

# The Impact of the COVID-19 Pandemic on the Income Gap Between Females and Males

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## Introduction

On March 11, 2020, the World Health Organization officially declared COVID-19 a pandemic, an announcement that marked the beginning of a global health crisis with lasting impacts. This time period is associated with significant economic shocks, including widespread job losses, the collapse of key industries, and an influential shift towards remote work – changes the American workforce is still seeing remnants of today. The pre-pandemic economic landscape, according to the U.S. Bureau of Labor Statistics in 2019, was already showing a persistent gender-based income gap, with women earning around 82 cents for every dollar earned by men (Bureau of Labor Statistics, 2020). The pandemic only widened these gaps, especially in sectors like retail and hospitality, which are heavily female dominated industries, and saw job loss rates of up to 25% and 39%, respectively. Unemployment peaked at nearly 15% in April 2020, proving the severity of the crisis (Pew Research Center, 2020).

The motivation behind this policy memo is to explore how these unprecedented conditions influenced pre-existing economic trends related to the gender-based income gap. This analysis is important not only to quantify the impact of the pandemic on this gap but also to identify and recommend policy solutions that could address and potentially reverse the widened gaps as we move into the recovery phase, post-pandemic. This analysis is meant to inform policymakers

and stakeholders to strengthen current and future recovery efforts so that they are inclusive and equitable, ultimately supporting a more resilient post-pandemic economy.

## Data

For this analysis, we sourced our data from the Integrated Public Use Microdata Series (IPUMS) for the years 2019 and 2022 within the United States. This data selection allows us to observe the economic landscape before and after the significant disruptions caused by the COVID-19 pandemic, specifically focusing on how these changes impacted the income gap between females and males.

Our dependent variable, wage income, represents individual income wages, with missing and top-coded values removed to further strengthen our analysis. One of our primary independent variables was Post, a binary indicator distinguishing observations before (2019: Post = 0) and after (2022: Post = 1) the start of the COVID-19 pandemic in 2020. We also created Female, a binary indicator variable distinguishing between male (0) and female (1) respondents, for the main analysis's purpose of determining the change in the gender-based income gap.

We also created an interaction variable, Female\*Post, between the post-COVID period and the female gender, which was the primary independent variable of interest to explore differential impacts of the pandemic on income by gender. Other variables we also wanted to

analyze included an individual's usual hours worked per week (uhrswork), Black, which was an indicator variable generated from the race variable, differentiating between non-black (0) and black (1) respondents.

When choosing our data, we thought it important to consider other variables that might influence wage income, so we created a binary indicator for metropolitan status (metroInd), identifying individuals living in metropolitan areas (1) versus those in non-metropolitan areas (0). We also included education (educ), a categorical variable representing educational attainment, age, which was captured as a continuous variable, and a marital status indicator variable (marstInd) we coded as married with spouse present (1) and other statuses such as unmarried, spouse not present, widowed, etc., (0).

**Table 1: Summary Statistics**

Variable	Mean	Std. dev.	Min	Max
Wage Income	35849.25	65232.32	0	791000
Age	49.18655	19.62439	16	97
Hours Worked Weekly	24.06894	21.07081	0	99
Metropolitan Status	0.8760864	0.329483	0	1
Female	0.5154298	0.4997619	0	1
Black	0.0947858	0.2929189	0	1
Marital Status	0.4924557	0.4999431	0	1
Post Covid	0.510381	0.4998923	0	1
<b>Education</b>				
Nursery School to Grade 4	0.0043606	0.065891	0	1
Grade 5, 6, 7, or 8	0.0192021	0.1372346	0	1
Grade 9	0.0135875	0.1157709	0	1
Grade 10	0.0232948	0.1508381	0	1
Grade 11	0.0294212	0.1689841	0	1
Grade 12	0.3485806	0.4765209	0	1
1 Year of College	0.1376196	0.3445003	0	1
2 Years of College	0.081064	0.2729334	0	1
4 Years of College	0.2076998	0.4056607	0	1
5+ Years of College	0.1351699	0.341905	0	1
N	4,594,507			

## Methods

For the methods, a regression model was used in order to pinpoint the data representing the wage gap. A difference in difference regression model was specifically chosen to represent the wage gap among females and males as this particular type of model is useful when trying to determine the effect of an event. Specifically, a difference in difference regression model is beneficial in examining the impact of an event which is especially applicable with the COVID-19 pandemic, as it still impacts economic issues such as pay to this day. Two regressions were run, a restricted and unrestricted model. The restricted model regressed wage income on the female and post-covid indicator variables, and also included an interaction variable between these (female-post):  $Wage\ Income = \beta_0 + \beta_1(Female) + \beta_2(Post-Covid) + \beta_3(Female-Post) + \epsilon_i$ .

