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Essays on fertility, informal childcare, maternal employment and child health development in China

By

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Abstract

This thesis contains three chapters exploring the female labour force participation in China. The first chapter investigates how fertility influences female labour force participation; the second chapter investigates how grandparents' childcare determines mothers' labour force participation; and the third chapter investigates the relationship between maternal employment in rural China and children's health development. For each chapter, instruments are selected for the endogenous regressors and instrumental variable estimators are adopted. Results from this thesis show that there is a negative relationship between fertility and female labour force participation in China but grandparents' providing childcare can increase mothers' labour force participation, and children in rural China can benefit from their mothers' off-farm work.

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List of abbreviations

The following table describes the abbreviations used through this thesis.

Abbreviation	Meaning
2SLS	Two-Stage Least Squares
CHNS	China Health and Nutrition Survey
CMS	Cooperative Medical System
HAZ	Height-to-age Z scores
IV	Instrument Variable
IV-probit	Instrument Variable Probit
OCP	One Child Policy
OLS	Ordinary Least Squares
WAZ	Weight-to-age Z scores

1. Introduction

1.1 Motivation

China has experienced a high growth rate in the three decades since 1978 and has become the second largest economy in the world. Various studies have paid attention to investigation of China's economic growth and many factors have been identified as contributors to this remarkable performance; for example, technological innovation, educational reforms and their effects on human resource improvement, trade and foreign direct investments and so on (Chen & Feng, 2000; Wang & Yao, 2003). One contributor that has long been considered an important source of rapid development in China is the demographic dividend. It can be seen from Figures 1.1 and 1.2 that both the labour force participation rate and the female labour force participation rate in China are higher than in the other seven developed countries shown.

Rapid population growth during the 1960s and 1970s formed this large base of work force, but also created demographic problems for the nation. Consequently, a unique experiment to control population growth emerged, namely the One Child Policy (OCP). In essence, the policy set a quota for each Han[1] couple and, in general, non-agricultural registered[2] couples were only allowed to have one child. In the literature, a negative relationship between fertility and female labour force participation has been widely shown, meaning that mothers can work more if they

[1] Han is the ethnic majority group in China, which accounts for over 90% of total population.

[2] Non-agricultural registration is one of the two types of registration (Hukou system) in China. Detailed information is provided in Section 2.

have fewer children. However, it seems what has happened in China contradicts this conclusion - as seen in Figure 1.2, the female labour force participation rate in China is decreasing while the fertility rate in China is decreasing, too.

Another indirect consequence of the OCP is "4-2-1" families, in which there are four grandparents, two parents and only one child. This smaller family size, together with the traditional Confucianism culture leads to a strong kinship ties across the generations and it is quite common in China that grandparents look after grandchildren, especially when the grandchildren are young and their mothers go back to work.

Overall, the aim of this thesis is to investigate the factors that influence mothers' labour force participation, and the effect of maternal employment on children's health development. Starting with the OCP, I will first estimate the effect of fertility on female labour force participation, and will then investigate how grandparents' childcare influences mothers' working decisions, and last investigate how mothers in rural China influence children's health development.

1.2 Overview of the thesis

The organisation of this thesis is as follows.

A full description of the data is provided in chapter 2. The China Health and Nutrition Survey (CHNS), used here to create all three chapters of estimation, is a longitudinal survey and a collaborative work carried out by the University of North Carolina at Chapel Hill and the National Institution for Nutrition and Health at the Chinese Centre for Disease Control and Prevention. More features of this dataset, including

the survey design, participating regions and the sample selection method, survey levels, and advantages of these data will be discussed later.

In chapter 3, the background information related to this thesis is introduced. For example, the instruments used in the first estimation of relationship between fertility and female labour force participation are the relaxation of the OCP and the fines imposed; therefore, explanations of the policy itself, explanations of how it has been relaxed and how it is implemented, and explanations of how and why fines are imposed are necessary. In general, six aspects of background information are discussed. These are the household registration system, the family planning policy, the Chinese labour market, the childcare system in China, left behind children and healthcare in rural China.

Chapter 4 is the first estimation, which aims to investigate the effect of fertility on female labour force participation. Considering the endogeneity of fertility, I employed two unique instruments to represent the variations in family size. One is based on the relaxation of the One Child Policy and the other is the fine imposed for one additional unpermitted child. Therefore, two samples are created from CHNS data due to the fact that fine levels data are only available in wave 1989, 1991 and 1993. Using two-stage least squares (2SLS) and instrumental variables probit (IV-probit) estimations, I found that an additional child significantly reduces the mother's likelihood of participating in the labour force by eight percentage points, and this negative influence is more noticeable for women living in rural areas.

A further estimation of the effect of grandparents' childcare on mothers' labour supply is provided in chapter 5 as co-resident with elderly parents are found positively related to female labour force participation in chapter 4. When modelling this relationship, one challenge is that grandparents' childcare could be endogenous due to unobserved factors, such as attitudes on the part of both grandparents and mothers. By creating an instrument that reflects both the availability and capability of grandparents, the two-stage least squares (2SLS) and instrumental variables probit (IV-probit) estimations show that childcare provided by grandparents increases mothers' possibility of labour force participation significantly (by more than 30 percentage points in China), and this positive effect is stronger for mothers living in rural areas.

The direction of estimation in chapter 6 is the opposite to the previous ones, as maternal employment form the variable of interest. The research objective in this estimation is children's health development, so weight-to-age Z scores (WAZ) and height-to-age Z scores (HAZ) created based on children's weight and height are used, and underweight and/or underheight children are identified if their Z score(s) was (were) less than 2. A sample containing children in rural China aged between 0-10 was created, without considering whether the child was living with or without parents in the household. Maternal employment in this estimation, specifically, is mothers' off-farm working status that takes binary values. Moreover, two instruments are selected from the community-level data and one more instrument created according to mothers' own characteristics. Similar to the previous two chapters, instrument estimators were used.

The last chapter presents the conclusions and shortcomings of this thesis.

1.3 Contributions

This thesis provides an innovative analytical and methodological approach around the topics of female labour force participation in China. The contributions of this thesis are threefold.

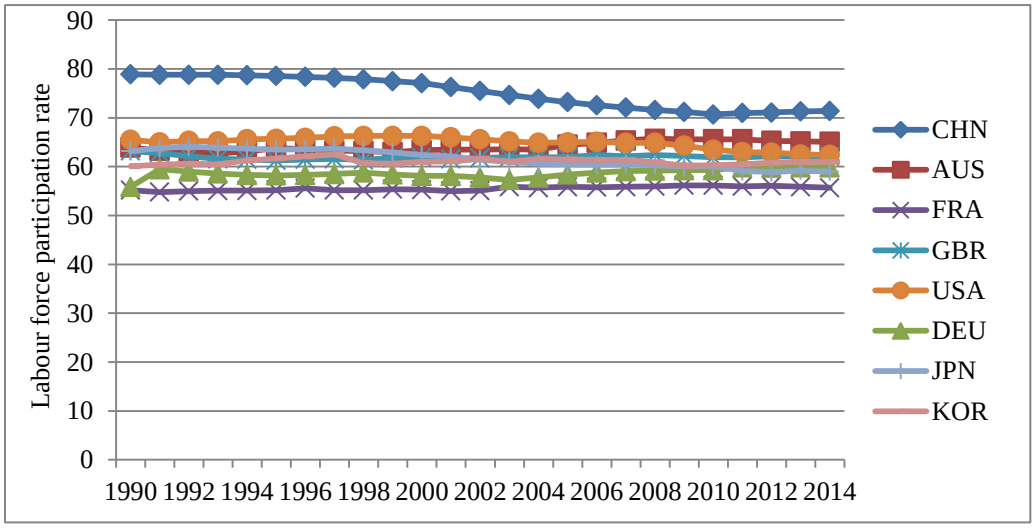
Firstly, the main contribution of this thesis comes from its methodology. Each chapter of estimations has employed different instruments, some are selected from the dataset and some are uniquely created. I believe the instruments in this thesis are advanced comparing with the existing ones in literature. For example, the instrument I created for grandparents' childcare is based on both proximity of grandparents, reflecting the availability, and health conditions of grandparents, reflecting the capability of grandparents. Therefore, the instrumental variable estimators can reveal the causality better.

Secondly, this thesis bridges the gaps of research on female labour force participation in China. Previous research on fertility and female labour force participation in China focuses on either urban or rural areas; this thesis gave the attempt of including both urban and rural areas in the sample. Moreover, this thesis firstly modelled the relationship between grandparents' childcare and female labour force participation in China, and investigated how mothers in rural areas taking off-farm work locally influence children's health development.

Last but not the least, this thesis is the first piece of progressing study that applying the investigations to the same data as well as trying to account an extended story

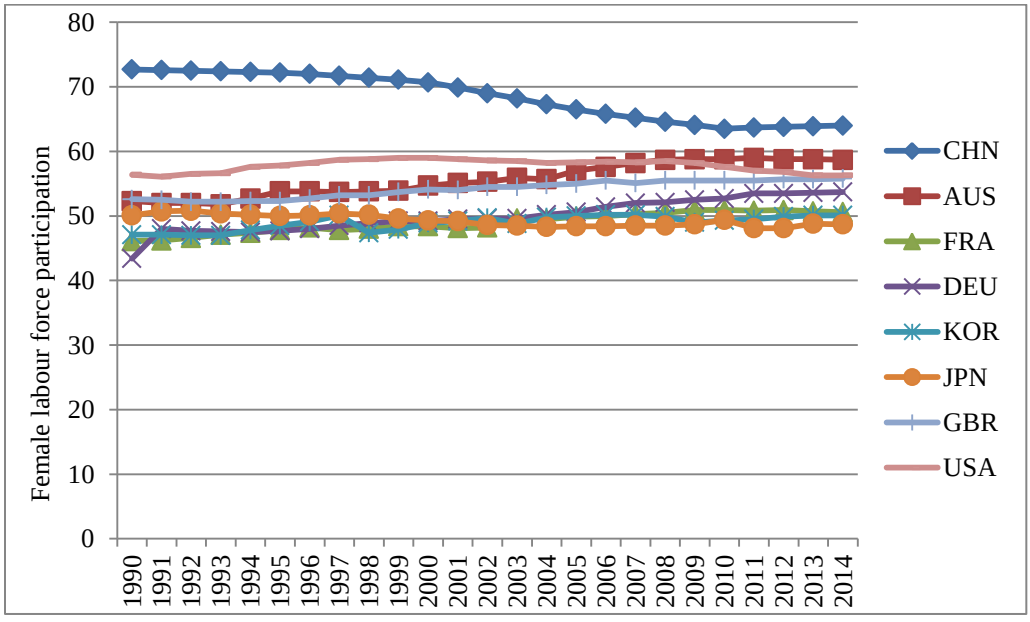
about mothers' labour force participation and about children's health development in China.

Figure 1. 1 The labour force participation rate in China and other seven developed countries



Source: World Bank Data. http://data.worldbank.org/indicator

Figure 1. 2 The female labour force participation rate in China and in seven other developed countries



Source: World Bank Data. http://data.worldbank.org/indicator

2. Data

2.1 CHNS description

The data used in this thesis are from the China Health and Nutrition Survey (CHNS), which is mainly designed to see how the health status of Chinese population has been affected by social and economic transformation after the economic reform. It is an on-going, open cohort and is a collaborative project designed by the Carolina Population Centre at the University of North Carolina and executed by the National Institute of Nutrition and Food Safety at the Chinese Centre of Disease Control and Prevention. In this survey, questionnaires contain different sections including health and physical examinations, diet and nutrition intake, work, time allocation and income, and family planning policy and program implemented by the local and national governments[3].

Initially, eight provinces were covered from the first wave (1989), namely Liaoning, Jiangsu, Shandong, Henan, Hubei, Hunan, Guangxi and Guizhou. In the fourth wave (1997), Heilongjiao replaced Liaoning province and, in the fifth wave (2000), both provinces were included in the survey. In 2011, three direct-controlled municipalities joined the survey and, in the latest completed round of interviews, three more provinces were included[4]. In total, including the newly added households in 2015, there are 7,200

[3] China Health and Nutrition Survey: http://www.cpc.unc.edu/projects/china

[4] Three direct-controlled municipalities are Beijing, Shanghai and Chongqing. Three newly joined provinces are Yunnan, Zhejiang and Shaanxi.

households with over 30,000 individuals. Since the first round of survey in 1989, 10 rounds of data covering over 20 years are available for public use. The subsequent waves were in 1991, 1993, 1997, 2000, 2004, 2006, 2009, 2011 and 2015[5]. In general, households included in the surveys will be followed up, with the exception of families that migrated to other villages, towns or cities that are not included in the survey area.

The samples surveyed in each province were drawn via a multi-stage, random cluster process so that the characteristics of the households and individuals in the sample are sufficient. The steps in the sample selection of CHNS data are as follows: (i) firstly, capital cities and a lower income city in each province are selected; (ii) counties are stratified according to income (high, middle and low), following which four are selected randomly; and (iv) villages and towns within counties and urban/suburban neighbourhoods then are selected randomly.

Figure 2.1 shows the locations of the provinces covered in the survey[6], and Figure 2.2 provides the distribution of ethnic minorities in China[7]. Comparing the two figures, it can be seen that the CHNS data cover households from north to south China and contains a good variety of ethnic groups. This is useful for our study of fertility and female labour force participation, as the ethnic minorities are not targeted by the family planning policy

[5] Wave 2015 is not yet available for use.

[6] Shaded areas in Figure 2.1 are the provinces covered in our sample.

[7] Figure 2.2 is a map of ethnolinguistic groups in China, but it can also be used as a map of ethnic minority distribution. Shaded areas are inhabited by ethnic minorities.

in China; thus, the data can reveal the difference in working patterns affected by fertility of the ethnic majority and minorities.

CHNS questionnaire layouts were redesigned once in wave 2004. Before 2004, survey sections were divided according to the aim of the survey to include household surveys, nutrition surveys, physical examinations, ever married women survey[8] and energy record. Since 2004, survey sections have been divided according to the survey level (although the nutrition survey has been kept separate); therefore, they cover household surveys, individual surveys and community surveys. In general, the questions in the individual surveys have been extracted from the previous household surveys related to individual information, and individual surveys have been further divided into adult surveys and child surveys based on the interviewees' ages. Specifically, the three levels of CHNS are described as follows:

Individual level survey — questions in this part of the survey are about individual details such as education, work and occupation, time allocation, income, physical examinations and health status, as well as marriage, pregnancies and birth histories. The child survey also contains questions about physical activities, body shape and mass media, diet and activity knowledge, and the use of health services. Furthermore, the link between children and their parents is clarified in the child survey by asking children "who is your father and who is your mother". With this information, I can match mother and children.

[8] Ever married women survey is for women age under 52; it also contains questions about pregnancy history and birth history.

Household level survey — questions in this part of survey are mainly about economic activities, household income and the household infrastructure. Specifically, a household roster is first conducted to identify new and returning member(s)[9]. Data about work activities, working income and other income, expenses and assets owned are obtained for all households and for every household member. Total household income is computed in three ways: through responses to direct questions about income, the summation of net receipts from all reported activities and responses to questions about expenditure; all three sections produce the households' gross income and net income.

Community level survey — questions in this survey are answered by knowledgeable community respondents such as local cadres. Community infrastructures such as water, markets and transport, and services such as family planning, health facilities and childcare facilities, as well as other information such as population and prevailing wages are covered in this part of survey. However, the in-depth data collection regarding the family planning policy was discontinued in 1997 and only selected questions have remained in the survey since then. Family planning fine level data are one of the data collections that have been suspended[10].

CHNS is a representative data not only because the provinces it covered vary substantially in geography, public resources and economic development, but also the provinces it covered contain over 40 percent populations in China. Table 2.1 shows the

[9] For new households entering the survey, demographic information will also be recorded.

[10] Partly due to its sensitivity, the original question about specific fines has been replaced by whether local cadres are connected with economic incentives.

population distribution in the whole country as well as the provinces covered in the CHNS, among which Hubei, Hunan, Guangxi and Guizhou are ethnic minorities inhabited while Jiangsu, Shandong and Henan are with Han as majority people. Compared with other datasets, such as the Chinese Population Census data, a frequently used dataset in the research on female labour supply in China, and the National Nutrition and Health Survey (China), another dataset often used in the research on child nutrition and health status, CHNS data have some unique advantages.

The first and also the most important advantage is that CHNS contains richer and wider information. Working status or wage, for example, is not provided in the Population Census data. The CHNS data, on the other hand, contain highly specific information, including whether the interviewee is presently working, the nature of the interviewee's occupation and position in the work unit, the type of work unit, and how much the interviewee earns each month, including normal wages and bonuses. Other information, such as fertility history, time allocation, diet patterns and nutrition, and specific demographic background and inter-generational links to parents is available in the CHNS data.

Secondly, CHNS has considerably better data quality. Collecting information on family planning is a potentially sensitive task in China (Greenhalgh, 1994). Couples, particularly couples from rural households, will become cautious when they are asked about how many children they have due to the tense relationship between the families and the local commission of family planning in the 1990s because of the risk of an unaffordable fine

for those families violating the family planning policy. Three facts about the CHNS data contribute to the better quality: (i) the questionnaires are designed not to be particularly sensitive to certain aspects of family planning; (ii) family planning is only a small part of the entire survey; and (iii) the group of people collecting the data are not from the local family planning commission, thus, they are viewed as nonthreatening with regard to family planning.

Next, the CHNS data are rich in terms of variety. CHNS data have been collected in 10 waves with gaps between two waves of two to four years, while the Chinese Population Census data have only been collected in six rounds since 1953, with intervals of eight or ten years in between. With smaller intervals, CHNS is able to observe more variation and capture different scenarios.

Finally, the CHNS data are easily accessible, as the individual and the household level data are publicly downloadable from the official website and the community-level data are distributed following the completion of a data use agreement.

Because of these merits and the nature of the data, the CHNS has been used in many research areas, such as microeconomics (Chen, 2006; Lee & Malin, 2013; Wang, 2014), labour economics (Li & Liu, 2014), health economics (Chen & Jin, 2012; Huang & Gan, 2015; Qin & Pan, 2015), nutrition (Thompson, Adair, Gordon-Larsen, Zhang, & Popkin, 2015; Xu, Hall, Byles, & Shi, 2015), epidemiology (Jones-Smith, Gordon-Larsen, Siddiqi, & Popkin, 2011; Reynolds, 2012), and so on.

2.2 Usage of CHNS in this thesis

Although CHNS is designed to follow up the households, it is not a strictly panel data set. In wave 1991, individuals only belong to wave 1989 were surveyed but from 1993, new households formed from the sample households who resided in the same areas were added and from 1997, new households formed from the same areas were added. Table 2.2 shows the follow up rate in CHNS data that from 1989 to 2009, 47% of households have been followed up for 8 waves and 39% of households have been followed up for 4-7 waves. Table 2.2 also shows the follow up rate in CHNS data by areas (i.e. rural and urban). Generally, follow up rates are higher in rural areas than in urban areas that 53% of rural households compared to 33% of urban households have been followed up for 8 waves. However, the high follow up rate does not necessarily mean the information about rural households is complete. In the CHNS, some household members, especially working age household members, are not surveyed in the middle wave(s) and may or may not come back afterwards, and the main reason for not living in the household is seeking employment elsewhere.

Basically, the CHNS as well as the sample selected from it are used as pooled cross-sectional data with time (wave) and county (province) effects captured by dummy variables in this thesis. The reasons are twofold. For one hand, follow up rate is the first reason. As discussed above, more than half of households were surveyed less than 8 waves (from wave 1989 to wave 2009) which means there is/are gap(s) for these households. For example, it may be the situation that it has been continuously surveyed

for five times or the situation that it has one or more gaps if a household appears in the data for five waves. For the other hand, missing value of variables is second reason. In CHNS, missing information has been left as blank cells that some can be imputed or replaced, such as missing information on age, education years, household registration type, relationship to household head and gender, while some cannot, such as working status, health status and income. The difficulty of imputing these missing values lies on the fact that there are no clues. For example, individuals with missing value on working status as well as working time and income can be the situation that either the individuals are not working or the information is not recorded properly. Similarly, missing value on annual income cannot be imputed by monthly wage without information on working period. Therefore, during the process of sample selecting, observations are deleted due to the missing values, which further results in gap(s) for households and variation of households across the waves.

The key difference between pooled cross-sectional and panel data is the participants that followed. In pooled cross-sectional data, households are randomly selected in different time periods while in panel data, households are surveyed repeatedly from the first wave. Applying this difference to the samples in this thesis, it is more suitable to use them as pooled cross-sectional rather than panel data due to the difference of households chased by CHNS data as well as the households selected in the samples in each wave.

Table 2. 1 Populations in China (the whole country and provinces in 8 waves from CHNS).

	1990	1991	1993	1997	2000	2004	2006	2009
China whole country	114,333	115,823	118,517	123,626	126,743	129,988	131,448	133,474
Liaoning	3,967	3,990	4,042	4,138	4,184	4,217	4,271	4,319
Heilongjiang	3,543	3,575	3,640	3,751	3,807	3,817	3,823	3,826
Jiangsu	6,767	6,844	6,967	7,148	7,327	7,433	7,550	7,725
Shandong	8,493	8,570	8,642	8,785	8,998	9,180	9,309	9,470
Henan	8,649	8,763	8,949	9,243	9,488	9,717	9,392	9,487
Hubei	5,439	5,512	5,653	5,873	5,960	6,016	5,693	5,720
Hunan	6,128	6,209	6,311	6,465	6,562	6,698	6,342	6,406
Guangxi	4,261	4,324	4,438	4,633	4,750	4,889	4,719	4,856
Guizhou	3,268	3,315	3,409	3,606	3,756	3,904	3,757	3,798
Total population of provinces in CHNS	50,515	51,102	52,051	53,642	54,832	55,871	54,856	55,607
Ratio of population of provinces in CHNS to total population in China	44.18%	44.12%	43.92%	43.39%	43.26%	42.98%	41.73%	41.66%

Note: numbers are in 10,000 people.
Source: National bureau of Statistics of the People's Republic of China.

Table 2. 2 Follow up rate in CHNS data.

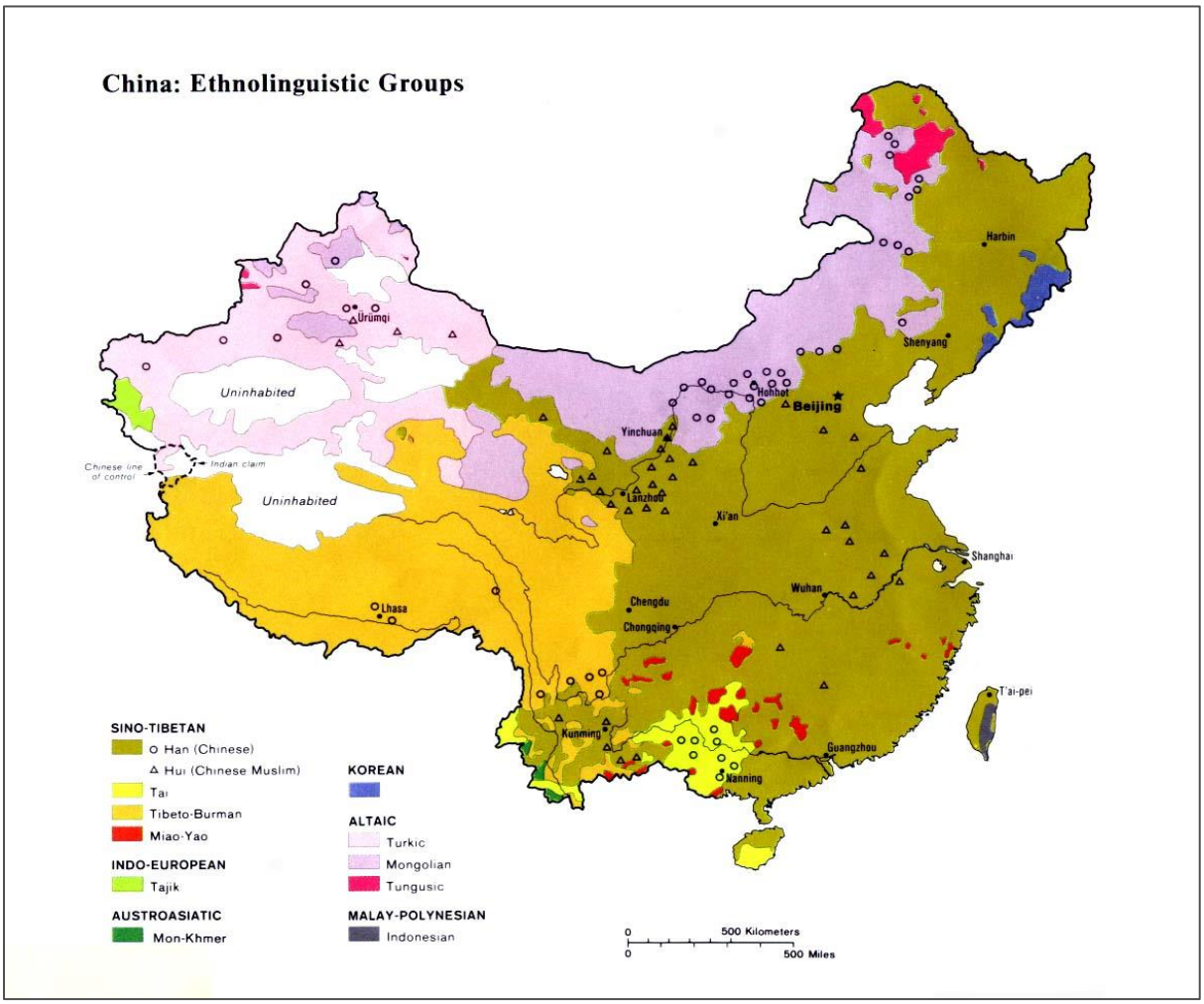
	Whole data		Urban		Rural	
Number of waves	Number of households	%	Number of households	%	Number of households	%
1	929	2.73	533	4.88	396	1.71
2	1,196	3.51	635	5.81	561	2.42
3	2,670	7.83	1,311	11.99	1,359	5.87
4	2,752	8.07	1,180	10.79	1,572	6.79
5	4,470	13.12	1,885	17.24	2,585	11.17
6	1,872	5.49	660	6.04	1,212	5.24
7	4,305	12.63	1,120	10.25	3,185	13.76
8	15,888	46.62	3,608	33.00	12,280	53.05
Total	34,082	100	10,932	100	23,150	100

Figure 2. 1 Regions in China Health and Nutrition Survey

Source: China Health and Nutrition Survey

http://www.cpc.unc.edu/projects/china/about/proj_desc/chinamap_600.jpg/view

Figure 2. 2 Distribution of ethnic minorities in China



Source: map courtesy of University of Texas Libraries,

http://www.lib.utexas.edu/maps/middle_east_and_asia/china_ethnolinguistic_83.jpg.

3. Institutional background

In this section, background information related to this thesis is provided and explained, including the household registration system in China, the family planning policy, the Chinese labour market, the childcare system, left behind child and the rural health care system.

3.1 The household registration (*Hukou*) system in China

The current household registration system (*Hukou*) in China started after the foundation of the People's Republic of China, and was initially designed to segregate the urban and rural populations in geographic terms and to limit rural to urban migration (Chan, 2010). Since 1950, as the newly founded country needed to resume production and enhance industrialisation, strong mechanisms were required to prevent rural exodus because the strategy was to extract agricultural surplus from the peasantry to work in the cities. After some early measures aimed to collect information about population characteristics, a more comprehensive system, namely the household registration system, was introduced in 1958 to control the population's mobility. The Standing Committee of the National People's Congress passed a regulation to provide a legal basis for this registration system (Cheng & Selden, 1994).

Via this registration system, each person in China has an official record of all personal information including gender, date of birth, place of birth, place of origin (father or grandfather's place of birth) and place of residence. It would seem that this identification

document is not significantly different from birth certificates in some developed countries, such as the United Kingdom or the United States, but it actually induced two classes of citizenship in China as the registration type is closely bound to people's social and economic circumstances (Li & Cooney, 1993).

There are two types of household registration, one is rural (or agricultural) and the other is urban (or non-agricultural). Briefly put, the former is for individuals who live in rural areas and mainly depend on working farm land for their household income. The latter is for individuals who live in cities or towns and who are engaged in paid work. People with agricultural registrations were essentially "producers" as they were not allowed to retain or sell agricultural products freely until the agricultural reform that started in the early 1980s. Each household with agricultural registration received food rations and other necessities determined by a local authority called the production team, which usually administrated a few villages, depending on the household's working points that were calculated directly from the household members' work efforts. People with non-agricultural registrations, on the other hand, received daily necessities via the direct allocation of coupons, such as food coupons, oil coupons and cloth coupons, from their work unit or from the government [11] (Potter, 1983). In addition, people with non-agricultural registrations also enjoyed guaranteed job placement, house allocation and social welfare, such as medical services, day-care nursery and children's education,

[11] Before the Chinese economic reform, daily necessities were sold by quota and people needed to provide coupons to buy them; for example, food coupons were for buying rice or flour, egg coupons were for buying eggs, and soap coupons were for buying soap. People with non-agricultural registrations would receive coupons directly from their work units, which were supervised by the government.

maternity leave, unemployment insurance and pensions (Cooney & Li, 1994; Potter, 1983). Moreover, as the first place registered is considered the official place of residence, individuals who wish to have a permanent change of place of residence and/or registration type must obtain the approval of both the original and the destination's administrative authorities, which makes the opportunity for successful transfer extremely limited.

However, the benefits for non-agricultural registration people are connected to a remarkably high opportunity cost in that one may be punished by severe administrative and economic sanctions, which means that some or all benefits will be denied if one violates any regulations or restrictions (Li & Cooney, 1993). For example, in some circumstances, such as violating the family planning policy, both husband and wife will be discharged from their employment.

Although agricultural (rural) people are allocated fewer social resources, they are allowed to have bigger families. The family planning policy in China, which will be discussed below, is implemented based on household registration. The policy relaxation is only applicable to agricultural couples as they need more labour on the farm land, and this applies whether the agricultural couple lives in an urban or a rural area.

One important characteristic of the household registration system is that it is successive. Children's registration follows their parents' registration type when the parents have the same registration and can choose either of the types when parents are registered

differently. If one of the parents transferred his or her registration successfully, the children can also decide to retain or transfer their registrations.

Since the foundation of the People's Republic of China, household management has experienced four stages. The earliest stage was from 1949 to 1957. During that period, there was no proper or strict household registration system, and populations were free to migrate as the Chinese constitution stated that citizens had the right and freedom of residence and migration. The second stage was the strictly controlled period, which lasted for two decades from 1958, and the household registration system is the outcome of this stage. Under the household registration system, less than 0.15% of the population transferred successfully from agricultural registration to non-agricultural registration, as the system aimed to exclude the rural population from access to state-provided goods, welfare and entitlements (Chan, 2010). The third stage, from 1978 to 1994, was the relaxation stage. Due to the country's economic growth strategy and the high intensity of exports, some adjustments and relaxations were made to the system and people were allowed to live outside of their place of residence legally, although this does not indicate transferring the place of residence and the registration type. In 1993, food and oil coupons were withdrawn from market circulation, representing the end of a connection between household registration and food allocation. One year later, the two aspects of household registration type based simply on food allocation were terminated. The last stage is the reform stage. From 1995, household registration has entered a new era in which limitations to migration have been greatly reduced. On the 30th of July, 2014, the

State Council of China issued “Suggestions on further reform on household registration”[12], representing the official cancellation of rural and urban registration.

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3.2 Chinese family planning policy

Similarly to the establishment of the household registration system, the family planning policy in China has also experienced several stages and reforms. In general, controlling population size is the primary purpose of China's family planning policy and it was also the original intention when the policy was approved.

The total population in China has been controlled at 1.32 billion according to the results from Population Census 2010[13], which is consistent with the initial population target. Simply speaking, this target was achieved by setting a "quota" of children allowed per family (Wang, 2012). In each different stage of the family planning policy in China, the policy was stricter for non-agricultural than agricultural households because the "quota" was smaller for households that enjoyed more social welfare benefits and resources.

Figure 3.1 shows the total fertility rate and total population in China from 1950 to 2010. It can be seen that total fertility rate is decreasing, with a "V" shape observed in the early period. This is because of the Great Famine that occurred from 1959 to 1961, during which time many people died and infant mortality was high. From 1970, the total fertility rate has decreased due to the introduction of the family planning policy.

[12] Details can be found on: http://www.gov.cn/zhengce/content/2014-07/30/content_8944.htm.

[13] Data source: National Bureau of Statistics of China. http://www.stats.gov.cn/

3.2.1 Stage 1: Fumbling and experimentation period (1949-1979)

It is not accurate to think that there was no proper family planning policy before the OCP in China, because social scientists and population specialists in China proposed some measures to control the population a few years after the founding of People's Republic of China (PRC). However, given the circumstances during the first decade of the PRC, experts on population were not allowed to provide any proposals to help the new government to understand the dynamic of population growth and to work out the complexities of policy making (Greenhalgh, 2008). As a result, because of the general political environment and the extensive influence of the birth-encouraging policy of the Soviet Union, the PRC experienced a period of rapid population growth with no policy to control the population until 1962.

After experiencing the Great Famine, the Chinese government issued an instruction regarding the implementation of family planning on the 18th of December 1962, known as the No. [62]698 document, which marked the start of China's family planning policy. This policy varied according to province and was designed to be limited to urban Han people[14]. This policy did not have an official name, but its emphasis was more like a slogan: "One is the best, Two are just right, Three are too many". This policy literally set a population growth target without drawing up a quota for each family so that, in general, when registering a new-born baby, a third birth or more was penalised but a second birth

[14] There are 56 ethnic groups in China, the Han is the majority and accounts for more than 90% of the population.

was only not encouraged. However, this early form of family planning policy was abandoned in 1966 when the Great Proletarian Culture Revolution started.

