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# Journal *of* Future Economists

## Economic Inequality

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# Contents

# Tomorrow's Economists Grapple with the Challenges of Today

*The publication of this journal comes during extraordinary times in the economy, in monetary policy, and in day-to-day life. The COVID-19 pandemic has caused unprecedented changes to both short-term and long-term economic and societal conditions. Where and how we work and study has been fundamentally altered, and policy makers are wrestling with the effects of those changes on traditional economic models.*

*This new economy requires new ideas and a new perspective. From the virtual classroom to future job opportunities, high school students have felt and will continue to feel the effects of the pandemic. While they will take stewardship of an economy that has undergone tremendous changes, the future economy also presents extraordinary opportunities.*

*Today's high school students have demonstrated flexibility and determination as they navigated the challenges of remote learning and an economy impacted by social distancing. Their experiences give them unique insights into both current economic conditions and to the future direction of the economy.*

*The purpose of the Journal of Future Economists is to inspire students' interest in economics and amplify student voices on policy issues. The Journal strives to provide students a platform to critically analyze the economy and provide their own solutions.*

*The inaugural volume contains 12 student essays on the topic of economic inequality. Structural inequality touches different facets of society, and the broad range of paper topics reflects the myriad ways inequality affects the economy and daily life. From financial literacy to housing policy and more, students demonstrated keen abilities in research, data analysis, and writing skills.*

*Sixty-six schools submitted papers, each reflecting the hard work and dedication of a team of student authors with the guidance of faculty advisors. We wish to thank every student and every teacher who submitted a paper. All schools, student authors, and advisors are acknowledged on pages 13-20.*

*We hope that readers find these papers thought-provoking and insightful, and we are excited to recognize the analytical skills and thoughtfulness of these future economists.*

# Dear Future Economists,

**JOHN C. WILLIAMS**
*President and Chief Executive Officer of the Federal Reserve Bank of New York*

*Congratulations on your outstanding contributions to the Journal of Future Economists! The work presented by you, as well as all the participating teams, shows that there are many talented thinkers ready to take on critical issues facing our world today and in the future.*

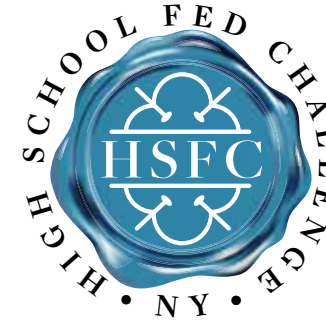
*Economic inequality is one of the most urgent topics of our time. You demonstrated remarkable expertise at research and analysis while exploring a wide range of themes that are so important for our future. Our success in building a stronger, more equitable foundation for our economy will continue to rely on fresh perspectives and unique approaches like the ones you've introduced.*

*Everything that you've done throughout this process is what*

*economists should do every day. Asking questions and working together to solve problems will always be at the heart of our profession. If you enjoy this work, I encourage you to consider pursuing a career as an economist. It's a challenging yet deeply rewarding path to take.*

*There are several ways you can apply your interests and skills in our field. An institution like the Federal Reserve offers many opportunities to work in support of a safe and strong economic system. Wherever you land, I know you have a successful future ahead of you. I am excited to see what you do next.*

JOHN C. WILLIAMS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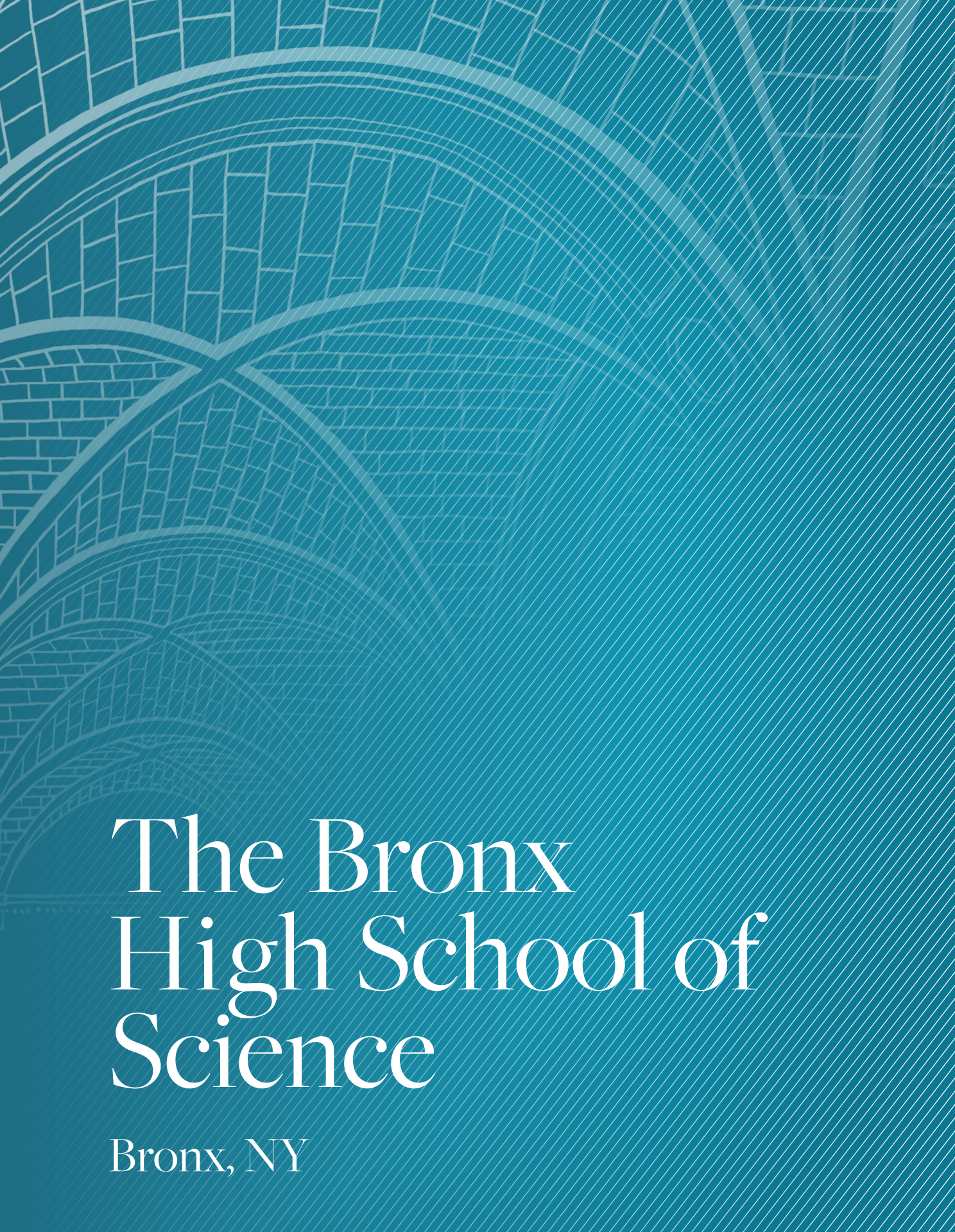

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# *LGBT & Economic Inequality:* A Hidden Gender Gap

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*Discrimination against the LGBT community and the economic inequality it has caused has long been acknowledged and observed. Is the economic inequality in LGBT taste-based or statistical? Using data provided by the United States Census Bureau, we examined the education and income gaps between same-sex couples and opposite-sex couples as well as within same-sex couples. We found that only female-female couples have on average lower incomes despite having higher education levels. This taste-based discrimination against female-female couples implies a hidden gender gap even within the LGBT community. Addressing the gender gap in economic opportunities and outcomes is critical to overcoming the economic inequality for the LGBT community.*

ACCORDING TO THE Williams Institute at the University of California Los Angeles, as of 2017, around 13 million people identify themselves as LGBT (lesbian, gay, bisexual, transgender) and more than 700,000 same-sex couples are living in the US. The discrimination against the LGBT community in the US has long been recognized. Center for American Progress reported in 2016 that 1 in 4 LGBT members expressed the experience of discrimination either in the workplace, school, or public life *(Badgett et al., 2007)*. These numbers have

attracted the attention of economists *(Badgett et al., 2019)* and policymakers. The House of Representatives voted in this past February on the Equality Act, a bill that bans any form of discrimination based on a person's sexual preference.

The mainstream of thinking about discrimination is that the less favorable attitude towards a certain group results in their economic disadvantage. This is what economists call taste-based discrimination *(Becker, 2010; Bertrand & Duflo, 2017; Christafore & Leguizamon, 2019)*. More specifically, the low tolerance towards the LGBT community results in their lower level of education, higher poverty rate, fewer chances of promotion, and lower pay.

Another line of research on discrimination argues that economic inequality results from statistical differences such as education level or personal capability, and this is called the statistical discrimination theory *(Arrow, 1971)*. When applied to the study of the economic inequality faced by the LGBT community, it could most likely be explained by the gaps in educational attainments, work performance, and other individual or family attributes.

Much of the existing research on LGBT discrimination focused on taste-based discrimination. Some researchers have investigated various types of discrimination that the LGBT community encounters *(Vargas et al., 2020)*. Others have tried to explore the relationship between a society's economic inequality and its attitude towards LGBT and showed that an economically equal society tends to be more open and tolerant to the LGBT community *(Andersen & Fetner, 2008)*. Because of the substantial effect of education on income, this paper connects the two research topics by comparing the education and income level of opposite-sex couples and same-sex couples to further identify the economic inequality that the LGBT community faces.

*Each $10,000 increase is associated with a 0.1 percentage point (about 20 percent to the national average) increase in the share of same-sex couples.*

Using data from the US Census Bureau, we conducted state-level comparisons in same-sex couples' education and income level, states' same-sex household percentage, and median household income. We achieved three findings. First, there is a positive correlation between a state's income level and its percentage of same-sex households. However, we didn't find any inverse relationship between income inequality and LGBT tolerance, which is different from the previous study using data from 35 countries *(Andersen & Fetner, 2008)*. Second, there is not a significantly large gap between opposite-sex couples and same-sex couples in terms of education and income levels. Taken as a whole,

same-sex couples have a slightly higher percentage of bachelor degrees, a slightly lower poverty rate, and a slightly higher wealthy household percentage. Third, when separated into male-male couples and female-female couples, a clear economic inequality can be identified for female-female couples, but not for male-male couples. We conclude that the observed economic inequality doesn't exist between same-sex couples and opposite-sex couples but within the LGBT community itself. The economic inequality that LGBT faced is in essence rooted in gender discrimination.

## I. Data and Variables

We used two sets of data from the United States Census Bureau. The first dataset is from the 2019 American Community Survey's session of Characteristics of Same-sex Couple Households. A same-sex household is defined by two people of the same gender either unmarried or married in the same household in the American Community Survey. The dataset provides aggregate data about different characteristics of same-sex couples by state. The second dataset is the 2018 median household income and Gini index of each state, reported in the American Community Survey Brief.

**State-level measures:** When exploring the relationship between a state's economic inequality and people's tolerance of LGBT, we used a state's percent of the same-sex households as an index of tolerance. To measure economic development and economic inequality, we used a state's median household income and Gini coefficient.

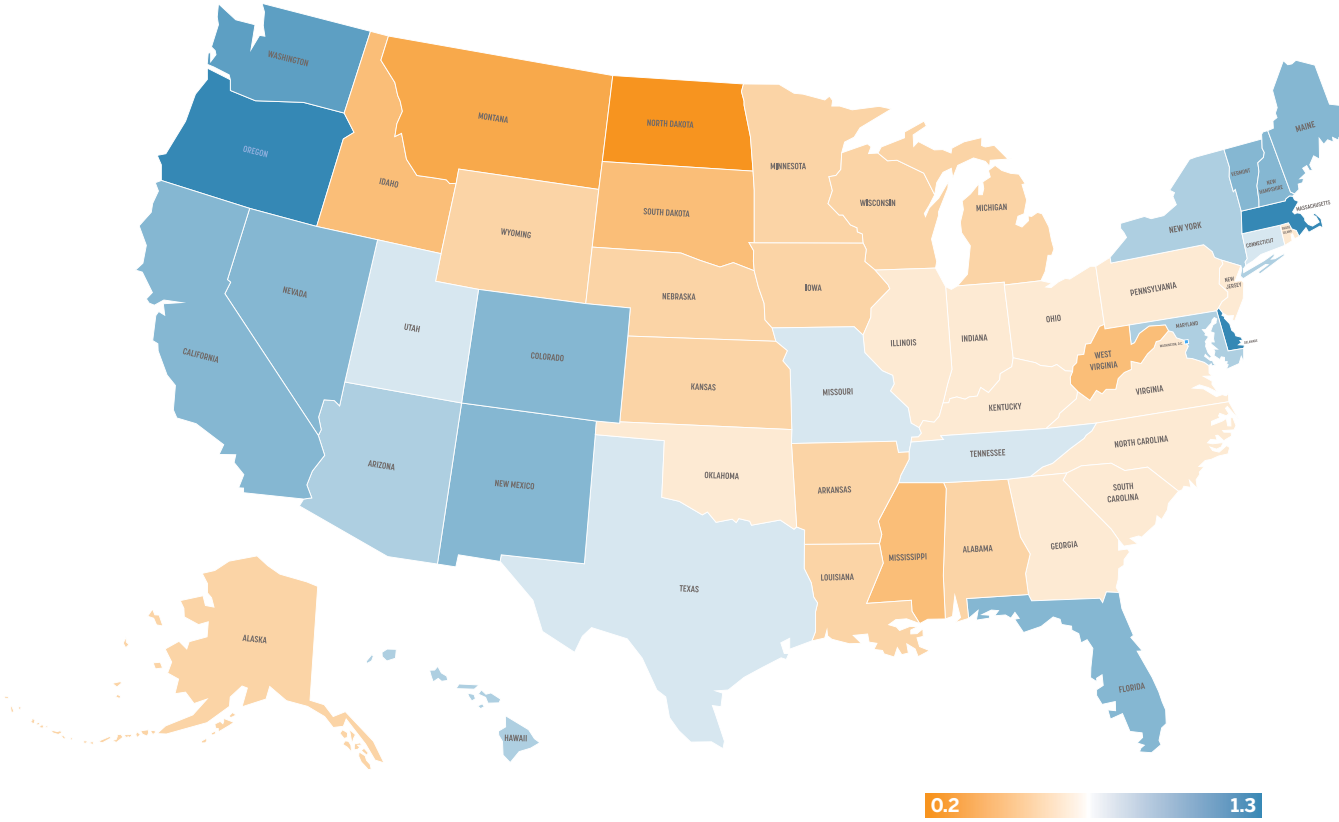
**Individual-level measures for education and income:** We also examined the economic difference same-sex couples face by education and income. A couples' high education level is defined as both partners with at least a bachelor's degree. A couple is considered in poverty if the annual household income is below $35k and considered wealthy if the annual household income is above $100k.

## II. LGBTQ Tolerance and Economic Inequality

There could be a lot of reasons for the density of the LGBT population in an area: for instance, diversity, social inclusion, and economic opportunities *(Cunningham & Nite, 2020)*. We began by examining the distribution of same-sex households by state. *Figure 1* visualizes the percent of same-sex households by state, with orange indicating low percentages (the lowest at around 0.2%) and blue indicating higher percentages (the highest at 1.3%). States with a higher percentage of same-sex households cluster around the west coast, southwest and northeast areas, and Florida. Oregon is a state that supports LGBT

**Figure 1**

## Percent of Same-Sex Household by State



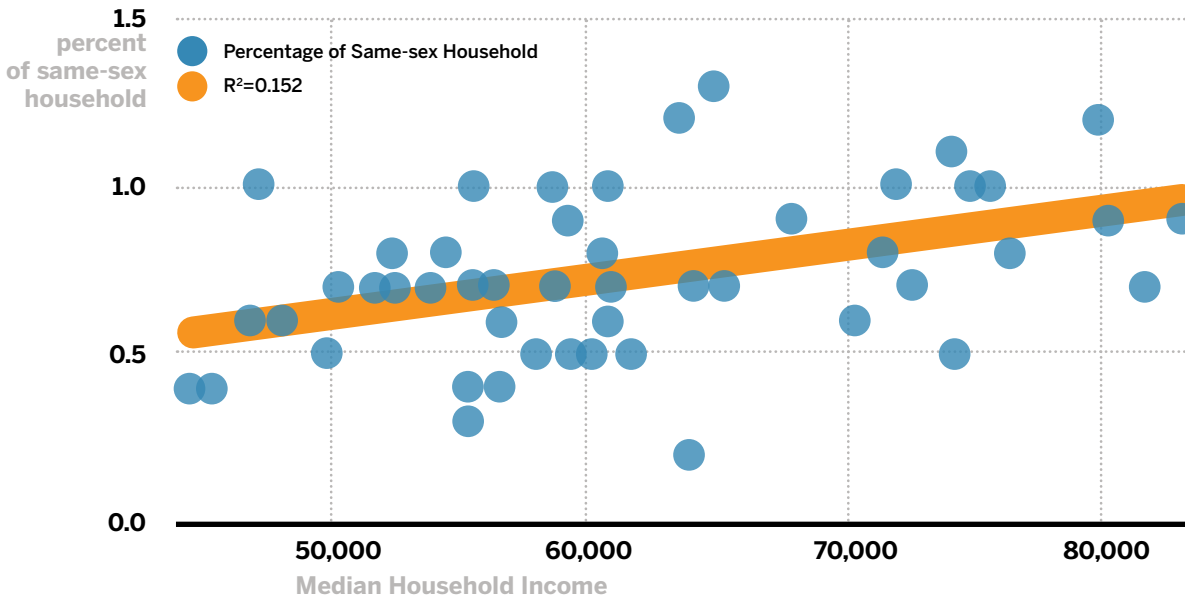

housing, employment, education, healthcare, marriage equality, and it has one of the highest percentages of same-sex households (1.2%). Montana supports marriage equality and transgender healthcare, but it doesn't support LGBT housing, education, or employment, and it has one of the lowest percentages of same-sex households (0.3%).

A previous study by Andersen & Fetner (2008) uses data from 35 countries and finds that national income inequality is negatively correlated to the tolerance of homosexuality. Does the same correlation hold in the United States? We replicated the correlational investigation using the state-level data and compared the percent of same-sex couples of each state and each state's income Gini index, we did not find any significant correlation between them.

A region's openness towards homosexuality can be affected by many other factors such as education levels, cultural background,

**Figure 2**

## Percent of Same-Sex Household by State's Median Household Income



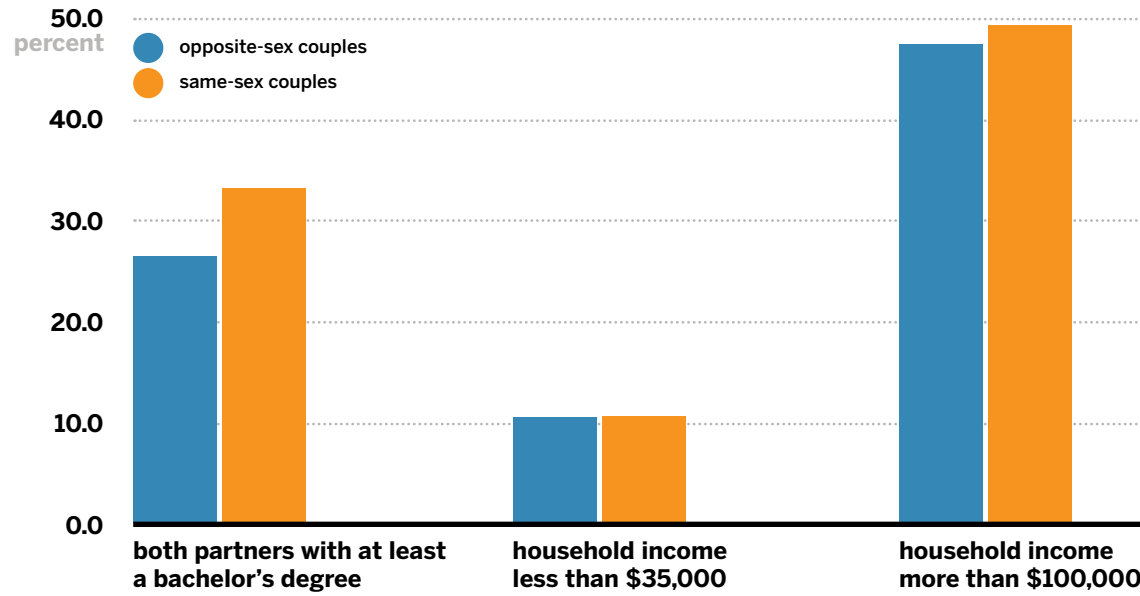

and religions. We then explored the relationship between a state's percent of same-sex couples and its median household income. *Figure 2* shows a positive correlation. Results from a linear regression suggest that a state's median household income explains 15.2% (R-squared) of the variation in the percent of same-sex couples. Each $10,000 increase is associated with a 0.1 percentage point (about 20 percent to the national average) increase in the share of same-sex couples. This result implies that, as an area's economy develops and income level goes up, more people move in, and diversity increases, which would increase people's openness to the LGBT community *(Andersen & Fetner, 2008)*.

### III. Income Inequality between Opposite-sex Couples and Same-sex Couples

The previous section looks at between-state variations. In this section, we examine between-household differences. *Figure 3* shows that, compared with opposite-sex couples, same-sex couples have a higher

**Figure 3**

## Percent of Same-Sex Household by State's Median Household Income



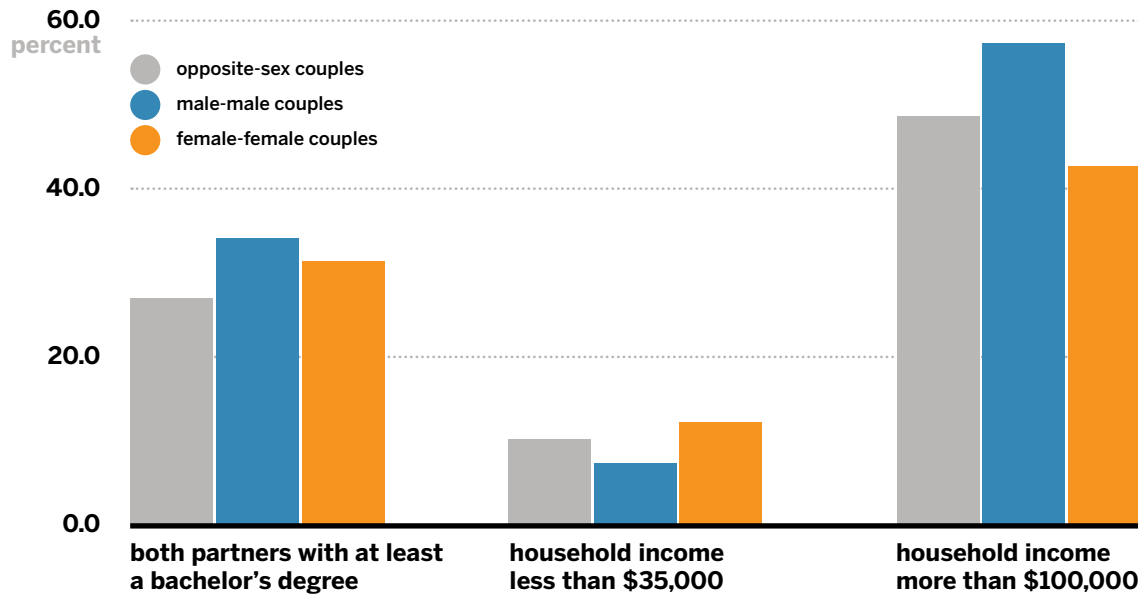

rate (33% vs 27%) of higher education degrees, a slightly lower percent (10.3% vs 10.4%) below the poverty line, and a slightly higher rate of wealthy household (49.3% vs 48.4%). Because of the strong positive correlation between education attainment and income level, same-sex couples have a higher level of education thus a higher level of income. On average, it doesn't seem to show any sign of economic disadvantage towards LGBT couples.

### IV. Income Inequality within LGBTQ Community

The indifference in education and household income between same-sex couples and opposite-sex couples in *Figure 3* is masked by a large gender gap. When we separate same-sex couples into male-male and female-female couples and compare them with opposite-sex couples, we find large differences in economic outcomes. Results in *Figure 4* suggest that, among the three groups, male-male couples have the highest percentage of above bachelor educational attainment at close to 35% and the highest percentage of wealthy households at 57%

**Figure 4**

## Comparison between Male-Male Couples and Female-Female Couples by Education and Income




as well as the lowest percentage of households in poverty at 7.8%. Female-female couples, on the other hand, have the second-highest percentage of above bachelor educational attainment at around 32% but the lowest percentages of wealthy households at around 43% as well as the highest percentage of having a household below the poverty line at around 13%.

*Figure 4* shows that female-female couples are well-educated but still suffer from poverty much more than opposite-sex couples who have significantly less education but make on average far more. This could be due to the fact that taste-based discrimination does exist towards the LGBT community, but mainly against female-female couples *(Badgett et al., 2007)*. It could also be because even as recent as 2019, there is still a major wage gap between males and females in the labor force regardless of education level *(Petrongolo, 2019)*.

Men are known to currently have a higher median income than women, so putting two males together who are both employed and well educated will likely lead to them having a higher combined household

median income regardless of possible discrimination faced as a result of their sexual preference. On the other hand, when a couple is opposite-sex, at the same education level, the disadvantage of the female's lower income can be offset by the male's higher income. When two females, who would already be at a wage disadvantage from their gender, make up a household, they would be at an even larger disadvantage. As a result, female-female couples suffer the most economically from this gender discrimination.

## V. Conclusion

This paper explores the relationship between economic inequality and tolerance towards LGBT as well as the economic inequality that the LGBT group is faced with. We show that, in the United States, tolerance towards LGBT increases as the income level increases, regardless of income inequality. While there is no significant difference between opposite-sex couples and same-sex couples in education and income inequality, however, when we compare opposite-sex couples, male-male couples, and female-female couples, we find that even with higher education levels, female-female couples still have higher poverty rates and lower-income. Our findings suggest that taste-based discrimination exists mainly towards female-female couples; furthermore, part of the economic inequality results from the gender gap in economic opportunities and outcomes.

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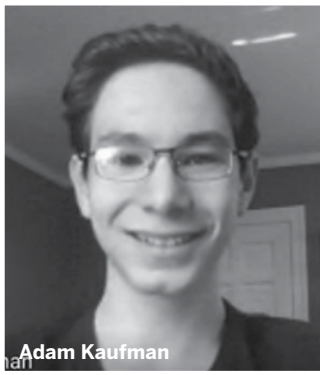

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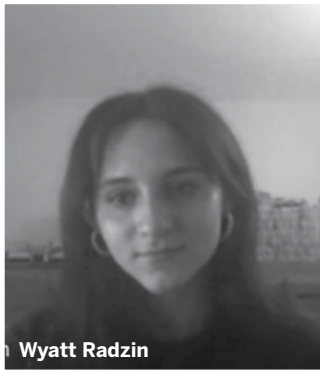
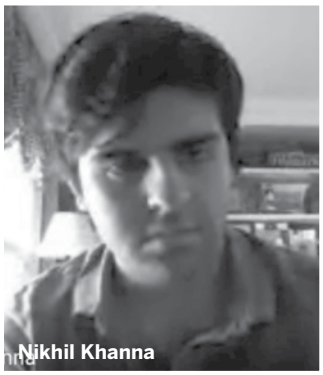


Wyatt Radzin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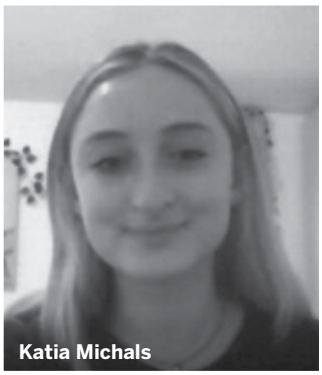
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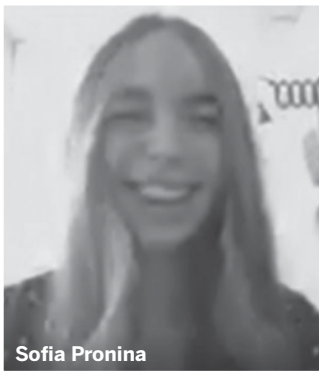
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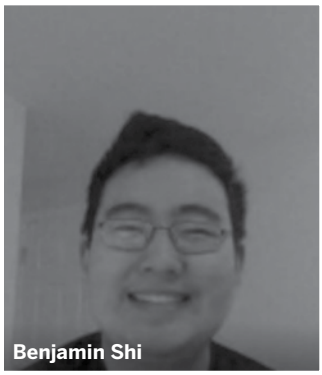
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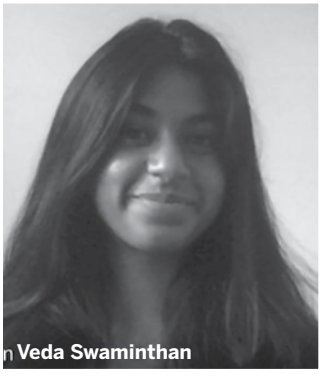
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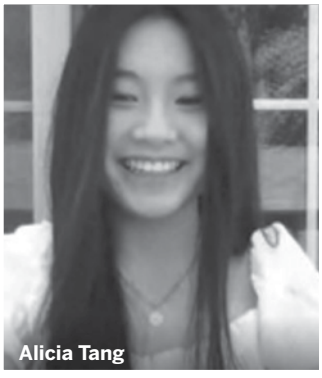
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# Greenwich High School

Greenwich, CT

# The COVID-19 Pandemic and the Circular Relationship Between Educational and Economic Inequality

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## ABSTRACT

*In the contemporary United States, it has grown clear that educational and income inequality are mutually reinforcing, amplifying one another through a positive feedback loop. As individuals attain higher levels of education, they become more desirable workers, subsequently earning higher incomes. In the United States, a nation where educational access is often closely tied to economic background, high-earners can often secure for their children, greater resources at the primary and secondary levels and, eventually, greater access to post-secondary studies. Their well-educated children then generally proceed to earn similarly high incomes, perpetuating the circular relationship between educational and income inequality. Amidst the economic consequences of COVID-19, low-wage workers faced unemployment and low-income students struggled without educational support. Through aggravating income and educational disparities, COVID-19 has strengthened the existing cycle of inequality*

*in a manner that will likely linger for years to come. By implementing targeted policy strategies—namely, categorical grants and tax credit stimulus—the federal government would take a promising first step toward mitigating the long-term economic impacts of COVID. Only through addressing this ongoing challenge will the US begin to tackle the age-old link between educational and income inequality.*

## 1. Introduction

FOR A NATION founded upon equal opportunity, the United States faces alarming inequalities in both education and income. In recent months, the enduring relationship between these two inequalities has been intensified by the COVID-19 pandemic as it wrought havoc across the US. Though affluent Americans can generally access supplemental academic materials, students of lower incomes often find themselves unable to afford even the most basic learning tools. Unsupported low-income students struggle to achieve higher grades, attend top universities, and consequently, work their way into higher paying jobs. As a result, children from lower income families are trapped in a cycle of poverty, receiving a subpar education and later struggling to ascend the income ladder. In this regard, the recent COVID-19 pandemic has been particularly detrimental to the lowest income brackets, actively exacerbating the circular relationship between educational and economic inequality.

## 2. The Extent of Educational Inequality

Education, aspirationally called the 'Great Equalizer,' is one of the most significant determinants of economic success. Equal access to education can give students from any background the opportunity to secure a high-paying job, but when applied unequally, education creates an economic caste system that greatly hampers upward mobility.

