

Research on the Impact of the Number of Children on the Basic Endowment Insurance Benefits of Urban Female Employees

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Abstract

With socioeconomic shifts and a rapidly aging population, pension replacement rates have become a pretty big deal—they shape not only the quality of life for retirees but also broader social stability. In this study, we bring together insights from social insurance and demography, drawing on CFPS data to explore how the number of children affects the basic pension benefits of urban female employees. We start by walking through the theoretical logic: how childbearing can disrupt women's career paths, shorten their contribution years, and lower their contribution bases. Then we put those ideas to the test with an empirical model, comparing pension outcomes across different family sizes. What we find is striking: having more children generally drags down women's pension levels, mainly because career interruptions and occupational constraints take a real toll on their contribution capacity. But this effect isn't one-size-fits-all—it varies quite a bit across income brackets and regions. On the flip side, sensible childcare support and a more gender-equal job market can help cushion the negative impact. Taken together, our results offer concrete evidence on the fertility-pension link, and they also point toward practical ways to refine the pension system and strengthen fertility-friendly policies along the way.

Keywords

Number of Children; Urban Female Employees; Basic Endowment Insurance; Benefit Level.

1. Introduction

1.1. Research Background

These days, with rapid socioeconomic growth and shifting demographics, building a fertility-friendly society has become a hot topic across the board [1]. At the same time, population aging is picking up speed, so the demand for a solid pension system feels more urgent than ever—and within that, women's retirement security really stands out as a pressing concern. The reason is pretty straightforward: women tend to shoulder heavier family responsibilities on top of their jobs. Especially around marriage and childbearing, they're much more likely to drop out of the workforce, hit a glass ceiling in career advancement, and earn relatively lower pay [2]. All of this eats into their social security entitlements, particularly when it comes to how many years they contribute to pension insurance and how much they put in. Those child-related hurdles directly limit women's income growth during their prime working years. And because the pension formula ties benefits to contributions, it's no surprise that women often end up with smaller monthly pensions than men after retirement [3]. So, making

sure the pension system treats both genders fairly and safeguards retired women's quality of life has become a pretty urgent task. On the policy front, China has been actively rolling out nationwide pooling of pension insurance and pushing for more gender-equitable employment practices in recent years, all with the goal of building a fairer, more inclusive social security system [4]. These policies have certainly helped—women's career prospects are looking better, and labor force participation has ticked up. Yet, when you look closely, the system still falls short in offsetting the true costs that fertility imposes on women. Since the three-child policy came into effect, the financial strain and career setbacks tied to having multiple children haven't really been addressed in any meaningful way [5]. Sure, the state has made efforts to protect reproductive rights and promote gender equality, but the pension scheme doesn't seem to offer much comfort to women who step back from work for marriage and childbearing. In fact, after retirement, lower monthly payouts may even penalize them; so a pressing question arises: how can childbearing rights and gender equality be protected without the retirement system unintentionally punishing women with more than one child? This study steps in right there [6]; the main goal is to work out how retirement systems can be redesigned to consider career breaks caused by having children, and finally close the gap between men and women in old-age benefits [7]. To achieve that, a detailed breakdown of the current system is needed—looking at how things like the number of children, time off work, and years of paying in all feed into the final pension amount. Taking the number of children as a starting point, the effect on the old-age insurance benefits of women workers in cities is examined; the aim is to produce solid evidence and practical suggestions that can guide future policy changes. In the end, the hope is to get fairer retirement security for women, to push policymakers to pay more attention to women's special needs while building a childbearing-friendly society, to remove unfair biases built into the system, and to move closer to real social fairness and harmony [8].

1.2. Research Objectives and Significance

The link between the number of children and the retirement benefits of female city workers is examined in this study; the question holds more weight than commonly believed, carrying real significance in both theory and practice, as people's lives are directly affected by policy decisions.

1.2.1. Theoretical Significance

Most existing studies have focused on gender gaps in pension benefits; surprisingly few have looked at things from the angle of household fertility decisions, so this paper takes a different route by bringing the number of children into the picture as a core variable. This allows the underlying logic to be spelled out, tying together women's labor force participation, wage levels, and ultimately pension benefits; at the same time, the study pushes the boundaries between fields a little, by linking social security and population studies in a way not done much before. The aim is to add some new real-world evidence and a fresh way of looking at ongoing academic discussions on gender and retirement security.

1.2.2. Practical Significance

Childbearing policy changes and old-age insurance reforms are now placed high on China's social management agenda; the move first to a two-child and then a three-child policy has put more pressure on women, who are already balancing work and home responsibilities; without proper support or payback from the system, having children slows career progress and cuts into future pension benefits, leaving women more financially at risk in old age.

This study provides solid evidence that can help governments design better childbearing support policies and adjust pension reforms; it also stresses the need to protect women's rights and reduce the pension losses tied to having more than one child. In short, this study makes clear the cause-and-effect link between childbearing choices and retirement benefits, and it points to practical steps, such as promoting fairer employment, strengthening child care

services, and working toward a fairer and more lasting social security system; these steps, in turn, support the larger national aims of population strategy and social justice.