During 1970-1971, Premier Zhou and other development-minded moderates tentatively institutionalised a process of population planning, policy making and programme creation. Until then, the population in China had increased exponentially for two decades. Document No. [71]51 reemphasised the importance of a family planning policy and a moderate and flexible policy, namely "Later, Longer, Fewer", was then announced. "Later" means later marriage and parenthood. In China, a traditional saying is "Man should get married, woman should get married"[15], which has dominated people's opinions about marriage for hundreds of years; accordingly, it was considered normal for young adults to be married before the age of 20 before the 1960s. The age for marriage recommended by this policy was 25 or above for men and 23 or above for women, and the recommended age for childbearing was 24 or above. "Longer" encouraged couples to space their births at least four years apart, and "Fewer" encouraged couples to have fewer children; generally, not more than two (Wang, 2012). The policy "Later, Longer, Fewer" was stricter than the previous one because a quota for each family was set and the enforcement was stronger because of its wide population coverage. While the previous policy was only designed for the urban Han people, "Later, Longer, Fewer" was aimed at the entire Han population, both rural and urban.

[15] In Chinese it is "男大当婚，女大当嫁 (nan da dang hun, nv da dang jia)". It means men and women should get married when they reach a certain age, which was 18 for men and 16 for women in old China.

3.2.2 Stage 2: One Child Policy (1980-2015)

With the end of the Cultural Revolution in 1976, the family planning policy process became more regulated. "Four modernisations" were introduced by Deng Xiaoping, the second generation of leaders in China, and his party to shift the nation's agenda towards rapid modernisation. At this time, population control began to receive strong and consistent attention from the leadership because Deng's regime argued that rapid population growth would retard the achievement of the "four modernisations"(Greenhalgh, 2008)[16]. Against this background, the OCP was conceived of in 1979 and implemented intensively from 1980 onwards.

The OCP literally restricted the number of children each couple could have except in some extraordinary circumstances, such as the first child being mentally or physically disabled, one member of the couple being a disabled military or a person who was wounded or disabled at work, a remarried couple with only one child from one person, one or both spouses being engaged in mining work continuously for more than five years, and so on. This policy only applied to Han couples, both in urban and in rural areas[17]. Before giving birth to a child, each woman had to apply for a birth permission certificate from her local family planning institution providing her marriage certificate, identification card and permanent residence registration notebook. The birth permission certificate was one of the documents required to register a birth, and those births without birth permission certificates are unsanctioned births. According to the OCP urban

[16] Four modernisations: modernisation of industry, agriculture, science and technology.

[17] Couples with at least one Han member were also targeted by the One Child Policy.

couples who wished to have second child would not receive a birth permission certificate and rural couples would be only granted one if their first child was a girl.

Economic incentives, namely family planning subsidies, were provided to families that voluntarily had only one child and penalties were imposed on families with unapproved births. Fines were usually much higher than the family planning subsidies, [18]and were sometimes unaffordable for families with agricultural registration (Doherty, Norton & Veney, 2001). In urban areas, One-child certificates were granted to couples who signed a pledge agreeing to have only one child. The certificate might be accompanied by cash such as a one-child subsidy, or other benefits such as better housing or extra food rations (Short & Zhai, 1998). If the couples with non-agricultural registrations violated the policy and had unapproved births, in addition to being fined, both spouses would be discharged from their employment and all social benefits would be cancelled.

The OCP did not set a universal standard for all provinces in China. The government modified the policy to address the local situation. Specifically, the OCP was only centrally implemented for four years; following the relaxation of the original policy, there are now three versions of the OCP. These are the "Strict OCP ", the "One-and-half Child Policy", and "Two Children Policy". Together with the unlimited policy concerning

[18] Family planning subsidies for married couples included many categories. For example, the child subsidy was five RMB every month for couples with only one child until their child was 14 years' old; bonuses were given to couples who voluntarily accepted sterilisation, and specific amounts varied across provinces and cities, but all amounts were less than 1000 RMB.

minority couples, which is called the "More Children Policy", these four policies constitute the contemporary Chinese family planning policy[19].

The OCP has experienced three periods nationwide.

Period 1: The strictly implemented period (1980-1984)

Since the firm and national implementation of the OCP in 1980, the number of children each family could have was strictly limited to one until 1984. Furthermore, the revised Marriage Law of 1980 stated that every Han couple was required to practice birth control (Bongaarts & Greenhalgh, 1985). However, some unintended consequences began to appear. Examples include female infanticide, sexual selection abortion which leads to an unbalanced sex ratio and missing girls (Qian, 2008), forced abortion and forced sterilisation, which lead to a strained relations between the local birth planning institution and the residents.

Period 2: The first relaxation (1984-2000)

Taking into account the traditional preference for a son, a second birth was officially permitted by Document 7 issued by the Central Party Committee on the 13th of April 1984. The principle of the relaxation announced in Document 7 is called the

[19] The "Strictly OCP" is for couples who are either ethnic majorities or of whom one is an ethnic majority and is non-agriculturally registered. The "One-and-half Child Policy" is for couples who are either ethnic majorities or of whom one is an ethnic majority as well as being agriculturally registered, and whose first-born child is a girl. The "Two Children Policy" is for couples who are both from single child families and for couples with extraordinary circumstances. The "More Children Policy" is for couples who are both ethnic minorities.

"1-son-2-child" rule (Qian, 2009). As males constitute the main labour force for working farm land in rural areas and sons are the traditional source of old-age care for parents in families with agricultural registrations, male children are preferred to female children (Lee, 2011)[20]. To decrease female infanticide, this relaxation allows families with agricultural registrations to have a second child if the first-born child is a girl.

Period 3: Further relaxation (2001-2015)

Further relaxation was first discussed in the late 1990s, but was not approved or formally implemented until 2000. Unlike the previous relaxation, all Han couples are eligible for this relaxation. Considering the first generation of only children has reached the age of marriage and childbearing, this relaxation was aimed at easing the imbalanced sex ratio as well as lowering the dependency rate, as the first generation of only children is experiencing the consequences of the "4-2-1" family structure, which has created tremendous pressure for them[21].

According to this relaxation, couples, no matter whether they have agricultural or non-agricultural registrations, could have a second child if both the husband and wife, or one of them, came from one child families.

[20] Households with agricultural registrations are not guaranteed any social benefits such as pensions or health insurance; thus, rural couples rely entirely on their children for old-age care. However, in a Confucian society, women should devote themselves to their husbands' families after getting married and they educated to be subordinate to men and to provide care for children and parents-in-law. In other words, rural couples can only rely on their sons.

[21] The "4-2-1" family structure is four grandparents, two parents, and one grandchild.

On 27th December 2015, with the approval of Amendment of Population and Family Planning Policy by the Standing Committee of the National People's Congress, all second children in the families born after 1st January 2016 are permitted. This event represents the end of OCP and a new era of family planning policy.

3.2.3 Fines and penalties

Although a central family planning commission has been set up, the responsibility for enforcement became linked to local birth-planning institutions administrated by local governments after the first relaxation of the OCP in 1984. As a result, the local birth-planning institutions reserve the right to set fines according to local population targets; therefore, the level of fines may vary across provinces or even counties.

The general standards and methods of collecting social maintenance fees, such as fines, are specified in the Social Maintenance Fees Collection and Management Measures issued by the State Council in 2002. Rule No. 3 in the measures states that the rate of social maintenance fee should be based on the urban/rural annual income per capita, combining the actual household income level and the real situation regarding an unpermitted birth. Specifically, fines should be three to six times the local annual per capita income; thus, the provincial government determines the actual amount when collecting social maintenance fees.

The direct effect of this regional governance rule is that there is no unique administrative standard across the country; for example, even two neighbouring counties may have

different levels of fines. As a result, some couples or pregnant women travel away from their hometowns to give birth[22].

There may be situations in which rural couples are too poor to pay the fines. In fact, other forms of penalties have been used as part of the fines, such as taking the household's property when the couple do not have ability to pay in full, or being discharged from work if one or both parents are employed by government or state-owned enterprises.

3.3 Chinese labour market

3.3.1 The labour market and labour market reforms in China

Before the establishment of the PRC, or more precisely before the anti-Japanese war started in 1937, the vast majority of people in China were peasant farmers and cities played the role of trade and manufacture (Cai, Park & Zhao, 2008). Migration was uncontrolled and labour mobility was quite common. Moreover, as there were no restrictions on the sector in which people were eligible to work, farmers could also find temporary jobs in cities when farm work was not busy.

The new government of the PRC installed a planned economy in the country whereby goods' prices were determined centrally, and inputs, including labour and products, were allocated administratively. The household registration system bound regional migration, meaning that agriculturally registered households had to remain in their original places, join the production teams and take on farm work only. The rationale for keeping most of

[22] 'Missing girls' is one of the unintended consequences of the One Child Policy and fines. Couples with unpermitted births may choose not to register the child, especially a female child, to evade paying fines; therefore, local authorities are not aware of these unpermitted births.

the population on farms was to ensure the food provision of cities due to the outdated production implements and low productivity (Meng, 2012). People with non-agricultural registrations had jobs arranged by the Bureau of Labour and Personnel based on their education attainment level. Once the job match was finalised, there was little opportunity for further mobility, which meant lifetime employment. Because of the low probability of being fired if the worker did not violate any regulations, lifetime employment was criticised for encouraging over-staffing and low productivity (Meng, 2000).

The earliest reform started in rural areas with the introduction of the Household Responsibility System (HRS) in the late 1970s. By signing an agreement of cultivating responsibility, rural households could freely retain or sell agricultural products as long as they sold the amounts specified in the agreement to the government. This reform increased rural productivity dramatically because it allowed rural households to retain agricultural profits (Lin, 1992). Furthermore, from 1984, rural farmers were allowed to work freely in nearby towns or in collectively-owned township or village enterprises (Cai, Park & Zhao, 2008). During the period from 1985 to 1992, managers of state-owned enterprises in urban areas sensed a great opportunity for development and began to attract rural farmers to work in urban areas on a temporary basis. Meanwhile, relaxations to household registrations also meant that agriculturally registered households could migrate to small towns and cities to seek better lives. Thereafter, with gradually flexible rules regarding migration, an increasing number of rural farmers came to urban areas searching for a better life.

In urban areas, reform is focused mainly on two dimensions; one is lifetime employment and the other is wages. The attempt to change the practice of lifetime employment was made by the gradual introduction of a labour contract system, which represents a relatively flexible labour allocation mechanism (Meng, 2000)[23]. Since then, the "iron rice bowl" model, which is a popular metaphor used by people for lifetime employment, has been phased out. With regard to wage reform, new wage systems have replaced the previous one in which wages were mainly determined based on an employee's professional qualifications (Xia, Li, Song, & Appleton, 2012). The current wage system in China consists of four categories, namely the grade wage system, the professional qualification wage system, the structures wage system and skill wage system[24]. Figure 6 briefly illustrates how the labour market was organised before and after the reform.

3.3.2 Employment and labour force participation

Most workers in China are full-time, although part-time jobs exist and some people are self-employed (Warner, 2010). In fact, part-time jobs are very rare and people are more eager to find a permanent and full-time job because pensions are directly connected to labour contracts provided by full-time employers[25], the main contributors to employees'

[23] This labour contract is only applicable to new entrants to the work unit, as existing employees are still employed for life.

[24] Both old and new wage systems apply to state-owned enterprise employees.

[25] In China, private firms and self-employed people may refuse to participate in the pension system because they have a relatively young work force and the incentives for people to join is unattractive because the return rate set by government is very low (Zhao &Xu, 2002).

pensions[26]. By means of full-time jobs, the Labour Law of the People's Republic of China (1994) established an eight-hour working day and a 40-hour working week (Cai, Park & Zhao, 2008).

The labour force participation rate in China was high by international standards, particularly for women (Maurer-Fazio, Hughes & Zhang, 2005). It was partly due to the job allocation system, which effectively prevented unemployment in urban China prior to the labour market reform. It can also be seen in Figure 1.1 and 1.2 that the general trend in both the labour force participation rate and the female labour force participation rate in China was decreasing. This was because of the state-owned enterprise reform in the late 1990s and further expansion in early 2000s, when massive numbers of workers were laid off. Some of the state-owned enterprises that laid off workers were textile factories in which female workers accounted for a large proportion of the workforce. Meanwhile, the market economy has provided many opportunities for people to run their own businesses and to invest in the financial market. The rise in household income and in non-labour income could be viewed as an income effect leading to women withdrawing from the labour market to concentrate on home activities such as housework, caring for the elderly and child care.

[26] The Chinese pension system has undergone several reforms, such as the economic reform. The pre-reform pension system was PAYGO (pay as you go), and it only existed in state and urban collective sectors. Pensioners received pensions directly from their previous employers and this paying channel worked very well due to the infrequent mobility of labour. After the reform, the pension system has been expected to cover every urban worker by setting up individual accounts, and the workers themselves contribute to these accounts. The new system retains the previous pension pool and the employers' pension injection goes partly to the pension pool and partly to an individual's account.

3.4 The childcare system in China

Childcare in China used to be centrally planned before the Chinese economic reform and was regarded as a public service. As early as 1952, the Chinese government issued the "Regulation for Kindergartens (draft plan)", which specified the kindergartens' targets, goals, teaching principles and activities, as well as the responsibility for developing kindergartens. In this regulation, kindergartens were confirmed as being the first stage of the education system in China. In particular, one of the main goals of kindergartens was to reduce the childcare burden on mothers so they could carry on with their work and participate in other activities. Children aged between three and six are eligible for kindergarten, and full-time stay is the only option[27]. Therefore, public childcare services are aimed at toddlers and older children rather than at infants.

In terms of the responsibility for developing kindergartens, four mechanisms jointly provide childcare in China. Firstly, the Ministry of Education ran a small number of kindergartens directly, which had better facilities and resources, as experimental and demonstrative examples. Secondly, work units in urban areas, including state-owned enterprises, public institutions and local governments, administrated kindergartens. As the principle supplier of childcare services before the economic reform, work units developed nurseries mainly to provide welfare because their employees freely enjoyed childcare services (Du & Dong, 2013). Thirdly, communities ran a few kindergartens as supplements to accommodate the needs of urban families whose employers did not have

[27]Full time means that children stay at kindergartens for eight to 12 hours per day.

childcare programmes. Lastly, in rural areas, kindergartens are primarily administrated by the people's communes, but childcare services are relatively less available. The disparity in childcare services between urban and rural areas is distinct because childcare services are essentially one of the public welfare systems that cater mainly for non-agricultural families. Apart from the quality of childcare, the quantity of childcare in rural areas lags far behind that in urban areas. In many rural areas, childcare is only available until the year prior to enrolling in primary school.

Before the Chinese economic reform, the management mode of kindergartens followed that of the Soviet Union in that the government administered this service directly. It was not until the middle of 1980s that privately run kindergartens started to play an increasingly important role in the development of Chinese society.

While privately run kindergartens are gradually increasing, public kindergartens and childcare programmes supported by the government and work units have been cut back substantially in the post-reform period. Vast state-owned enterprises ceased to offer subsidised childcare to employees due to the increasing pressure to make profits and, from the mid-1990s and as a result of the welfare reform, some of the state-owned enterprises transferred their facilities to local governments, such as hospitals, schools and kindergarten (Du & Dong, 2013). On the other hand, quite a number of community-run kindergartens were closed because a lack of government funding.

Although kindergartens have been set as the first stage of education in China, they are not compulsory for entering primary school. The nine years of compulsory education in

China covers primary schools and junior middle schools. As a result, in some under-developed areas in which kindergartens are not available, childcare by families is essential.

3.5 Left behind children

As discussed above, household registration system induced two classes of citizenship, 'residents' (*jumin*) in urban areas and 'peasants' (*nongmin*) in rural areas (Xiang, 2007). After the Economic Reform, peasants started to seek jobs in cities as the Agriculture Reform[28] released their responsibilities on farm land working and further relaxation on migration rules provided opportunities for them to work in cities. However, obtaining a permanent urban registration for peasant workers[29] (*nongmingong*) is still highly difficult, which means rural migrants often have to work in the informal sectors taking temporary jobs, without secured wages and social benefits.

Moreover, apart from the household registration system, other social factors remain the obstacles for whole family migration, for example, education resources for peasant workers' children. Although the nine years compulsory education has been popularized in China, it is essentially location based, which means children only can obtain free education in their original registered place, namely hometown. If children are attending schools outside their hometown, parents need to pay sponsorship fees to the selected schools, which is a big burden for peasant workers as it can be over 10,000 yuan annually

[28] See explanation in section 3.3.1.

[29] Specifically, peasant workers are those populations coming from rural areas with agricultural registration and taking temporary jobs in urban cities.

while the average annual income for a peasant worker is 36,000 Yuan in 2015[30]. As a result, with different reasons, peasant workers often choose to separate with their families and work in cities alone. Thus, a large population consisting children, female spouse and elderly parents are left behind in rural areas (Chang, Dong, & MacPhail, 2011; Wen & Lin, 2012; Xiang, 2007). Those children who live in a single-parent family or a non-parent family cared for by grandparent, relatives, non-relatives or even live by themselves, are called left behind children.

3.6 Healthcare in rural China

Before the agricultural reform, health services for China's rural population were organised and financed through the Cooperative Medical System (CMS) and, in general, rural health care was organised according to a three tier structure, namely 'barefoot doctors', township clinics and county hospitals. Rural residents with common illness usually went to see a 'barefoot doctor' first and were prescribed Chinese herbal medicines. For slightly more serious illness, barefoot doctors referred patients to the second tier, township clinics, where patients receive basic treatment. More patients with more serious illnesses that township clinics cannot handle were referred to county hospitals and, in rare cases of the most serious illness, patients were transferred to urban hospitals (Liu, Hsiao, Li, Liu, & Ren, 1995).

[30] Peasant Worker Monitoring and Survey Report 2015, National Bureau of Statistics of the People's Republic of China.

After the agricultural reforms, most CMS schemes collapsed because communes disappeared, many barefoot doctors stopped providing services and township clinics closed due to suspended financial support (Yip & Hsiao, 2008). Therefore, the vast majority of rural population had to self-fund their health care rather than enjoying the services on the previously pre-paid basis. Although the number of private medical practices, such as individual or family run clinics, has increased rapidly in the past two decades, and rural residents can seek medical services directly from urban hospitals when the illness is serious or treatment is not available in county hospitals, rural residents are still disadvantaged in terms of health services due to rising medical costs, the lack of availability of health facilities and urban-rural resource gaps.

Medical costs are the main reason that rural residents feel under pressure. Data collected by the World Bank (1997) show that approximately 40% of individuals who are referred to higher level hospitals for treatment do not go because they cannot afford the costs. At present, one solution, the New Cooperative Medical Scheme, is in place to insure rural residents against catastrophic health expenses. However, one major limitation of this scheme is that it does not reduce the out-of-pocket expenses per outpatient visit (Wagstaff, Lindelow, Jun, Ling, & Juncheng, 2009; You & Kobayashi, 2009).

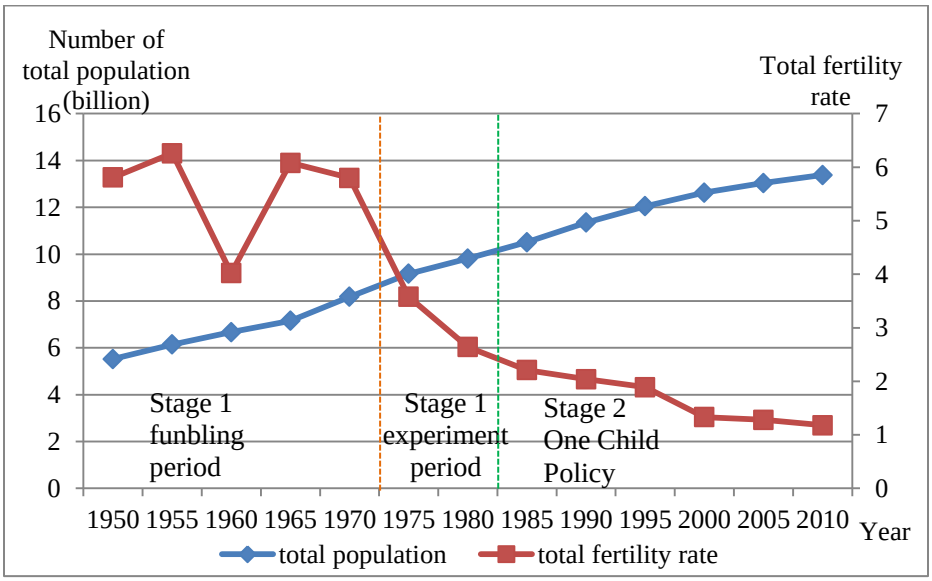
Simply speaking, the New Cooperative Medical Scheme is a health insurance system rather than a health care system. Even though its coverage has expanded to 2,429 counties in China, accounting for over 85% of all rural counties, the impact of the New Cooperative Medical Scheme on health care services and rural residents' health status is

limited (Hu, 2008). Income is still the most important factor that influences residents' medical choices and subsequent health outcomes.

3.7 Summary

In this chapter, background information related to this thesis is introduced. In particular, detailed description of the household registration system and family planning policy in China has been provided to help understand the concepts of building instruments for the first estimation. China used to be a country with planned economy that many public services and social benefit were centrally administrated. Therefore, brief explanations on the institutional background are useful at delivering a fully understanding of the research in this thesis. For example, part-time jobs in China are not as common as in some western countries due to the characteristics of Chinese labour market, so that in the estimations of female labour force participation in this thesis, only working status is taken into consideration, not the working hours.

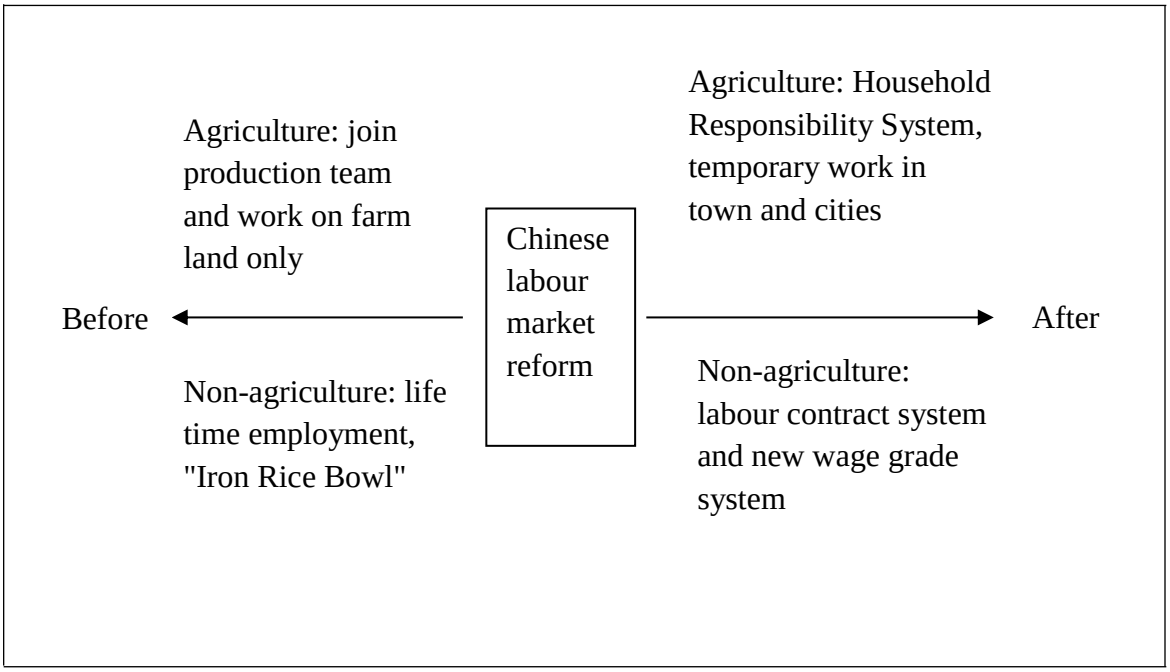
Figure 3. 1 Total population growth and total fertility rate in China, 1950-2010



Data source: The World Bank.

http://databank.worldbank.org/data//reports.aspx?source=2&country=CHN&series=&period=

Figure 3. 2 Changes in Chinese labour market



4. Fertility and female labour force participation in China

4.1 Introduction

In traditional family life, women are more responsible for family issues, such as looking after children and taking care of elderly parents. Particularly during the early stage of childhood, mothers are the primary mediators to help children build and develop their first-stage skills (Ravnbol & Grover, 2011). Therefore, it is common to see a greater labour force participation rate for male workers than for female workers.

Many factors can influence women's labour market behaviours, such as women's education levels and health condition, labour market structures, institutional systems and even cultural variations. Of all these factors, fertility is an important one because women disproportionately face the responsibilities of bearing and raising children, and both of these activities are time intensive. The interaction between fertility and female labour force participation has fascinated social scientists for decades, and a great deal of investigation has been carried out to reveal the causality. In general, a negative relationship is well established, in that more children present in the household would decrease mother's inclination to work outside the home.

While extensive research could be found in literature regarding the link between fertility and female labour force participation in developed countries, little work has been done to investigate this link in China, which is of particular importance given its rapid economic growth rate, enormous population and controversial family planning policy (Fang et. al.,

2013). According to Figure 1.2 in the previous section, the female labour force participation rate in China was over 70% before it started to decrease in 2001 but, overall, it is always higher than it is in most other developed countries.

Before the Chinese labour market reform, which aimed to increase productivity, all able-bodied individuals were expected to work. While workers in urban areas were guaranteed life-time employment based on their educational attainment, workers in rural areas were obliged to work on farm lands because rural households had to earn their productive capitals and necessities (for example, matchsticks) via a production team based on their household members' work efforts (Meng, 2000). In order to maintain the rural and urban production system and to deter geographic labour mobility, the household registration (*Hukou*) system was designed to maintain the urban and rural labour market segregation. It assigned agricultural or non-agricultural status to each person, based on the place of birth, place of living and place of working. New-born children's obtain status followed that of their parents, and changing from agricultural registration to non-agricultural registration was extremely difficult as people needed to get permissions from both their original registration and their destination's local governments (Cai, Park & Zhao, 2008).

Furthermore, governments protected urban workers by issuing regulations. On one hand, the central government prevented enterprises from firing urban workers by restricting the ratio of dismissed workers; on the other hand, municipal governments continued to allocate jobs to new graduates even though additional staff or workers were not required.

Thus, there was virtually no unemployment in urban areas until the mid-1990s (Cai, Park & Zhao, 2008). Things changed dramatically when the central government started to implement the state-owned enterprise reform, allowing some insufficient enterprises to reduce employment or go bankrupt. As a result, millions of workers were been laid off and over 50% of the layoffs affected women (Xia et. al., 2009). This is the reason for a distinct reduction in the number of females participating in the labour force since the mid-1990s.

The high female labour force participation rate, together with the characteristics of the Chinese labour market and the planned economy, led to few researchers devoting their time and energy to modelling the relationship between fertility and female labour force participation. Not until the late 2000s did social scientists, whether from domestic China or worldwide, start to investigate the determinants of female labour force participation in China.

One important issue related to the interaction between fertility and female labour force participation is the endogeneity of fertility. The reason for considering fertility as endogenous is twofold. Firstly, fertility and the female labour supply may be jointly determined. For example, career-oriented women tend to delay childbirth or limit the number of children they have. Secondly, fertility and labour supply may be influenced by unobservable factors, such as personal preferences. Therefore, one should be cautious when interpreting this relationship.

In the existing literature, two approaches have been employed to resolve this endogeneity problem. One is estimating the determinants of fertility and labour supply within a simultaneous-equation framework, as done by Moffitt (1984). The other is seeking valid instruments to reflect family size. Frequently used instruments include multiple birth or twins (Rosenzweig & Wolpin, 1980), the sex of the first two children (Angrist & Evans, 1998) and infertility (Agüero & Marks, 2008).

The starting point for this chapter is China's family planning policy. After the foundation of the People's Republic of China in 1949, the population in China experienced a vast growth for two decades before demographers proposed some measures to control population growth in the late 1960s. Figure 3.1 in the previous section also plots the population growth in China from 1950 to 2010. In that figure, the entire time horizon has been divided into three parts based on the implementation of family planning policies. Stage 1 fumbling period is from 1950 to 1970, during which there was no proper family planning policy. Stage 1 experiment period is from 1970 to 1980, during which some local measures were in place to control population. Stage 2 OCP is after 1980, when the OCP was implemented nationally. Three features can be seen in the figure. The first one is in stage 1 fumbling period, the total population was small but there was a high total fertility rate. The second one is in stage 1 experiment period, the total fertility rate decreased sharply, but the total population was still increasing. The third one is in OCP period, total population increased although the fertility rate was low.

China's family planning policy is legally applicable to all married couples with Chinese nationality, but its validation is in fact based on married couples' ethnicities and it varies according to registration types. Ethnic minority groups, such as the Zhuang, Hui and Man, are not affected by this policy and they can have as many children as they wish. Han couples, the ethnic majority in China, are facing stricter family planning policies especially non-agriculture registered Han couples, are having higher opportunity cost for violating the policy as they enjoy more social resources, such as state-provided housing.

Formally implemented from 1980, the OCP provides a good means of assessing the correlation between fertility and female labour force participation because it limited the number of children each married couple could have. This policy was implemented strictly for four years and experienced two relaxations, which provides a good variation in family size. Taking the traditional preference for sons into consideration, the first relaxation that was implemented in 1984 allowed agriculturally registered couples to have a second child if the firstborn child was a girl, while the second relaxation that has been gradually implemented since 2000 allows couples who are from both one-child families, whether they have agricultural registrations or non-agricultural registrations, to have a second child.

An analysis conducted by He and Zhu (2016) was the first study of the link between fertility and female labour force participation in China. Using Population Census Data and employing twins as an instrument for fertility, He and Zhu concluded that there was no significant impact of fertility on female labour force participation. I am using the

China Health and Nutrition Survey (CHNS) to model this relationship. Fertility is treated as endogenous, and I employ two different instruments. One was developed by Qian (2009), who created an instrument based on the relaxation of the OCP to investigate the effect of family size on children's school enrolment, and the other is the level of fines imposed for one additional unpermitted child. My study is the first to use this instrument in this context.

Using 2SLS and IV probit estimation techniques, I find a significant effect in that an additional child reduces the possibility of female labour force participation by up to nine percentage points. I also find that children aged under three reduce mothers' labour supply significantly, in both rural and urban areas. However, the size of this effect shows that rural women are more vulnerable when they have young children. Furthermore, women who live in urban areas reduce their labour market attachment significantly if they have primary school aged children present in their households.

The contribution of this chapter is threefold. Firstly, the sample I constructed for this analysis covers women living in rural and urban areas. Previous studies about female labour force participation focused on urban China; for example, those by He and Zhu (2013), Maurer-Fazio et al. (2009) and Liu et al (2010). Secondly, I applied the instrument created by Qian (2009) representing family size to another research area and this instrument works as expected in the analysis of correlation between fertility and

female labour force participation in China[31]. Lastly, this chapter is the first study to use variations in fine levels as an instrument for fertility in the empirical studies investigating female labour force participation in China.

4.2 Literature review and methodology

4.2.1 Previous research in other countries

Attempted investigations of the labour force participation of married women started in the early 20th century with Mincer's work (1962) acting as pioneering research that focused on determinants of married women's decisions to participate in the labour force.

The classic labour supply theory assumes leisure time is a normal good, so that a positive substitution effect and a negative income effect would be observed in response to hours of work supplied and variations in the wage rate. According to Mincer (1962), however, this assumption is not sufficiently true for analyse the labour force behaviour of married women. He pointed out that working at home is part of married women's labour supply, apart from working in the labour market, and women would adjust the time devoted to both via a change in hours of leisure (Mincer, 1962).

Mincer's seminal (1962) study introduced some new concepts to model female labour supply. Firstly, income is more likely to be used by the entire family and secondly, the work-leisure choice for married women is actually a three-way choice. The former

[31] This instrument has been used in a study by Islam and Smyth (2010), who investigated children and parental health. The instrument was designed to represent family size to see how a parent's health status would be influenced by family size.

concept implies that each family member may alter his/her consumption pattern in response to one member's change in income, as the change means a variation in the entire family's budget constraints. The latter comes from the fact that housework and child care are part of marriage; thus, married women face three life components, namely leisure, work in the marketplace and work at home. The success of Mincer's work relies on his consistent conclusion from both cross-sectional analyses and a time-series analysis. He found that the effect of the husband's income was negative and the effect of the wife's earning power was positive on wife's labour force participation, and that the effect of the wife's earning power was stronger.

After Mincer, research on female labour force participation experienced extensive development and the theory has been revitalised. The wage rate was no longer the dominant factor influencing married women's labour force participation decisions and new concepts concerning non-market behaviours, such as education, marriage and childbearing, were added to the analysis framework. Another improvement was delimiting endogenous variables that were previously regarded as exogenous;. Research in this period can be roughly divided into three camps. The first camp estimates the determinants of fertility and labour supply within a simultaneous-equation framework, the second camp is to instrument fertility with exogenous events, and the last camp focuses on finding causality directions between fertility and female labour force participation, i.e. direction from fertility to female labour force participation, or female labour force participation to fertility, or mutual causality.

Three core research studies using simultaneous-equation estimation include those by Cain and Dooley (1976), Moffitt (1984) and Hotz and Miller (1988). Cain and Dooley (1976) adopted a one-period, life-time model that aimed to explain long-term behaviour. However, this approach was criticised by Moffitt (1984) because the results are difficult to interpret, as the one-period model is static in conception and specification. By regarding labour supply and fertility as life-time decisions, Moffitt claimed the model in his work was more complete because labour supply and fertility decisions are modelled jointly in a life-cycle not separately in multiple periods. On the other hand, Hotz and Miller adopted a dynamic approach and used longitudinal data to analyse both fertility and the related life-cycle labour supply behaviour of married women. Comparing these three studies, it can be seen that all the authors concluded that there was a negative correlation between fertility and female labour force participation. Hotz and Miller further pointed out that young children have a negative effect on female labour force participation, and that the presence of older children had a positive effect.

