# The Effect of Industrial Digitalization on the Gender Wage Gap: An Analysis Based on Input-Output Tables and Causal Inference

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Author: Wanqing Liao
Co-Authors: Chunyan Shi, Nan Zhao

Reasonable wage distribution is a core element in building an efficient and inclusive labor market. However, wage inequality is a widespread phenomenon in labor markets worldwide, with wage disparities between genders being particularly significant. According to the Global Gender Gap Report 2023, in 2022, women globally earned only 62.9% of what men earned for the same positions. It is estimated that it will take 131 years to fully eliminate the gender wage gap. As womenâ€™s levels of education and work experience continue to improve, traditional human capital differences are no longer sufficient to explain gender wage gap (Blau & Kahn, 2017; Goldin & Mitchell, 2017). Increasingly, scholars have begun to emphasize the roles of technological advancements, family factors, and social norms in identifying new methods to reduce gender wage gap (Giuliano, 2020; Berniell et al., 2023; Zhang et al., 2024).

This study aims to explore the effect of industrial digitalization on the gender wage gap in China. As the most populous country in the world, women in China account for approximately 18% of the global female population , placing significant responsibility on the country to promote gender equality and womenâ€™s development. Using the provincial input-output tables for 2007, 2012, and 2017 published by the National Bureau of Statistics of China, this study calculates the complete dependency of different industries on the digital industry, to measure industrial digitalization levels. These indicators are then matched with data from the Chinese Household Income Project (CHIP) for 2008, 2013, and 2018 to examine how industrial digitalization affects gender wage gap through causal inference methods.

The findings reveal that industrial digitalization generally contributes to reducing the gender wage gap. Specifically, for every 0.1-unit increase in digitalization dependency, the gender wage gap decreases by an average of 2.76%. The narrowing of the wage gap is primarily driven by the reduction in hourly wage differences, rather than changes in working hours, indicating that the comparative advantage of men and women in the labor market may have shifted. To test this hypothesis, we use occupational skill data from the U.S. O*NET website to explore how digitalization affects the returns to different skills. The results show that industrial digitalization devalues physical skills and increases the value of cognitive skills. Since men are more likely to work in occupations requiring high levels of physical skills, this shift leads to a narrowing of the gender wage gap. Moreover, as industrial digitalization progresses, the devaluation of physical skills becomes more pronounced, resulting in a stronger effect on reducing the wage gap. However, the overall gender wage gap does not consistently decline. Using the Oaxaca-Blinder decomposition to analyze the contribution of different factors to the gender wage gap across various years, we find that the expansion of occupational segregation is the main reason for the increase in the wage gap. Although industry digitalization alters skill premiums, it does not reduce occupational segregation. Heterogeneity analysis suggests that factors such as caregiving responsibilities and work flexibility may be the main obstacles to narrowing the gender wage gap.

This study offers three main contributions to the existing literature. First, it enriches research on the effect of digitalization from an industry perspective. Existing studies on measuring digitalization mostly focus on the national, provincial, or corporate level, with limited attention given to industries. Considering the different production models and organizational structures across industries, which result in significant variations in technological applications and gender distribution, the industry-level

digitalization measurement based on input-output tables in this study can more accurately capture this heterogeneity. Second, this study provides new evidence on how digitalization reduces the gender wage gap. Previous research has mainly explored the effect of digitalization on gender wage gap through changes in labor market participation rates, employment types, and gender norms. This study argues that changes in skill premiums are also an important reason for the narrowing gender wage gap. Finally, this paper finds that although industry digitalization helps to narrow the gender wage gap, the increased occupational segregation and gender discrimination have led to a rebound in the overall gap. This not only provides new evidence for understanding the complex dynamics of gender wage gaps but also offers important insights for policymakers on how to address discrimination, promote gender equality, and achieve sustainable development in the digital era.