

Impact of the Number of Siblings on Income Levels—Based on CFPS Microdata

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Abstract

Based on the CFPS micro database, the influence direction and degree of the number of brothers and sisters on the income of the sample after adulthood were analyzed, and the heterogeneity between urban and rural areas, between men and women, different marital status and different birth years was analyzed. Studies have shown that the effect of the number of brothers and sisters on the income level after adulthood is significantly negative, that is, with the increase of the number of brothers and sisters owned by individuals, the income level of individuals after adulthood will decrease significantly, and the personal income level will fall by about 1663 yuan per year. The effect of the number of siblings on individual income level is significantly different between urban and rural areas and between samples of different birth years, as follows: for each additional sibling, the reduction of income level in urban areas is 972 yuan more than that in rural areas; the reduction of income level born before the implementation of the one child policy is 1067 yuan more than the after ones. This paper does not find that the influence of the number of brothers and sisters on personal income level is significantly different between men and women and between different marital states. The effect of the number of brothers and sisters on the level of personal income is that more brothers and sisters occupy family resources, reduce the education level of individuals, and disperse the care of parents, which makes the personal health condition worse.

Keywords

Number of Brothers and Sisters Income Level Personal Education Level Personal Health Status

1. Introduction

1.1. Research Background and Significance

In the 1980s, based on a wealth of empirical analysis, Blake (1981) put forward the resource dilution theory, which holds the view that, in the case of limited resources owned by the family, there is a competitive relationship between brothers and sisters, and the increase in the number of brothers and sisters means that less resources are allocated to each child. This is still true and effective in China. When family is a decision-making body, the number of children will affect the investment in children under certain resources. In general, the more children, the less resources invested in each child. The less resources children receive, the worse future development. The income level after adulthood will be affected, so the number of children in the family will affect the income level of the children. Therefore, using previous data and historical experience, this paper analyzes the influence of the number of family children on the achievement of children in the family (measured by personal income level), and takes the number of brothers and sisters as independent variable, to study its influence on dependent variable—personal income level.

1.2. Innovation

Compared with previous literature on growth environments, including the effects of parental traits (such as parents' education) or behavior (such as migrant workers) on the physical and mental health of their children, most of them are samples from the children's bank, or study the impact of growth environment on individual career choice income after adulthood, few studies on growth environment (such as the number of siblings) affecting individual adult income.

As a result, this paper focuses on studying an important factor in personal growth environment—the influence of the number of brothers and sisters on their income level in adulthood, using microdata CFPS samples from adult database data, and paying attention to the relationship between the number of brothers and sisters and personal health status, personal health status and personal income level, thus noting the role of personal education and personal health in the reduction of personal income level by more brothers and sisters. Dependent variables of the study become the income level of individuals in adulthood, and independent variables are an important part of personal growth environment—the number of brothers and sisters.

1.3. Shortcomings

Although there are some innovations in this paper, it is undeniable that there are still many shortcomings in the article. First of all, the research angle of this paper is only one of the factors affecting income level—the number of brothers and sisters, and the analysis is not comprehensive enough. In addition, there are still many defects in the data used. This paper uses only CFPS2010 years of microda-

ta, which is not new enough, and no other database as a supplement, which will reduce the representativeness of the research samples, and the cross-section data is used to compare the differences between individual samples and the factors that cause the differences at the same time point. Without the assistance of tracking data, it is impossible to study and analyze the stability of the conclusions in time trends.

The mechanism analysis in this paper only focuses on the role of individual education and personal self-assessment of health in this causal relationship, ignoring other possible impact mechanisms.

Finally, in the robustness test part of this paper, it is not complete. In the later stage, we can consider choosing appropriate tool variables to avoid endogenous problems, which makes the research results more persuasive.

2. Literature Studies

2.1. Literature Review

Studies on the impact of the number of children in the family have begun early at home and abroad. Moreover, empirical studies have shown that the influence of sibling number on educational achievement is significant and shows that this effect is very large. For example, a study of the effects of the number of brothers and sisters on the number of years of educational was conducted on white Americans, and it was found that after controlling other factors affecting the access to education, each additional sibling reduced the number of years of education by 0.2 years, and this effect is almost equal to the father's education. [Blake \(1981\)](#) in the 1980s, based on a lot of empirical analysis, put forward the "resource dilution theory". The theory holds that in the case of limited resources owned by the family, there is a competitive relationship between brothers and sisters, and the increase in the number of brothers and sisters means that the amount of resources allocated to each child becomes less. In addition, some studies in East Asian society have enriched the "resource dilution theory" by introducing a gender perspective. For example, studies using data from the Taiwan region have found that families tend to invest limited resources in their sons, and that women in their children, especially older women, usually have to sacrifice their access to more education, possibly because of the East Asian tradition of preference for men.

A number of empirical studies have examined the relationship between family size and child achievement. [Lindert \(1977\)](#) noted that, the larger family size makes parents have less time, energy and money to take care of every child, children who grow up in these families will have lower IQ, leave school earlier, lower status and lower wages. [Blake \(1981\)](#), [Sandberg and Rafia \(2014\)](#) studies have confirmed the existence of resource dilution, that is, the reduction of individual available resources will affect individual educational achievements, there is educational crowding effect between brothers and sisters. [Hanushek \(1992\)](#) found there existed a trade-off between child quantity and child quality, which

means more children, lower quality of children. [Lu and Treiman \(2008\)](#) mentioned having more siblings reduces one's education achievement. These studies also found that, in wealthy families, resource dilution theory is much weaker, not even obvious, and the dilution of resources is not only the dilution of material resources, it also includes cultural resources. As a result: when there are more children, on the one hand, parents may need to spend more time working to support their families, Reducing meeting time with children; on the other hand, the average time parents spend with each child may also decline. Both of them causes dilute the cultural resources children get from their parents. Dilution of cultural resources not only affects individual educational achievement, it may also be an important factor affecting other individual achievements.

