The Impact of Technological Progress on the Gender Wage Gap

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Abstract. Technological advancements not only enhance the income levels of workers but also modify the gender wage disparity. Utilizing the "task-based model" and the "brain-muscle dual-factor model," this analysis investigates the implications of technological advancements on the gender gap, employing micro-econometric methods to examine variables associated with wage and income performance differentials attributable to gender. Through the efficient allocation of resources, technological progress has reduced the relative cost of manual labor while elevating the worth of cognitive labor, thereby transforming the traditional labor market that has been predominantly manual labor-oriented. In this context, women, leveraging their strengths in communication, coordination, and focus, demonstrate a greater adaptability to the demands of cognitive work, resulting in enhanced competitiveness within the labor market. By aligning the regional level of technological advancement (specifically at the prefecture-level city) with the mixed micro-individual cross-sectional data from the CFPS database for the years 2018 and 2020, the findings reveal several key insights: a notable wage disparity persists between male and female workers throughout the sample period; the impact of technological progress significantly boosts wage growth among laborers, particularly benefiting female workers, which suggests a reduction in the gender wage gap; female laborers in rural areas experience more pronounced positive incentives regarding wage income compared to their urban counterparts; and, in geographical comparisons, women in the central region receive more substantial positive incentives in wage income relative to those in the eastern and western regions. Consequently, it is imperative for each region to expedite technological advancement, refine the employment structure for women, and foster technological progress to mitigate the gender wage gap.

Keywords: Technological progress, gender wage gap.

1. Introduction

China has been vigorously promoting digitalisation in recent years, triggering structural changes in industry and employment and generating new forms of employment, while at the same time, it is facing an aging population and a waning demographic dividend, which is hampering economic growth. In addition to demographic issues, the topic of gender wages is subject to change in the context of technological advances, which will also bring new opportunities. Technological advancements such as digital development and the use of smart gadgets have altered the labor force's skill advantage as well as the gender division of labour in the employment market. With the deepening development of digital technologies, we not only need to pay attention to the industrial changes and efficiency enhancement they have brought about, but also think about how we can make use of these technologies to create a more equal employment environment for women, improve their economic status and encourage them to move forward on the path of entrepreneurship [1].

Technological advancements have fundamentally reshaped labor demand dynamics, significantly influencing women's wage levels, thus rendering it a critical subject within gender wage gap research. A considerable body of literature currently exists, suggesting that technologies such as the Internet can play a pivotal role in bridging the gender wage divide. Feng Xiliang's research examines the gender wage disparity among migrant workers, revealing that technological innovations exert a more pronounced positive effect on the incomes of female migrant laborers, with this differential in returns contributing to the reduction of the gender wage gap [1]. Similarly, Chi Yudong's analysis indicates that between 2010 and 2015, the percentage of women utilizing the Internet surged as the survey

years progressed, aiding in the contraction of the gender wage gap [2]. In summary, technological progress has facilitated the narrowing of the gender wage gap by transforming labor demand structures, promoting automation technologies, and enabling the emergence of new digital innovations like the Internet. Collectively, these elements have enhanced employment opportunities for women.

This article presents an empirical analysis of the influence of technological advancements on women's labor market outcomes. It examines prefectural and city-level indicators from the China Family Tracking Survey (CFPS) for 2018 and 2020. The study utilizes the "task-based model" to comprehensively assess the multifaceted effects of technological progress on the labor market. Various econometric data analyses are employed to explore the impact of gender disparities on earnings and income levels, along with the application of Welch's "brain-muscle dual-factor model." The research includes a detailed investigation of the effects of technological advancements on the gender wage gap through comparative analyses of employment and wage outcomes across different genders within the context of technological change. It also examines the direct impacts of technological progress on gender employment opportunities, occupational gender segregation, and gender wage disparity, while considering the indirect effects of societal gender role perceptions on these dynamics [3].

2. Research Hypothesis

2.1. The impact of technological progress on the labour market

“Task-based model” offers a strong theoretical foundation for comprehending the far-reaching and complex effects of technological advancement on the labor market. The model emphasizes how technological progress changes the demand and supply of different tasks in the labour market. The model fully considers the comparative advantages of technology and labour in different tasks, and the theory emphasizes both positive and negative impacts, with the negative being the substitution effect, and the positive including the job creation effect and the productivity effect, and the combination of the positive and negative impacts determines the final effect. Technological progress tends to drive automation and intelligence, allowing some traditional, repetitive tasks to be replaced by machines, thus reducing the demand for labour to perform these tasks [4-8].