The pioneers in the instrument camp are Rosenzweig and Wolpin (1980) who formulated a multi-period optimisation model containing a production function and an inter-temporal relationship between earning capacity and labour supply. They believed in a heterogeneous population and that personal tastes were unobservable and varied from individual to individual. They then argued that, in a labour supply equation, consistent estimates of effects only come from an exogenous instrument that accurately identifies endogenous fertility in a manner unconnected to personal tastes. Thus, the authors considered multiple births or twins delivered in the first birth could be used as

instruments, as these natural events provided a close approximation for exogenous variation in the number of children and reflect the impact of an additional, unanticipated child. Despite the advantages of having twins in the first birth, the authors pointed out one limitation of this instrument that twins at first birth cannot actual change the family size but only alters the life-cycle pattern of fertility.

Surprisingly, few works have made use of twins at first birth as an instrument in female labour force participation studies after Rosenzweig and Wolpin until 1999, when Jacobsen, Pearce III and Rosenbloom (1999) conducted research using twin births as a natural experiment. They found that an unanticipated twins birth had a pronounced but transitory impact on labour supply, reducing both the proportion of women working for pay and working hours.

A new instrument providing variation in the number of children was constructed by Angrist and Evans (1998). The principle of this instrument relies on the widely observed phenomenon of parental preference for a mixed-sibling sex composition. Therefore, in a family in which the first two siblings are the same sex, the parents are significantly and substantially more likely to have an additional child. Thus, a dummy for whether the sex of second child matches the sex of the first child provides a plausible instrument for additional childbearing among women with at least two children. The authors also confirmed that children lead to a reduction in the female labour supply. Another work, carried out by Cruces and Galiani (2007), followed this instrument's strategy and applied it to two developing countries, Argentina and Mexico. The authors found that the

instrument was feasible for these two countries and that the effect of fertility on the female labour supply in these two countries was quantitatively similar to the effect in the U. S.

Another instrument used is infertility shock, devised by Agüero and Marks (2008). They proposed this alternative exogenous source of variation in family size because neither of the previous instruments could reveal the relationship between fertility and female labour force participation in terms of no children or one child. Together with another study carried out by Rondinelli and Zizza (2011), infertility has been proven to be valid instrument. However, the results from this instrument contradict the twins at first birth or same-sex sibling compositions, finding that there was no evidence that children had a causal effect on female labour force participation.

While a large amount of literature has tested the correlation between fertility and female labour force participation, few studies have paid attention to the direction of the causality of these two factors. The hypothesis in the literature is that fertility levels will fall as female labour force participation rates rise because both child rearing and employment are time-intensive issues. However, some researchers have found evidence showing the relationship may be more complicated than the hypothesis, as some countries that are experiencing low fertility levels have low female labour force participation rates (Bernhardt, 1993; Bettio & Villa, 1998; Rindfuss et al., 2000; Rindfuss & Brewster, 1996). Four possible explanations are suggested by this camp: (i) women's fertility influences their labour force participation; (ii) women's labour force participation

influences their fertility; (iii) a reciprocal relationship exists between the two factors; and (iv) Negative association is spurious, so other factors are dominant (Cramer 1980, Weller 1977).

However, this camp fails to provide consistent conclusions because some studies have found a short-term unidirectional Granger causality between fertility and female labour force participation (Cheng, Hsu & Chu, 1997), while some studies have found a short-term bi-directional Granger causality between fertility and female labour force participation (Michael, 1985; Klijzing, Sieger, Keilman & Groot, 1988).

4.2.2 Empirical studies in China

China has the largest population in the world and its family planning policy, particularly the OCP, is a good experiment regarding population control as the policy limits the number of children each family could have. The Chinese labour market has also changed tremendously because of the Chinese economic reform and other policy changes, such as the labour market reform and migration relaxation. These factors have created an excellent research background for examining people's labour supply patterns and investigating the factors that may influence labour supply.

Numerous previous works have shed light on research into Chinese family planning policies and the labour market, such as the impact of the family planning policy (Wang, 2012; Du, 2012; Lee, 2012; Li, Zhang & Zhu, 2005; Li, Zhang & Zhu, 2009), labour market reform and its outcomes (Meng, 2012; Xia et.al., 2009), or employment, labour

supply and the gender wage gap (Knight & Song, 1999; Li & Song, 2011; Zhang et al., 2008; Appleton, Song & Xia, 2014; Maurer-Fazio, Hughes & Zhang, 2005).

However, very few works have focused on the relationship between fertility and female labour force participation in China. It was not until 2000 that married women's labour supply in China attracted the attention of researchers, although most of the studies have concentrated on one particular region, either rural area or urban areas, due to the unique Chinese situation in which people's migrations are restricted by household registration (Cai and Wang, 2012; Liu, Dong & Zheng, 2010; Du & Dong, 2013).

Two empirical works are related to my research. One was carried out by Maurer-Fazio et al. (2011), and the other is by He and Zhu (2016). Both of these work used Population Census data and focus on urban China. The former work is particularly interested in how the presence of pre-school and school-age children and/or elderly and disabled parents in the household affects women's likelihood of engaging in work outside of the home. The authors also compared the labour force participation patterns of rural migrant women and non-migrant women, and explored the determinants of labour force participation decisions for the two groups to see how the determinants changed over time. In their work, fertility was not included as an explanatory variable as the primary interest was childcare; thus, children in the household were divided into different age groups, namely 0-5, young school-age children aged 6-12, older school-age children aged 13-15, and

those aged 16-17 whose school fees were substantially higher[32]. Therefore, this instrument was not employed. They found co-residency with older adults increased prime-age women's labour force participation and that pre-school age children reduced mothers' labour supply to the highest degree. They also found that migrant women's labour force participation appeared to be more hampered by childcare than was that of non-migrants.

The latter consideration, which is the closest to our research, investigated the relationship between fertility and female labour force participation. Similarly to other western research, the authors treated fertility as endogenous and used twin births as an instrument for the number of children in the household. At the end of their work, He and Zhu (2016) concluded that the instrument estimations suggested very small and insignificant effects of fertility on female labour force participation. Nevertheless, limitations still exist in their work and are mainly caused by the data used in the analysis. Firstly, 1% of the sample of the 1990 Chinese Population Census and 0.095% of the sample of the 2000 Chinese Population Census were used separately; thus, information about the households might not be coherent. In essence, the aim of the Chinese Population Census was a comprehensive survey of information about the population and to count the population in

[32] The compulsory education period in China is six years of primary school and three years of junior school, and the youngest age at which children start primary school is six. There are no tuition fees for compulsory education because the fees are paid by the country, but students still have to pay for books and other things such as study tools and materials, which are cheap. When children progress to higher education, such as senior school, tuition fees are sponsored by the household itself; fees are moderate for public schools but are much higher for private schools. Moreover, unlike university or college education, students cannot get bank loans to cover their fees, so fees are a burden to the household.

order to provide a basis for future population policies and social and economic development programmes[33]. Therefore, the population census questionnaire did not ask interviewees about their economic status, such as personal income or household income, resulting in no information on that view, which leads to the second limitations. Through the ages, wages or income has been considered an important factor that influences people's labour supply decisions, and Mincer (1962) pointed out women's income power is even stronger. Finally, the husband's income also influences women's labour supply decisions. Therefore, a model with missing income variables is not complete.

4.3 Methodology

The neoclassical theory of labour supply posits that people have to make a trade-off between paid work and leisure because of time limitations. To get paid work, an individual has to participate in the labour market. The reservation wage, according to the theory, is the factor that an individual relies on to decide whether to participate in the labour market, and non-wage income is the only parameter that can modify the reservation wage if an individual's other tastes are stable. Once an individual participates in the labour market, wage is an important determinant of labour supply. However, when household production is taken into account, the wage is not the only determinant as, within the household, leisure is not the sole alternative to paid work. People will devote time to household activities if the marginal productivity of such types of work is superior to an hourly wage.

[33] See State Council Document No. 576, 24th April, 2010.

Other factors can also influence people's labour supply decisions. Income earned from outside the labour market, the family environment, the number of children, and other family members' incomes can play a role in people's labour market choices.

4.3.1 Conceptual framework

Before starting discussing the framework, one important issue should be clarified is the female labour force participation and how it is defined in this chapter. Although doing housework has been considered as the labour supply inside home, what this chapter focuses is women's labour force participation outside home, i.e. taking paid jobs. This is because, unlike mothers working outside home who sacrifice their time on other family issues such as childcare, mothers supplying labour at home can balance. For example, while working mothers may not be able to, housewife mothers can attend the important events of children such as school meetings. Simply, the logic behind this definition is that the number of children may not influence housewife mothers' labour force participation.

I first examine the impact of fertility on female labour force participation and then expand the model to examine the impact of children of different ages on mothers' labour supply. It is hypothesised that women's labour force participation will decrease as the more children they have and that younger children will reduce women's labour supply to the highest degree.

4.3.1.1 Effect of the number of children

I started with the following model in which the dependent variable is a binary working decision that equals 1 if the woman is in the labour force and 0 if not.

$$LFP_{it} = \beta_{i0} + \beta_{i1}Children_{it} + \beta_{i2}X_{it} + \varepsilon_{it1} \quad (1)$$

In this equation, $Children_{it}$ is the number of children each woman has and β_{i1} is the parameter of interest. X_{it} is a vector for personal characteristics including age, age squared, education levels, health conditions, an ethnic minority dummy, an urban registration dummy, annual wage, other personal incomes, husband's income and a dummy indicating whether the individual was co-resident with older parents and adult children. Year dummy variables and province dummy variables are included to capture the yearly fixed effect and the county fixed effect.

The dependent variable, female labour force participation, is a binary variable which takes values of 0 and 1 that 1 represents joining the labour market while 0 not. Therefore, equation 1 is a non-linear model as the dependent variable is not continuous. Long (1997) argued that the effects of independent variables will have diminishing returns as the predicted probability approaches 0 or 1, so that a linear model gives a the biased effect of a non-linear relationship.

The strategy is both linear and non-linear estimations are adopted so that the differences between them can be observed. In addition to this, the number of children is treated as endogenous following the literatures and instrument variable (IV) estimators are used to reveal the causal effects. More discussion about instruments employed in this chapter will be presented in later section.

In general, OLS and probit estimations provide the baseline results and IV estimations, in particular the Two-Stage Least Squares (2SLS) and Instrument Variable probit, provide consistent results in the face of endogenous fertility.

4.3.1.2 Effect of household structure

Children of different ages have different childcare needs and, obviously, new-born babies and young children aged under three need more intensive care. The model is as follows:

$$LFP_{it} = \gamma_{i0} + \gamma_{i1}Age_{it} + \gamma_{i2}X_{it} + \varepsilon_{it2} \quad (2)$$

The same as before, X_{it} in Equation 2 is the vector for personal characteristics, the same as in equation 2. Age_{it}, is the vector for different age groups of children and shows how many children a woman has in each group. When defining children, I adopted the principle of the upper age limit of 16 and divided children into four groups; 0-3, 4-6, 7-12 and 13-16[34]. It is expected that children within the age group 0-3 would have the greatest influence on mothers' working decisions among the four groups.

For equation 2, OLS and probit estimation results will be presented as household structure (variable Age_{it}) is exogenous.

4.3.2 Instrument

[34] Correspondingly, the four age groups of children are (1) at home and being taken care of by parents, (2) at nursery, (3) in primary school, and (4) in junior middle school. In China, the official age for registering at a nursery is three, so infants and toddlers are usually at home being looked after by parents or grandparents.

4.3.2.1 Relaxation to OCP

A good instrument should satisfy the restriction that it must be correlated with family size but have no direct effect on the mother's labour supply or any other right-hand-side variable. It is not difficult to find instruments for family size in the literature since family size has long been regarded as endogenous. Some variables are highly correlated with fertility, but it is difficult to argue that they have no effect on labour market behaviour other than via fertility. These variables may include ethnic group, mother's education, mother's number of siblings and length of the marriage (Lacovou, 2001)[35].

Besides, shortcomings still exist regarding the instruments for family size used in previous studies. Firstly, although the occurrence of multiple births or twins is random and not correlated with female labour force participation, it mainly represents a time failure on the complete family size. Secondly, the same sex of the first two children is not suitable for developing countries because, in some developing countries with a deeply rooted culture of preferring sons, the gender composition might be affected by selective abortion (Basu & Das Gupta, 2001). Finally, infertility is not suitable for China either

[35] For example, ethnic culture may influence people's attitudes towards children as well as towards work, as some ethnic groups prefer big families and believe that women should stay at home looking after children, such as men in China. Women's fertility may also be influenced by the number of siblings. They may want more children if they have many siblings, or vice versa. Their labour supply pattern may also be influenced by their siblings as their sisters can help them to look after children. To some degree, the duration of the marriage can reflect the number of children in the household, but this is not absolute. Therefore, it is difficult to explain why these variables are good instruments.

because women who are childless due to infertility are very rare as they usually adopt a child.

In this chapter, instruments employed have distinct Chinese characteristics. The first instrument strategy relies on the OCP and its relaxation. The "1-son-2-children" relaxation policy started in 1984 and is only applicable to one-child rural registration families. The strict OCP was formally implemented in 1980, so this relaxation applies to those families with only one child that was born after 1980. However, Qian (2009) argued that, if the previous four-year spacing policy had been enforced well, the OCP should be binding on those families with only one child born in 1976 or after. Therefore, following Qian, the instrument takes the form of a triple interaction of the first born child's sex, year of birth and household registration type. Specifically, in our estimation, dummy variables will be created to indicate child's sex (0 = boy, 1 = girl), year of birth (0 = born before 1976, 1 = born after 1976) and household registration (0 = non-agricultural registration, 1 = agricultural registration). Therefore, only agricultural couples whose first child was a girl born after 1976 have an instrument that equals 1.

4.3.2.2 Fines for unpermitted births

The second instrument was constructed using fines imposed for one extra unpermitted child. Theoretically, it is believed that fine level and fertility are inversely correlated. From the previous background, according to the Social Maintenance Fees Collection and Management Measures issued in 2002, actual fines are calculated based on households and the local community's income per capita, but the records of fines in the CHNS data

discontinued in the wave of 1997, which means fines data used in this estimation are not regulated according to national standard. However, local economic development and the population situation will be taken into consideration when setting fines; for example, provinces with a high GDP like Jiangsu province would have a high level of fines, as would provinces with a large population like Henan province.

Basically, instead of using the fines directly, a ratio of fines to household annual income is created to use as instrument. This is because the restriction power of imposing fines for unpermitted births cannot be demonstrated without comparing the fines with actual household income. Put it simply, a 5,000RMB fine would be severe for a household in rural inland China with totally 3,000RMB annual income while it would be acceptable for a household in rural China along the east coast with totally 6,000RMB annual income. Therefore, the ratio can reflect the extent of the penalty imposed on households. Besides, fines recorded in the CHNS community level data are penalty standard rather than actual amount of money, so the ratios are always bigger than zero.

4.3.4 Fitted wage for non-working females

From the discussion in section 4.3.1, annual wage is included in the model capturing one of women's personal characteristics. However, for those women who are not participating in the labour market, their annual wage cannot be observed. The strategy here is to estimate a wage equation first and predict a value of annual wage for those non-working women.

By concluding previous wages have a significant effect on the reservation wage, Hogan (2004) examined a reservation wage equation with previous wages and distribution wage offers which cannot be actually observed. So he first estimated a standard wage equation on a sample consisting of all the newly employed, i.e. all those who are in their current jobs for less than a year and predict a fitted value afterwards as the mean distribution of wage offers. Inspired by Hogan's method, a standard wage equation will be estimated firstly and it is as follows:

$$\text{Ln AWage}_{it} = \delta_0 + \delta_1 \text{Edu}_{it} + \delta_2 X_{it} + \delta_3 \text{Occu} + \varepsilon_{it3} \quad (3)$$

where AWage is working women's annual wage, Edu is their education years and X is the vector for personal characteristics, including age, age square, marital status, a dummy variable indicating excellent and good health status, a dummy variable indicating their registration type (1=urban), a dummy variable indicating their ethnic groups (1=minority) and logged value of husbands' income, and Occu is a vector of women's occupations.

Table 4.1 presents the estimation results of equation 3, in which column 1 doesn't consider year and county effects while column 2 does. The results show that except marriage status and ethnics, all other variables play significant influence on women's wage income. For example, holding others constant, having one more schooling year can help women increase 4 per cent of their annual wage. Similarly, holding others constant, taking professional jobs can increase women's annual wage by over 30 per cent. So, with the estimation coefficients, non-working women's annual wage can be predicted based on

their characteristics by assuming the same character would lead to the same working decision.

4.4 Sample and Variables

4.4.1 Sample selection

The raw longitudinal data contain 66747 observations of women, consisting of 14525 individuals including children and elderly people. Since the main focus of this chapter is female participation in the labour force, some restrictions were applied to the sample selection process.

Firstly, after narrowing down the raw data to women aged between 16 and 55[36], individuals who were single[37], currently in school or who were not working at the time due to disability or retirement were excluded. Individuals whose primary occupations were farmers, fisher people and hunters were also excluded from the sample because women engaged in these occupations can still have considerable time and flexibility to combine work and childcare. Secondly, individuals who had at least one child born

[36] The official working ages for male and female workers are different in China. For male workers, the working age is 16-60, while for female workers, the working age is 16-50 if their work position is that of a worker and 16-55 if their work position is that of a cadre. The new retirement age was implemented in 2015, which is outside of the scope of this research.

[37] Single mothers in China are very rare because, as explained in the previous section, birth permission certificates must be provided if a newborn baby is registered and birth permission certificates are only issued to married women.

before 1976 were excluded because these births were not under the OCP and the parents could have had one more child according to the four-year gap policy, which means that the relaxation of the policy did not apply to these couples. Thirdly, individuals whose self-reported number of children was not equal to the actual number of children living in the household, or whose self-reported household size was not equal to the counted household size, were excluded from the sample because an accurate number of children cannot be attributed to those mothers[38]. In addition, women who were step-mothers were excluded to avoid an estimation bias. Furthermore, individuals with uncertain marital status, registration type or any other information that had been lost, such as missing records of gender, date of birth and household relationship to head of household, were excluded from the sample. Figure 4.1 illustrates the steps in the sample selection. With regard to the sample for the levels of fines, this was further narrowed down to women for whom data concerning fines were available, based on the whole sample.

4.4.2 Sample description and variables

There are 5029 observations in total, representing for 2093 women in the whole sample and 1485 observations that represent for 758 women in the fine levels sample. Both samples are unbalanced.

[38] Inter-generational linkage was provided as the interviewees were asked "who is your mother?" and the line numbers are presented in the data in order to create an ID variable to match mothers and children. Details of the matching method are provided in Appendix.

The dependent variable is a binary variable representing work decisions. Working time was not used as a dependent variable because there is little part-time work in China, and around 90% of the observations in our sample worked for more than 40 hours per week.

Personal characteristics such as age, marital status, education levels, registration types, ethnicity, health conditions, women's annual wages and other personal income[39] were taken into account. Family characteristics were also considered in order to capture the additional worker effect; thus, a dummy equal to 1, representing 'living with adult children and husband's income', was included. A dummy variable was also created that 1 representing 'living with elderly parents'. County dummies and year dummies were also included.

The descriptive statistics of the variables are presented in Tables 4.2 and 4.3, in which Table 4.2 presents the statistics of the whole sample and Table 4.3 presents the statistics of fine levels sample. In order to check the sample selection bias, each table contains the statistics of raw data[40] as the comparisons. Generally, difference between raw data and samples still exists but it is not tremendous. Average female labour force participation in raw data from wave 1989 to 2009 is 80.31% while in the whole sample it is 82.52%,

[39] In our sample, some women had personal income although they did not work. In fact, this is usual in China. Rurally registered households own farm land for cultivation and house land for living. During the process of urbanisation, some rurally registered households that used to live in the peri-urban areas had their farm land requisitioned; thus, they expanded the houses on their housing land and rented out the rooms to earn money. Therefore, rent is the main source of personal income for those women who do not work.

[40] To produce the raw data statistics, male observations and non-working age female observations have been excluded.

leaving a 2% difference on this variable. For the fine levels sample, this difference is even smaller. The big difference observed lies on the household structures that women have no children and education categories. This is because the raw data contains single women who do not have children and the income information for most less educated women is missing that they have been excluded from the sample selection. Apart from these two variables, statistics of other variables in the samples are close to their levels in the raw data.

Average female labour force participation rates in both samples were over 80%, which is higher than the number reported by the World Bank[41]. This is due to the sample selection criteria that excluded some women because of incomplete information. The average number of children each woman had was 1.3 in both samples, which is also slightly higher than the official total fertility rate in the National Population Census 2010[42]. However, it is still acceptable because the CHNS data covers less households compared to the national census survey and also Greenhalgh (1994) claimed that in fact, the data quality of fertility from CHNS data is better. Furthermore, the statistics showed that, on average, women who did not work had more children than women who worked.

Mothers with children under the age of three tended to work less, which was the only category in which the proportion of mothers who did not work was higher than was the proportion of mothers who did. Education levels in the two samples were relatively low.

[41] According to World Bank, Female labour force participation rate in China was 73% in 1990 and 64% in 2014.

[42] The total fertility rate in the National Population Census 2010 is 1.18.

Only 20% of the women who participated in the labour market had higher education (a college degree or higher). About 40% of women in the two samples joined the labour market after graduating from junior middle school. More non-agriculturally registered women participated in the labour market than did agriculturally registered women. Moreover, women from ethnic minorities tended to work less. Meanwhile, women who did not participate in the labour market had higher personal income from other sources and/or higher husband's income. More women participated in the labour market when they lived with elderly parents whose health conditions were good or excellent.

Figures 4.2 to 4.4 show the variation in the levels of fines in the fine level sample. Taking all three figures together, it can be seen that the sample contains data regarding fine levels for eight provinces[43] and that the variations are distinct. Fines in areas inhabited by ethnic minorities, such as Guizhou, Hunan and Hubei provinces, are relatively lower than they are in other provinces, especially those in which the population consists mainly of Han people, who are in the majority, such as Henan province. Liaoning, Shandong and Jiangsu are the top three provinces with high ratios.

Possible reasons for high fine levels in the three provinces mentioned are, firstly, the population mainly consists of Han people in those provinces and the GDP growth is relatively high. In particular, Liaoning province has had consistently high ratios across the three waves, and this is partly because Liaoning used to be an important industrial

[43] The areas that have been shaded in the figures are the provinces covered in our sample. Heilongjiang province has no data about fine levels because it joined the survey in 1997 as a replacement for Liaoning province and the fine level data are only available for 1989, 1991 and 1993.

base in China, with many heavy industrial manufactures providing long-term employment. Thus, as a consequence of being employed and enjoying social benefits, a high level of fines for violating the family planning policy is imposed.

4.5 Empirical results

In this section, estimation results are presented to show the effect of the number of children on female participation in the labour force. The baseline results are from the OLS and probit estimations, in which the number of children is treated as exogenous. IV estimations reveal the true effects. As two instruments were employed, I also compared them to see which worked better in this research. Investigation of how household structures, such as children of different ages, affected women's labour supply is presented in the last section.

4.5.1 Effect of fertility on the female labour supply

4.5.1.1. Baseline results

Tables 4.4 to 4.7 show the baseline results, in which Tables 4.4 and 4.5 contain the results from the whole sample with waves 1989 to 2009, and Tables 4.5 and 4.6 show results from the fine levels sample with waves 1989 to 1993.

Negative coefficients are observed in all four tables, showing a negative correlation between the number of children and married women's labour force participation. This negative correlation is in line with the hypothesis in this chapter and is also consistent

with the well-established negative correlation between fertility and female labour force participation in the existing literature. It can be seen in the four tables that, with everything else being constant, an additional child will reduce the possibility of mother's labour force participation significantly, by over 10 percentage points.

The baseline results show that, compared to those women who attended primary school or who had less education, gaining further education increased the possibility of joining labour market. However, a difference in the effect of education on married women's labour supply between the whole sample and the fine level sample can be observed. In the whole sample, this positive effect was only significant for married women who had qualifications above the junior middle school level, which means that having a junior middle school qualification did not influence married women's labour supply decisions. However, in the fine level sample, junior middle school qualifications increased married women's labour force participation. This is partly because the fine levels sample contains waves from 1989 to 1993, during which period educational resources were not as plentiful as they were in the 2000s, which means that people with junior middle school qualifications were considered to be well educated and had a competitive advantage in the labour market.

Having a good health condition and living with elderly parents who were in good health can also help married women to contribute more to the labour market. Consistent with the features explained in the background that people with non-agricultural registrations had

more opportunities to find jobs, the results confirmed that married women with non-agricultural registrations had a higher possibility of working.

A negative effect was found for the variable ‘ethnic minority’, meaning that ethnic minority women with more children were less likely to work. In addition, income variables played expected roles in female labour force participation. Women's annual wages, fitted value I used, had a positive effect, and the husband's income had a negative effect. The magnitude of effects of these two variables in our research is consistent with Mincer's findings that women's earning power influences their labour supply decisions more strongly than does their husbands' incomes. Women's other income also had a negative influence on their labour supply, and the magnitude of this effect was even greater than was the negative effect of husbands’ income.

Although the baseline results explained the correlation between the number of children and female labour force participation reasonably well, one should interpret such negative effects with caution because the estimation could be either upwardly biased or downwardly biased due to the endogeneity of family size. Next, the two-stage least square (2SLS) regression and the IV probit estimation results are presented using two different instruments, respectively.

4.5.1.2 First instrument - relaxation of the OCP

Looking at Tables 4.8 and 4.9, it can be seen that relaxation as instrument is positively and significantly related to family size. The results showed that relaxation policy is

significantly related to the number of children, which can increase the chance of having another child by 50 percentage points if couples are eligible to the relaxation policy.

The rest results from the first stage estimation demonstrate that, among the factors influencing women's fertility decision, non-agricultural registration exerts the greatest effect. Others being equal, women with non-agricultural registration have 50 percentage points lower chance of giving birth to another child comparing to women with agricultural registration. This is true with the fact that non-agriculturally registered residents enjoy more social benefits than agriculturally registered while in exchange, non-agricultural residents have less children.

Women's annual wage income is the second biggest factor that influences fertility decision. Holding other variables constant, a 10% increase in women's annual wage will reduce 25-45 percentage points' chance of having another child. Education years also play negative effect on their fertility decision, the more years they attained, the fewer children they have. For example, comparing with women who only attained primary school education, women with a college degree will reduce their possibility of having more children by over 30 percentage points.

On the other hand, positive effects on fertility decision can be found on variables of women's health condition, living with elderly parents, women's non-labour income (other income) and husband's income. With other characters being the same, the possibility of having more children is 10 percentage points higher when women live with

elderly parents[44]. Likewise, the possibility of having more children is also over 10 percentage points higher when there is a 10% increase in women's other income or husband's income.

From the second stage estimation results, number of children continues to suggest a negative effect on female labour force participation. Holding other variables constant, an additional child reduces the possibility of married women's labour force participation by around six percentage points. Comparing the size of effect with baseline results, however, it can be seen that the magnitudes from the instrument estimations are smaller, which confirms there is an upward bias from estimations treating the family size as exogenous.

Other variables have shown expected results that greater educational attainment, good health condition, non-agricultural registration, higher annual wage and living with healthy elderly parents all contributed to greater likelihood of labour force participation, while the factors of ethnic minority, non-labour income and partners' income reduced this possibility. The negative effect size of husband's income is smaller than the positive effect size of women's annual income, consistent with the conclusion from Mincer that

[44] This may not be true in western countries but, in China, it is understandable. Due to the traditional ideas of Confucius and Mencius, big families are preferred and not producing descendants is considered the worst unfilially conduct with regard to ancestors. Therefore, having been bound by such opinions for thousands of years, elderly parents would suggest that young married couples have children as soon as possible. If they live together, this suggestion may be interpreted as an order and pressure from parents as well as from the surroundings would be extremely intense. Meanwhile, living with healthy elderly parents means childcare provided by grandparents is available.

women’s earning power is stronger when making the decision of labour force participation.

Comparing the coefficients of women's annual wages and other income in Tables 4.8 and 4.9, the negative effect of other income is greater than is the positive effect of women's annual wages, showing that married women would prefer to withdraw from the labour market if they had higher non-labour income. This is true when simply assuming that leisure is a normal good, but if it is considered in the family context, it is difficult to tell whether this is related to women's household responsibilities to look after children or elderly parents.

4.5.1.3 Second instrument - fine levels

Tables 4.10 and 4.11 present the results of the estimations using the second instrument, fine levels. Unlike the instrument of relaxation, fine levels are negatively related to the number of children, which means higher fine levels leads to families having fewer children. As explained in section 4.3.2, the instrument used is a ratio of fine levels to household income, therefore with one time increase in the ratio, women will reduce about 30 percentage points’ chance of having one more child.

Similar to the whole sample, the first stage results showed that women who had higher non-labour income, higher husbands’ income, who lived with healthy grandparents and who were ethnic minorities tended to have more children, while women who had higher education attainments and non-agricultural registrations had a reduced chance of having

more children. A college or higher degree reduced women's willingness to have big families tremendously. Everything being equal, women with college or higher degrees are in lower chances of having more children. Instead, better education increased the possibility of joining labour market. A college or higher degree can help women to increase their possibility of labour force participation by up to 30 percentage points.

The second stage results from the fine levels sample confirmed the results from the whole sample in that having one more child would reduce the likelihood of married women joining labour market significantly, with a slightly greater effect of about eight percentage points. Women's annual income and co-residence with healthy grandparents increased the possibility of labour force participation, and women's earning power was more influential on their labour supply decisions than was the husband's income.

4.5.1.4 Urban-rural differences

Considering the urban and rural differences, such as the economic development gap, unequal facility recourses and uneven job opportunities, I investigated whether there were any urban-rural differences in the effect of the number of children on female labour force participation. It was expected that an additional child would reduce the labour supply of married women living in rural areas dramatically due to the inefficiency of public nurseries and formal childcare.

Tables 4.12 to 4.19 present the 2SLS and IV probit estimation results from urban areas and rural areas. Tables 4.12 to 4.15 show the estimation results using the whole sample,

and Tables 4.16 to 4.19 show the results using the fine level samples. The main concern is still the effect of the number of children on married women's labour force participation, and it can be seen that an urban-rural difference of this negative effect does exist.

In urban areas, women are more likely to be involved in the labour market because the size of this negative effect is smaller than it is in rural areas. Particularly when considering the results using the fine level sample, holding other variables constant, an additional child will reduce the mother's labour supply by up to 12 percentage points when living in rural areas, while this figure is seven percentage points in urban areas.

The first stage results also tell different stories about family size in the two areas. Based on the whole sample, relaxation is more attractive for agriculturally registered households in rural areas as the size of its positive effect is greater than it is for agriculturally registered households in urban areas. However, fine levels play the opposite role in that they have a greater effect on households in urban areas than they do in rural areas.

In addition, non-agricultural registration, a college degree or higher, and women's annual wages are the top three obstacles to having big families in urban areas, according to both the whole sample and the fine level sample. Among these three factors, non-agricultural registration can reduce the chance of having one more child by over 60%. In rural areas, on the other hand, the results from the whole sample show that women's annual wage reduced the chance of having one more child to the greatest degree, while the results from fine level sample show that having a college or higher degree was the main factor in reducing the likelihood of having more children.

4.5.1.5 Validity of the instruments

One may question the validity of the first instrument, the relaxation of the OCP, because only agriculturally registered households are eligible for this relaxation. Would the instrument also apply to the non-agriculturally registered households? Estimations for agriculturally registered households living in urban areas will provide the answer. The reason for this approach is that agriculturally registered households living in urban areas have some similarities to non-agricultural households as they share similar facilities and may have similar attitudes as agricultural couples towards family size even after many years of living in urban areas.

Tables 4.20 and 4.21 present the estimation results. It can be seen that the first instrument, relaxation, is positively and significantly related to family size, and the magnitude is less than it is in rural areas and slightly greater than it is in urban areas, showing that there has been changes for agricultural couples towards family size after few years living in urban areas. Furthermore, the influence of an additional child on married women's labour supply is milder for agriculturally registered women living in urban area as the effect is smaller than it is for women living in rural areas.

Other variables provide similar coefficients to those in the previous estimations. The first stage results show that women with higher education and higher annual wages have less chance of having another child, while women who are ethnic minorities, live with healthy elderly parents, earn higher non-labour income and having higher husband's income tend to have more children.

4.5.1.6 Which instrument is better?

From the IV regression results, both of the instruments work well in this chapter as they provide proper correlations and are statistically significant. So, which instrument is better? The following estimation approach, using relaxation as instrument for the fine levels sample, will reveal the difference.

Tables 4.22 and 4.23 present the estimation results. Compared to Tables 4.10 and 4.11, which contain the results from the fine levels sample with fine ratio as instrument, it can be seen that the first stage results are similar, except that fine levels are negatively related to family size while relaxation of the OCP is positively related to family size, which is as expected. Regarding the effect size, magnitudes of coefficients in Table 4.22 and 4.23 are slightly bigger than they are in Table 4.10 and 4.11. This might be due to the feature of fine levels sample that it contains fewer waves than whole sample, only 1989, 1991 and 1993, as well as the attitudes that couples have towards the family size. Before 1990s, people, especially agriculturally registered people, prefer large family size as more household labours will bring more household income. While later on, with the economic development and changes to people daily life, couples begin to care more about quality of children rather than quantity.

Other results from the first stage and second stage estimations are similar to what they look like in Table 4.10 and 4.11. It can be concluded that, together with the fact that F-statistics for the two instruments reveal neither of them are weak instruments, both the OCP and fine levels are good instruments.

4.5.1.7 Robustness Check

In this section, robustness checks are carried out from three aspects. The first aspect is releasing the selection criteria to include farmers, fisher people and hunters into the sample; the second aspect is adding a dummy variable indicating mothers' working unit as well as an interaction term between fine ratios and working unit since discharge from employment is also a punishment for mothers being as employees; and the third aspect is testing the relationship using a random effect model.