1.3. Research Innovations

This paper brings new angles to the research view and the data-based methods used: first, the research view is new, shifting from looking at women's retirement benefits through gender bias, work discrimination, or pay gaps as earlier studies did, to placing the number of children at the center, directly examining the long-term influence of women's childbearing actions on pension benefits, and thus widening the cross-field study between population and social security; second, the way the mechanism is analyzed is also new, going beyond just estimating the overall link between the number of children and pension benefits, the years of paying into the pension system are brought in as a linking variable to open up the internal logic connecting childbearing actions and pension results, building a more organized framework for explaining such research; third, the data-based methods used are new, several statistical models and stability checks are adopted to make sure the conclusions are dependable and steady, and an analysis of subgroups with different income levels and regional backgrounds further captures how the number of children affects pension benefits in different ways.

2. Literature Review

Used as the main way to measure pension benefit levels, the retirement income replacement rate and how it relates to household childbearing decisions make up a key research field in social security and population studies around the world; foreign research puts stress on how pension systems are designed to shape fertility and the creation of multi-pillar systems, while domestic studies pay attention to regional and time differences in replacement rates, what fertility does to pension security, and the gaps between city and countryside areas and among different population groups; this section reviews research progress from both home and abroad in a systematic way.

2.1. Domestic and International Research Status

Foreign scholars have studied pension replacement rates and household fertility decisions from many sides; the main focus is on how pension systems shape fertility and on ways to improve pension designs. Rossi [9] uses Uruguay as the study setting to look at how motherhood changes women's chances of getting into contributory pensions, and finds a clear link between the number of children and women's pension eligibility. Women with low incomes are often pushed out of the labor market and cannot meet the minimum contribution requirements. Liu [10] looks at China's New Rural Pension Scheme (NRPS) and finds that having more children shows a clear negative tie with pension sign-ups; however, when the relationship is checked with an instrumental variable method that uses family planning fines, the result shows no strong cause-and-effect connection between the two. These studies mostly analyze how parity is related to pension eligibility and participation rates; other research deals with the ways pension insurance affects the wish to have children and how the pension system can be made better. Qingjie et al. [11] use CFPS data to study what pension insurance does to fertility willingness, and their results show that pension insurance brings down overall fertility intentions and the liking for sons, while child-raising costs put a very strong negative push on fertility desires. At the same time, scholars in other countries look widely into how pension systems can handle population aging, and they stress ways to make up for women's losses during child care, so as to lessen the problem of not enough pension coverage and to spread welfare benefits more fairly. Building multi-pillar pension systems has become an important way to make social security more lasting and fair [12]. To sum up, studies from other countries look broadly at how pension system design and fertility are linked, and they give a deep look

into systems with multiple pillars and ways to make up for the economic loss of women raising children; these studies offer useful lessons for countries dealing with an aging population and trying to balance the needs of having children and pension provision. However, big differences across countries in how institutions are set up, how economies develop, gender culture, and how mature social security systems are make it hard to apply the findings directly, so the findings need to be adjusted to China's special national conditions, leaving space for focused research inside the country [13]. Research inside China on pension replacement rates and household childbearing choices is marked by different angles and analysis at several levels; it covers how families handle money, what drives the wish to have children, and differences in replacement rates across time and places. When it comes to how family finance connects with childbearing decisions, Ma Yu and others [14] argue that the number and gender makeup of children strongly shapes how families spread out risky financial assets; having more children cuts down the family's involvement in risky money markets, and families who have more sons, because they face bigger housing costs, are likely to increase savings set aside for safety and lower their risky investments, which reflects how their ability to take risks weakens as the burden of raising children grows. Zhou Haizhen and others [15] find that having more children clearly brings down the chance that parents will buy commercial pension insurance, and sons have a stronger holding-back effect, especially in households with low income and among middle-aged or elderly groups; this kind of research shows how childbearing puts limits on families' financial planning for retirement. Studies on what pension insurance does to the wish to have children come up with findings that are not all the same; Xiong Jingwei and others [16] discover that workers with flexible jobs who are covered by pension insurance would rather have fewer children but put child quality first, and the effects are different between city and countryside areas and across types of insurance; Fan Hongli [17] demonstrates that basic pension insurance's influence on fertility intentions depends on competing income and substitution effects: income effects boost fertility willingness, while substitution effects suppress it, with income effects dominating among rural and low-income groups. Zhang Pengfei [18] further finds that spousal joint pension enrollment discourages additional births, while parental pension coverage raises couples' willingness to have more children, especially when children are young. Research on the characteristics and drivers of pension replacement rates indicates that China's urban employee pension replacement rate has declined year by year with prominent regional disparities: eastern regions record lower rates, while western and northeastern regions show narrower gaps, driven by regional economic performance, government regulatory capacity and fiscal expenditure structures [19]. Scholars recommend raising pension benefits and optimizing fiscal spending to narrow inter-regional replacement rate gaps. Xue Huiyuan et al. [20] stress that moderately elevated replacement rates guarantee elderly living standards, yet excessively high rates strain pension fund liquidity, requiring a balance between fiscal sustainability and benefit adequacy. Gender-specific research targeting women confirms substantial fertility impacts on female pension benefits and fertility intentions. Wang Lijia et al. [21] find that professional women in Caofeidian District, Tangshan, predominantly prefer one or two children, with extremely low willingness to have three children, linked to household finances, childcare costs and housing conditions. The authors propose reducing fertility costs and improving public services and social security to ease women's childbearing burdens and raise fertility intentions. Deng Qinqin [22] notes that the universal two-child policy failed to achieve expected fertility outcomes and negatively impacted women's pension security. Empirical analysis shows women's fertility decisions are shaped by labor force participation and human capital returns; policy improvements including expanded childcare services and optimized two-child maternity insurance can alleviate women's fertility pressures. Feng Jin et al. [23] conduct pension benefit simulations showing that parity, age at first birth and birth intervals significantly determine women's pension benefits, with career

