

The Effects of Having a Second Child on Chinese Women's Wages

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Abstract

Understanding the economic costs of childbearing is crucial in addressing China's declining fertility rate. Using a Difference-in-Differences (DID) approach with data from the Chinese General Social Survey (CGSS), this paper examines the wage effects associated with having a second child. Results show that the wage penalty persists over time but weakens in its intensity, with clear disparities by wage level. Specifically, low-wage women experience significant short-term penalties, middle-wage women face long-term effects, while high-wage women endure both. These findings highlight essential class-based differences in the economic consequences of childbearing, emphasizing the need for targeted policies to mitigate these wage penalties and support family well-being.

1. Introduction

In recent years, China has faced a sharp decline in its fertility rate, dropping to 1.707 births per woman which is far below the suggested replacement level of 2.1. This trend, combined with a rapidly aging population, has caused pressing challenges to the country’s economic sustainability, particularly concerning the labor force and social welfare systems. In an attempt to alleviate these problems, the Chinese government has implemented policies to relax birth restrictions and encourage higher birth rates. However, these policies performed poorly, especially for working women who face increasing conflicts between career progression and family responsibilities.

In order to better understand the “motherhood wage penalty” on working women in China and thereby, improve families’ awareness of childbirth costs and the implementation of fertility policies, this study conducted Difference-in-Difference (DID) analysis using the data from the Chinese General Social Survey (CGSS). Our results reveal a significant short-term negative impact of having a second child on women’s wages, which diminishes over time. And the wage penalty occurs in the short term for low-wage women, persists into the long term for middle-wage women, and is present in both the short and long term for high-wage women.

2. Literature Review

Women in the labor market suffer a “motherhood wage penalty” for having children. Mothers earn significantly lower wages compared to childless women, with an average wage penalty of 3.6-3.8% (Cukrowska-Torzewska & Matysiak, 2020). This wage gap, on one hand, can be explained by the loss of human capital — If a woman has to choose between working and taking care of the children, she will choose to withdraw from the labor market, and the accumulation of human capital investment will be interrupted (Wang, 2022, p92). Moreover, women’s existing experience and abilities are very likely to depreciate after they return to the labor market (Yu & Xie, 2014, p20). On the other hand, women giving up better job opportunities for lower-paying but more family-friendly positions will also affect earnings (Gan, 2017).

We found that “motherhood wage penalty” is common in developed countries like the United States (Anderson et al., 2002), United Kingdom (Waldfogel, 1995) and Canada (Phipps et al., 2001). While compared with developed countries, the phenomenon of labor market segmentation is more serious in developing countries, which has an important impact on

the penalty since the differences in working hour flexibility, compensation mechanism and regulatory system between the formal labor market sector and the informal can lead to mothers' different choices (Gan, 2017). While existing researches have explored the penalty phenomenon in developed countries, few have specifically focused on developing countries like China. China has a background of strictly implementing "one-child" policy for around 35 years. Since 2016, the Chinese government has rolled out different policies aimed at easing birth restrictions and increasing fertility rate, such as "two-child" and "three-child" policies. Families now have more choices in the number of children they have. At the same time, women are facing more conflicts between employment and childbearing. Based on the nowadays fertility rate of about 1.7 births per woman in China, which lies between 1 and 2, we will focus on the heterogeneous effects of having a second child on Chinese women's wages.

3. Methodology and Data

3.1 Hypothesis

The results from multiple studies in developed countries show that the negative effect of childbearing on women's wages increases with the number of births (Waldfogel, 1997; Korenman & Neumark, 1992; Molina & Montuenga, 2009; Livermore, Rodgers, & Siminski, 2011). Based on these findings, our first hypothesis is:

H_1 : *Having a second child has a negative impact on women's wages in China.*

Different career paths can determine how much time and effort women need to put into their work, which at the meantime can determine the wages. In the labor market, if women are forced to stop working due to childbirth, even if they return to the labor market afterwards, how to balance the time input between family and work is still a big problem. Lower-wage women who has below-average personal financial condition are more likely to have more time to spend on childcare, so that they don't normally struggle too much between raising children and working, while middle-wage women are more likely to choose "Nine-to-five" jobs (Xiong & Li, 2017). Traditional family labor divisions often place the burden of childbearing predominantly on women, who consequently face the dual demands of both societal and domestic labor, leading to conflicts between work and family responsibilities. High-wage women, endowed with greater material resources and social capital, tend to experience increased parenting costs associated with higher earnings. As a result, these women often prioritize the quality of their children's upbringing over quantity, focusing on intensive in-

vestment in their development. However, this approach to refined parenting necessitates substantial financial and time resources, exacerbating the challenges of reconciling work and family obligations. Therefore, our second hypothesis is:

H₂ : The impact of having a second child on women's wages is heterogeneous.

3.2 Model Specification

The impact of having a second child on women's wages in short term and long term can be assessed by comparing wage differences before and after childbirth. However, during the periods before and after the birth of a second child, other factors may also influence women's wages, which could affect women who do not have a second child as well. To adequately account for these factors and avoid misjudgments, our study applies a difference-in-differences (DID) method to evaluate the effects. The model can be written as:

$$y_{it} = \alpha + \beta(\text{treat}_i \cdot \text{time}_t) + X_i + \mu_t + \epsilon_{it} \quad (1)$$

where:

- y_{it} : Log of total wages for individual i in year t .
- α : Constant intercept.
- β : Coefficient for the interaction term $\text{treat}_i \cdot \text{time}_t$, representing the estimated impact of having a second child.
- treat_i : Indicator for whether individual i has a second child or not. 1 if yes, 0 if no.
- time_t : Dummy variable, representing the timing of the childbirth event. 1 if the woman is within a specified time frame after giving birth to the second child (e.g., within one year for the short term, or within four years for the long term); 0 if the woman is before the childbirth event or outside the specified time frame.
- $\text{treat}_i \cdot \text{time}_t$: Main explanatory variable, used to measure the DID effect of having a second child on women's wages.
- X_i : Control variables (e.g., health condition, ethnic group, type of workplace).
- μ_t : Year fixed effects.
- ϵ_{it} : Random error.

3.3 Data and Variables

The data used in our study comes from Chinese General Social Survey (CGSS) in 2017, 2018 and 2021. CGSS is a national, comprehensive and continuous academic investigation project of high quality in China. It is a repeated cross-sectional dataset that includes representative micro-level information on individuals' region, fertility, income, assets and more. The survey covers 30 major provinces in China, encompassing both urban and rural areas and sampling approximately 10000 individuals depending on the year.

The short term effect in this study refers to that within one year after the maternity leave policy being implemented, whether having a second child has a negative impact on women's wages and what is the extent of this impact. While the long term effect extends the time range to within four years after the implementation of the policy.

When cleaning and screening the data, this study looked into three aspects: 1) We only selected women with one to two kids because those who have not given birth are not eligible for maternity leave. 2) We only considered women who gave birth after 2006, since the impact of childbirth on wages is time-sensitive, and we hope to compare the impact of having one child and having two children on women's wages at the same time. 3) We only applied data of female employees from urban areas. Lots of women from rural areas participate in informal economic activities, and their income is often considered as part of the household rather than being clearly divided individually, making it difficult to measure through formal statistics. Meanwhile, women who have self-employment business in urban areas might not have much concern about the impact of childbirth on their wages. After screening, the number of valid samples is 972 in total.

Besides the interaction term which is our main interest, we also chose control variables carefully, which include:

1. Demographic characteristics, which are ethnic group, health condition, education level and whether the individual is a member of Communist Party of China (CCP) or not. Ethnicity controls for wage disparities across ethnicities due to differences in economic opportunities. Health condition accounts for labor participation and productivity differences related to health. Education level is included since higher educational attainment generally leads to better employment opportunities, higher wages, and greater career resilience. Party membership may indicate access to higher-paying or more stable employment opportunities due to political connections or advantages.
2. Job characteristics, which are the type and ownership structure of the current work-

place. These two factors help capture workplace-level determinants of wages. The type of job (e.g., private, public, or foreign-owned) and the nature of ownership often affect pay scales, job security, and available benefits, thus influencing women's wage outcomes.