The unrestricted model considered these variables as well as hours worked weekly, an indicator for Black or non-Black observations, metropolitan status, education level, age, and marital status:  $Wage\ Income = \beta_0 + \beta_1(Female) + \beta_2(Post-Covid) + \beta_3(Female-Post) + \beta_4(Hours\ Worked) + \beta_5(Black) + \beta_6(Metropolitan\ Status) + \beta_7...15(Education\ Level) + \beta_16(Age) + \beta_17(Marital\ Status) + \epsilon_i$ .

While gender was the primary indicator variable, it was important to include multiple variables in order to produce the least possible coefficients and a more accurate depiction of influence.

## Results

**Table 2: Restricted Model**

VARIABLES	Wage Income
Female	-17,720*** (86.18)
Post-Covid	3,452*** (86.60)
Female-Post	-303.1** (120.6)
Constant	43,301*** (61.89)
Observations	4,594,507
R-squared	0.019
Standard errors in parentheses *** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$	

**Table 3: Unrestricted model**

VARIABLES	Wage Income
Female	-8,621.968*** (71.400)
Post Covid	4,452.384*** (71.213)
Female-Post	-1,584.261*** (99.155)
Hours Worked Weekly	1,464.231*** (1.334)
Black	-3,535.671*** (85.665)
Metropolitan Status	7,975.181*** (76.009)
<i>Education</i>	
Grade 5, 6, 7, or 8	812.588* (415.600)
Grade 9	5,981.637*** (432.006)
Grade 10	9,435.440*** (410.490)
Grade 11	8,499.958*** (403.988)
Grade 12	2,632.750*** (377.752)
1 Year of College	5,114.032*** (381.481)
2 Years of College	6,666.039*** (385.543)
4 Years of College	23,790.015*** (379.638)
5+ Years of College	43,827.215*** (381.749)
Age	172.883*** (1.444)
Marital Status	9,607.225*** (53.404)
Constant	-30,285.518*** (396.417)
Observations	4,594,507
R-squared	0.338
Standard errors in parentheses *** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$	

After running the regression there was clear indication that the coefficients displayed a strong relationship with wage. The restricted model showed a statistically significant relationship at the 99% confidence level between wage and gender, with a coefficient of -17,720 and  $p < 0.01$ . This tells us that, on average, females earned \$17,720 less than males, assuming other factors in the model remain constant. The Female-Post coefficient measures the additional change in the wage gap between males and females post-COVID. This coefficient is statistically significant at 95% confidence, with  $p < 0.05$ . It indicates that the wage disparity between males and females worsened slightly after the onset of the pandemic, with females experiencing a further decrease in wages relative to males by an additional \$303.

The unrestricted model also showed a smaller yet still statistically significant relationship at 99% confidence between wage and gender with a coefficient of -8,622 and  $p < 0.01$ . This coefficient tells us that, on average, females earned \$8,622 less than males, while controlling for the other variables in the model. The most significant finding is that the Female-Post variable decreased to -1,584.261 (became more negative), indicating women are earning even less relative to males after covid when these other factors are taken into consideration. This finding is statistically significant at the 99% confidence level with  $p < 0.01$ .

## Conclusion

Using the regression model, we found that the existing difference between males and females grew even more because of the COVID-19 pandemic. Overall, after

accounting for other relevant factors, it seems likely that the gender wage gap worsened because of the effects of the COVID-19 pandemic, increasing the disparity by \$1584.26. In order to mitigate the negative effect of the pandemic on the gender wage gap, there are a few policy initiatives that can be implemented. For instance, the federal government can take initiative to enforce mandatory paid maternity leave so that there is ambiguity among state laws. Additionally, a federal mandated pay transparency policy can be beneficial in making sure that employees have clear information about their wages. Career education programs in public schools can also be impactful in encouraging women to join male dominated industries and providing them with important skill sets.

## References

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