For the first aspect, Table 4.24 to 4.27 present the results of estimation with farmers, fisher people and hunters reintroduced to the whole sample. The rational is farmers, fisher people and hunters are believed to have more flexibility to balance the time spent working and looking after children, or they can perform the two jobs simultaneously, therefore the influence from number of children to mothers' labour force participation would change. From the first stage results in Table 4.26 and 4.27, the instrument variable estimation results show that having one more child still reduces the possibility of mothers' labour force participation significantly, even with farmers, fisher people and hunters included in the whole sample. Holding other variables constant, having one more child can reduce the probability of joining labour market by around six percentage points. Table 4.28 to 4.31 present the results of estimation with farmers, fisher people and hunters reintroduced to the fine levels sample.

Comparing these results with results in Table 4.8 to 4.11, some similarities and differences can be observed. Similarities lie on the effect size of number of children on

mothers' labour force participation while the differences lie on the effect size of instrument and education variables on women's fertility, and the effect size of women's annual income on their labour force participation. For the whole sample with farmers, fisher people and hunters, the size of the positive effect of the instrument, relaxation, on the number of children increased. This is because most of the farmers, fisher people and hunters are agriculturally registered and may eligible to have a second child. The size of negative effect of education levels on the number of children decreased as well as the positive effect of women's annual income on their labour force participation. For the fine levels sample with farmers, fisher people and hunters, the size effect of fines on extra unpermitted births also decreased indicating that the strength of punishment becomes smaller.

For the second aspect, the rationale behind this strategy is that people who work for the government, in government institutions or for state-owned enterprises will experience administrative punishment in addition to fines if they have one extra child; for example, they will be discharged from work or denied any benefits. The work place dummy takes a value of 1 if mothers worked for the government, in government institutions or for a state-owned company. Results in Table 4.32 and 4.33 show that, with other characters being the same, having one more child would consistently reduce the possibility of mothers' labour force participation by up to eight percentage points. The first stage results also show that fines decrease the chance of having more children even after controlling mothers' working place, indicating the strength of punishment on fertility is independent and strong. Meanwhile, working for the government, in government

institutions and for state-owned enterprises reduced the chance of having more children and the magnitude is approximately the same as fine levels.

For the third aspect, since CHNS is a longitudinal data, random effect estimations were carried out. Results are presented in Table 4.34 and 4.35 using 2SLS estimator, in which Table 4.34 is whole sample with relaxation as instrument and Table 4.35 is fine levels sample with fine ratios. The two instruments are significantly related to number of children showing that couples eligible for relaxation to OCP are 50 percentage points higher possible to have another child and with one time increase in the fine ratio, chance of having another child will be reduced by up to 20 percentage points, assuming other variables constant. Likewise, comparing with Table 4.8 to 4.11, generally there is no tremendous difference between the baseline results and random effect model results apart from the variable of women's annual wage. The magnitudes from random effect model estimations are much smaller than are from the baseline instrument estimations, showing that when taking individual specific effect, negative effect of women's own income on fertility would decrease.

4.5.2 Effect of household structure on female labour supply

The previous estimation results showed that one additional child could reduce the possibility of married women's labour force participation significantly, but the age group of children that has the greatest influence on mothers' labour supply remained unknown. In this section, I will investigate the correlation between household structure and mothers' labour supply. As discussed in the section 4.3.1.2, children will be divided into

four age categories: (i) at home being looked after by parents (0-3); (ii) at nurseries (4-6); (iii) in primary school (7-12); and (iv) in middle school (13-16).

Tables 4.36 and 4.37 provide the OLS estimation results and probit estimation results, respectively. In each table, the upper section provides the results from the whole sample, the middle section provides the results from urban areas, and the lower section shows the results from rural areas.

According to the results for the whole sample, either OLS or probit, with the exception of children in middle school, the other three age categories negatively affect mothers' labour force participation. Young children in the age group 0-3 have the biggest effect across all age groups. Holding other variables constant, mothers reduce their labour supply by about 8.5 percentage points if they are living with a child under the age of three.

Comparing results from urban and rural areas, children under the age of three still reduce mothers' labour force participation to the greatest degree in both areas. This negative effect can account for up to 16 percentage points in rural areas. The effects of pre-schoolers on their mothers' labour force participation are opposite in the two areas. A negative effect is observed for women living in rural areas but, in urban areas, pre-schoolers do not influence mothers' labour supply. Conversely, primary school aged children reduce the mothers' labour force participation in urban areas but not in rural areas. Holding other variables constant, a mother with a primary school aged child living in an urban area would reduce her labour force participation by up to five percentage points.

Although not shown in the table, other control variables produced similar results as previous estimations. In general, higher education or degrees, good health conditions, non-agricultural registration, higher annual wages and living with healthy grandparents can increase mothers' labour force participation, while being an ethnic minority, having higher non-labour income and higher partners' income decreased their attachment to the labour market[45].

4.6 Conclusion

In this study, I estimated the effect of fertility, or the actual number of children, on female labour force participation in China and examined how the different ages of children influence mothers' labour supply. The two samples were derived from CHNS; one is the baseline sample, or whole sample, while the other is the sample of fine levels. Treating fertility as endogenous and using two different instruments, one a triple-interaction term based on relaxation of the OCP and the other fine levels for unpermitted births, I found evidence that an additional child reduces the possibility of married women's labour force participation significantly, by six to eight percentage points.

Women's annual wages positively affected their labour supply and its effect was indeed stronger than was that of the husbands' income, which is consistent with Mincer's (1962) conclusion. Furthermore, estimation results in this chapter showed that women tended to reduce their attachment to the labour market if they had other, non-labour incomes, and

[45] The full table of results is presented in Appendix B to G.

that the magnitude of this negative effect can be greater than that of women's earning power.

I further divided the two samples to see whether children influenced married women's labour force participation differently in rural and in urban areas. The results showed that a difference exists and that women living in rural areas are more vulnerable than are women living in urban areas in that one additional child could reduce the likelihood of married women's labour force participation by up to 12 percentage points. This might be due to inefficient health support and childcare support, meaning that women in rural areas have to spend more time on child rearing. Women with agricultural registrations but living in urban areas were luckier as they had a higher possibility of remaining in the labour market. This is understandable, urban areas have more facilities to help mothers with childcare, and people also have to work longer hours in order to afford their living costs in cities.

The first stage estimation results in this study also tell interesting stories. Non-agricultural registration and higher educational qualifications are two factors that reduce the chance of having more children dramatically. Ethnic minorities tend to have more family members, and this is consistent with the fact that they are not targeted by the OCP. Women are substantially less inclined to have more children if annual wages are increased, but have a greater chance of having more children if they receive non-labour income. Furthermore, the estimation results for agriculturally registered women living in urban areas show that they have smaller families than do women living in rural areas.

There may be numerous possible reasons for this phenomenon. For example, high living costs in cities cause people to limit the size of their families they may change their opinions of having large families the longer they live in urban areas.

I also estimated how household composition affects women's labour supply, and I found that childcare played different roles across age groups as well as according to the area. In general, infants reduce mothers' likelihood of labour force participation to the greatest degree. Pre-schoolers reduce rural mothers' possibility of labour force participation by about five percentage points, while primary school aged children reduce mothers' labour force participation in urban areas.

I believe the research in this chapter has some advantages over the previous empirical research on female labour force participation in China. Firstly, I used a different data set containing richer information, which makes the model more precise as more variables are controlled. Secondly, more women were included in the sample. This does not necessarily mean I had a large sample size, but it did include women living in both rural and urban areas, unlike previous empirical studies in China that focused only on one particular area. Finally, I have presented the first attempt to use fines as an instrument for fertility in the empirical studies of female labour force participation in China, and have proved that this instrument performed as expected.

4.7 Shortcomings and future research

This chapter still has one shortcoming. Rural migrant women and comparisons of their labour force participation to that of non-migrant women have not been discussed.

Although estimations on agriculturally registered women living in urban area have been carried out, this does not necessarily mean these women are migrants. Normally, the term ‘rural migrant people’ in China refers to those who have agricultural registrations but who leave their hometowns to seek work opportunities in more developed areas. Women who have non-agricultural registrations would not change their fertility behaviour or labour supply patterns significantly, but those with agricultural registrations would. For example, migrant women with agricultural registrations may maintain their fertility levels but increase their labour supply to afford living costs.

Therefore, more work on migrant women's labour force participation is needed in the future to determine any specific factors that influence their labour supply. Furthermore, a comparison of labour supply between migrant and non-migrant women could be useful for drawing policy implications.

Another interesting finding in this chapter is that co-residency with healthy elderly parents helped married women to increase the possibility of labour force participation. In addition, estimation results using the household structure showed that children of different age groups influenced mothers’ labour force participation in different ways. Certainly, children's ages determine their childcare demands, but the fact that grandparents looking after children is important and cannot be neglected. Therefore, in the next chapter, I will estimate how grandparents’ childcare affects mothers’ labour force participation.

Figure 4. 1 Selection progress of whole sample

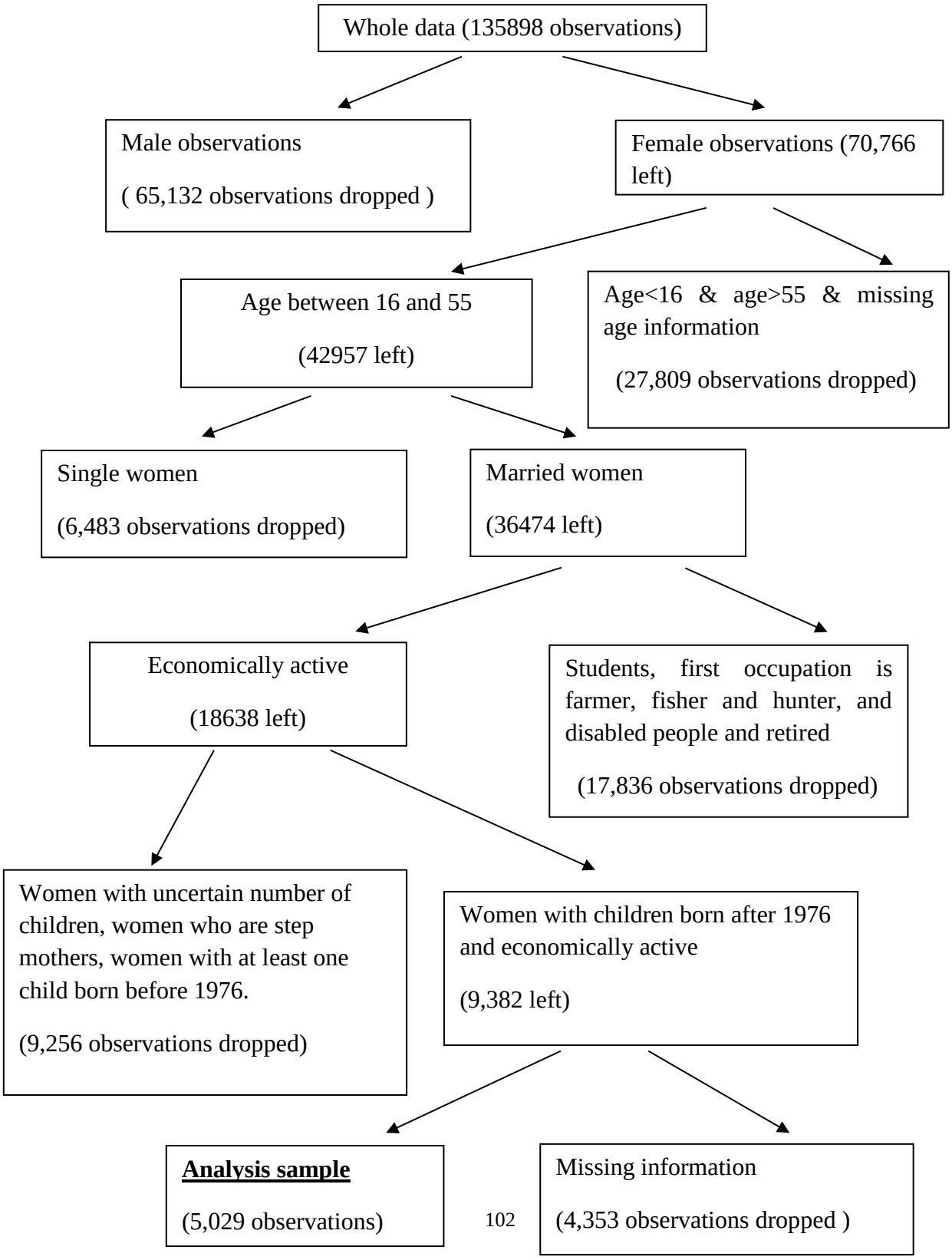


Figure 4. 2 Fine variations in fine level sample, wave 1989

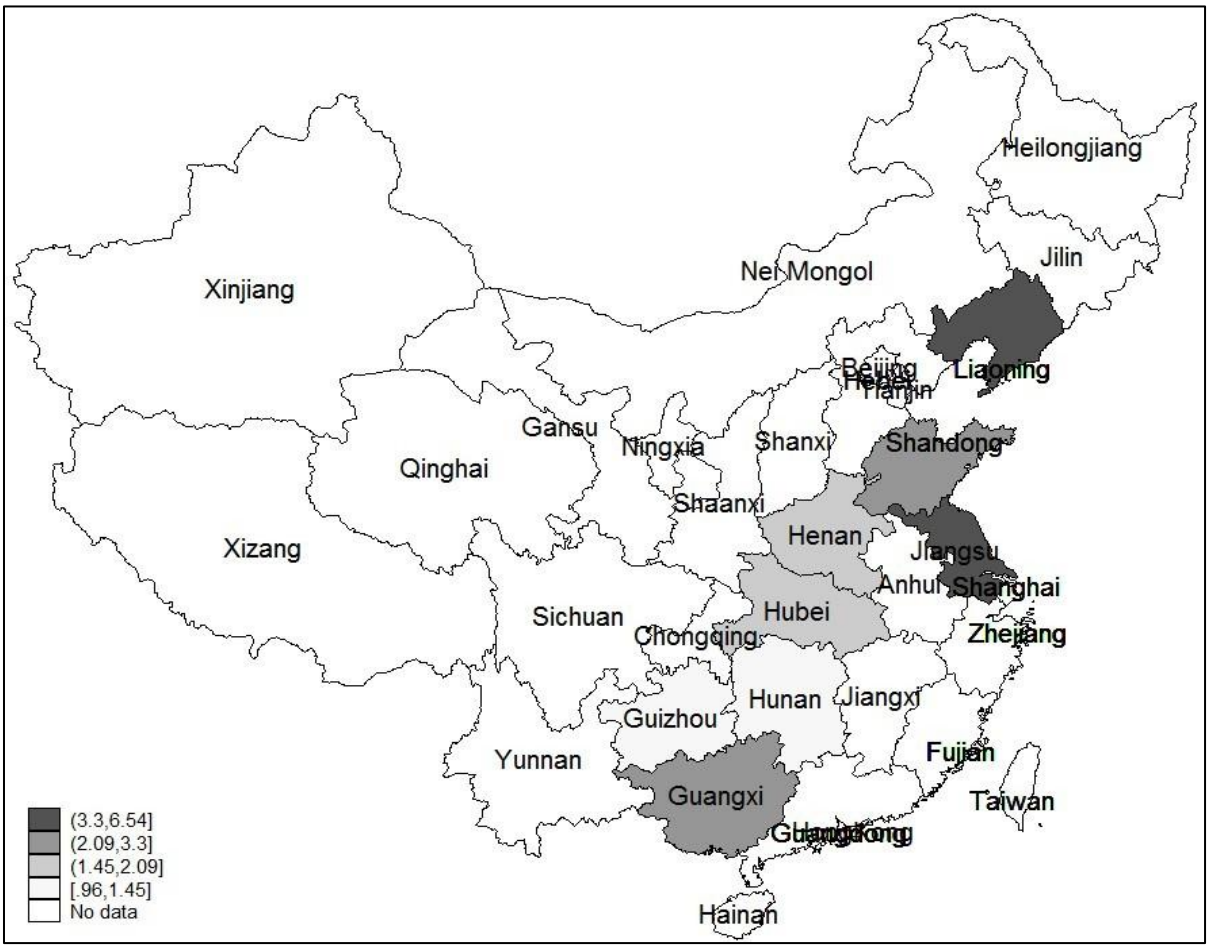


Figure 4. 3 Fine variations in fine sample, wave 1991

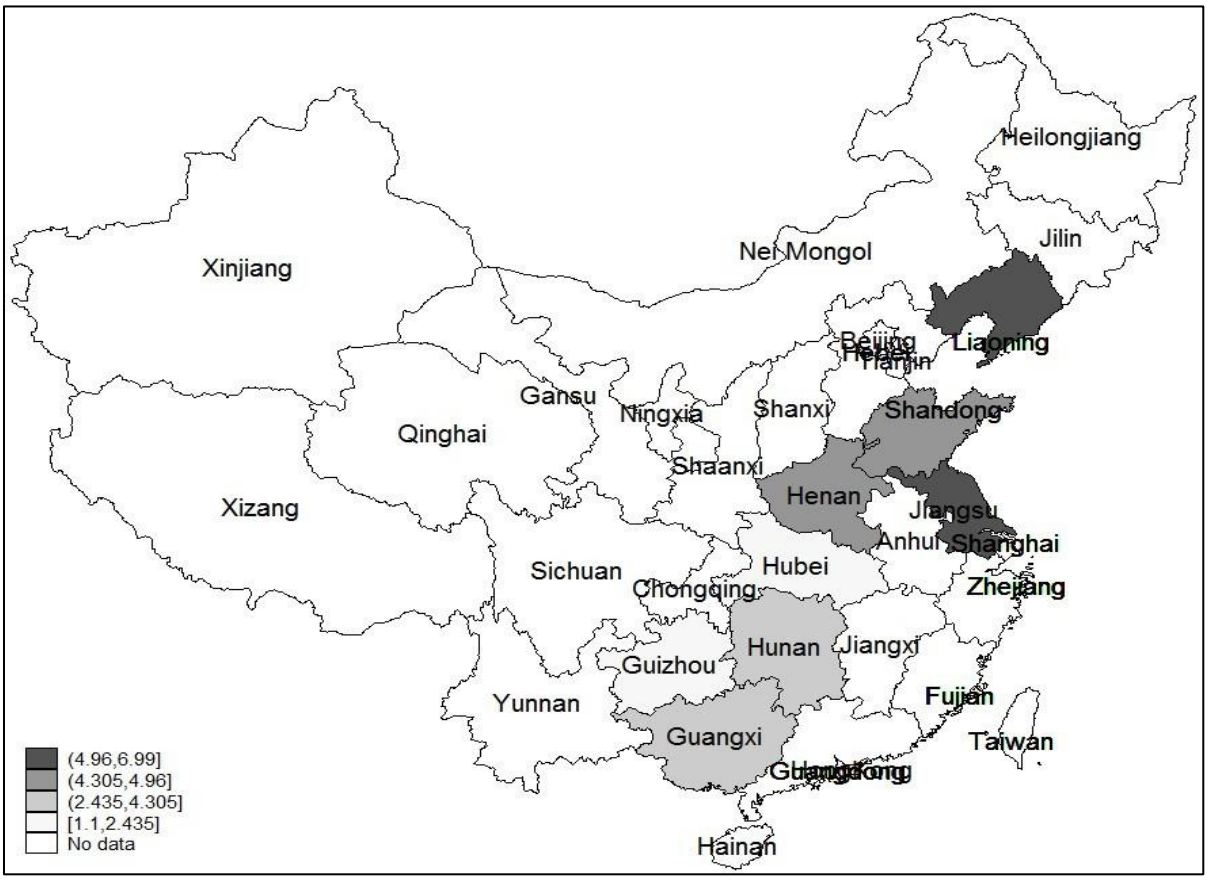


Figure 4. 4 Fine variations in fine sample, wave 1993

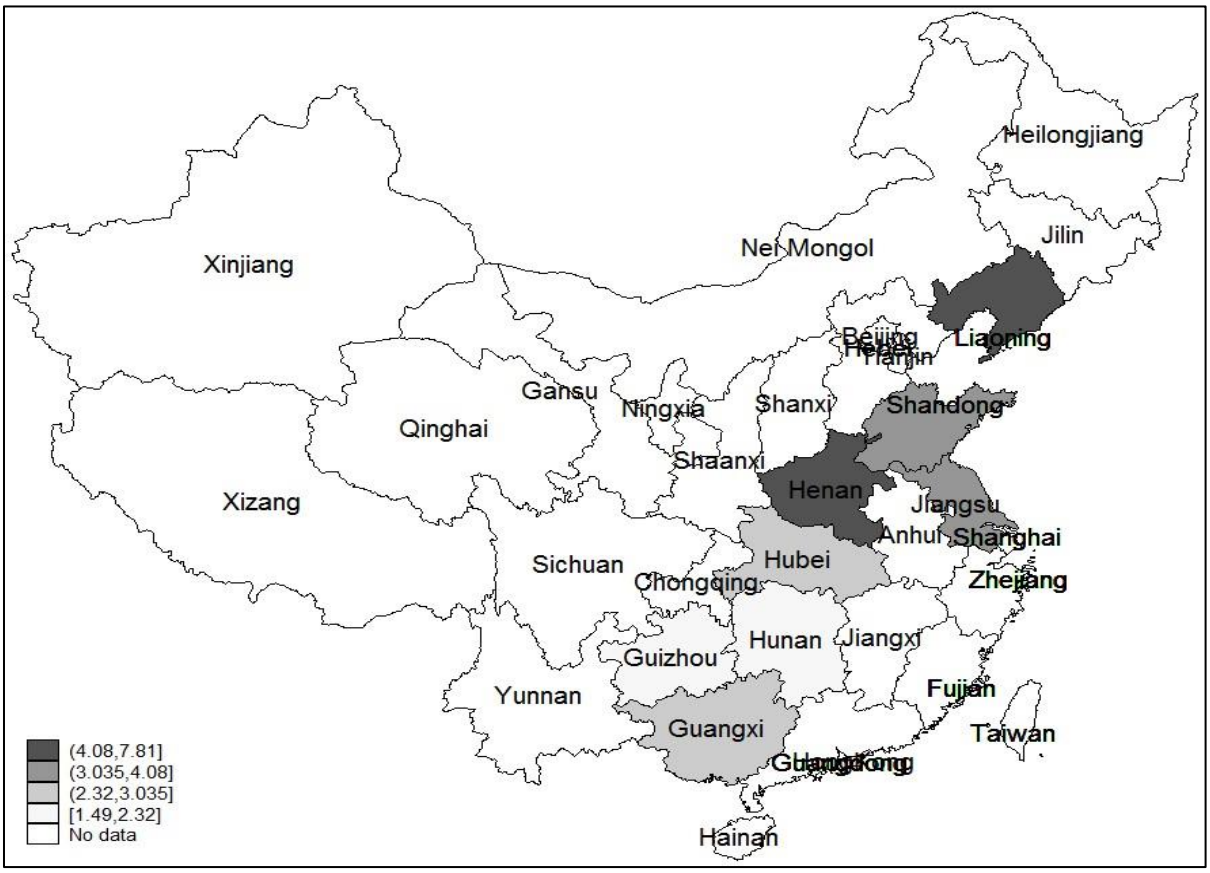


Table 4. 1 OLS estimation of working women's annual wage.

Explanatory variables	(1)	(2)
Age	0.0729***	0.0702***
	(0.0048)	(0.0047)
Age square	-0.0008***	-0.0008***
	(0.0001)	(0.0001)
Education years	0.0402***	0.0491***
	(0.0021)	(0.0021)
Married (1=yes)	-0.0941	-0.1284*
	(0.0756)	(0.0773)
Health status: excellent/good (1=yes)	0.1067***	0.0345
	(0.0143)	(0.0226)
Non-agriculture registration (1=yes)	0.0566***	0.1161***
	(0.0150)	(0.0149)
Ethnic minority (1=yes)	0.0250	0.0077
	(0.0194)	(0.0223)
Husband's income (logged value)	0.1652***	0.1858***
	(0.0089)	(0.0097)
Occupations		
Base case: non-skilled		
Skilled workers	0.2387***	0.2841***
	(0.0258)	(0.0248)
Professional	0.3337***	0.4393***
	(0.0257)	(0.0244)
Administrator	0.2866***	0.2694***
	(0.0241)	(0.0237)
Service industry	0.2534***	0.2479***
	(0.0210)	(0.0208)
Other occupations	0.1913***	0.2293***
	(0.0503)	(0.0493)
Constant	2.6106***	3.9523
	(0.1338)	(0.1465)
Year effect	No	Yes
County effect	No	Yes
R-squared	0.358	0.406
Observations	17,159	17,159

Table 4. 2 Descriptive statistics of key variables, whole sample

	raw data (age between 16-55, female only)		whole sample (married and with partners)		women participate in labour markets		women don't participate in labour markets	
Explanatory variables	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Female labour force participation rate (%)	80.31	39.77	82.52	37.98	1	0	0	0
Number of children	0.86	2.71	1.28	0.56	1.25	0.54	1.39	0.63
Household structure								
Women without children (%)	18.53	38.85	1.57	12.44	1.52	12.23	1.82	13.38
Women with children under3 (%)	9.84	31.79	12.85	34.23	11.4	32.31	19.68	41.46
Women with children age 3-6 (%)	12.16	35.47	16.74	38.08	17.4	38.54	13.65	35.65
Women with children age 6-12 (%)	27.83	55.76	41.14	56.44	42.55	56.33	34.47	56.53
Women with children age 12-16 (%)	21.67	47.96	24.18	46.69	24.36	46.7	23.32	46.66
Age	35.82	10.90	36.22	7.25	36.11	6.92	36.7	8.59
Education categories (dummy %)								
Primary or less	41.90	49.34	18.25	38.63	16.77	37.37	25.26	43.47
Junior middle school	32.87	46.97	40.72	49.14	38.94	48.77	49.15	50.02
Senior middle school	12.24	32.78	23.88	42.64	24.46	42.99	21.16	40.87
College or more	7.59	26.49	17.14	37.69	19.83	39.88	4.44	20.6
Urban registration (%)	32.93	47.00	71.64	45.08	74.48	43.6	58.25	49.34
Ethnic minority (%)	14.82	35.53	8.59	28.02	8.27	27.54	10.13	30.18
Health condition (good/excellent, %)	30.63	46.10	31.74	46.55	34.07	47.4	20.71	40.54
Women's annual wage (logged value & inflated, RMB)	8.22	1.13	8.71	0.87	8.71	0.87	0	0
Women's other income (logged value & inflated, RMB)	8.31	2.49	8.95	0.93	8.92	0.91	9.1	1.02

Husband's annual income(logged value & inflated, RMB)	8.56	1.12	7.77	3.58	7.75	3.5	7.9	3.93
Co-resident with adult children (%)	32.10	48.51	28.22	45.01	26.07	43.91	38.34	48.65
Co-resident with elder parents (%)	17.28	37.81	23.23	42.23	23.78	42.58	20.59	40.46
Year dummy (%)								
1989	14.36	35.07	12.87	33.48	13.71	34.4	8.87	28.45
1991	13.34	34.00	11.97	32.46	12.87	33.49	7.74	26.73
1993	12.54	33.12	11.99	32.49	13.18	33.83	6.37	24.44
1997	13.31	33.96	14.67	35.39	15.28	35.98	11.83	32.32
2000	14.80	35.51	14.1	34.8	14.05	34.75	14.33	35.06
2004	11.03	31.33	9.92	29.9	8.87	28.43	14.9	35.63
2006	10.55	30.73	9.7	29.6	8.99	28.6	13.08	33.74
2009	10.08	30.10	14.77	35.49	13.06	33.7	22.87	42.02
Province dummy (%)								
Liaoning	9.63	29.50	13.4	34.07	13.95	34.65	10.81	31.07
Heilongjiang	6.76	25.11	8.15	27.37	7.49	26.33	11.26	31.63
Jiangsu	11.49	31.89	14.77	35.49	16.41	37.04	7.05	25.62
Shandong	11.01	31.31	14.18	34.89	13.76	34.45	16.15	36.82
Henan	12.60	33.19	8.15	27.37	8.07	27.24	8.53	27.95
Hubei	11.78	32.24	11.77	32.23	11.93	32.42	11.04	31.35
Hunan	11.69	32.13	12.27	32.81	10.43	30.57	20.93	40.71
Guangxi	12.79	33.40	10.14	30.19	10.65	30.85	7.74	26.73
Guizhou	12.23	32.77	7.16	25.78	7.3	26.02	6.48	24.64
Total observations	31,551		5,029		4,150		879	

Table 4. 3 Descriptive statistics of key variables, fine levels sample

	raw data (age between 16-55, female only)		whole sample		women participate in labour markets		women don't participate in labour markets	
Explanatory variables	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Female labour force participation rate (%)	88.65	31.72	89.89	30.16	1	0	0	0
Number of children	1.08	2.39	1.27	0.53	1.25	0.5	1.5	0.68
Household structure								
Number of women without children (%)	24.77	43.17	2.42	15.38	2.23	14.77	4.13	19.99
Number of women with children under3 (%)	14.32	38.07	19.8	40.49	18.31	39.17	33.06	48.97
Number of women with children age 3-6 (%)	18.90	43.55	30.41	47.8	30.2	47.33	32.23	51.99
Number of women with children age 6-12 (%)	35.50	63.09	53.55	58.82	52.42	57.41	63.64	69.52
Number of women with children age 12-16 (%)	23.39	50.90	19.13	43.2	19.24	43.26	18.18	42.82
Age	32.97	10.68	32.66	5.53	32.9	5.41	30.6	6.09
Education categories (dummy %)								
Primary or less	48.76	49.99	18.55	38.88	17.19	37.75	30.58	46.27
Junior middle school	29.21	45.48	44.61	49.73	44.24	49.69	47.93	50.17
Senior middle school	10.70	30.91	25.73	43.73	26.21	44	21.49	41.24
College or more	3.80	19.11	11.11	31.44	12.36	32.93	0	0
Urban registration (%)	30.85	46.19	85.71	35.01	86.9	33.76	75.21	43.36
Ethnic minority (%)	17.84	38.29	9.36	29.13	9.2	28.92	10.74	31.1
Health condition (good/excellent, %)	50.27	50.00	56.39	49.61	56.51	49.6	55.37	49.92
Women's annual wage (logged value & inflated, RMB)	7.79	0.99	8.12	0.6	8.12	0.6	/	/
Women's other income (logged value & inflated, RMB)	8.39	1.42	8.79	0.94	8.82	0.91	8.57	1.09

Husband's annual income(logged value & inflated, RMB)	8.09	0.94	8.33	0.65	8.31	0.63	8.48	0.83
Co-resident with adult children (%)	15.55	49.69	6.68	24.98	6.6	24.84	7.44	26.35
Co-resident with elder parents (%)	12.07	32.58	10.69	30.92	11.06	31.38	7.44	26.35
Year dummy (%)								
1989	35.68	47.91	30.91	46.23	30.95	46.25	30.58	46.27
1991	33.14	47.08	38.68	48.72	38.1	48.59	43.8	49.82
1993	31.18	46.32	30.41	46.02	30.95	46.25	25.62	43.83
Province dummy (%)								
Liaoning	11.26	31.61	17.63	38.12	18.59	38.92	9.09	28.87
Heilongjiang	0.00	0.00	0	0	0	0	0	0
Jiangsu	11.68	32.12	9.36	29.13	9.57	29.44	7.44	26.35
Shandong	11.54	31.95	15.2	35.92	14.68	35.41	19.83	40.04
Henan	13.63	34.31	8.1	27.3	8.74	28.25	2.48	15.61
Hubei	12.83	33.44	15.87	36.56	16.26	36.92	12.4	33.09
Hunan	11.99	32.48	13.53	34.22	11.62	32.06	30.58	46.27
Guangxi	13.27	33.93	10.78	31.02	11.34	31.72	5.79	23.44
Guizhou	13.81	34.50	9.52	29.37	9.2	28.92	12.4	33.09
total observations	12,696		1,485		1,335		150	

Table 4. 4 Effect of fertility on female labour force participation - OLS estimation & whole sample (baseline results)

Explanatory variables	(1)	(2)	(3)	(4)
Number of children	-0.1080***	-0.1081***	-0.1092***	-0.1080***
	(0.0117)	(0.0118)	(0.0117)	(0.0118)
Age	0.0519***	0.0502***	0.0528***	0.0506***
	(0.0076)	(0.0075)	(0.0076)	(0.0074)
Age suqare	-0.0007***	-0.0007***	-0.0007***	-0.0007***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education category				
Base case: primary or less				
Lower middle school	0.0219	0.0239	0.0220	0.0266
	(0.0148)	(0.0146)	(0.0147)	(0.0146)
Upper middle school	0.0480***	0.0743***	0.0477***	0.0740***
	(0.0181)	(0.0177)	(0.0180)	(0.0177)
College or more	0.1668***	0.2166***	0.1672***	0.2167***
	(0.0179)	(0.0186)	(0.0178)	(0.0186)
Health condition (good/excellent)	0.0775***	0.0728***	0.0736***	0.0724***
	(0.0109)	(0.0193)	(0.0110)	(0.0193)
Ethnic minority	-0.0419**	-0.0442**	-0.0455**	-0.0482**
	(0.0196)	(0.0204)	(0.0196)	(0.0204)
Non-agriculture registration	0.0411***	0.0442***	0.0423***	0.0405***
	(0.0110)	(0.0111)	(0.0111)	(0.0111)
Co-resident with adult children	-0.0115	-0.0076	-0.0169	-0.0066
	(0.0163)	(0.0162)	(0.0163)	(0.0161)
Co-resident with elderly parents	0.0220*	0.0292**	0.0250**	0.0288**
	(0.0123)	(0.0128)	(0.0123)	(0.0128)
Women's annual wage	0.0990***	0.1324***	0.0908***	0.1348***
	(0.0262)	(0.0242)	(0.0256)	(0.0268)
Women's other income	-0.1206***	-0.1431***	-0.1258***	-0.1403***
	(0.0016)	(0.0015)	(0.0016)	(0.0015)
Husband's income			-0.0502***	-0.0515***
			(0.0072)	(0.0077)
Constant	-0.4047***	-0.9881***	-0.3534*	-0.9096***
	(0.1941)	(0.2082)	(0.1924)	(0.2044)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
R-squared	0.325	0.359	0.332	0.360
Observations	5,029	5,029	5,029	5,029

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB.