breaks amplifying these effects. Ji Xingyu [24] uses panel data with a fixed-effects method to show how the basic old-age insurance for workers shapes support across generations: when pension payments are received, adult children send less money to their aging parents, while financial help from elders to younger generations goes up. Scholars at home and abroad have built up a large amount of research on pension replacement rates and household childbearing choices; studies from other countries set up frameworks for analyzing how pensions and fertility interact, and they give a theoretical base for building multi-pillar pension systems and for ways to make up economic losses for women; research inside China puts the analysis in the country's own conditions, and it spots patterns of pension replacement rates across time and space, the way childbearing affects family money management and pension sign-ups, the two-sided effects of old-age insurance on the wish to have children, and the special risks women face because of their gender.

2.2. Literature Review Commentary

Although research on pension replacement rates and fertility decisions exists, most studies do not focus only on urban female employees, and they lack a systematic look at how the number of children shapes their retirement benefits; research inside China mainly covers overall trends and regional differences in replacement rates, along with the broad effects of fertility on pension systems, and seldom brings gender and childbearing together in the analysis; earlier studies show that more children reduce the holding of risky assets by households and the buying of private pension insurance, but these studies do not separate out the gender gap, especially the long-term retirement losses coming from women's career breaks and slower job growth after having children; research from abroad, on the other hand, puts more weight on building multi-pillar pension systems and on ways to make up for the economic losses of women while raising children, and it stresses the use of combined social policies to ease the tension between childbearing and pension security. Differences in institutions, culture and social security systems between China and Western countries greatly limit how directly the findings from abroad can be used in China. This paper points out several important gaps in earlier writings: first, few studies look specially at urban female workers or unpack the special ways the number of children connects to their retirement benefits; second, the study of the linking factors is not complete, as most research leaves out the years of paying into the pension system, overlooking how those years can help lighten the childbearing load and lift retirement benefits; third, the analysis of differences across groups is not deep enough, and telling apart groups by income, schooling and region using detailed data is still underworked; fourth, the findings from other countries can only be used to a limited extent outside their own settings, because differences in institutions and culture give rise to one-sided conclusions when the findings are applied to China. fifth, Existing literature also shows problems of logical disconnection and not enough citations; against this background, the paper takes the number of children as the key explanatory variable, brings in pension contribution years as a linking pathway, and uses CFPS microdata to run data-based tests; it fills gaps in current research, gives detailed and systematic evidence on how fertility connects to pension benefits for urban female employees, and produces targeted policy suggestions.

3. Research Design and Methodology

3.1. Data Source

The microdata for this study are taken from the China Family Panel Studies (CFPS), which is run by the Institute of Social Science Survey at Peking University; the survey gathers detailed information on households and individuals in areas like economics, population, education, health and social security, and it can fully show the social and economic conditions of Chinese families; the paper uses data that tracks households from 2014 to 2022, and the data has been

cleaned and matched in a standard way so that the definitions of variables are consistent and comparable; the outcome variable (the pension replacement rate) is worked out by using the average wages of city workers from the China Statistical Yearbook and the yearly national spending on basic old-age insurance together with the total number of retired insured people, both provided by the Ministry of Human Resources and Social Security; the key explanatory variable is the number of children, the mediating variable is the years of paying into the pension system by female city workers, and the control variables include household spending, household income, housing loans, health status and education, all of which are drawn from the CFPS household and individual questionnaires.

3.2. Variable Definition and Measurement

3.2.1. Dependent Variable: Pension Replacement Rate

Calculation formula:

$$\text{Mean_ratio} = E / (R * W)$$

Mean_ratio means average pension replacement rate for retired employees nationwide, E means total annual expenditure of the national basic pension insurance fund, R means total number of retired insured persons in the corresponding year, W means average wage of urban on-the-job employees. This formula computes the ratio of average pensions received by retirees to average wages of active workers. Higher values indicate more adequate pension security for retirees; lower values signal weaker pension replacement capacity.