There are also many studies on the impact of the number of siblings on individual education and health. [Rosenzweig and Zhang \(2009\)](#) found that more siblings cause less access to education; [Ye and Wu \(2011\)](#) mentioned that China's fertility rate continues to decline, showing a decrease in the number of brothers and sisters at the family level, but also affects the composition of brothers and sisters, which in turn affects family investment in children's education. The more brothers and sisters, the lower the number of years of education for women than for men, especially when they have brothers. [Zhang and Xie \(2015\)](#) believed that there is a negative correlation between the number of brothers and sisters and their educational achievements, supporting the "resource dilution theory". It is believed that the increase of brothers and sisters will inhibit the development of children's education. [Nie et al. \(2016\)](#) based on the rural survey data of northwest China, using propensity score matching, found that when there are more siblings, the role of "resource dilution" is more pronounced, as a result, children with two or more siblings are significantly poorer in mental health and academic performance than children with one sibling, explaining the number of brothers and sisters on the personal health of the impact of the "inverted U type". [Zheng and Lu \(2017\)](#) mentioned that there is still gender discrimination in human capital investment of Chinese families, "Having brothers" has a significant negative impact on women's education, and the negative effect mainly exists in the countryside. [Zhong and Dong \(2018\)](#) that siblings have an educational crowding effect on individuals, and there are significant gender differences in this effect.

The literature on the relationship between personal education and income level: [Cao \(2017\)](#) analyzed the influence of school education and family education on individual total income basing on the extended Mingser income equation and CGSS data. It was found that school education and family education had a significant positive effect on individual income, and school education had a higher impact on female income than men. [Yuan and Zhao \(2017\)](#) all pointed out that the increase of education level can significantly increase the level of personal income.

A study of the relationship between personal health and income levels is pre-

sented by Yu (2013) based on panel data from the China Health and Nutrition Survey (CHNS), Hausman-Taylor model, it provides empirical evidence for the important role of healthy human capital in increasing farmers' income. Qian and Chen (2018) based on 812 micro surveys of migrant workers, it turns out that under the premise of controlling individual ability, the return on education for migrant workers is about 2.3 percent; healthy migrant workers are 14.6% higher than unhealthy ones. Deng et al. (2018) used data from China Family Tracking Survey (CFPS) for 2010 and 2012, it is found that good health condition has a significant positive effect on the participation of rural residents in non-agricultural employment and the acquisition of non-agricultural employment income. Wang and Liang (2018) based on the comprehensive survey data of rural economic and social development in western China, and found that health status has a significant impact on farmers' income in ethnic areas, the worse the health status of farmers, their income will be significantly reduced; after considering endogeneity and using instrumental variables, the relationship between farmers' health and income is more prominent. These documents prove that, there is a significant positive correlation between individual health and income levels, the deterioration of personal health will cause the income level to decline.

2.2. Basic Assumptions

Based on the above domestic and foreign literature review and the basic facts and laws of real life, there are two assumptions made in this paper: the more the number of brothers and sisters, the lower the income level of individuals after adulthood. The number of brothers and sisters has a resource dilution effect on the individual, so there are two important components in the mechanism of the effect of the number of brothers and sisters on the level of personal income: the level of education of the individual and the level of physical health of the individual.

3. Data, Models and Results

3.1. Data, Variables

Data (Table 1) used in this paper are mainly from adult data for CFPS2010 years. CFPS2010 year's adult database data is selected because 2010 is a baseline survey, collecting data at three levels: individual, family and community, covering 25 provinces and regions of the country, with a survey scale of 16,000 households, which is highly representative of China's social and economic problems and has strong guidance for social and economic research. Every other year after that, the survey is followed up on the basis of this baseline survey, and the specific data report will be combined with the baseline survey report. Therefore, the 2010 data is more suitable for this paper.

This paper mainly uses the number of individual brothers and sisters in the adult database of 2010, personal education level, income and occupation data, personal age data, indicators to measure the physical health status of individuals,

Table 1. Variable name and explanation.

Variable names and interpretation	
Variable names	Variable interpretation
income	The level of personal income is a comprehensive variable
qb1	how many brothers and sisters are there in total
qb2	how many brothers and sisters living together
eduy	the qb1 of years of education
qp3	Personal health status, the higher the score, the worse the body
feduy	father's years of education
meduy	mother's years of education
qa1age	personal qa1age
Gender	dummy variable, male value 1
Urban	dummy variables for, city value 1

comprehensive variables to measure the educational level of parents, parents' age data, and urban and rural and gender virtual variables data. The number of siblings and personal income data include 31,553 samples. After adding various control variables, there are still 8751 samples, and the sample size is large, which makes the study more representative.