Table 4. 5 Effect of fertility on female labour force participation - probit estimation & whole sample (baseline results)

Explanatory variables	(1)	(2)	(3)	(4)
Number of children	-0.1443***	-0.1483***	-0.1453***	-0.1480***
	(0.0096)	(0.0097)	(0.0095)	(0.0096)
Age	0.0439***	0.0441***	0.0446***	0.0445***
	(0.0059)	(0.0058)	(0.0058)	(0.0057)
Age square	-0.0006***	-0.0005***	-0.0006***	-0.0005***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education category				
Base case: primary or less				
Lower middle school	0.0071	0.0064	0.0071	0.0260
	(0.0136)	(0.0132)	(0.0136)	(0.0132)
Upper middle school	0.0400***	0.0582***	0.0391***	0.0575***
	(0.0143)	(0.0128)	(0.0143)	(0.0128)
College or more	0.1562***	0.1642***	0.1551***	0.1635***
	(0.0105)	(0.0088)	(0.0104)	(0.0087)
Health condition (good/excellent)	0.0762***	0.0772***	0.0737***	0.0772***
	(0.0104)	(0.0202)	(0.0105)	(0.0202)
Ethnic minority	-0.0413**	-0.0482**	-0.0456**	-0.0497**
	(0.0190)	(0.0207)	(0.0193)	(0.0209)
Non-agriculture registration	0.0380***	0.0461***	0.0398***	0.0481***
	(0.0128)	(0.0122)	(0.0128)	(0.0123)
Co-resident with adult children	-0.0171	-0.0127	-0.0123	-0.0114
	(0.0161)	(0.0150)	(0.0160)	(0.0149)
Co-resident with elderly parents	0.0215*	0.0300**	0.0241**	0.0298**
	(0.0123)	(0.0121)	(0.0122)	(0.0120)
Women's annual wage	0.0713***	0.0748***	0.0755***	0.0786***
	(0.0061)	(0.0068)	(0.0058)	(0.0064)
Women's other income	-0.1015***	-0.0902	-0.1053***	-0.0941***
	(0.0014)	(0.0013)	(0.0014)	(0.0013)
Husband's income			-0.0349***	-0.0395***
			(0.0067)	(0.0066)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Pseudo R-squared	0.249	0.331	0.251	0.379
Observations	5,029	5,029	5,029	5,029

Note: Marginal effects are reported. Robust standard errors in parentheses.

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

Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB

Table 4. 6 Effect of fertility on female labour force participation - OLS estimation & fine levels sample (baseline results)

Explanatory variables	(1)	(2)	(3)	(4)
Number of children	-0.1454***	-0.1440***	-0.1452***	-0.1438***
	(0.0193)	(0.0197)	(0.0193)	(0.0197)
Age	0.0820***	0.0767***	0.0815***	0.0764***
	(0.0188)	(0.0190)	(0.0187)	(0.0190)
Age square	-0.0011	-0.0010***	-0.0011***	-0.0010***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Education category				
Base case: primary or less				
Lower middle school	0.0480*	0.0503*	0.0471*	0.0501*
	(0.0277)	(0.0282)	(0.0277)	(0.0282)
Upper middle school	0.0672**	0.0747***	0.0665**	0.0746***
	(0.0284)	(0.0287)	(0.0285)	(0.0287)
College or more	0.1250***	0.1347***	0.1229***	0.1339***
	(0.0256)	(0.0277)	(0.0255)	(0.0276)
Health condition (good/excellent)	0.1085***	0.1301***	0.1055***	0.1309***
	(0.0189)	(0.0276)	(0.0191)	(0.0276)
Ethnic minority	-0.0869***	-0.0913**	-0.0895***	-0.0917***
	(0.0327)	(0.0354)	(0.0328)	(0.0355)
Non-agriculture registration	0.0394**	0.0376**	0.0392**	0.0376**
	(0.0160)	(0.0162)	(0.0160)	(0.0162)
Co-resident with adult children	-0.0059	-0.0081	-0.0048	-0.0073
	(0.0343)	(0.0348)	(0.0342)	(0.0347)
Co-resident with elderly parents	0.0518**	0.0389*	0.0505**	0.0381*
	(0.0207)	(0.0217)	(0.0206)	(0.0218)
Women's annual wage	0.0956***	0.0970***	0.1039***	0.1123***
	(0.0112)	(0.0120)	(0.0098)	(0.0106)
Women's other income	-0.1068***	-0.1060***	-0.1168***	-0.1161***
	(0.0066)	(0.0068)	(0.0066)	(0.0068)
Husband's income			-0.0680***	-0.0706***
			(0.0156)	(0.0161)
Constant	-0.5740*	-0.5681*	-0.5016	-0.5234
	(0.3192)	(0.3272)	(0.3289)	(0.3396)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
R-squared	0.266	0.300	0.297	0.321
Observations	1,485	1,485	1,485	1,485

Note: The same as Table 4.3.

Table 4. 7 Effect of fertility on female labour force participation - probit estimation & fine levels sample (baseline results)

Explanatory variables	(1)	(2)	(3)	(4)
Number of children	-0.1456***	-0.1450***	-0.1451***	-0.1448***
	(0.0167)	(0.0170)	(0.0167)	(0.0170)
Age	0.0742***	0.0706***	0.0735***	0.0703***
	(0.0147)	(0.0147)	(0.0146)	(0.0146)
Age square	-0.0010***	-0.0009***	-0.0009***	-0.0009***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Education category				
Base case: primary or less				
Lower middle school	0.0444*	0.0410*	0.0433*	0.0405*
	(0.0231)	(0.0233)	(0.0231)	(0.0233)
Upper middle school	0.0595**	0.0654**	0.0588**	0.0648**
	(0.0266)	(0.0267)	(0.0266)	(0.0267)
College or more	0.1233***	0.1259***	0.1211***	0.1255***
	(0.0299)	(0.0311)	(0.0300)	(0.0311)
Health condition (good/excellent)	0.0962***	0.0962***	0.0933***	0.0974***
	(0.0204)	(0.0306)	(0.0207)	(0.0306)
Ethnic minority	-0.0847***	-0.0892***	-0.0876***	-0.0899***
	(0.0260)	(0.0294)	(0.0261)	(0.0294)
Non-agriculture registration	0.0412**	0.0430**	0.0422**	0.0435**
	(0.0201)	(0.0209)	(0.0210)	(0.0209)
Co-resident with adult children	-0.0033	-0.0052	-0.0012	-0.0035
	(0.0411)	(0.0413)	(0.0411)	(0.0412)
Co-resident with elderly parents	0.0731***	0.0525*	0.0715***	0.0515**
	(0.0279)	(0.0273)	(0.0278)	(0.0273)
Women's annual wage	0.1084***	0.1022***	0.1024***	0.1093***
	(0.0111)	(0.0115)	(0.0099)	(0.0106)
Women's other income	-0.1168***	-0.1162***	-0.1169***	-0.1164***
	(0.0050)	(0.0052)	(0.0050)	(0.0052)
Husband's income			-0.0876***	-0.0915***
			(0.0133)	(0.0134)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Pseudo R-squared	0.205	0.342	0.206	0.343
Observations	1,485	1,485	1,485	1,485

Note: The same as Table 4.4.

Table 4. 8 Effect of fertility on female labour force participation - 2SLS estimation & whole sample

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0579*		-0.0613*		-0.0604*		-0.0627*
		(0.0301)		(0.0334)		(0.0313)		(0.0346)
Instrument-relaxation	0.5191***		0.4974***		0.5182***		0.4974***	
	(0.0295)		(0.0277)		(0.0295)		(0.0278)	
Age	0.1351***	0.0297***	0.1611***	0.0317***	0.1434***	0.0291***	0.1580***	0.0321***
	(0.0183)	(0.0137)	(0.0127)	(0.0136)	(0.0182)	(0.0083)	(0.0146)	(0.0082)
Age square	-0.0015***	-0.0004*	-0.0018***	-0.0004***	-0.0016***	-0.0004**	-0.0018***	-0.0004***
	(0.0003)	(0.0002)	(0.0002)	(0.0001)	(0.0003)	(0.0001)	(0.0002)	(0.0001)
Education categories								
Base case: primary or less								
Lower middle school	-0.1752***	0.0260	-0.1571***	0.0209	-0.1748***	0.0227	-0.1572***	0.0216
	(0.0254)	(0.0199)	(0.0244)	(0.0159)	(0.0254)	(0.0195)	(0.0240)	(0.0159)
Upper middle school	-0.1827***	0.0645***	-0.1852***	0.0858***	-0.1834***	0.0635***	-0.1852***	0.0853***
	(0.0277)	(0.0203)	(0.0264)	(0.0160)	(0.0277)	(0.0183)	(0.0264)	(0.0202)
College or more	-0.3244***	0.1964***	-0.3049***	0.2313***	-0.3244***	0.1958***	-0.3049***	0.2314***
	(0.0273)	(0.0233)	(0.0241)	(0.0237)	(0.0273)	(0.0180)	(0.0270)	(0.0237)
Health condition (good/excellent)	0.0923***	0.0463***	0.0947***	0.0513***	0.0894***	0.0489***	0.0947***	0.0529***
	(0.0163)	(0.0110)	(0.0295)	(0.0188)	(0.0163)	(0.0108)	(0.0295)	(0.0187)
Ethnic minority	0.3083***	-0.0156	0.2817***	-0.0207	0.3609***	-0.0182	0.3046***	-0.0216
	(0.0262)	(0.0201)	(0.0281)	(0.0196)	(0.0262)	(0.0195)	(0.0289)	(0.0212)
Non-agriculture registration	-0.5172***	0.0344*	-0.5392***	0.0406**	-0.5192***	0.0386**	-0.5539***	0.0395**
	(0.0292)	(0.0178)	(0.0281)	(0.0190)	(0.0291)	(0.0175)	(0.0281)	(0.0188)
Co-resident with adult children	0.0451	-0.0601	0.0371	-0.0272	0.0504	-0.0555	0.0472	-0.0257
	(0.0353)	(0.0591)	(0.0248)	(0.0191)	(0.0353)	(0.0492)	(0.0347)	(0.0191)
Co-resident with elderly parents	0.1135***	0.0488***	0.1035***	0.0365***	0.1114***	0.0507***	0.0713***	0.0363***
	(0.0171)	(0.0136)	(0.0180)	(0.0136)	(0.0171)	(0.0136)	(0.0180)	(0.0136)
Women's annual wage	-0.4792***	0.0968**	-0.4320***	0.1305***	-0.4349***	0.1152***	-0.4275***	0.1411***

	(0.0703)	(0.0443)	(0.0426)	(0.0375)	(0.0703)	(0.0428)	(0.0467)	(0.0377)
Women's other income	0.1182***	-0.1372***	0.1178***	-0.1433***	0.1162***	-0.1378***	0.1179***	-0.1338***
	(0.0077)	(0.0030)	(0.0062)	(0.0031)	(0.0077)	(0.0031)	(0.0069)	(0.0031)
Husband's income					0.1651***	-0.0350***	0.1548***	-0.0329***
					(0.0099)	(0.0070)	(0.0128)	(0.0074)
Constant	0.5252***	0.3231***	0.5562***	0.3798**	0.5853***	0.3803***	0.5506***	0.3127*
	(0.2016)	(0.1594)	(0.1902)	(0.1642)	(0.2067)	(0.1632)	(0.2080)	(0.1740)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	99.24	/	59.69	/	92.25	/	57.75	/
Observations	5,029		5,029		5,029		5,029	
R-squared	0.250	0.353	0.306	0.341	0.249	0.316	0.297	0.342

Note: Robust standard errors in parentheses

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 9 Effect of fertility on female labour force participation – IV-probit estimation & whole sample

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0625*		-0.0641*		-0.0632*		-0.0643*
		(0.0334)		(0.0338)		(0.0330)		(0.0335)
Instrument-relaxation	0.5191***		0.4974***		0.5182***		0.4974***	
	(0.0294)		(0.0277)		(0.0295)		(0.0278)	
Age	0.1351***	0.0245***	0.1611***	0.0303***	0.1434***	0.0253***	0.1580***	0.0307***
	(0.0183)	(0 .0066)	(0.0127)	(0.0066)	(0.0182)	(0.0066)	(0.0146)	(0.0066)
Age square	-0.0015***	-0.0003***	-0.0018***	-0.0004***	-0.0016***	-0.0003***	-0.0018***	-0.0004***
	(0.0003)	(0 .0001)	(0.0002)	(0.0001)	(0.0003)	(0.0001)	(0.0002)	(0.0001)
Education categories								
Base case: primary or less								
Lower middle school	-0.1752***	0.0172	-0.1571***	0.0288	-0.1748***	0.0165	-0.1572***	0.0282
	(0.0254)	(0.0155)	(0.0244)	(0.0150)	(0.0254)	(0.0155)	(0.0240)	(0.0150)
Upper middle school	-0.1827***	0.0562***	-0.1852***	0.0729***	-0.1834***	0.0545***	-0.1852***	0.0719***
	(0.0276)	(0.0174)	(0.0264)	(0.0170)	(0.0277)	(0.0173)	(0.0264)	(0.0170)
College or more	-0.3244***	0.2640***	-0.3049***	0.2898***	-0.3244***	0.2612***	-0.3049***	0.2885***
	(0.0273)	(0.0285)	(0.0241)	(0.0277)	(0.0273)	(0.0284)	(0.0270)	(0.0276)
Health condition (good/excellent)	0.0923***	0.0498***	0.0947***	0.0607***	0.0894***	0.0484***	0.0947***	0.0709***
	(0.0162)	(0.0127)	(0.0295)	(0.0223)	(0.0163)	(0.0127)	(0.0295)	(0.0222)
Ethnic minority	0.3083***	-0.0157	0.2817***	-0.0268	0.3609***	-0.0185	0.3046***	-0.0279
	(0.0262)	(0.0187)	(0.0281)	(0.0192)	(0.0262)	(0.0187)	(0.0289)	(0.0193)
Non-agriculture registration	-0.5172***	0.0394***	-0.5392***	0.0453***	-0.5192***	0.0430***	-0.5539***	0.0470***
	(0.0292)	(0.0148)	(0.0281)	(0.0152)	(0.0291)	(0.0148)	(0.0281)	(0.0151)
Co-resident with adult children	0.0451	-0.0387	0.0371	-0.0238	0.0504	-0.0338	0.0472	-0.0220
	(0.0353)	(0.0317)	(0.0248)	(0.0168)	(0.0353)	(0.0369)	(0.0347)	(0.0168)
Co-resident with elderly parents	0.1135***	0.0507***	0.1035***	0.0394***	0.1114***	0.0521***	0.0713***	0.0392***
	(0.0171)	(0.0150)	(0.0180)	(0.0147)	(0.0171)	(0.0149)	(0.0180)	(0.0147)

Women's annual wage	-0.4792***	0.0814***	-0.4320***	0.0970***	-0.4349***	0.0856***	-0.4275***	0.0979***
	(0.0703)	(0.0065)	(0.0426)	(0.0069)	(0.0703)	(0.0057)	(0.0467)	(0.0062)
Women's other income	0.1182***	-0.1001***	0.1178***	-0.1000***	0.1162***	-0.1009***	0.1179***	-0.1013***
	(0.0077)	(0.0014)	(0.0062)	(0.0014)	(0.0077)	(0.0014)	(0.0069)	(0.0014)
Husband's income					0.1651***	-0.0454***	0.1548***	-0.0461***
					(0.0099)	(0.0069)	(0.0128)	(0.0070)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F statistics on instrument	106.22	/	69.88	/	98.54	/	67.64	/
Wald test of exogeneity (p value)	3.09 (0.048)		1.64 (0.028)		3.44 (0.031)		1.42 (0.035)	
Observations	5,029		5,029		5,029		5,029	

Note: Marginal effects are presented. Robust standard errors in parentheses

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 10 Effect of fertility on female labour force participation - 2SLS estimation & fine levels sample

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0819*		-0.0829*		-0.0831*		-0.0850*
		(0.0442)		(0.0444)		(0.0441)		(0.0443)
Instrument-fine	-0.2806***		-0.2628***		-0.2824***		-0.2638***	
	(0.0150)		(0.0152)		(0.0151)		(0.0152)	
Age	0.1666***	0.0823***	0.1702***	0.0855***	0.1674***	0.0842***	0.1707***	0.0865***
	(0.0240)	(0.0239)	(0.0237)	(0.0304)	(0.0238)	(0.0240)	(0.0235)	(0.0303)
Age square	-0.0020***	-0.0011***	-0.0021***	-0.0011***	-0.0021***	-0.0011***	-0.0021***	-0.0011***
	(0.0004)	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0003)	(0.0004)	(0.0004)
Education categories								
Base case: primary or less								
Lower middle school	-0.2989***	0.0374*	-0.2806***	0.0487*	-0.2967***	0.0376*	-0.2798***	0.0493*
	(0.0424)	(0.0200)	(0.0416)	(0.0307)	(0.0423)	(0.0200)	(0.0416)	(0.0304)
Upper middle school	-0.2761***	0.0866***	-0.2746***	0.0813***	-0.2748***	0.0818***	-0.2741***	0.0891***
	(0.0474)	(0.0285)	(0.0466)	(0.0256)	(0.0474)	(0.0285)	(0.0466)	(0.0263)
College or more	-0.5794***	0.2626***	-0.5855***	0.2845***	-0.5756***	0.2619***	-0.5834***	0.2793***
	(0.0454)	(0.0297)	(0.0478)	(0.0312)	(0.0455)	(0.0296)	(0.0479)	(0.0303)
Health condition (good/excellent)	0.0638**	0.0822***	0.0106	0.0886***	0.0698**	0.0888***	0.0089	0.0895***
	(0.0293)	(0.0193)	(0.0417)	(0.0280)	(0.0296)	(0.0196)	(0.0418)	(0.0279)
Ethnic minority	0.2400***	-0.0867***	0.2638***	-0.0875**	0.2434***	-0.0885***	0.2647***	-0.0875**
	(0.0440)	(0.0330)	(0.0482)	(0.0359)	(0.0437)	(0.0331)	(0.0482)	(0.0360)
Non-agriculture registration	-0.4757***	0.0913**	-0.4958***	0.0935**	-0.4754***	0.0971***	-0.4957***	0.0914**
	(0.0419)	(0.0352)	(0.0419)	(0.0395)	(0.0420)	(0.0355)	(0.0419)	(0.0393)
Co-resident with adult children	0.0450	-0.0463	0.0382	-0.0308	0.0432	-0.0425	0.0367	-0.0339
	(0.0708)	(0.0479)	(0.0720)	(0.0619)	(0.0707)	(0.0479)	(0.0720)	(0.0615)
Co-resident with elderly parents	0.1047***	0.0459***	0.0951***	0.0496***	0.1023***	0.0428***	0.0935***	0.0582***
	(0.0363)	(0.0140)	(0.0384)	(0.0154)	(0.0362)	(0.0140)	(0.0385)	(0.0153)

Women's annual wage	-0.2758***	0.0820***	-0.2569**	0.0828***	-0.2618***	0.0884***	-0.2762***	0.0883***
	(0.0252)	(0.0130)	(0.0257)	(0.0147)	(0.0299)	(0.0118)	(0.0298)	(0.0131)
Women's other income	0.0818***	-0.1039***	0.0923***	-0.1031***	0.0817***	-0.1041***	0.0821***	-0.1032***
	(0.0081)	(0.0065)	(0.0079)	(0.0066)	(0.0081)	(0.0065)	(0.0079)	(0.0067)
Husband's income					0.1027***	-0.0718***	0.1018***	-0.0702***
					(0.0281)	(0.0157)	(0.0283)	(0.0165)
Constant	-1.2992***	-0.5088	-1.4144***	-0.5862	-1.3980***	-0.4615	-1.4996***	-0.5564
	(0.4090)	(0.3550)	(0.4109)	(0.4133)	(0.4202)	(0.3617)	(0.4275)	(0.4255)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	48.32	/	32.92	/	44.97	/	31.56	/
Observations	1,485		1,485		1,485		1,485	
R-squared	0.300	0.283	0.314	0.2913	0.301	0.280	0.325	0.288

Note: Robust standard errors in parentheses.

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 11 Effect of fertility on female labour force participation – IV-probit estimation & fine levels sample

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0807*		-0.0816*		-0.0800*		-0.0821*
		(0.0424)		(0.0436)		(0.0429)		(0.0440)
Instrument-fine	-0.2806***		-0.2628***		-0.2824***		-0.2638***	
	(0.0150)		(0.0152)		(0.0151)		(0.0152)	
Age	0.1666***	0.0802***	0.1702***	0.0772***	0.1674***	0.0812***	0.1707***	0.0875***
	(0.0240)	(0.0215)	(0.0237)	(0.0254)	(0.0238)	(0.0210)	(0.0235)	(0.0230)
Age square	-0.0020***	-0.0010***	-0.0021***	-0.0010***	-0.0021***	-0.0010***	-0.0021***	-0.0011***
	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)
Education categories								
Base case: primary or less								
Lower middle school	-0.2989***	0.0478*	-0.2806***	0.0502*	-0.2967***	0.0496*	-0.2798***	0.0521*
	(0.0424)	(0.0299)	(0.0416)	(0.0309)	(0.0423)	(0.0292)	(0.0416)	(0.0300)
Upper middle school	-0.2761***	0.0814**	-0.2746***	0.0875**	-0.2748***	0.0875**	-0.2741***	0.0877**
	(0.0474)	(0.0391)	(0.0466)	(0.0390)	(0.0474)	(0.0387)	(0.0466)	(0.0391)
College or more	-0.5794***	0.2899***	-0.5855***	0.3033***	-0.5756***	0.2922***	-0.5834***	0.3054***
	(0.0454)	(0.0311)	(0.0478)	(0.0315)	(0.0455)	(0.0315)	(0.0479)	(0.0320)
Health condition (good/excellent)	0.0638**	0.1087***	0.0106	0.1083***	0.0698**	0.1016***	0.0089	0.1034***
	(0.0293)	(0.0208)	(0.0417)	(0.0207)	(0.0296)	(0.0210)	(0.0418)	(0.0304)
Ethnic minority	0.2400***	-0.0833***	0.2638***	-0.0821***	0.2434***	-0.0854***	0.2647***	-0.0802***
	(0.0440)	(0.0263)	(0.0482)	(0.0303)	(0.0437)	(0.0265)	(0.0482)	(0.0309)
Non-agriculture registration	-0.4757***	0.1088***	-0.4958***	0.1032***	-0.4754***	0.1070***	-0.4957***	0.1012***
	(0.0419)	(0.0334)	(0.0419)	(0.0430)	(0.0420)	(0.0326)	(0.0419)	(0.0419)
Co-resident with adult children	0.0450	-0.0268	0.0382	-0.0263	0.0432	-0.0326	0.0367	-0.0480
	(0.0708)	(0.0538)	(0.0720)	(0.0603)	(0.0707)	(0.0532)	(0.0720)	(0.0594)
Co-resident with elderly parents	0.1047***	0.0622**	0.0951***	0.0625**	0.1023***	0.0593*	0.0935***	0.0642**
	(0.0363)	(0.0308)	(0.0384)	(0.0308)	(0.0362)	(0.0305)	(0.0385)	(0.0307)

Women's annual wage	-0.2758***	0.0830***	-0.2569**	0.0850***	-0.2618***	0.0880***	-0.2762***	0.0869***
	(0.0252)	(0.0136)	(0.0257)	(0.0136)	(0.0299)	(0.0122)	(0.0298)	(0.0131)
Women's other income	0.0818***	-0.1008***	0.0923***	-0.1055***	0.0817***	-0.1005***	0.0821***	-0.1005***
	(0.0081)	(0.0053)	(0.0079)	(0.0055)	(0.0081)	(0.0053)	(0.0079)	(0.0056)
Husband's income					0.1027***	-0.0662***	0.1018***	-0.0690***
					(0.0281)	(0.0137)	(0.0283)	(0.0143)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F statistics on instrument	38.86	/	25.43	/	36.07	/	24.35	/
Wald test of exogeneity (p value)	1.53 (0.047)		1.85 (0.035)		1.55 (0.045)		1.99 (0.033)	
Observations	1,485		1,485		1,485		1,485	

Note: Marginal effects are presented. Robust standard errors in parentheses.

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 12 Effect of fertility on female labour force participation - 2SLS estimation, whole sample & urban areas

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0504*		-0.0609*		-0.0534*		-0.0623*
		(0.0316)		(0.0356)		(0.0319)		(0.0352)
Instrument-relaxation	0.3914***		0.3679***		0.3906***		0.3683***	
	(0.0452)		(0.0425)		(0.0452)		(0.0425)	
Age	0.0425***	0.0581***	0.0426***	0.0640**	0.0425***	0.0584***	0.0429***	0.0680***
	(0.0110)	(0.0121)	(0.0110)	(0.0201)	(0.0110)	(0.0121)	(0.0111)	(0.0201)
Age square	-0.0005***	-0.0003*	-0.0005***	-0.0004**	-0.0005***	-0.0003*	-0.0005***	-0.0004**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Education categories								
Base case: primary or less								
Lower middle school	-0.1138***	0.0022	-0.1246***	0.0390	-0.1153***	0.0022	-0.1228***	0.0372
	(0.0334)	(0.0310)	(0.0305)	(0.0308)	(0.0334)	(0.0310)	(0.0306)	(0.0307)
Upper middle school	-0.2738**	0.0412	-0.3026***	0.0474*	-0.2755**	0.0367	-0.3009***	0.0857***
	(0.0354)	(0.0304)	(0.0328)	(0.0303)	(0.0356)	(0.0303)	(0.0328)	(0.0303)
College or more	-0.4669***	0.1788***	-0.5068***	0.2248***	-0.4684***	0.1742***	-0.5054***	0.2232***
	(0.0357)	(0.0343)	(0.0340)	(0.0372)	(0.0357)	(0.0341)	(0.0340)	(0.0369)
Health condition (good/excellent)	0.0616***	0.0365**	0.0603**	0.0485**	0.0603***	0.0336**	0.0605**	0.0487**
	(0.0184)	(0.0166)	(0.0291)	(0.0225)	(0.0186)	(0.0166)	(0.0291)	(0.0225)
Ethnic minority	0.1398***	-0.0534	0.1400****	-0.0349	0.1389***	-0.0551	0.1406***	-0.0353
	(0.0388)	(0.0366)	(0.0381)	(0.0357)	(0.0389)	(0.0363)	(0.0381)	(0.0357)
Non-agriculture registration	-0.6271***	0.1171***	-0.6825***	0.1088***	-0.6277***	0.1146***	-0.6832***	0.1089***
	(0.0287)	(0.0367)	(0.0283)	(0.0372)	(0.0287)	(0.0369)	0.0282524	(0.0372)
Co-resident with adult children	0.0340	-0.0222	0.0358	-0.0314	0.0363	-0.0265	0.0352	-0.0308
	(0.0289)	(0.0266)	(0.0277)	(0.0259)	(0.0289)	(0.0265)	(0.0277)	(0.0258)
Co-resident with elderly parents	0.1172***	0.0749***	0.1524***	0.0667***	0.1157***	0.0779***	0.1522***	0.0665***
	(0.0188)	(0.0215)	(0.0196)	(0.0199)	(0.0189)	(0.0216)	(0.0196)	(0.0199)

Women's annual wage	-0.5098***	0.0619***	-0.5416***	0.0706***	-0.5023***	0.0606***	-0.5333***	0.0783***
	(0.0123)	(0.0092)	(0.0156)	(0.0126)	(0.0163)	(0.0082)	(0.0171)	(0.0109)
Women's other income	0.2050***	-0.0922***	0.2039***	-0.0928***	0.2049***	-0.0924***	0.2040***	-0.0928***
	(0.0021)	(0.0021)	(0.0022)	(0.0021)	(0.0021)	(0.0021)	(0.0022)	(0.0021)
Husband's income					0.2161***	-0.0495***	0.2147***	-0.0535***
					(0.0148)	(0.0110)	(0.0153)	(0.0121)
Constant	0.4368*	0.4273*	-0.1207*	-0.4371*	0.4759**	0.5252*	-0.1939	-0.3697
	(0.2257)	(0.2338)	(0.2593)	(0.2379)	(0.2294)	(0.2426)	(0.2781)	(0.2593)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	40.10	/	48.56	/	38.11	/	43.22	/
Observations	2411		2411		2411		2411	
R-squared	0.284	0.336	0.298	0.380	0.296	0.332	0.285	0.382

Note: Robust standard errors in parentheses

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 13 Effect of fertility on female labour force participation – IV-probit estimation, whole sample & urban areas

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0456*		-0.0510*		-0.0481*		-0.0522*
		(0.0288)		(0.0294)		(0.0285)		(0.0290)
Instrument-relaxation	0.3914***		0.3679***		0.3906***		0.3683***	
	(0.0451)		(0.0422)		(0.0450)		(0.0422)	
Age	0.0425***	0.0186**	0.0426***	0.0347***	0.0425***	0.0192**	0.0429***	0.0344***
	(0.0110)	(0.0093)	(0.0110)	(0.0088)	(0.0110)	(0.0092)	(0.0110)	(0.0088)
Age square	-0.0005***	-0.0003**	-0.0005***	-0.0004***	-0.0005***	-0.0003***	-0.0005***	-0.0004***
	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0001)
Education categories								
Base case: primary or less								
Lower middle school	-0.1138***	0.0006	-0.1246***	0.0283	-0.1153***	0.0048	-0.1228***	0.0260
	(0.0333)	(0.0233)	(0.0303)	(0.0220)	(0.0333)	(0.0232)	(0.0304)	(0.0219)
Upper middle school	-0.2738**	0.0559**	-0.3026***	0.0654***	-0.2755**	0.0511**	-0.3009***	0.0635***
	(0.0353)	(0.0245)	(0.0326)	(0.0230)	(0.0354)	(0.0244)	(0.0326)	(0.0229)
College or more	-0.4669***	0.2271***	-0.5068***	0.2499***	-0.4685***	0.2187***	-0.5054***	0.2468***
	(0.0356)	(0.0354)	(0.0338)	(0.0333)	(0.0356)	(0.0350)	(0.0338)	(0.0330)
Health condition (good/excellent)	0.0616***	0.0436**	0.0703**	0.0610**	0.0603***	0.0423**	0.0705**	0.0618**
	(0.0184)	(0.0176)	(0.0289)	(0.0272)	(0.0185)	(0.0176)	(0.0290)	(0.0271)
Ethnic minority	0.1398***	-0.0511	0.1400***	-0.0259	0.1389***	-0.0505	0.1406***	-0.0260
	(0.0386)	(0.0325)	(0.0379)	(0.0323)	(0.0387)	(0.0322)	(0.0378)	(0.0322)
Non-agriculture registration	-0.6271***	0.0831***	-0.6825***	0.0749***	-0.6277***	0.0807***	-0.6832***	0.0749***
	(0.0287)	(0.0260)	(0.0283)	(0.0268)	(0.0287)	(0.0261)	0.0282524	(0.0268)
Co-resident with adult children	0.0340	-0.0242	0.0358	-0.0240	0.0363	-0.0280	0.0352	-0.0224
	(0.0288)	(0.0224)	(0.0276)	(0.0208)	(0.0288)	(0.0224)	(0.0275)	(0.0207)
Co-resident with elderly parents	0.1172***	0.0695***	0.1524***	0.0564***	-0.1157***	0.0711***	0.1522***	0.0562***
	(0.0188)	(0.0218)	(0.0194)	(0.0198)	(0.0189)	(0.0219)	(0.0194)	(0.0198)

Women's annual wage	-0.5098***	0.0637***	-0.5416***	0.0650***	-0.5023***	0.0601***	-0.5333***	0.0660***
	(0.0123)	(0.0093)	(0.0155)	(0.0105)	(0.0162)	(0.0082)	(0.0170)	(0.0094)
Women's other income	0.2050***	-0.0910***	0.2197***	-0.0913***	0.2049***	-0.0911***	0.2040***	-0.0913***
	(0.0021)	(0.0019)	(0.0022)	(0.0018)	(0.0021)	(0.0019)	(0.0022)	(0.0018)
Husband's income					0.2161***	-0.0364***	0.2147***	-0.0363***
					(0.0147)	(0.0101)	(0.0152)	(0.0097)
County effect	No		Yes		No		Yes	
Yesr effect	No		Yes		No		Yes	
F statistics on instrument	41.34	/	31.07	/	38.51	/	30.05	/
Wald test of exogeneity (p value)	6.60 (0.010)		5.11 (0.024)		6.12 (0.013)		4.85 (0.028)	
Observations	2411		2411		2411		2411	

Note: Marginal effects are presented. Robust standard errors in parentheses

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 14 Effect of family size on female labour force participation - 2SLS estimation, whole sample & rural areas