A number of factors contribute to educational inequality in the US. Notably, low-income Americans often encounter several hurdles on their route to education, including malnourishment, unstable housing, and a lack of learning materials both digital and paper based. Additionally, since public education primarily subsists off of local property taxes, wealthier regions generally offer greater educational support. *Figure 1* provides a clear illustration of this relationship by comparing 2015 PISA mathematics scores amongst American students, which were positively correlated with annual government spending per student *(Evans)*. Spending by district is highly unequal; while the Northeast,

as indicated by *Figure 2a*, typically spends above the U.S. average of $11,841 per student, the Southeast and Southwest spend far less *(Turner)*. Furthermore, great disparities exist within each state. Connecticut serves as an effective example: Bridgeport, a lower-income community, spends an average of $14,051 per student, while the wealthier Fairfield school district spends $17,928 *(Johnson; Jones)*. The distribution of district spending in the US, as seen in *Figure 2b*, is palpably skewed right, indicating that the majority of districts spend below the average, and that the mean, influenced by the most wealthy districts, is greater than the median *(Turner)*. In all, the quality of education students receive across America is intrinsically tied to the affluence of their locality, with the wealthiest areas greatly outspending the rest.

Racial inequality is also intertwined with educational inequality. Decades of racial segregation have produced a worrying gap between education in communities that are primarily white and those that are primarily minority, a disparity revealed through differences in funding. Schools with more than 90% students of color spend $733 less per student annually than schools with a makeup of over 90% white students. Additionally, within schools, minority groups are more frequently entangled in disciplinary troubles; black students are 3.8 times more likely to receive one or more out-of-school suspensions than white students. Minorities are also significantly underrepresented in advanced programs and classes. Black and Hispanic students make up 38% of students in schools that offer Advanced Placement (AP) classes, but only 29% of students that are enrolled in at least one AP course *("K-12 Disparity Facts and Statistics")*. Trends such as these lead to great disparities across district performance; for example, while black students retain a 52.5 District Performance Index (DPI) in Bridgeport, CT, they do not even make the charts for white-majority Fairfield, CT. Even within Bridgeport itself, the white population still performs considerably better than the black population (*Figure 3*). This educational inequality in turn worsens racial economic inequality by making it more difficult for minority students to find economic success post-education.

*In this regard, the recent COVID-19 pandemic has been particularly detrimental to the lowest income brackets, actively exacerbating the circular relationship between educational and economic inequality.*

As education level and future earnings are positively correlated, educational inequality reinforces income inequality. According to *Figure 4*, for example, the median incomes for workers with high school degrees and workers with bachelor's degrees are $749 and $1,281 per

week respectively. These values represent a broader trend: as an individual obtains a higher degree of education, their median earnings rise. Furthermore, just as educational inequality produces income inequality, income inequality produces educational inequality. For instance, *Figure 5* illustrates that though the lowest income quartile has a post-secondary continuation rate of only 60%, the continuation rate for members of the top income quartile is 87%. The 27% gap between the top and bottom quartiles represents a stark difference in educational attainment among high- and low-income students. Likewise, according to *Figure 6*, only 10% of the dependents who obtained a bachelor's degree by the age of 24 were in the bottom quartile for family income, while 54% were in the top income quartile. These disparities reflect a significantly stronger level of educational attainment among dependents of the top quartile, a trend that ultimately feeds the cycle of income inequality.

*Bridgeport, a lower-income community, spends an average of $14,051 per student, while the wealthier Fairfield school district spends $17,928.*

## 3. Impact of COVID on Income and Educational Inequality

The American public felt the seismic economic impacts of the pandemic during the national lockdown. As a result of social distancing measures, aggregate demand decreased, leading to 100,000 business closures and 30 million worker lay-offs by May 2020 (*Long; Morath*). While hardships were felt across the spectrum, low-wage workers suffered the most. By mid-April, the employment rate for low-wage workers (less than 27k per year) had decreased by 37.1%, while the employment rate of high-wage workers (more than 60k per year) decreased by only 12.9% (*Figure 7*). Alongside gradual reopening, fiscal stimulus through the CARES Act and stimulus checks were able to partially revive the economy; however, the issue of economic inequality remains evident in the recovery process.

As of February 2021, though employment among those in lower income brackets is still down 17%, employment has already surpassed pre-COVID levels in higher income brackets (*Figure 7*). COVID's disproportionate impact on low-income earners can be attributed to the disease's outsized effects on the service industry, which is largely composed of workers without degrees. Conversely, degree-holding workers from higher income brackets have been far more likely to be able to work from home. Unfortunately, the stimulus has by no means been equally distributed. Though some relief has been provided to low-in-

come earners, much of the US's economic stimulus has been doled out to large corporations. In fact, in the recent Paycheck Protection Program (PPP) loan scheme—a central component of the US government's COVID-19 relief plan—one percent of borrowers received more than 25% of the total loan money *(Cowley and Koeze)*. This unequal disbursement fuels pre-existing employment and income gaps.

Likewise, COVID has had different educational impacts for students of varying socioeconomic backgrounds. In response to the pandemic, most school districts have opted for "distance learning" policies in which students learn digitally using either hybrid or fully remote learning schedules. Many urban centers with large low-income populations in particular, such as Chicago, Los Angeles, and New York City, have been required to follow a fully remote learning schedule for the academic year *("In-Person Index for K-12 Public Schools")*. As shown in ***Figure 8***, this shift appears to have drastically affected low-income student participation, which has fallen by 17.3% in math classes since Jan 20th, 2020. Chronic absenteeism, a measure of student engagement and participation, was already a severe issue in lower-income communities (***Figure 9***). Meanwhile, high-income students have continued to attend and participate in online classes. In fact, student participation in math coursework among high-income students has increased throughout the pandemic by 2.4% (***Figure 8***). The quality of education is also impacted by moving to a digital format. Estimates show that the overall impact of COVID-19 on education will result in the loss of the equivalent of around 6.8 months of learning on average. The impact is far more severe for low-income students, however, coming in at the equivalent of 12.4 months of lost school *(Dorn)*. Furthermore, 86% of black students and 79% of Hispanic students have received low quality instruction or no instruction at all throughout the pandemic, as compared to only 62% of white students *(Dorn)*.

One major contributor to this disparity is internet access, as simultaneous streaming and recording requires access to broadband that many low-income families cannot afford. In fact, in 2018, 17 million US children lived in homes without high-speed internet *(Balingit)*. Likewise, according to ***Figure 10***, in the same year, 24% of children in families making less than $30,000 were unable to complete their work because of a lack of reliable internet connection. The ensuing digital "homework gap" disproportionately affects minority households; 25% of black students and 17% of Hispanic students were unable to complete their work due to unstable internet connection and 21% of black students and 9% of Hispanic students had to use public WiFi to complete their work due to a lack of home internet (***Figure 10***). When cou-

pled with the strain of multiple students studying in the same household and/or parents working remotely, many low-income families simply lack adequate internet access to make digital learning realistic.

Parents from higher income backgrounds also have more time to invest into their children's education. In general, remote learning has required a greater time input by parents in homeschooling their children. This trend can be observed when comparing parental educational time with children pre-pandemic to during the pandemic, which rose from an average of 1.26 hours per day in 2019 to 5.15 hours per day in 2020. This increase in parental time is disproportionate given that wealthier parents, whose jobs allow them to work from home, have the capability to invest more time into helping their children with school-related tasks. As seen in ***Figure 11***, parental time investments by parents in the top income deciles are 50 and 70 percent higher than average- and low-income parents respectively. Another factor that has likely exacerbated educational inequality throughout the pandemic is household environment. While students from wealthier families often have access to larger and quieter homes, students in low-income households may struggle to overcome family distractions in shared spaces. As such, students in the lowest income families bear a greater burden during school shutdowns.

*...the median incomes for workers with high school degrees and workers with bachelor's degrees are $749 and $1,281 per week...*

This educational gap has had and will continue to have long-lasting consequences. A study conducted by McKinsey & Company concluded that the United States lost up to $550 billion in 2019 because the educational achievement gaps between low-income and high-income students wasn't resolved in 2009; an additional $705 billion was lost because of the same gap between black and Hispanic students compared to their white peers *(Dorn)*. Looking into the future, a study conducted by Agostinelli et al used a quantitative model to analyze the long-run impact of high-school COVID-19 closures *(Agostinelli et al)*. ***Figure 12*** illustrates the initial shock of COVID-19 on a 9th grader's accumulation of skills over the course of a school year as well as a projected curve for those same children by the end of high school. Both the original COVID-19 shock and long-term skill accumulation paths are uneven across different income percentiles. In fact, in the poorest neighborhoods, this loss of skills equated to a decrease of a half a point of the standard four-point grade point average. Meanwhile, more affluent neighborhoods observed no learning losses and the top decile even saw a slight improvement in performance, pointing to the long-lasting, dis-

proportionate effects of the pandemic on education.

As the pandemic impairs education unequally across the United States, it will exacerbate the existing cycle of educational and economic inequality, inhibiting social mobility and hindering future workers from attaining economic success.

## 4. Conclusion and Further Thoughts

With greater recognition of the pandemic's impact on education and income inequality, the US must begin to work towards solutions. As previously discussed, educational and income inequality are mutually reinforcing. Thus, to fully address income inequality, the US must specifically target educational inequality in a manner that moves beyond the broader goals of earlier COVID relief bills. Though education often falls under state jurisdiction, a number of federal avenues are available. For instance, a system of education-oriented categorical grants could bypass state control to ensure that, regardless of state, all students have improved access to education. To address unequal distribution of digital devices, for example, this system would provide grants from the federal government directly to school districts who apply for aid to increase technological access. Additionally, the federal government should continue to implement a Child Tax Credit, which provides additional support to low-income families with children *(Taylor)*. Beginning in 2021, lower-income families will receive a fully refundable tax credit of $3,000 per child aged 6-17 and $3,600 per child under six. Such tax-credits can enable low-income families to afford to spend more on educational materials for their children. While legislative accommodations to bolster the remote system can never fully replicate in-person learning, categorical grants and additional stimulus could begin to bridge the digital divide.

Ultimately, in light of the COVID-19 pandemic, the structural link between economic and educational inequality has been highlighted and amplified. These inequalities illustrate the difficulties of establishing a pure meritocracy, especially in the midst of a pandemic. Going forward, the United States must take comprehensive yet targeted actions to secure equal opportunity for its students.

**Figure 1**

**Education spending and student learning outcomes**

*https://blogs.worldbank.org/impactevaluations/education-spending-and-student-learning-outcomes*

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**Figure 2a**

**Spending per Student in 2016, by School District**

**Figure 2b**

**What Districts Spend across the U.S., 2016**

*https://www.npr.org/2016/04/18/474256366/why-americas-schools-have-a-money-problem*

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**Figure 5**

**High School Graduates College Continuation Rates by Family Income Quartile: 1970 to 2014**

*https://www.luminafoundation.org/wp-content/uploads/2017/08/indicators-of-equity-2016.pdf*

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**Figure 6**

**Distribution by family income quartile of dependent family members aged 18 to 24 who attained a bachelor's degree by age 24: 1970 to 2014.**

*https://www.luminafoundation.org/wp-content/uploads/2017/08/indicators-of-equity-2016.pdf*

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**Figure 7**

**Employment rates by wage levels, Jan 2020 - Jan 2021**

*https://tracktherecovery.org/*

Figure 3

## 2018-19 School District Performance for Fairfield, CT...

A District Performance Index (DPI) is the average performance of students in a subject area (i.e., ELA, Mathematics or Science) on the state summative assessment. The DPI ranges from 0-100. A DPI is reported for all students tested in a district and for students in each individual student group. Connecticut's ultimate target for a DPI is 75.

| | English Language Arts (ELA) | | Math | | Science | |
|---|---|---|---|---|---|---|
| | Count | DPI | Count | DPI | Count | DPI |
| **American Indian or Alaskan Native** | * | * | * | * | * | * |
| **Asian** | 372 | 81.9 | 327 | 82.4 | 143 | 80.7 |
| **Black or African American** | * | * | * | * | * | * |
| **Hispanic or Latino of any race** | 576 | 70.7 | 575 | 66.7 | 263 | 66.7 |
| **Native Hawaiian or Other Pacific Islander** | 0 | N/A | 0 | N/A | 0 | N/A |
| **Two or more Races** | 230 | 81.1 | 230 | 79.2 | 84 | 78.5 |
| **White** | 4,006 | 79.1 | 3,998 | 75.9 | 1,749 | 76.1 |

## ...and Bridgeport

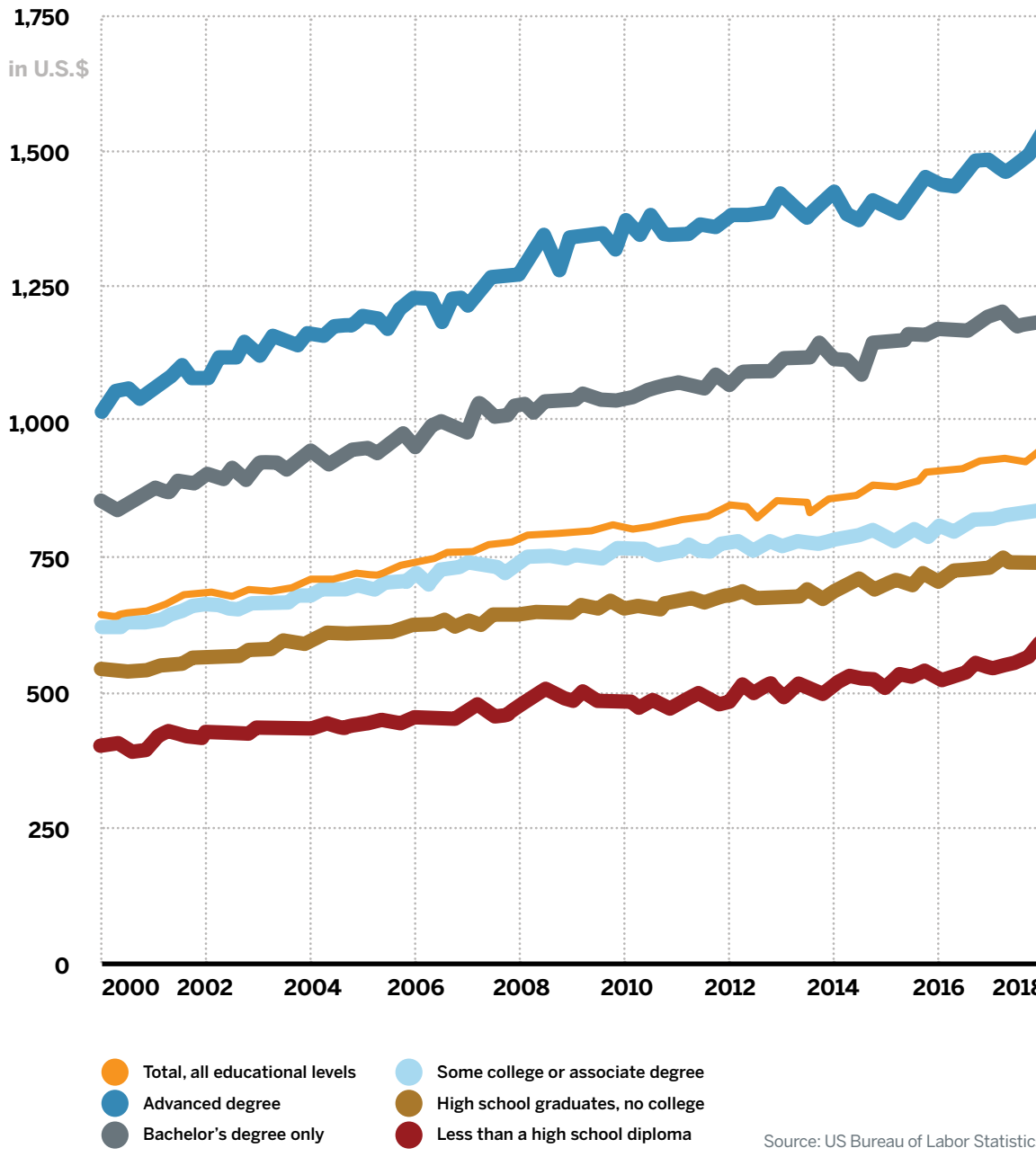
| | | | | | | |
|---|---|---|---|---|---|---|
| **American Indian or Alaskan Native** | 82 | 61.0 | 82 | 54.1 | 27 | 57.7 |
| **Asian** | 248 | 65.0 | 248 | 60.6 | 115 | 62.0 |
| **Black or African American** | 3,368 | 52.5 | 3,356 | 43.6 | 1,349 | 45.6 |
| **Hispanic or Latino of any race** | 4,877 | 53.3 | 4,872 | 45.5 | 1,851 | 48.0 |
| **Native Hawaiian or Other Pacific Islander** | 15 | * | 15 | * | 8 | * |
| **Two or more Races** | 91 | 60.4 | 91 | 53.1 | 38 | 58.1 |
| **White** | 1,080 | 60.9 | 1,079 | 54.6 | 414 | 56.3 |

*** When an asterisk is displayed, data have been suppressed to safeguard student confidentiality, or because of a very small sample size.**

**Figure 4**

## Median usual weekly earnings of full-time wage and salary workers age 25 years and older

*educational attainment, first quarter 2000–third quarter 2019, not seasonally adjusted*




Source: US Bureau of Labor Statistics

Figure 9

## 2018-19 Measures of Chronic Absenteeism in Fairfield...

| | Chronic Absenteeism[4] | | Suspension / Expulsion[5] | |
|---|---|---|---|---|
| | Count | Rate (%) | Count | Rate (%) |
| **Female** | 252 | 5.4 | 28 | 0.6 |
| **Male** | 291 | 5.9 | 153 | 2.9 |
| **Black or African American** | * | * | 16 | 6.6 |
| **Hispanic or Latino of any race** | 85 | 7.6 | 39 | 3.3 |
| **White** | 391 | 5.4 | 104 | 1.4 |
| **English Learners** | 25 | 9.3 | 9 | 3.1 |
| **Eligible for Free or Reduced-Price Meals** | 158 | 10.3 | 91 | 5.2 |
| **Students with Disabilities** | 162 | 11.9 | 65 | 4.0 |
| **District** | 543 | 5.6 | 181 | 1.8 |
| **State** | | 10.4 | | 6.7 |

Number of Students in 2017-18 qualified as truant under state statue: 377
Number of school-based arrests: Fewer than 6

## ...and Bridgeport

| | | | | |
|---|---|---|---|---|
| **Female** | 1,756 | 18.7 | 987 | 9.4 |
| **Male** | 1,933 | 19.0 | 1,676 | 14.5 |
| **Black or African American** | 1,234 | 18.5 | 1,288 | 17.2 |
| **Hispanic or Latino of any race** | 1,956 | 20.7 | 1,128 | 10.6 |
| **White** | 418 | 16.3 | 191 | 6.5 |
| **English Learners** | 680 | 17.5 | 261 | 6.2 |
| **Eligible for Free or Reduced-Price Meals** | 2,960 | 21.4 | 2,241 | 13.3 |
| **Students with Disabilities** | 1,001 | 27.1 | 674 | 15.4 |
| **District** | 3,689 | 18.8 | 2,663 | 12.0 |
| **State** | | 10.4 | | 6.7 |

Number of Students in 2017-18 qualified as truant under state statue: 7,386
Number of school-based arrests: 12

* When an asterisk is displayed, data have been suppressed to safeguard student confidentiality, or because of a very small sample size.

[4] A student is chronically absent if they miss ten percent or greater of total number of days enrolled in the school year for any reason. Pre-Kindergarten students are excluded from this calculation.

[5] This column displays the count and percentage of students who receive at least one in-school suspension, out-of-school suspension or expulsion.

**Figure 8**

**Impact of COVID on student participation in math coursework by income level 2020-21**

*https://tracktherecovery.org/*

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**Figure 10**

**Internet and technology access across income and race 2020-21**

*https://www.pewresearch.org/fact-tank/2020/03/16/as-schools-close-due-to-the-coronavirus-some-u-s-students-face-a-digital-homework-gap/*

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**Figure 11**

**Simulated effects of COVID on parenting: authoritative investments in Grade 9 and Grade 10, 2020-21**

*https://www.nber.org/system/files/working_papers/w28264/w28264.pdf*

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**Figure 12**

**Simulated effects of COVID on a 9th grader's skills 2020-21**

*https://www.nber.org/system/files/working_papers/w28264/w28264.pdf*

Source: Connecticut State Department of Education

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Citation Formatting: **MLA 8**


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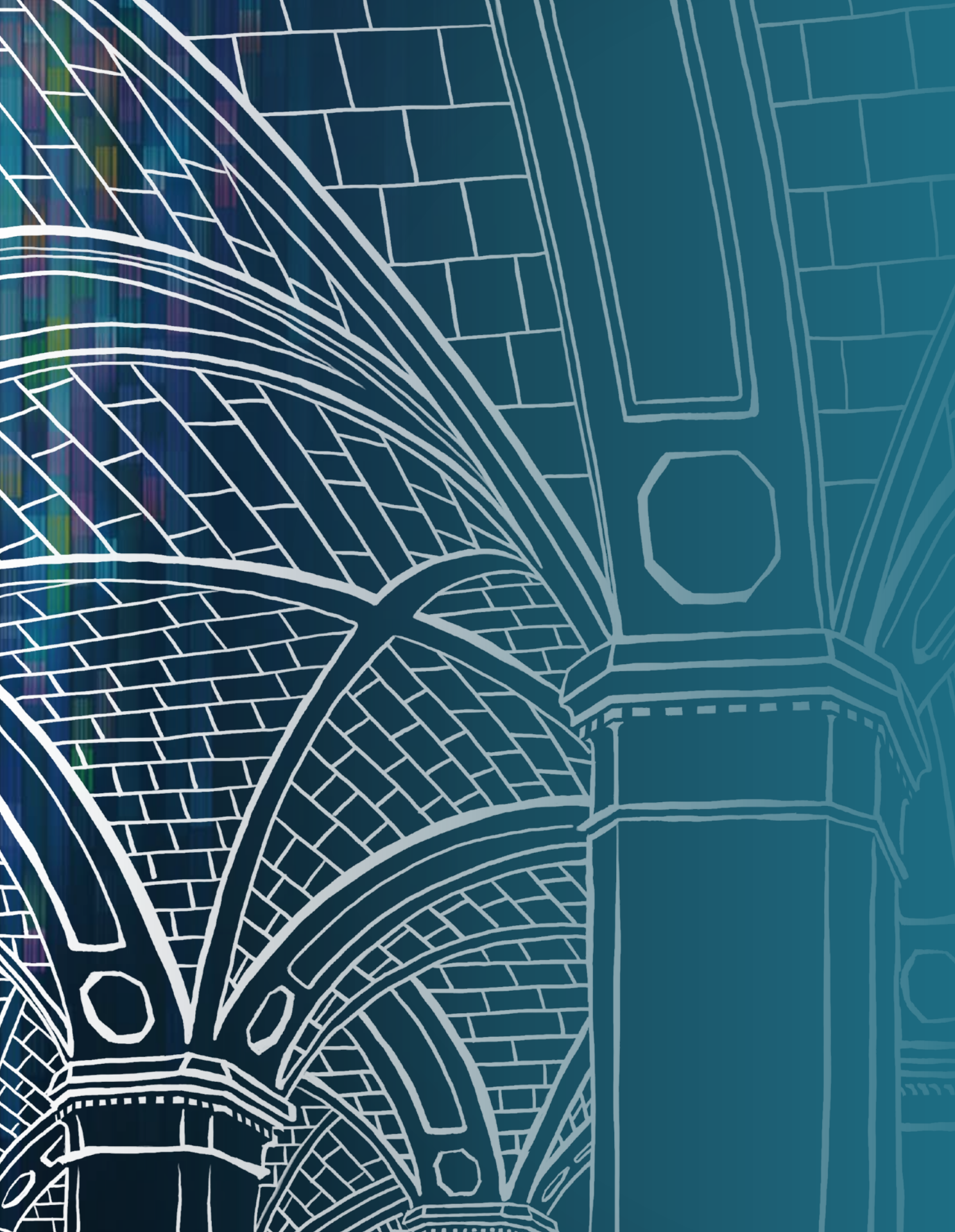

Front L to R: Erin Barr, Audrey Armstrong, Zelie Goldberg Little
Back L to R: Clay Seliga, Nico Jordan, Gerard Trimarco (advisor)
Not pictured: Alexander Sas

# The High School for Math, Science and Engineering

## @ CCNY New York, NY

# The Effects of Gentrification on Economic Inequality in Bedford-Stuyvesant

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In New York City, gentrification is a direct and steadily growing cause of economic inequality. In Brooklyn, prices have risen significantly as wealthier, often white residents move into historically working class neighborhoods, driving social and economic change. In recent years, some of the most radical change has occurred in the neighborhood of Bedford-Stuyvesant (nicknamed Bed-Stuy). Often cited as a prime example of a rapidly gentrifying neighborhood, Bed-Stuy serves as a microcosm of a much more endemic issue surrounding the inequities of gentrification. As new middle and upper-class residents move in, the cost of living rapidly increases, making it more difficult for long-term residents to make ends meet. Basic necessities like rent and groceries become increasingly more unaffordable, and working-class residents are forced to move out of homes they have lived in their whole lives. All the while, the wage gap between Bed-Stuy's new and old residents grows ***(Bedford Stuyvesant Neighborhood Profile)***. From the outside it is easy to ignore the negative effects of gentrification. After all, more restaurants, retail, and art galleries sound appealing, not to mention all the building and street renovations. But these changes to make the neighborhood a "nicer" place affect the livelihood of working-class residents, as the benefits of Bed-Stuy's transformation are often inaccessible to them and do

not address the systemic inequality that hinders their social mobility. These changes pose the question: why has Bed-Stuy seen so much gentrification, and what can be done to reduce the economic inequality it causes?

In the early decades of the 20th century Bed-Stuy was not primarily a Black community. Until the 1930s the Black community represented 1.4% of the total population, in 1930 it rose to 12% (*Hymowitz 1*). The Black population was not that prominent, yet the neighborhood was still redlined in 1934. The effects of redlining in the 1930s continued to be felt well after its inception. Redlining allowed for banks to prevent the granting of loans or selling of property in areas deemed "dangerous" by the Home Owners' Loan Corporation (HOLC). In a clear deference to the racist practices that not only those in the HOLC practiced but also the federal government of the era, most of these areas were primarily minority communities. From the lack of funding going into the community, to both buy property or improve what they already owned, Bed-Stuy became ridden with dilapidated homes and gained limited municipal assistance. The once architecturally stunning area fell into disrepair, once grand brownstones were instead sectioned off into small apartments to rent out so homeowners could afford the cost of living (*Hymowitz 1*) mainly due to underfunding brought about by redlining. Many residents fled the struggling community, mainly Jews and Italians, leaving the community over 50% Black by 1950 (*Hymowitz 1*). Those who did remain were forced to take loans from private lenders at insane interest rates, the beginnings of predatory lending which would continue decades later (*Spellen 1*). With very little aid and even less people interested in truly helping improve the community, the sentiment became one of pure survival. For the rest of the 20th century the slogan for Bed-Stuy was "Do or Die," a practice most residents lived by simply to make ends meet.

*"To this day, Restoration has continued operation and at one point was second only to the City of New York for the title of largest real estate owner in NYC."*

There have been attempts to better the economic standing for all Bed-Stuy residents, rather than only the most affluent. In 1967, to counter the long-lasting effects of redlining, the Bedford-Stuyvesant Restoration Corporation (referred to as Restoration) was founded by Senator Robert Kennedy as a non-profit community organization to improve the living conditions of the citizens of Bed-Stuy and close the gaps inside the community. To this day, Restoration has continued operation and at one point was second only to the City of New York for

the title of largest real estate owner in NYC. Restoration has constructed or renovated 2,300 units of affordable housing and repaired the facades of 150 homes in the Bed-Stuy area *(Bedford Stuyvesant Restoration Corporation)*. Restoration has also made progress in adding more job opportunities through the creation of Restoration Plaza, a mixed-use development including affordable housing, office space, and retail. This increase in retail and housing opportunities has become a double-edged sword: they have been able to aid those most in need, but at the same brought in newer more economically advantaged residents.

In Bedford-Stuyvesant, many original brownstones, built in the late 19th century, were sold in the 1990s and 2000s for far below market price through a practice known as "blockbusting," where complete strangers would walk up to random homes in the area and offer around $30,000 cash to occupants for their residences. Most homeowners were not aware that the market price for their homes were more than one million dollars *(The Neighborhoods Project...)* and so they accepted the $30,000, thinking they were getting a good deal— falling prey to an all-too-common predatory real-estate scam. At the same time, in rent-regulated buildings, tenants were harassed into leaving their homes in favor of higher-income households. Bed-Stuy alone made up 15% of foreclosures in Brooklyn from 2005-2011 *(The Bedford Stuyvesant... 16)*. During the Subprime Mortgage Crisis in 2008, Bed-Stuy had a foreclosure rate double that of both Brooklyn and New York City as a whole *(The Bedford Stuyvesant... 23)*. Most of these homes went to the middle and upper-class newcomers who opened or patronized new businesses that further priced out longtime residents. While some longtime residents have managed to hold on to their homes throughout the years, they continue to face discrimination and unfair rent practices. One-third of Bed-Stuy residents live in rentals that are not subject to rent regulation, meaning the landlords can price them out in favor of more wealthy tenants *(An Economic Snapshot... 5)*. With their rents subject to change at the drop of a hat, many long-term Bed-Stuy residents live in a state of constant uncertainty. Will their landlord decide tomorrow to raise their rent in favor of attracting wealthier tenants? Long-term residents have no way of knowing.

*In 2008, Bed-Stuy had a foreclosure rate double that of both Brooklyn and New York City*

In recent years, Bed-Stuy has seen a massive surge in economic activity, spurred by an influx of new residents as well as city investment. Classified as a "gentrifying neighborhood" by the office of the New York State Comptroller, the population has grown by 25 percent

over a fifteen-year period *(An Economic Snapshot... 1)*. Bed-Stuy is an attractive neighborhood for new residents, with enticing housing prices and good transit access to Manhattan and other commercial centers of the city. However, the bulk of these new residents have a higher income than long-term residents, "putting pressure on housing costs, [and] making it increasingly less affordable for long-term residents, especially seniors, to remain in the neighborhood" *(An Economic Snapshot... 1)*. Demographic changes have come swiftly as well, impacted by this rise in population. Once one of the most prominent Black neighborhoods in New York City, the proportion of Black Bed-Stuy residents has decreased from "three-quarters [...] to half its population" from 2000 to 2015 *(An Economic Snapshot... 2)*. In comparison, between 2000 and 2010 the white population increased by almost 16,000 *(Lewis, et al)*. These new white residents account for much of Bed-Stuy's new middle and upper-class population. This increase in new residents, especially white residents, has increased the cost of living, alienating longtime residents both culturally and financially.

*Between 2000 and 2010 the white population increased by almost 16,000*

The increase in income brought in by Bed-Stuy's new residents has dramatically affected job growth. Since 2000, the number of businesses has increased by 123 percent, making it the fourth-fastest growth rate of any New York City neighborhood as of 2010 *(Brooklyn Neighborhood Economic Profiles 14)*. The most notable job growth has occurred within the retail trade and the leisure and hospitality sectors, due to a boom in restaurants, cafés, bars, retail shops and live entertainment, which cater to the neighborhood's new residents as they are the ones who can afford the services. This is a problem for Bed-Stuy's working-class population, as goods and services (including basic necessities such as groceries) are rapidly becoming more and more unaffordable, and long-standing businesses (like Head Hunter Barbershop, which closed after 70 years of operation) are priced out of existence. In most cases, new businesses are a sign of economic growth and lead to a higher economic standing for the entire community. However, this new growth is not equitable and leaves the most disadvantaged in exactly the same, or in some cases a worse position than they were previously. As a result, the wage gap in Bed-Stuy continues to grow: in 2015, the median household income of new residents was $50,200 and long-term residents was $28,000 *(An Economic Snapshot... 1)*.