3.2.2. Explanatory Variable

Core independent variable: Number of children, measuring household childcare burden and serving as the key research focal point.

3.2.3. Mediating Variable

Pension contribution years of urban female employees are set as the mediating variable to examine its transmission and buffering effects between the number of children and pension replacement rates. More children typically disrupt women's career trajectories through work breaks or reduced working hours during childcare, shortening pension contribution years and lowering future pension benefit levels.

3.2.4. Control Variables

Control variables eliminate confounding factors affecting the dependent variable across multiple dimensions: Economic indicators: Household consumption expenditure, household income, housing loans (capturing economic pressure, total household wealth and long-term debt burdens); Demographic indicators: Age and age squared (capturing life-cycle non-linear effects), household size (resource sharing within families); Elderly support and health indicators: Number of seniors, number of unhealthy household members (elderly care burdens and health-related financial strain); Labor and human capital indicators: Employment status, years of education (labor force participation's impact on pension accumulation, long-term income and pension planning effects of human capital); Marital status: Reflecting household stability and spousal financial/social support. This variable system ensures accurate identification of core relationships and provides sufficient data foundation for analyzing the mediating role of contribution years between childcare burdens and pension replacement rates.

3.3. Research Hypotheses

Hypothesis 1: The number of children is negatively correlated with the pension replacement rate.

Hypothesis 2: The number of children reduces pension replacement rates by shortening female employees' pension contribution years.

Hypothesis 3: Impacts on pension replacement rates exhibit heterogeneity across income groups, educational attainment levels and regions.

3.4. Analytical Models

Benchmark Regression Model:

$$\text{mean_ratio}_{it} = \alpha + \beta_1 * \text{child}_{it} + \beta_2 * \text{controls} + \mu_i + \lambda_t + \varepsilon_{it}$$

Mediating Effect Model:

$$\text{Step 1: mean_ratio}_{it} = \alpha + \beta_1 * \text{child}_{it} + \beta_2 * \text{controls} + \mu_i + \lambda_t + \varepsilon_{it}$$

$$\text{Step 2: payment_period}_{it} = \alpha + \beta_1 * \text{child}_{it} + \beta_2 * \text{controls} + \mu_i + \lambda_t + \varepsilon_{it}$$

$$\text{Step 3: mean_ratio}_{it} = \alpha + \beta_1 * \text{child}_{it} + \beta_2 * \text{payment_period}_{it} + \beta_3 * \text{controls} + \mu_i + \lambda_t + \varepsilon_{it}$$

mean_ratio means pension replacement rate (dependent variable), Child means number of children (core independent variable), control variables including annual household consumption, annual household income, household head age, etc. Payment period means pension contribution years (mediating variable).

Table 1. Variable Definition Table

Variable Category	Variable Name	Abbreviation	Indicator Definition
Dependent Variable	Pension Replacement Rate	mean_ratio	Total pension benefits / wage income
Independent Variable	Number of Children	Child	Number of household members under 16 years old
Mediating Variable	Pension Contribution Years	payment period	Total years of employee pension insurance contributions
Control Variables	Annual Household Consumption	Consume	Natural logarithm of total annual household consumption
	Annual Household Income	Lnin	Natural logarithm of total annual household income
	Household Head Age	age	Age of household head
	Age Squared	age2	Square of household head age
	Housing Loan	hloan	1 = outstanding housing loan; 0 = no housing loan
	Household Size	size	Total number of household members
	Number of Elderly Members	old	Number of household members aged above 65
	Number of Unhealthy Members	weak	Count of household members reporting poor self-rated health (1=excellent, 2=very good, 3=fair, 4=average, 5=poor)
	Employment Status	Work	1 = employed; 0 = unemployed
	Years of Education	eduy	Illiterate/semi-literate=0, Primary=6, Junior High=9, Senior High=12, College=15, Bachelor=16, Master=19, Doctor=24
	Marital Status	marriage	1 = married household head; 0 = unmarried or other
Fixed Effect	Individual ID	Pid	Financial respondent identifier
Fixed Effect	Survey Year	Year	Survey wave year

4. Empirical Analysis and Result Discussion

4.1. Descriptive Statistical Analysis

Table 2 presents descriptive statistics for all variables, illustrating overall sample distribution and variability.

Table 2. Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Median	Minimum	Maximum
Pension Replacement Rate	23412	0.531	0.214	0.514	0.0457	1.470
Number of Children	23412	0.127	0.424	0	0	4
Annual Household Consumption	23412	10.76	0.984	10.82	0	15.44
Annual Household Income	23412	10.82	1.042	10.92	6.232	15.92
Household Head Age	23412	49.07	14.44	49	16	95
Age Squared	23412	2616	1473	2401	256	9025
Housing Loan	23412	0.217	0.412	0	0	1
Household Size	23412	2.552	1.275	2	1	12
Number of Elderly Members	23412	0.418	0.692	0	0	4
Number of Unhealthy Members	23412	0.410	0.644	0	0	4
Employment Status	23412	0.884	0.320	1	0	1
Years of Education	23412	7.772	4.912	9	0	24
Marital Status	23412	0.816	0.387	1	0	1

The average pension replacement rate stands at 0.531 with substantial volatility. Most households have few children under 16. The average household head age is 49.07; most respondents are employed and married, with a mean education length of 7.772 years and significant cross-sample disparities. Household structure, health burdens and housing loan status all show visible variation. Rich multi-dimensional variation across economic and demographic indicators provides robust support for subsequent regression analysis.