Because this paper studies the effect of the number of brothers and sisters on individual income levels in adulthood, the dependent variable in the study model is the measurement of the income level (income) of the individual, an independent variable is the number of siblings owned by individuals (qb1); control are a range of other factors that may affect dependent variables—personal income levels, including the age (qa1age) of individual *i*, personal occupation (qg601_occu), parents' education (feduy, meduy), parents' age (fage, mage), etc. **Table 2** is a descriptive statistic of the main variables used in the study:

We can see in **Table 2** that the independent variable—the average number of siblings owned by individuals qb1 is 2.93; Dependent variable is the income level of an individual (income). Because parents' education reflect to some extent their time and their ideas, influencing the way they nurture and educate their children, and may affect the child's education, affecting an individual's adult income, so parents' education (feduy, meduy) are also described here. In general, there's an "age wage", in this case, an individual's income level is affected by the age (qa1age) of the individual; a person's occupation (qg601-occu) is closely related to his income level, so the personal age (qa1age) and personal occupation (qg601-occu) are also described here. As the saying goes, "The body is the capital of the revolution", a person's health condition (qp3) can affect a person's work motivation, work intensity and work innovation, it obviously affects personal

income, and the worse the personal health, the lower the level of personal income. Besides, because the traditional concept of “inferiority of men and women” is deeply rooted in Chinese society, women face some gender discrimination in the workplace, their income levels are affected, so the impact of the number of siblings on personal income levels will be examined by sex. China has a long history of urban-rural dual structure, and there is a wide gap between urban and rural economic conditions, residents’ perceptions and educational levels. The factors that affect personal income levels vary widely, therefore, this paper will also analyze the impact of the number of brothers and sisters on personal income level.

Table 2. Summary statistics.

Variable	Obs	Mean	Std.Dev.	Min	Max
income	31,553	10,141	20,228	0	800,000
qb1	31,553	2.933	1.923	0	15
qb2	31,553	-0.599	2.392	-8	10
feduy	12,638	5.265	4.591	0	22
meduy	15,798	2.896	4.044	0	22
fparty	24,670	3.557	1.043	1	4
mparty	25,158	3.918	0.448	1	4
eduy	31,543	6.049	4.948	0	22
qaly_best	31,553	1963	19.12	-9	1994
qalage	31,553	46.81	15.57	16	110
qg601_occu	31,553	6730	18,414	-8	90,000
qp3	31,553	1.846	1.043	-8	5
urban	31,553	0.46	0.498	0	1
gender	31,553	0.484	0.5	0	1
qe1	31,553	2.126	0.83	-8	5
mar	31,553	0.914	0.28	0	1
timedum	31,553	0.873	0.333	0	1
qb1_time	31,553	2.753	2.072	0	15
qb1_urban	31,553	1.261	1.895	0	12
qb1_gender	31,553	1.38	1.957	0	15
qb1_mar	31,553	2.808	2.018	0	15

Note: qb1_time = qb1*timedum, qb1_urban1 = qb1*urban, qb1_gender = qb1*gender, qb1_mar = qb1*mar.

3.2. Chart Presentation

First of all, we look at the scatter plot between the income level of each sample and the number **Figure 1** brothers and sisters we have. Through the observation of the scatter plot above, we find that the more brothers and sisters individuals have, the lower the income level in adulthood.

3.3. Metrological Models

To test whether there is a true and robust causal relationship between them, this paper uses a sample of the CFPS2010 year adult database to verify the initial hypothesis—the higher the number of brothers and sisters, the lower the income level. The measurement model of this paper is as follows:

$$y_i = \beta_0 + \beta_1 * x_i + \beta_3 * \text{control}_i + \varepsilon_i$$

where i is the individual sample; the dependent variable is the y , X is the independent variable that represents the measurement of income levels (income) of individuals, representing the number of siblings owned by individual i (qb1); control_i is a range of other factors that may affect dependent variables, including parental years of education (feduy, meduy), personal age (qalage), personal occupation (qg601_occu), etc. β_1 Is our most concerned coefficient, measuring the impact direction and degree of the number of brothers and sisters to adult income level.

Here's the idea: $\beta_1 < 0$, the personal income level (income) will decrease with the increase of the number of brothers and sisters (qb1), the more brothers and sisters, the lower the personal income level. This is realistic and reasonable. In general, the more brothers and sisters in the family, the less resources and less educational resources individuals can receive. Under the realistic background of “attaching importance to academic qualifications” in Chinese society, the income level is naturally lower than the smaller number of siblings.

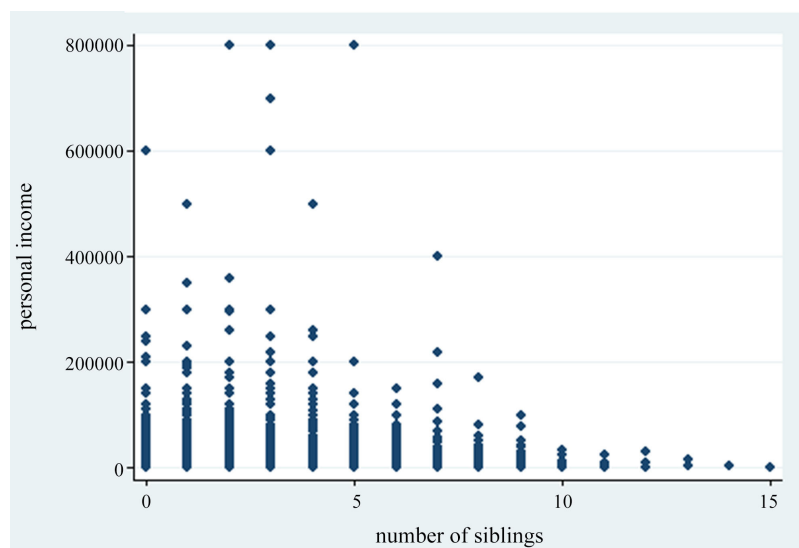


Figure 1. Scatter plot.