3. Physical capital, which are number of real estate properties and spouse's wages. Property ownership is a measure of wealth and financial stability, which can affect labor market participation and bargaining power. The spouse's wages can influence a woman's labor force decisions, including work intensity or employment type, due to financial support or shared responsibilities, making it an important factor in wage analysis.

Table 1 is the specific value assignment criteria and descriptive statistics for the key variables.

Table 1: Descriptive Statistics for Key Variables

Variable	Value Assignment	N	Mean	Std. Dev.
Dependent Variable				
Annual Total Wage	Take log	972	12.06	0.88
Childbearing Variable				
Number of Children Under 18	Number count	972	1.143	0.39
Personal Characteristics				
Ethnicity	1 for Han, 0 for minority	972	0.90	0.23
Health Condition	Very unhealthy = 1 ; Relatively unhealthy = 2 ; Average = 3; Relatively healthy = 4; Very healthy = 5	972	4.48	0.78
Education Level	1 for above college (Associate degree or higher), 0 for Below college (High school or less)	972	0.51	0.34
CCP Membership	1 if member, 0 if not	972	0.45	0.50
Occupation Characteristics				
Type of Workplace	Government = 1 ; Enterprise = 2; Institution = 3; Social Organization = 4; Military = 5	972	2.24	0.98
Ownership of Workplace	State-owned = 1; Collective-owned = 2; Private-owned = 3; Hong Kong, Macau, or Taiwan-owned = 4; Foreign-owned = 5	972	2.11	1.32
Asset Characteristics				
Number of Real Estate Properties	Number count	972	1.06	0.72
Spouse's Annual Total Wage	Take log	972	10.84	2.08

4. Results and Discussions

4.1 Baseline Estimations

Table 2: Impact of Having a Second Child on Women's Wages

	OLS Regression	With Control Variables
Whether Has Second Child	-0.308** (-3.724)	-0.262** (-3.017)
Constant	10.742** (96.022)	9.961** (42.608)
Ethnicity	-	0.272** (2.889)
Education Level	-	0.293** (3.019)
Health Condition	-	0.098 (1.634)
CCP Membership	-	-0.076 (-0.028)
Type of Workplace	-	0.070 (0.396)
Ownership of Workplace	-	-0.082 (-1.177)
Number of Real Estate Properties	-	0.348** (4.289)
Spouse's Annual Wage	-	0.105** (3.654)
R^2	0.064	0.088
Adjusted R^2	0.062	0.079
F Value	$F(1, 970) = 66.317$	$F(9, 962) = 10.316$

* $p < 0.05$, ** $p < 0.01$, t-values included in parentheses

Table 2 shows the results of basic OLS regression without and with control variables. We found that women's wages decrease by 30.8% after the birth of a second child, and this decline remains significant at 26.2% after accounting for control variables. These findings indicate a substantial negative impact of having a second child on women's wages. Meanwhile, the control variables also have impacts on women's wages as following: Han women have higher wages than ethnic minority women. Women with higher education level have higher wages. Women who own more real estate properties have higher wages. Women with higher-wage spouses also have higher wages. While the effects of other control variables are not statistically significant.

4.2 Persistence Analysis (Short Term vs. Long Term)

The previous analysis has confirmed the short-term negative impact of having a second child on women’s wages. However, we were curious about whether this effect would diminish or disappear in the long term. Therefore, it is necessary to use a DID model to explore the persistence of the impact. Given that the decision to have a second child is non-random and may be influenced by observable factors, Propensity Score Matching (PSM) was applied to address potential selection bias. Specifically, we used non-replacement nearest neighbor matching to create a balanced sample for analysis. This ensures comparability between the treatment and control groups and helps satisfy the parallel trends assumption required by the DID model. The balance tests, shown in Table 3, indicate that the absolute mean differences of control variables after matching are all below 20% and lower than before matching, confirming that there is no systematic bias.