In response to this issue, as of 2016 the inclusion of affordable housing in new private housing developments was made mandatory in New York City — however, these "affordable" apartments remain fi-

nancially unattainable for most Bed-Stuy residents. For instance, a proposal in 2019 to build a new apartment building in the neighborhood was approved by the City Planning Commission, with the project subject to Mandatory Inclusionary Housing, the aforementioned policy that requires developers to incorporate affordable residences *(Gray 1)*. The rule requires developers to leave 25% of residential floor area for housing units priced for residents making 60% of the Average Median Income (AMI) for New York City *(NYC Planning)*. In New York City 60% AMI correlates to an income of $46,620 for a family of 3. However, in Bed Stuy, over 48% of the population makes under 60% AMI ***(The Bedford Stuyvesant... 10)***. In fact, in Bed-Stuy 45.5% of renters are considered to be rent-burdened, meaning they spend more than 30% of their income on rent *(The Bedford Stuyvesant... 21)*. These "affordable" options are anything but, and are largely insufficient to support the pressing need for affordable living for Bed Stuy's longtime residents. As more and more new residents move into the neighborhood, genuinely affordable housing becomes more and more pressing.

*Bed-Stuy 45.5% of renters are considered to be rent-burdened, meaning they spend more than 30% of their income on rent.*

Despite Bed-Stuy's widespread renovations, many long-term residents still experience low quality of life and unsafe living conditions, as 23% of Bed-Stuy residents still live in poverty *(Bedford Stuyvesant Community Health Profiles 7)*. Community Health Profiles completed by the NYC Department of Health have documented the socioeconomic status, housing situations, and a number of health indicators in neighborhoods throughout the city. In Bed-Stuy, 23% of the population had no air conditioning, 30% reported cockroaches, and 60% had homes with maintenance defects. These numbers are higher than the city median of 11% of households without working air conditioners, 23% reporting cockroaches, and 56% with maintenance defects. The linkage between poor housing conditions and community health is well-documented. Cockroaches, for example, have been found to be a trigger for asthma. "Pest infestations, through their association with asthma, provide another linkage between substandard housing and chronic illness. Cockroaches can cause allergic sensitization and have emerged as an important asthma trigger in inner-city neighborhoods." *(Krieger, et al)*. Unsurprisingly. Bed-Stuy has higher rates of Child Asthma Emergency Department Visits (375 per 10,000 children) than NYC as a whole (223 per 10,000 children) *(Bedford Stuyvesant Community Health Profiles 12)*. Despite the influx of new wealthier residents, the bulk of Bed-Stuy's population still lives in poverty—in dangerous hous-

ing conditions that are not being fixed in neighborhood beautification and renovation projects, a direct consequence of festering inequality.

With City Council elections coming up this year in New York City, the district containing Bedford-Stuyvesant already has dozens of politicians registered to run for the open seat in District 36 *(New York City Campaign Finance Board)*. Affordable housing, gentrification, and economic inequality have all rightly become hot button issues in the race. Leading candidates have put forth a variety of proposals, from reforms to the New York City Housing Authority (NYCHA), changes to the Uniform Land Use Review Procedure, and using a more equitable metric for income for communities than Area Median Income *(osse2021.com)*. The former are all policy staples of candidate Chi Ossé, a popular progressive and community activist. Other candidates, such as Tahirah Moore, a current City Hall public servant have proposed changes to the Third Party Transfer Program, where the city helps to rehabilitate buildings that have delinquent charges and unsafe living conditions, to prevent misuse leading to a loss of property and wealth of one to two family homeowners *(tahirahmoore.nyc)*.

*Affordable housing, gentrification, and economic inequality have all rightly become hot button issues in the race.*

While the citizens of District 36 will ultimately be the ones to decide how to address the issues affecting their home in the upcoming election—the following proposals may go a long way in reducing the negative impact of gentrification on economic inequality. Firstly, Moore's third-party transfer reforms are important; this program, which is intended to help repurpose indebted buildings for affordable housing, has resulted in overzealous seizures of property from Black and Brown homeowners. Reducing and better targeting the use of third-party transfers removes what is effectively a state-sponsored barrier to homeownership, especially for minority residents. The AMI statistic does not work in areas such as Bed-Stuy, which has a consistently lower median income then the rest of the city. This disparity is most evident with affordable housing since about half of the population is under 60% AMI. In order to make affordable housing truly affordable for every neighborhood AMI should not be the main metric used. Instead, as Ossé proposes, moving to a mode income set calculation for determining affordable housing thresholds is more representative of residents' incomes, and thus more equitable. The impact of this decision cannot be overstated — moving away from AMI will radically shift requirements for affordable housing and prices in a direction that is far more inclusive to low-income Bed-Stuy residents. The ripple effect of this change in metrics touches

on nearly every issue that has been addressed thus far, from unaffordable "affordable" housing to driving spending to helping the neighborhood remain affordable even in the face of higher-income immigration. Above all else, helping longtime Bed-Stuy residents remain secure in their homes and in close proximity to affordable options will allow the neighborhood to reap the benefits of economic growth. Gentrification may be inevitable, but economic inequality doesn't have to be.

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# The Koinonia Academy

## Plainfield, NJ

# *Make Noise:* The Socioeconomic Effects of Riots on Urban Areas

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THE RIOTS OF the 1960s left an impactful legacy. Many large and prosperous American cities experienced significant decline, the effects of which we see today. In cities such as Detroit, Michigan, as well as the cities of Plainfield and Newark in New Jersey, income inequality was a leading force for the riots. Racism, defined by the Oxford Language Dictionary as "the belief that different races possess distinct characteristics, abilities, or qualities, especially so as to distinguish them as inferior or superior to one another", was a major cause of the increasing income inequality at the time. Income inequality of any severity will leave a significant economic aftermath. The cities that suffered because of the riots have dealt with changes in demographics, closed or moved businesses and skyrocketing poverty numbers. The 1960 riots, caused by historic oppression and racism, were one of the major elements that impacted and heightened income inequality in American cities to this day. African Americans and other minorities were faced with cruel and unusual abuses of power from a mostly white, financially stable elite who discriminated against them. Many of these challenges and unresolvable social frustrations resulted in riots and civil disturbances, particularly in Northern urban areas, where minority people tended to live. They were some of the most memorable uproars instigated by persistent irritation about inequality, police brutality, unemployment, low rates of home ownership, discriminatory lending, and residential segregation of African Americans.

The 1965 Los Angeles Riots, otherwise known as the Watts Riots, began after the arrest of an African American man, Marquette Frye, by a white Highway Patrol officer on suspicion of driving while intoxicated. The riot was a result of the growing discontentment with high unemployment rates, substandard housing, and inadequate schools. Rioters burned automobiles, looted and damaged stores throughout the city, and over the course of the six days, the rioting claimed the lives of 34 people, more than 1000 injuries, almost 4000 arrests, and more than $40 million of property damage *(Edy, 2007)*. National Guard troops were sent in and order was restored on August 17.

Detroit's unemployment rates were higher than ever, the automotive industry was failing, and poverty had stricken the city. Racial segregation could not only be seen throughout the city with the Eight Mile wall, but in the police department, where there were only 50 black officers out of 4,700 *(Boissoneault, 2017)*. Stress and tensions were high and when the Detroit Police raided an underground bar on 12th Street, where most customers were African American, protests, vandalism, looting and arson began. Police surrounding the neighborhood went out of control, and the National Guard and Army units deployed. After five days, the rioting had resulted with 43 people dead, 342 injured, and nearly 1,400 buildings burned down.

In Newark, tensions were high after John Smith, a black cab driver, was arrested on July 12 when driving around on 15th avenue. He was charged with tailgating, offensive language and physical assault. Witnesses called the CORE, or the Congress of Racial Equality, were allowed to see Smith injured and abused in his holding cell. They demanded he go to the hospital after seeing all of the injuries he had sustained by the police and other cab drivers began to circulate the report. Word began to spread and many angrily gathered on the street. A peaceful protest started but advanced to something violent when men began to throw bricks and bottles at the windows. Looting began to spread throughout major sections of Newark, and police were allowed to use firearms to defend themselves. New Jersey Governor Richard J. Hughes sent in the National Guard to help in restoring order. 425 people were sent to jail, hundreds were injured, but the intense rioting continued for three more days. Property damage averaged over $10 million and the rioting ended on July 17, 1967 *(Wang, 2008)*.

In Plainfield, New Jersey, riots also ensued. In an article written about the Plainfield riots, it says that tension arose when banks practiced "discriminatory lending, residential segregation of African Americans in the West End of the city, and the loss of jobs in the city" *(Braimah, 2017)*. Tracks at the high school were separated, whites following the

college prep track, and blacks following the trades, and whites were allowed to wear certain clothes, while blacks weren't. Deteriorating neighborhoods and unemployment drove tension to an all-time high. Though the exact situation is still a bit muzzled, rioting broke out after an incident at the White Star diner on July 14, 1967. "Angered by how police treated the black community, they threw rocks through store windows and at police cars" *(Deak, 2017)*. The rioting continued through the weekend, but peaked on Sunday afternoon after a group of black youths had been asked to leave by an officer because they did not obtain a permit. Witness of the riots, Spurgeon Cameron, said "The youths rushed out of the park. Cars were overturned, buildings were set on fire and stores were looted. Cars driven by whites were stoned. Appliances stolen from a store became barricades to block outsiders from entering a part of the West End now called "Soulville." After much looting, fires, and fighting, the riot came to an end leaving 46 injured and 167 arrested.

*The act banned segregation in public places and forbade employment discrimination regarding race, color, religion, sex or national origin.*

Many legislative actions were taken to eliminate the racism causing income inequality. One such action, the Civil Rights Act of 1964, outlawed Jim Crow laws in employment, schools and public places. The act banned segregation in public places and forbade employment discrimination regarding race, color, religion, sex or national origin. This act ended segregation in all courthouses, sports arenas and parks. The Civil Rights Act was initially put forward by President John F. Kennedy and was later signed by Lyndon B. Johnson. This was one of the most comprehensive civil rights legislations ever to be seen. This act opened doors for the Voting Rights Act of 1965 which prohibited any literacy test and other methods to discriminate against the black community from voting. Another significant act was the Fair Housing Act of 1968. This bill was the subject of a controversial debate in the Senate, but was passed quickly by the House of Representatives after the assassination of Martin Luther King, Jr. on April 4, 1968. King's death not only called for Congress to hurriedly pass the Fair Housing Act, which prohibited discrimination concerning the sale, rental and financing of housing based on race, religion, national origin or sex, but it also sparked rioting in more than 100 cities around the country. "In the U.S. Senate debate over the proposed legislation, Senator Edward Brooke of Massachusetts, the first African American ever to be elected to the Senate by popular vote, spoke personally of his return from World War II and his inability to provide a home of his choice for his new family because

of his race" *(Fair Housing Act, 2010)*. The Kerner Commission was set out by President Lyndon B. Johnson and the National Advisory Commission on Civil Disorders, led by Governor Otto Kerner Jr. of Illinois. Its purpose was to study the causes of the riots and propose solutions. Released 50 years ago, the infamous report found that poverty and institutional racism were driving inner-city violence. The Report found that "our nation is moving toward two societies, one black, one white, separate and unequal" *(Kerner Commission Report released, 2010)*.

As a result of the riots, many once prosperous places around America became slums. Plainfield, once known as New Yorkers' summer retreat, became a run-down town with high poverty and disconcerting crime rates. 19% of the local residents as of 2020 are reported to be under the poverty line *(Hedman, 2018)*. Another result of the riots is the phenomenon known as "white flight". Many of Plainfield's white residents fled to neighboring towns, leaving Plainfield's black population to double in subsequent years. More than $5.5 million (in 2021 dollars) of property was damaged or vandalized, and many businesses closed or left town as a result *(Deak, 2017)*. Redlining and housing are also several continued products of the legacy of the Long, Hot Summer of 1967, Detroit being a prime example. Black Homeownership in Michigan was at 53% in 1970, and after a short jump upward, it tanked to 40% in 2018 *(Hedman, 2018, pg 4)*. Urban decay has been happening in the city for quite a while, and the more run-down neighborhoods tend to be splotched with open fields. "These homeownership disparities contribute to the shocking racial wealth gap in America. In 2017, the typical white family held ten times the amount of wealth as the typical black family, $171,000 for whites to $17,409 for blacks, on average. These numbers have worsened since 1968 and point to the fact that housing discrimination continues to determine life outcomes" ***(Fair Housing Act Overview and Challenges, 2018)***. Another major sign of desperation in the Detroit real estate market are abandoned residences and ridiculously underpriced homes, some even swooping down to $1.

*Black Homeownership in Michigan was at 53% in 1970, and after a short jump upward, it tanked to 40% in 2018.*

The riots of the 1960's, caused by historic oppression and racism, were one of the detriments against any hope of immediate or long-term economic equality. It created a constant fear of police and authority, and challenged African Americans to look for other ways of economic advancement. As many people faced economic ruin, awareness of these issues was created by riots. The awareness these riots created caused some change to come into effect around the late 1960's. While more

visible changes, such as segregation and redlining were outlawed and heavily monitored for, the institutional basis of these practices can be seen to this day. One of the more striking results of the riots is urban decay in major cities and minority-dominant areas. The major connection to rioting happened in these areas in the mid-to-late 1960s, which means business, investors and modern commerce fled these places and have yet to fully return. Continued ignorance of these areas by big economic players and over reliance on small startups will eventually continue nurturing an unacceptable status quo. The riots are a main cause of inequality because they created different scenarios for different kinds of people; scenarios that hinder them from any progress.

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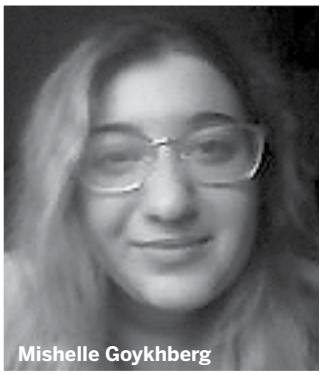

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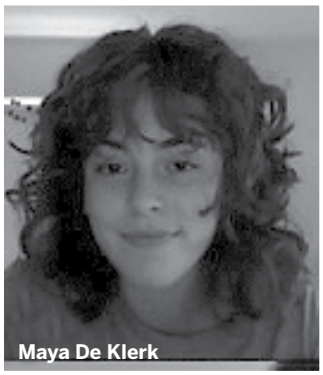
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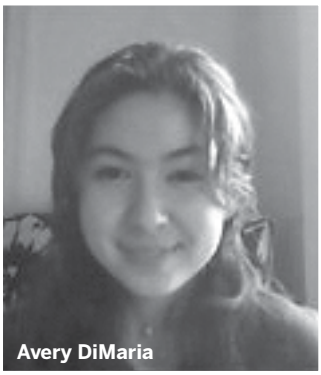
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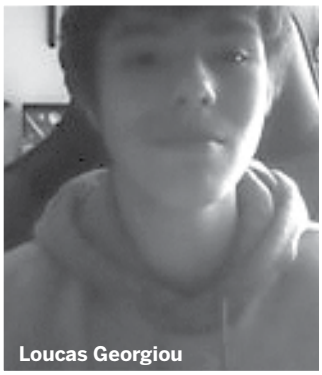
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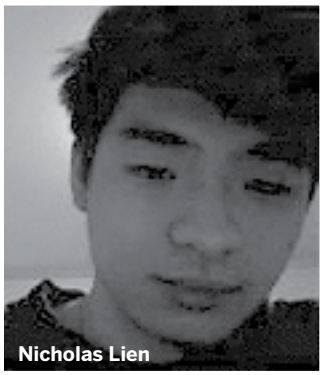
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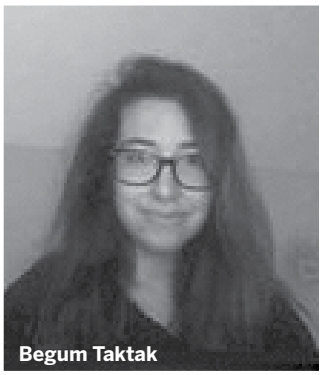
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# *The Federal Reserve System's Impact on Economic Inequality:* How Different Types of Monetary Policy Affect the Wealth and Income Gap


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## INTRODUCTION


*The Federal Reserve's dual mandate is to promote maximum employment and stable prices. As it subsequently goes, addressing inequality is not a direct objective of the Federal Reserve. Nevertheless, since pursuing goals on a macroeconomic level has the propensity to impact economic inequality, it is a concern that necessitates some attention when making policy decisions. This paper will analyze how different types and tools of monetary policy impact economic inequality. We find that contractionary policies and shocks both have adverse effects on economic inequality. However, when it comes to expansionary monetary policy, conventional tools like the Fed Funds Rate reduce the gap, while the newer method of quantitative easing leads to significant distributional consequences.*

## Contractionary Monetary Policy and Shocks

WHEN INFLATION REACHES levels that warrant action, the Fed employs a contractionary approach, inevitably slowing economic activity and causing an increase in unemployment – disproportionately impacting different income levels and adding to economic inequality.

Monetary policy shocks account for a significant component of the historical variation in economic equality. While the major difficulty of scarce data on income inequality arises when attempting empirical analyses of distribution effects of monetary policy, certain measures help aid in exploring dynamic interactions between variables pertaining to monetary policy, one such measure being the Gini coefficient, which gauges income distribution across a population: the effect of contractionary shock is economically significant, "given the high persistence and limited variation in the Gini coefficient, and is robust across different measures of inequality (top income shares and the share of wage income in GDP)" *(Furceri et al. 5)*. Other studies focusing on estimated effects based on standard VARs and the Romer and Romer (2004) approach find that monetary policy tightening increases inequality, "with high-earning households (the 90th percentile) earning about 4 percent more labor income after contractionary shocks while the labor income for low-earning households (the 10th percentile) declining by 4 percent in the long run" *(Furceri et al. 4)*.

However, it should also be noted that the rising disparity between the rich and the poor is not entirely attributed to the suffering of lower-income earners. The wealthy can withstand macroeconomic changes better than those who are not. Wealthier individuals are also much more likely to have their wealth tied to investments such as stocks or real estate. For the ultra-wealthy or even just those higher-income earners, periods of contraction yield new horizons. According to the *Office of Investor Education and Advocacy*, when interest rates increase, stock prices decrease as investors are able to obtain a better rate of return on bonds with less associated risk; investors move money out of stocks and into bonds. The opposite is seen during periods of expansion. When interest rates are low, it is possible to borrow large sums of money with the intent of investing for the chance to benefit from higher returns.

Studies by the National Bureau of Economic Research show that once the Federal Reserve suddenly raises interest rates and reduces the money supply, this can have a negative effect on low-income households. These sudden contractionary monetary policy shocks result in

more earnings for those with high incomes, and fewer earnings for those with low incomes, increasing the economic disparity gap. Another empirical analysis, which focuses on mapping quantitative data from consumer expenditure surveys for the 10th (lowest) percentile of each distribution and equivalency for the 25th, 50th, 75th, and 90th percentiles in terms of income inequality, earnings inequality, expenditure inequality, and consumption inequality, exhibits a significant divergence between lower and higher percentile earners; in all indexes, lower percentile earners observed greater shocks and overall decreases in percentage points in response to contractionary shocks in comparison to higher percentiles *(Heathcote et al.)*.

This position is also backed up by *Innocent Bystanders?* by Coibion et al., exploring the impact of monetary policy shocks on income inequality. It finds that changes seen in terms of labor earnings by percentile show lower-income households undergoing a drastic decrease after contractionary monetary policy shocks, while high earning households are shown to earn more (shown on *Figure 1*). Business income also undergoes a decline after a contractionary monetary policy shock. While high-income households can deal with these effects due to an increase

**Figure 1**

**Distributional Effects of Contractionary Monetary Policy Shock by Percentiles**

*https://www.nber.org/papers/w18170*

in labor incomes, lower-income households are less equipped to deal with this decrease in business revenue.

When the Federal Reserve implements contractionary policies, its unfavorable side-effects fall disproportionately on the poor. Higher-income earners have the means to grow their wealth during periods of expansion and contraction because their assets provide them with the means. Lower-income earners are quite the opposite. Their assets, if any, are mostly liquid. Their real values are subject to great change at the behest of macroeconomic action. In times of contraction: the rich get richer while the poor get poorer.

Of course, it is also worth noting that while data suggests contractionary monetary policy actions by the Fed heavily impacts certain groups, this is not to say monetary policy is the problem, rather, it emphasizes the need for more thorough consideration and, if need be, government compensation for disadvantaged groups (made possible through other avenues centered in fiscal policy).

## Conventional Expansionary Monetary Policy

As current economic conditions spiral downwards, the question comes to mind as to whether or not adopting expansionary monetary policy will revitalize the economy with respect to income inequality. While expansionary monetary policy could exacerbate income inequality, it is more likely that it reduces income inequality.

Evidence suggesting that expansionary monetary policy reduces income inequality is significant through two channels: savings redistribution and earnings heterogeneity. When it comes to the savings redistribution channel, "expansionary monetary policy can reduce inequality as an unexpected decrease in policy rates will benefit borrowers—generally those less wealthy—and hurt savers" *(Furceri et al. 4)*. In essence, increases in unexpected inflation, as fostered by expansionary monetary policy, lower the real value of nominal assets and liabilities, and therefore debts, which in turn make borrowers better off at the expense of lenders. The effect on inequality, according to former employee of the Federal Reserve Bank of Cleveland Pedro Amaral, is dependent on the way those assets, as well as their different maturities, are distributed across households (2). For instance, a study conducted by Matthias Dokpe and Martin Schneider on the effects of a sustained surprise increase in inflation showed that, when mapping asset holdings from the Survey of Consumer Finances (SCF) into age and wealth categories, the group that experienced larger net wealth increases was middle-class households, and conversely, the group that lost the most was richer households *(Doepke & Schneider)*. This channel clearly suggests that expansionary monetary policy is likely to reduce the wealth gap and therefore economic inequality.

*When interest rates are low, it is possible to borrow large sums of money with the intent of investing for the chance to benefit from higher returns.*

Additionally, it is important to preface that the distribution of gains (labor and profit earnings) incurred from monetary expansions is unlikely to be equal, as "some agents tend to benefit disproportionately...some tend to lose in relative terms" *(Auclert 1)*. Indeed, this is the premise upon which the earnings heterogeneity channel is built. According to a systematic empirical study of cross-sectional inequality, the top distributive earners were predominantly affected by alterations in hourly wages, whereas the bottom distributive earners were affected by alterations in hours worked and the unemployment rate *(Heathcote et al. 18)*. With the effects of monetary policy being drastically different for these distributive extremes, redistributive income effects are bound to occur; that is, if expansionary monetary policy shows a stron-

ger correlation with reducing unemployment than it does with increasing hourly wage, it will result in reduced income inequality. In fact, a National Poverty Center study exploring the differential impact of policy on the labor market suggests that increasing the federal funds rate disproportionately increases the unemployment rates of less-skilled workers and racial minorities *(Carpenter & Rogers)*. Thus, this channel further supports the notion that expansionary monetary policy generally reduces economic inequality.

## The Effects of Quantitative Easing on Economic Inequality

Some of the largest gains in the stock market have occurred during quantitative easing (QE) operations. It signals economic recovery while lowering interest rates, similarly to conventional expansionary monetary policy. However, QE's effects on the distribution of wealth are different: while conventional expansionary policy reduces income inequality, QE has adverse effects on it.

In their paper, *Did Quantitative Easing Increase Income Inequality?,* Juan Antonio Montecino and Gerald Epstein point to three channels through which QE affects the distribution of income: employment gains, asset appreciation, and mortgage refinancing. When it comes to employment, any type of expansionary policy is bound to lead to gains, and although wages have been stagnant, "changes in the level of employment unambiguously decreased net income inequality" *(Montecino et al. 16)*. However, as the paper also notes, this effect is misleading.

In the case of assets and interest rates, the gains are heavily concentrated at higher income levels, offsetting the positive results of the employment channel. Analyzing the contributions of equity ownership to the distributional effects of QE, Montecino et al finds that the equity ownership, particularly post-QE stock returns, was highly dis-equalizing: "dwarfing the comparatively modest equalizing impact of increasing employment," and causing the dis-equalizing effects to "far [outweigh] the equalizing effects" (17). Donggyu Lee, who also investigated QE, found that while QE benefited all households, it had distributional effects that "widened the income and consumption gap between the top 10% and the rest of the wealth distribution, by boosting profits and equity prices" (1). This rise in equity prices disproportionately benefits the individuals with ownership of these equities. With equity ownership being significantly higher for wealthier individuals, this boost drives the wealth gap further apart.

*Business income also undergoes a decline after a contractionary monetary policy shock.*

Lastly, the housing channel shows similar results. Since QE involves lowering interest rates, it should lead to an increase in refinancing and aggregate consumption through the housing channel. In the eurosystem, this works. In a study conducted by the European Central Bank, it was concluded that QE "diminished income inequality" since it "has a positive impact on housing wealth" *(Lenza et al. 3)*. However, with the American housing markets and regulations, it simply does not work for low income homeowners. According to the Federal Reserve Board Governor Sarah Bloom Raskin, "...only about half of homeowners who could profitably refinance have the equity and creditworthiness needed to qualify for traditional refinancing." These regulations and lending standards prevent indebted households from benefiting from QE through the housing channel. This is not a new development. According to *How Quantitative Easing Works: Evidence on the Refinancing Channel*, although the initial round of QE led to a significant increase in refinancing activity, "QE1 credit seems to have benefitted the hardest hit areas—with the highest share of underwater homeowners—the least during the Great Recession" *(Maggio et al. 26)*. Clearly this monetary policy tool does create the intended activity in refinancing, and thus adds to economic inequality by preventing lower-income households from taking advantage of QE's impact on the housing market.

Overall, whether it is rising asset prices or fueled borrowing, QE focuses on areas that higher income level households simply are more directly involved with, inevitably adding to economic inequality despite the positive gains from employment.

## Conclusion

The impact of monetary policy on economic inequality has gained more attention with the coronavirus pandemic. The virus has created significant unemployment and instability, which has been detrimental to economic inequality. In order to alleviate the economic impact of the pandemic, the Federal Reserve took action to promote its dual mandate: largely through the lowering of the federal funds rate and the fourth round of quantitative easing. Given how these two methods differ in their implementation and impact, and because low-income households were hit particularly hard by the pandemic – especially through the service industry – the concern over the distributional consequences of different monetary policy types has grown.

By all counts, the impact of monetary policy on economic inequality is significant. The lowered real value of nominal liabilities and assets due to unexpected increases in inflation is a boon to borrowers. For households who rely on borrowing as a means of survival, but espe-

cially those who have accumulated an abundance of debt, the decrease in real value of nominal debts preserves the viability of lower income earning households. Redistributive income effects provide additional reduction to inequality when unemployment decreases to a larger extent than hourly wages. Savings redistribution and earnings heterogeneity are both feasible and manageable means made possible by expansionary policy. Conversely, contractionary policy comes with unintended threats which push the bounds of the disparity between rich and poor. Simply put, the wealthy thrive while lower-income earners bear the brunt of shocks. These are grave consequences which necessitate proper consideration.

When it comes to quantitative easing, there seems to be either a significant preference for higher income levels or secondary considerations that offset the equalizing effects. This brings into question conventional expansionary monetary policy and why the results seem to differ despite both being intended for the same purpose. Both lead to short-term growth, lower unemployment, and inflation. However, research shows that although conventional expansionary methods like lowering the Fed Funds rate work to bridge the gap between lower and higher income households, quantitative easing has adverse effects on economic inequality. Since QE is a direct tool to inject money into the economy through purchases of assets, it is understandable that its effects on equity prices are more profound than other expansionary methods, which would indirectly affect the variables that cause economic growth. QE has proved to be an invaluable tool that speeds up recovery and generates growth. When considering the role the Federal Reserve has been playing and will play in the economic recovery from the pandemic as focus on economic inequality increases, this research does bring the distributional cost of this tool into question.

*By all counts, the impact of monetary policy on economic inequality is significant.*

Distributional consequences of monetary policy is a rising concern. Although more research is needed to accurately determine how different types of monetary policy impact economic inequality and its connection to the dual mandate, actions as expansive as those taken by the Federal Reserve certainly require a more thorough consideration of the distributional costs.

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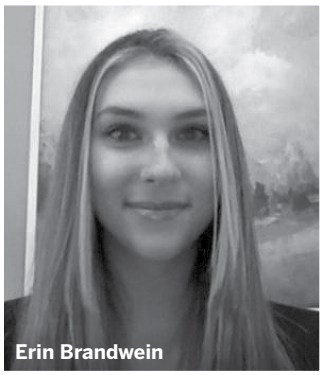
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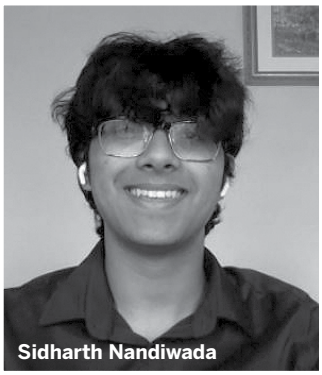
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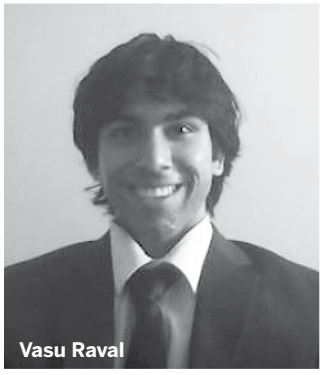
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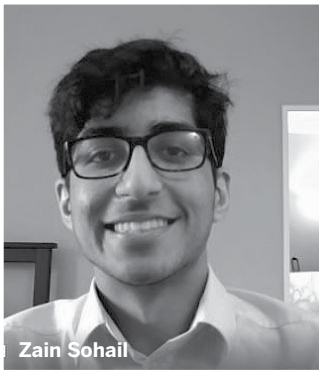
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# The Stock Market's Role in Economic Inequality

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## ABSTRACT

THE WEALTH GAP in the United States has proceeded to expand throughout the preceding decades. Many factors contribute to this problem such as discrimination, developing technology, the American economic system, and more, but one factor that is commonly overlooked is the stock market. The stock market is a system in which citizens trade shares and other financial securities of publicly held companies, allowing them to accumulate wealth through smart investment decisions. However, there are fatal flaws within the system that enable the stock market to disproportionately benefit certain groups over others. Being that the majority of the stock market is currently controlled by the top few percent of wealthy Americans, this elite group reaps all of the benefits, while the lower and middle classes lack the financial knowledge or resources to do so. This paper will explore exactly how the stock market exacerbates economic inequality and touch upon a few potential policies to ease the situation.

Jeff Bezos makes $149,353 per minute—more than three times what the median U.S. worker makes in an entire year *(Warren 2020)*. Since the 1980s, nearly every region in the world has suffered from an increase in economic inequality, and the United States is no exception to this trend *(World Inequality Report 2018)*. Economic inequality is defined as the disparity among individuals' incomes and wealth *(Fontinelle 2020)*. Although multiple factors contribute to severe economic disparity, one that is often overlooked is the unequal balance of capital ownership within the stock market. The stock exchange is a platform

used by investors to buy and sell shares and similar financial securities of publicly traded companies. It is a means through which individuals accumulate wealth, thus increasing their standard of living. However, there are clear distinctions in how the wealthier classes utilize the stock market to their advantage compared to lower-income individuals who cannot pursue similar investment opportunities.

The United States, along with the rest of the world, is currently suffering economic repercussions from the coronavirus pandemic. One in four American adults report difficulty paying their bills since the pandemic began, and 32% of lower-income adults reported struggling to make rent or mortgage payments *(Parker, Minkin, Bennett, 2020)*. Furthermore, unemployment rates peaked at 14.8% in April 2020, and despite the rate's recent decline, millions of Americans continue to be laid off and are struggling to obtain employment *(Congressional Research Service 2021)*.

Although the majority of Americans suffer from the pandemic, a select group profit from the economic downturn. America's billionaires' wealth has increased by more than $1.3 trillion, a shocking 44%, since the start of the pandemic *(Woods 2020)*.

The 2008 recession exemplifies a similar trend. From 2009 to 2011, the top 1% of U.S. earners experienced an increase in income by over 31% while the bottom 99% experienced an increase of only 0.4% *(Woods 2020)*. Both the 2008 recession and the coronavirus pandemic highlight how even in times of economic decline, America's richest individuals can accumulate wealth. Such wealth disparity has been plaguing the nation since the 1970s, as depicted by the Gini coefficient. The Gini coefficient measures wealth inequality in a nation, and in 1974, America's Gini coefficient was valued at 34.5. Furthermore, the indicator has been steadily increasing since, reaching 48 in 2019 *(Statista 2021)*. Due to these conditions, America is classified as the most unequal country amongst those in the G6 group.