The labor market is experiencing a negative substitution effect due to technological advancements. Specifically, the use of digitalization, automation, and robotics has caused machines to take over repetitive and simple tasks that were previously performed by humans. This has resulted in a decrease in the need for low-skilled labor, which has forced some practitioners to deal with unemployment and job switching. However, at the same time, there are now more opportunities for technicians with the necessary skills to develop, operate, and maintain these emerging technologies.

New industries, new occupations, and changes in the need for labor force skills are the major ways that technical advancements have helped the labor market create jobs. The advancement of emerging technologies such as artificial intelligence, big data, and cloud computing has led to the creation of numerous new sectors and industries. For example, there is a growing demand for jobs like data analysts, artificial intelligence engineers, and cybersecurity specialists, which offer a wide range of employment opportunities and encourage diversity and adaptability in the labor market.

The positive productivity effect of technological progress in the labour market refers to the positive impact of technological progress on production efficiency and productivity in the following ways: first, technological progress will make the production process more efficient, automation and digitalisation will make it possible to drastically reduce manpower inputs in the production line, improve production efficiency and reduce operating costs; second, technological progress promotes the upgrading of the skills of the workforce and the transformation of the workforce. Second, the growth of technology encourages skill enhancement and workforce change. Jobs in traditional industries are gradually being replaced by machinery due to technological advancements, but workers can enhance their skill sets through education and training to meet the demands of new employment,

which raises the standard of productivity and the labor force as a whole; third, as technology advances, the industrial structure becomes more optimized and upgraded. This leads to the emergence of new industries as well as the transformation and upgrading of established ones. These adjustments to the industrial structure improve the labor market's supply and demand dynamics and raise overall productivity levels.

2.2. The impact of technological progress on the gender gap

According to the 'two-factor brain-muscle model' put forward by Welch, male and female labourers exhibit the same level of ability in mental work under the same conditions. The male labor force, on the other hand, represents both the physical and mental labor performed by the female and male work forces, respectively, and has a greater range of physical labor performance than the female labor force.

Assuming the existence of production thresholds I and S, which satisfy $0<I<S<1$, the production tasks are as follows: when $i \leq I$, the production tasks are digitised, and the factor inputs are technological progress capital Q; when $I<i \leq S$, the production tasks are low-skill tasks, and the factor inputs are traditional capital K and manual labour L; when $S<i$, the production tasks are high-skill production tasks, and the factor inputs are intellectual labour H in the equation (1) to (7).

$$L_f < L_m \tag{1}$$

$$H^f = H^m \tag{2}$$

The wage incomes of the male and female labor forces, respectively, are represented by the pay levels of the labor force, which are based on a mix of individual labor endowments and labor factor prices.

$$W_f=\omega_L L^f+\omega_H H^f \tag{3}$$

$$W_m=\omega_L L^m+\omega_H H^m \tag{4}$$

Define the gender wage gap as a function:

$$\pi = \frac{W_m}{W_f} = \frac{\omega_L L^m+\omega_H H^m}{\omega_L L^f+\omega_H H^f} = \frac{L^m+\varphi H^m}{L^f+\varphi H^f} \tag{5}$$

This is obtained by partial derivation of the gender wage gap with respect to the production threshold I and the technological progress capital Q, respectively:

$$\frac{\partial \pi}{\partial I} = \frac{H^m L^f-H^f L^m}{(L^f+\varphi H^f)^2} \cdot \frac{\partial \varphi}{\partial I} < 0 \tag{6}$$

$$\frac{\partial \pi}{\partial Q} = \frac{H^m L^f-H^f L^m}{(L^f+\varphi H^f)^2} \cdot \frac{\partial \varphi}{\partial Q} < 0 \tag{7}$$

Assuming the aforementioned conditions hold true, increasing the capital required for technical advancement (Q) and raising the output threshold I contribute to closing the gender wage-income gap in the labor force. Thus, it can be inferred from the deductive argument above that technology advancements have the potential to close the gender wage gap [9-11].

Based on the above analyses, this paper proposes the following hypotheses:

H1: The increase in the level of technological progress in the region is conducive to reducing the gender wage gap.

3. Empirical Research

3.1. Sample Selection and Data Sources

The data in this paper are mainly from the 2018 and 2020 CFPS databases. In this paper, the samples are screened, the age limit of women is 18-55 years old, the age limit of men is 18-60 years

old, the sample of non-agricultural employment is retained, and school students and people who have lost the ability to work are deleted.

