

ORIGINAL RESEARCH ARTICLE

Fertility Behavior of Professional Women in China: Exploring inhibitor factor of second-child fertility behavior.

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Keywords: Professional women, fertility, fertility behavior, child-birth rate, health policy, China

ABSTRACT

Background:

The actual fertility level is lower than the policy fertility rate reflects in China. Family planning based on fertility intention has replaced national planning as an important variable affecting fertility levels. The lower than expected fertility rate reflects the existence of many inhibitory factors in family fertility decision-making. Professional women's participation in labor has become an inhibitory factor in second-child fertility behavior.

Objectives:

The study explores the difference in fertility behavior between professional women and non-professional women and aims to contribute to the debate on to what extent the increase in labor participation rate reduces women's fertility behavior and whether the emergence of professional women is an inhibitor of second-child fertility behavior.

Methods:

The authors developed an analysis of national data from the social survey involving 10,968 records applying the Heckman model. The sample used for the study consists of 3,912 females registered in the national survey according to the formal definition of 'professional woman'. The empirical research developed aimed at testing if the selection bias exists. That is, whether the characteristics of professional women's education, urban, income, and other factors led to differences in fertility intention and fertility behavior, applying confounding variables through propensity score matching.

Results:

It was possible to demonstrate that there is a selective effect among low-birth behaviors of professional women. However, the selective effect of fertility intention was not significant. On the other hand, labor participation reduced the fertility behavior confirming the existence of fertility dilemma. Therefore, the study indicates that it is necessary to explore how to alleviate the fertility dilemma within options of social support, family support and employment environment.

Main Contribution to Evidence-Based Practice:

The article demonstrates how the Heckman model contributes to facilitate the understanding of participation on fertility intention and fertility behavior. Additionally, it contributes to the international debate on the topic.

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What do we already know about this topic?

Available evidence supports an overview of the fertility behavior of professional women.

What is the main contribution to Evidence-Based Practice from this article?

The Heckman model facilitates the understanding of national surveys on fertility intention and fertility behavior amongst professional women.

What are the main implications towards theory, practice, or policy?

The article identified that it is necessary to explore how to alleviate the fertility dilemma within options of social support, family support and employment environment.

Authors' Contributions Statement: Xue conceptualized and drafted the article

The current academic research on the fertility

behavior of professional women can be divided into two aspects, on the one hand, the female employment market and family are the main subjects to discuss the impact of fertility behaviors on professional women under the adjustment of fertility policies; On the other hand, from the perspective of "encouraging birth according to the policy", the professional women's fertility intention, Fertility dilemma and fertility support under the two-child policy in China are discussed.

However, related studies have ignored the origin of the relationship between the two, that is, whether the increase in female labor participation will reduce fertility behavior. Specifically, it can be expressed as whether there is a significant difference in fertility behavior between professional women and non-professional women, if there is a difference, is it due to women's participation in labor and fierce competition in the employment market that led to low fertility behavior(Xu,Q.,2021;Wang J.2020). Hence, we can argue if it may be due to the education level, urban household registration or perhaps more open to concept of fertility of professional women, which lead to low fertility behavior. What is a professional woman? Are the factors that determine becoming a professional woman a source of bias on the estimation of OLS parameters between the explanatory variable female labor participation and the dependent variable fertility? Faced with the possibility of sample selection bias and data truncation of dependent

variable fertility, it is necessary to control the sample selection that affects the fertility behavior of professional women to explore the true impact of labor participation rate on fertility behavior, only by verifying the true causal relationship between the two, it is necessary to explore the fertility dilemma and fertility support of professional women under the adjustment of the second-child policy. The Heckman model seems to be a good option to study the phenomena. (Zhou H. 2015; Liang T.2020).

Reviewing relevant research

Some scholars believe that in the post-demographic transition period, attention should be paid to studying the phenomenon of low fertility from the perspective of women, they also proposed to pay attention to the role of professional women's low birth willingness in fertility decision-making in the context of rising fertility costs. (Harriet,B.,2001,P.27;Wang J.,Shi R.2021) Therefore, the following is a review of the impact of women's participation in market labor on the fertility level from three aspects: the balance between the cost and utility of fertility; the imbalance between work and family; personal characteristics.

Fertility of professional women will interrupt their career planning, increasing additional birth costs such as insufficient human capital accumulation, employment discrimination, income punishment, downward occupational mobility and even unemployment caused by frequent entry and exit of the labor market. On the other hand, increasing income and economic status of professional women strengthen their power in family fertility decision-making (Zhou,X.,Wang,F.,2010;Shen,C.2020),lower

expectations of children's future economic utility and pension utility. Therefore, the increase in cost and the decrease in utility have become the main inhibitors of the second-child fertility behavior of professional women.