*The United States, along with the rest of the world, is currently suffering economic repercussions from the Coronavirus pandemic.*

To progress, upper-income and lower-income households must be defined. The median household income in America, as of 2019, was $68,703. Using this benchmark, upper-income households are classified as those that earn a combined income of $137,406 or more, double the national median income. Low-income households, on the other hand, earn $45,802 or less *(Kochar, Fry Bennet, 2020)*.

Evidently, the United States has a significant wealth inequality

problem, stimulated by factors such as discrimination, education, and technology. However, one factor that is often overlooked is how the stock market makes a difference in wealth distribution.

In the current landscape of the stock market, higher-income groups possess a distinct advantage. As of 2019, the top 1% of Americans controlled 38% of the value of financial accounts holding stocks, and the top 10% controlled 84% of stocks *(Gebeloff 2021)*. The economic disparity between the average individual and the wealthiest of Americans is increasingly growing and is only intensified by the ongoing pandemic. While more than half of Americans have at least one financial account tied to the stock market, wealthier families are much more likely to own these accounts compared to middle and lower-class families.

This disparity in the markets means that different size portfolios yield various outcomes. When higher-income households hold larger investment accounts, they incur capital gains that are exponentially greater than those with smaller portfolios. This means that higher-income households consistently collect greater profits.

In a survey conducted by Trader's Magazine, it was revealed that 92% of high-income earners, and 75% of those with postgraduate degrees, have a stake in the stock market. On the contrary, only 30% of those in lower-income brackets and 32% of those who have a high school degree or less are involved in the stock market. This data demonstrates a clear relationship between higher-income brackets and investments. In addition, this survey highlights the differences in retirement accounts between the higher and lower-income classes. Only 92% of people earning $250,000 or more maintain a retirement account, while 79% of those earning less than $20,000 do not. Since retirement accounts are an integral part of building wealth, it is unsurprising that lower-income groups are yet again at a disadvantage *(D'Antona Jr. 2020)*.

*Only 92% of people earning $250,000 or more maintain a retirement account, while 79% of those earning less than $20,000 do not.*

Another significant sign of inequality in the markets is the portfolio size of those who participate. The median portfolio size of middle-class families was $13,000 in 2019. On the other hand, families belonging to the higher income group have a median portfolio size of almost 13 times that, sitting at $170,000 *(Gebeloff 2021)*. Larger portfolios yield greater returns, however, medium and lower-income households oftentimes do not possess the means to finance such an affluent investment account.

Moreover, obtaining the monetary capital required to invest in securities renders an enormous barrier to entry for middle and low-

er-income households. Since COVID-19 hit, 63% of Americans have been living paycheck to paycheck *(Leonhardt 2020)*. As a result, they lack the necessary resources to fund investment accounts that will help them amass wealth.

Furthermore, a common misconception about the stock market is that, due to its inherent volatility, at any moment every penny invested could be lost. This is far from the truth. The stock market always begets some caliber of risk, but proper education on risk management would equip the middle-class with the capability to advantageously exercise the stock market. Due to this fallacy, people—especially those who do not possess the money to jeopardize— are apprehensive about investing. However, in reality, the historical average stock market return is 10% before inflation *(Royal, O'Shea 2021)*. Education is crucial as these hesitant potential investors realize that low-risk, smart investments, such as index funds, could, in fact, benefit them.

*With financial education being such an important factor in building wealth, not mandating such courses places students at a grave disadvantage.*

Lower-income households also lack the financial education required to invest in the stock market. America's current education system does not incorporate such courses; only 21 states have the completion of a financial education class as a graduation requirement. Furthermore, only 6 of these states require personal finance as a standalone course while the other 15 require personal finance curriculum to be integrated into other courses *(Ranzetta 2020)*. With financial education being such an important factor in building wealth, not mandating such courses places students at a grave disadvantage.

Likewise, research shows that up to 50% of wealth inequality is caused by differences in financial literacy *(Wolla, Sullivan 2017)*. Not only are people with less financial education more likely to fall victim to high cost-borrowing options, but the lack of knowledge is also significant concerning long-term investments, which most often involve the equities market. Students are unable to learn real-life financial skills that may serve them in the future. As mentioned previously, this trend is especially evident in low-income communities, where proper education is limited. In a recent study, the Department of Education found that over 40% of low-income schools do not receive their fair share of state and local resources, hence exacerbating the education rift *(Department of Education 2011)*.

On the other hand, people in higher-income groups find it easier to gain access to financial education, whether it be through schooling or independently. Many of these individuals are taught financial ed-

ucation at the primary or secondary level and are also able to afford colleges that offer seminars and classes discussing managing credit and personal finances. There are eight major categories of financial education from "high school only" to a combination of "high school, college, and employer." Higher-income groups can gain access to financial education in seven of these eight categories, whereas lower-income groups may only learn skills in one of these categories *(Wager 2018)*. With more comprehensive education, wealthier individuals understand the complexities of investing in the real world, especially in the stock market. Thus, they can invest smartly and receive greater profits.

In addition, in America, 75% of the population are tasked with managing their personal finances absent of professional help or online services. 17% of Americans employ financial advisors and it is palpable that percentage is composed of high net worth individuals. Moreover, individuals who make over $150,000 a year are more likely to use some variation of an app service or finance professional, whereas those who make under $50,000 are often unable to adequately plan their financial future *(Dickler 2019)*. This heavily contributes to the wealth gap as it reinforces the inaccurate notion that only people who possess substantial wealth merit financial planning. The truth is, those who make more money have more flexibility and can recover from poor financial decisions. This means that as long as lower-income individuals continue to make nonstrategic decisions with their money due to a lack of proper resources, lower-income households will remain unable to work themselves out of cyclical poverty.

To ease this issue, Americans first need to recognize that inequality is, indeed, preventable under a capitalistic economic system, and can be combated through various policies addressing its origins. Increasing the minimum wage to give the lower-class adequate income to support themselves is a potential solution that has been discussed by the federal government in recent months. Proponents of this policy believe that raising the minimum wage would both spur economic growth and reduce poverty, while opposers believe that a higher minimum wage would increase unemployment. Furthermore, increasing investment in education is also a viable solution since, as mentioned previously, a lack of education is a large contributor to economic inequality. Increased quality of education will increase economic mobility, increase productivity, as well as decrease economic inequality *(Powell)*. Overall, the stock market does contribute to economic inequality that plagues our nation, however, it can be combatted through the proper reforms.

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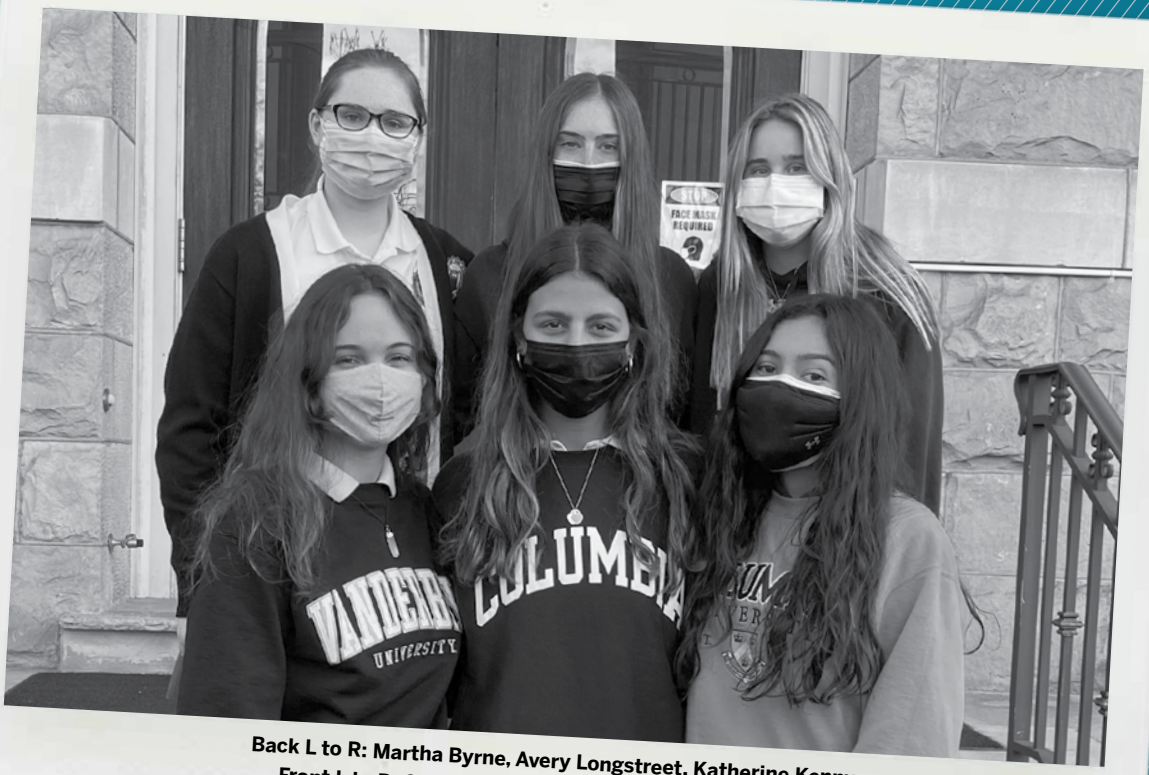


Back L to R: Martha Byrne, Avery Longstreet, Katherine Kenny
Front L to R: Olivia Quiroga, Sabrina Dilorio, Andrea Ruiz

# Mount Saint Mary Academy

## Watchung, NJ

# Leading Factors of Gender Inequality

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## INTRODUCTION

*The unfortunate reality of women falling behind men is not a novel narrative in the United States. Women obtained the right to vote in 1920 barely 100 years ago, and it was not until the 1970s that they began to significantly enter male-dominated fields. Due to long-standing gender norms, women engage in traditionally female areas of work, which affects economic equality between the sexes. Even today, women's long-term economic growth opportunities have been inhibited most by their decisions to pursue lower-paying careers, gender disparities in income within these careers, and childcare responsibilities, ultimately leading to the wage gap. Additionally, this gender divide has been exacerbated by the COVID-19 pandemic as women's struggles with childcare and workplace responsibilities in particular have worsened.*

### Gender Differences in College Majors

Women often have lower-wage jobs than men because they go into fields that generally pay less, as shown in *Figure 1*. Women do earn more postsecondary degrees than men, but tend to major in education, the humanities, or the social sciences, rather than engineering or computer and information sciences, which are predominantly studied by men and pay more. *(Equitable Growth, 2019)*.

A study done by Georgetown University *(Carnevale, 2015)* focusing on college majors illustrated that men outnumber women in all but one in the top five best-paying majors, as shown in *Figure 2*. Even within the same major, occupational segregation occurs—female graduates work in lower-paying areas than male graduates with similar degrees (for example, teaching and healthcare versus business and management).

Men and women differ in their preferences of major for a variety of reasons. According to a study done by Northwestern University *(Lapan, 2018)*, men on average typically prefer financial rewards for work, while women typically prefer to enjoy what they do and make time for family. Additionally, women tend to be affected more by poor grades, have lower self-confidence, and have less faculty and peer support in fields that are composed of a majority of men *(Equitable Growth, 2019)*. Female engineering students *(Goodman, 2002)* and economics students *(Goldin, 2015)* are more likely to drop out of their majors partly from these reasons, shaping the eventual careers women end up pursuing.

Social norms and internalized expectations also influence the decisions women make about their education and careers. The Society of Women Engineers (SWE) 2017 Literature Review noted that women often feel discouraged from pursuing certain fields because of the way the academic disciplines are presented. In STEM fields, particularly engineering, academia can encourage a "masculine" culture, which then affects a woman's sense of belonging, dissuading her from continuing in the major (Meiksins, 2018). Similar practices also occur in the workplace: employers often gear recruitment presentations towards men, discouraging women from pursuing certain careers *(Wynn et al., 2018)*.

*Over 50% of gender wage inequality stems from gender segregation, which represents $403.6 billion.*

## Disparity in Job Choice

Over 50% of gender wage inequality stems from gender segregation, which represents $403.6 billion *(Equitable Growth)*. The two main components of this inequality are: women tend to work in different industries than men or in different jobs within an industry and occupations with a female majority tend to pay less than majority-male occupations.

Women tend to work in different occupations than men, as shown in *Figure 3*. With the exception of nurses, all of the common majority-female jobs shown pay less than common majority-male jobs. Even within individual jobs, men tend to have a higher weekly income than women in the same occupation.

As shown in *Figure 4*, there are discrepancies within industries. While women hold the majority of legal positions, only 43% of women in law are lawyers, compared to over 78% of men *(BLS, 2020)*. The remainder of women hold other positions, such as paralegals, law clerks, or legal assistants, which pay significantly less. The median week-

ly income for those who hold legal occupations is $1,540 ($2,097 for lawyers), but when broken down by women and men, the difference caused by varying occupations is clear: men make $2,275 weekly, while women make only $1,252 *(BLS, 2020)*. Evidently, wage discrepancy largely comes from these differences in careers.

## Childcare Responsibilities

Although advances have been made in trying to support mothers in the workforce, many still face societal pressure to adjust their work according to their children. Only 16% of Americans say that the ideal situation for young children is a mother that works full time, shown in *Figure 5*. About 42% of Americans say that the ideal situation for women with young children is for the mother to work part time. This popular opinion leads to more women than men cutting down their hours, resulting in one of the largest contributors to the wage gap: less time working. Continuing this idea, 70% of Americans say that the ideal situation for men with young children is working full time.

Single mothers face societal pressures in both shifting work hours and stunting potential educational pursuits because of their children. As of 2015, 31% of single mothers aged 25 and older held a bachelor's degree or higher *(IWPR, 2017)*, and even after attaining a degree, women are more likely to fall into low-income jobs. About 60% of Americans say that career opportunities are given to less qualified employees instead of working mothers who may be more skilled. *(Modern Family Index, 2019)*. Known as the "motherhood penalty," research has shown that a mother is less likely to be hired than a woman without children, and even if a mother is hired, they are more likely to receive a lower salary. In contrast, a man suffers no penalty, or he may even be given a higher salary. This higher salary, or "fatherhood bonus," means that for each child, men's earnings increase by 6%, while women's earnings decrease by 4% *(Budig, 2014)*.

*Paid maternity leave minimizes the impact on the wage gap that comes from new mothers leaving their jobs to care for their families.*

## COVID-19 Impact

The COVID-19 pandemic has increased gender inequality in the workforce, with women being 1.8 times more susceptible to job loss *(Wood, 2020)*. In general, women make up 39% of the labor force yet disproportionally represent different sectors, mainly working in: accommodation and food services (54%), retail and wholesale trade (43%), and arts, recreation and public administration (46%) *(Wood, 2020)*. All these occupations have suffered due to the pandemic. As of May 2020,

women accounted for 54% of overall job loss even though they account for a lower percentage of the labor force *(Mahajan et al., 2020)*. The pandemic has hit women in lower income jobs the hardest. Over 57% of women making less than $30,000 lost income because of COVID-19 *(Bertrand, 2020)*, increasing the financial insecurity and job loss anxiety for women working in these jobs. Mothers have also suffered, due to decisions between shifting to part-time jobs or fully exiting the labor force to accommodate additional childcare needs. Workers who lost jobs during previous recessions endure continual earnings losses, so following the COVID-19 pandemic, many women who have been unemployed or forced to leave the labor force will experience a persistent and perpetual consequence. Additionally, senior-level women are struggling due to COVID-19; they are under pressure to compensate for the underperforming pandemic-time economy. Over 50% of senior level women in 2020 are feeling exhausted at work, compared to approximately 40% of senior level men, as shown in *Figure 6*. These women are 1.5 times more likely to think about leaving their position and either downshift or exit the workforce during COVID-19. With the number of females in executive level jobs already minimal, these women dropping out will further decrease the number of senior-level women, widening the inequality gap. With over 2.2 million women considering leaving the workforce, this underrepresentation of women will increase on all levels *(Coury et al., 2020)*.

Women are considering downshifting their positions or leaving the workforce completely due to financial burdens or housework and childcare caused by the pandemic. Women provide roughly 75% of the unpaid-care work such as cooking, cleaning, and childcare. Responsibilities for these domestic duties are almost three times more likely to fall on mothers rather than fathers, creating an additional three or more hours of labor to their day and make them feel as though they are working a "double shift" *(Madgavkar et.al, 2020)*. Additionally, this increases the pressure on mothers and causes them to burnout and consider leaving or downshifting their job. As seen in *Figure 7*, the percentage of women is consistently higher than men in every circumstance, slowly heightening gender inequality and stretching the length of time in which it ultimately can be resolved *(Wood, 2020)*.

The implications of women leaving the work force are harmful to businesses and the economy. With women in senior executive roles, it can lead to a company's profits increasing by as much as 50% *(Coury et al., 2020)*. These senior level women are more likely to sponsor women of color (38%), compared to men (23%), positively diversifying the work environment, and increasing the opportunities for women in

higher positions. With COVID-19 reducing the number of women in the workforce, global GDP growth could be lowered by $1 trillion by 2030 in comparison to if women were equally represented in the labor force *(Wood, 2020)*.

## Policy Recommendation and Impact

While the issue of economic inequality by gender is complex and there is no immediate fix, we believe there are steps to be taken that can alleviate the pressure on women and reduce the gap. We believe the first step in reducing the economic disparities by gender is to create a more affordable and accessible childcare system. As previously mentioned, one of the main reasons that women are so negatively affected by the pandemic is because they had to quit their jobs and drop out of the labor force to take care of their children, eliminating a stable source of income for their household. For single mothers, the lack of childcare is even more detrimental. Choosing to care for one's child(ren) should not result in sacrificing one's career. Women should have the option of affordable childcare if they want or need to continue working.

Through federal mandates and categorical grants, the federal government can provide money to the states with strict limitations on how the money must be used - in this case, to improve the quality, affordability, and accessibility of government-run childcare services. The current block grant in place provides $5.83 billion in federal aid, which is not nearly enough to serve all those who need subsidized childcare, especially since about 11 million children were eligible for aid in 2018 but did not receive it *(Mongeau, 2020)*. With federal funding making up a majority of state program budgets, expanding this grant would allow more working parents, especially single mothers, to have access to what they need to support their families. At the current rate, this grant is helping fewer families each year. The federal funding for childcare must be revisited if we want to address the gender inequality in the US.

In addition, we also propose better workplace protections to protect a woman's right and ability to work, regardless of her familial status. Better workplace policies that allow for paid medical leave and flexible hours would help to create a work environment better suited for women. Given current maternity leave laws, women are granted 12 weeks of unpaid leave after childbirth *(Green, 2018)*. This law provides (at best) a weak support for new mothers; many women are forced to return to the labor force after a mere 12 weeks. This time interval places a difficult decision on women as they must find some form of childcare following the 12 weeks. By providing paid leave, women are granted the opportunity to support their families while still being able to

care for them at crucial stages. Since men traditionally are not the ones to stay home with a newborn, they (on average) have an opportunity to further their career while women take time off. Paid maternity leave minimizes the impact on the wage gap that comes from new mothers leaving their jobs to care for their families.

Along with these short-term recommendations, we believe there are also solutions to implement in the long run to further reduce economic inequality by gender. Specifically, we propose providing federal tax breaks and subsidies on housing for single-parent households, 80% of which are run by single mothers, and about a third are living below the poverty line. By offering these tax breaks and subsidies for single parents, we aim to level the playing field and alleviate the burden on women through financial assistance in the form of monetary payments. Finally, we encourage girls and women in various levels of education to study different fields and actively choose what career they want to pursue, instead of listening to societal pressures about gender roles and employment. As this requires a change in mindset, we understand that it may take several years to implement; however, we feel that providing a federal initiative to introduce young girls to different fields can have a significant economic payoff. Giving young women the opportunities to break into male-dominated fields can boost GDP and create more tax revenue in the long run. These long-term solutions can help offset the drawbacks of the pandemic for future generations.

We recognize the issue of economic inequality by gender is extremely complex and years of discrimination toward women in employment cannot be fixed quickly, but we believe the recommendations we have proposed promote substantial change and will aid in eliminating the gender inequality demonstrated. A main source of this inequality comes from the job sector, as women feel pressured to work in certain fields and are deemed unfit to work in others, or simply cannot work because they carry the burden of childcare and managing the family. The COVID-19 pandemic has also clearly exacerbated the issue of gender inequality, demonstrating the concentration of women in low-income jobs as well as overreliance on an inadequate childcare system. As a result, compared to other groups women are suffering the most, and if nothing is done to fix this inequality and discrimination in employment, they will continue to suffer with every recession and economic downturn. As a team of young women about to enter the labor force, this issue is particularly important to us as we not only want to ensure we have the best opportunities to succeed, but also strive to promote progress for the generations of women that come after us.

**Figure 1**

**Men & Women Sorted Into Different Majors, Affecting Base Pay Later**

*https://www.glassdoor.com/research/app/uploads/sites/2/2017/04/FULL-STUDY-PDF-Gender-Pay-Gap2FCollege-Major.pdf*

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**Figure 2**

## Best and Worst Paying Majors – Men v. Women

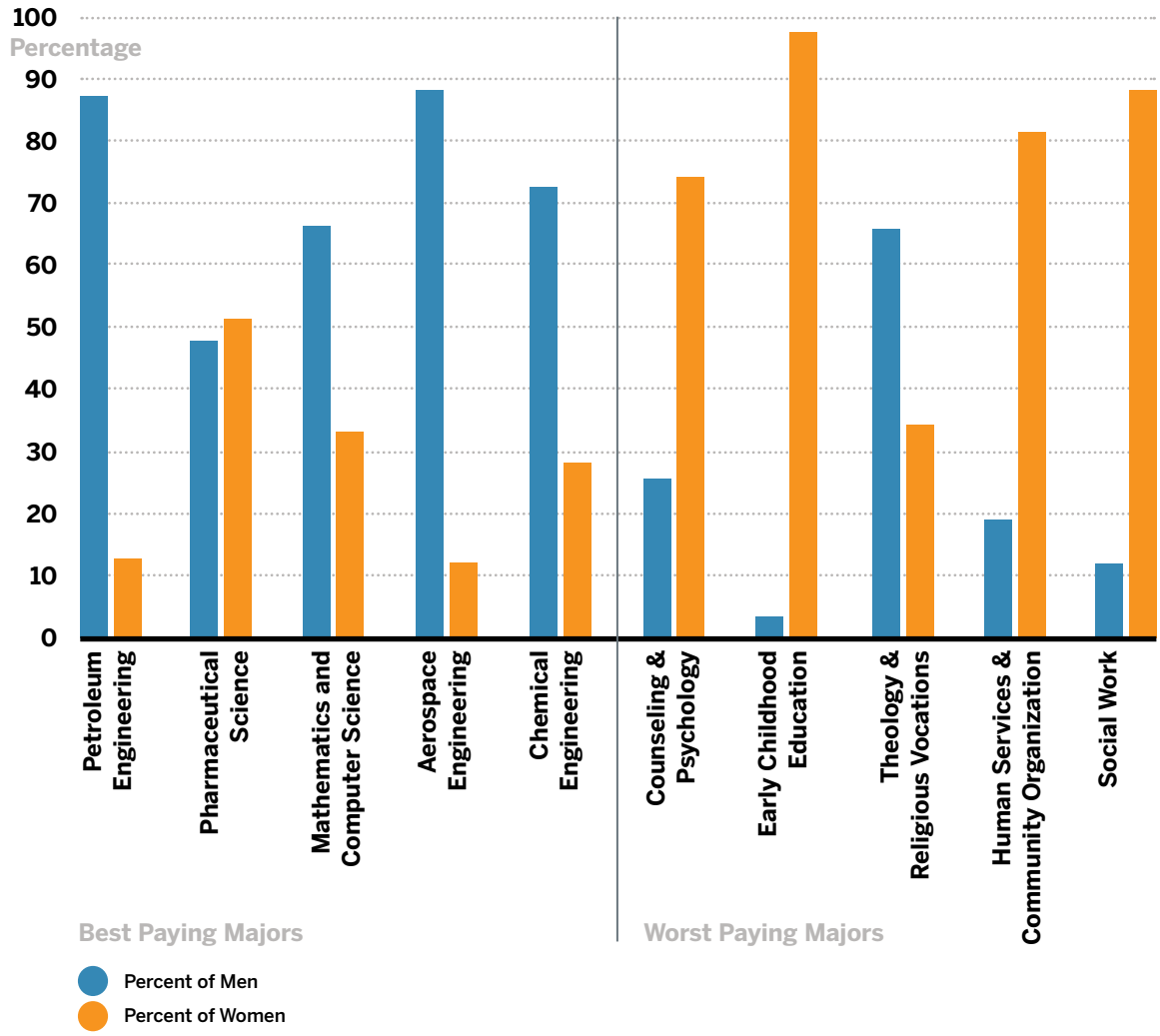
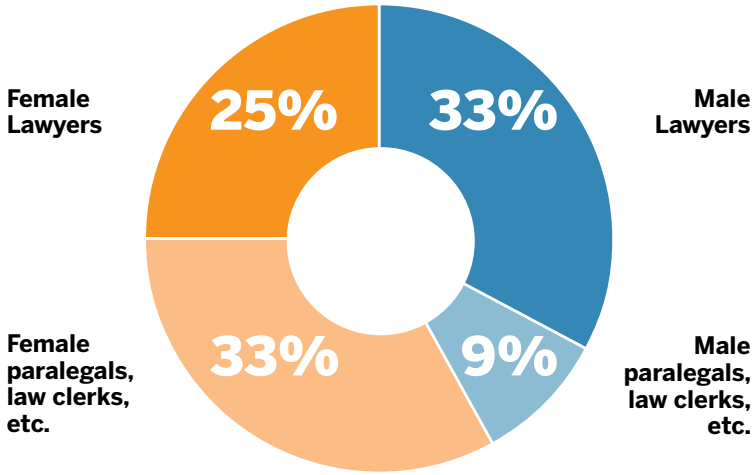


**Figure 4**

## More Women Work in Law, But Fewer Are Lawyers

*Legal Occupations — Men vs. Women*




Source:
Bureau of Labor Statistics, 2020

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**Figure 5**

**Very Few Americans Say Full-time Working Mom is Ideal for Young Children**

*https://www.pewresearch.org/fact-tank/2018/03/15/for-womens-history-month-a-look-at-gender-gains-and-gaps-in-the-u-s/*

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**Figure 6**

**Female Work Exhaustion Compared to Men**

*https://www.mckinsey.com/featured-insights/diversity-and-inclusion/women-in-the-workplace*

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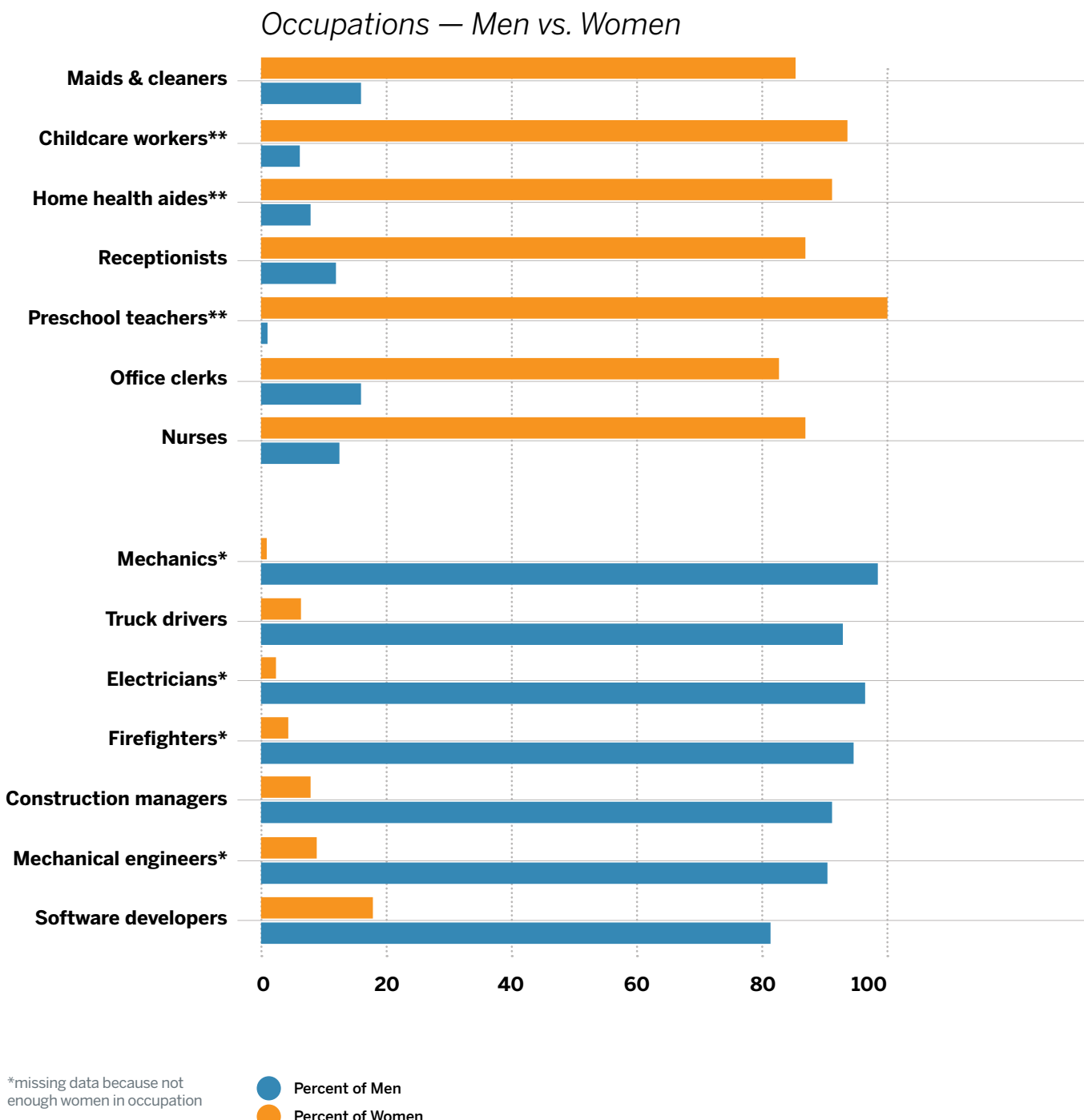
**Figure 7**

**Percentage of Women and Men Considering Downshifting or Leaving the Workforce**

*https://www.mckinsey.com/featured-insights/diversity-and-inclusion/seven-charts-that-show-covid-19s-impact-on-womens-employment*

Figure 3

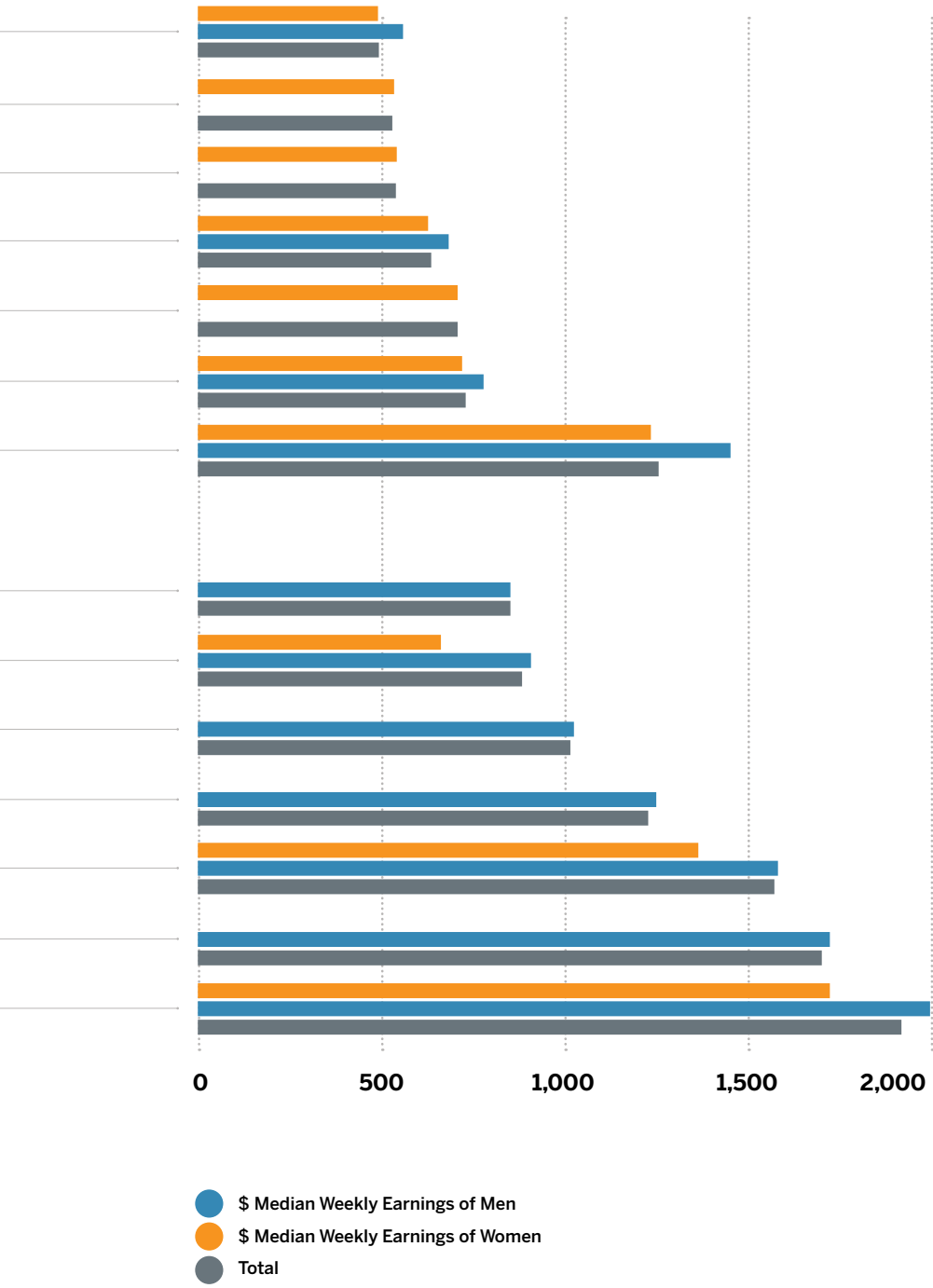
# Women's Jobs Pay Less




*missing data because not enough women in occupation

**missing data because not enough men in occupation

## *Income by Occupation — Men vs. Women*




Note:
All occupations chosen are among the top 10% of occupations for each gender, and are made up of at least 80% of that gender. Occupations chosen show a variety of fields.