3.4. Empirical Findings

In column 1 of **Table 3**, we saw that the estimated coefficient between the number of siblings (qb1) and the income level (income) was significantly negative and passes the 1% significance level test, indicating that the more siblings the individual had, the lower the income level of the individual after adulthood. This is the basic result of the linear measurement model in this paper. At this time, there are no other factors that may affect the income level, such as parents' education level, personal occupation, marital status and so on.

The second column is to investigate the influence of the number of brothers and sisters on the level of personal income on the basis of adding multiple levels of control variables. The estimated coefficient qb1 the core independent variable is still significantly negative.

4. Robustness Test

Next, this paper examines the robustness of the effect that the increase in the number of siblings will reduce the level of personal income.

4.1. Other Measurements of Independent Variable

The number of brothers and sisters (qb1) is replaced by the number of brothers and sisters who live together (qb2). We can see that in column 1 of **Table 4**, the coefficient of qb2 is less than 0, and the significant level test of 1% is passes.

Table 3. Siblings and income.

	(1)	(2)
	income	income
qb1	-1.1e+03*** -56.45	-1.7e+03*** -143.846
feduy		360.692*** -62.958
meduy		297.692*** -87.124
fparty		-657.686** -244.985
mparty		-1.00E+03 -580.368
qg601_occu		0.167*** -0.014
qalage		285.018*** -23.009
_cons	1.3e+04*** -222.431	8300.464*** -2220.795
N	31553	8751

Table 4. Robustness test.

	(1)	(2)	(3)
	income	income	income
qb2	−643.519*** (85.593)		
qb1		−1.9e+03*** (196.235)	−1.3e+03*** (222.747)
feduy	398.291*** (63.591)	350.682*** (73.180)	262.985** (84.059)
meduy	301.173*** (88.541)	267.738* (108.432)	167.554 (144.859)
fparty	−674.641** (245.615)	−1.2e+03* (469.891)	−1.4e+03* (624.515)
mparty	−1.1e+03 (580.552)	−594.319 (713.147)	−796.437 (982.334)
qg601_occu	0.176*** (0.014)	0.130*** (0.012)	0.123*** (0.011)
qalage	172.636*** (19.446)	946.961*** (64.012)	765.292*** (75.557)
_cons	7866.619*** (2224.098)	−7.3e+03* (3344.842)	−1.4e+03 (4242.106)
<i>N</i>	8751	4346	3164

4.2. Sample Adjustment

Because this paper uses 2010 data, which belongs to cross-sectional data, it is difficult to avoid the problem of heteroscedasticity. Therefore, after considering the heteroscedasticity of the sample, **Table 4** is observed again after the sample is adjusted, including the deletion of sample before 1978 and the only child sample. Here is why these two adjustments are made to the sample and why 1978 is chosen instead of other years. First of all, China implemented the policy of reform and opening up in 1978. After that, the income level of Chinese residents increased significantly, and the income level of individuals may rise by leaps and bounds, which makes the research results unstable. Therefore, this paper limits the sample to the group which born after 1978. In addition, because this paper studies the effect of the number of brothers and sisters on the level of personal income, the previous result is to consider the whole sample, and only consider the situation of having brothers and sisters, that is non-only child samples.

Column 2: the samples were all samples born after 1978, we found that the qb1's influence coefficient remains significantly negative. Column 3: for non-only children, the more brothers and sisters they have, the lower the income level of the sample.

Through the addition **Table 3** multiple levels of control variables and **Table 4** in column 2 above to replace independent variables, sample adjustment, this paper finds that the effect of sibling number on personal income level is always significantly negative. Therefore, we can say that more siblings have a lower effect on the income level of the sample, and this effect is robust.

5. Mechanism Analysis

We already know that the influence of the number of brothers and sisters on the income level of the sample is negative and significant, and after adding controlling variables and replacing other indexes on the basis of heteroscedasticity, adjusting the sample, the results are still significant, which shows the robustness of the research results. Next this article carries on the mechanism analysis, trying to find out the mechanism of how the number of brothers and sisters influence the personal income. Based on the research and study of previous literature, the hypothesis of influence mechanism proposed in this paper includes individual education level and personal health level.

5.1. Education Mechanisms

First of all, we look at the role that individual education plays in this impact, specifically in **Table 5**:

Table 5. Education mechanisms.