Song Jian and Zhou Yuxiang(2016) believe that the dilemma of work-family balance faced by professional women is an important reason that hinders them from fertilizing or continuing to fertility. On the one hand, due to traditional habits and gender differences, women are mainly responsible for household chores and child rearing, which will compress or encroach on their leisure time; on the other hand, the increase in the economic income and economic status of professional women has strengthened their power of family fertility decision-making (Zhou,X.,Wang,F.,2010;Ng, T. W. H. and D. C.2012), they can more autonomously determine their own fertility behavior (Zhu,C.Z.,&Li,S.Z.,1994;Li F., Feng X.2021). Besides, with extensive participation in social labor, the contradiction between fertility rights and labor rights makes professional women face the dilemma of work-family balance, reducing the fertility intention and fertility level.

Individual-level fertility inhibitors refer to changes in women's personal characteristics, including education level, social status, lifestyle and value changes, etc. According to Wu Hongxue's(2017) research, the personal characteristics of professional women, including income level, education level and professional status, have an important impact on the willingness to give birth to a second child. Specifically, middle-income professional women are relatively more willing to have a second child, professional women with higher and lower income levels are relatively less willing to have a second child; professional women with higher education levels are less willing to give birth, professional women with lower levels of education are more likely to have a second child; the higher the professional status of women, the lower the intention to have a second child.

In general, the factors that affect the fertility behavior of professional women can be divided into fertility dilemmas related to labor participation and selection effects related to personal characteristics. It can be seen from the literature review that most of the research ideas on low-fertility behaviors of professional women are as follows: first, empirically analyze the results of low-fertility intention or low-fertility behavior of professional women, then qualitatively speculate or describe the corresponding reason quantitatively, and put forward measures to promote fertility under the background of "encouraging birth according to policy". This kind of thinking is likely to fall into the false causality of female labor participation causing low fertility intention or fertility behavior, ignoring the selection of personal characteristics related to fertility among professional women.

Methodology

Overall, the difference in fertility behavior between professional women and non-professional women may derive from the increase in labor participation rate or the selection effect. Therefore, it is necessary to separate the selection effect through appropriate research design to obtain the true impact of labor participation on the fertility level.

Research hypothesis

1. there is a selection effect in the analysis of the influence of labor participation on the fertility behavior of professional women;
2. the fertility behavior of professional women under the control of the corresponding confusion variables is lower than that of non-professional women;
3. under the control of the corresponding confounding variables, the intention to have children of professional women is lower than that of non-professional women;
4. there are not only selection effects related to personal characteristics in the fertility behavior of professional women, but also the fertility dilemma caused by participating in market labor.

Analysis of selection effects

The analysis of whether this selection effect exists can be tested using the Heckman model, first use a two-step procedure to model the structure of the selection deviation, then use the conditional probability of receiving intervention in the result analysis to control the bias of selection effect. Specifically, it can be understood that the impact of labor participation on the fertility behavior of professional women can be divided into two functional equations, the first is the influence of age, education level, household registration, social class, family income, ideology and labor participation on fertility behavior; the second is the influence of age, education level, household registration, social class, family income and ideology on labor participation. At last, use the likelihood ratio result in the MLE estimation to test whether there is a selection effect, if the coefficient that reflects the correlation between the error term and the result variable

$\rho = \text{corr}(\varepsilon, \mu)$ is significantly not 0, that is,

$\rho(\rho)$ significant indicates that there is a selective bias, OLS will lead to inconsistent estimates; on the contrary, if you cannot reject the null

hypothesis of " $H_0: \rho = 0$ ", then give up using the

sample selection model (Guo,S.Y.,2016,pp.67-83).

Propensity score matching analysis method

The propensity score matching analysis method is based on the causal analysis method under the counterfactual framework, under the ignorable assumption, uses observational data to match between the experimental group and the control group according to certain principles, controlling the confounding variables caused by selection bias and obtaining the average treatment effect on the treated.

The research idea combined with the theme of this article is to reduce the confounding variables related to the fertility behavior of professional women to one dimension through the calculation of propensity score, and match between professional women and

non-professional women, form the experimental group and the control group to eliminate the selective difference in fertility levels between professional women and non-professional women due to confounding variables, the difference in fertility behavior between the two is only due to the factor of participating in market labor, analyze the causal relationship between labor participation and fertility behavior by quasi-experimental methods based on CGSS cross-sectional data.