Source:
Bureau of Labor Statistics, 2020

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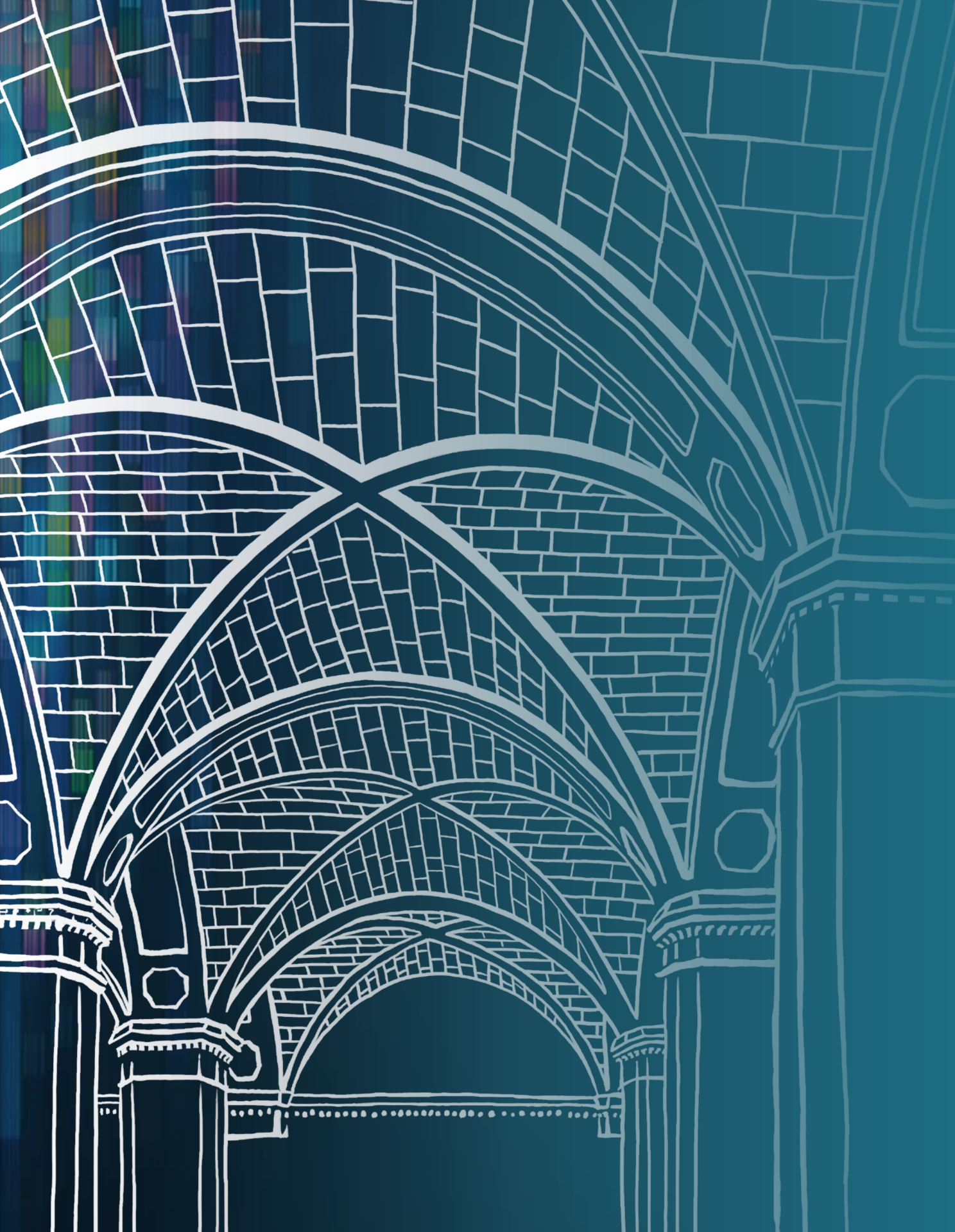

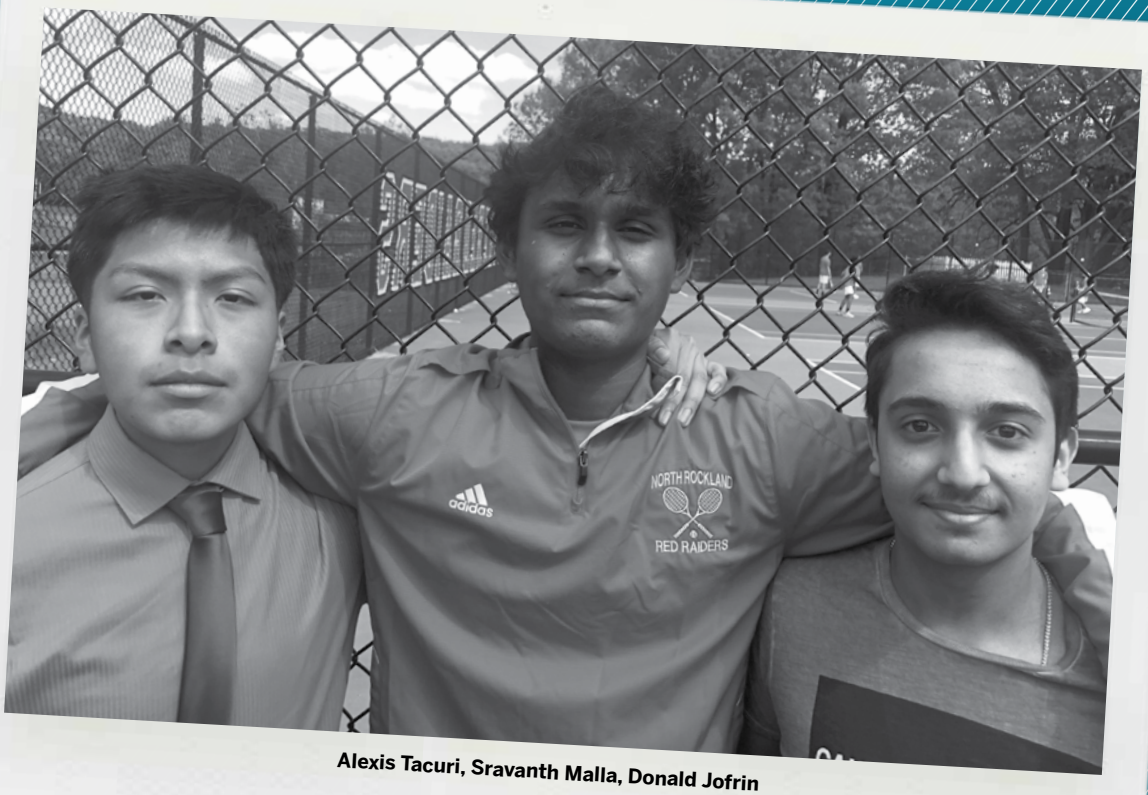


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## Thiells, NY

# Does Lack of Money Affect Children's Mental and Physical Wellbeing Later in Life?

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POVERTY IS THE single largest determinant of health for both adults and children, as declared by the World Health Organization *(Jakovljevic et al. 457)*. In fact, according to the U.S. Census Bureau, approximately 38.1 million people were living below the federal poverty line in the United States in 2018, with over 20% of those being children *(Semega et al. Par. 4; Smeeding and Thevenot Par. 2)*. You may have heard the phrase, "Money can't buy happiness." However, money plays a huge role in an individual's mental health, shown by the fact that mental disorders, like depression and anxiety, are twice as frequent among the poor as compared to the rich, according to the WHO. This is a huge problem in today's society that severely affects poor children, with negative effects ranging from physical disabilities and mental illness to educational problems. Plus, with the recent pandemic, more people have descended into poverty due to lack of employment and many assets losing value rapidly.

Poverty is defined as a state or condition in which an individual

"lacks the financial resources and essentials for a minimum standard of living," *(Chen Par. 1)*. It is assigned to individuals who fall below a certain income threshold that is set by the Department of Health & Human Services. Each year, national poverty rates are calculated by the U.S. Bureau of Census *(Chen Par. 2)*. Out of nearly 40 million people living in poverty, ethnic minorities are hit hardest. In fact, 27.4% of African Americans, 26.6% of Hispanic Latinos, 27% of American Indian/Alaska Natives, and 12.1% of Asians live in poverty, as compared to only 9.9% of non-Hispanic Whites *(Santiago et al. 115)*. While these statistics seem incredible, numbers are even higher for minors. According to the American Psychological Association, in 2014, approximately 39% of African-American children and adolescents and 33% of Latino children and adolescents were living in poverty. This figure is more than double the poverty rate for non-Latino, White, and Asian children/adolescents, which fell at about 14% *("Ethnic and Racial Minorities" Par. 5)*.

Children living in poverty are shown to be more subject to physical disabilities. Ivana Jakovljevic, MD, explains that "Children affected by poverty have higher rates of infant mortality, low birth weight, childhood hospitalizations, asthma, obesity, and functional impairments" *(Jakovljevic et al. 457)*. However, this pattern isn't just present for children living in poverty. A study done in England explained that poverty during childhood is associated with increased morbidity and decreased lifespan in adulthood. This association persists irrespective of the social status one acquires as an adult *(Kuh et al. 1076)*. Results of the study also showed study members receiving the poorest care during their childhood had double the death rate during adulthood of those who had lived in better conditions relative to the study. These results emphasize the fact that the health of individuals during their childhood is severely impacted by their socioeconomic status due to the fact that, despite success later in life, their low health showed a correlation with their childhood. There are numerous possible reasons for this correlation, including a lack of food causing low birth weight, functional impairments, and infant mortality. Low air quality in poorer areas can contribute to asthma as well as other respiratory issues. Since child development during early years of life lays the foundation for an individual's health, trouble at the start of their lives can persist throughout.

*Since child development during early years of life lays the foundation for an individual's health, trouble at the start of their lives can persist throughout.*

Physical health isn't the only disadvantage poverty-stricken children face. Children from families of low socioeconomic status are, on

average, 3 times more likely to suffer from psychiatric conditions, according to Charlotte Waddell, a professor at Simon Fraser University. *(Waddell et al. 828)*. These range from externalizing disorders such as ADHD, ODD, and behavioral disorders, to internalizing disorders such as anxiety, depression, and poor coping skills. Besides these disorders, people living in poverty tend to be more unhappy in general. According to findings by the Gallup Organization & Healthways Corporation, people's life evaluations rise steadily with income *(Kahneman and Deaton 16491)*. Essentially, lower-income individuals feel less happiness and satisfaction with their lives, encapsulating the low emotional-wellbeing of these people. The survey also showed that as income decreased from $75,000, happiness also decreased, with sadness and stress increasing *(Kahneman and Deaton 16492)*. These findings suggest that painful experiences have a worse effect on poor people than rich, and less money is associated with more emotional pain. Thus, this unique data suggests that, rather than money buying happiness, lack of money brings you emotional suffering. The problem though is the fact that people living in poverty are exposed to significantly more violence in their lives than those of higher socioeconomic status. As explained by Catherine Decarlo Santiago, a psychology professor at Loyola University-Chicago, roughly "20%-50% of American children have been exposed to violence in their homes, schools, and communities," and that "poor & ethnic minority individuals are at highest risk for exposure to violence" *(qtd. in Santiago et al. 116)*. Also, according to Christopher Kearney, Ph.D., professor at the University of Nevada, exposure to violence and trauma such as that of poor neighborhoods contributes to behavioral problems in individuals, such as aggression, delinquency, alcohol, and tobacco use, drug problems, and academic problems *(e.g., Kearney, Wechsler, Kaur, & Lemos-Miller, 2010)*. The fact is, exposure to violence and trauma at youth has a huge effect on the lifestyle and future of an individual. With both violence and trauma being amplified for economically disadvantaged individuals, the recurring pattern is poor mental health felt by the people.

These mental health problems also contribute to the fact that children living in poverty have problems educationally. Jakovlkevic also explains that "Children from low-income households are less prepared for formal schooling and perform below their middle-class counterparts on tests of intelligence and school achievement" *(Jakovljevic et al. 457)*. A likely explanation of this is simply the lack of resources to learn, with poorer neighborhoods having lower standards of teaching and education. This is reflected in the fact that 38% of kindergarteners in poorer Vancouver neighborhoods were shown to be vulnerable on

at least one dimension of the Early Development Instrument (EDI), compared to only 6% of those living in comfort. The EDI assesses the physical health and well-being, social competence, emotional maturity, language and cognitive development, and communication skills, and general knowledge of children. These essential skills being weaker than desirable often lead to a lower ability to comprehend information. This difficulty causes many children with mental disorders to leave their education behind. According to Kristian Wahlbeck, a psychiatrist, "26% of people with severe mental disorders and 20% of people with severe and moderate disorders left full-time education before age 15, compared with 14% of individuals without mental disorder" *(Wahlbeck et al. 2)*. This increase of almost 200% is due to the fact that the educational experience is much more difficult for individuals who are suffering from mental disorders, with problems ranging from lack of understanding to pure lack of motivation. In fact, nearly 1 in 3 students who are living below the line of poverty drop out of high school before they get a chance to graduate *("Statistics on Underprivileged" 3)*. The problem though is the fact that giving up on their education limits these children later in life. For example, "Low levels of education have been implicated as a risk factor for dementia", as per Vikram Patel, Ph.D, a professor at Harvard *(Patel and Kleiman 612)*. This goes along with the previously discussed angle of children's upbringing affecting their future health. Also, the number of well-paying jobs that can be attained without a high school diploma is few in number, and "lack of education represents a diminished opportunity for persons to access resources that improve their situation" *(Patel and Kleiman 611)*. Due to the lack of well-paying jobs that don't require a high school diploma, high school dropouts are seven times more likely to be impoverished by their late 20s and early 30s *("Statistics on Underprivileged" 6)*. The problem is that, without money, there isn't much individuals can do to improve their socioeconomic status, and without a well-paying job, they are simply stuck. In economics, this is known as the "cycle of poverty."

*In economics, this is known as the "cycle of poverty".*

The common argument is that more money causes problems. One claim of this argument is that higher-paying jobs are more stressful. They bring up research, such as a LinkedIn Learning study done in 2018, which claimed that nearly 68% of people making over $200,000 a year reported feeling stressed at work, compared to just 38% of those earning between $50,000 and $75,000 *(Petrone Par. 6)*. However, the truth of the matter is the more difficult a job is, the more an individual gets paid. People making over $200,000 per year hold extremely difficult jobs such as being a doctor but are rewarded with the money

they make. Low-income jobs are also typically low-effort jobs, which explains the lower stress levels at work for the individuals. Also, the fact is, the study examined the levels of stress at work, rather than the overall lives of individuals. Despite the fact that their work-life is less stressful, earning low-income pressures families financially, thus resulting in "significant stressors that may negatively impact mental health" *(Gupta et al. 669)*. So, despite a less stressful work-life, the overall mental health of individuals is worse at lower income brackets. Opponents may also argue that, according to the same study, people making between $50,000 and $75,000 a year reported the greatest job satisfaction at 81% *(Petrone Par. 8)*. But you must consider the fact that 79% of people making between $200,000-$250,000 reported job satisfaction, a decrease of only 2%. This minimal decrease can be explained by a multitude of factors, including the small sample size of 1,000 individuals surveyed. Another explanation could be the fact that the survey was conducted on LinkedIn members, which is a networking site known for finding job opportunities. A large portion of users on the site are likely to be searching for a new job, feeling unsatisfied at their current workplace. Thus, the argument that richer people are more stressed is simply inaccurate; while their work lives are more stressed, the money they earn improves their lives overall.

All in all, childhood poverty is a huge problem that many children face today. It has many drastic effects, including physical disabilities and mental illness. What is truly tragic is the extreme difficulty of leaving the cycle of poverty, which traps people in the downward spiral of low mental health and low income. These negative effects follow individuals throughout their lives, despite the success they may achieve through hard work and perseverance. To combat this problem, we need to start with the improvement of public education systems. A lack of good education is a huge source of poverty, as there are very few jobs that will accept you without a high school diploma. Since poverty-stricken students don't feel motivated to continue school, investing in a solid public education system that encourages students to pursue learning can have many benefits, including more and more individuals getting out of poverty by earning well-paying jobs. However, this is a solution that can be very expensive and will take time to implement. It also doesn't guarantee immediate results, as children who have already been mentally affected by poverty may not improve their mental health. This is a solution that will take a few generations to see proper results. Although these tough circumstances are a brutal reality for today's children, there is hope for their future. While it may be impossible to completely eliminate poverty, society must acknowledge

the availability of solutions to improve the lives of those less fortunate than ourselves. 

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Citation style used: **MLA 8**


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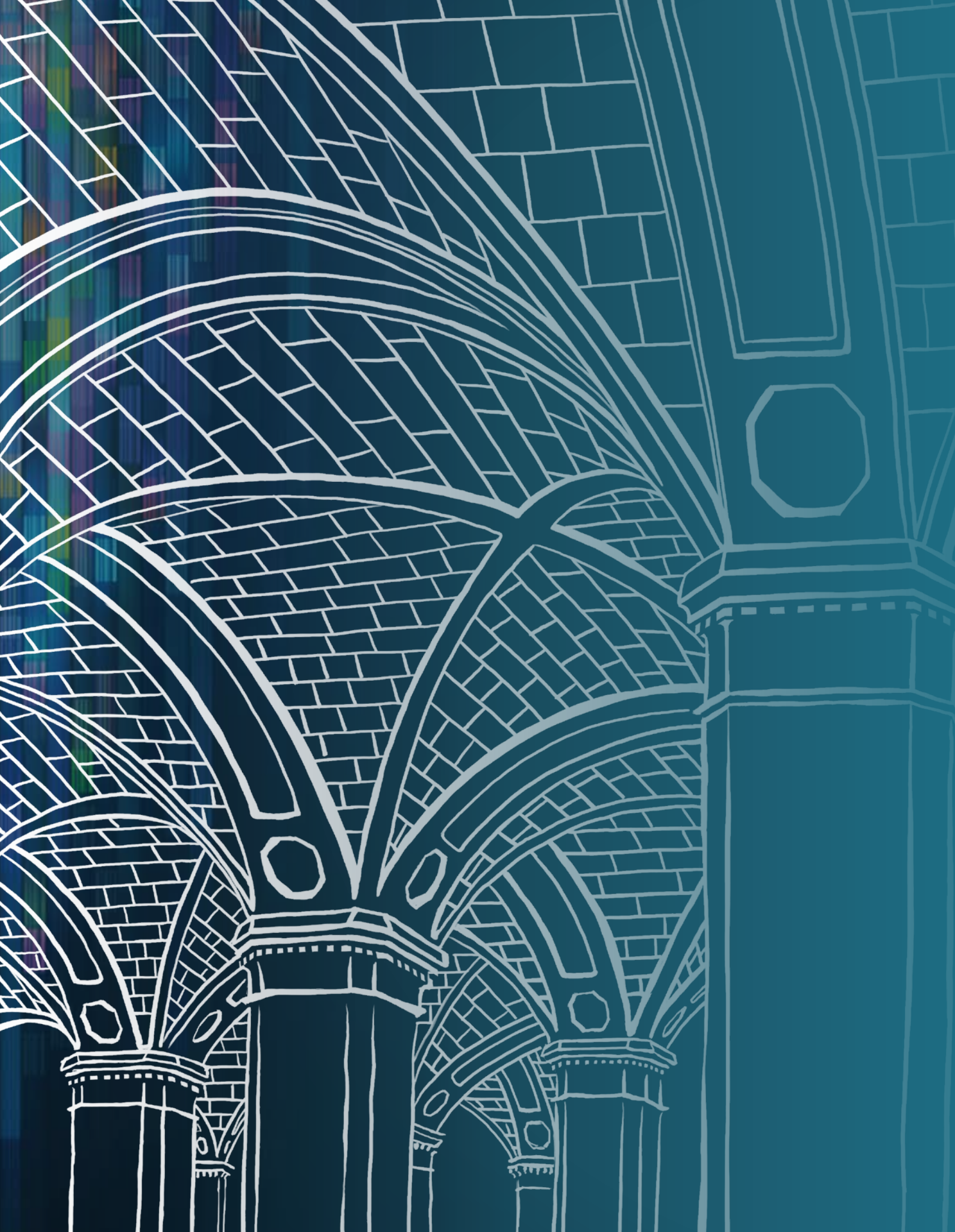


L to R: Charles Healy, Tim Monahan (adviser), Peter Joseph, Emily Truszkowski, Alex Jerdee (front), Emma Su, Rebecca Samano, and Skyler Snow

# Ridgewood High School

## Ridgewood, NJ

# *A Lasting Legacy:* An Analysis of the Causes and Potential Solutions to U.S. Housing Inequality with a Focus on New Jersey

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Since the American economy was struck by COVID-19, widespread inequality has been thrust into the forefront of public debate. While some attention has been directed to legal and income inequality, the issue of housing may be deserving of the most attention. Housing is foundational on a local and national[1] level, encouraging job opportunities and building tax revenue.[2] Housing inequality is not economically efficient as it decreases potential GDP through low labor mobility.[3] Housing also exacerbates wealth disparities, as low-income families are disproportionately reliant on their homes to accumulate wealth.[4] Wealth inequality has risen dramatically over the last forty years, and the lack of affordable housing pushes affected individuals into financial insecurity.[5] Wealth accumulation is directly tied to race, as Black people have been historically denied equal access to opportunities. Housing inequality and

segregation particularly impact minority groups, and although policies have attempted to address this issue, few have been successful. Racial housing inequality, deeply connected to Reconstruction and Jim Crow in the South,[6] was largely exacerbated by the practice of "redlining" in the 1930s. Redlining refers to the government's refusal to grant loans to people in places, mainly cities, where Black people were concentrated. The Federal Housing Administration (FHA), created in 1934, aimed to grow the economy during the Great Depression by increasing home-ownership. The Home Owners' Loan Corporation (HOLC), a subset of the FHA created by the Roosevelt Administration in response to a wave of foreclosures, established the practice of redlining. The agency created maps to mark areas by their risk of foreclosure. It insured loans for working-class people in new properties outside cities, on the explicit premise that neighborhoods with "incompatible racial elements... will prove far less stable and desirable."[7] This restrictive methodology largely excluded African Americans from the benefits of mortgage insurance. From 1934 to 1962, less than 2% of 120 billion dollars the federal government underwrote went to non-Whites[8].

**Case Study: Ridgewood, New Jersey.** The impacts of such measures can be seen across the nation to this day, but particularly in New Jersey, where many areas are diverse, but not integrated, perpetuating

[1] Housing accounted for nearly 15% of GDP in 2018.
U.S. Library of Congress, Congressional Research Service, ***Introduction to U.S. Economy: Housing Market***, by Jeffrey M. Stupak, IF11327 (2019), 1.

[2] 1,000 average single-family homes results in the production of 2,900 jobs and an estimated $110.96 million in taxes.
Robert Dietz, ***"Top Posts of 2016: What Building 1,000 Homes Means to the U.S. Economy,"*** last modified December 28, 2016, accessed February 28, 2021, https://eyeonhousing.org/2016/12/top-posts-of-2016-what-building-1000-homes-means-to-the-u-s-economy/.

[3] At the peak of the housing market bubble, residential construction employed more than 1 million individuals. However, as a result of the housing bubble bursting and subsequent recession, employment fell to a low of about 560,000 employees in 2011.
Congressional Research Service, Introduction to the U.S. Economy: Housing Market, IF11327 2019.

[4] Across all majority Black neighborhoods, owner-occupied homes are undervalued by $48,000 per home on average, amounting to $156 billion in cumulative losses.
Andre Perry, Jonathan Rothwell, and David Harshbarger, ***"The Devaluation of Assets in Black Neighborhoods,"*** Brookings Institution, November 2018, pp. 3-5, https://www.brookings.edu/wp-content/uploads/2018/11/2018.11_Brookings-Metro_Devaluation-Assets-Black-Neighborhoods_final.pdf.

[5] In 1983, an average upper-class household in the United States held 28 times the amount of wealth held by a lower-class family. In 2016, the number was recorded at 75.
***"Most Americans Say There is Too Much Income Inequality in the U.S., But Fewer Than Half Call it a Top Priority,"*** Pew Research Center, Washington, D.C. (January 9 2020) https://www.pewresearch.org/social- trends/2020/01/09/trends-in-income-and-wealth-inequality/.

[6] Reconstruction gave way to Jim Crow in the South in 1877. While the demand for industrial labor driven by World War I triggered the Great Migration, those seeking to escape sharecropping and Jim Crow ran into a new, different form of discrimination in Northern industrial centers.

[7] Federal Housing Administration, ***Underwriting Manual: Underwriting and Valuation Procedure Under Title II of the National Housing Act***, Revised Feb. 1938, https://www.huduser.gov/portal/sites/default/files/pdf/Federal- Housing-Administration-Underwriting-Manual.pdf.

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the impacts of de jure segregation established by the HOLC.[9] One New Jersey town in Bergen County, Ridgewood, is a microcosm of White suburbia and illustrates the lasting impacts of redlining. Ridgewood has been predominantly White since its founding in 1894. Similar to many locations, residents and realtors have discriminated against minorities on an individual basis since the town's origin. Many housing deeds banned non-White people from buying homes,[10] and in 1941, the Ridgewood Board of Realtors explicitly published their goal to "bring here only the kind of people who are here and thus preserve the congenial neighbor tradition."[11]

In the 1930s, redlining shifted discrimination in Ridgewood beyond the individual and onto the HOLC, whose agents used race as a distinguishing factor in grading. Ridgewood was split into sectors graded from "Best" to "Hazardous." The sectors marked as "Hazardous" contained the highest concentrations of Black and foreign people (25% in each), and the sectors marked "Best" or "Still Desirable" did not contain Black or foreign homeowners. The descriptions by HOLC agents show clearly that race was a major factor in grading, describing areas with larger percentages of Black people as containing "a low-grade population"[12] and lowering a sector's grade because the "predominantly 'White' [population] is threatened by negro invasion."[13] Poor grades doomed areas to disinvestment and low property values. Redlined neighborhoods had 4.8% lower prices in 1990 when compared to nearby areas.[14]

Redlining cemented racial segregation in Ridgewood, even as residents adopted more progressive ideas on race. A Columbia 1963 study collected data on Ridgewood residents' perspectives on race, as "a microscopic view of what segregation is like in America." 82% of residents said they thought their neighbors would be opposed to a Black family moving into their block, yet only 18% of the neighbors said they might move away if a Black family moved in.[15]

*Poor grades doomed areas to disinvestment and low property values. Redlined neighborhoods had 4.8% lower prices in 1990 when compared to nearby areas.*

This ignorance and fear of "White flight" fueled segregation and increased housing inequality across metropolitan areas.

Despite affordable housing initiatives in recent decades, Ridgewood remains moderately racially segregated. Redlined areas still contain higher concentrations of minorities and lower property values.[16] The area as a whole has remained predominantly White. As of 2018, there were 5 times more White residents than any other race or ethnicity and only 1.8% of residents were Black.[17]

**The disparate wealth impact of property values.** Although the HOLC ceased operations in 1951, the effects of its discriminatory practices still persist across the nation today. Discriminatory lending practices prevented Black people from purchasing affordable homes that later increased in value, enabling White households to reap the benefits of rising property values. According to data from the US Census Bureau, median home prices in the United States increased over 15-fold from 1951 to 2020.[18] As residential property constitutes a significant portion of wealth, homeownership is a key determinant of wealth accumulation over time. From 1968 to 2016, Black households gained an average of $6,350 in wealth while White households gained an average of $78,917.[19] African Americans received fewer residential opportunities [20] and experienced the devaluation of their homes, which are currently undervalued by $48,000 on average.[21] Many areas are doubly segregated by race and poverty, as Black individuals are ten times more likely to live in impoverished neighborhoods than their White counterparts.[22] Many Black individuals were denied strong financial returns, as property has been systematically less available and undervalued for them.

**Effect on education.** Housing discrimination also amplifies the educational disparities between Black and White Americans. Nearly half of public school funding is based on property taxes, therefore

[9] See, for example, ***Crabgrass Frontier: The Suburbanization of the United States***, in which prominent historian Ken Jackson refers to the voluntary segregation of New Jersey specifically as the "balkanization" of New Jersey.

[10] "This conveyance is further made subject to the following conditions and restrictions...That no person wholly or partly of Negro Mongolian or Semitic race shall ever be permitted to own rent or occupy any part of said lands except as servant of an owner tenant or occupant being of the Caucasian race"
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[21] Perry, Rothwell, and Harshbarger, "The Devaluation of Assets in Black Neighborhoods," pp. 3-5.

[22] Jane Gingrich and Ben Ansell, "Sorting for Schools: Housing, Education and Inequality," ***Socio-Economic Review 12***, no. 2 (April 2014): pp. 329-351, https://doi.org/https://doi.org/10.1093/ser/mwu009.

neighborhoods with lower property values often have lower education budgets.[23] In 2019, school districts with majority Black students received $23 billion less in funding than those with majority White students, widening differences in the quality of public education.[24] Black students are more than four times as likely as White students to attend schools in which over 20% of their teachers do not meet state certification and licensing requirements.[25] Predominantly minority schools have 15% larger class sizes, and Black students overall have fewer and lower-quality books, laboratories, computers, and curriculums.[26] Lack of access leaves students unprepared for college,[27] hindering social mobility, and resulting in poorer job opportunities, perpetuating the cycle of poverty.