Table 3: Balance Tests for Control Variables

Control Variables	Status	Treatment Group		Control Group		Difference (%)		<i>t</i> -statistic		<i>p</i> -value	
		Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
Ethnicity	Before PSM	2.108	1.804	1.324	1.266	37.19%	29.82%	2.350	2.271	0.021	0.023
	After PSM	2.108	1.804	2.472	1.668	-17.27%	7.54%	-0.736	-0.491	0.379	0.608
Education Level	Before PSM	3.224	2.994	2.871	2.603	10.95%	13.06%	3.653	3.402	0.013	0.016
	After PSM	3.224	2.994	3.507	2.893	-8.78%	3.37%	-1.536	-1.291	0.199	0.528
Health Condition	Before PSM	4.286	4.175	4.266	4.198	0.47%	-0.55%	0.301	-0.349	0.765	0.727
	After PSM	4.286	4.175	4.263	4.235	0.54%	-1.44%	0.329	-0.686	0.743	0.494
CCP Membership	Before PSM	3.645	1.102	3.519	2.178	3.46%	-97.64%	1.577	-12.750	0.121	0.000
	After PSM	3.645	1.102	3.804	1.145	-4.36%	-3.90%	-0.605	-0.510	0.548	0.611
Type of Workplace	Before PSM	1.863	1.905	2.414	2.383	-29.58%	-25.09%	-5.453	-6.017	0.000	0.000
	After PSM	1.863	1.905	2.039	2.039	-9.45%	-7.03%	1.178	1.970	0.249	0.049
Ownership of Workplace	Before PSM	2.137	1.099	2.312	1.080	-8.19%	1.73%	-1.047	0.241	0.299	0.810
	After PSM	2.137	1.099	2.179	1.064	-1.97%	3.18%	-0.215	0.415	0.846	0.679
Number of Properties	Before PSM	1.432	2.650	1.650	2.376	-15.22%	10.34%	2.382	1.857	0.021	0.066
	After PSM	1.432	2.650	1.496	2.135	-4.47%	19.43%	0.712	0.498	0.484	0.620
Spouse’s Annual Wage	Before PSM	10.689	8.985	10.853	10.301	-1.53%	-14.65%	1.091	1.509	0.679	0.012
	After PSM	10.689	8.985	10.409	8.137	2.62%	9.44%	0.384	1.201	0.703	0.266

After PSM, the differences between treatment and control groups are substantially reduced, ensuring better comparability.

The wage change over time associated with having a second child depends on the interplay of two dimensions. On one hand, maternity leave policy provides temporary stability on

women’s wages in the short term. On the other hand, the limited availability and low quality of childcare services in China compel women to invest more time and effort in childcare by themselves, negatively affecting their work performance and, consequently, their wages (Zhang & Li, 2024). The balance between these two factors ultimately determines the overall wage effect. As shown in Table 4, women’s wages decrease significantly in the short term, but the extent of this decline diminishes over time. This suggests that the negative impact of having a second child on wages weakens in the long run. Therefore, our interpretation is, despite the protection from maternity leave policy, the negative consequences of additional childbearing and childcare initially outweigh this benefit, leading to a notable short-term wage decline. While in the long term, as children transition into the preschool stage (around age three), caregiving demands lessen, allowing the negative impact to subside and the positive effects of women’s human capital to gradually emerge.

Table 4: The Persistence of the Impact of Having Two Children on Women’s Wages

	Short Term	Long Term
treat · time	−0.421* (−2.773)	−0.779* (−2.437)
<i>p-value</i>	0.007**	0.015*
<i>F Value</i>	4.876	7.114
<i>R²</i>	0.034	0.066
<i>Sample Size</i>	242	400

* $p < 0.05$, ** $p < 0.01$. treat · time represents the interaction term for DID effect. Significant values suggest an effect of having two children on women’s wages.

4.3 Wage level Heterogeneity Analysis

Do the fertility behaviors of women at different wage levels significantly differ due to their inherent economic capacities? In order to further explore whether the wage disparity genuinely exists in the pathway through which having a second child affects women’s wages, we conducted DID analysis again based on different wage levels to check the heterogeneity. The sample was categorized based on wage rankings, sorted from lowest to highest. Specifically, the lowest 25% of the sample was classified as “low-wage group”, the middle 50% as “middle-wage group”, and the highest 25% as “high-wage group”, and short-term and long-term DID models were established respectively. From Table 5, we can see that the impact of having a second child on wage changes varies across women of different wage levels, demonstrating

the heterogeneity in the impact. We also took the persistence effect into consideration. In the short term, having a second child makes a significant negative impact on women from both low- and high-wage group, while it doesn't show significant impact on the middle-wage group. In the long term, the higher wage level, the stronger the negative impact is.