4.2. Model Suitability Tests

Variance Inflation Factor (VIF) tests in Table 3 assess the severity of multicollinearity among explanatory variables.

All the VIF values came in below 2, with an average of just 1.41-well under the usual red-flag threshold of 10. So we're pretty safe on that front: there's very little correlation among the explanatory variables, and no serious multicollinearity to worry about. That, in turn, gives us more confidence that the regression results are both robust and easy to interpret.

Table 3. Multicollinearity Test

Variable	VIF	1/VIF
Annual Household Consumption	1.88	0.53
Annual Household Income	1.85	0.54
Household Head Age	1.71	0.59
Years of Education	1.51	0.66
Number of Elderly Members	1.47	0.68
Household Size	1.38	0.72
Marital Status	1.20	0.84
Number of Unhealthy Members	1.17	0.85
Number of Children	1.15	0.87
Housing Loan	1.09	0.91
Employment Status	1.07	0.93
Mean VIF	1.41	—

Table 4 reports F-test and Hausman test results to verify model suitability.

Table 4. Model Suitability Tests

Test Item	Statistic	P-value
F-test	583.72	0.0000
Hausman Test	1851.35	0.0000

The F-test came back significant, so overall the regression equation holds up pretty well statistically. The Hausman test, meanwhile, pushed us toward fixed effects—it clearly rejected the random-effects model, which means we’d better stick with the former to keep our coefficient estimates from going sideways. All of this gives us a solid statistical footing for including both individual and year fixed effects in the later regressions, and it also helps ensure that whatever we pull out of the model is both credible and easy to make sense of.

4.3. Benchmark Regression

Table 5 displays benchmark regression results under two model specifications, estimating variable impacts on pension replacement rates while controlling individual and year fixed effects.

Benchmark regression results show that the number of children, household consumption, household income, number of elderly household members and number of unhealthy members exert significant negative effects on pension replacement rates, consistent with theoretical expectations that childcare, elder care and health burdens, alongside income ceiling constraints, suppress pension benefit levels. Household size, employment status, educational attainment and marital status generate significant positive effects; age squared carries a significantly positive coefficient, while housing loan and age lack statistical significance. High R-squared and

significant F-statistics demonstrate strong model explanatory power aligned with theoretical predictions.

Table 5. Benchmark Regression Results

Variables	(1) Pension Replacement Rate	(2) Pension Replacement Rate
Number of Children	-0.017*** (-6.80)	-0.015*** (-5.63)
Annual Household Consumption	—	-0.004** (-2.44)
Annual Household Income	—	-0.024*** (-16.20)
Household Head Age	—	0.002 (0.48)
Age Squared	—	0.000*** (3.59)
Housing Loan	—	-0.004 (-1.52)
Household Size	—	0.007*** (5.27)
Number of Elderly Members	—	-0.009*** (-3.48)
Number of Unhealthy Members	—	-0.004** (-2.32)
Employment Status	—	0.008** (2.39)
Years of Education	—	0.001*** (2.70)
Marital Status	—	0.017*** (3.18)
Observations	23,412	23,412
R-squared	0.802	0.806
Individual Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
F-statistic	46.25	36.08

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.4. Robustness Tests

Table 6 compares OLS, random-effects and fixed-effects outputs to verify coefficient stability.

Table 6. Robustness Test 1: Alternative Regression Specifications

Variables	OLS Pension Replacement Rate	Random Effects Pension Replacement Rate	Fixed Effects Pension Replacement Rate
Number of Children	-0.035*** (-11.25)	-0.024*** (-9.52)	-0.015*** (-5.63)
Annual Household Consumption	-0.032*** (-18.54)	-0.019*** (-13.34)	-0.004** (-2.44)
Annual Household Income	-0.071*** (-44.53)	-0.046*** (-33.67)	-0.024*** (-16.20)
Household Head Age	0.001** (2.00)	0.002** (2.54)	0.002 (0.48)
Age Squared	-0.000*** (-3.80)	-0.000*** (-3.69)	0.000*** (3.59)
Housing Loan	0.006* (1.79)	-0.002 (-0.63)	-0.004 (-1.52)
Household Size	0.028*** (24.11)	0.016*** (14.93)	0.007*** (5.27)
Number of Elderly Members	-0.031*** (-13.17)	-0.018*** (-8.01)	-0.009*** (-3.48)
Number of Unhealthy Members	0.002 (0.74)	-0.000 (-0.21)	-0.004** (-2.32)
Employment Status	0.049*** (12.31)	0.022*** (6.86)	0.008** (2.39)
Years of Education	-0.003*** (-9.75)	-0.004*** (-10.05)	0.001*** (2.70)
Marital Status	0.031*** (8.64)	0.022*** (5.71)	0.017*** (3.18)
Constant	1.543*** (74.87)	1.140*** (50.81)	0.592*** (3.43)
Observations	23,412	23,412	23,412
R-squared	0.230	—	0.105
Individual Fixed Effects	YES	YES	YES
Year Fixed Effects	YES	YES	YES
F-statistic	583.7	—	113.9
Number of Individuals	7,806	7,806	7,806