**Environmental/health effects.** Housing impacts health, as environmental inequity causes pollution to disproportionately affect Black communities. Highways constructed by the Public Works Administration were designed to "go right through cities and not around them,"28 displacing Black communities. As of 2010, 4.4% of Black people live within 150 meters of a major highway, as opposed to 3.1% of White people.[29] As a result, African Americans experience 54% more air pollution than the overall population.[30] This close proximity to major roads and high traffic density is associated with respiratory diseases such as asthma, chronic obstructive pulmonary disease, cardiovascular disease, and mortality.[31] 12.6% of Black children had asthma compared to 7.7% of White children in 2017.[32]

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**Discrimination against other marginalized groups.** In addition to Black communities, housing has been a challenge for other marginalized groups. Single-parent families make up a large portion of those under the poverty line, an issue that has been aggravated by the 2008 housing crisis. Intersectional discrimination and housing burdens often leave single-parent families at risk for homelessness, as they struggle to support living costs.[33] LGBTQ+ individuals also face severe housing discrimination. In 2017, 22% of LGBTQ+ adults reported experiencing discrimination based on their sexual orientation or gender identity when entering the housing market for rentals or purchases.[34] A University of Chicago study revealed that LGBTQ+ youth aged 18 to 25 have a 120% higher risk of homelessness than heterosexual or cisgender youth.[35]

**Affordable Housing under Mount Laurel Doctrine.** In response to issues of housing inequality, affordable housing has been offered by courts and policymakers as a potential solution. The Mount Laurel I (1975) New Jersey Supreme Court case brought attention to the issue and set a major affordable housing precedent, yet it was ultimately un-

successful. At the time, the Township of Mount Laurel was developing solely single-family homes to attract White middle-class and upper-class families, excluding the affordable housing needed by many African-Americans recently displaced by the construction of a nearby highway.[36] To address this, the New Jersey Supreme Court established the Mount Laurel doctrine, declaring that New Jersey municipalities must provide affordable housing options. But in response, New Jersey municipalities only targeted wetlands and industrial parks with little economic opportunity, ultimately rezoning 20 acres out of an available 14,300 acres of land.[37] The insufficient cooperation led to the development of Mount Laurel II and the Fair Housing Act, producing the Council on Affordable Housing (COAH) for reinforcement.

Mount Laurel II and the COAH failed to satisfy the constitutional burden of Mount Laurel I, as they allowed municipalities to decide

[23] Bruce J Biddle and David C Berliner, "A Research Synthesis / Unequal School Funding in the United States," Unequal School Funding in the United States - Educational Leadership, accessed March 7, 2021, http://www.ascd.org/publications/educational-leadership/may02/vol59/num08/Unequal-School-Funding-in-the-Unit ed-States.aspx#:~:text=Public%20school%20funding%20in%20the,between%20wealthy%20and%20impoverished%20communities.

[24] "23 Billion," EdBuild, accessed February 7, 2021, https://edbuild.org/content/23-billion.

[25] U.S. Department of Education Office for Civil Rights, "***Civil Rights Data Collection Data Snapshot: Teacher Equity,***" Last modified March 2014, Accessed March 7, 2021. https://www2.ed.gov/about/offices/list/ocr/docs/crdc-teacher-equity-snapshot.pdf.

[26] Linda Darling-Hammond, "Unequal Opportunity and Race," Brookings Institution, March 1998, https://www.brookings.edu/articles/unequal-opportunity-race-and-education/.

[27] In 2011-12, only 57 % of Black students had access to a full range of Math and Science courses necessary for college readiness, compared to 71% of White students "K-12 Disparity Facts and Statistics," UNCF, March 20, 2020, https://uncf.org/pages/k-12-disparity-facts-and-stats.

[28] Robert Moses, Hearing Before the President's Advisory Comm. on a Nat'l Highway Program 48 (Statement, Washington, DC, Oct. 7, 1954).

[29] U.S. Department for Health and Human Services, Centers for Disease Control and Prevention, Residential Proximity to Major Highways 2010, Atlanta: U.S. Department of Health and Human Services, 2010.

[30] Ayana Byrd, "EPA Report Proves That Black Communities More Likely to Breathe Toxic Air," Feb 2018, ColorLines, https://www.colorlines.com/articles/epa-report-proves-black-communities-more-likely-breathe-toxic-air.

[31] Tegan K. Boehmer et. al., "Residential Proximity to Major Highways — United States, 2010," Morbidity and Mortality Weekly Report 62, no 3 (November 22, 2013): 46-50.

[32] Sofia Carratala and Connor Maxwell, "Health Disparities by Race and Ethnicity," Center for American Progress, accessed March 5, 2021, https://www.americanprogress.org/issues/race/reports/2020/05/07/484742/health- disparities-race-ethnicity/#:~:text=In%202017%2C%2010.6%20percent%20of,health%20insurance%20coverage%20in%202017.

[33] Out of 11 million single-parent families in the U.S. with children under the age of 18, 80% were headed by single mothers in 2019.
U.S. Census Bureau, "America's Families and Living Arrangements 2019," (FG10) Family Groups, (FG6) One-Parent Unmarried Family Groups with Children Under 18, accessed February 26, 2021, https://www.census.gov/data/tables/2019/demo/families/cps-2019.html.

[34] Adam P. Romero, Shoshana K. Goldberg, and Luis A. Vasquez, "LGBT People and Housing Affordability, Discrimination, and Homelessness." (UCLA, April 2020), https://williamsinstitute.law.ucla.edu/wp-content/uploads/LGBT-Housing-Apr-2020.pdf.

[35] Emily Bramhall, "Five Facts about Housing Access for LGBT People," Housing Matters, June 13, 2018, https://housingmatters.urban.org/articles/five-facts-about-housing-access-lgbt-people.

[36] "Mount Laurel Doctrine," Fair Share Housing Center, accessed February 7, 2021, https://fairsharehousing.org/mount-laurel-doctrine/.

[37] Ibid.

whether or not to build affordable housing. Mount Laurel II provided incentives for developers to initiate exclusionary zoning suits.[38] However, local developers rarely used these incentives due to public opposition to subsidized housing. Many constituents believed affordable housing would be a heavy financial burden and a catalyst for urban sprawl. Instead, developers built four times as much higher-end housing as affordable housing, failing to aid the impoverished population.[39] The COAH enabled towns to reject affordable housing, contrary to its intended purpose. Through the COAH, towns could make plans for affordable housing developments without following through on construction to avoid meeting their subsidized housing quotas. In this process, municipalities decreased 75% of their low-income housing obligations.[40] A study from TCNJ found that Mount Laurel II and the Fair Housing Act did not affect economic segregation from 1990 to 2000.[41]

**Benefits and drawbacks of affordable housing.** Despite Mount Laurel's failures, proper execution of affordable housing has been shown to have positive effects on housing and economic sustainability. Subsidized housing received by formerly homeless families is the primary predictor of housing stability.[42] Thus, affordable housing has lasting positive effects on low-income earners. Affordable housing is also theoretically economically efficient. A 2015 study by the National Association of Home Builders found that the affordable housing shortage in major metropolitan areas costs the US economy about $2 trillion a year in lower wages and productivity, and estimates that GDP growth between 1964 and 2009 would have been 13.5% higher if families had had better access to affordable housing.[43]

Affordable housing is becoming increasingly difficult to obtain in the U.S. as demand for housing increases and supply decreases.[44] Currently, there are 10.9 million renters and 7.5 million homeowners in the U.S. who are classified as severely cost-burdened,[45] and the number of available low-cost units is shrinking.[46] Only 35 of every 100 extremely low-income renter households[47] have access to subsidized living. The severity of the housing crisis has worsened markedly since the Great Recession.[48] Little has been done to alleviate this issue and new policies must be explored in order to reach a firm solution. However, such policies are often politically unpopular and fail similar to the Mount Laurel Doctrine. In order to progress, the benefits of subsidized housing must be made clear, and the courts must consider a more top-down approach to enforcement.

**Benefits and drawbacks of public housing.** Alongside affordable housing, stable public housing could aid low-income populations. Unlike for-profit developers, governments that produce these developments can keep prices low without dwelling on profits.[49] Low-income

individuals would have to work 68 to 118 hours a week to afford the average market apartment in their city. Living in public housing reduces the burden of high housing costs, opening consumer spending to other necessities and industries. Additionally, every $1 million spent on the developments generates $1.89 million in economic activity and supports eleven full-time jobs on average.[50]

Although public housing has clear benefits, numerous projects have failed to aid low-income people in the long-term. Created by the U.S. Housing Act of 1937, the Low Rent Public Housing program attempted to target low-income individuals with subsidized housing. One notable example was in Paterson, New Jersey, where the Riverside Terrace housing project constructed in 1943 was soon plagued by open-air drug markets and extreme violence. Residents in this area became more susceptible to the cycle of poverty and crime that low-income minorities often face through on-site violence, and the demolition of the project began in 2019.[51] More broadly, serious crime rates at public

[38] Ibid.

[39] Ibid.

[40] Corey Klein, "Re-Examining the Mount Laurel Doctrine After the Demise of the Council on Affordable Housing: A Critique of the Builder's Remedy and Voluntary Municipal Compliance" (2012), Law School Student Scholarship, 123, https://scholarship.shu.edu/student_scholarship/123.

[41] Damiano Sasso, "The Effect of the Mount Laurel Decision on Segregation by Race, Income, and Poverty Status" (2004), pp. 2-23, https://business.tcnj.edu/wp-content/uploads/sites/219/2011/07/Sasso.tcnj_.pdf

[42] M., Shinn, "Predictors of Homelessness among Families in New York City: from Shelter Request to Housing Stability," American Journal of Public Health, 1998, 1651–57, https://doi.org/10.2105/ajph.88.11.1651.

[43] Elayne Weiss, A Place to Call Home: The Case for Increased Federal Investments in Affordable Housing (Washington, DC: Campaign for Housing and Community Development Funding, 2017), 10, https://nlihc.org/sites/default/files/A-Place-To-Call-Home.pdf.

[44] Prices for housing are still on the rise, with 2019 being the 8th year that the median sales price of existing single-family homes rose faster than median household income. Pricings of modest homes that were already valued at 75% of the average area median increased another 7.5% in 2020 and the S&P CoreLogic Case-Shiller Home Price Index found that housing prices were up 5.7% in 2020 despite high rates of unemployment.
"2020 State of the Nation's Housing Report: 4 Key Takeaways for 2021," Cost of Home, Habitat For Humanity, Accessed February 10, 2021, https://www.habitat.org/costofhome/2020-state-nations-housing-report-lack-affordable -housing.

[45] Cost burdened: More than 50% of one's income goes towards housing.
Amy Brisson and Lindsay Duerr, "Impact of Affordable Housing on Families and Communities: A REVIEW OF THE EVIDENCE BASE," Enterprise, 2014, p. 3, https://homeforallsmc.org/wp-content/uploads/2017/05/Impact-of-Affordable-Housing-on-Families-and-Communities.pdf.

[46] The State of the Nation's Housing 2013. Joint Center for Housing Studies of Harvard University, 2013.
http://www.jchs.harvard.edu/sites/jchs.harvard.edu/files/son2013.pdf

[47] Households with incomes at or below the Poverty Guideline or 30% of the average median income in the area

[48] "In 2007, 40 affordable and available rental homes existed for every 100 extremely low renter households" Andrew Aurand, "The Gap: A Shortage of Affordable Homes," (NLIHC, Washington, DC, 2018), 5, https://nlihc.org/sites/default/files/gap/Gap-Report_2018.pdf.

[49] Rachel G. Bratt, "Should We Foster the Nonprofit Housing Sector as Developers and Owners of Subsidized Rental Housing?" ***Joint Center for Housing Studies of Harvard University***, March 2007, https://www.jchs.harvard.edu/sites/default/files/media/imp/rr07-12_bratt.pdf.

[50] The Council of Large Public Housing Authorities, "The Economic Impact of Public Housing," October 2018, https://clpha.org/sites/default/files/documents/EconomicImpactPublicHousing_final2_digital_0.pdf.

[51] Paterson Housing Authority, "Public Housing Information," accessed February 29, 2021, https://clpha.org/sites/default/files/documents/EconomicImpactPublicHousing_final2_digital_0.pdf.

housing sites are often two to twenty times higher than the national rates for the same crimes.[52] Mold, asbestos, and other health hazards also have a high presence at low-income developments.[53] Expansion of social services, drug education, and job placement programs for youth can help ameliorate crime, while property maintenance and updates can increase the quality of low-income housing. Public housing can be effective, but should not be used in isolation.

**Effect of mortgage tax deduction.** Another potential way to address housing inequality is to reallocate access to mortgage deductions. Mortgage Interest Deductions (MIDs) allow homeowners to deduct the interest on a mortgage from their taxable income. MIDs could be strengthened for low-income households to help lower the amount of taxes owed.

*Expansion of social services, drug education, and job placement programs for youth can help ameliorate crime, while property maintenance and updates can increase the quality of low-income housing.*

Higher-income, White families currently benefit most from MIDs, as they are far more likely to own households and take out a mortgage. A study by Brandeis University found that White people gain 78% of benefits from the MID while only making up 67% of households. Conversely, Black and Latino households comprise about 13 percent of the population, but access merely 6 to 7% of the benefits, totaling an estimated $8.9 billion in lost housing investments.[54] A University of Chicago study revealed that repealing the MID could decrease the Gini Coefficient for after-tax income by 0.0019 to 0.008.[55] However, a majority of voters support the MID, so a repeal is unlikely. While there is potential to reduce housing inequality, legislative action would likely be challenging to accomplish.

As housing plays a significant role in American lives, it is important to prioritize increasing access for marginalized groups, whose long histories of discrimination will continue without comprehensive and definitive action. In New Jersey, the Mount Laurel case helped spread awareness of the severity of housing inequality. Yet, decades later, New Jersey remains largely segregated in suburban towns like Ridgewood and urban cities like Paterson. Policies like affordable housing, public housing, and MID reforms have potential to improve outcomes, but until the history of discrimination can be collectively confronted and acknowledged, effective actions cannot be taken. Ignorance breeds apathy towards marginalized groups and is economically inefficient, harming the US housing sector and slowing growth. The solution to integrated housing has not yet been fully recognized, but the pursuit of solutions is crucial: not just for marginalized groups, but for all Americans.

[52] Mary Jo Huth, "Strategies for Crime Reduction in Public Housing," The Western Michigan University Journal of Sociology and Social Welfare: Vol. 8: Iss 3, Article 9, 1981, https://scholarworks.wmich.edu/cgi/viewcontent.cgi?article=1499&context=jssw.

[53] Black people and low-income people are respectively 1.7 times and 2.2 times more likely to occupy homes that contain poor conditions and lead to severe physical problems than the general population. James Krieger and Donna L. Higgins, "Housing and Health: Time Again for Public Health Action," American Journal of Public Health 92 (5): 758-786, May 2002, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1447157/.

[54] Institute on Assets and Social Policy (IASP) & National Low Income Housing Coalition, "Misdirected Investments: How the Mortgage Interest Deduction Drives Inequality and the Racial Wealth Gap," Institute on Assets and Social Policy at The Heller School for Social Policy and Management at Brandeis University, October 2017, https://heller.brandeis.edu/iere/pdfs/racial-wealth-equity/racial-wealth-gap/misdirected-investments.pdf.

[55] Daniel Hemel and Kyle Rozema, "Inequality and the Mortgage Interest Deduction," Coase-Sandor Institute for Law and Economics at the University of Chicago, 2016, https://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?article=2461&context=law_and_economics.

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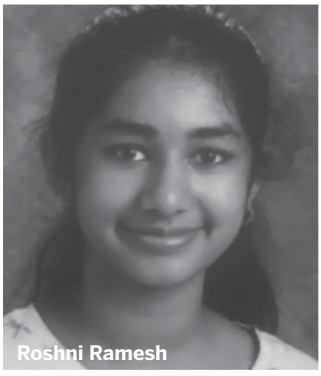
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# Shaker High School

## Latham, NY

# *A New Approach to Forecasting Inequality:* Using Machine Learning to Predict the Gini Coefficient

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## INTRODUCTION

*The Gini coefficient is the most widespread measure of income or wealth inequality used by economists and policymakers alike. The Gini coefficient can range from zero to one, with zero reflecting a society in which income or wealth is equally distributed across all society's members, and one representing the opposite extreme, a society in which one member has all the society's income or wealth. The Gini coefficient can be defined based on the Lorenz Curve, a graph in which the proportion of income or wealth in the population is on the vertical axis, and the cumulative amount earned by the bottom percentage of the population is on the horizontal axis. A 45-degree line would represent a perfectly equal society. The Gini coefficient is the area between this line of equality and the Lorenz Curve (Ramzai, 2020). Mathematically, it can be shown that the Gini coefficient measures how far a society's average income or wealth disparities are from a society that is perfectly equal or perfectly unequal*

*(Escudero, 2018).*

*When calculated at the country level, higher Gini coefficients indicate higher levels of inequality in a country. Although richer countries generally tend to have lower levels of income inequality than poorer countries, inequality is not always related to a country's GDP or overall state of development. The United States for example as of 2015 had a Gini coefficient of 41.1, while the Gini coefficient for the same year in Ethiopia, a much poorer country, was 35.0 (World Bank, 2021). Studies have documented that some of the factors that drive differences in income inequality across countries include the demographics of the population, GDP growth, tax policy, technological change, and households' saving behavior (Hailemariam et al., 2020; Cloninger, 2016). These studies generally have relied on traditional regression-based methods of analysis.*

## Goal

THIS STUDY SEEKS to predict the Gini coefficient using machine learning. First, a model is trained using various statistical indicators that were acquired using a computer automated process. Based on any input of values for these same statistical indicators, a Gini coefficient is outputted and stored. After this model is run repeatedly, a statistical analysis is performed and the results are visualized.

## Methodology

### *Data*

Data included 24 World Bank Development indicators accessed via the World Bank API from the World Bank World Development Indicators Database, as well as Gini coefficient data from the same database. The data was divided into 8 categories for purposes of analysis and the drawing of more general conclusions about associations with Gini coefficients, with each category listed alongside a thesis relating to it in the "Theses" section of this paper.

Data was collected for every country in the world, and some autonomous regions or overseas territories, like Hong Kong and the British Virgin Islands. Data was collected only from the World Bank for consistency, and for its availability of data globally. It was collected for the earliest year available between 2000 and 2020 for each region analyzed, due to partial unavailability of data.

Data collection and storage was automated using Python program-

ming and organized into a Pandas Dataframe as shown by *Figure 1*, for analysis. This was done with a combination of web-scraping and use of the World Bank API. Each variable was used as a column vector to try to predict the Gini coefficient.

**Figure 1**
**Our Data**
**The Global Gini Coefficient Hypervolume**

$$P=\begin{bmatrix} a_1 & b_1 & c_1 & d_1 & e_1 & f_1 & g_1 & h_1 & i_1 \\ a_2 & b_2 & c_2 & d_2 & e_2 & f_2 & g_2 & h_2 & i_2 \\ a_3 & b_3 & c_3 & d_3 & e_3 & f_3 & g_3 & h_3 & i_3 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ a_n & b_n & c_n & d_n & e_n & f_n & g_n & h_n & i_n \end{bmatrix}$$

$\overrightarrow{R_1}=\{a_1 \quad b_1 \quad c_1 \quad d_1 \quad e_1 \quad f_1 \quad g_1 \quad h_1 \quad i_1\}$ *defines one country*
$\overrightarrow{C_1}=\{a_1 \quad a_2 \quad a_3 \quad \ldots \quad a_n\}$ *defines the first economic indicator*

## *Data Analysis*

Data analysis was conducted first using a regression approach, using the Pearson correlation, and using a machine learning approach, using the Random Forests model. Pearson correlation is a widely used correlation, and generates what is known as the Pearson r value, a stationary measure of relationship between two variables, and performs well in demonstrating the direction of relationships (positive or negative) in data. Therefore, it was used here to determine the direction of associations of World Bank indicators with Gini coefficient values.

A decision tree is a technique used in supervised machine learning in which a dataset is divided into smaller subsets based on decisions made at branches extending from each node. Random Forests builds on this basic technique by utilizing an idea called the "Wisdom of the Crowd" which states that an aggregated prediction tends to be more accurate than an individual prediction. The use of several rather than individual predictors is called Ensemble Learning with an ensemble of decision trees being a Random Forest.

The process begins with a training dataset—the data that will be used to build the model. Then, in a process called bagging or bootstrap aggregation, the training dataset is sampled with replacement and distributed to different predictors. In Random Forests, these predictors are decision trees. Each decision tree will be trained on their respective subset of the training data. When a prediction is made, a value traverses through all the decision trees. Since Random Forests is based on a "majority vote" system, whatever value the majority of decision trees outputs, is the value that is outputted by the model. In this study, Random Forests Regression will be used since the model will attempt

to output a quantitative variable: Gini coefficient. A model must also be able to split the data and determine the "quality" of that split. To determine the quality of a split, Gini impurity is typically used in Random Forests.

Gini impurity can be defined more simply as the probability of incorrectly classifying an element. Gini values range from 0 to 0.5. For example, a Gini impurity value of 0.5 says that the probability of incorrectly classifying an element would be 50%—the model would simply be "guessing". To avoid "guessing" and to maximize the assurance that the model's prediction is correct, a decision tree in a Random Forest will continue to split the data until Gini impurity is as close as possible to 0. These procedures allow feature importance to be calculated. By determining how much each feature reduced Gini impurity on average, the most influential feature can be found. Feature importance will be calculated to determine which economic indicator had the most influence on the projected Gini coefficient.

$$G = 1 - \sum_{i=1}^{C} p(i)^2$$

$C$ = Number of classes

$p(i)$ = Probability of selecting class $i$

$G$ = Gini impurity

**Figure 2.1**
**Gini Impurity Equation**

**Gini impurity is different from the Gini coefficient. Gini impurity measures the "inequality" in data while the latter measures global inequality in wealth.*

$$f_{ii} = \frac{\sum j: \text{node } j \text{ splits on feature } i \; ni_j}{\sum k \in \text{all nodes } ni_k}$$

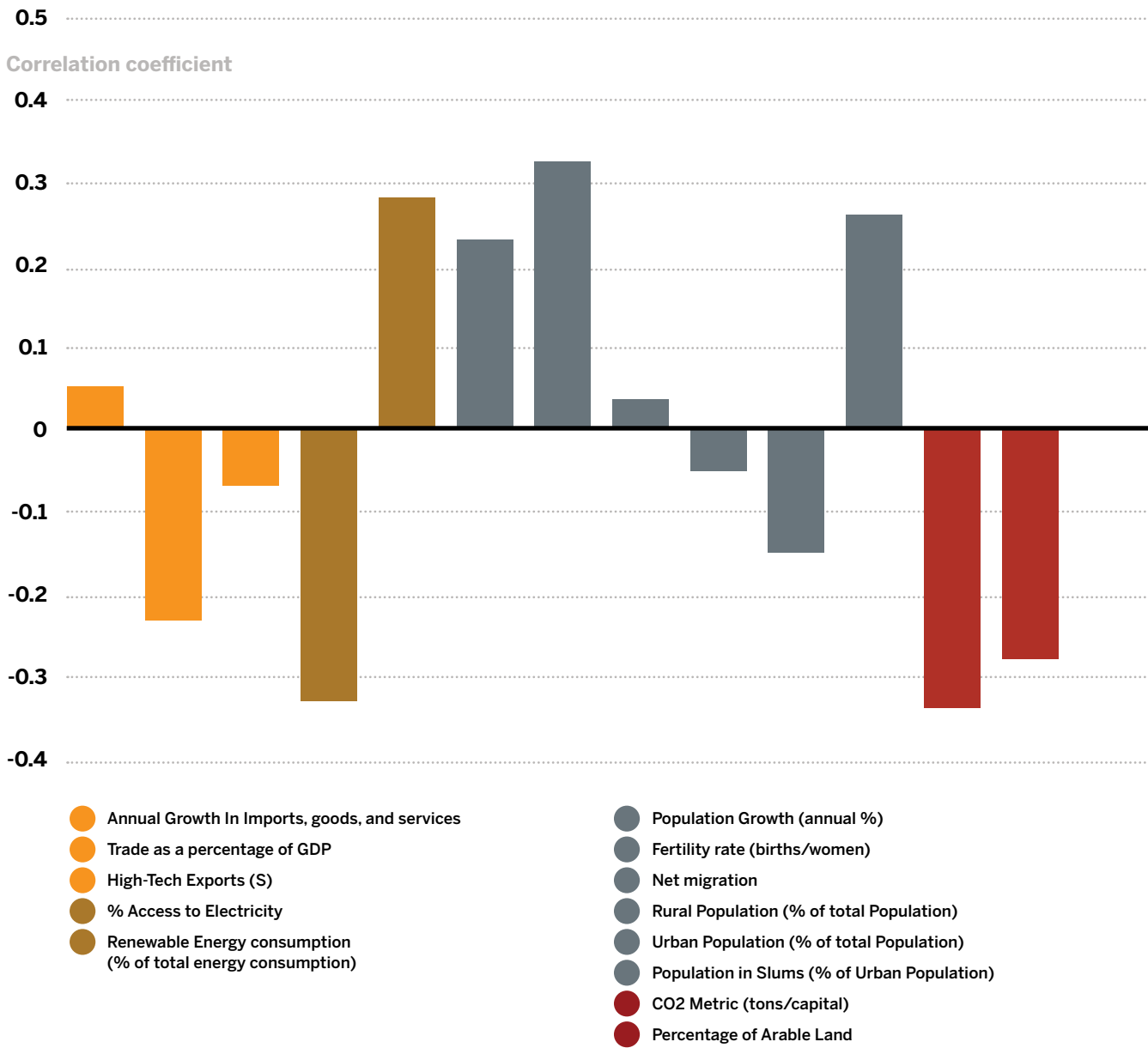
**Figure 2.2**
**Feature Importance Equation**

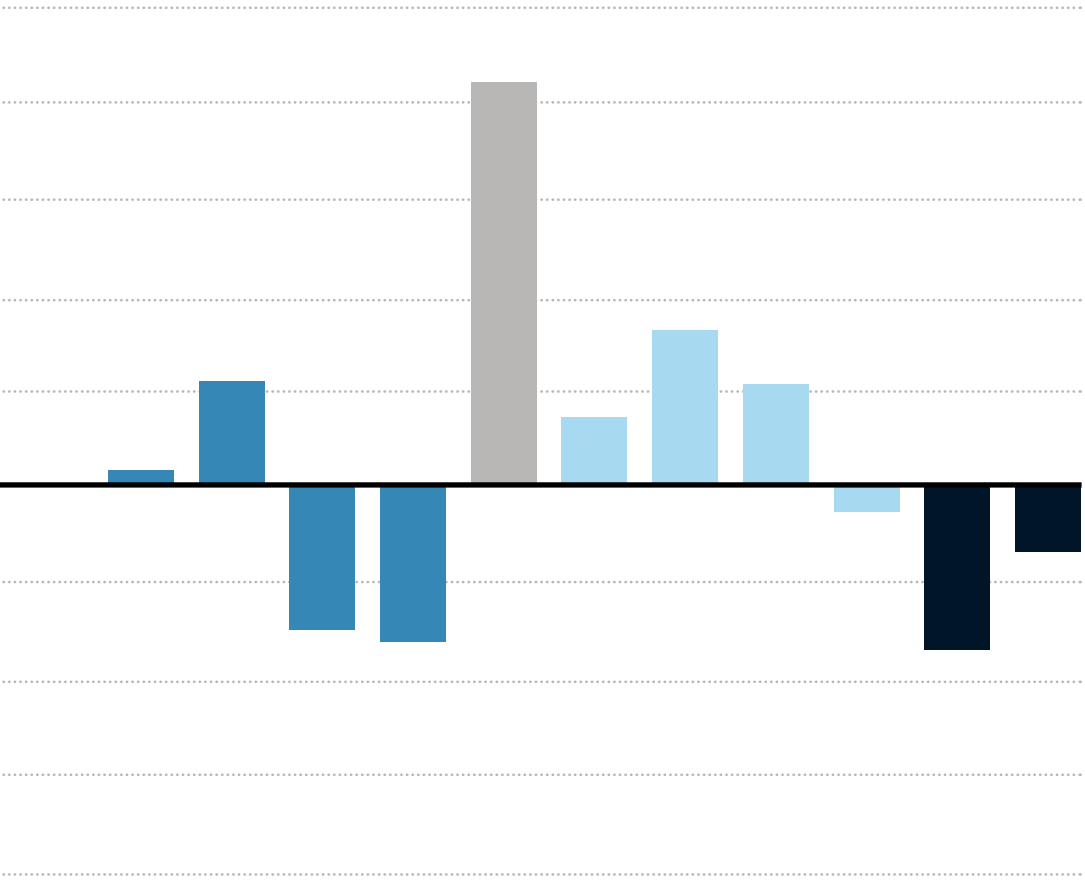
Figure 3

## Correlation Coefficients

*(Regression Model Findings)*

### Correlation Coefficient of World Bank Indicators with Gini Index



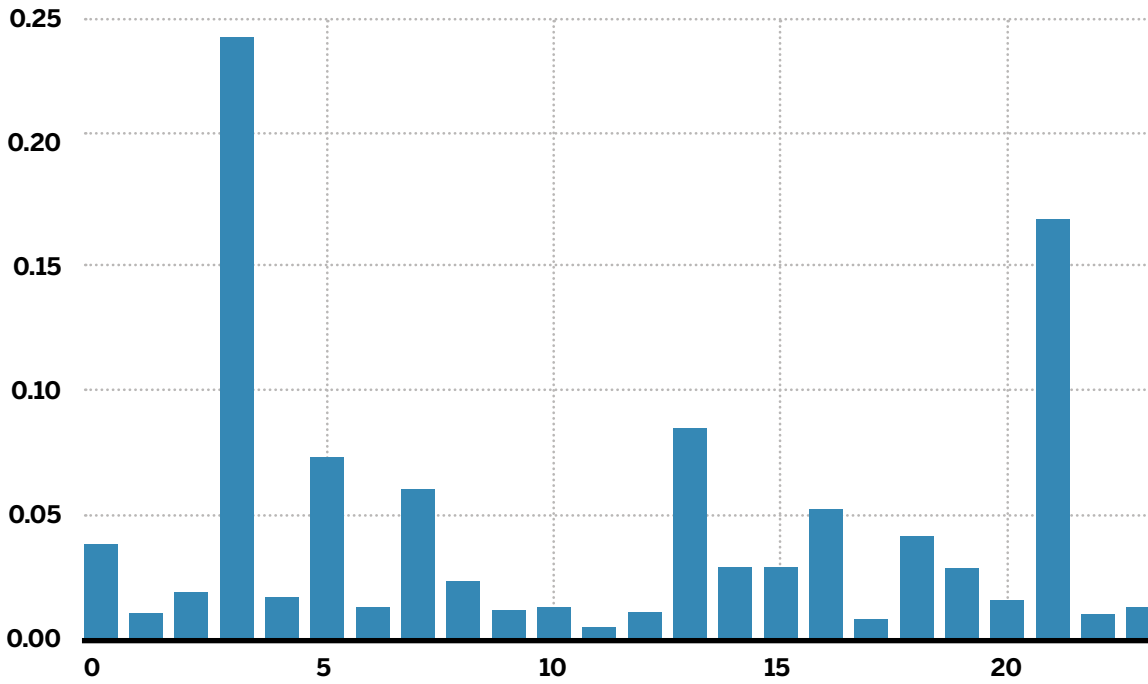


- Government Expenditure on Education (% GDP)
- Adult female literacy rate (15 + up)
- Literacy rate, adult male (% males ages 15 + up)
- School enrollment, primary and secondary (gross), gender parity index
- Cause of death, by communicable disease and maternal, parental and nutrition conditions (% of total)
- Agricultural Land (% Land)
- Agriculture, Forest, Fishing, Value Added (% GDP)
- Children in Employment (% Male)
- Industry, Value Added (% GDP)
- GDP Growth per Capital (annual)
- External Debt Stock % GNI

Figure 4

## Feature Importance

*(Random Forests Model Findings)*




0 **Annual Growth in Imports of Goods and Services** *(annual%)*

1 **Access to Electricity** *(% of the population)*

2 **Arable Land** *(% of total land area)*

3 **Cause of Death by communicable diseases and maternal, parental and nutrition conditions** *(% of total death)*

4 **Metric tons of CO2 per capita**

5 **External Debt Stocks** *(% of GNI)*

6 **Fertility Rate** *(births per woman)*

7 **GDP Growth Per Capita** *(annual%)*

8 **Government expenditure on Education** *(% of GDP)*

9 **Adult female literacy rate** *(% of females aged 15 and up)*

10 **Adult male literacy rate** *(% of males aged 15and up)*

11 **Net migration**

12 **Population growth** *(annual%)*

13 **Renewable Energy Consumption** *(% of total final energy consumption)*

14 **Trade** *(% of GDP)*

15 **Agricultural Land** *(% of total land area)*

16 **Agriculture, Forest, Fishing, Value Added** *(% GDP)*

17 **Children in Employment** *(% of male)*

18 **High-tech Exports** *(USD)*

19 **Industry, Value Added** *(% GDP)*

20 **Population in Slums** *(% of Urban Population)*

21 **Rural population** *(% of total Population)*

22 **School enrollment, primary and secondary** *(gross)***, gender parity index**

23 **Urban Population** *(% of total population)*

## Summarization of Figures

### *Regression Model*

The data is clustered in this display, and all the variables have relatively low correlation coefficients. This supports the notion there is not one factor or even one group of factors that determine economic inequality. However, this figure does indicate that some indicators are more important than others. The industrial, agricultural, and financial indicators (light blue and black) proved to have little correlation with the Gini index. Environmental indicators (red) had a relatively strong negative correlation with the Gini index while the sole health indicator (grey) and the demographic indicators (dark grey) both had a relatively strong positive correlation with the Gini index.