Table 5: Heterogeneity across Different Wage Levels

	Low-Wage		Middle-Wage		High-Wage	
	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
<i>treat · time</i>	-0.693** (-3.410)	-0.660 (-1.861)	-0.382 (-0.000)	-0.425* (-2.583)	-0.530** (-2.779)	-0.794** (-2.724)
<i>p-value</i>	0.001**	0.065	1.000	0.010*	0.006**	0.008**
<i>R²</i>	0.093	0.056	0.841	0.317	0.132	0.187
<i>Sample Size</i>	82	91	100	221	60	88

* $p < 0.05$, ** $p < 0.01$. Similar to Table 4, *treat · time* represents the interaction term for DID effect. Significant values suggest an effect of having two children on women's wages.

For low-wage women, they are mostly employed in the secondary labor market and face a vulnerable employment position, making them more susceptible to the "wage penalty" effect (Budig & Hodges, 2010). Having a second child can lead these women into a deeper "fertility trap," wherein the need to care for a newborn results in short-term work interruptions, directly causing a significant decline in wages. Moreover, due to the lack of economic resources, this group relies more heavily on policy support, and the increased caregiving responsibilities reduce their work engagement, thereby lowering productivity. Thus, the short-term impact is significant. However, in the long term, as children grow and enter school age, the child-care burden is relatively eased, and the negative impact on low-wage women's labor market performance diminishes, with their wages gradually stabilizing (Kleven et al., 2019).

For middle-wage women, who are mostly employed in nine-to-five jobs, they represent the primary target group of fertility policy (Waldfogel, 1998). In the short term, having a second child does not have a significant impact on their wages, as maternity leave provides legal protection and economic security. However, in the long term, wages of women in the treatment group are 43% lower compared to those in the control group. Compared to women at the two ends of the wage spectrum (high-wage and low-wage), the impact on middle-wage women is more pronounced, with having a second child imposing a penalty effect on their wages. In practice, the responsibility for childcare is almost entirely shifted to families, with mothers facing a substantial increase in caregiving duties (Budig & Hodges, 2010). This exacerbates the conflict between work and family responsibilities for middle-wage women,

ultimately resulting in reduced labor market standing and a significant decline in long-term wages.

High-wage women experience a significant impact on wages due to having a second child, both in the short and long term, with the negative wage effect intensifying at higher wage levels. Although high-wage women have greater economic and social resources, traditional gender roles often assign them increased childcare responsibilities, which leads to substantial time costs associated with raising a second child. In particular, high-wage women are more likely to engage in “scientific” and “intensive” parenting styles, demanding extensive involvement in their children’s upbringing, which can cause sharp work-family conflicts and manifests as a negative wage effect (Zhang & Wang, 2019).

Compared to the short-term effects, the impact of having a second child diminishes over time for all wage groups. Overall, differences in wage levels contribute significantly to the heterogeneous wage impacts of having a second child. Middle- and high-wage women face more pronounced imbalance between work and family, while low-wage women experience less significant long-term wage effects.

4.4 Robustness Test

To ensure the reliability of the regression results, this study conducted robustness checks based on equation (1). Women’s annual occupational wages was substituted by total income to verify consistency.

Table 6: The Persistence of the Impact of Having Two Children on Women’s Income (Using Income instead of Wages)

	Short Term	Long Term
treat · time	−0.654* (−2.128)	−0.594* (−1.873)
<i>p-value</i>	0.034*	0.022*
<i>F Value</i>	7.960	4.195
<i>R</i> ²	0.042	0.127
<i>Sample Size</i>	242	400

* $p < 0.05$, ** $p < 0.01$. Similar to Table 4, treat · time represents the interaction term for DID effect. Significant values suggest an effect of having two children on women’s income.