Source of data

The China General Social Survey is a national, comprehensive and continuous academic survey project. It comprehensively collects data at multiple levels of society, communities, families and individuals, summarizes the trends of social changes, discusses issues of major scientific and practical significance. The sampling principle adopts multi-stage stratified PPS random sampling, covering 478 villages in 28 provinces/cities/autonomous regions in China, a total of 10968 valid questionnaires were completed. According to the definition of professional women, professional and non-professional women account for 35.9% and 64.1% respectively, 73.8% of non-professional women have never worked. Therefore, the comparison between professional and non-professional women can be approximately equivalent to the comparison between women of childbearing age with and without labor participation.

Data analysis

The analysis of fertility behavior of professional women is divided into two parts, one is to test whether the selection bias exists through the Heckman model, that is, whether the characteristics of professional women's high education, urban household registration, high social class, high family income, and more open and free fertility concepts have led to the difference in fertility intention and fertility behavior of professional women and non-professional women; The second is to control the selection effect under confounding variables through propensity score matching, analyze the true

impact of labor participation on fertility intention and fertility behavior of professional women. The specific analysis results are as follows:

Test of selection effect

From the analysis results of Heckman's selection model, it can be seen that there is a selection bias in the analysis model that takes the number of ever born children "how many children do you have" as the dependent variable, there is no selection bias in

the analysis model that takes fertility intention "How many children do you want to have if there are no policy restrictions" as the dependent variable. Specifically, the coefficient of the variable "Whether she is a professional woman" passed a significant test in the number of children ever born model, indicates that the difference between professional and non-professional women significantly affects fertility behavior.

Table 1 Analysis results of Heckman selection model

	Fertility intention	Number of children ever born
Age	-0.0323 (0.0194)	-0.0123*** (0.0034)
Education level	-0.0026 (0.0248)	-0.0137*** (0.0052)
Hukou	-0.3379*** (0.1710)	-0.0876*** (0.0277)
Social class	0.0635 (0.0575)	0.0094 (0.0073)
Age at first marriage	0.0406*** (0.0165)	-0.0174*** (0.0033)
Annual household income	1.32e-08 (1.67e-07)	6.16e-08 (3.34e-08)
In the economic downturn, female employees should be laid off first	0.0174 (0.0586)	-0.0006 (0.0116)
Couples should share housework equally	0.0098 (0.0632)	0.0040 (0.0117)
Whether a professional woman	0.0723 (0.1142)	-0.0605*** (0.0240)
Constant term	2.4552*** (0.5157)	1.7732*** (0.1051)
Selectivity of labor participation		
Age	-0.0284*** (0.0118)	0.0043 (0.0128)
Education level	-0.0036 (0.0190)	-0.0851*** (0.0179)
Hukou	-0.2914*** (0.1025)	-0.1790 (0.1085)
Social class	0.1109*** (0.0264)	0.0098 (0.0293)
Age at first marriage	0.0112 (0.0113)	0.0446*** (0.0130)
Annual household income	4.04e-07 (6.31e-07)	1.63e-06*** (7.29e-07)
In the economic downturn, female employees should be laid off first	-0.0441 (0.0427)	-0.0165 (0.0478)
Couples should share housework equally	0.0660 (0.0420)	0.0234 (0.0459)
Constant term	2.8553*** (0.3764)	1.3356*** (0.3922)
lambda	3.3297 (3.0115)	1.0963*** (0.3120)
athrho	18.3684 (106.9401)	0.3593*** (0.0696)
N	3,912	3,794
chi2	370.78	304.08

Note: Use the Stata14 software to complete the analysis of the Heckman model, refer to the Stata manual for specific commands; 2. The numbers in parentheses are standard errors; 3.***: $p < 0.05$.

That is, partial regression coefficient -0.0605 indicates that the number of children ever born to professional women is 0.0605 lower than that of non-professional women, but not significant in the fertility intention model, means the difference between professional and non-professional women has no effect on the number of children who wish to have; The coefficient $\rho(\rho)$, which reflects whether the variable that chooses to become a professional woman will have a significant impact on fertility intention and fertility behavior, adopts the significance assumption in the model of the number of children ever born, rejects the null hypothesis equal to 0, means from the overall model, it can be seen that there is a selection effect in the number of children that professional women ever born, the $\rho(\rho)$ of the fertility intention model is not significant, it cannot be determined that there is a selective effect in fertility intention of professional women.

Although the Heckman model can calculate the average intervention effect after controlling for the selection bias, essentially, the difference between the two groups is represented by the coefficients of the regression equation, the result does not really represent the average intervention effect (Zhou,H.,2015). Therefore, it is necessary to conduct causal analysis under the counterfactual framework through the method of propensity score matching.

