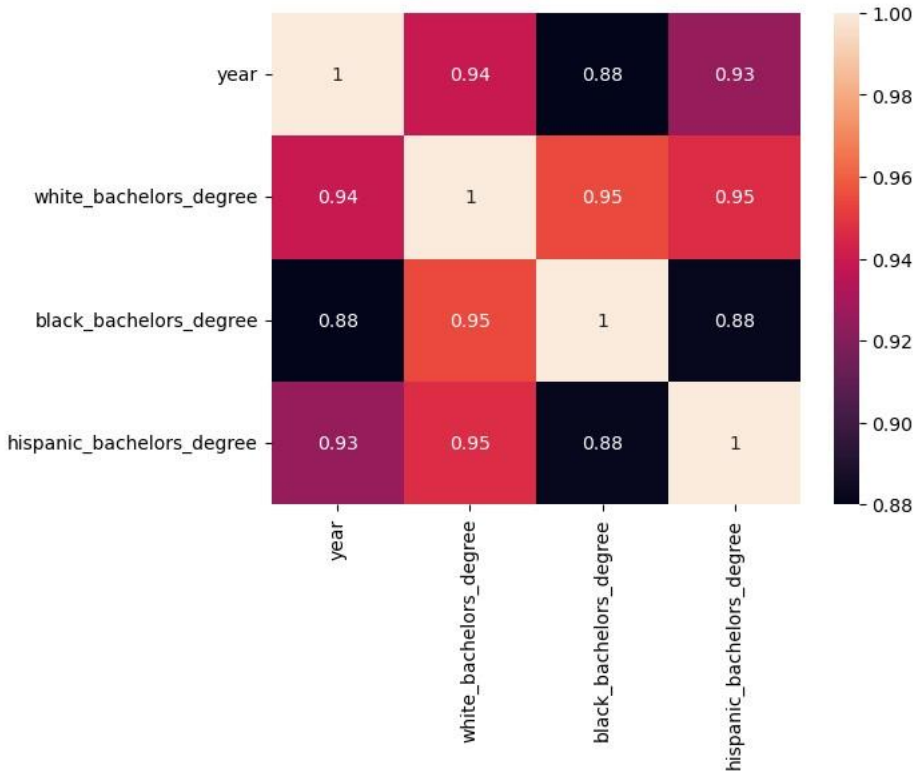
Red Dots (Black): The trajectory started in the early 1980's with income levels around 26k27k, with the recession and financial crisis and rising unemployment. The upward trend is consistent, with a notable increase in the late 1990's and early 2000s.

Blue Dots (Hispanic): This group starts at a slightly lower income level than the black group, but surpasses it around the early 2000s. After this group, the Hispanic groups income levels continue to rise, reaching the highest levels on the plot by 2020.

Both ethnicities groups show growth in income over time. Indicating the potential economic benefits of a bachelor's. The scatter plot indicates that there was a shift in the income dynamics between Black and Hispanic races with bachelor's degrees around the early 2000s with the Hipanic group eventually surpassing the black group in terms of income by 2020. This suggests that educational attainment does contribute to economic growth and improvement. The reasons

for the trends observed in the scatter plot could be the sole determinant of income, and there are likely other socioeconomic factors.

Graph 3 HeatMap :



This heatmap made from the data set shows correlation between the different races as time goes on. All the variables have very high correlation with each other. This makes sense because as all the variables grow higher all the other variables increase as well. When looking at the other races' correlation with each other they have high correlation because overall there is an increase in salary with all the races. This also highlights how all the races have increased sum overtime. That does not mean they all have an equal increase from looking at the summary statistics. This brings up the question of why the scatter plot shows the average white person making overtime is

higher than the other races. One reason could be that White people started making higher income earlier on. As time passed all the races increased, but because White people started with higher income, they still make on average more than the other races because they did not start at the same level. The main point we get from this heatmap is all the races are correlated with each other because they all increase overtime. However, even though they have a high correlation it does not mean they all get paid the same.

Conclusion

In conclusion, this report explored the influence that race has on the income of people with Bachelor's degrees. The primary research question that drove the report was as follows; do White people with bachelor's college degrees make more income in comparison to African Americans and Hispanic people with bachelor's degrees in the United States? This research question led to three key takeaways, most prominently that White people, on average, make more money than Black and Hispanic people. The report also revealed that recessions closed the racial wage gap, albeit marginally. The income of White people was also found to increase at a similar rate to that of Hispanic people, but due to their income being higher initially White people still make 20% more on average than Hispanic people. The dataset was unfortunately a

little general, as it lumped all the data into one country, when it could have split it up to see how it varies across the states. Despite this limitation, this report can lead to an avenue for future research by showing when and how the wage gap increased or decreased, in order to better combat the racial wage gap in the future. More research could also be done to try to have a better understanding of why other races have higher average salaries than other races. The research conducted shows not only that there's a wage gap between the races present, but it also shows

any extra factors that influence it, and how these could be leveraged to fix the problem in the future.

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