Table 7: Heterogeneity across Different Income Levels (Using Income instead of Wages)

	Low-Income		Middle-Income		High-Income	
	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
treat · time	-0.417*	-0.120	-0.397	-0.382*	-0.814**	-0.285*
	(-1.246)	(-0.451)	(-0.525)	(-2.178)	(-2.779)	(-0.957)
<i>p-value</i>	0.047*	0.652	0.613	0.019*	0.006**	0.044*
<i>R</i> ²	0.066	0.218	0.347	0.502	0.279	0.564
<i>Sample Size</i>	82	91	100	221	60	88

* $p < 0.05$, ** $p < 0.01$. Similar to Table 4, treat · time represents the interaction term for DID effect. Significant values suggest an effect of having two children on women’s income.

As shown in Tables 6 and 7, having a second child has a clear short-term negative effect on women’s total income, while the long-term impact is not significant. Additionally, Table 7 indicates that middle-income women are more affected compared to their low- and high-income counterparts. The significance of the coefficient β aligns with the original regression results, suggesting that the findings are robust even when the dependent variable is changed. These results further underscore the persistent wage effects of having a second child, particularly for middle-income women.

5. Conclusions and Implications

The “motherhood wage penalty” associated with having a second child is commonly observed in developed countries, and this study demonstrates that this phenomenon also exists in China. Furthermore, using PSM and DID model, we explored the persistence of the wage penalty effect of having a second child across different time periods and wage level groups, highlighting its heterogeneity based on wage levels. Specifically speaking, our key findings are: 1) Having a second child significantly affects women’s wages in both the short and long term, though the marginal impact diminishes over time. 2) The wage penalty for low-wage women occurs in the short term, whereas for middle-wage women, it persists in the long term. For high-wage women, the penalty effect is present in both the short and long term.

These findings draw attention to the persistent negative impact of having a second child on Chinese women’s wages, as well as emphasizing economic level strata plays a crucial role in shaping the wage impacts of motherhood. From the perspective of families or women themselves, our study allows for a more comprehensive and objective assessment of part of

the childbearing costs. When making fertility decisions, it is noteworthy to have a clear understanding and expectation of the temporal effects and wage-level disparities of negative impacts on wages.

In light of China’s declining fertility rates and the introduction of policies such as the ”three-child policy” and associated incentives, the results of this study emphasize the urgency for targeted policy interventions. Current fertility policies in China aim to encourage higher birth rates, yet without adequate support systems, the economic burden on mothers could undermine these efforts. To mitigate the motherhood wage penalty, several policy measures are recommended:

1. **Childcare Industry:** Increase public investment in the childcare sector, provide subsidies for private providers, and support community-based childcare. Establish stringent quality standards and monitoring systems to ensure service quality and safety, while also promoting diversified models such as family-based and public-private partnerships.
2. **Parental Leave Policies:** Strengthen parental leave policies to provide extended paid leave for both parents. This can promote a more balanced distribution of childcare responsibilities and reduce the career impact on mothers specifically. At the same time, encourage employers to offer flexible work arrangements, such as remote work options or adjusted work hours, to reduce the wage penalty associated with career interruptions.
3. **Targeted Financial Assistance:** Provide targeted financial assistance to low- and middle-income families to offset the economic burden of having additional children. This could include tax benefits and subsidies for essential childcare expenses, which would directly reserve more disposable income and keep out-of-pocket expenses within a relatively controllable range.

Despite the valuable insights provided, this study has several limitations. First, the dataset used for examining temporal effects and wage-level heterogeneity is relatively small, partly due to the shrinking size of the original data in recent years and the strict screening criteria we applied. Second, the potential impact of the COVID-19 pandemic must be acknowledged, as the data spans both pre- and post-pandemic years (2017, 2018, and 2021). The pandemic likely brought shocks to labor markets and childcare service availability, which may have intensified the wage penalty for mothers, particularly those in low- and middle-wage households. Future research should consider the pandemic’s long-term effects on maternal labor outcomes and investigate how related policies, such as emergency childcare support, may

have influenced these dynamics. Moreover, in the future, exploration of the impact of evolving fertility policies and labor market dynamics on different demographic groups will also provide a deeper understanding of the motherhood wage penalty.

6. References

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