### *Random Forests Model*

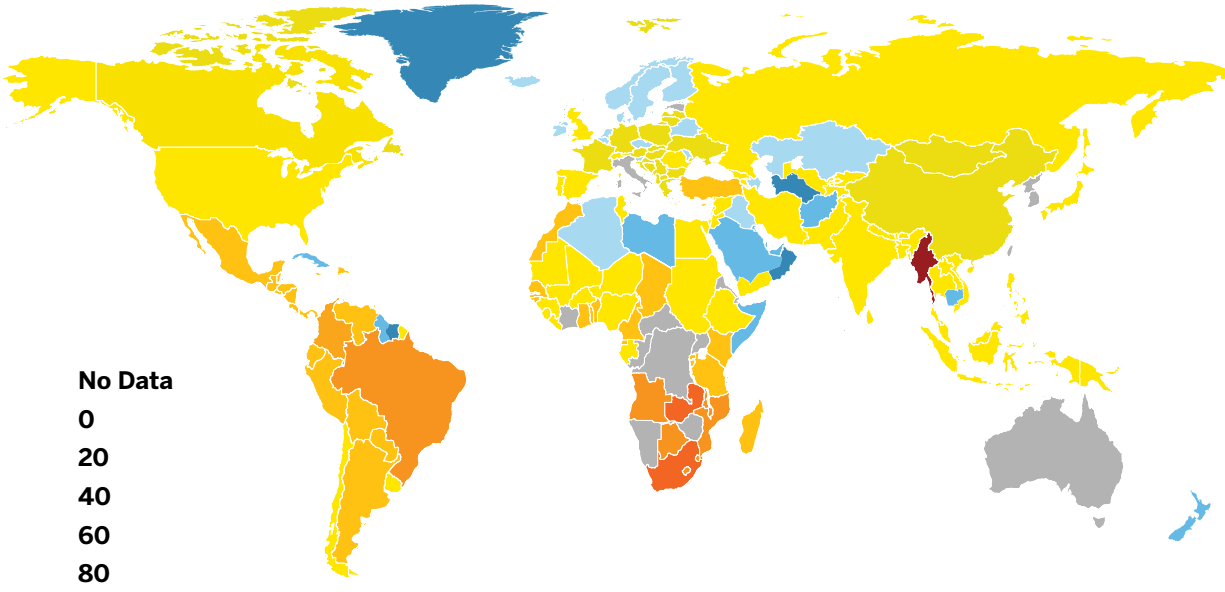
The feature importance chart clearly indicates that indicator #3 (cause of death by communicable diseases) and indicator #21 (rural population as a percentage of total population) are by far the most important in the model. Aside from these outliers, the features with moderate importance are overwhelmingly measures of demography such as fertility rate and migration rather than financial indicators such as GDP growth per capita, industry as a percentage of GDP, and other indicators that are typically used to differentiate "rich" countries from "poor" countries. Furthermore, it is clear that the "poor" countries do not necessarily have the highest income inequality. However, feature importance does not suggest correlation and certainly not causation.

#### Overall Random Forests Model Accuracy

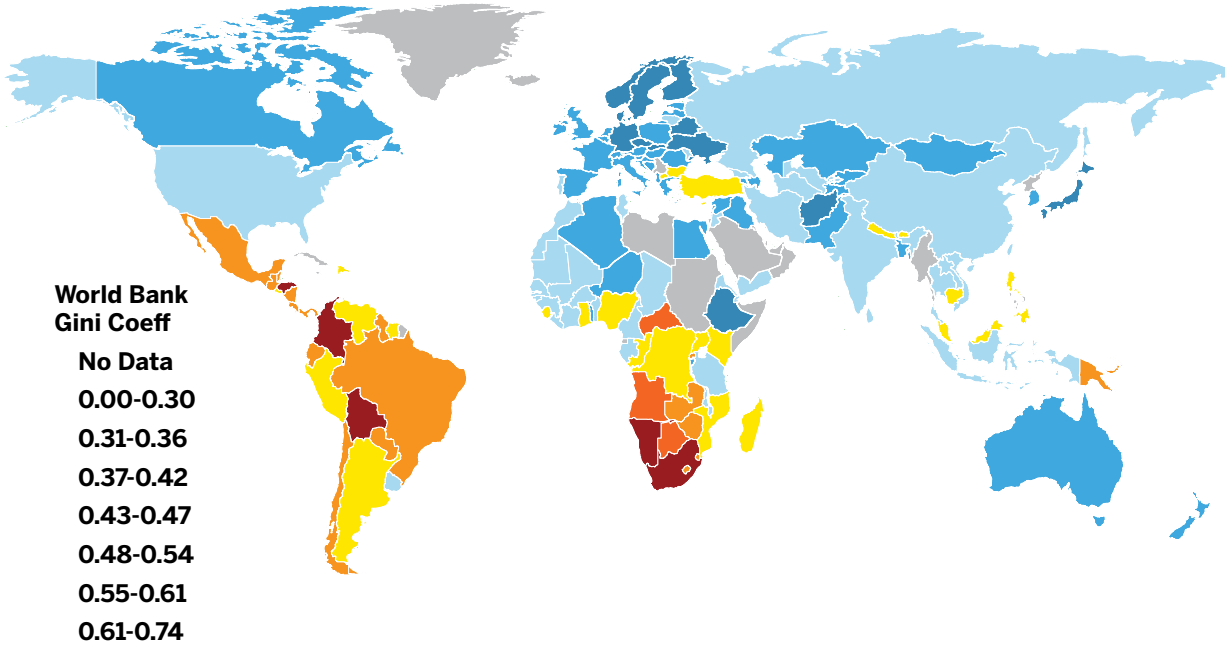
Accuracy on Training (Fitting) Data: 98%
Accuracy on Testing (Forecasting) Data: 90%

Figure 5

## Projected Gini Coefficients based on the Random Forests Model *(produced by students)* vs. 2012 Gini Coefficients *(Elvidge et al., 2012)*




## 2012 Actual Gini Coefficients *(Elvidge et al., 2012)*



## Theses and Discussion

The Gini coefficient is a result of a complex interplay of variables; therefore, in contrast to traditional regression methodology, a machine learning approach is needed. Furthermore, the Gini hypervolume is not defined merely by measures of economic prosperity, but it is defined by a combination of socio-political, economic, and health factors that are largely independent of regional wealth. We analyzed eight categories of indicators, and their relationships to Gini coefficients, and found that:

1. **Trade:** As a percentage of a countries' economic output, high volumes of trade seem to have an equalizing effect, minimizing Gini coefficients. On the other hand, growth in imports from other countries seems to increase wealth inequality and Gini coefficients slightly.

2. **Technological Development:** The impact of technological development on Gini coefficients is relatively strong, but the kind of technological development in question is important in determining the effect on Gini values. We found that improvements in technologies which are more widely accessible worldwide negatively contributes to Gini coefficient values in a region, whereas the development of a high-technology economy, demonstrated by use of renewables, is generally associated with greater inequality.

3. **Demographic Factors:** All forms of population growth, whether considered in births, migration, or measured generally are associated with higher levels of inequality. Both higher percentages of rural and urban populations are negatively associated with lower Gini coefficients, suggesting that more suburban countries are the most highly unequal in terms of wealth distribution (more regarding this conclusion in discussion). Unsurprisingly, regions with more of their urban population living in slums tend to have higher Gini coefficients.

4. **Environmental:** Both the percent of land in a country that is arable and the use of CO2 per capita is associated with lower Gini coefficients. This may suggest less technologically developed countries and those which can rely on agriculture have lower Gini coefficients, or this may be more a proxy of natural resources like land and fossil fuels contributing to lowered Gini coefficients.

5 **Education:** Regions whose governments spend proportionately more on education tend to have higher Gini coefficients, though more research is required to determine whether this stems from inadequate budgets in general, or a true relationship between education and inequality. Other factors analyzed suggest that educational attainment in general contributes to inequality, especially when the male-female divide in education is lessened. This divide seems to be the most associated feature of education with Gini coefficients.

6 **Health:** Causes of death generally due to poor healthcare are most highly associated with higher Gini coefficients worldwide. This suggests wealth inequality often manifests as differing access to healthcare, but it may also speak to the impact of slums on healthcare, given the positive relationship between population in slums and Gini coefficients.

7 **Industries:** All measures of agricultural and foresting production's importance in an economy are associated with higher Gini coefficients. Economies with more child labor tend to have higher wealth inequality, and industrial economies seem to have slightly less inequality, though this relationship is weak. These factors correlate with one another as well, potentially confusing causative analysis, as employment in agriculture makes up the largest portion of child labor worldwide.

8 **Finances:** Income growth per capita is associated with lower Gini coefficients, suggesting that in many regions new wealth is in fact distributed in a way that equalizes wealth. However, this may speak to the existing concentration of wealth worldwide, and where this growth takes place requires further research. Our research also suggests that foreign financing is negatively associated with inequality in a region, another surprising finding that requires further analysis.

**Indicators not directly related to individual wealth were the most important predictors of Gini coefficients, many of them stemming from social dynamics.** For example, the importance of deaths by communicable disease, maternal, prenatal, and nutritional causes was indicative of the complexity of income inequality, both in how it manifests and in where it stems from. While more direct measures like population living in slums were analyzed, our machine learning model, which was 90% accurate at predicting Gini coefficients, placed higher

importance on this feature. Population dynamics like the dispersion of people in rural areas was also an important feature in the model, despite not having a strong correlation with Gini coefficients in our regression analysis. Along with general lack of strong correlation in the regression analysis yet strong performance by the Random Forests model, it is clear that patterns exist in the indicators that are highly interdependent, and that income inequality, both in how it manifests and how it results, is more nuanced than can be captured by regression analysis, especially analysis using the indicators typically expected to be important (like income growth and the breakdown of an economy by sectors). Our findings might also indicate the ways in which COVID-19 exacerbated existing income inequality were not as simple as disproportionate effects on different sectors of the economy, as many analyses have found, and that health disparities may be related to income disparities in more complex social and political relationships than would be expected simply from the fact that access to healthcare is more difficult to attain with lowered income.

## Conclusions

**Machine learning analyses of income inequality may provide more information than is available through regression analysis.** The fact that so many correlation coefficients were significant, but not strong values, suggests great interdependence of variables in the way they individually contribute to income inequality as measured by Gini coefficients. It appears that the Random Forests model was able to pick up on these interdependencies and create a model with strong accuracy, indicating that it represents data in the real world well. The map in *Figure 5*, demonstrates that the model represents Gini coefficients fairly well, and also demonstrates that lower income countries do not necessarily have higher Gini coefficients.

**Wide-ranging analysis of economic, social, health, and political indicators are required to accurately model inequality.** While correlations were found between some important financial indicators and income inequality, the strongest relationships as determined by both regression and Random Forests analysis were not those directly associated with income. It may be that the use of more indicators would yield different results, but ultimately it is clear that non-financial indicators were of great importance to an accurate model, and it should be expected this will always be the case. In our analysis we analyzed 24 indicators spanning 8 classifications, but it is possible to expand this kind of analysis dramatically, as we plan to do, to discover more important relationships.

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**Citation Formatting: MLA**

**All images, graphs, and displays were produced by the student participants unless otherwise stated.*


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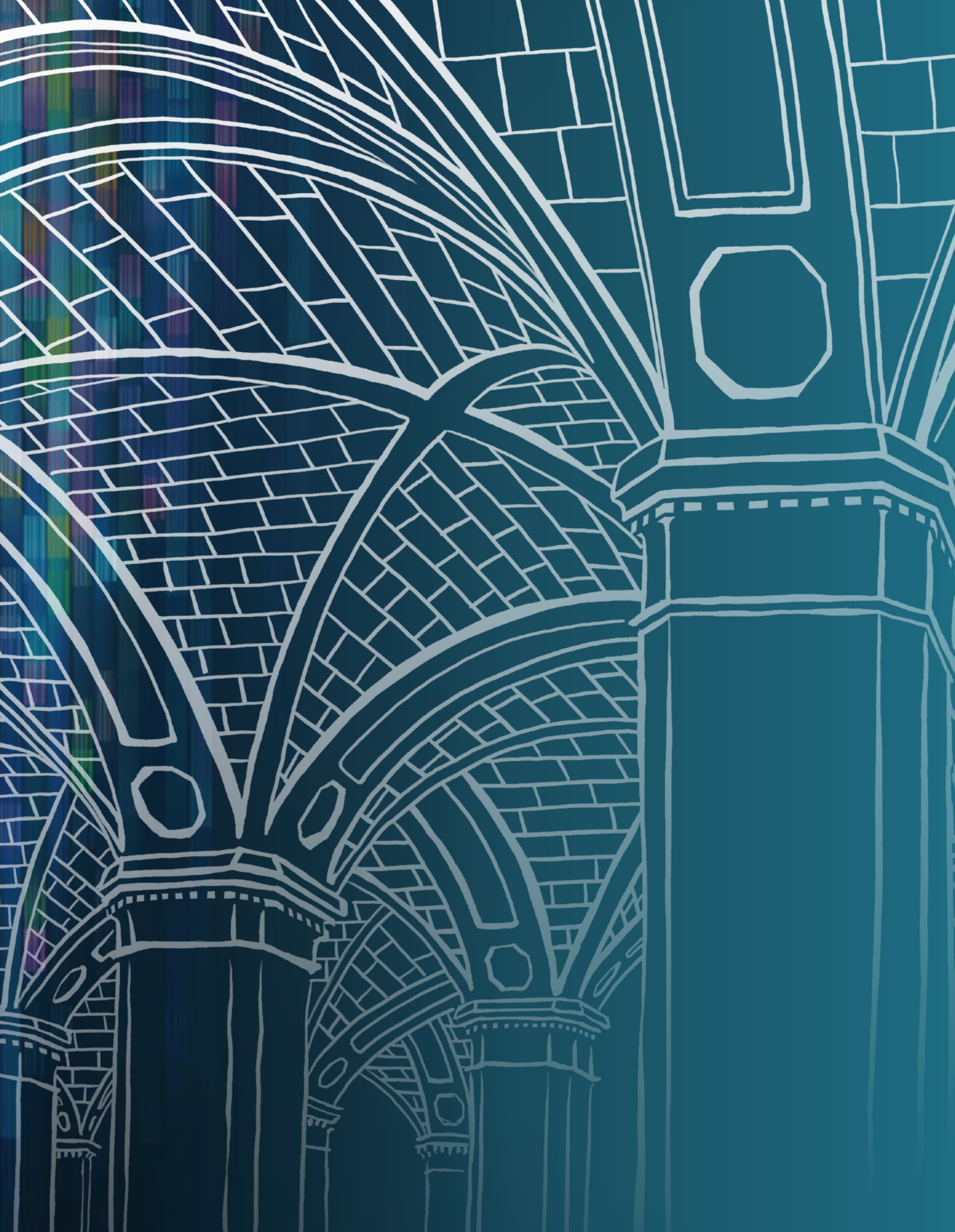

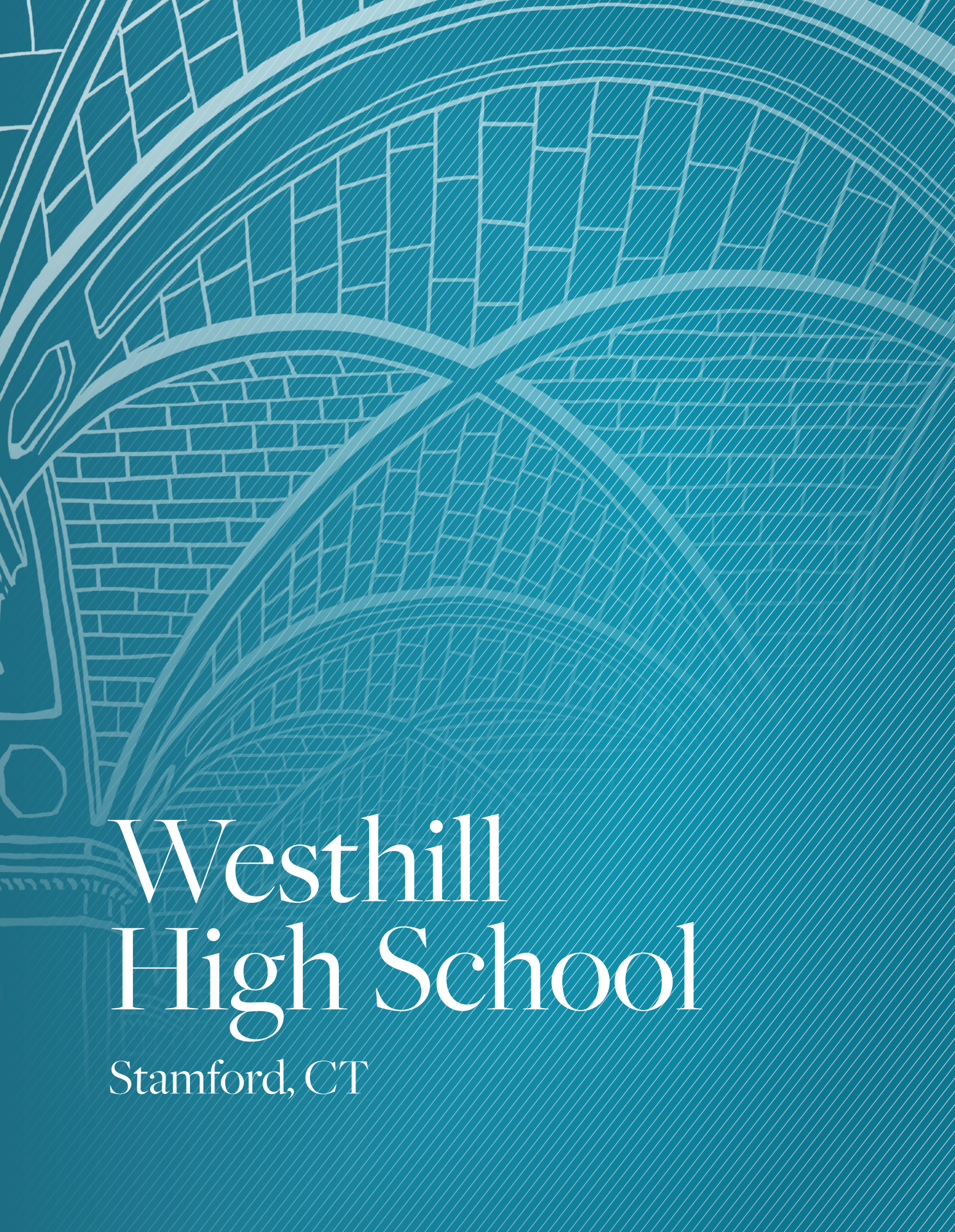

# Westhill High School

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# Tackling Income Inequality in the United States

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## ABSTRACT

*In the past few decades, economic inequality has been on the rise in America. As the distribution of both income and opportunities has become more uneven, American policymakers are keen to find a solution. This paper focuses on a specific type of economic inequality - income inequality - within the United States. To begin with, this paper discusses the history of income inequality in the U.S., and how it has increased rapidly over the past 50 years. Then, it examines the impact of the COVID-19 pandemic on income inequality, and proposes a two-pronged solution. First, it calls for an expansion of the Earned Income Tax Credit (EITC), a federal income tax credit for individuals with low to moderate income levels. Second, the paper proposes increased investment in both infrastructure and public education in low-income communities.*

## Introduction

ECONOMIC INEQUALITY HAS existed since the beginning of human civilization. In primitive farming societies, the amount of land owned by individuals differed. Today, although society has changed greatly, the fact that some people have more wealth than others is still true.

In the U.S., economic inequality has been on the rise since the 1980s, according to indicators of economic inequality such as the Gini coefficient and the Lorenz curve.[1] However, the recent COVID-19 pandemic has amplified the negative repercussions of economic inequal-

ity. The nationwide lockdowns and restrictions made many low-wage workers lose their jobs or experience wage cuts. For America's lowest-paid workers, the unemployment rate is above 20%, compared to around 6% for the overall workforce.[2] On the other hand, the wealthy, who tend to have white-collar jobs, are able to work remotely and use their savings to weather the negative effects of the recession. Thus, as a result of the pandemic, the issue of economic inequality has gained more attention from the media and policymakers.

Why is income inequality a problem in the first place? To better understand this, it is imperative to understand that America's economy runs on consumer spending. When very few people hold most of the capital in the country, spending decreases since the wealthy individuals spend less as a whole, following the law of diminishing marginal utility. On the other hand, making the distribution of income more equal helps increase spending, which stimulates the economy, creates jobs, and moves macroeconomic indicators and the stock market in the right direction. For this reason, we decided to focus on disparities in income in the U.S., highlighting why income inequality has become more of an issue during the COVID-19 pandemic, and finally proposing a solution.

## A Brief History of Income Inequality in the U.S.

The first major signs of income inequality appeared in the United States in the 1910s. A few decades earlier, the U.S. claimed the position of the world's largest economy, and the American economy showed no signs of stopping. Around this time, statisticians found that 18% of total American income went to the top 1% of earners.[3] Consequently, in 1913, America introduced the current income tax structure. However, this tax did little to solve income inequality; tax credits made it such that only the wealthiest Americans would be taxed. The Great Depression reduced income inequality, but this was only because most Americans were deprived of their normal income. At this time, 15% of total income went to the top 1%.[4] Following World War II, the American economy was expanding at a very fast rate, and only 11% of the total American income went to the top 1%.[5] However, the post-WWII era of prosperity

[1] "U.S. Household Income Distribution, by Gini-Coefficient 2019" (Statista, January 20, 2021), https://www.statista.com/statistics/219643/gini-coefficient-for-us-individuals-families-and-households/.

[2] Lael Brainard, "Speech by Governor Brainard on Full Employment in the New Monetary Policy Framework" (Board of Governors of the Federal Reserve System, January 13, 2021), https://www.federalreserve.gov/newsevents/speech/brainard20210113a.htm.

[3] Thomas Piketty and Emmanuel Saez, "Income Inequality in the United States, 1913-1998," *The Quarterly Journal of Economics* 118, no. 1 (February 2003).

[4] Ibid., pg. 8

[5] Ibid., pg. 9

was followed by the stagflation of the 1970s. In response, the U.S. government implemented pro-growth policies, such as decreasing marginal tax rates and deregulating financial intermediaries. While this did guarantee the return of a growing economy, it came at the cost of increased economic inequality. While large corporations and the wealthy were benefiting, unions of low-wage workers were also being attacked in courts. This marked the beginning of the decline of unions, especially in the private sector. The private sector union membership rate in 1973 was 24.2%. By 2020, this percentage fell to 6.3%.[6] All of these factors contributed to the income inequality we see in the United States today.

A widely used indicator of income inequality is the Gini coefficient. This indicator is derived from the Lorenz curve, a graphical display of the distribution of income in a nation. The Gini coefficient is a number between 0 and 1, with a coefficient of 0 indicating that all citizens of a nation have the same income, and a coefficient of 1 indicating that one citizen earns all of the nation's income. In 1990, the Gini coefficient for the U.S. before taxes and transfers was calculated to be about 0.43. By 2015, the Gini coefficient rose to 0.48.[7] This correlates with the increase in income inequality discussed earlier.

## Impact of COVID-19

COVID has disproportionately affected lower-income groups, worsening the issue of income and general economic inequality in the United States. This is due to lower-income households losing more of their jobs and income as a result of COVID-related restrictions.

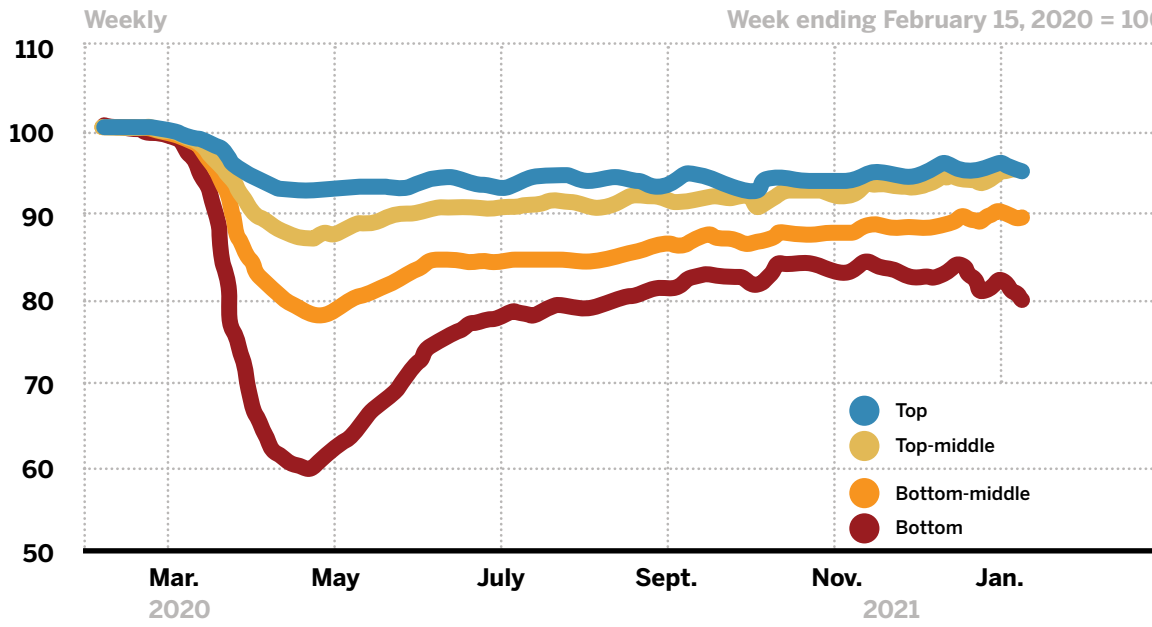
The lowest 20% of American earners lost close to 40% of their jobs by April 2020.[8] While this income group rebounded to holding 80% of their pre-pandemic jobs by June, the highest-income group held about 95% of their jobs in the same month (see graph). One contributing factor to why the lowest-income households were slower to gain their jobs back is because of the industries they are employed in. Industries that employ millions of low-wage workers, such as the accommodation and food services industries, saw a negative 26% change in employment between February and June 2020.[9] The leisure and hospitality industry, which employs 64.4% of all minimum-wage workers in America, lost nearly 500,000 jobs in December alone. On the other hand, industries that typically employ high-income workers, such as the finance and insurance industries, lost 5% of their total employment between February and June.[10]

## Solutions and Recommendations

What can be done about rising income inequality in the United States?

**Figure 1**

## Employment declines for low-, middle-, and high-wage workers




Note: The data are seasonally adjusted by the Federal Reserve Board and extend through January 16, 2021.
Wage quartiles are defined using the February 2020 wage distribution.
Source: Federal Reserve Board staff calculations using ADP, Inc., payroll processing data.

Traditional policies instituted to reduce inequality such as progressive income taxes and welfare don't seem to be working. Hence, the U.S. must either expand existing programs and policies that are working or develop new methods to address inequality. This paper will identify

[6] Barry Hirsch and David Macpherson, 2020.
[7] "U.S. Household Income Distribution, by Gini-Coefficient 2019" (Statista, January 20, 2021), https://www.statista.com/statistics/219643/gini-coefficient-for-us-individuals-families-and-households/.
[8] "Federal Reserve Board Issues Report on the Economic Well-Being of U.S. Households" (Board of Governors of the Federal Reserve System), https://www.federalreserve.gov/newsevents/pressreleases/other20200514a.htm.
[9] Tomaz Cajner et al., "The U.S. Labor Market During the Beginning of the Pandemic Recession," Brookings Papers on Economic Activity, July 20, 2020.
[10] Tayyeba Irum, "Hospitality Industry Drives US Job Losses in December 2020 amid COVID-19 Spike" (S&P Global, January 8, 2021), https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/hospitality-industry-d rives-us-job-losses-in-december-2020-amid-covid-19-spike-62034297.

the two best solutions to income inequality in the U.S. - one being an extension of an existing policy, and the other being an approach the American government has yet to take. Based on research and analysis of data, we determined that the best policy to reduce income inequality that is already implemented by the U.S. is the Earned Income Tax Credit (EITC). The EITC is a federal income tax credit for those with low to moderate incomes. When set up as a refundable credit, the EITC can even function as another source of income for those who qualify. In 2021, the maximum gross income that qualifies for the EITC ranges from $15,980 for a single individual with no dependents to $57,414 for a married couple with three dependents.[11]

In practice, the EITC program has seen considerable success in lifting low-income households out of poverty. In 2017, 5.7 million people were lifted out of poverty as a direct result of the federal EITC.[12] In California, the EITC led to an increase in output of $5 billion, as well as the addition of about 30,000 jobs to the economy in 2007 alone.[13] Additionally, the EITC program has been found to reduce the number of single mothers and other disadvantaged members of the working poor receiving welfare.[14] Yet another reason why many economists and policy makers have favored the EITC program is because it not only is considered to be much more cost effective than traditional welfare programs,[15] but it also does not disincentivize work. Thus, an expansion of the EITC program is likely to find bipartisan support.

Avalos and Alley (2010) discuss some disadvantages of the EITC, including an increased burden on taxpayers. While this is true, most policies aimed at reducing income inequality require increased taxes. Furthermore, any repercussions of increased taxes will eventually be negated by the increase in economic output as a result of the EITC in the long-run. Another economic consequence of the EITC is an increase in the supply of labor, which will drive down wages.[16] However, this can be countered by an increase in the minimum wage.

## Expansion of the EITC

**The EITC will be expanded in two ways:**

1. The amount of the tax credit will be increased by 100% (increase from $543 to $1086 for individuals without children).

2. The maximum qualifying gross income will be increased by 50% (increase from $15,980 to $23,970 for single individuals without dependents).