Furthermore, it is essential to exclude samples with missing values prior to conducting empirical analyses, as various variables may exhibit incomplete data across different samples.

3.2. Description of Variables

Table 1. Selection of variables

Type of variable	Variable symbols	Variable name	Explanation of the meaning of the variable
Explained Variable	wage	Wage Income	Gross wage income, in natural logarithms
Explanatory Variable	tfp	Technical progress	Total factor productivity (OLS model measure at city level)
	gender	Gender	Assigned a value of 0 for males and 1 for females
Control Variables	age	Age	Difference between current year and year of birth
	edu	Educational attainment	No schooling, primary school, junior high school, high school (junior college), junior college, undergraduate, master's degree and doctoral degree are converted into years of education: 0, 6, 9, 12, 15, 16, 19, 22 years.
	party	Political Appearance	Party members are assigned a value of 1, others are assigned a value of 0
	health	Health status	Very unhealthy-very healthy, assigned 1-5 respectively
	marry	Marital status	Married 1, other values 0
	staterun	Nature of the organisation	State-run and collective units are assigned 1, others are assigned 0.
	hukou	Nature of Account	Urban households are assigned 1, rural households are assigned 0.
	lpjwage	Average Wage	The corresponding average wage in the city, take the natural logarithm
	lrjgdp	GDP per capita	GDP per capita of urban counterparts, in natural logarithm.
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The following paragraph outlines the dependent variables, independent variables, and control variables utilized in this study. The research utilizes the Solow residual approach to evaluate total

factor productivity, drawing data from the China Urban Statistical Yearbook as well as provincial and municipal statistical yearbooks. Real GDP represents the output index, while capital stock represents the input index, with a depreciation rate set at 9.6%. The price index deflator has been adjusted accordingly (table 1).

To compute total factor productivity, the production function is defined as the equation (8) to (12):

$$Y_{it}=A_{it}e^{\partial_{it}}K^{\partial_K}L^{\partial_L} \tag{8}$$

Where denotes the output of industry i in year t, K denotes capital inputs, L denotes labour inputs, represents the output elasticity of capital, and the output elasticity of labour represents the total factor productivity of industry i in year t.

Both sides are obtained by taking logarithms:

$$\ln Y_{it}=\ln A_{it}+\partial_{it}+\partial_K \ln K_{it}+\partial_L \ln L_{it} \tag{9}$$

When the condition of constant returns to scale is satisfied, there is:

$$\ln(Y_{it}/L_{it})=\ln A_{it}+\partial_{it}+\partial_K \ln(K_{it}/L_{it}) \tag{10}$$

The output elasticity of capital and the output elasticity of labour are calculated and regularised to obtain:

$$\partial_K^*=\partial_K/(\partial_K+\partial_L) \quad \partial_L^*=\partial_L/(\partial_K+\partial_L) \tag{11}$$

Then total factor productivity is:

$$TFP_{it}=\frac{Y_{it}}{K^{\partial_K^*}L^{\partial_L^*}} \tag{12}$$

4. Model Setting

4.1. Sample Selection and Data Sources

The study discusses the mathematical properties of the explanatory variables and considers the interaction between technological advancement and gender. The moderating effect model has been formulated. The specific equation is provided below:

$$wage_{it}=\beta_0+\beta_1 tfp_{it}+\beta_2 gender_{it}+\beta_3 gender_{it}*tfp_{it}+\beta_n controls_{it}+\delta_{i_{city}}+\gamma_t+\varepsilon_{it} \tag{13}$$

In this expression, (i) denotes distinct individuals, while (t) signifies the timeframe (2018/2020). The equation comprises an intercept term, a random error term, a group of control variables, and fixed effects for both geographical areas and time.

5. Empirical analyses

5.1. Descriptive Statistics

Table 2 below displays the descriptive statistics for the chapter's core and control variables. Men are given a value of 0 in this study, whereas women are given a value of 1. A grand total of 8229 samples were chosen for this chapter, according to the quantitative data for the entire sample. The details of the mean, standard deviation, minimum and maximum values of the variables are shown in Table 2 below.