	(1)	(2)	(3)	(4)
	eduy	income	income	income
qb1	−0.576*** (0.030)		−377.850*** (52.634)	−1.1e+03*** (136.295)
eduy		1194.245*** (57.798)	1231.067*** (29.225)	1129.443*** (57.536)
feduy	0.249*** (0.011)	100.430 (61.591)		85.001 (61.295)
meduy	0.242*** (0.012)	77.514 (86.670)		27.201 (87.578)
fparty	−0.300*** (0.038)	−313.519 (237.392)		−315.830 (236.971)
mparty	−0.352*** (0.076)	−785.518 (569.302)		−686.047 (568.670)
qg601_occu		0.151*** (0.013)		0.145*** (0.013)
qalage		217.595*** (19.696)		291.090*** (22.504)
_cons	9.465*** (0.335)	−2.5e+03 (2244.277)	3802.256*** (209.463)	−2.2e+03 (2242.596)
N	8750	8750	31543	8750

The first dependent variable of the analysis in **Table 5** is the individual education level (eduy), and the influence of the number of brothers and sisters on the individual education level is investigated. According to the “resource dilution theory”, the more brothers and sisters owned by individuals, and because of the competitive relationship between brothers and sisters, the resources available to everyone will be reduced when the resources is limited. This naturally includes educational resources. **Zhong and Dong (2018)** believe that siblings have crowding effect on individuals, and there are significant gender differences in this effect. That is to say, more siblings will reduce the number of years of education and educational achievements of individuals, more obvious for female samples, supporting the “resource dilution theory”. When we observe column 1 in **Table 5**, we find that the coefficient of qb1 is significantly negative, which shows that the more brothers and sisters, the lower the educational years of individuals, which accords with the theory of resource dilution.

Income is the dependent variable in column 2. Here we examine the relationship between the eduy of individual years of education and income level. **Fang and Huang (2017)** found that the educational years, working experience and wage level of the floating population are positively correlated, using CHIP data and basing on the Mingser equation; **Yuan and Zhao (2017)** found that the increase of educational years had a significant positive effect on income level. These documents prove that, the increase in the number of years of education will increase the income level of individuals, and in column 2, eduy’s coefficient is significantly positive, that is to say the higher the individual’s education, the higher the income. There is a positive relationship between income levels and years of education, it is consistent with many previous literature conclusions. It is easy to understand in today’s Chinese society, because today’s society values education, in general, higher education, higher income.

Column 3 is without any control variables, after observing the years of personal education, here we want to observe how the influence of the number of brothers and sisters on the level of personal income changes. Contrast **Table 3** column 1, we found out, although the qb1 coefficients in column 3 remain significant, however, both the absolute and significant levels of the estimated coefficients decreased (from 1053 to 378, t absolute value decreased from 18.7 to 7.2), at this time, the influence coefficient of individual education years is also significant.

The column 4 is to observe how the influence of the number of brothers and sisters on the level of personal income changes after adding many controlling variables and individual years of education. We found out, although the qb1 coefficient remains significant, however, both the absolute and significant levels of the estimated coefficients decreased (from 1662 to 1066, t value dropped from 11.6 to 7.8), and the influence coefficient of individual education years is also significant. That means, the number of years of education (eduy) is the influence mechanism of the number of brothers and sisters (qb1) on the decrease of per-

sonal income level (income). So one of the mechanisms by which the number of siblings that individuals own affects income levels is: the more siblings they have, according to the “resource dilution theory”, the lower the individual’s education, relatively low competitiveness in the job market, income levels will also decrease.

5.2. Health Status Mechanisms

Followed by a study of the role of individual health status, specifically in **Table 6**:

Observing **Table 6**, in column 1 dependent variable is the self-assessment of his own physical health, here we investigate the effects of the number of brothers and sisters on the physical health of individuals. In CFPS data, if a person thinks he is very healthy, the score is 1, if he thinks he is in very bad health, the score is 5; that is to say, the higher the score of qp3, the worse the self-rated physical condition. According to the “resource dilution theory”, the individual’s brothers and sisters will compete with the individual, which reduces the resources available, in addition to specific financial resources, it also includes time

Table 6. Health status mechanisms.

□	(1)	(2)	(3)	(4)
	qp3	income	income	income
qb1	0.014 [*] (0.006)		−921.291 ^{***} (56.759)	−1.6e+03 ^{***} (143.350)
qp3		−1.4e+03 ^{***} (248.895)	−2.0e+03 ^{***} (85.580)	−1.4e+03 ^{***} (247.966)
feduy	−0.007 ^{**} (0.002)	401.762 ^{***} (64.123)		352.188 ^{***} (63.193)
meduy	−0.003 (0.002)	397.466 ^{***} (86.142)		292.666 ^{***} (87.271)
fparty		−676.672 ^{**} (246.367)		−649.251 ^{**} (245.285)
mparty		−1.2e+03 [*] (579.937)		(577.489)
qg601_occu	−0.000 [*] (0.000)	0.178 ^{***} (0.014)		0.167 ^{***} (0.014)
qalage	0.019 ^{***} (0.001)	195.673 ^{***} (21.041)		312.466 ^{***} (24.296)
_cons	0.932 ^{***} (0.031)	9991.234 ^{***} (2289.815)	1.6e+04 ^{***} (279.156)	9453.550 ^{***} (2276.623)
<i>N</i>	10457	8751	31553	8751

with parents and implicit care from parents. First, More siblings, with limited family resources, will reduce nutritional and medical resources available to individuals, and malnutrition and lack of access to health care may occur. Besides, previous literature has shown that parents going out have adverse effects on their mental and physical health. [Zhu \(2016\)](#) found that, the absence of parents in the growing period (0 - 12 years old) had a significant negative effect on their social interaction after adulthood. This shows a reduction in time spent with and caring for parents, will cause physical and psychological deterioration, and individual self-rated health status qp3 scores will rise. [Zhao \(2017\)](#) found that on the basis of excluding endogenous problems through tool variable method, compared to other rural children, left-behind children with both parents are at greater risk of illness and overweight. In column 1, the coefficient of qb1 is significantly positive, which shows that the more siblings, the worse the health status of personal self-assessment, which is consistent with the previous relevant literature conclusions.