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0793***		-0.0892***		-0.0800***		-0.0883***
		(0.0146)		(0.0174)		(0.0147)		(0.0176)
Instrument-relaxation	0.5764***		0.5391***		0.5755***		0.5393***	
	(0.0372)		(0.0350)		(0.0372)		(0.0350)	
Age	0.0653***	0.0332***	0.0702***	0.0336***	0.0676***	0.0343***	0.0706	0.0346***
	(0.0173)	(0.0119)	(0.0175)	(0.0121)	(0.0171)	(0.0120)	(0.0173)	(0.0121)
Age square	-0.0006**	-0.0004***	-0.0006**	-0.0004***	-0.0006**	-0.0005***	-0.0006**	-0.0005***
	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0003)	(0.0002)
Education categories								
Base case: primary or less								
Lower middle school	-0.0955***	0.0444*	-0.0956***	0.0475*	-0.0919***	0.0458*	-0.0951***	0.0387
	(0.0347)	(0.0248)	(0.0328)	(0.0241)	(0.0348)	(0.0248)	(0.0328)	(0.0241)
Upper middle school	-0.1536***	0.0727***	-0.1260***	0.0812***	-0.1527***	0.0730***	-0.1258***	0.0817***
	(0.0392)	(0.0276)	(0.0373)	(0.0274)	(0.0392)	(0.0276)	(0.0373)	(0.0274)
College or more	-0.3489***	0.2047***	-0.2989***	0.2477***	-0.3467***	0.2054***	-0.2987***	0.2486***
	(0.0390)	(0.0330)	(0.0398)	(0.0319)	(0.0391)	(0.0331)	(0.0399)	(0.0320)
Health condition (good/excellent)	0.1186***	0.0531***	0.1206***	0.0547***	0.1140***	0.0511***	0.1209***	0.0540***
	(0.0253)	(0.0180)	(0.0604)	(0.0189)	(0.0253)	(0.0181)	(0.0604)	(0.0389)
Ethnic minority	0.4014***	-0.0205	0.4113***	-0.0222	0.4185***	-0.0221	0.4118***	0.0213
	(0.0337)	(0.0258)	(0.0388)	(0.0273)	(0.0335)	(0.0258)	(0.0388)	(0.0274)
Non-agriculture registration	-0.3883***	0.0073	-0.4094***	0.0126	-0.3892***	0.0069	-0.4096***	-0.0111
	(0.0325)	(0.0200)	(0.0305)	(0.0206)	(0.0325)	(0.0199)	(0.0305)	(0.0204)
Co-resident with adult children	0.0552	-0.0210	0.0447	-0.0247	0.0638	-0.0272	0.0583	-0.0225
	(0.0402)	(0.0283)	(0.0390)	(0.0285)	(0.0402)	(0.0285)	(0.0390)	(0.0285)
Co-resident with elderly parents	0.1121***	0.0377**	0.1001***	0.0465**	0.1103***	0.0385**	0.1003***	0.0462**
	(0.0277)	(0.0191)	(0.0289)	(0.0196)	(0.0277)	(0.0191)	(0.0289)	(0.0196)

Women's annual income	-0.5066***	0.1201***	-0.5135***	0.1244***	-0.4410***	0.1210***	-0.5093***	0.1251***
	(0.0170)	(0.0093)	(0.0193)	(0.0098)	(0.0213)	(0.0078)	(0.0218)	(0.0086)
Women's other income	0.2009***	-0.1524***	0.2094***	-0.1511***	0.2087***	-0.1523***	0.2094***	-0.1510***
	(0.0028)	(0.0025)	(0.0028)	(0.0025)	(0.0028)	(0.0025)	(0.0028)	(0.0025)
Husband's income					0.1366***	-0.0965***	0.1407***	-0.0972***
					(0.0186)	(0.0104)	(0.0189)	(0.0110)
Constant	0.2953	0.2643	-0.4867	0.1831	0.3640	0.2955	-0.4575	0.2484
	(0.3202)	(0.2224)	(0.3542)	(0.2298)	(0.3277)	(0.2255)	(0.3743)	(0.2386)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	77.46	/	47.56	/	72.13	/	45.96	/
Observations	2618		2618		2618		2618	
R-squared	0.275	0.250	0.342	0.281	0.277	0.252	0.342	0.283

Note: Robust standard errors in parentheses

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 15 Effect of fertility on female labour force participation – IV-probit estimation, whole sample & rural areas

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0726***		-0.0712***		-0.0774***		-0.0707***
		(0.0203)		(0.0224)		(0.0204)		(0.0223)
Instrument-relaxation	0.5764***		0.5391***		0.5755***			
	(0.0371)		(0.0348)		(0.0371)			
Age	0.0653***	0.0273***	0.0702***	0.0293***	0.0676***	0.0282***	0.0706***	0.0300***
	(0.0173)	(0.0098)	(0.0174)	(0.0099)	(0.0170)	(0.0098)	(0.0172)	(0.0099)
Age square	-0.0006**	-0.0004***	-0.0006**	-0.0004***	-0.0006***	-0.0004***	-0.0006***	-0.0004***
	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0001)
Education categories								
Base case: primary or less								
Lower middle school	-0.0955***	0.0481**	-0.0956***	0.0475**	-0.0919***	0.0489**	-0.0951***	0.0480**
	(0.0346)	(0.0212)	(0.0326)	(0.0203)	(0.0347)	(0.0212)	(0.0326)	(0.0204)
Upper middle school	-0.1536***	0.0656**	-0.1260***	0.0720***	-0.1527***	0.0650**	-0.1258***	0.0716***
	(0.0391)	(0.0251)	(0.0370)	(0.0248)	(0.0391)	(0.0251)	(0.0370)	(0.0247)
College or more	-0.3489***	0.2964***	-0.2989***	0.3398***	-0.3467***	0.2959***	-0.2987***	0.3394***
	(0.0389)	(0.0500)	(0.0395)	(0.0495)	(0.0390)	(0.0500)	(0.0396)	(0.0495)
Health condition (good/excellent)	0.1186***	0.0550***	0.1206***	0.0554**	0.1140***	0.0538***	0.1209***	0.0549***
	(0.0253)	(0.0185)	(0.0600)	(0.0260)	(0.0252)	(0.0185)	(0.0600)	(0.0161)
Ethnic minority	0.4014***	-0.0030	0.4113***	-0.0045	0.4185***	-0.0030	0.4118***	-0.0056
	(0.0336)	(0.0247)	(0.0386)	(0.0263)	(0.0334)	(0.0247)	(0.0386)	(0.0264)
Non-agriculture registration	-0.3883***	0.0548***	-0.3094***	0.0538**	-0.3892***	0.0536***	-0.4096***	0.0517***
	(0.0286)	(0.0186)	(0.0281)	(0.0190)	(0.0286)	(0.0185)	(0.0281)	(0.0189)
Co-resident with adult children	0.0552	-0.0538**	0.0470	-0.0232	0.0638	-0.0505**	0.0575	-0.0216
	(0.0401)	(0.0255)	(0.0388)	(0.0261)	(0.0401)	(0.0257)	(0.0387)	(0.0261)
Co-resident with elderly parents	0.1121***	0.0415*	0.1001***	0.0474**	0.1103***	0.0422**	0.1002***	0.0471**
	(0.0277)	(0.0218)	(0.0287)	(0.0220)	(0.0277)	(0.0217)	(0.0288)	(0.0220)

Women's annual income	-0.4655***	0.1118***	-0.5135***	0.1073***	-0.4410***	0.1012***	-0.5093***	0.1024***
	(0.0170)	(0.0093)	(0.0192)	(0.0098)	(0.0212)	(0.0083)	(0.0216)	(0.0088)
Women's other income	0.2090***	-0.1502***	0.2094***	-0.1510***	0.2087***	-0.1522***	0.2094***	-0.1510***
	(0.0028)	(0.0021)	(0.0028)	(0.0021)	(0.0028)	(0.0021)	(0.0028)	(0.0021)
Husband's income					0.1366***	-0.0857***	0.1377***	-0.0851***
					(0.0186)	(0.0099)	(0.0187)	(0.0102)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	67.83	/	42.81	/	63.46	/	41.33	/
Wald test of exogeneity (p value)	6.09 (0.027)		6.01 (0.048)		6.08 (0.027)		6.01(0.048)	
Observations	2618		2618		2618		2618	

Note: Marginal effects are reported. Robust standard errors in parentheses

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

Women's annual income takes fitted value and

Women's other income and husband's income take logged value, in RMB

Table 4. 16 Effect of fertility on female labour force participation - 2SLS estimation, fine levels sample & urban areas

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0712*		-0.0723*		-0.0720*		-0.0725*
		(0.0417)		(0.0450)		(0.0420)		(0.0451)
Instrument-fine	-0.3189***		-0.3250***		-0.3210***		-0.3216***	
	(0.0107)		(0.0125)		(0.0108)		(0.0122)	
Age	0.1291***	0.0704**	0.1241***	0.0715**	0.1347***	0.0720**	0.1294***	0.0725**
	(0.0319)	(0.0320)	(0.0293)	(0.0342)	(0.0313)	(0.0326)	(0.0288)	(0.0348)
Age square	-0.0017***	-0.0009***	-0.0016***	-0.0009***	-0.0018***	-0.0009***	-0.0017***	-0.0009***
	(0.0005)	(0.0003)	(0.0004)	(0.0003)	(0.0005)	(0.0003)	(0.0004)	(0.0003)
Education categories								
Base case: primary or less								
Lower middle school	-0.2055***	0.0214	-0.2038***	0.0225	-0.1975***	0.0223	-0.1965***	0.0235
	(0.0688)	(0.0165)	(0.0638)	(0.0168)	(0.0682)	(0.0167)	(0.0635)	(0.0170)
Upper middle school	-0.2743***	0.0329*	-0.2894***	0.0345*	-0.2683***	0.0330*	-0.2821***	0.0350*
	(0.0716)	(0.0195)	(0.0686)	(0.0201)	(0.0714)	(0.0200)	(0.0685)	(0.0202)
College or more	-0.4606***	0.2443***	-0.4698***	0.2488***	-0.4503***	0.2425***	-0.4573***	0.2501***
	(0.0697)	(0.0242)	(0.0694)	(0.0250)	(0.0695)	(0.0240)	(0.0694)	(0.0251)
Health condition (good/excellent)	0.0769**	0.0755**	0.0745**	0.0800**	0.0691*	0.0811**	0.0706*	0.0815**
	(0.0355)	(0.0378)	(0.0373)	(0.0380)	(0.0357)	(0.0410)	(0.0374)	(0.0411)
Ethnic minority	0.1228**	-0.0998	0.1292**	-0.0988	0.1194**	-0.0792	0.1240**	-0.0811
	(0.0603)	(0.0857)	(0.0602)	(0.0855)	(0.0597)	(0.0721)	(0.0600)	(0.0719)
Non-agriculture registration	-0.6779***	0.0301**	-0.7215***	0.0321**	-0.6702***	0.0354**	-0.7142***	0.0355**
	(0.0751)	(0.0154)	(0.0734)	(0.0155)	(0.0765)	(0.0150)	(0.0747)	(0.0155)
Co-resident with adult children	-0.0221	-0.0401	-0.0159	-0.0389	-0.0179	-0.0411	-0.0086	-0.0399
	(0.0910)	(0.0487)	(0.0900)	(0.0480)	(0.0906)	(0.0490)	(0.0900)	(0.0485)
Co-resident with elderly parents	0.1096***	0.0451**	0.0880**	0.0423**	0.1093***	0.0436**	0.0890**	0.0443**
	(0.0401)	(0.0198)	(0.0423)	(0.0200)	(0.0399)	(0.0194)	(0.0423)	(0.0201)

Women's annual income	-0.3988***	0.0786***	-0.3746***	0.0801***	-0.3703***	0.0805***	-0.3482***	0.0811***
	(0.0398)	(0.0267)	(0.0394)	(0.0271)	(0.0448)	(0.0213)	(0.0418)	(0.0215)
Women's other income	0.0611***	-0.0978***	0.0636***	-0.0981***	0.0693***	-0.0913***	0.0616***	-0.0950***
	(0.0181)	(0.0207)	(0.0178)	(0.0211)	(0.0183)	(0.0184)	(0.0181)	(0.0195)
Husband's income					0.0922**	-0.0630**	0.0934**	-0.0644**
					(0.0431)	(0.0269)	(0.0410)	(0.0270)
Constant	-1.3622**	0.8191	-1.3820**	0.8375	-1.6096***	0.8268	-1.6530***	0.9168
	(0.5805)	(0.9322)	(0.5577)	(0.9428)	(0.5896)	(0.8707)	(0.5842)	(0.8828)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	21.52	/	21.49	/	21.06	/	21.42	/
Observations	764		764		764		764	
R-squared	0.247	0.195	0.334	0.200	0.250	0.205	0.337	0.210

Note: Robust standard errors in parentheses

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 17 Effect of fertility on female labour force participation – IV-probit estimation, fine levels sample & urban areas

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0743*		-0.0753*		-0.0726*		-0.0735*
		(0.0453)		(0.0473)		(0.0454)		(0.0471)
Instrument-relaxation	-0.3189***		-0.3250***		-0.3210***		-0.3216***	
	(0.0107)		(0.0125)		(0.0108)		(0.0122)	
Age	0.1291***	0.0754**	0.1241***	0.0946***	0.1347***	0.0765**	0.1294***	0.0925***
	(0.0319)	(0.0346)	(0.0293)	(0.0363)	(0.0313)	(0.0350)	(0.0288)	(0.0368)
Age square	-0.0017***	-0.0005***	-0.0016***	-0.0006**	-0.0018***	-0.0005***	-0.0017***	-0.0006**
	(0.0005)	(0.0002)	(0.0004)	(0.0003)	(0.0005)	(0.0002)	(0.0004)	(0.0003)
Education categories								
Base case: primary or less								
Lower middle school	-0.2055***	0.0315	-0.2038***	0.0366	-0.1975***	0.0458	-0.1965***	0.0435
	(0.0688)	(0.0491)	(0.0638)	(0.0498)	(0.0682)	(0.0578)	(0.0635)	(0.0570)
Upper middle school	-0.2743***	0.0452*	-0.2894***	0.0474*	-0.2683***	0.0483*	-0.2821***	0.0490*
	(0.0716)	(0.0253)	(0.0686)	(0.0259)	(0.0714)	(0.0253)	(0.0685)	(0.0262)
College or more	-0.4606***	0.2568***	-0.4698***	0.2599***	-0.4503***	0.2503***	-0.4573***	0.2511***
	(0.0697)	(0.0281)	(0.0694)	(0.0300)	(0.0695)	(0.0355)	(0.0694)	(0.0351)
Health condition (good/excellent)	0.0769**	0.0862**	0.0745**	0.0918**	0.0691*	0.0870**	0.0706*	0.0925**
	(0.0355)	(0.0373)	(0.0373)	(0.0459)	(0.0357)	(0.0383)	(0.0374)	(0.0479)
Ethnic minority	0.1228**	-0.0750	0.1292**	-0.0727	0.1194**	-0.0770	0.1240**	-0.0751
	(0.0603)	(0.0506)	(0.0602)	(0.0606)	(0.0597)	(0.0513)	(0.0600)	(0.0519)
Non-agriculture registration	-0.6779***	0.0355*	-0.7215***	0.0403*	-0.6702***	0.0352*	-0.7142***	0.0415**
	(0.0751)	(0.0181)	(0.0734)	(0.0221)	(0.0765)	(0.0183)	(0.0747)	(0.0225)
Co-resident with adult children	-0.0221	-0.0431	-0.0159	-0.0484	-0.0179	-0.0468	-0.0086	-0.0499
	(0.0910)	(0.0489)	(0.0900)	(0.0506)	(0.0906)	(0.1040)	(0.0900)	(0.0515)
Co-resident with elderly parents	0.1096***	0.0521**	0.0880**	0.0544**	0.1093***	0.0563**	0.0890**	0.0563**
	(0.0401)	(0.0237)	(0.0423)	(0.0248)	(0.0399)	(0.0240)	(0.0423)	(0.0241)

Women's annual income	-0.3988***	0.0740***	-0.3746***	0.0817***	-0.3703***	0.0757***	-0.3482***	0.0831***
	(0.0398)	(0.0289)	(0.0394)	(0.0291)	(0.0448)	(0.0282)	(0.0418)	(0.0295)
Women's other income	0.0611***	-0.0983***	0.0636***	-0.0960***	0.0693***	-0.0935***	0.0616***	-0.0950***
	(0.0181)	(0.0156)	(0.0178)	(0.0140)	(0.0183)	(0.0166)	(0.0181)	(0.0155)
Husband's income					0.0922**	-0.0621***	0.0934**	-0.0654***
					(0.0431)	(0.0229)	(0.0410)	(0.0230)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	23.49	/	22.19	/	22.82	/	21.48	/
Wald test of exogeneity (p value)	4.19 (0.041)		4.38 (0.040)		3.45 (0.043)		3.25 (0.041)	
Observations	764		764		764		764	

Note: Marginal effects are reported

Robust standard errors in parentheses

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 18 Effect of fertility on female labour force participation - 2SLS estimation, fine levels sample & rural areas

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.1017**		-0.1209**		-0.1026**		-0.1213**
		(0.0502)		(0.0560)		(0.0502)		(0.0559)
Instrument-fines	-0.1731***		-0.1552***		-0.1748***		-0.1565***	
	(0.0281)		(0.0337)		(0.0282)		(0.0337)	
Age	0.2060***	0.1030***	0.2070***	0.1420***	0.2057***	0.1050***	0.2067***	0.1430***
	(0.0352)	(0.0346)	(0.0352)	(0.0436)	(0.0350)	(0.0349)	(0.0350)	(0.0436)
Age square	-0.0024***	-0.0013***	-0.0025***	-0.0017***	-0.0024***	-0.0013***	-0.0025***	-0.0017***
	(0.0005)	(0.0003)	(0.0005)	(0.0005)	(0.0005)	(0.0003)	(0.0005)	(0.0005)
Education categories								
Base case: primary or less								
Lower middle school	-0.1701***	0.0855**	-0.1828***	0.0844**	-0.1689***	0.0825**	-0.1825***	0.0852**
	(0.0531)	(0.0363)	(0.0527)	(0.0358)	(0.0530)	(0.0366)	(0.0527)	(0.0358)
Upper middle school	-0.1840***	0.1075**	-0.2123***	0.1015**	-0.1829***	0.1045**	-0.2122***	0.1023**
	(0.0642)	(0.0465)	(0.0617)	(0.0485)	(0.0643)	(0.0467)	(0.0618)	(0.0484)
College or more	-0.3259***	0.2204***	-0.3373***	0.2396***	-0.3216***	0.2121***	-0.3350***	0.2427***
	(0.0797)	(0.0688)	(0.0885)	(0.0702)	(0.0802)	(0.0695)	(0.0890)	(0.0703)
Health condition (good/excellent)	0.0901**	0.1252***	0.0970**	0.1273***	0.0975**	0.1278***	0.0977**	0.1233***
	(0.0458)	(0.0314)	(0.0415)	(0.0321)	(0.0464)	(0.0318)	(0.0417)	(0.0322)
Ethnic minority	0.3570***	-0.1570***	0.3804***	-0.1050*	0.3524***	-0.1610***	0.3580***	-0.1062*
	(0.0610)	(0.0480)	(0.0643)	(0.0530)	(0.0608)	(0.0481)	(0.0740)	(0.0631)
Non-agriculture registration	-0.2050***	0.1457***	-0.2169***	0.1490***	-0.2055***	0.1470***	-0.2175***	-0.1500***
	(0.0513)	(0.0369)	(0.0513)	(0.0473)	(0.0514)	(0.0372)	(0.0513)	(0.0473)
Co-resident with adult children	0.0359	-0.0413	0.0339	-0.0505	0.0349	-0.0449	0.0330	-0.0570
	(0.1075)	(0.0647)	(0.1063)	(0.0624)	(0.1074)	(0.0650)	(0.1063)	(0.0621)
Co-resident with elderly parents	0.1020*	0.0831**	0.1082*	0.0858**	0.0992*	0.0993**	0.1062*	0.0971**
	(0.0579)	(0.0376)	(0.0593)	(0.0358)	(0.0578)	(0.0379)	(0.0593)	(0.0459)

Women's annual income	-0.1871***	0.0904***	-0.1827***	0.0959***	-0.1782***	0.0975***	-0.1748***	0.0997***
	(0.0300)	(0.0191)	(0.0311)	(0.0242)	(0.0369)	(0.0196)	(0.0377)	(0.0252)
Women's other income	0.1503***	-0.1299***	0.1593***	-0.1218***	0.1535***	-0.1282***	0.1594***	-0.1217***
	(0.0081)	(0.0076)	(0.0084)	(0.0084)	(0.0082)	(0.0076)	(0.0085)	(0.0084)
Husband's income					0.1869***	-0.0762***	0.1896***	-0.0753***
					(0.0370)	(0.0235)	(0.0373)	(0.0273)
Constant	-1.5541**	-0.6934	-1.7472***	-0.7264	-1.6103**	-0.6580	-1.8036***	-0.7245
	(0.6096)	(0.5400)	(0.6144)	(0.6720)	(0.6256)	(0.5450)	(0.6353)	(0.6850)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	37.86	/	24.48	/	35.03	/	23.37	/
Observations	721		721		721		721	
R-squared	0.345	0.195	0.364	0.200	0.345	0.205	0.364	0.210

Note: Robust standard errors in parentheses

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 19 Effect of fertility on female labour force participation – IV-probit estimation, fine levels sample & rural areas

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.1081**		-0.1286**		-0.1098**		-0.1257**
		(0.0481)		(0.0523)		(0.0469)		(0.0516)
Instrument-fines	-0.1731***		-0.1552***		-0.1748***		-0.1565***	
	(0.0281)		(0.0337)		(0.0282)		(0.0337)	
Age	0.2060***	0.0981***	0.2070***	0.1154***	0.2057***	0.0982***	0.2067***	0.1152***
	(0.0352)	(0.0244)	(0.0352)	(0.0212)	(0.0350)	(0.0243)	(0.0350)	(0.0212)
Age square	-0.0024***	-0.0012***	-0.0025***	-0.0014***	-0.0024***	-0.0012***	-0.0025***	-0.0014***
	(0.0005)	(0.0003)	(0.0005)	(0.0003)	(0.0005)	(0.0003)	(0.0005)	(0.0003)
Education categories								
Base case: primary or less								
Lower middle school	-0.1701***	0.0797**	-0.1828***	0.0735**	-0.1689***	0.0703**	-0.1825***	0.0734**
	(0.0531)	(0.0381)	(0.0527)	(0.0369)	(0.0530)	(0.0380)	(0.0527)	(0.0369)
Upper middle school	-0.1840***	0.0951**	-0.2123***	0.0928**	-0.1829***	0.0934**	-0.2122***	0.0923**
	(0.0642)	(0.0449)	(0.0617)	(0.0447)	(0.0643)	(0.0447)	(0.0618)	(0.0444)
College or more	-0.3259***	0.2188***	-0.3373***	0.2212***	-0.3216***	0.2105***	-0.3350***	0.2258***
	(0.0797)	(0.0690)	(0.0885)	(0.0701)	(0.0802)	(0.0698)	(0.0890)	(0.0721)
Health condition (good/excellent)	0.0901**	0.1257***	0.0970**	0.1228***	0.0975**	0.1173***	0.0977**	0.1229***
	(0.0458)	(0.0290)	(0.0415)	(0.0454)	(0.0464)	(0.0291)	(0.0417)	(0.0455)
Ethnic minority	0.3570***	-0.1229***	0.3804***	-0.1276***	0.3524***	-0.1257***	0.3580***	-0.1277***
	(0.0610)	(0.0332)	(0.0643)	(0.0417)	(0.0608)	(0.0333)	(0.0740)	(0.0418)
Non-agriculture registration	-0.2050***	0.1426***	-0.2169***	0.1674***	-0.2055***	0.1414***	-0.2175***	0.1468***
	(0.0513)	(0.0306)	(0.0513)	(0.0297)	(0.0514)	(0.0303)	(0.0513)	(0.0296)
Co-resident with adult children	0.0359	-0.0152	0.0339	-0.0440	0.0349	-0.0168	0.0330	-0.0439
	(0.1075)	(0.0645)	(0.1063)	(0.0719)	(0.1074)	(0.0642)	(0.1063)	(0.0716)
Co-resident with elderly parents	0.1020*	0.0833**	0.1082*	0.0841**	0.0992*	0.0817**	0.1062*	0.0840**
	(0.0579)	(0.0393)	(0.0593)	(0.0369)	(0.0578)	(0.0391)	(0.0593)	(0.0369)

Women's annual income	-0.1871***	0.0943***	-0.1827***	0.0964***	-0.1782***	0.0908***	-0.1748***	0.0976***
	(0.0300)	(0.0174)	(0.0311)	(0.0177)	(0.0369)	(0.0176)	(0.0377)	(0.0188)
Women's other income	0.1503***	-0.1223***	0.1593***	-0.1228***	0.1535***	-0.1222****	0.1594***	-0.1228***
	(0.0081)	(0.0066)	(0.0084)	(0.0065)	(0.0082)	(0.0066)	(0.0085)	(0.0065)
Husband's income					0.1869***	-0.0702***	0.1896***	-0.0710***
					(0.0370)	(0.0190)	(0.0373)	(0.0187)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	27.04	/	26.78	/	22.82	/	26.02	/
Wald test of exogeneity (p value)	5.97 (0.015)		11.99 (0.001)		6.30 (0.012)		12.37 (0.0004)	
Observations	721		721		721		721	

Note: Marginal effects are reported

Robust standard errors in parentheses

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 20 Validity of instrument - 2SLS estimation on agriculture registered families in urban areas using instrument relaxation

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0682**		-0.0658**		-0.0675**		-0.0656**
		(0.0326)		(0.0322)		(0.0327)		(0.0322)
Instrument-relaxation	0.4522***		0.4318***		0.4520***		0.4322***	
	(0.0557)		(0.0486)		(0.0557)		(0.0483)	
Age	0.0572*	0.0585**	0.0516*	0.0763***	0.0573*	0.0590**	0.0504*	0.0764***
	(0.0304)	(0.0268)	(0.0274)	(0.0261)	(0.0305)	(0.0267)	(0.0276)	(0.0260)
Age square	-0.0005*	-0.0009**	-0.0005*	-0.0011***	-0.0005*	-0.0009**	0.0005*	-0.0011***
	(0.0003)	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0004)	(0.0003)	(0.0003)
Education categories								
Base case: primary or less								
Lower middle school	-0.1091*	0.0882*	-0.1047*	0.0833*	-0.1089*	0.0890*	-0.1059*	0.0845*
	(0.0588)	(0.0525)	(0.0561)	(0.0491)	(0.0587)	(0.0523)	(0.0545)	(0.0500)
Upper middle school	-0.2133***	0.1495*	-0.2097***	0.1456*	-0.2128***	0.1518*	-0.2246***	0.1472*
	(0.0794)	(0.0782)	(0.0760)	(0.0776)	(0.0802)	(0.0780)	(0.0746)	(0.0799)
College or more	-0.2571***	0.1519***	-0.2745***	0.1820***	-0.2569***	0.1525***	-0.2926***	0.1500***
	(0.0336)	(0.0475)	(0.0328)	(0.0451)	(0.0368)	(0.0473)	(0.0325)	(0.0421)
Health condition (good/excellent)	0.1010***	0.0435**	0.0871**	0.0515**	0.1010***	0.0481**	0.0859**	0.0413**
	(0.0389)	(0.0217)	(0.0369)	(0.0247)	(0.0390)	(0.0218)	(0.0392)	(0.0205)
Ethnic minority	0.2117***	-0.0599	0.2168***	-0.0535	0.2115***	-0.0589	0.2160***	-0.0535
	(0.0472)	(0.0492)	(0.0427)	(0.0431)	(0.0472)	(0.0491)	(0.0427)	(0.0430)
Co-resident with adult children	0.0393	-0.0025	0.0349	-0.0189	0.0392	-0.0015	0.0349	-0.0189
	(0.0774)	(0.0673)	(0.0631)	(0.0635)	(0.0778)	(0.0673)	(0.0626)	(0.0635)
Co-resident with elderly parents	0.1142***	0.0529**	0.1184***	0.0516**	0.1139***	0.0514**	0.1127***	0.0517**
	(0.0620)	(0.0254)	(0.0564)	(0.0256)	(0.0630)	(0.0253)	(0.0563)	(0.0256)
Women's annual income	-0.2663***	0.0545**	-0.2742***	0.0554**	-0.2674***	0.0540**	-0.2745***	0.0590**

	(0.0346)	(0.0259)	(0.0378)	(0.0265)	(0.0399)	(0.0258)	(0.0419)	(0.0259)
Women's other income	0.2604***	-0.1357***	0.2615***	-0.1397***	0.2604***	-0.1360***	0.2624***	-0.1341***
	(0.0071)	(0.0064)	(0.0066)	(0.0054)	(0.0070)	(0.0064)	(0.0067)	(0.0054)
Husband's income					0.3017***	-0.0433*	0.3066***	-0.0474*
					(0.0363)	(0.0227)	(0.0333)	(0.0255)
Constant	(0.2162)	-0.2760	-0.7299	-0.7347	0.2208	-0.2383	-1.0040	-0.7041
	(0.5677)	(0.5196)	(0.6095)	(0.5759)	(0.5799)	(0.5379)	(0.6184)	(0.6242)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	38.31	/	51.45	/	39.21	/	52.01	/
Observations	364		364		364		364	
R-squared	0.264	0.238	0.342	0.281	0.277	0.252	0.342	0.283

Note: Robust standard errors in parentheses

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 21 Validity of instrument – IV-probit estimation on agriculture registered families in urban areas using instrument relaxation

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0658**		-0.0640**		-0.0677**		-0.0639**
		(0.0275)		(0.0255)		(0.0268)		(0.0251)
Instrument-relaxation	0.4522***		0.4318***		0.4520***		0.4322***	
	(0.0557)		(0.0486)		(0.0557)		(0.0483)	
Age	0.0572*	0.0499**	0.0516*	0.0513**	0.0573*	0.0511**	0.0504*	0.0525**
	(0.0304)	(0.0231)	(0.0274)	(0.0227)	(0.0305)	(0.0230)	(0.0276)	(0.0353)
Age square	-0.0005*	-0.0008**	-0.0005*	-0.0010***	-0.0005*	-0.0008**	0.0005*	-0.0010***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Education categories								
Base case: primary or less								
Lower middle school	-0.1091*	0.0910*	-0.1047*	0.0981*	-0.1089*	0.0916*	-0.1059*	0.0991*
	(0.0588)	(0.0511)	(0.0561)	(0.0597)	(0.0587)	(0.0558)	(0.0545)	(0.0579)
Upper middle school	-0.2133***	0.1611**	-0.2097***	0.1725**	-0.2128***	0.1616**	-0.2246***	0.1623**
	(0.0794)	(0.0737)	(0.0760)	(0.0710)	(0.0802)	(0.0730)	(0.0746)	(0.0716)
College or more	-0.3571***	0.1801***	-0.3745***	0.2035***	-0.3569***	0.1894***	-0.3926***	0.1837***
	(0.0336)	(0.0675)	(0.0328)	(0.0685)	(0.0368)	(0.0676)	(0.0325)	(0.0681)
Health condition (good/excellent)	0.1010***	0.0420*	0.0871**	0.0480*	0.1010***	0.0464*	0.0859**	0.0492*
	(0.0389)	(0.0234)	(0.0369)	(0.0238)	(0.0390)	(0.0258)	(0.0392)	(0.0263)
Ethnic minority	0.2117***	-0.0578	0.2168***	-0.0564	0.2115***	-0.0551	0.2160***	-0.0547
	(0.0472)	(0.0967)	(0.0427)	(0.0949)	(0.0472)	(0.0961)	(0.0427)	(0.0941)
Co-resident with adult children	0.0393	-0.0101	0.0349	-0.0120	0.0392	-0.0110	0.0349	-0.0125
	(0.0774)	(0.0655)	(0.0631)	(0.0673)	(0.0778)	(0.0656)	(0.0626)	(0.0623)
Co-resident with elderly parents	0.1142***	0.0587**	0.1184***	0.0561**	0.1139***	0.0588**	0.1127***	0.0559**
	(0.0620)	(0.0263)	(0.0564)	(0.0236)	(0.0630)	(0.0260)	(0.0563)	(0.0230)
Women's annual income	-0.2663***	0.0608*	-0.2742***	0.0658*	-0.2674***	0.0617*	-0.2745***	0.0663*

	(0.0346)	(0.0332)	(0.0378)	(0.0378)	(0.0399)	(0.0339)	(0.0419)	(0.0373)
Women's other income	0.2604***	-0.1268***	0.2615***	-0.1340***	0.2604***	-0.1225***	0.2624***	-0.1293***
	(0.0071)	(0.0056)	(0.0066)	(0.0048)	(0.0070)	(0.0064)	(0.0067)	(0.0126)
Husband's income					0.3017***	-0.0468***	0.3066***	-0.0434***
					(0.0363)	(0.0148)	(0.0333)	(0.0171)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	41.19	/	55.40	/	42.84	/	55.90	/
Wald test of exogeneity (p value)	6.45 (0.028)		6.22 (0.039)		6.39 (0.029)		6.15 (0.039)	
Observations	364		364		364		364	

Note: Marginal effects are reported. Robust standard errors in parentheses

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 22 Instruments comparison - relaxation as instrument in fine levels sample, 2SLS estimation

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0810*		-0.0879*		-0.0888*		-0.0856**
		(0.0466)		(0.0498)		(0.0470)		(0.0402)
Instrument-relaxation	0.6471***		0.6263***		0.6476***		0.6269***	
	(0.0506)		(0.0517)		(0.0505)		(0.0515)	
Age	0.1339***	0.0627***	0.1403***	0.0598***	0.1337***	0.0617***	0.1401***	0.0592***
	(0.0240)	(0.0216)	-0.0236	(0.0221)	(0.0241)	(0.0215)	(0.0237)	(0.0220)
Age square	-0.0017***	-0.0008***	-0.0017***	-0.0008**	-0.0017***	-0.0008***	-0.0017***	-0.0008**
	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)
Education categories								
Base case: primary or less								
Lower middle school	-0.3164***	0.0715**	-0.2943***	0.0663**	-0.3167***	0.0712**	-0.2943***	0.0669**
	(0.0408)	(0.0332)	(0.0399)	(0.0330)	(0.0408)	(0.0332)	(0.0400)	(0.0331)
Upper middle school	-0.3066***	0.0908***	-0.3069***	0.0934***	-0.3068***	0.0908***	-0.3070***	0.0940***
	(0.0459)	(0.0343)	(0.0449)	(0.0351)	(0.0459)	(0.0344)	(0.0450)	(0.0352)
College or more	-0.5586***	0.2681***	-0.5577***	0.2706***	-0.5594***	0.2667***	-0.5581***	0.2708***
	(0.0447)	(0.0414)	(0.0461)	(0.0440)	(0.0447)	(0.0413)	(0.0461)	(0.0441)
Health condition (good/excellent)	0.0653**	0.0845***	0.0030	0.0813***	0.0663**	0.0813***	0.0034	0.0822***
	(0.0278)	(0.0195)	(0.0407)	(0.0281)	(0.0282)	(0.0198)	(0.0407)	(0.0281)
Ethnic minority	0.2447***	-0.1017***	0.2317***	-0.1032***	0.2437***	-0.1053***	0.2314***	-0.1041***
	(0.0439)	(0.0350)	(0.0494)	(0.0370)	(0.0435)	(0.0351)	(0.0491)	(0.0370)
Non-agriculture registration	-0.4935***	0.0720**	-0.4605***	0.0671**	-0.4936***	0.0722**	-0.4608***	0.0677**
	(0.0407)	(0.0296)	(0.0416)	(0.0312)	(0.0406)	(0.0297)	(0.0414)	(0.0313)
Co-resident with adult children	0.0277	0.0393	0.0427	0.0509	0.0278	0.0395	0.0426	0.0505
	(0.0853)	(0.0442)	(0.0850)	(0.0450)	(0.0853)	(0.0440)	(0.0850)	(0.0449)
Co-resident with elderly parents	0.1125***	0.0665***	0.0868**	0.0462**	0.1130***	0.0652***	0.0872**	0.0454**
	(0.0345)	(0.0227)	(0.0365)	(0.0227)	(0.0345)	(0.0227)	(0.0366)	(0.0228)