Table 2. Descriptive statistics

Variable name	Mean value	Standard deviation	Minimum value	Maximum value	Sample size
wage	10.012	1.588	0	12.676	8229
tfp	0.363	0.085	0.091	0.584	8229
gender	0.455	0.498	0	1	8229
age	37.223	10.362	18	60	8229
edu	10.116	4.008	0	22	8229
party	0.02	0.14	0	1	8229
health	3.27	1.086	1	5	8229
marry	0.78	0.414	0	1	8229
staterun	0.014	0.116	0	1	8229
hukou	0.271	0.445	0	1	8229
lpjwage	11.193	0.21	10.569	11.814	8229
lrjgdp	10.828	0.553	9.446	12.068	8229

5.2. Benchmark regression

The regression findings presented in Table 3 demonstrate the stepwise inclusion of control variables in Columns 1-3. Notably, the coefficient for technological progress (tfp) in Column 3 is 3.598, indicating a statistically significant positive influence on wage income at the 1% significance level. Furthermore, the gender coefficient, which is -0.522, also attains statistical significance at the 1% level, suggesting that female employees earn considerably less than their male counterparts, highlighting the existence of a gender wage disparity.

Table 3. Benchmark model regression results

	(1) wage	(2) wage	(3) wage
tfp	3.776***	3.533***	3.598***
	(7.440)	(7.034)	(6.850)
gender	-0.473***	-0.490***	-0.522***
	(-13.657)	(-14.231)	(-15.149)
age		0.012***	0.004*
		(6.143)	(1.901)
edu		0.063***	0.059***
		(13.132)	(11.441)
party		-0.153	-0.124
		(-1.250)	(-1.021)
health		0.071***	0.071***
		(4.384)	(4.404)
marry			0.343***
			(7.474)
staterun			-0.968***
			(-6.612)
hukou			0.101**
			(2.314)
lpjwage			-0.082
			(-0.561)
lrjgdp			0.012
			(0.208)
_cons	8.856***	7.658***	8.471***
	(47.541)	(35.110)	(6.557)
Year fixed effect	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes
N	8229	8229	8229
R2	0.039	0.061	0.073

5.3. Moderated Effects Analysis

The results of the moderated effects regressions can be found in Table 4 below. Columns 1-3 display the regression findings as control variables are progressively included. Based on the regression results in Column 3, the coefficient for the interaction term involving gender and technological progress (tfp_gender) is 0.983, indicating statistical significance at the 5% level. This suggests that, to some extent, technological advancement can mitigate the detrimental effects of the "gender" factor on "wage income." Stated differently, technological advancements have the potential to mitigate the gender wage gap.

Table 4. Moderated effects regression results

	(1)	(2)	(3)
	wage	wage	wage
tfp	3.399***	3.170***	3.207***
	(6.372)	(6.007)	(5.844)
gender	-0.809***	-0.813***	-0.875***
	(-5.371)	(-5.456)	(-5.903)
tfp_gender	0.935**	0.900**	0.983**
	(2.291)	(2.229)	(2.450)
age		0.011***	0.004*
		(6.126)	(1.874)
edu		0.063***	0.059***
		(13.115)	(11.421)
party		-0.157	-0.129
		(-1.283)	(-1.057)
health		0.071***	0.071***
		(4.398)	(4.420)
marry			0.343***
			(7.494)
staterun			-0.974***
			(-6.657)
hukou			0.102**
			(2.340)
lpjwage			-0.084
			(-0.570)
lrjgdp			0.011
			(0.183)
_cons	8.992***	7.790***	8.645***
	(45.992)	(34.465)	(6.684)
Year fixed effect	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes
N	8229	8229	8229
R2	0.040	0.061	0.074

5.4. Heterogeneity regression analysis

5.4.1 Urban-rural heterogeneity

Based on the kind of hukou, the sample in this paper is separated into urban and rural samples. Table 5 below reports the regression results of urban-rural heterogeneity. The findings of the regression analysis in Columns 1 and 2 indicate that advancements in technology have a more pronounced beneficial impact on wage income in rural areas, with women earning much less than men in these settings.