*** p<0.01, ** p<0.05, * p<0.1

Across all three models, the core variables hold their signs and significance levels pretty much in line with the benchmark regression. Sure, we see a few minor shifts in the coefficients or p-values for some peripheral variables, but nothing that changes the bottom line.

As for Table 7, we dropped the 2020 observations there—mainly to filter out any macroeconomic distortions from the pandemic and see if our conclusions still hold up under different conditions.

Table 7. Robustness Test 2: Excluding 2020 Pandemic Sample

Variables	(1) Pension Replacement Rate	(2) Pension Replacement Rate
Number of Children	-0.020*** (-6.88)	-0.015*** (-4.86)
Annual Household Consumption	—	-0.002 (-0.94)
Annual Household Income	—	-0.024*** (-14.08)
Household Head Age	—	0.001 (0.17)
Age Squared	—	0.000*** (3.09)
Housing Loan	—	-0.005 (-1.48)
Household Size	—	0.006*** (3.85)
Number of Elderly Members	—	-0.010*** (-3.30)
Number of Unhealthy Members	—	-0.008*** (-3.53)
Employment Status	—	0.012*** (2.97)
Years of Education	—	0.001 (0.93)
Marital Status	—	0.014** (2.25)
Observations	19,434	19,434
R-squared	0.815	0.819
Individual Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
F-statistic	47.28	28.19

*** p<0.01, ** p<0.05, * p<0.1

The core coefficients hold their ground-both in direction and significance-pretty much matching the baseline results. A couple of variables do drop off, namely household consumption and education, but on the flip side, the negative effect of poor health actually gets stronger. All in all, it seems the pandemic didn't throw off the main relationships we're interested in.

As for Table 8, we applied cluster-robust standard errors to tidy up any heteroskedasticity and within-individual serial correlation. That step gives us a bit more confidence in the significance tests, making the results more reliable.

Table 8. Robustness Test 3: Clustered Robust Standard Errors

Variables	(1) Pension Replacement Rate	(2) Pension Replacement Rate
Number of Children	-0.017*** (-6.74)	-0.015*** (-5.79)
Annual Household Consumption	—	-0.004** (-2.26)
Annual Household Income	—	-0.024*** (-14.38)
Household Head Age	—	0.002 (0.51)
Age Squared	—	0.000*** (3.30)
Housing Loan	—	-0.004 (-1.48)
Household Size	—	0.007*** (4.99)
Number of Elderly Members	—	-0.009*** (-3.25)
Number of Unhealthy Members	—	-0.004** (-2.13)
Employment Status	—	0.008** (2.35)
Years of Education	—	0.001*** (2.60)
Marital Status	—	0.017*** (2.85)
Observations	23,412	23,412
R-squared	0.802	0.806
Individual Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
F-statistic	45.45	28.59

*** p<0.01, ** p<0.05, * p<0.1

Key results remain unchanged, confirming strong model explanatory power and external validity.

Table 9 incorporates regional fixed effects to absorb unobservable institutional, economic and social cross-region disparities.

Table 9. Robustness Test 4: Adding Regional Fixed Effects

Variables	(1) Pension Replacement Rate	(2) Pension Replacement Rate
Number of Children	-0.016*** (-6.61)	-0.014*** (-5.22)
Annual Household Consumption	—	-0.004** (-2.50)
Annual Household Income	—	-0.023*** (-16.05)
Household Head Age	—	0.003 (0.76)
Age Squared	—	0.000*** (3.62)
Housing Loan	—	-0.004 (-1.57)
Household Size	—	0.005*** (4.42)
Number of Elderly Members	—	-0.009*** (-3.53)
Number of Unhealthy Members	—	-0.005** (-2.55)
Employment Status	—	0.007** (2.08)
Years of Education	—	0.001* (1.96)
Marital Status	—	0.015*** (2.87)
Observations	23,412	23,412
R-squared	0.807	0.812
Individual Fixed Effects	YES	YES
Regional Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
F-statistic	43.73	35.10

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The core variables-both their signs and significance levels-line up pretty well with the baseline regression. We even see a slight uptick in R-squared, which suggests the model's explanatory power gets a little bit better. And across all four robustness checks, the main findings hold up consistently-no nasty surprises, so we're confident the results are reliable.