Women's annual income	-0.2630***	0.0891***	-0.2484***	0.0859***	-0.2661***	0.0817***	-0.2508***	0.0821***
	(0.0244)	(0.0118)	(0.0243)	(0.0122)	(0.0284)	(0.0100)	(0.0281)	(0.0104)
Women's other income	0.0839***	-0.1074***	0.0818***	-0.1064***	0.0839***	-0.1075***	0.0818***	-0.1066***
	(0.0076)	(0.0068)	(0.0075)	(0.0070)	(0.0076)	(0.0068)	(0.0075)	(0.0070)
Husband's income					0.1060***	-0.0607***	0.1047***	-0.0629***
					(0.0261)	(0.0160)	(0.0266)	(0.0165)
Constant	-1.5451***	-0.3575	-1.5692***	-0.3754	-1.5210***	-0.2701	-1.5493***	-0.3170
	(0.4097)	(0.3499)	(0.4027)	(0.3566)	(0.4217)	(0.3612)	(0.4183)	(0.3723)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	51.42	/	35.35	/	47.86	/	33.78	/
Observations	1,485		1,485		1,485		1,485	
R-squared	0.327	0.278	0.354	0.310	0.327	0.279	0.354	0.310

Note: Robust standard errors in parentheses

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 23 Instruments comparison - relaxation as instrument in fine levels sample, IV probit estimation

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0878*		-0.0821*		-0.0862*		-0.0809*
		(0.0463)		(0.0497)		(0.0462)		(0.0497)
Instrument-relaxation	0.6462***		0.6191***		0.6462***		0.6190***	
	(0.0507)		-0.052		(0.0505)		(0.0518)	
Age	0.1325***	0.0562***	0.1386***	0.0559***	0.1325***	0.0552***	0.1386***	0.0555***
	(0.0256)	(0.0174)	(0.0251)	(0.0177)	(0.0256)	(0.0173)	(0.0251)	(0.0176)
Age square	-0.0016***	-0.0007***	-0.0017***	-0.0007***	-0.0016***	-0.0007***	-0.0017***	-0.0007***
	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)
Education categories								
Base case: primary or less								
Lower middle school	-0.3137***	0.0654**	-0.2871***	0.0527*	-0.3137***	0.0646**	-0.2870***	0.0526*
	(0.0406)	(0.0273)	(0.0398)	(0.0272)	(0.0406)	(0.0272)	(0.0398)	(0.0271)
Upper middle school	-0.3042***	0.0814***	-0.3030***	0.0801**	-0.3042***	0.0810***	-0.3029***	0.0798**
	(0.0457)	(0.0310)	(0.0446)	(0.0316)	(0.0456)	(0.0309)	(0.0446)	(0.0315)
College	-0.5463***	0.2710***	-0.5489***	0.2786***	-0.5472***	0.2755***	-0.5490***	0.2805***
	(0.0440)	(0.0433)	(0.0456)	(0.0495)	(0.0440)	(0.0430)	(0.0456)	(0.0495)
Health condition (good/excellent)	0.0650**	0.0838***	-0.0012	0.0855***	0.0649**	0.0805***	-0.0013	0.0870***
	(0.0299)	(0.0210)	(0.0451)	(0.0321)	(0.0304)	(0.0213)	(0.0451)	(0.0321)
Ethnic minority	0.2222***	-0.0931***	0.2344***	-0.0928***	0.2223***	-0.0971***	0.2345***	-0.0941***
	(0.0457)	(0.0271)	(0.0513)	(0.0302)	(0.0453)	(0.0273)	(0.0511)	(0.0302)
Non-agriculture registration	-0.4912***	0.0614***	-0.4545***	0.0575**	-0.4911***	0.0628***	-0.4544***	0.0583**
	(0.0407)	(0.0243)	(0.0415)	(0.0255)	(0.0406)	(0.0242)	(0.0413)	(0.0255)
Co-resident with adult children	0.0010	0.0470	0.0166	0.0589	0.0010	0.0460	0.0166	0.0576
	(0.0902)	(0.0643)	(0.0904)	(0.0663)	(0.0902)	(0.0641)	(0.0903)	(0.0661)
Co-resident with elderly parents	0.1147***	0.0897***	0.0944**	0.0615**	0.1147***	0.0880***	0.0943**	0.0605**
	(0.0369)	(0.0310)	(0.0391)	(0.0297)	(0.0369)	(0.0308)	(0.0392)	(0.0297)

Women's annual income	-0.2681***	0.0819***	-0.2538***	0.0815***	-0.2678***	0.0806***	-0.2532***	0.0801***
	(0.0252)	(0.0116)	(0.0251)	(0.0120)	(0.0292)	(0.0099)	(0.0288)	(0.0105)
Women's other income	0.0839***	-0.1073***	0.0812***	-0.1065***	0.0839***	-0.1074***	0.0812***	-0.1067***
	(0.0078)	(0.0051)	(0.0075)	(0.0053)	(0.0078)	(0.0051)	(0.0075)	(0.0053)
Husband's income					0.1006***	-0.0607***	0.1012***	-0.0642***
					(0.0266)	(0.0136)	(0.0269)	(0.0138)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	45.39	/	29.47	/	41.87	/	28.11	/
Wald test of exogeneity (p value)	3.14 (0.037)		3.30 (0.043)		3.13 (0.037)		3.32 (0.044)	
Observations	1,485		1,485		1,485		1,485	

Note: Marginal effects are reported. Robust standard errors in parentheses.

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB.

Table 4. 24 Robustness check, effect of fertility on female labour force participation - OLS estimation, whole sample with farmers, fisher people and hunters

Explanatory variables	(1)	(2)	(3)	(4)
Number of children	-0.0964***	-0.0954***	-0.0959***	-0.0958***
	(0.0247)	(0.0248)	(0.0245)	(0.0248)
Age	0.0249***	0.0269***	0.0258***	0.0274***
	(0.0045)	(0.0044)	(0.0044)	(0.0044)
Age square	-0.0004***	-0.0004***	-0.0004***	-0.0004***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education category				
Base case: primary or less				
Lower middle school	0.0238***	0.0220***	0.0286***	0.0267***
	(0.0082)	(0.0082)	(0.0082)	(0.0082)
Upper middle school	0.0495***	0.0466***	0.0459***	0.0486***
	(0.0116)	(0.0111)	(0.0116)	(0.0112)
College or more	0.1348***	0.1705***	0.1405***	0.1718***
	(0.0128)	(0.0131)	(0.0128)	(0.0131)
Health condition (good/excellent)	0.0562***	0.0517***	0.0517***	0.0523***
	(0.0106)	(0.0105)	(0.0107)	(0.0105)
Ethnic minority	-0.0210**	-0.0211**	-0.0265**	-0.0263**
	(0.0099)	(0.0112)	(0.0099)	(0.0112)
Non-agriculture registration	0.0356***	0.0583***	0.0328***	0.0540***
	(0.0098)	(0.0096)	(0.0097)	(0.0096)
Co-resident with adult children	-0.0475***	-0.0155	-0.0424***	-0.0150
	(0.0109)	(0.0109)	(0.0108)	(0.0109)
Co-resident with elderly parents	0.0879***	0.0824***	0.0839***	0.0819***
	(0.0086)	(0.0088)	(0.0086)	(0.0087)
Women's annual wage	0.0979***	0.0933***	0.0954**	0.0943***
	(0.0026)	(0.0029)	(0.0022)	(0.0027)
Women's other income	-0.1047***	-0.1037***	-0.1038***	-0.1033***
	(0.0015)	(0.0015)	(0.00150)	(0.0015)
Husband's income			-0.0485***	-0.0457***
			(0.0037)	(0.0037)
Constant	0.6061***	0.2328***	0.7225***	0.3514***
	(0.0806)	(0.0830)	(0.0815)	(0.0857)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
R-squared	0.252	0.304	0.261	0.308
Observations	9,788	9,788	9,788	9,788

Note: The same as Table 4.3.

Table 4. 25 Robustness check, effect of fertility on female labour force participation - probit estimation, whole sample with farmers, fisher people and hunters

Explanatory variables	(1)	(2)	(3)	(4)
Number of children	0.1231***	-0.1297***	-0.1207***	-0.1298***
	(0.0044)	(0.0047)	(0.0044)	(0.0047)
Age	0.0171***	0.0228***	0.0175***	0.0228***
	(0.0033)	(0.0033)	(0.0033)	(0.0033)
Age suqare	-0.0003***	-0.0003***	-0.0003***	-0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education category				
Base case: primary or less				
Lower middle school	0.0486***	0.0342***	0.0449***	0.0330***
	(0.0072)	(0.0072)	(0.0072)	(0.0071)
Upper middle school	0.0509***	0.0461***	0.0583***	0.0492***
	(0.0104)	(0.0102)	(0.0104)	(0.0101)
College or more	0.1425***	0.1618***	0.1499***	0.1641***
	(0.0208)	(0.0199)	(0.0206)	(0.0197)
Health condition (good/excellent)	0.0622***	0.0667***	0.0686***	0.0675***
	(0.0074)	(0.0126)	(0.0075)	(0.0126)
Ethnic minority	-0.0299***	-0.0278***	-0.0260***	-0.0291***
	(0.0101)	(0.0108)	(0.0101)	(0.0108)
Non-agriculture registration	0.0560***	0.0516***	0.0519***	0.0500***
	(0.0082)	(0.0081)	(0.0081)	(0.0081)
Co-resident with adult children	-0.0251*	-0.0092	-0.0213*	-0.0081
	(0.0159)	(0.0090)	(0.0151)	(0.0089)
Co-resident with elderly parents	0.0314***	0.0338***	0.0359***	0.0327***
	(0.0086)	(0.0088)	(0.0086)	(0.0087)
Women's annual wage	0.0713***	0.0738***	0.0782***	0.0802***
	(0.0027)	(0.0028)	(0.0024)	(0.0026)
Women's other income	-0.1001***	-0.1034***	-0.1005***	-0.1031***
	(0.0012)	(0.0011)	(0.0011)	(0.0011)
Husband's income			-0.0295***	-0.0238***
			(0.0034)	(0.0035)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Pseudo R-squared	0.174	0.220	0.183	0.225
Observations	9,788	9,788	9,788	9,788

Note: The same as Table 4.4.

Table 4. 26 Robustness check, effect of fertility on female labour force participation - 2SLS estimation, whole sample with farmers, fisher people and hunters

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0627**		-0.0636*		-0.0592*		-0.0542*
		(0.0326)		(0.0341)		(0.0327)		(0.0341)
Instrument-relaxation	0.6669***		0.5875***		0.6627***		0.5874***	
	(0.0163)		(0.0153)		(0.0163)		(0.0153)	
Age	0.0896***	0.0138***	0.0916***	0.0182***	0.0912***	0.0150***	0.0919***	0.0189***
	(0.0077)	(0.0042)	(0.0073)	(0.0042)	(0.0077)	(0.0042)	(0.0073)	(0.0042)
Age square	-0.0009***	-0.0002***	-0.0009***	-0.0003***	-0.0009***	-0.0002***	-0.0009***	-0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education categories								
Base case: primary or less								
Lower middle school	-0.1360***	0.0377***	-0.1175***	0.0212**	-0.1275***	0.0334***	-0.1165***	0.0191**
	(0.0155)	(0.0083)	(0.0147)	(0.0083)	(0.0155)	(0.0083)	(0.0147)	(0.0082)
Upper middle school	-0.1304***	0.0507***	-0.1589***	0.0518***	-0.1253***	0.0517***	-0.1581***	0.0534***
	(0.0212)	(0.0111)	(0.0198)	(0.0111)	(0.0211)	(0.0111)	(0.0198)	(0.0110)
College	-0.2981***	0.1553***	-0.2655***	0.1793***	-0.2892***	0.1593***	-0.2644***	0.1817***
	(0.0294)	(0.0158)	(0.0278)	(0.0156)	(0.0294)	(0.0157)	(0.0278)	(0.0156)
Health condition (good/excellent)	0.1241***	0.0416***	0.1216***	0.0457***	0.1174***	0.0382***	0.1214***	0.0462***
	(0.0141)	(0.0075)	(0.0224)	(0.0121)	(0.0141)	(0.0075)	(0.0224)	(0.0121)
Ethnic minority	0.3801***	-0.0233**	0.3325***	-0.0052	0.3719***	-0.0190*	0.3330***	-0.0041
	(0.0206)	(0.0107)	(0.0220)	(0.0119)	(0.0206)	(0.0106)	(0.0220)	(0.0119)
Non-agriculture registration	-0.4956***	0.0464***	-0.4600***	0.0626***	-0.4902***	0.0436***	-0.4582***	0.0587***
	(0.0185)	(0.0102)	(0.0174)	(0.0108)	(0.0184)	(0.0101)	(0.0175)	(0.0107)
Co-resident with adult children	0.0285	-0.0172	0.0194	-0.0151	0.0294	-0.0110	0.0199	-0.0140
	(0.0215)	(0.0111)	(0.0205)	(0.0113)	(0.0215)	(0.0111)	(0.0206)	(0.0113)
Co-resident with elderly parents	0.1020***	0.0492***	0.0625***	0.0485***	0.0980***	0.0412***	0.1026***	0.0482***
	(0.0180)	(0.0094)	(0.0172)	(0.0094)	(0.0179)	(0.0094)	(0.0172)	(0.0094)
Women's annual income	-0.4796***	0.0757***	-0.4201***	0.0725***	-0.4453***	0.0735***	-0.4147***	0.0793***
	(0.0072)	(0.0039)	(0.0072)	(0.0039)	(0.0084)	(0.0044)	(0.0081)	(0.0044)
Women's other income	0.2101***	-0.1106***	0.2093***	-0.1108***	0.2099***	-0.1105***	0.2093***	-0.1107***

	(0.0024)	(0.0012)	(0.0022)	(0.0012)	(0.0024)	(0.0012)	(0.0022)	(0.0012)
Husband's income					0.0572***	-0.0325***	0.0505***	-0.0328***
					(0.0074)	(0.0039)	(0.0071)	(0.0039)
Constant	0.0265	0.8104***	-0.793***	0.469***	0.1958	0.9066***	-0.7453***	0.5720***
	(0.1483)	(0.0763)	(0.1478)	(0.0808)	(0.1495)	(0.0770)	(0.1514)	(0.0825)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	436.73	/	458.19	/	442.25	/	467.78	/
Observations	9,788		9,788		9,788		9,788	
R-squared	0.351	0.257	0.356	0.261	0.349	0.246	0.352	0.250

Note: Robust standard errors in parentheses

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

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 27 Robustness check, effect of fertility on female labour force participation – IV-probit estimation, whole sample with farmers, fisher people and hunters

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0630**		-0.0635*		-0.0595*		-0.0541*
		(0.0312)		(0.0339)		(0.0325)		(0.0339)
Instrument-relaxation	0.6669***		0.5875***		0.6627***		0.5874***	
	(0.0163)		(0.0153)		(0.0163)		(0.0153)	
Age	0.0896***	0.0181***	0.0916***	0.0162***	0.0912***	0.0190***	0.0919***	0.0165***
	(0.0077)	(0.0040)	(0.0073)	(0.0041)	(0.0077)	(0.0040)	(0.0073)	(0.0040)
Age2	-0.0009***	-0.0002***	-0.0009***	-0.0002***	-0.0009***	-0.0002***	-0.0009***	-0.0002***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education categories								
Base case: primary or less								
Lower middle school	-0.1360***	0.0361***	-0.1175***	0.0394***	-0.1275***	0.0337***	-0.1165***	0.0387***
	(0.0155)	(0.0082)	(0.0147)	(0.0080)	(0.0155)	(0.0082)	(0.0147)	(0.0079)
Upper middle school	-0.1304***	0.0429***	-0.1589***	0.0409***	-0.1253***	0.0429***	-0.1581***	0.0405***
	(0.0212)	(0.0112)	(0.0198)	(0.0110)	(0.0211)	(0.0111)	(0.0198)	(0.0109)
College	-0.2981***	0.2030***	-0.2655***	0.2206***	-0.2892***	0.2028***	-0.2644***	0.2201***
	(0.0294)	(0.0224)	(0.0278)	(0.0215)	(0.0294)	(0.0222)	(0.0278)	(0.0215)
Health condition (good/excellent)	0.1241***	0.0439***	0.1216***	0.0416***	0.1174***	0.0410***	0.1214***	0.0423***
	(0.0141)	(0.0079)	(0.0224)	(0.0129)	(0.0141)	(0.0079)	(0.0224)	(0.0129)
Ethnic minority	0.3801***	-0.0227**	0.3325***	-0.0201*	0.3719***	-0.0180*	0.3330***	-0.0209*
	(0.0206)	(0.0113)	(0.0220)	(0.0118)	(0.0206)	(0.0112)	(0.0220)	(0.0119)
Non-agriculture registration	-0.4956***	0.0405***	-0.4600***	0.0580***	-0.4902***	0.0381***	-0.4582***	0.0541***
	(0.0185)	(0.0098)	(0.0174)	(0.0104)	(0.0184)	(0.0097)	(0.0175)	(0.0104)
Co-resident with adult children	0.0285	-0.0108	0.0194	-0.0109	0.0294	-0.0148	0.0199	-0.0150
	(0.0215)	(0.0103)	(0.0205)	(0.0104)	(0.0215)	(0.0104)	(0.0206)	(0.0103)

Co-resident with elderly parents	0.1020***	0.0405***	0.0625***	0.0477***	0.0980***	0.0416***	0.1026***	0.0468***
	(0.0180)	(0.0098)	(0.0172)	(0.0096)	(0.0179)	(0.0097)	(0.0172)	(0.0095)
Women's annual income	-0.4796***	0.0781***	-0.4201***	0.0750***	-0.4453***	0.0738***	-0.4147***	0.0788***
	(0.0072)	(0.0032)	(0.0072)	(0.0031)	(0.0084)	(0.0024)	(0.0081)	(0.0027)
Women's other income	0.2101***	-0.1065***	0.2093***	-0.1033***	0.2099***	-0.1056***	0.2093***	-0.1009***
	(0.0024)	(0.0012)	(0.0022)	(0.0012)	(0.0024)	(0.0012)	(0.0022)	(0.0012)
Husband's income					0.0572***	-0.0319***	0.0505***	-0.0325***
					(0.0074)	(0.0039)	(0.0071)	(0.0038)
County effect	No		Yes		No		Yes	
Yesr effect	No		Yes		No		Yes	
F statistics on instrument	407.47	/	421.33	/	410.58	/	422.86	/
Wald test of exogeneity (p value)	3.05 (0.023)		3.64 (0.038)		3.14 (0.025)		3.66 (0.040)	
Observations	9,788		9,788		9,788		9,788	

Note: Marginal effects are reported. Robust standard errors in parentheses

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

Women's annual income takes fitted

Women's other income and husband's income take logged value, in RMB

Table 4. 28 Robustness check, effect of fertility on female labour force participation - OLS estimation, fine levels sample with farmers, fisher people and hunters

	OLS estimations			
Explanatory variables	(1)	(2)	(3)	(4)
Number of kids	-0.1039***	-0.1049***	-0.1029***	-0.1051***
	(0.0049)	(0.0054)	(0.0049)	(0.0054)
Age	0.0252**	0.0280***	0.0246**	0.0273***
	(0.0098)	(0.0098)	(0.0098)	(0.0098)
Age square	-0.0004**	-0.0004***	-0.0004**	-0.0004**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education category				
base case: primary or less				
Lower middle school	0.0213**	0.0208**	0.0177*	0.0178*
	(0.0104)	(0.0106)	(0.0104)	(0.0107)
Upper middle school	0.0372***	0.0337**	0.0331**	0.0304**
	(0.0136)	(0.0134)	(0.0137)	(0.0135)
College	0.0758***	0.0802***	0.0778***	0.0819***
	(0.0103)	(0.0117)	(0.0104)	(0.0117)
Health condition (good/excellent)	0.0843***	0.0824***	0.0860***	0.0836***
	(0.0090)	(0.0137)	(0.0090)	(0.0137)
Ethnic minority	-0.0224	-0.0315**	-0.0256*	-0.0317**
	(0.0139)	(0.0157)	(0.0139)	(0.0157)
Non-agriculture registration	0.0684***	0.0620***	0.0663***	0.0693***
	(0.0108)	(0.0109)	(0.0108)	(0.0109)
Co-resident with adult children	0.0033	0.0037	0.0020	0.0017
	(0.0201)	(0.0198)	(0.0199)	(0.0197)
Co-resident with elderly parents	0.0245**	0.0231**	0.0235**	0.0225*
	(0.0115)	(0.0117)	(0.0114)	(0.0117)
Women's annual wage	0.1109***	0.1056**	0.1107	0.1032***
	(0.0025)	(0.0027)	(0.0019)	(0.0023)
Women's other income	-0.0850***	-0.0834***	-0.0860***	-0.0844***
	(0.0048)	(0.0049)	(0.0048)	(0.0049)
Husband's income			-0.0259***	-0.0199***
			(0.0049)	(0.0049)
Constant	0.5500***	0.4567***	0.6533***	0.5456***
	(0.1632)	(0.1641)	(0.1634)	(0.1645)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
R-squared	0.266	0.300	0.297	0.321
Observations	3,599	3,599	3,599	3,599

Notes: Robust standard errors in parentheses;*** p<0.01, ** p<0.05, * p<0.1
Women's annual wage takes fitted value and logged, in RMB; Women's other income and husband's income takes logged value, in RMB

Table 4. 29 Robustness check, effect of fertility on female labour force participation - probit estimation, fine levels sample with farmers, fisher people and hunters

	probit estimations			
Explanatory variables	(1)	(2)	(3)	(4)
Number of kids	-0.0945***	-0.0954***	-0.0843***	-0.0853***
	(0.0054)	(0.0055)	(0.0054)	(0.0055)
Age	0.0212***	0.0235***	0.0196***	0.0222***
	(0.0071)	(0.0063)	(0.0070)	(0.0062)
Age square	-0.0003***	-0.0003***	-0.0003***	-0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education category				
base case: primary or less				
Lower middle school	0.0199**	0.0188**	0.0171*	0.0167*
	(0.0098)	(0.00933)	(0.00969)	(0.00922)
Upper middle school	0.0467***	0.0427***	0.0537***	0.0510***
	(0.0131)	(0.0121)	(0.0128)	(0.0119)
College	0.0649***	0.0682***	0.0678***	0.0719***
	(0.0073)	(0.0077)	(0.0074)	(0.0077)
Health condition (good/excellent)	0.0680***	0.0649***	0.0647***	0.0662***
	(0.0090)	(0.0114)	(0.0088)	(0.0112)
Ethnic minority	-0.0222*	-0.0311**	-0.0255**	-0.0308**
	(0.0120)	(0.0125)	(0.0118)	(0.0124)
Non-agriculture registration	0.0660***	0.0688***	0.0630***	0.0654***
	(0.0096)	(0.0092)	(0.0094)	(0.0091)
Co-resident with adult children	0.0003	0.0026	0.0022	0.0004
	(0.0188)	(0.0169)	(0.0183)	(0.0166)
Co-resident with elderly parents	0.0270**	0.0212*	0.0252*	0.0199
	(0.0135)	(0.0124)	(0.0132)	(0.0123)
Women's annual wage	0.0828***	0.0863**	0.0805***	0.0828***
	(0.0031)	(0.0029)	(0.0021)	(0.0023)
Women's other income	-0.0539***	-0.0530***	-0.0546***	-0.0536***
	(0.00351)	(0.0034)	(0.0032)	(0.0032)
Husband's income			-0.0267***	-0.0190***
			(0.0052)	(0.0049)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Pseudo R-squared	0.121	0.178	0.135	0.186
Observations	3,599	3,599	3,599	3,599

Notes: Margins are presented; robust standard errors in parentheses;*** p<0.01, ** p<0.05, * p<0.1

Women's annual wage takes fitted value and logged, in RMB; Women's other income and husband's income takes logged value, in RMB

Table 4. 30 Robustness check, effect of fertility on female labour force participation – 2SLS estimation, fine levels sample with farmers, fisher people and hunters

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0605**		-0.0663*		-0.0600**		-0.0638*
		(0.0269)		(0.0372)		(0.0268)		(0.0369)
Instrument-fine ratios	-0.1623***		-0.1314***		-0.1633***		-0.1319***	
	(0.0117)		(0.0127)		(0.0117)		(0.0127)	
Age	0.2578***	0.0117	0.2567***	0.0139	0.2583***	0.0137	0.2567***	0.0156
	(0.0208)	(0.0102)	(0.0200)	(0.0121)	(0.0208)	(0.0101)	(0.0200)	(0.0120)
Age square	-0.0031***	-0.0002	-0.0032***	-0.0002	-0.0031***	-0.0002	-0.0032***	-0.0002
	(0.0003)	(0.0001)	(0.0003)	(0.0002)	(0.0003)	(0.0001)	(0.0003)	(0.0002)
Education categories								
Base case: primary or less								
Lower middle school	-0.1245***	0.0412***	-0.1600***	0.0411***	-0.1255***	0.0419***	-0.1618***	0.0415***
	(0.0273)	(0.0112)	(0.0267)	(0.0124)	(0.0273)	(0.0111)	(0.0267)	(0.0124)
Upper middle school	-0.1456***	0.0619***	-0.1963***	0.0654***	-0.1467***	0.0626***	-0.1978***	0.0655***
	(0.0366)	(0.0145)	(0.0355)	(0.0158)	(0.0366)	(0.0144)	(0.0355)	(0.0158)
College or more	-0.4845***	0.1332***	-0.5453***	0.1354***	-0.4845***	0.1278***	-0.5445***	0.1311***
	(0.0638)	(0.0277)	(0.0620)	(0.0318)	(0.0638)	(0.0275)	(0.0620)	(0.0316)
Health condition (good/excellent)	0.0882***	-0.0127	0.0058	0.0223*	0.0877***	-0.0102	0.0050	0.0234*
	(0.0242)	(0.0089)	(0.0329)	(0.0127)	(0.0242)	(0.0089)	(0.0329)	(0.0126)
Ethnic minority	0.2925***	-0.0292**	0.3136***	-0.0357**	0.3018***	-0.0313**	0.3136***	-0.0357**
	(0.0336)	(0.0126)	(0.0373)	(0.0144)	(0.0336)	(0.0125)	(0.0373)	(0.0143)
Non-agriculture registration	-0.5778***	0.0400**	-0.5398***	0.0424*	-0.5789***	0.0419**	-0.5424***	0.0444*
	(0.0275)	(0.0191)	(0.0266)	(0.0231)	(0.0276)	(0.0189)	(0.0267)	(0.0230)
Co-resident with adult children	-0.3589***	0.0156	-0.3734***	0.0208	-0.3582***	0.0098	-0.3711***	0.0153
	(0.0527)	(0.0221)	(0.0511)	(0.0242)	(0.0527)	(0.0220)	(0.0511)	(0.0240)

Co-resident with elderly parents	0.0497	0.0325**	0.1052***	0.0333**	0.0492	0.0305**	0.1054***	0.0314**
	(0.0334)	(0.0127)	(0.0330)	(0.0133)	(0.0334)	(0.0126)	(0.0330)	(0.0132)
Women's annual wage	-0.3013***	0.0858**	-0.2732***	0.0839***	-0.3232***	0.0815***	-0.2918***	0.0841***
	(0.0130)	(0.0049)	(0.0127)	(0.0049)	(0.0144)	(0.0054)	(0.0140)	(0.00538)
Women's other income	0.1214***	-0.0619***	0.1144***	-0.0606***	0.1210***	-0.0631***	0.1137***	-0.0616***
	(0.0092)	(0.00348)	(0.0089)	(0.0035)	(0.0092)	(0.0035)	(0.0089)	(0.0035)
Husband's income					0.1824***	-0.0429***	0.2149***	-0.0483***
					(0.0139)	(0.0052)	(0.0135)	(0.0052)
Constant	-1.8944***	0.7294***	-2.1256***	0.6667***	-1.9241***	0.7934***	-2.1845***	0.7200***
	(0.3521)	(0.1499)	(0.3445)	(0.1692)	(0.3556)	(0.1499)	(0.3489)	(0.1703)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
Observations	3,599		3,599		3,599		3,599	
R-squared	0.315	0.207	0.321	0.237	0.318	0.219	0.324	0.245

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Women's annual wage takes fitted value and logged, in RMB; Women's other income and husband's income take logged value, in RMB.

Table 4. 31Robustness check, effect of fertility on female labour force participation – IVprobit estimation, fine levels sample with farmers, fisher people and hunters

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0695*		-0.0655*		-0.0625*		-0.0602*
		(0.0380)		(0.0362)		(0.0385)		(0.0363)
Instrument-fine ratios	-0.1655***		-0.1323***		-0.1662***		-0.1334***	
	(0.0134)		(0.0133)		(0.0134)		(0.0133)	
Age	0.2571***	0.0175	0.2562***	0.0124	0.2571***	0.0190	0.2568***	0.0137
	(0.0243)	(0.0217)	(0.0225)	(0.0263)	(0.0243)	(0.0227)	(0.0224)	(0.0258)
Age square	-0.0031***	-0.0011	-0.0032***	-0.0017	-0.0031***	-0.0012	-0.0032***	-0.0019
	(0.0004)	(0.0010)	(0.0003)	(0.0012)	(0.0004)	(0.0010)	(0.0003)	(0.0012)
Education categories								
Base case: primary or less								
Lower middle school	-0.1231***	0.0426*	-0.1580***	0.0480*	-0.1239***	0.0404*	-0.1597***	0.0431*
	(0.0281)	(0.0234)	(0.0265)	(0.0250)	(0.0281)	(0.0243)	(0.0265)	(0.0255)
Upper middle school	-0.1470***	0.0592***	-0.1978***	0.0544***	-0.1479***	0.0543***	-0.1994***	0.0426***
	(0.0347)	(0.0108)	(0.0335)	(0.0120)	(0.0346)	(0.0108)	(0.0335)	(0.0120)
College or more	-0.4839***	0.1256***	-0.5263***	0.1254***	-0.4615***	0.1286***	-0.5125***	0.1241***
	(0.0625)	(0.0248)	(0.0600)	(0.0258)	(0.0648)	(0.0269)	(0.0620)	(0.0246)
Health condition (good/excellent)	0.0881***	-0.0923	0.0827***	0.195**	0.0875***	-0.0686	0.0818***	0.211**
	(0.0249)	(0.0673)	(0.0345)	(0.0955)	(0.0250)	(0.0683)	(0.0345)	(0.0959)
Ethnic minority	0.3097***	-0.0206	0.3189***	-0.278***	0.3090***	-0.228**	0.3190***	-0.281***
	(0.0332)	(0.0879)	(0.0390)	(0.106)	(0.0332)	(0.0899)	(0.0390)	(0.107)
Non-agriculture registration	-0.5723***	0.0635***	-0.5309***	-0.300*	-0.5734***	-0.248*	-0.5339***	-0.315*
	(0.0258)	(0.0146)	(0.0250)	(0.180)	(0.0259)	(0.146)	(0.0251)	(0.177)
Co-resident with adult children	-0.3657***	0.0115	-0.3726***	0.119	-0.3648***	0.0704	-0.3707***	0.0724
	(0.0704)	(0.0154)	(0.0699)	(0.168)	(0.0704)	(0.157)	(0.0699)	(0.171)

Co-resident with elderly parents	0.1470***	0.0451**	0.1106***	0.0445**	0.1465***	0.0437**	0.1099***	0.0417*
	(0.0346)	(0.0102)	(0.0347)	(0.0110)	(0.0346)	(0.0104)	(0.0347)	(0.0112)
Women's annual wage	-0.3006***	0.0763***	-0.3031***	0.0807***	-0.3346***	0.0806***	-0.3100***	0.0807***
	(0.0139)	(0.0235)	(0.0133)	(0.0255)	(0.0156)	(0.0165)	(0.0148)	(0.0200)
Women's other income	0.1207**	-0.0684***	0.1280***	-0.0646***	0.1203***	-0.0656***	0.1120***	-0.0614***
	(0.0087)	(0.0263)	(0.0078)	(0.0296)	(0.0086)	(0.0254)	(0.0077)	(0.0284)
Husband's income					0.2091***	-0.0383***	0.2159***	-0.0354***
					(0.0152)	(0.0424)	(0.0143)	(0.0430)
Constant	-1.8633***	0.4492	-2.1114***	-0.5976	-1.8964***	1.0234	-2.1734***	-0.1183
	(0.3981)	(1.0300)	(0.3722)	(1.1967)	(0.4026)	(1.0464)	(0.3778)	(1.2089)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
Observations	3,599		3,599		3,599		3,599	

Notes: Marginal effects are presented; standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Women's annual wage takes fitted value and logged, in RMB; Women's other income and husband's income take logged value, in RMB.