Table 5. Results of urban-rural heterogeneity regression

	(1) Town	(2) Rural
tfp	3.626***	3.650***
	(5.483)	(4.028)
gender	-0.502***	-0.556***
	(-11.288)	(-10.164)
age	0.006**	0.002
	(2.079)	(0.518)
edu	0.067***	0.049***
	(9.603)	(6.108)
party	-0.294*	0.106
	(-1.862)	(0.552)
health	0.056***	0.087***
	(2.613)	(3.562)
marry	0.379***	0.302***
	(6.223)	(4.287)
staterun	-0.891***	-1.046***
	(-4.610)	(-4.651)
hukou	0.045	0.257**
	(0.878)	(2.445)
lpjwage	-0.064	-0.241
	(-0.345)	(-0.957)
lrjgdp	0.020	-0.033
	(0.257)	(-0.348)
_cons	8.075***	10.838***
	(5.135)	(4.539)
Year	Yes	Yes
Province	Yes	Yes
N	4593	3636
R2	0.080	0.069

5.4.2 Regional heterogeneity

Based on the province in which the participants are located, the sample in this article is split into samples from the eastern, central, and western regions. The findings of the regional heterogeneity regression are shown in Table 6 below. The central region exhibits a more significant positive contribution of technological advancement to wage income, as indicated by the regression results in Columns 1, 2 and 3. Additionally, female workers in the central region have a significantly lower wage income than male workers.

Table 6. Regional heterogeneity regression results

	(1) Eastern Region	(2) Central Region	(3) Western Region
tfp	3.955***	4.503***	3.243**
	(6.095)	(4.040)	(2.031)
gender	-0.493***	-0.550***	-0.544***
	(-9.967)	(-8.903)	(-7.294)
age	0.009***	0.002	-0.001
	(3.051)	(0.556)	(-0.188)
edu	0.072***	0.059***	0.043***
	(9.250)	(6.230)	(4.198)
party	0.236	-0.485**	-0.187
	(1.275)	(-2.304)	(-0.743)
health	0.044*	0.094***	0.085**
	(1.855)	(3.334)	(2.400)
marry	0.200***	0.394***	0.522***
	(3.013)	(4.737)	(5.418)
staterun	-0.682***	-1.719***	-0.461
	(-3.435)	(-6.310)	(-1.373)
hukou	0.000	0.162**	0.200**
	(0.008)	(2.070)	(2.035)
lpjwage	-0.500***	0.623*	0.298
	(-2.726)	(1.721)	(0.728)
lrjgdp	0.167**	-0.222	-0.116
	(2.074)	(-1.522)	(-0.957)
_cons	11.082***	3.089	5.691
	(7.104)	(0.976)	(1.498)
Year	Yes	Yes	Yes
Province	Yes	Yes	Yes
N	3499	2750	1980
R2	0.085	0.080	0.058

5.5. Robustness test

The findings from the previous section reveal several key insights. Firstly, technological advancements have a significant positive impact on wage income. Secondly, there exists a persistent gender wage disparity, with female workers earning substantially less than their male counterparts. However, the adverse effects of the "gender" variable on "wage income" can be partly mitigated by technological improvements, which may help narrow the gender wage gap.

To validate the conclusions drawn from the earlier regression analyses, supplementary analyses are conducted in three critical areas: sample selection, inclusion of additional control variables, and variable substitution, drawing from existing literature.

Firstly, respondents aged 20-50 years are chosen as the research subjects, as this age group is likely to possess more developed subjective awareness and judgment, thus enhancing the sample's credibility. Secondly, considering that the level of urbanization (czh) may influence wage income, this variable is included in the control variable framework. Thirdly, total factor productivity (tfp1) computed from the Random Effects (RE) model is utilized as a proxy for technological advancement.

Table 7 displays the regression results from the robustness tests. Columns 1 and 2 exhibit the regression outcomes for the filtered samples; Columns 3 and 4 present the results after adding control variables; and Columns 5 and 6 show the outcomes following variable substitution. The regression results indicate consistently positive and statistically significant coefficients for technological advancement, while the coefficients for gender are notably negative at a significant level. The

coefficients for the interaction terms are also significantly positive, suggesting that technological progress has a substantial positive effect on wage income, that female workers' wage income is significantly lower than that of their male counterparts (indicating the existence of a gender wage gap), and that increased technological advancement can help mitigate this gap. These findings align with the earlier benchmark regression results, reinforcing the previously drawn conclusions.