Income is the dependent variable in column 2. Here we examine the relationship between individual health status qp3 and income levels. Based on panel data from China Health and Nutrition Survey (CHNS), it is found that higher height can increase farmers' agricultural income. [Qian and Chen \(2018\)](#) based on 812 micro surveys on migrant workers, found that under the premise of controlling individual abilities, migrant workers with good health are 14.6% higher than those with poor health. [Deng et al. \(2018\)](#) used data from China Family Tracking Survey (CFPS) for 2010 and 2012. It is found that good health condition has a significant positive effect on the level of income such as rural residents in China. These documents all prove that there is a significant positive relationship between individual health status and income level, the deterioration of health can lead to lower income levels. The higher the qp3 score in the CFPS data, the worse the personal health. The coefficient of qp3 remains significantly negative in column 2 of [Table 6](#), which indicates that the higher the qp3 score, the worse the personal health, the lower the personal income level, which is consistent with many previous literature conclusions. This can also be understood in the real society, because the worse a person's self-rated health, the lower the enthusiasm for work and innovation, the lower the ability to work, and the lower the income level.

Column 3 is without any control variables, after adding the qp3 of personal self-assessment of health, we want to observe how the influence of the number of brothers and sisters on the level of personal income changes. We found out, although the qb1 coefficients in column 3 remain significant, however, both the absolute and significant levels of the estimated coefficients decreased (from 1053 to 921, t absolute value decreased from 18.7 to 16.2), and the coefficient of personal health (qp3) is also significant.

Column 4 is the addition of a number of control variables to the individual self-rated health status qp3, we observe how the influence of the number of brothers and sisters on personal income level changes. We found out that al-

though the coefficient of qb1 in column 4 remains significant, however, both the absolute and significant levels of the estimated coefficients decreased (from 1662 to 1646, the absolute value was reduced from 11.6 to 11.4), and the coefficient of personal health (qp3) is also significant. That means, the qp3 of personal self-assessment of health status is the influence mechanism of the number of brothers and sisters (qb1) on the decrease of personal income level (income). Therefore, the second mechanism of the influence of the number of brothers and sisters owned by individuals on the income level is: the more brothers and sisters owned, according to the “resource dilution theory”, the worse health is, and work capacity is affected, income levels will also decrease.

6. Heterogeneity Analysis

Given the traditional concept of “inferiority of men and women” and the reality of the large gap between urban and rural areas, there may be significant differences in the effect of the number of brothers and sisters on the reduction of personal income levels between urban and rural areas and between men and women and different marital states. Therefore, this paper carries on the heterogeneity analysis, the result is in **Table 7**.

qb1_urban1 is the intersection of the qb1 and urban and rural dummy variable, qb1_gender is the intersection of qb1 and gender dummy variable, qe1 is an investigation into a person’s marital status, Unmarried equaling 1, mar is a dummy variable of marriage, if the qe1 is 1, mar equaling 0. qb1_mar is the intersection of qb1 and marriage dummy variable, timedum is the dummy variable of whether an individual was born before the implementation of the one child policy, if the person was born before 1982, timedum equaling 1, qb1_time is the intersection of qb1 and timedum dummy variable.

Since the “five-year plan” in the early days of the founding of the People’s Republic of China, the phenomenon of the transfer of resources from rural areas to cities has persisted for a long time, which is a “natural deficiency” in rural areas. The coefficient of qb1_urban in column 1 of **Table 7** is significantly negative. In CFPS data, the urban sample value is 1, the rural sample value is 0, the qb1_urban is significantly negative, which indicates that there are significant differences between urban and rural areas in the influence of the number of brothers and sisters on personal income level. This is only absolute data, not a comparison of relative growth rates.

Zheng & Lu (2017) found that gender discrimination still exists in the current investment of human capital of families, and having brothers is unfavorable to women. Therefore, we should analyze the influence of the number of brothers and sisters on personal income level. According to **Table 7**, we see that the coefficient of qb1_gender is not significant. In the CFPS data, the male sample value is 1, the female sample value is 0, the coefficient of qb1_gender is not significant, which indicates that there is no significant difference between the number of brothers and sisters on the level of personal income between different genders.

Table 7. Heterogeneity analysis.

	(1)	(2)	(3)	(4)
	income	income	income	income
qb1	−972.920*** (143.211)	−1.5e+03*** (169.130)	−1.3e+03*** (268.166)	−716.410*** (213.476)
qb1_urban	−993.849*** (236.864)			
urban	7305.020*** (751.171)			
qb1_gender		326.009 (234.196)		
gender		6144.872*** (735.821)		
qb1_mar			−457.184 (298.318)	
mar			2843.799*** (827.393)	
qb1_time				−1.1e+03*** (264.159)
timedum				7059.981*** (921.729)
feduy	305.682*** (63.161)	366.320*** (62.107)	361.676*** (62.991)	359.701*** (62.638)
meduy	146.833 (85.576)	356.424*** (87.679)	314.105*** (86.602)	342.046*** (88.394)
fparty	−540.794* (240.981)	−599.705* (241.095)	−654.713** (244.828)	−610.265* (242.101)
mparty	−893.441 (577.204)	−911.397 (574.528)	−1.1e+03 (579.821)	−1.0e+03 (576.979)
qg601_occu	0.154*** (0.014)	0.153*** (0.013)	0.167*** (0.014)	0.163*** (0.014)
qalage	233.529*** (24.000)	271.249*** (22.600)	236.898*** (27.738)	99.374** (36.869)
qb1_mar			−457.184 (298.318)	
mar			2843.799*** (827.393)	
_cons	6001.607** (2192.337)	4169.369 (2263.837)	7832.851*** (2295.681)	9109.277*** (2234.468)
N	8751	8751	8751	8751

