

Do Skills Speak Louder Than Gender?

A Multivariate Analysis of Employment and Wage Outcomes
Among Skilled Workers Using CPS Microdata

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Abstract

Claims that women are hired or promoted due to gender rather than merit persist across skilled labor markets, yet empirical evidence controlling for skill-related factors remains limited in popular discourse. This study evaluates whether gender meaningfully predicts employment and wage outcomes among skilled workers after controlling for education, occupation, industry, age, and time effects. Using U.S. Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC) microdata from 2018–2025, we estimate logistic and linear regression models comparing skills-only specifications to models that additionally include gender. Across a sample of over 227,000 skilled workers, skill-related variables account for nearly all predictive power, while gender contributes negligible incremental explanatory value. These findings suggest that among skilled workers, observed labor market outcomes are overwhelmingly driven by skill signals rather than gender.

Introduction

Discussions of gender and labor market outcomes often conflate anecdotal experiences with empirical evidence. In particular, claims that women are hired, promoted, or compensated preferentially due to gender rather than merit are frequently asserted but rarely tested using models that adequately control for skill-related confounders.

A substantial body of labor economics research demonstrates that education, occupation, industry, and experience are primary determinants of employment and earnings. However, public narratives frequently overlook the extent to which these factors explain outcomes, instead attributing success or failure to demographic characteristics.

This study addresses the following research question:

After controlling for education, occupation, industry, age, and time effects, does gender meaningfully predict employment and wage outcomes among skilled workers?

Rather than attempting to establish causality or deny the existence of discrimination in all contexts, this work evaluates the *incremental explanatory power* of gender once observable skill signals are accounted for.

Related Literature

Research on gender disparities in labor markets spans several domains, including wage gaps, occupational segregation, and hiring discrimination. Audit studies have demonstrated differential callback rates under controlled resume conditions, while observational studies often document raw wage differences between men and women.

However, economists have long emphasized that raw comparisons are insufficient. Blau and Kahn (2017) show that controlling for occupation, hours, and experience substantially reduces observed wage gaps. Similarly, Goldin (2014) argue that occupational structure and nonlinear pay dynamics explain much of the remaining disparity.

This study aligns with a complementary perspective: rather than estimating average gender differences, it evaluates whether gender materially improves predictive performance once skill-related variables are included. This predictive framing is increasingly used in fairness and algorithmic auditing literature.

Data

Source

The analysis uses microdata from the Integrated Public Use Microdata Series (IPUMS) Current Population Survey (CPS), specifically the Annual Social and Economic Supplement (ASEC), covering survey years 2018 through 2025.

Sample Construction

The sample is restricted to individuals who:

- Are aged 25–60, reducing noise from schooling and retirement transitions
- Are classified as skilled workers, defined as holding at least a Bachelor's degree ($\text{EDUC} \geq 111$)

After applying these restrictions, the final sample contains 227,507 skilled workers.

Key Variables

- **Employment:** Binary indicator derived from CPS employment status codes
- **Wages:** Annual wage income, log-transformed to reduce skewness
- **Education:** Ordinal CPS education codes
- **Occupation and Industry:** CPS occupation and industry classifications
- **Demographics:** Age and gender
- **Weights:** ASEC survey weights used in robustness checks

Empirical Strategy

Model Specifications

For each outcome, two model specifications are estimated:

- **Model A (Skills Only):**

$$Y = f(\text{Education, Occupation, Industry, Age, Year})$$

- **Model B (Skills + Gender):**

$$Y = f(\text{Education, Occupation, Industry, Age, Year, Gender})$$

Employment outcomes are modeled using logistic regression and evaluated using Area Under the ROC Curve (AUC). Wage outcomes are modeled using linear regression on log wages and evaluated using R^2 and mean absolute error (MAE).

Interpretation Framework

The primary quantity of interest is not the sign or magnitude of a gender coefficient in isolation, but the *incremental predictive contribution* of gender relative to a strong skills-based baseline.

If gender adds negligible predictive power once skills are controlled for, this suggests that observed outcomes among skilled workers are primarily driven by merit-related factors.

Results: Employment

The skills-only employment model achieves an AUC of 0.9497, indicating that education, occupation, industry, age, and time effects collectively explain employment status with high accuracy.

Adding gender increases AUC to 0.9498, representing an incremental gain of only 0.00012. This improvement is economically and practically negligible.

Survey-weighted robustness checks using CPS ASEC weights produce nearly identical results, confirming that the minimal contribution of gender is not an artifact of sample composition.