Table 7. Robustness test regression results

	(1) wage	(2) wage	(3) wage	(4) wage	(5) wage	(6) wage
tfp	3.399***	3.029***	3.699***	3.309***		
	(6.011)	(5.136)	(6.999)	(5.995)		
tfp1					0.689**	0.359
					(2.086)	(0.975)
gender	-0.515***	-0.854***	-0.523***	-0.875***	-0.531***	-0.792***
	(-13.835)	(-5.373)	(-15.176)	(-5.901)	(-15.375)	(-5.913)
tfp_gender		0.946**		0.980**		
		(2.192)		(2.441)		
tfp_gender1						0.782**
						(2.021)
age	0.009***	0.009***	0.004*	0.004*	0.004*	0.004*
	(3.480)	(3.453)	(1.922)	(1.895)	(1.916)	(1.904)
edu	0.061***	0.060***	0.059***	0.059***	0.060***	0.060***
	(10.561)	(10.527)	(11.421)	(11.401)	(11.528)	(11.525)
party	-0.180	-0.184	-0.122	-0.126	-0.122	-0.124
	(-1.444)	(-1.475)	(-1.002)	(-1.037)	(-0.998)	(-1.018)
health	0.063***	0.063***	0.071***	0.071***	0.074***	0.074***
	(3.568)	(3.565)	(4.379)	(4.395)	(4.578)	(4.601)
marry	0.287***	0.287***	0.343***	0.343***	0.343***	0.344***
	(5.833)	(5.848)	(7.475)	(7.495)	(7.465)	(7.483)
staterun	-0.753***	-0.755***	-0.970***	-0.976***	-0.983***	-0.987***
	(-4.737)	(-4.755)	(-6.626)	(-6.670)	(-6.701)	(-6.727)
hukou	0.070	0.072	0.101**	0.102**	0.088**	0.089**
	(1.476)	(1.517)	(2.309)	(2.335)	(2.006)	(2.034)
lpjwage	-0.084	-0.086	-0.056	-0.058	0.090	0.089
	(-0.527)	(-0.540)	(-0.383)	(-0.393)	(0.609)	(0.605)
lrjgdp	0.015	0.014	-0.076	-0.077	0.012	0.011
	(0.236)	(0.222)	(-0.976)	(-0.986)	(0.196)	(0.182)
czh			0.291*	0.289*		
			(1.711)	(1.697)		
_cons	8.438***	8.609***	8.966***	9.136***	7.620***	7.746***
	(6.008)	(6.122)	(6.773)	(6.894)	(5.834)	(5.925)
N	7085	7085	8229	8229	8229	8229
R2	0.067	0.067	0.073	0.074	0.068	0.069

6. Conclusion

Using the micro-database of the 2018-2020 China Family Tracking Survey (CFPS) provided by Peking University's China Social Science Research Centre, this study investigates the mechanisms by which technological progress affects the gender wage gap in 421 prefectural and municipal administrative units across China's provinces. To assess technical advancement in each region, we estimated each municipality's total factor productivity (TFP).

6.1. Technological progress promotes wage growth, and there is a gender wage gap

In the context of this research, the Solow residual method was employed to compute the Total Factor Productivity (TFP) of 421 prefectural-level cities in China, serving as a measure to evaluate the degree of technological advancement. The analysis indicates a notable positive correlation

between technological progress and wage levels, as indicated by the statistically significant technological progress coefficient (tfp) of 3.598 at the 1% level. Additionally, the research underscores the existence of a gender wage gap, with female workers receiving significantly lower wages compared to their male counterparts, as reflected in the gender coefficient of -0.522, also significant at the 1% level.

6.2. Urban-rural and regional gender wage gap

The positive impact of technology advancement on wage income is more pronounced in rural areas than in urban ones, and the wage income of female workers in rural areas is substantially less than that of male workers. The central area has experienced a more favorable impact on earnings due to technical advancements, with female workers' incomes much lower than male workers'.

6.3. The role of technological progress in gender wage differences

We find that the coefficient of the interaction term between gender and technological progress (tfp_gender) is significant at 0.983, a result that maintains at the 5 percent significance level, after experimentally analyzing the effect of technological advancement on the gender wage gap. This shows that the improvement of technology can assist to close the gender wage gap by mitigating the negative effects of the "gender" factor on "wage income" to some extent.

Wage disparities in the labor market encourage workers to take proactive measures. Workers will put in more effort to build up their human capital and hone their abilities via practice and ongoing education in order to close the pay gap. On the other hand, an excessively large wage difference will negatively affect the labor market and maybe jeopardize social stability and peaceful growth. Technological advancement has a positive effect on narrowing the wage gap between men and women, but we must not push technological advancement too far, which may also lead to consequences that cannot be borne as a result of technological advancement. While encouraging technological development and promoting technological advancement, we must ensure that technological advancement is in the right direction to avoid negative impacts. In addition, technology is a double-edged sword that needs to be co-ordinated with other policies to form a synergy in order to narrow the gender pay gap in various sectors more effectively.

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