Wang and Li (2016) used the data of China Health and Nutrition Survey (CHNS) from 1989 to 2009 to find that the wage level of married men is significantly higher than that of unmarried men after controlling for the relevant characteristic variables, which indicates that different marital status has an impact on the income level. Yuan and Xiong (2017) based on the 2013 China Social Comprehensive Survey data (CGSS), found that marriage did have an impact on the wages of male employees, and showed that marriage had a positive premium effect on male employees.

Therefore, we then analyze the influence of the number of brothers and sisters on personal income level in different marital states. With the CFPS data of 2010, the virtual variable generated the marital status variable *mar* is based on *qe1* in this paper and the value is 1 when the sample is married, and 0 when unmarried. In column 3 of Table 7, we see that the coefficient of the married virtual variable is greater than 0, and passes the 1% significance level test, which is consistent with the previous literature research results, and the income of the married sample is significantly higher than that of the unmarried sample. In addition, the coefficient *qb1_mar* the number of brothers and sisters is less than 0, but not significant, which indicates that the influence of the number of brothers and sisters on the level of personal income has no significant difference in the sample of different marital status.

Since China implemented one child policy in 1982, the rate of birth of China's population changed significantly, and the number of brothers and sisters owned by individuals decreased after the implementation of one child policy. Therefore, this paper then analyzes whether the policy affect the influence of the number of brothers and sisters on personal income. With the CFPS data of 2010, this paper generates variables according *qaly_best*, the year of birth of the sample time-dum, If the sample is born before the implementation of the one child policy, the *timedum* value is 1, whereas the value is 0. The coefficient of *qb1_time* in column 4 is less than 0 and passes the 1% significance level test. This shows that the number of brothers and sisters has a significant difference in the income level of between the sample born before and after the one child policy, and this effect has a greater impact on the sample born before 1982. The specific performance is: add a sibling, the income level of the sample born before 1982 is 1067 yuan more than that of the sample born after 1982.

Urban dummy variable coefficient is positive, which is also in line with the reality of china—the average income level in urban areas is higher than that in rural areas; with the development of the times, the income of the sample born after one child policy naturally rises with the overall level of Chinese economy, so the time dummy variable coefficient is positive; gender dummy variable coefficient is positive because male's income is generally higher than that of women in real life; marriage dummy variable coefficient is positive, consistent with previous research conclusions, Yuan and Xiong (2017) think there is a marriage premium in the market.

In column 1, coefficient of intersection of *qb1* and urban dummy variable is

negative, indicating that the income level of the sample in urban areas is more affected by the number of compatriots than the sample in rural areas. The reasons for this may be: because the sample in rural areas can originally receive few resources, the increase in the number of brothers and sisters will cause less dilution of individual samples, and the decrease in income level will be smaller; but the urban area has more resources, increases a sibling, for the individual sample, dilution effect is bigger, the income level reduction will also be bigger, this can also be understood as the “marginal utility” of the number of siblings to the level of personal income in urban areas is bigger.

The coefficient of $qb1$ and time dummy variable is negative, indicating that the income level of the sample born before the one child policy is more affected by the number of brothers and sisters than after ones. This analysis may be due to the fact that, before the implementation of the one child policy, the number of children in the family is larger, besides the care of parents, the different and low level of parental attention to each child, the low level of parental care and actual survival resources, development resources (educational resources) available to each child, and the low level of personal education, finally causing lower income level. In contrast, the number of children born after the one child policy, even if not the only child, is not large, parents have enough energy to take good care of the healthy growth of the children, and can provide the children with relatively more resources for survival and development, so leading to higher income level.

On the other hand, the effect of the increase in the number of brothers and sisters on the reduction of personal income levels is not significantly different between gender and marital status may be due to:

1) As a result of traditional Chinese patriarchal attitudes and ideas, there is still gender discrimination in the workplace, men's income level is higher than that of women, and when a sibling is added, women's access to education, access to nutrition which can meet their own needs will be reduced, so women will be more likely to lower their income than men. The absolute amount of male income is larger than that of women, the proportion of income reduction is lower than that of women, and the two forces resist each other, which shows that there is no significant gender difference in the influence of the number of brothers and sisters on the level of personal income. Therefore, this paper believes that when analyzing whether there are differences in the influence of the number of compatriots on the income level of men and women, we should use a comparison between the relative proportion rather than the direct absolute amount of change. However, due to limited personal capacity and 1-year panel data, this is not verified here, which is a major deficiency of this paper.

2) Although according to Wang and Li (2016), marriage makes individuals more responsible and thus works actively to raise their income levels, however, this paper argues that marriage represents not only a combination of two individuals, but also a combination of two families. Under the influence of one child policy, a couple usually needs to support four or eight elderly people, plus one or

two children. This burden is not only reflected in the increase of financial expenditure, but also in the increase of time to accompany elders and children. In this way, the time spent on improving their working skills will be reduced, and the heavy burden will affect physical and mental health, further reduce work efficiency and income levels, and form a vicious circle. Therefore, even if marriage enhances personal responsibility, the two roles counteract each other for family reasons, and finally show that the influence of number of brothers and sisters on income level has no significant difference between people in different marital states.