Analysis results of propensity score matching

The test results of the Heckman model show that the influence of labor participation on the fertility behavior of professional women has a selective effect, therefore, it is necessary to eliminate the selection bias through the analysis method of propensity score matching, observing how the difference in the number of children ever born between professional and non-professional women will change. What needs to be explained here is that

there are many influencing factors in the fertility behavior of professional women, due to the limitations of questionnaire design and the lack of existing knowledge, it is difficult to completely separate the confounding variables.

Therefore, the result of propensity score matching is only a rough analysis of the size of the selection effect. Here we still use fertility intention and fertility behavior as the dependent variable analysis to confirm each other. In a certain sense, the propensity score matching analysis method can be regarded as a kind of resampling, that is, through matching and re-sampling, the observed data is as close as possible to the random experimental data. This article selects three matching methods: Nearest Neighbor Matching, Mahalanobis Matching and Kernel Matching, compare their analysis results to test the robustness of the method.

1. Test of matching balance

The balance test of propensity score matching is to examine whether the matching result balances the data well, is a test of the quality of the matching. The following uses the nearest neighbor matching scheme as an example, under the setting of the 0.04 caliper range and the one-to-one matching with replacement, the matching result of `pstest` through the stata command .The standard deviations and significant changes of the confusion variables before and after matching can be seen between the two groups of professional women and non-professional women, after matching, the standard deviation of most variables is within 10%, and the difference between the two groups is not significant. Although the difference between the two variables of education level and household registration distribution is still significant after matching, the standard deviation of the two has decreased by 50.2% and 18.5% respectively, indicating that the overall balance of matching is better.

Table 2 Test of matching balance between professional women and non-professional women

		professional women	non-professional women	Standard deviation
Age	Before matching	42.91	52.97	-75.7***
	After matching	43.00	42.51	3.7
Education level	Before matching	5.38	4.42	32.0***
	After matching	5.35	4.87	15.9***
Hukou	Before matching	1.44	1.52	-16.1***
	After matching	1.44	1.38	13.1***
Social class	Before matching	4.47	4.45	0.8
	After matching	4.47	4.37	5.9
Age at first marriage	Before matching	30.38	19.77	76.6***
	After matching	19.80	19.87	-0.5
Annual household income	Before matching	75192	68349	2.3
	After matching	75140	77765	-0.9
In the economic downturn, female employees should be laid off first	Before matching	2.05	2.16	-11.6***
	After matching	2.05	2.09	-4.5
Couples should share housework equally	Before matching	3.99	3.86	13.5***
	After matching	3.98	3.93	5.6

Note: The nearest neighbor matching scheme with replacement 1 to 1 and caliper range set to 0.04 is adopted; 2. *** $p < 0.01$;

2. Analysis of fertility intention and fertility behavior

The average treatment effect analysis results of different dependent variables and different matching methods can be divided into three parts to test the robustness of the results: the difference before matching, the difference after matching, the difference of results under different matching methods.

First of all, it can be seen from the difference between fertility intention and fertility behavior before matching that professional women are significantly lower than non-professional women. Specifically, the number of children of professional women ever born is less than 0.3979 for non-professional women, if there is no policy restriction for professional women, the number of children hoped to be lower than 0.1656 for non-professional women. This difference may be caused by

participation in market labor, or it may be the result of the selection bias of professional women.

Secondly, combining the differences in fertility intention and fertility behavior between the matched two groups can be drawn that after controlling for the selection effect, there are still significant differences in fertility behavior under different matching methods. That is, the number of children born to professional women is significantly lower than that of non-professional women, it can be explained by counterfactual causal inference that if professional women do not participate in work, their average number of children should be higher than they are now as professional women. Take the result of matching 1 as an example, today's professional women have had 1.344 children, if they are not working, the number of children ever born should be 1.484. Participation in work has resulted in a decrease in the average fertility number of women

by 0.1398, it shows that labor participation significantly reduces the fertility behavior of professional women; However, there is no significant difference in fertility intention under different matching methods to control the confounding variables, that is, there is no difference in the number of children desired between the two groups, it shows that labor participation has no significant impact on fertility intention of professional women .

At last, comparing the analysis results under different matching methods, it can be seen that the directionality and significance of each coefficient are consistent. the average treatment effect of fertility

behavior and fertility intention is robust. Take the number of children ever born as an example, Nearest neighbor, Nearest Neighbor Matching, Mahalanobis Matching and Kernel Matching three average treatment effect results are negative and the T test is significant, but the difference in the three average treatment effect results of the number of children is expected to be negative and the T test is not significant. From the point of view of specific coefficient values, the changes under different matching schemes are also very small, indicating that the results of the above analysis are robust.