**Figure 2**

**Public investment is crucial to strengthening U.S. economic growth and tackling inequality**

*https://equitablegrowth.org/public-investment-is-crucial-to-strengthening-u-s-economic-growth-and-tackling-inequality/*

There are various reasons why we decided to make a substantial change to the amount of the tax credit. Firstly, doubling the credit amount will create a much greater incentive for work. Secondly, the increased credit will provide qualifying households with greater disposable income, bolstering consumer spending. In this way, the tax credit will also act as a stimulus package during the COVID crisis, helping to speed the recovery of the American economy. Expanding the EITC will also aid lower-income individuals who have been disproportionately affected by the economic fallout caused by the pandemic.

Increasing the maximum qualifying gross income will allow more Americans to fall under the EITC, helping those affected the most by the pandemic. The reason why we decided to increase the maximum qualifying gross income by only 50% is because doubling the income cap would place a large strain on government spending. While it has been discussed why raising taxes will not have a substantial economic impact in the future, it is not advisable to raise taxes during the current recession. However, once the economy recovers and if the expansion of the EITC is successful, then we recommend increasing the maximum qualifying gross income.

## Improving Infrastructure and Education

The second part of our recommendation - an approach to solving

[11] "Earned Income and Earned Income Tax Credit (EITC) Tables" (Internal Revenue Service (IRS)), https://www.irs.gov/credits-deductions/individuals/earned-income-tax-credit/earned-income-and-earned-in come-tax-credit-eitc-tables.

[12] "Earned Income Tax Credits" (Centers for Disease Control and Prevention (CDC), February 13, 2020), https://www.cdc.gov/policy/hst/hi5/taxcredits/index.html.

[13] Antonio Avalos and Sean Alley, "The Economic Impact of the Earned Income Tax Credit (EITC) in California," The California Journal of Politics & Policy 2, no. 1 (2010).

[14] Dennis J. Ventry, "The Collision of Tax and Welfare Politics: The Political History of the Earned Income Tax Credit, 1969–99," *National Tax Journal 53,* no. 4 (December 2000): pp. 983-1026.

[15] Sheldon H. Danziger and Sandra K. Danziger, "The U.S. Social Safety Net and Poverty: Lessons Learned and Promising Approaches," *PSC Research Report, 2005.*

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income inequality that the U.S. has yet to focus on - is increased investment in infrastructure and education. It is well known that improvements in infrastructure boost productivity and economic growth through their impact on capital. As Palei (2015) pointed out, "Infrastructure contributes to the accession of the poor and undeveloped areas to the core business activities, public communications, which can raise the value of their assets, and increase human capital."[17] However, after reaching highs in the 1940s, U.S. federal public investment dropped significantly in the 1970s, the same time at which income inequality began to increase (see graph).[18] While infrastructure can spur economic growth and increase upward mobility, investing in education creates gains in human capital and leads to increases in worker productivity. Yet, the state of public education in the U.S. is declining, and U.S. academic scores in science, mathematics, and reading are falling behind other countries.[19]

A plan for increasing investment in infrastructure and education would entail reallocating spending from other areas that take up a large portion of the federal budget. It would also need increased funding for public education, as well as increased availability of test prep courses and other outside help for low-income students. Additionally, public school teachers must be paid a higher salary so that they will be incentivized to teach students better. Moreover, higher salaries will also transform public education into an attractive field for talented, dedicated individuals. For infrastructure, the government must fund focused investments in low-income neighborhoods. This may include investing in areas such as public transportation, which will enable lower-income individuals to expand access to work locations and job opportunities farther away from home. Additionally, low-income areas tend to have inadequate access to safe drinking water and sanitation. More than 2 million Americans lack access to essential human needs, such as running water and basic plumbing.[20] Investing in new equipment and facilities will ensure that all Americans, regardless of income, have access to clean water and other necessities. Policies such as these will provide low-income individuals with more opportunities to ascend the social ladder in the long run.

*More than 2 million Americans lack access to essential human needs, such as running water and basic plumbing.*

## Conclusion

Since their rise in the 1970s, income inequality and the more general issue of economic inequality have become incredibly important to

American economic and social well-being. The COVID-19 pandemic has amplified the negative repercussions of economic inequality, leaving many low-income individuals without a job or with lowered wages. The Earned Income Tax Credit will help low-income individuals recover from the pandemic, as well as lift millions of Americans out of poverty. Increased investment in education and infrastructure will provide low-income Americans with greater ability to participate in the economy and escape generational poverty. Overall, we believe that the policies presented in this paper will work to solve the decades-old issue of income and economic inequality in the United States.

[17] Tatyana Palei, "Assessing The Impact of Infrastructure on Economic Growth and Global Competitiveness," *Procedia Economics and Finance* 23 (2015): pp. 168-175.

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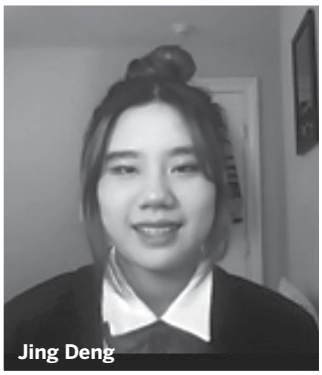
Sydney Gilbert, Advisor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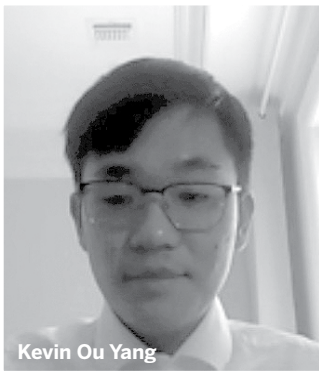
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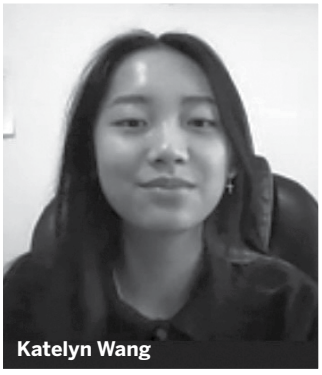
Katelyn Wang


John Xie

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Great Neck, NY

# *Impacts of Financial Literacy on Income Inequality:* How Does Education and Economic Opportunities Matter?

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## ABSTRACT

*The income gap between the wealthy and the poor has been widening over time in the US, and a lot of researchers have referred the reason to the huge difference among people's financial knowledge (Chetty et al., 2014). How does financial literacy affect income inequality? With individual-level data from the 2018 National Financial Capability Study, this paper explores the role of financial literacy in reducing income inequality through its interaction with education and economic opportunities. Our findings revealed that education, financial literacy, and economic opportunities are all significant contributors to income earnings. While a high level of education and financial literacy overcome*

*the limit of economic opportunities on people's income, access to economic opportunities plays an important role in determining the income for people with low financial literacy. For those who live in areas with limited economic opportunities and resources, financial literacy and education are important solutions to income inequality.*

FINANCIAL CAPABILITY, ACCORDING to the National Financial Capability Study (NFCS), measures people's combination of skills, judgment, and resources to manage their financial well-being. According to NFCS, Americans have been showing a low level of financial knowledge, and their financial knowledge has been decreasing over the past decade *(Lin et al., 2019)*. These findings are crucial to both individuals and society and improving financial literacy has been an important economic policy discussion. For instance, 42 out of the 50 states have pending financial literacy legislation in their 2019 legislative sessions.

With the recent interest in financial literacy increasing, a growing body of literature in the past decade demonstrated a strong correlation between financial literacy and income levels *(Angrisani et al., 2020; Arianti, 2018; Kaiser & Menkhoff, 2017; Mitchell & Lusardi, 2015; Gale & Levine, 2011)*. People with higher financial literacy tend to have better spending habits *(Lusardi et al., 2014)*.

There is also a recent line of research on income inequality (measured by different income levels or Gini coefficient) and financial literacy *(Michaud, 2017; Abdulla et al., 2015)*. Existing literature has examined the heterogeneity in the correlation between income inequality and financial literacy by three common demographic variables: ethnicity, gender, and education *(Vlachantoni, 2012; Lusardi & Mitchell, 2011)*.

This paper aims to combine the two lines of literature to examine the impacts of individuals' financial literacy, education, and economic opportunities on income inequality. Using data from the U.S. Census and the National Financial Capability Study, we present three main findings. First, at the state level, there is a strong negative correlation between financial literacy and income inequality. When residents in a state have an overall higher level of financial literacy, the state income inequality, as measured by Gini coefficient, is smaller. Second, though for individuals with the same education level, higher financial literacy is significantly correlat-

*The relationship between education, financial literacy, income, and wealth imply a correlation between a state's residents' financial knowledge and its income inequality.*

ed with higher income levels, at a macro state level, the relationship between financial literacy and income level is not all-time positive. There exists an inverted U shape between a state's overall financial literacy and income level. Third, at the individual level, financial literacy affects income levels differently depending on the economic opportunities and education. For people with high financial literacy, education overcomes the income gap resulting from the external economic inequality; however, for people with low financial literacy, living in a high-income state is a more significant factor in bringing up income level compared with education. These findings suggest that high financial literacy lessens the economic gap generated by education. For people with low financial literacy, regardless of the positive effect of financial literacy on income level, the large economic gap still exists due to limited economic opportunities for disadvantaged people in low-income areas.

*When residents in a state have an overall higher level of financial literacy, the state income inequality, as measured by Gini coefficient, is smaller.*

## I. Data

We used the data constructed by the NFCS to study the financial literacy of adults in the United States. In our analysis, we focused on financial knowledge, education level, income level in the NFCS 2018 survey. There were approximately 27,000 respondents. We used survey weights, such as age, gender, ethnicity, and education to generate national-level or state-level representative summary statistics and conduct the correlational regression analyses.

### Measures of Income Inequality

We looked at income inequality at both the macro and micro levels. For the macro level, we used the income data of each state from the United States Census Bureau database and computed the income Gini coefficient for each state. For the micro-level, we followed NFCS' grouping criteria for different income levels: 2($15,000 ≤ $25,000); 3($25,000 ≤ $35,000); 4($35,000 ≤ $50,000); 5($50,000 ≤ $75,000); 6($75,000 ≤ $100,000).

### Measures of Financial Literacy

Our primary explanatory variable is financial literacy. To measure a respondent's financial literacy, we used the following six questions in the NFCS 2018 survey that include financial knowledge from different perspectives: compound interest, inflation, risk, bond, and mortgage.

1. Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow? (question M6)

2. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account? (question M7)

3. If interest rates rise, what will typically happen to bond prices? (question M8)

4. Suppose you owe $1,000 on a loan and the interest rate you are charged is 20% per year compounded annually. If you didn't pay anything off, at this interest rate, how many years would it take for the amount you owe to double? (question M31, added in 2018)

5. A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less. (question M9)

6. Buying a single company's stock usually provides a safer return than a stock mutual fund. (question M10)

We followed the NFCS's grouping standard to use a dichotomous indicator for "high financial literacy," assigning the value one to respondents who answered four or more questions correctly and the value zero to respondents who answered three or fewer questions correctly. We conducted robustness checks using other cut points (e.g., 5 or 3) and found similar results.

### Measures of Education Level

We adopted NFCS's measures for education level in this study: 1. Did not complete high school; 2. High school graduate - regular high school diploma; 3. High school graduate - GED or alternative credential; 4. Some college, no degree; 5. Associate's degree; 6. Bachelor's degree.

### Measures of Economic Opportunity

We used a state's median household income as an indicator of the economic opportunities to its residents. People living in a high-income state have access to more economic opportunities and vice versa. Using data on state median household income from the US Census Bureau, we defined a state with median household income below $50k as a low-income state and above $75k as a high-income state.

## II. Financial Literacy by State and Median Household Income

*Figure 1* presents a state-level map of the average number of correct answers in the six NFCS 2018 financial knowledge questions. Out of the six financial knowledge questions, the average number of correct answers varies by state, with Georgia being the lowest (2.73) and Utah and Nebraska being the highest (3.37). The national average is 3.05.

The average number of correct answers also varies by regions. As shown in *Figure 1*, the highest financial literacy areas are in the New England and Midwest districts, while the lowest areas are in the Southern states. Since financial knowledge is correlated with educational attainment *(Abdullah, 2013)*, the lower financial literacy in the Southern States could be linked with lower education levels *(Bumcrot, 2013)*. On

**Figure 1**

**Financial Literacy by State**

*(Average Number of Correct Answers)*

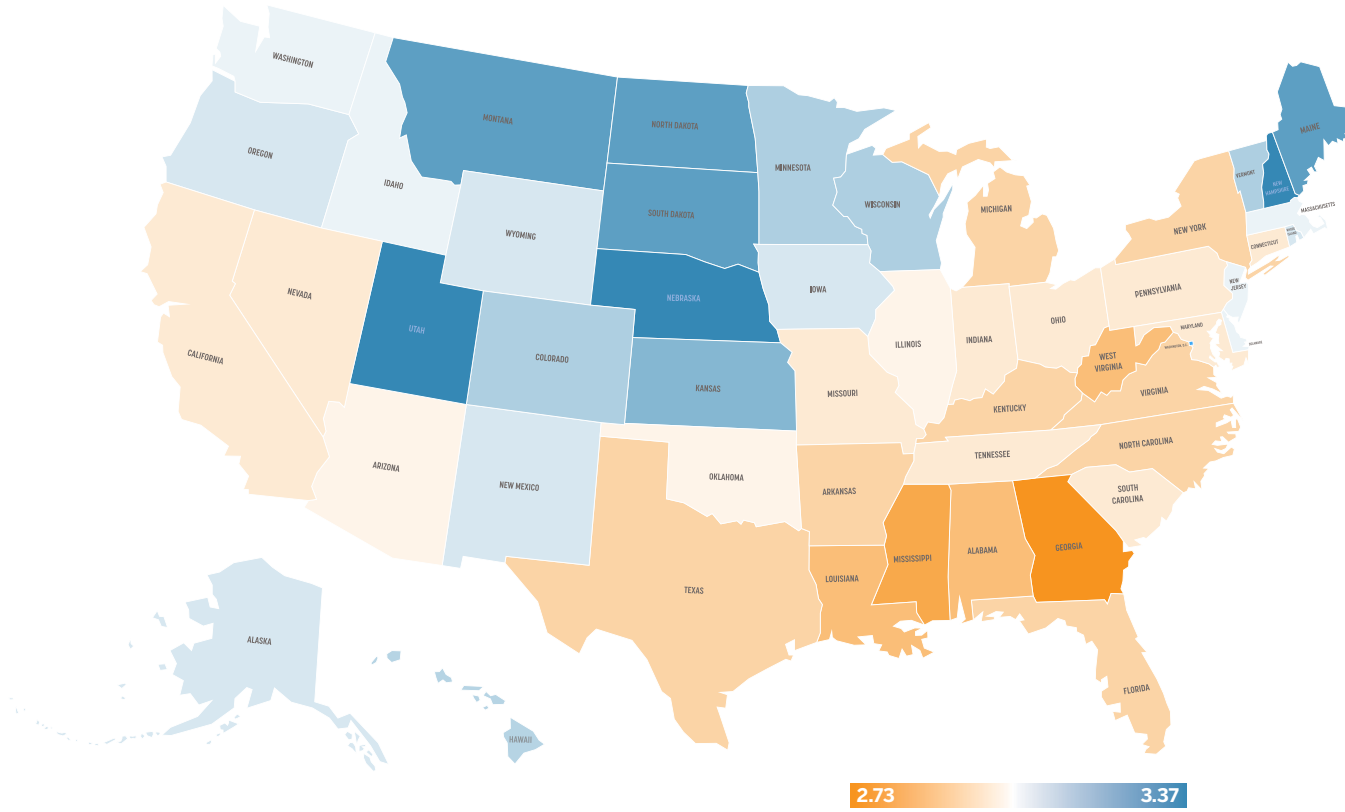
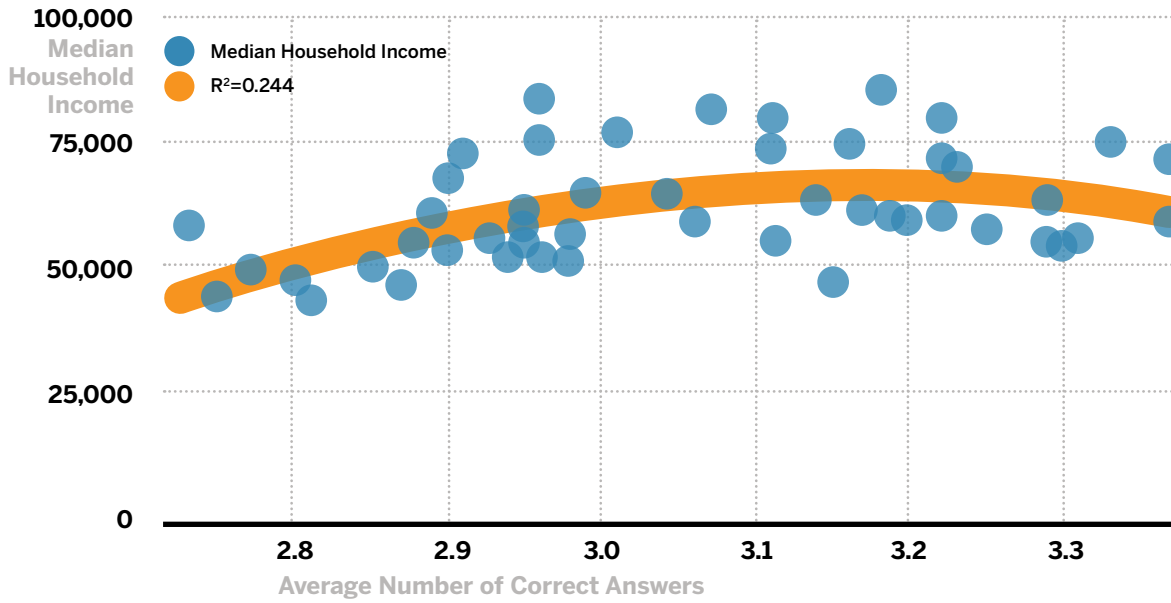


**Figure 2**

## Correlation Between State-level Financial Literacy and Median Household Income



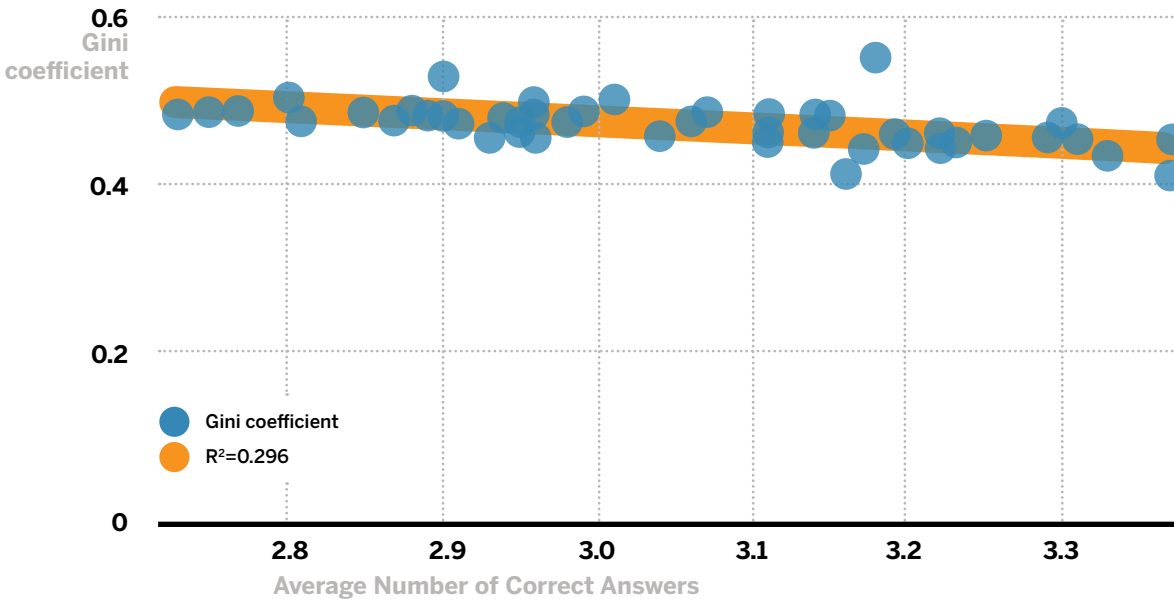

the other hand, a higher financial literacy level surrounding the New England area is expected, as it is centered around New York which contains Wall Street, the hub for finance *(Hastings et al., 2013)*. Due to the well-recognized correlation between education and income *(Blanden and Gregg, 2004; Gregorio and Lee, 2002; Griliches and Mason, 1972)*, we focused on the relationship between a state's financial literacy (average number of correct answers) and its median household income.

*Figure 2* shows a correlation of financial literacy and median household income. We recognized that Utah, which has the highest average correct number of 3.37, has a median household income of $71,417. In contrast, Alabama, which has the average correct number of 2.77, has a median household income of $49,861. Not only is the score between these two states drastic, but the incomes are inarguably distant. This actively demonstrates that being accomplished in financial literacy is associated with greater incomes; due to comprehension in maintaining and obtaining better wealth habits, better choices are made *(Agrisani et al., 2020)*. Therefore, the more people in the state who have this

**Figure 3**

## State Income Gini Coefficient by Financial Literacy

*(Average Number of Correct Answers)*




comprehension, the wealthier the overall state will be; the trend in *Figure 2* follows this pattern. This contributes to our hypothesis in which having advancements in financial literacy is a critical factor in evolving income *(Taft et al., 2013)*. However, there is a slight curve in *Figure 2*, with the vertex at about three questions correct and a median household income close to $75k, suggesting that the highest income could be reached without having the highest level of financial literacy. The flattening curve after this vertex point implies that income reaches a saturation level after this point. This finding brought us to further explore the roles of education and economic opportunities.

### III. State Income Inequality by Financial Literacy

People with higher educational attainment tend to have higher levels of financial knowledge *(Angrisani et al., 2020)*, which, in return, enables them to have better financial habits and make better financial decisions *(Remund, 2010)*, and these behaviors then increase their wealth. The relationship between education, financial literacy, income, and wealth imply a correlation between a state's residents' financial knowledge and

its income inequality.

*Figure 3* shows that, at the state level, higher economic inequalities, as measured by the income Gini coefficient, are correlated with lower financial literacy scores. The average financial literacy score and the Gini coefficient have a cluster around the points of three (number of correct answers) and 0.475 of Gini coefficient. This indicates that there is a lower economic inequality when a state has a higher financial literacy level.

## IV. Individual's Income by Education, Financial Literacy, and Economic Opportunity

Financial literacy has played a big impact in differentiating the wealthy and poor. Those who are literate in finance usually show patterns of higher income and better spending habits; those who are financially illiterate are linked to characteristics such as low pay, little education, and low participation in the stock market (*Lusardi & Mitchell, 2015*). We provide direct empirical evidence that supports this hypothesis. *Figure 4* suggests that, for people with the same education levels, higher financial literacy is always associated with higher income.

**Figure 4**

**Individual's Income Level by Education and Financial Literacy**

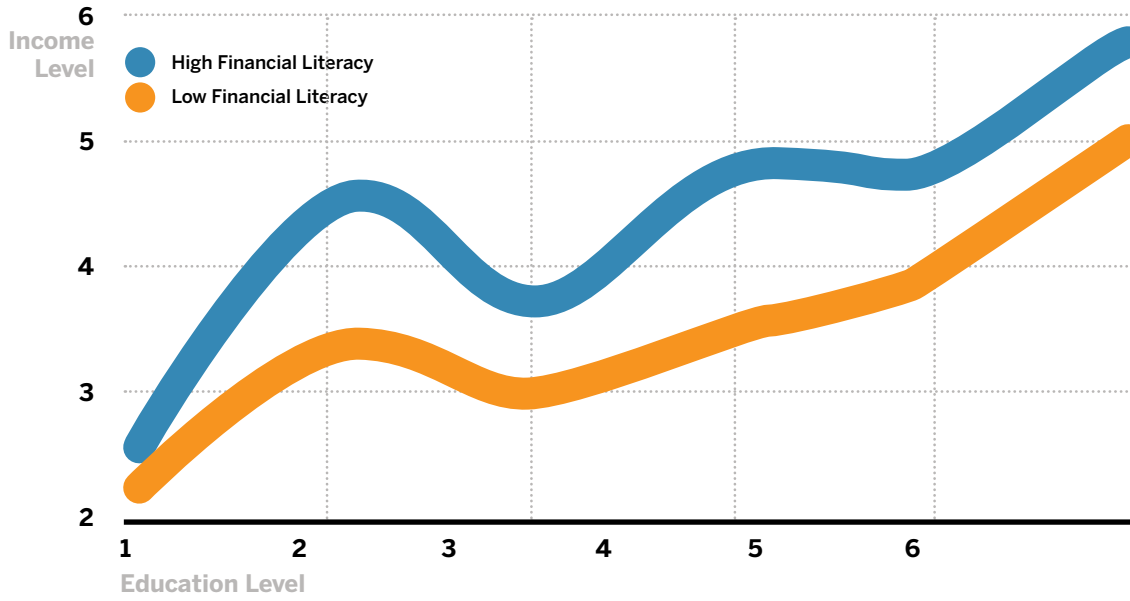
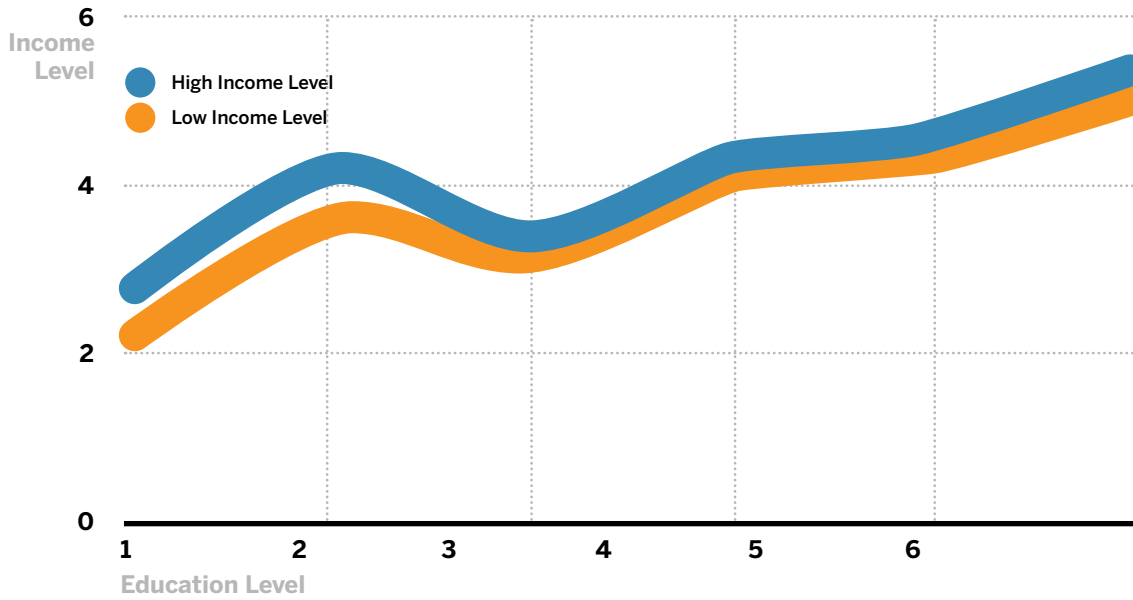


**Figure 5**

## Individual's Income Level by Education and Economic Opportunities



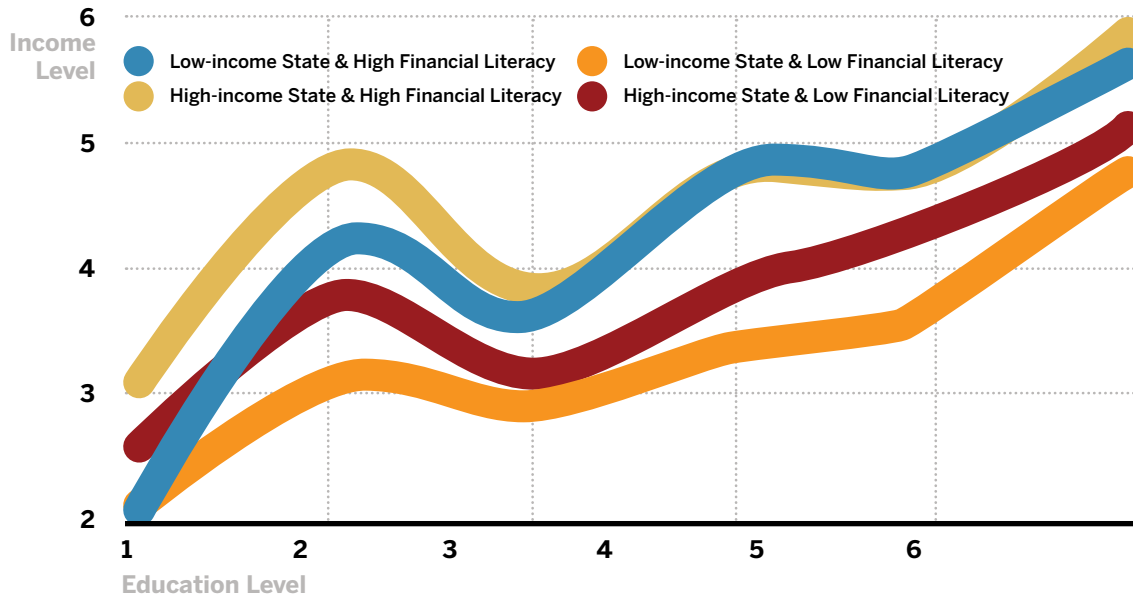

A person's income level is also affected by the economic opportunities they have access to *(Chetty et al., 2018; Disney & Gathergood, 2013; Prete, 2013; Hendel et al., 2005)*. In *Figure 5*, we compared the income levels of individuals in high-income states to those of individuals in low-income states and found that, for people with the same education level, having more economic opportunities brings them an advantage in income levels. However, when we compared *Figure 5* with *Figure 4*, the income inequality caused by economic opportunity is significantly smaller than the one caused by my financial literacy. This shows that financial literacy can overcome the income gap caused by unequal economic opportunities.

While there is a widening economic gap between the rich and the poor in the United States *(Chetty et al., 2017)*, the extent to which the impacts of financial literacy differ by region remain unknown. *Figure 6* shows that the association between financial literacy and income level may depend on the availability of economic opportunity. At all levels of education, if a financially illiterate individual lives in a high-income

**Figure 6**

## Individual's Income Level by Education, Financial Literacy, Economic Opportunity

*(High-income State vs. Low-income State)*




state (in gold and red), he or she is more likely to earn a higher income compared with a financially illiterate person who lives in a low-income state (in blue and orange). In contrast, among those who have high financial literacy, the income gap between living in a high-income state and a low-income state only exists when people have low education levels (no college education). Studies have suggested that financial literacy could play a role in this widening gap, but the mechanisms behind this possible correlation, consisting of the potential impacts of both education and economic opportunities, are not clear *(Angrisani et al., 2020)*. Future research is needed to provide compelling causal evidence.

When we compared the high financial literacy line and the low financial literacy line, we found that, after controlling for education level, the income of the financially literate individuals always have higher income at all education levels, whether they live in a rich state or a poor state as shown in *Figure 6*. Thus, it can be concluded that financial literacy not only has a positive correlation with income, but also a possible positive causal relationship. This positive causal relationship between

financial literacy and income could be due to the negative correlation between financial literacy and financial concerns *(Taft et al., 2013)*.

## V. Conclusions

This paper has shown the relationship between financial literacy and income inequality. At the state level, financial literacy is negatively correlated with income inequality: the higher a state's overall financial literacy is, the more equal its income is. At the individual level, the association between financial literacy levels and income depends on both education and economic opportunities. Specifically, people with low financial literacy suffer the most if they live in a low-income state, but people with high financial literacy and education levels can overcome the disadvantage that their outside economic opportunities bring to their income: if a person has some college education and high financial literacy, even if he or she lives in a low-income state, his or her income would be similar to someone who has the same education and financial literacy levels but lives in a high-income state. Our findings provide important implications for innovative economic policies to improve people's financial literacy, particularly those who are economically disadvantaged or living in economic opportunity deserts.

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