7. Conclusions and Recommendations

7.1. Conclusions

Based on the micro database of CFPS2010 years, this paper analyzes the influence and degree of the number of brothers and sisters on the income level after adulthood, and analyzes whether there are significant differences between men and women, urban and rural areas and different marital status samples. The study shows that the influence of the number of brothers and sisters on the income level after adulthood is significantly negative, that is, with the increase of the number of brothers and sisters owned by individuals, the income level of individuals will decrease significantly after adulthood, and the personal income level will drop about 1667 yuan per year for each additional sibling. Moreover, the influence of the number of brothers and sisters on the level of personal income is significantly different between urban and rural areas and between the samples before and after the implementation of one child policy. The income level of urban samples is more affected by the number of brothers and sisters than in rural areas. However, there is no significant difference between gender and marital status, that is, the effect of the number of siblings on the income level of male and female samples is not significantly different; that is, the number of siblings on income levels has no significant difference married and unmarried samples.

In the analysis of influence mechanism, this paper focuses on the role of education level and personal self-assessment health status in the process of influencing the income level of siblings. The specific transmission mechanism is: according to the “resource dilution theory”, the resources of a family are limited, whether economic resources or time resources; adding a sibling, the number of resources available to individuals will be reduced, resources including not only specific financial resources, but also invisible time with parents and parental care, etc.; the reduction of financial resources will reduce the maximum educational years available to individuals, and also reduce the number and probability of individuals receiving nutrition and medical resources, so as to increase the likelihood of individual malnutrition and illness. According to the “theory of educational return”, which has a positive correlation between education level and income, the decrease of education level will reduce the income level. The re-

ality and previous literature have also proved that there is a positive correlation between health quality and income level, and the deterioration of health condition will reduce income level. As a result, the number of brothers and sisters increased, and the income level of individuals after adulthood decreased. Moreover, after controlling for many other factors that may affect the income level of the sample, this paper finds that education level and personal self-assessment health status do play a role in the influence of the number of brothers and sisters on the income level. The decrease of the number of brothers and sisters on the personal income level is the common result of the decline of personal education and the deterioration of personal health.

The innovation of this paper is that domestic research on the influence of brothers and sisters few takes into account the role of personal health in the reduction of the number of brothers and sisters on the level of personal income. In the further analysis of this paper, the study finds that there are significant differences between urban and rural areas, between gender and marital status, and explains that: 1) the traditional Chinese patriarchal concept and gender discrimination in the workplace make the income level of men higher than that of women, and in the same increase of a sibling, women will lower their income than men. The two forces resist each other, and finally show that there is no significant gender difference in the influence of the number of brothers and sisters on the level of personal income. 2) Marriage enhances the sense of personal responsibility, but for family reasons, the two roles counteract each other, and ultimately show that there is no significant difference in the effect of the number of brothers and sisters on the income level among people in different marital states.

Based on the micro-family perspective, this paper finds that there is a significant negative causal relationship between the number of siblings owned by individuals and the income level. In China, the implementation of the “two-child policy” has a great impact on China’s population development, and can alleviate the pressure on China because of the “aging society” in the present era. However, at the micro level, the implementation of the “two-child policy” may increase the number of children in the family, dilute the inherent resources of the family, and is not conducive to the individual receiving more and better education and personal physical and mental health growth. In order to achieve the goal of better and faster economic development, it is necessary to coordinate the relationship between population growth and economic growth, and to treat population growth and development rationally.

7.2. Recommendations

In order to improve the level of personal income at the micro level and promote the healthy development of China’s economy, this paper suggests strengthening the following aspects:

- 1) Strengthen gender equality education and reduce the impact of traditional

ideas.

Based on the phenomenon of patriarchal preference and gender discrimination in the workplace, this paper suggests that we should strengthen the propaganda and education of equality between men and women, and reduce the traditional concept of “inferiority of men and women” and the discrimination against women in the modern workplace.

2) Government should increase support in rural areas and narrow the gap between urban and rural areas.

Based on the result that the influence of family brothers and sisters on personal income varies greatly between urban and rural areas, this paper suggests that we should increase the support to rural areas and improve the level of economic development in rural areas. The gap between rural families and urban families is narrowed, thus making the “dilution effect” of siblings on family resources smaller between urban and rural areas.

3) Government should increase investment in education, increase the density and intensity of education subsidies.

In order to better play the role of “improving the level of education” in raising the level of personal income, the government should increase investment in education and improve the overall education level of residents. To provide a better channel for education to improve the level of personal income, and basing on the perspective that education can reduce social discrimination against women, develop education can narrow the gender income gap and promote the harmonious development of society.

Increasing the density and intensity of education subsidies can alleviate the situation that individuals cannot receive more and better education because of the increase in the number of brothers and sisters, and promote the better development of individuals at the micro level.

4) Government should pay attention to the physical and mental health of residents and carry out relevant education.

In order to better play the role of “personal health improvement” in improving the level of personal income, the government should pay attention to the physical and mental health of residents and improve the overall health level of residents, to provide a better channel for personal health to improve the level of personal income, and health education for residents is conducive to promoting the harmonious development of society.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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