4.5. Mechanism Test

Additional children frequently force women to exit employment, shortening urban employee pension contribution years and ultimately depressing pension benefit levels. Table 10 presents three-step mediating effect test results.

Table 10. Mediating Mechanism Test: Pension Contribution Years

Variables	(1) Pension Replacement Rate	(2) Contribution Years	(3) Pension Replacement Rate
Pension Contribution Years	—	—	0.005*** (19.39)
Number of Children	-0.015*** (-5.63)	-0.214** (-2.46)	-0.014*** (-5.31)
Annual Household Consumption	-0.004** (-2.44)	-0.002 (-0.04)	-0.004** (-2.47)
Annual Household Income	-0.024*** (-16.20)	-0.098** (-2.04)	-0.023*** (-16.07)
Household Head Age	0.002 (0.48)	-0.063 (-0.49)	0.002 (0.56)
Age Squared	0.000*** (3.59)	-0.006*** (-13.80)	0.000*** (5.74)
Housing Loan	-0.004 (-1.52)	0.165* (1.82)	-0.005* (-1.82)
Household Size	0.007*** (5.27)	0.076* (1.88)	0.006*** (5.04)
Number of Elderly Members	-0.009*** (-3.48)	-0.317*** (-3.80)	-0.007*** (-2.93)
Number of Unhealthy Members	-0.004** (-2.32)	-0.146** (-2.31)	-0.004** (-1.99)
Employment Status	0.008** (2.39)	-0.250** (-2.32)	0.009*** (2.78)
Years of Education	0.001*** (2.70)	0.476*** (27.75)	-0.001 (-1.54)
Marital Status	0.017*** (3.18)	0.259 (1.53)	0.015*** (2.98)
Constant	0.577*** (3.11)	37.664*** (6.22)	0.400** (2.18)
Observations	23,412	23,412	23,412
R-squared	0.806	0.961	0.811
Individual Fixed Effects	YES	YES	YES
Year Fixed Effects	YES	YES	YES
F-statistic	36.08	91.99	63.04

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Our mediation analysis shows that, overall, having more children does have a significant negative effect on pension replacement rates. The way it works is pretty straightforward: extra kids tend to interrupt women's careers or delay their return to the labor market, which in turn shortens their contribution years and eats into long-term pension savings. Interestingly, even after we factor in contribution years, the direct negative effect of children remains statistically significant—so what we're seeing is a case of partial mediation, not a full pass-through.

4.6. Heterogeneity Analysis

Table 11 splits samples into high-income and low-income groups to identify differentiated effects across income strata.

Table 11. Income Heterogeneity Analysis

Variables	High-Income Pension Replacement Rate	Low-Income Pension Replacement Rate
Number of Children	-0.016*** (-5.17)	-0.009 (-1.60)
Annual Household Consumption	0.001 (0.43)	-0.004* (-1.72)
Annual Household Income	-0.038*** (-12.28)	-0.011*** (-4.30)
Household Head Age	0.011** (2.25)	-0.008 (-1.15)
Age Squared	0.000*** (4.56)	0.000 (0.87)
Housing Loan	0.001 (0.26)	-0.005 (-0.97)
Household Size	0.008*** (4.80)	0.004* (1.83)
Number of Elderly Members	-0.011*** (-3.26)	-0.004 (-0.91)
Number of Unhealthy Members	-0.004 (-1.45)	-0.005* (-1.74)
Employment Status	0.012*** (2.59)	-0.001 (-0.27)
Years of Education	0.003*** (4.43)	-0.001 (-1.03)
Marital Status	0.008 (0.97)	0.024*** (2.91)
Observations	10,530	12,882
R-squared	0.884	0.798
Individual Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
F-statistic	27.55	3.601

*** p<0.01, ** p<0.05, * p<0.1

Impacts differ sharply between income groups: high-income women suffer significant pension losses from additional children, constrained by pension benefit caps, childcare and elder care burdens. Low-income households face weaker significant effects of parity but are more vulnerable to consumption pressures, poor health and marital instability. Coefficient magnitude and statistical significance diverge substantially across groups.

Table 12 divides observations into three regional cohorts to capture geographic disparities shaped by regional economic and social conditions.