Table 3 Average treatment effect of fertility behavior and fertility intention

Method	Professional women	non-professional women	difference	Standard error	t value
Number of children ever born					
Before matching	1.344	1.742	-0.3979***	0.0349	-11.39
Match 1	1.344	1.484	-0.1398***	0.0456	-3.07
Match 2	1.344	1.480	-0.1359***	0.0375	-3.62
Match 3	1.344	1.431	-0.0874***	0.0260	-3.36
Match 4	1.344	1.474	-0.1306***	0.0362	-3.60
Fertility intention					
Before matching	1.933	2.099	-0.1656***	0.0259	-6.40
Match 1	1.933	1.990	-0.0568	0.0343	-1.66
Match 2	1.933	1.959	-0.0257	0.0290	-0.89
Match 3	1.933	1.975	-0.0414	0.0249	-1.66
Match 4	1.933	1.960	-0.0263	0.0270	-0.98

Note: Match 1, with 0.04 as the radius, there is a 1-to-1 nearest neighbor matching; Match 2, With 0.04 as the radius, there is a 1-to-4 nearest neighbor matching (one-to-four matching can minimize the mean square error); Match 3, using Mahalanobis distance matching, K=4, M=4; Match 4, use kernel matching, the kernel settings are all default values; The reason why the caliper range is set to 0.04 is because the propensity score for fertility behavior is $0.25\hat{\sigma}_{pscore} \approx 0.0415$, the propensity score for fertility intention is $0.25\hat{\sigma}_{pscore} \approx 0.0406$, to be conservative, set the caliper range to 0.04, that is, to match the observed values with a 4% difference in propensity scores; ***p<0.05.

Discussion

Compared to non-professional women, low fertility intention and low fertility behavior of professional women may derive from the selective characteristics related to fertility behaviors, such as high education, urban household registration, high social class and more open concept of fertility, it may also derive from labor-related fertility dilemmas such as increased fertility opportunity costs, pressure to survive in the workplace and pressure from family care due to participation in market labor. To explore the influence of labor participation on the fertility behavior of professional women, the selection effect must be separated to get the true causality.

The selection effect refers to the fact that a woman's personal characteristics affect not only whether she becomes a professional woman, but also a woman's fertility behavior. This leads to the non-random allocation of intervention variables, that is, the parameter estimation bias in the analysis model of the impact of "participation in work" on "female fertility behavior".

Woodridge (2002: 255) uses one case to illustrate the problem of selection effects. When discussing the effect of individual drinking behavior on income, He emphasized that there may be some individual characteristics that not only determine whether an individual drinks or not, but also affect an individual's income level.

These results are in accordance with other recent evidence (Zhou H. 2015; Liang T.2020) which also reached a similar interpretation on migration fertility and the influence of premarital cohabitation based on the Heckman model. Therefore, The design of this study includes the use of the Heckman model to test whether there is a selection effect in the number of children ever born to professional women and the number of children they hope to have, and using propensity score matching method to analyze the true impact of labor participation on fertility intention and fertility behavior on the basis of controlling the selection effect.

Conclusions and Recommendations

This article is based on the 2015 China General Social Survey data, uses the propensity score matching method of the counterfactual framework, under the control of confusing variables such as age, education level, household registration, family income, social class and fertility concept, exploring whether the difference in fertility behavior between professional women and non-professional women has a selection effect and whether the increase in labor participation rate reduces women's fertility behavior.

The Heckman model test results show that there is a selection effect in the number of children ever born to professional women, however, the test results of the selection effect of the number of hoped children are not significant. Combined with the test of propensity score matching balance and the average treatment effect, it is concluded that labor participation reduces the fertility behavior of professional women, but it has no significant impact on fertility intention. Specifically, the number of children ever born to professional women after matching is still significantly lower than that of non-professional women, hope the number of children born is not significant between the two groups. From another perspective, the low-fertility behavior of professional women under the undifferentiated fertility intention confirms the existence of the fertility dilemma of professional women.

It can be explained that the cost and utility trade-offs and the imbalance between work and family caused by participating in work may have become inhibitors of professional women's fertility, it is necessary to explore how to alleviate the fertility dilemma of professional women from social support, family support and standard employment environment in the context of "encouraging birth according to policy", and promote the improvement of fertility.

It is proposed that a family policy to encourage childbearing should be established in three aspects, including cash and tax subsidies for maternity benefits, a work-family conflict balance mechanism, child care and child development service systems, in order to promote the long-term balanced development of the population.

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