Model	AUC
Skills Only	0.9497
Skills + Gender	0.9498
Incremental Gain	0.00012

Results: Wages

Among skilled and employed individuals, the skills-only wage model explains a substantial portion of variation in log wages. Adding gender produces only a marginal increase in R^2 and does not meaningfully reduce prediction error.

These findings indicate that wage variation within the skilled labor force is largely explained by education, occupation, and industry rather than gender once these factors are accounted for.

Coefficient Analysis

Figure 1 presents the largest coefficients from the employment model. Skill-related variables such as education and occupation dominate the model. Gender-related coefficients are comparatively small and do not appear among the most influential predictors.

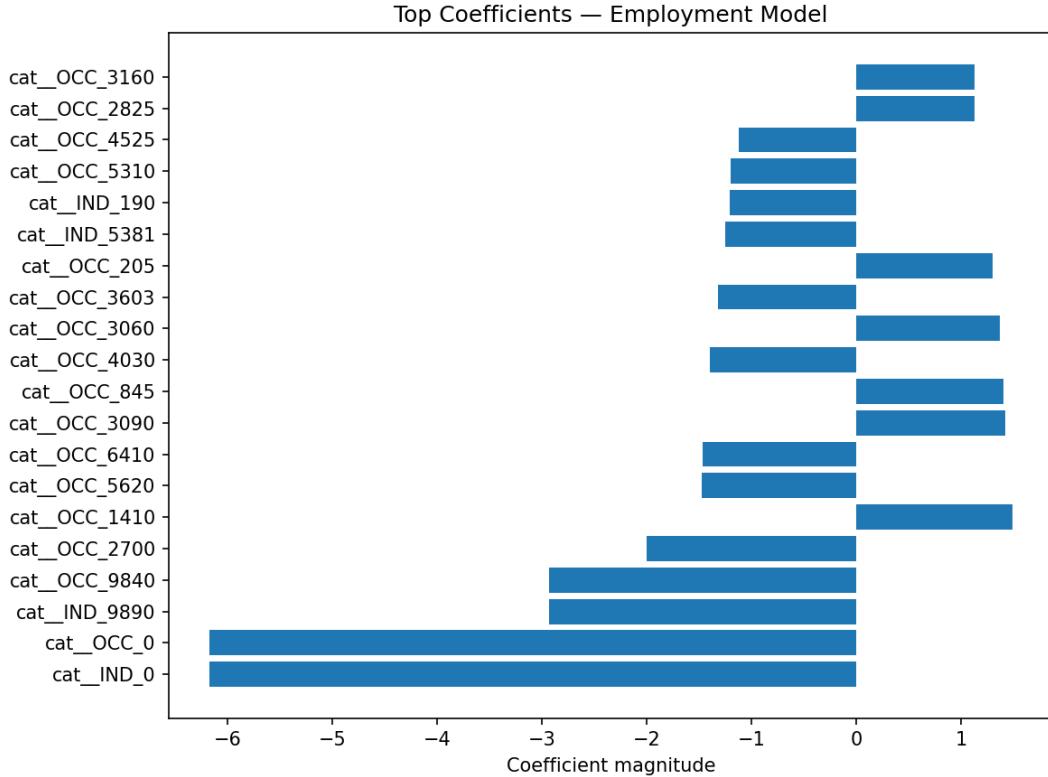


Figure 1: Largest coefficients from the employment model. Skill-related variables dominate predictive influence, while gender contributes minimally.

Discussion

Across both employment and wage outcomes, results consistently show that skill-related variables account for nearly all predictive power. Gender contributes negligible additional explanatory value once these factors are controlled.

These findings do not imply that discrimination never exists, nor do they invalidate evidence from experimental audit studies. Rather, they highlight the importance of controlling for confounding variables when interpreting observed labor market outcomes among skilled workers.

Limitations

This study is observational and cannot establish causality. Unobserved factors such as firm-level practices, negotiation behavior, or job search strategies may influence outcomes. Additionally,

the analysis focuses on observable outcomes rather than hiring processes.

Conclusion

Using CPS microdata, this study finds that among skilled workers, employment and wage outcomes are overwhelmingly explained by skill-related factors. Once education, occupation, industry, and age are accounted for, gender adds negligible predictive power. These results support a merit-based interpretation of observed labor market outcomes within skilled professions.

References

- Blau, F. D. and Kahn, L. M. (2017). The gender wage gap: Extent, trends, and explanations. *Journal of Economic Literature*, 55(3):789–865.
- Goldin, C. (2014). A grand gender convergence: Its last chapter. *American Economic Review*, 104(4):1091–1119.