Table 12. Regional Heterogeneity Analysis

Variables	Eastern Pension Replacement Rate	Central Pension Replacement Rate	Western Pension Replacement Rate
Number of Children	-0.008*** (-2.61)	0.005 (0.82)	-0.033*** (-5.81)
Annual Household Consumption	-0.004* (-1.66)	-0.004 (-1.16)	-0.003 (-1.17)
Annual Household Income	-0.018*** (-7.98)	-0.024*** (-7.87)	-0.026*** (-10.83)
Household Head Age	0.016*** (2.91)	-0.002 (-0.28)	-0.005 (-0.73)
Age Squared	0.000 (0.10)	0.000 (1.45)	0.000*** (2.84)
Housing Loan	-0.012*** (-3.02)	0.006 (1.07)	-0.006 (-1.39)
Household Size	-0.001 (-0.28)	-0.001 (-0.37)	0.013*** (5.99)
Number of Elderly Members	-0.007** (-1.98)	-0.007 (-1.15)	-0.013*** (-3.03)
Number of Unhealthy Members	0.002 (0.72)	0.005 (1.11)	-0.013*** (-4.02)
Employment Status	0.010** (2.25)	-0.016* (-1.94)	0.010* (1.68)
Years of Education	0.001** (2.34)	-0.002 (-1.61)	0.001 (0.81)
Marital Status	0.022*** (3.09)	0.015 (1.21)	0.013 (1.54)
Observations	8,136	4,455	10,438
R-squared	0.877	0.704	0.717
Individual Fixed Effects	YES	YES	YES
Year Fixed Effects	YES	YES	YES
F-statistic	13.53	8.063	18.38

*** p<0.01, ** p<0.05, * p<0.1

Geographic disparities are pronounced: Western women experience the largest pension declines from additional children due to heavier childcare and health burdens. Eastern regions are primarily shaped by consumption, income and human capital dynamics. Central China exhibits unique, mostly insignificant parity effects. Varied coefficient magnitudes and significance reflect uneven regional public services, economic development and social security infrastructure.

Table 13 separates high-education and low-education cohorts to examine human capital-driven differences.

Table 13. Educational Attainment Heterogeneity Analysis

Variables	High-Education Replacement Rate	Pension	Low-Education Replacement Rate	Pension
Number of Children	-0.017*** (-4.53)		-0.002 (-0.34)	
Annual Household Consumption	-0.004* (-1.92)		-0.003 (-1.06)	
Annual Household Income	-0.022*** (-10.77)		-0.024*** (-10.38)	
Household Head Age	-0.001 (-0.09)		0.005 (0.91)	
Age Squared	0.000*** (4.35)		-0.000 (-0.51)	
Housing Loan	-0.004 (-1.25)		0.003 (0.58)	
Household Size	0.009*** (5.46)		0.000 (0.20)	
Number of Elderly Members	-0.008** (-2.18)		-0.003 (-0.65)	
Number of Unhealthy Members	-0.001 (-0.24)		-0.002 (-0.69)	
Employment Status	0.002 (0.41)		0.003 (0.58)	
Years of Education	-0.004*** (-2.96)		0.003 (1.46)	
Marital Status	0.013** (2.09)		0.018* (1.92)	
Observations	13,726		9,686	
R-squared	0.816		0.810	
Individual Fixed Effects	YES		YES	
Year Fixed Effects	YES		YES	
F-statistic	18.58		10.83	

*** p<0.01, ** p<0.05, * p<0.1

Highly educated women face significant pension penalties from more children, stemming from higher career opportunity costs and binding pension benefit ceilings. Less educated women rely more heavily on marital stability and household size for positive pension outcomes, with insignificant parity effects. Distinct coefficient patterns reveal divergent human capital constraints across educational groups.

5. Conclusion and Policy Recommendations

The analysis looks at how household fertility decisions affect pension replacement rates and clarifies the mediating role of contribution years; three main findings are brought out: first, the number of children has a significant negative effect on the pension replacement rate of urban female workers, as more children lead to career breaks from childbirth and child care, shortening contribution years and lowering the base, directly cutting retirement benefits; this negative link remains robust after controlling for income, education, health and other factors; second, contribution years work as a key mediating channel between fertility and pension

security, with women who have more children often pausing work for child care, which cuts total contribution years and slows the growth of long-term pension benefits; third, the effect of the number of children on pension benefits differs greatly by group and region, since high-income and well-educated women suffer larger pension losses due to higher career opportunity costs, and women in western cities see the sharpest decline after having children, pointing to deep unfairness in regional social security and child care facilities; overall, urban female workers face higher risks of not enough pension protection when bearing and raising children, calling for targeted institutional reforms and policy actions.

Based on empirical results, this paper proposes targeted policy recommendations to socialize fertility costs, offset women's pension losses and coordinate fertility policy with pension system sustainability: Introduce fertility credit mechanisms in pension calculation: 1) Treat maternity and childcare leave as credited pension contribution years funded by national pension funds, and incorporate a fertility compensation factor into pension benefit formulas to offset pension losses for mothers with multiple children. 2) Expand enterprise annuity coverage and establish career interruption individual accounts to help women accumulate supplementary pension benefits during childcare periods. 3) Build a fertility-friendly employment ecosystem: Strictly enforce anti-gender-discrimination labor regulations and expand affordable universal childcare services to stabilize women's labor force participation and sustained pension contributions. 4) Implement targeted regional and group support: Increase fiscal transfers and targeted pension subsidies for western regions, low-income women and other vulnerable cohorts disproportionately harmed by childbearing; launch pension financial literacy education to boost participation in multi-pillar pension systems. Collectively, these policies systematically reduce women's fertility burdens, safeguard their financial security in old age, and advance coordinated, sustainable development of national fertility strategies and equitable pension insurance systems.

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