Table 4. 32 Robustness check, effect of fertility on female labour force participation - 2SLS estimation, fine levels sample with working unit dummy and interaction term

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0720*		-0.0742*		-0.0759*		-0.0779*
		(0.0445)		(0.0423)		(0.0443)		(0.0419)
Instruments: fine levels	-0.2430***		-0.2210***		-0.2455***		-0.2232***	
	(0.0291)		(0.0298)		(0.0291)		(0.0299)	
Age	0.1976***	0.0645***	0.1976***	0.0671**	0.1983***	0.0692***	0.1989***	0.0608**
	(0.0240)	(0.0229)	(0.0238)	(0.0275)	(0.0240)	(0.0223)	(0.0238)	(0.0269)
Age2	-0.0025***	-0.0009***	-0.0025***	-0.0009**	-0.0025***	-0.0009***	-0.0025***	-0.0009**
	(0.0004)	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0003)	(0.0004)	(0.0004)
Education categories								
Base case: primary or less								
Lower middle school	-0.1946***	0.0030	-0.1790***	0.0055	-0.1919***	0.0025	-0.1776***	0.0049
	(0.0370)	(0.0296)	(0.0375)	(0.0324)	(0.0370)	(0.0288)	(0.0375)	(0.0317)
Upper middle school	-0.1571***	0.0614**	-0.1478***	0.0685**	-0.1553***	0.0659**	-0.1466***	0.0622**
	(0.0416)	(0.0287)	(0.0420)	(0.0310)	(0.0416)	(0.0281)	(0.0420)	(0.0304)
College or more	-0.4111***	0.2641***	-0.4094***	0.2555***	-0.4061***	0.2430***	-0.4053***	0.2398***
	(0.0547)	(0.0508)	(0.0562)	(0.0609)	(0.0547)	(0.0493)	(0.0563)	(0.0592)
Health condition (good/excellent)	0.0492*	0.0867***	0.0263	0.0872***	0.0485*	0.0883***	0.0237	0.0911***
	(0.0294)	(0.0166)	(0.0420)	(0.0241)	(0.0296)	(0.0164)	(0.0420)	(0.0238)
Ethnic minority	0.2202***	-0.0715***	0.2463***	-0.0855***	0.2242***	-0.0766***	0.2473***	-0.0856***
	(0.0431)	(0.0247)	(0.0482)	(0.0276)	(0.0431)	(0.0244)	(0.0482)	(0.0273)
Non-agriculture registration	-0.3903***	0.0636***	-0.4043***	0.0621***	-0.3894***	0.0617***	-0.4034***	0.0687***
	(0.0342)	(0.0262)	(0.0344)	(0.0318)	(0.0342)	(0.0255)	(0.0344)	(0.0311)
Work in government/enterprises/institutions	-0.2424***	0.4597***	-0.2288***	0.4610***	-0.2401***	0.4474***	-0.2262***	0.4523***

	(0.0567)	(0.0424)	(0.0566)	(0.0535)	(0.0567)	(0.0412)	(0.0566)	(0.0522)
Interactions of fine ratios and working in government/ enterprises/institutions	-0.0882***	0.0157	-0.0795**	0.0162	-0.0888***	0.0155	-0.0805**	0.0165
	(0.0321)	(0.0109)	(0.0321)	(0.0113)	(0.0321)	(0.0108)	(0.0321)	(0.0113)
Co-resident with adult children	0.0434	-0.0370*	-0.0499	-0.0251	-0.0404	-0.0303	-0.0473	-0.0201
	(0.0362)	(0.0222)	(0.0376)	(0.0228)	(0.0362)	(0.0218)	(0.0376)	(0.0225)
Co-resident with elderly parents	0.0626**	0.0577**	0.0608**	0.0557**	0.0675**	0.0528**	0.0611**	0.0440*
	(0.0248)	(0.0260)	(0.0248)	(0.0258)	(0.0248)	(0.0248)	(0.0248)	(0.0245)
Women's annual income	-0.2518***	0.0765***	-0.2456***	0.0711***	-0.2350***	0.0618***	-0.2295***	0.0619***
	(0.0216)	(0.0128)	(0.0218)	(0.0131)	(0.0243)	(0.0139)	(0.0242)	(0.0139)
Women's other income	0.0955***	-0.0956****	0.0950***	-0.0968***	0.0911***	-0.0968***	0.0909***	-0.0972***
	(0.0086)	(0.0049)	(0.0086)	(0.0049)	(0.0086)	(0.0048)	(0.0086)	(0.0049)
Husband's income					0.0331	-0.0463***	0.0334	-0.0406***
					(0.0218)	(0.0124)	(0.0219)	(0.0127)
Constant	-1.033**	0.0110	-1.2145***	-0.0035	-1.1610**	0.1447	-1.3499***	0.1257
	(0.4504)	(0.2945)	(0.4510)	(0.3355)	(0.4581)	(0.2976)	(0.4595)	(0.3438)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	28.34	/	20.70	/	29.06	/	21.11	/
Observations	1,485		1,485		1,485		1,485	
R-squared	0.375	0.353	0.364	0.311	0.371	0.340	0.355	0.301

Note: Robust standard errors in parentheses

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

Interaction takes the form of Fine levels multiplies the dummy of works in government, government institutions or state owned company.

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB

Table 4. 33 Robustness check, effect of fertility on female labour force participation – IV-probit estimation, fine levels sample with working unit dummy and interaction term

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0653*		-0.0657*		-0.0685*		-0.0675*
		(0.0398)		(0.0394)		(0.0363)		(0.0369)
Instruments: fine levels	-0.2430***		-0.2210***		-0.2455***		-0.2232***	
	(0.0291)		(0.0298)		(0.0291)		(0.0299)	
Age	0.1976***	0.0647***	0.1976***	0.0644**	0.1983***	0.0622***	0.1989***	0.0672***
	(0.0240)	(0.0227)	(0.0238)	(0.0274)	(0.0240)	(0.0222)	(0.0238)	(0.0246)
Age2	-0.0025***	-0.0009***	-0.0025***	-0.0009***	-0.0025***	-0.0009***	-0.0025***	-0.0009***
	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)
Education categories								
Base case: primary or less								
Lower middle school	-0.1946***	0.0104	-0.1790***	0.0112	-0.1919***	0.0036	-0.1776***	0.0059
	(0.0370)	(0.0269)	(0.0375)	(0.0276)	(0.0370)	(0.0258)	(0.0375)	(0.0262)
Upper middle school	-0.1571***	0.0609**	-0.1478***	0.0636**	-0.1553***	0.0673**	-0.1466***	0.0698**
	(0.0416)	(0.0277)	(0.0420)	(0.0287)	(0.0416)	(0.0269)	(0.0420)	(0.0277)
College or more	-0.4111***	0.2499***	-0.4094***	0.2311***	-0.4061***	0.2389***	-0.4053***	0.2355***
	(0.0547)	(0.0488)	(0.0562)	(0.0422)	(0.0547)	(0.0476)	(0.0563)	(0.0418)
Health condition (good/excellent)	0.0492*	0.0796***	0.0263	0.0789***	0.0485*	0.0726***	0.0237	0.0764***
	(0.0294)	(0.0183)	(0.0420)	(0.0272)	(0.0296)	(0.0183)	(0.0420)	(0.0264)
Ethnic minority	0.2202***	-0.0593***	0.2463***	-0.0753***	0.2242***	-0.0669***	0.2473***	-0.0769***
	(0.0431)	(0.0217)	(0.0482)	(0.0250)	(0.0431)	(0.0209)	(0.0482)	(0.0241)
Non-agriculture registration	-0.3903***	0.0675**	-0.4043***	0.0668**	-0.3894***	0.0626**	-0.4034***	0.0696**
	(0.0342)	(0.0279)	(0.0344)	(0.0292)	(0.0342)	(0.0241)	(0.0344)	(0.0281)
Work in government/institutions/enterprises	-0.2424***	0.4285***	-0.2288***	0.4271***	-0.2401***	0.4169***	-0.2262***	0.4218***

	(0.0567)	(0.0695)	(0.0566)	(0.0654)	(0.0567)	(0.0670)	(0.0566)	(0.0627)
Interactions of fine ratios and working in government/ enterprises/institutions	-0.0882***	0.0243***	-0.0795**	0.0258***	-0.0888***	0.0248***	-0.0805**	0.0253***
	(0.0321)	(0.0096)	(0.0321)	(0.0092)	(0.0321)	(0.0093)	(0.0321)	(0.0087)
Co-resident with adult children	0.0434	-0.0404*	-0.0499	-0.0352	-0.0404	-0.0486*	-0.0473	0.0527
	(0.0362)	(0.0238)	(0.0376)	(0.0473)	(0.0362)	(0.0224)	(0.0376)	(0.0452)
Co-resident with elderly parents	0.0626**	0.0549**	0.0608**	0.0589**	0.0675**	0.0589**	0.0611**	0.0535**
	(0.0248)	(0.0267)	(0.0248)	(0.0265)	(0.0248)	(0.0258)	(0.0248)	(0.0256)
Women's annual income	-0.2518***	0.0708***	-0.2456***	0.0793***	-0.2350***	0.0735***	-0.2295***	0.0710***
	(0.0216)	(0.0112)	(0.0218)	(0.0116)	(0.0243)	(0.0134)	(0.0242)	(0.0131)
Women's other income	0.0955***	-0.0955***	0.0950***	-0.0931***	0.0911***	-0.0960***	0.0909***	-0.0937***
	(0.0086)	(0.0040)	(0.0086)	(0.0041)	(0.0086)	(0.0041)	(0.0086)	(0.0042)
Husband's income					0.0331	-0.0409***	0.0334	-0.0406***
					(0.0218)	(0.0125)	(0.0219)	(0.0133)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F statistics on instrument	28.34	/	20.70	/	29.06	/	21.11	/
Wald test of exogeneity (p value)	1.57 (0.041)		1.75 (0.037)		1.65 (0.043)		1.89 (0.035)	
Observations	1,485		1,485		1,485		1,485	

Note: Marginal effects are reported. Robust standard errors in parentheses.

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

Interaction takes the form of Fine levels multiplies the dummy of works in government, government institutions or state owned enterprises.

Women's annual income takes fitted value and logged, in RMB.

Women's other income and husband's income take logged value, in RMB.

Table 4. 34 Robustness check, effect of fertility on female labour force participation – random effects estimation, whole sample, relaxation as instrument & 2SLS

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0800*		-0.0807*		-0.0757*		-0.0761*
		(0.0477)		(0.0477)		(0.0476)		(0.0475)
Instrument-relaxation	0.5313***		0.5015***		0.5299***		0.5014***	
	(0.0326)		(0.0287)		(0.0324)		(0.0287)	
Age	0.0442***	0.0203**	0.0546***	0.0280***	0.0452***	0.0218***	0.0544***	0.0285***
	(0.0088)	(0.0085)	(0.0101)	(0.0088)	(0.0088)	(0.0085)	(0.0101)	(0.0087)
Age square	-0.0004***	-0.0003***	-0.0005	-0.0004***	-0.0004***	-0.0003***	-0.0005***	-0.0004***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education categories								
Base case: primary or less								
Lower middle school	-0.1678***	0.0171	-0.1478***	0.0361*	-0.1663***	0.0192	-0.1480***	0.0358*
	(0.0266)	(0.0227)	(0.0244)	(0.0215)	(0.0265)	(0.0226)	(0.0244)	(0.0215)
Upper middle school	-0.1758***	0.0535**	-0.1770***	0.0800***	-0.1754***	0.0539**	-0.1773***	0.0790***
	(0.0291)	(0.0245)	(0.0270)	(0.0233)	(0.0291)	(0.0244)	(0.0269)	(0.0233)
College or more	-0.2964***	0.1689***	-0.2836***	0.2144***	-0.2952***	0.1711***	-0.2844***	0.2144***
	(0.0281)	(0.0268)	(0.0274)	(0.0264)	(0.0281)	(0.0266)	(0.0274)	(0.0263)
Health condition (good/excellent)	0.0691***	0.0392***	0.0622**	0.0386**	0.0675***	0.0363***	0.0623**	0.0083
	(0.0124)	(0.0116)	(0.0271)	(0.0191)	(0.0125)	(0.0116)	(0.0272)	(0.0191)
Ethnic minority	0.0527*	-0.0173	0.0555*	-0.0231	0.0505*	-0.0213	0.0556*	-0.0249
	(0.0280)	(0.0262)	(0.0285)	(0.0267)	(0.0278)	(0.0260)	(0.0284)	(0.0266)
Non-agriculture registration	-0.0198	0.0478**	-0.0427**	0.0438*	-0.0205	0.0453**	-0.0421**	0.0453**
	(0.0230)	(0.0231)	(0.0210)	(0.0224)	(0.0230)	(0.0230)	(0.0210)	(0.0223)
Co-resident with adult children	0.0135	-0.0481***	0.0674***	-0.0442**	0.0189	-0.0408**	0.0680***	-0.0413**

	(0.0209)	(0.0185)	(0.0233)	(0.0194)	(0.0210)	(0.0184)	(0.0234)	(0.0194)
Co-resident with elderly parents	0.0844***	0.0249*	0.0595***	0.0344**	0.0827***	0.0294**	0.0602***	0.0345**
	(0.0158)	(0.0146)	(0.0175)	(0.0145)	(0.0159)	(0.0145)	(0.0176)	(0.0145)
Women's annual wage	-0.2477***	0.0876**	-0.2316***	0.0804***	-0.2303***	0.0676***	-0.2312***	0.0700***
	(0.0100)	(0.0071)	(0.0129)	(0.0079)	(0.0123)	(0.0076)	(0.0142)	(0.00795)
Women's other income	0.1445***	-0.0507***	0.1484***	-0.0505***	0.1441***	-0.0504***	0.1449***	-0.0506***
	(0.0015)	(0.0016)	(0.0017)	(0.0016)	(0.0015)	(0.0016)	(0.0017)	(0.0016)
Husband's income					0.0266**	-0.0453***	0.0306**	-0.0355***
					(0.0108)	(0.0080)	(0.0124)	(0.0082)
Constant	0.6829***	0.2733	-0.0704	-0.3400*	0.7453***	0.3845**	-0.0690	-0.1789
	(0.1713)	(0.1699)	(0.2212)	(0.1756)	(0.1785)	(0.1722)	(0.2393)	(0.1833)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
Observations	5,029		5,029		5,029		5,029	
Number of households	1,781		1,781		1,781		1,781	

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Women's annual wage takes fitted value and logged, in RMB; Other income and husband's income take logged values, in RMB.

Table 4. 35 Robustness check, effect of fertility on female labour force participation – random effects estimation, fine levels sample, fine ratios as instrument & 2SLS

	(1)		(2)		(3)		(4)	
Explanatory variables	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp	No. of kids	lfp
Number of children		-0.0859**		-0.0847**		-0.0840**		-0.0838**
		(0.0416)		(0.0357)		(0.0417)		(0.0359)
Instrument-relaxation	-0.1784***		-0.1633***		-0.1863***		-0.1736***	
	(0.0249)		(0.0246)		(0.0256)		(0.0255)	
Age	0.1368***	0.0610**	0.1464***	0.0596**	0.1363***	0.0606**	0.1461***	0.0594**
	(0.0242)	(0.0239)	(0.0239)	(0.0249)	(0.0243)	(0.0239)	(0.0240)	(0.0249)
Age square	-0.0019***	-0.0008**	-0.0018***	-0.0008**	-0.0017***	-0.0008**	-0.0018***	-0.0008**
	(0.0004)	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0003)	(0.0004)	(0.0004)
Education categories								
Base case: primary or less								
Lower middle school	-0.2719***	0.0796**	-0.2495***	0.0774**	-0.2726***	0.0795**	-0.2494***	0.0777**
	(0.0441)	(0.0355)	(0.0425)	(0.0356)	(0.0441)	(0.0355)	(0.0425)	(0.0357)
Upper middle school	-0.2755***	0.0931**	-0.2804***	0.0994***	-0.2763***	0.0929**	-0.2807***	0.0995***
	(0.0489)	(0.0370)	(0.0473)	(0.0379)	(0.0489)	(0.0370)	(0.0474)	(0.0379)
College or more	-0.5124***	0.174***	-0.5165***	0.181***	-0.5146***	0.1733***	-0.5176***	0.1811***
	(0.0465)	(0.0432)	(0.0478)	(0.0470)	(0.0464)	(0.0431)	(0.0478)	(0.0471)
Health condition (good/excellent)	0.0841***	-0.0236	0.0816**	0.0140	0.0810***	-0.0218	0.0829***	0.0146
	(0.0222)	(0.0178)	(0.0324)	(0.0256)	(0.0225)	(0.0180)	(0.0323)	(0.0258)
Ethnic minority	0.0848*	-0.1140**	0.0922*	-0.1110**	0.0812*	-0.1156**	0.0913*	-0.1113**
	(0.0482)	(0.0449)	(0.0520)	(0.0462)	(0.0478)	(0.0450)	(0.0518)	(0.0463)
Non-agriculture registration	-0.1478***	0.0739**	-0.1491***	0.0684*	-0.1479***	0.0739**	-0.1498***	0.0687*
	(0.0430)	(0.0349)	(0.0434)	(0.0368)	(0.0428)	(0.0349)	(0.0432)	(0.0368)
Co-resident with adult children	0.0313	0.0424	0.0566	0.0502	0.0327	0.0431	0.0569	0.0503

	(0.0740)	(0.0378)	(0.0740)	(0.0400)	(0.0740)	(0.0377)	(0.0740)	(0.0399)
Co-resident with elderly parents	0.0751***	0.0595**	0.0623**	0.0494**	0.0756***	0.0592**	0.0628**	0.0493**
	(0.0295)	(0.0243)	(0.0310)	(0.0249)	(0.0295)	(0.0243)	(0.0312)	(0.0250)
Women's annual wage	-0.1526***	0.0843***	-0.1448***	0.0850***	-0.1628***	0.0884***	-0.1518***	0.0821***
	(0.0204)	(0.0119)	(0.0204)	(0.0123)	(0.0239)	(0.0121)	(0.0238)	(0.0123)
Women's other income	0.1621***	-0.0550***	0.1609***	-0.0459***	0.1522***	-0.0551***	0.1507***	-0.0447***
	(0.0062)	(0.0065)	(0.0059)	(0.0066)	(0.0062)	(0.0064)	(0.0060)	(0.0066)
Husband's income					0.2199***	-0.0417***	0.2141***	-0.0460***
					(0.0228)	(0.0159)	(0.0230)	(0.0164)
Constant	-1.5650***	-0.2745	-1.6822***	-0.3122	-1.4760***	-0.2214	-1.6168***	-0.2833
	(0.4082)	(0.3856)	(0.4038)	(0.3982)	(0.4190)	(0.3962)	(0.4181)	(0.4134)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
Observations	1,485		1,485		1,485		1,485	
Number of households	527		527		527		527	

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Women's annual wage takes fitted value and logged, in RMB; Other income and husband's income take logged values.

Table 4. 36 Effect of household structure on female labour force participation - OLS estimation

	all married women in whole sample			(observations: 5029)
Household structure				
Base case: no child				
number of child under 3	-0.0635***	-0.0839***	-0.0802***	-0.0848***
	(0.0180)	(0.0175)	(0.0180)	(0.0175)
number of child under 6	-0.0183*	-0.0180*	-0.0177*	-0.0175*
	(0.0114)	(0.0114)	(0.0114)	(0.0113)
number of child under 12	-0.0209**	-0.0234**	-0.0212**	-0.0266**
	(0.0105)	(0.0116)	(0.0104)	(0.0116)
number of child under 16	0.0177	0.0193	0.0187	0.0197
	(0.0144)	(0.0144)	(0.0143)	(0.0144)
	women live in urban areas			(observations: 2411)
Household structure				
Base case: no child				
number of child under 3	-0.0617*	-0.0685**	-0.0619*	-0.0678**
	(0.0355)	(0.0328)	(0.0353)	(0.0328)
number of child under 6	0.0033	0.0049	0.0012	0.0052
	(0.0277)	(0.0267)	(0.0276)	(0.0267)
number of child under 12	-0.0489**	-0.0470**	-0.0508**	-0.0465**
	(0.0240)	(0.0229)	(0.0238)	(0.0229)
number of child under 16	0.0238	0.0256	0.0228	0.0248
	(0.0248)	(0.0255)	(0.0367)	(0.0256)
	women live in rural areas			(observations: 2618)
Household structure				
Base case: no child				
number of child under 3	-0.1464***	-0.1651***	-0.1474***	-0.1645***
	(0.0307)	(0.0308)	(0.0307)	(0.0308)
number of child under 6	-0.0452**	-0.0506**	-0.0473**	-0.0502**
	(0.0209)	(0.0220)	(0.0209)	(0.0220)
number of child under 12	-0.0325	-0.0359	-0.0352	-0.0656
	(0.0296)	(0.0300)	(0.0297)	(0.0300)
number of child under 16	0.0408	0.0479	0.0424	0.0471
	(0.0306)	(0.0307)	(0.0307)	(0.0307)
Husband income	No	No	Yes	Yes
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Included variables: age, age square, household structures, education categories variables, health condition, ethnic minority, non-agriculture registration, co-resident with adult children, co-resident with elderly parents, women's annual wage, women's other income and husbands' income.

Table 4. 37 Effect of household structure on female labour force participation - probit estimation

	all married women in whole sample			(observations: 5029)
Household structure				
Base case: no child				
number of child under 3	-0.0863***	-0.150***	-0.128***	-0.156***
	(0.0277)	(0.0389)	(0.0399)	(0.0474)
number of child under 6	-0.0195*	-0.0181*	-0.0185*	-0.0174*
	(0.0115)	(0.0117)	(0.0116)	(0.0119)
number of child under 12	-0.0214**	-0.0244**	-0.0227**	-0.0243**
	(0.0106)	(0.0123)	(0.0108)	(0.0125)
number of child under 16	0.0176	0.0182	0.0181	0.0191
	(0.0157)	(0.0153)	(0.0155)	(0.0156)
	women live in urban areas			(observations: 2411)
Household structure				
Base case: no child				
number of child under 3	-0.0613**	-0.0653**	-0.0585*	-0.0656**
	(0.0310)	(0.0281)	(0.0311)	(0.0286)
number of child under 6	0.0060	0.0029	0.0061	0.0066
	(0.0277)	(0.0262)	(0.0277)	(0.0174)
number of child under 12	-0.0433**	-0.0447**	-0.0448**	-0.0539**
	(0.0205)	(0.0190)	(0.0205)	(0.0191)
number of child under 16	0.0276	0.0246	0.0273	0.0261
	(0.0260)	(0.0256)	(0.0260)	(0.0251)
	women live in rural areas			(observations: 2618)
Household structure				
Base case: no child				
number of child under 3	-0.1382***	-0.1568***	-0.1382***	-0.1560***
	(0.0252)	(0.0254)	(0.0252)	(0.0254)
number of child under 6	-0.0462**	-0.0435**	-0.0476**	-0.0432**
	(0.0208)	(0.0201)	(0.0208)	(0.0201)
number of child under 12	-0.0314	-0.0326	-0.0318	-0.0332
	(0.0280)	(0.0283)	(0.0280)	(0.0282)
number of child under 16	0.0421	0.0431	0.0432	0.0449
	(0.0294)	(0.0296)	(0.0294)	(0.0296)
Husband income	No	No	Yes	Yes
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes

Notes: Marginal effects are reported. Robust standard errors in parentheses. *** p<0.01, **
Included variables: age, age square, household structures, education categories variables, health condition, ethnic minority, non-agriculture registration, co-resident with adult children, co-resident with elderly parents, women's annual wage, women's other income and husbands' income.

5. Grandparents' childcare and female labour force participation in China

5.1 Introduction

Family planning policy in China has changed Chinese household structures dramatically. Children used to have siblings, but are now "little emperors" in the family because of the unique "4-2-1" family style. Deeply influenced by Confucianism, links between parents and children are essential in traditional Chinese family life and Chinese grandparents are very keen to provide childcare. In fact, grandparents are the main childcare providers before children go to nurseries because mothers often have to return to their full-time work [46](Chen et al., 2000). Although formal childcare will be in place when children reach the age of three in China, this does not signal the end of grandparents' childcare.

On average Chinese employees retire at a younger age than do western workers, and most of them become grandparents when they retire[47]. Driven by strong kinship ties, traditional grandparents who have retired and who are still healthy choose to devote their time to taking care of grandchildren. The involvement of grandparents in childcare in China includes different aspects of daily life, such as buying and preparing food, doing

[46] 98 days is the current official period for maternity leave in China, according to "Regulation and Protection for Female Labourers". This regulation was issued in 1988 and revised in 2012. Before its revision, maternity leave was 90 days.

[47] The official retirement ages for women working in the state and in the collective sector are 50 for workers and 55 for administrators, and the official ages for men working in the state and collective sectors are 55 for workers and 60 for administrators.

housework and checking grandchildren's study (Nyland et al., 2009). It has been found that the presence of grandparents in the household significantly reduces the mother's involvement in childcare (Chen et al., 2000).

On the other hand, female labour force participation rates in China are among the highest in the world. This is because the characteristics of the Chinese labour market have determined that mothers in China cannot spend as much time with their children as western mothers do. Part-time jobs are rarely found in China, while being a full-time mother is a risk because no job means no social security. As a result, working mothers in China, especially in urban areas, rely heavily on childcare centres (Du & Dong, 2010). However, formal childcare services in China are under-supplied, leaving mothers turning to informal childcare, especially before their children go to nurseries.

Apart from grandparents' childcare, looking for a resident nanny is another popular form of informal childcare in urban China. Women from rural areas coming to cities to find jobs or laid-off female workers who cannot find other skilled jobs may be hired as nannies. Nevertheless, grandparents still play an important role because of the strong kinship ties. Many grandparents have the idea that they missed out on their children's childhoods but cannot miss out on their grandchildren's childhoods. Meanwhile, young parents still turn to grandparents for help if the grandparents are available, even if the young parents and grandparents live in different cities or countries (Salaf & Greve, 2004).

A large body of literature explores the relationship between public childcare and female labour supply, focusing on childcare costs. Some early research includes the works of Blau and Robins (1988), Connelly (1992), Ribar (1992) and Kimmel (1998), who all find increasing childcare costs decrease the possibility of mothers joining the labour market. Although Heckman (1974) was an early study, incorporating the availability of informal childcare in a childcare cost function and suggested that research on informal childcare would be fruitful, research on informal childcare is limited.

Guzman (1999) and Wheelock and Jones (2002) investigated the usage of grandparents' childcare in United States and United Kingdom, respectively, and from different points of view. Guzman found that grandparents' availability was the main determinant of grandparents' childcare, while Wheelock confirmed that grandparent s' childcare was considered the best source of childcare if mothers could not look after children themselves due to employment. Since then, research has started to pay attention to childcare. In the early stages, such research focused mainly on childcare costs and childcare choices. Childcare costs are widely concluded as being negatively related to public childcare usage, and Del Boca, Locatelli and Vuri (2005) claimed that informal childcare is the choice parents shift to when costs increase.

Since Leibowitz et al. (1992) developed the hypothesis that the availability of relatives would have a greater impact on mothers' labour supply in the first few years after giving birth, some research has been conducted to investigate the availability of grandparents on women's labour force participation. Kolodinsky and Shirey (2000) and Gray (2005)

concluded that having grandparents living in the same household or nearby would increase the possibility of mothers' labour force participation.

With regard to the 21st century, research on the causal effect of grandparent s' childcare on maternal employment has gradually been conducted. In general, grandparents' childcare is positively related to mothers' labour force participation. However, identifying the causal effect of grandparents' childcare on mother's labour force participation is challenging at least for two reasons. Firstly, unobserved factors may influence the availability of grandparents' childcare as well as mothers' employment decisions. For example, traditional grandparents may be more willing to provide childcare than would modern grandparents who would not be prepared to sacrifice their time. Moreover, career-oriented mothers may be more passionate about their work than they are about looking after children, or mothers who care more about childhood development may stay at home with their children simultaneously with grandparents' help. Secondly, grandparent s' childcare and mothers' employment may have a reverse effect on each other. For example, grandparents may offer themselves as alternatives to formal childcare after the mothers' decisions to return to work. To address this challenge when estimating the relationship, instruments used in the existing literature focus mainly on the availability of grandparents, such as the death of grandmothers, whether grandmothers are alive, especially the mother's mother, and the number of siblings a woman has.

Although informal childcare is normal and popular in China, research on this topic is limited. Existing research mainly covers the areas of maternal childcare and childcare choices (F. Chen, Short, & Entwisle, 2000; Du & Dong, 2013; Short, Chen, Entwisle, & Zhai Fengying, 2002), but no particular study focuses on grandparents' childcare in China. Chen, Short and Entwisle (2000) investigated the impact of the proximity of the grandparents' residence on mother's childcare involvement in China using the 1991 CHNS, and concluded that only the proximity of paternal grandparents would reduce a mother's childcare involvement. Du and Dong (2013) also constructed their sample using the CHNS (waves 1991 to 2006), and found that access to informal childcare became increasingly important for women's labour force participation after child care reform in China.

The starting point for this chapter is, as living close to grandparents can reduce mother's[48] childcare involvement and results from the previous chapter show that living with grandparents can increase mothers' labour force participation, the correlation between grandparents' childcare and mothers' labour force participation is not clear.

The sample is constructed using the CHNS, covering 20 years from 1991 to 2011. In total, 688 mothers are included in the sample. Grandparents' childcare is treated as endogenous and an instrument reflecting both the availability of grandparents and their ability to provide care is used; ability to care is proxied by their health condition. A

[48] In this chapter, 'grandparents' refers to the first generation of both maternal and paternal grandparents. 'Mothers' refers to the second generation, whose labour force participation is our research interest. 'Children' are the third generation and this refers to grandchildren.

grandparent who is seriously ill cannot provide childcare but may require care themselves. Therefore, I created a dummy variable that 1 represents either maternal grandparents or paternal grandparents are living in the same city with mothers and grandparents are in a good health condition. More details are presented in the following section.

By using 2SLS and IV probit estimation techniques, our instrument is negatively and significantly related to grandparents' childcare. Other things being equal, with a healthy grandparent living in the same household, mothers have a greater chance of receiving grandparents' childcare by up to 18 percentage points. With grandparents' helping with childcare, mothers increase their possibility of labour force participation by more than 30 percentage points.

5.2 Literature review

Since Heckman (1974) first estimated a childcare cost function and found the price of childcare to be a determinant of the decision to work and of the actual hours of work, a large body of literature has investigated the relationship between childcare and maternal employment. Some early researchers were Blau and Robins (1988), Connelly (1992), Ribar (1992) and Kimmel (1998). Using the 1980 baseline household survey of the Employment Opportunity Pilot Projects (EOPP) in the US and a simple family labour supply model, Blau and Robins first provided direct empirical results concerning the impact of childcare costs on family labour supply. They concluded that higher childcare costs discouraged women from working and, if the mother worked, higher childcare costs

reduced the probability that the other worked. Using the same Income Survey Program Participation (ISPP) data in the US but different year sections, Connelly (1992), Ribar (1992) and Kimmel (1998) provided supporting evidence that increased childcare costs lower the probability of mothers' labour force participation. Connelly (1992) pointed out mother's labour force participation was not as sensitive as Blau and Robins' (1988) findings indicated, but he did not look at how the wage change and childcare cost change would influence the types of childcare used. Ribar (1992) and Kimmel (1998) both looked at the differences between paid and unpaid childcare, while Kimmel (1998) did not make a significant contribution except for adding single mothers to the estimation sample.

Heckman (1974) also incorporated measures of the availability of informal childcare in his childcare cost function. These measures included a dummy indicating the presence in the household of sisters, parents and grandparents, variables for the number of children age between 14 and 18, a dummy indicating whether the mother had lived in a Standard Metropolitan Statistical Area (SMSA) all her life, and another continuous variable measuring the number of years of having lived in an SMSA. He found that older children, relatives living in the home and the length of residence in the SMSA all had negative effects on the price of childcare. Although he did not investigate the relationship between informal childcare and women's work efforts, he suggested the approach of modelling informal childcare might be fruitful.

Meanwhile, informal childcare has been considered as grandparents' childcare in most cases because grandparents are the primary informal childcare providers (Presser, 1989). In fact, grandparents would become the primary caregivers when their adult children were unable to raise their children due to extraordinary reasons, such as imprisonment, severe illness or death. Although grandparents' childcare is often seen in daily life, research about this topic is limited (Kalb, 2009).

Guzman (1999) looked at the role that maternal preferences and kinship ties plays in the decision to use grandparents' childcare in the United States. Using data from the first and second waves of the National Survey of Families and Households (1987-88, and 1992-94) and further creating a sample of females who were currently employed and who had children under the age of five, she concluded that the use of grandparents' childcare was driven by the availability of grandparents, both maternal and paternal, but that mothers' childcare needs are less important. However, Guzman failed to reveal how maternal preferences influenced the use of grandparents' childcare as she did not include mothers' preferences in her model, while her ambiguous definition of grandparents' childcare due to deficient information concerning this variable also led to a biased estimation.

Wheelock and Jones (2002) collected data by sending out packs of questionnaires via employers across a wide range of sectors, as well as conducting telephone interviews[49] in

[49] According to Wheelock and Jones (2002), 3,000 survey packs were distributed, with 425 returns received and another 224 packs returned by informal childcare givers. In addition, as the authors carried out

Tyneside[50] to capture the scenario of informal childcare usage in the United Kingdom. They found that a substantial proportion of parents saw grandparents as the next best source of childcare when mothers were working or could not look after the children. However, this work did not adopt a quantitative analysis to model grandparents' childcare and mothers' labour supply.

Del Boca, Locatelli and Vuri (2005) explored how the decision to use childcare is made by dual workers' families in Italy. Lacking data containing all the demographic, economic, and background information of the families and childcare information, the authors matched two data sets to overcome this limitation. One was the Bank of Italy Survey on Household Income and Wealth (SHIW), which contained detailed information on the income and wealth of family members, labour market activities and socio-demographic characteristics. The other was the Multiscopo survey, collected by the Italian Institute for Statistics (ISTAT) in 1998, which provided detailed information about family structures and the use of childcare including childcare costs, hours of childcare and types of childcare. By using a multinomial logit model and a maximum likelihood estimation method, they concluded that private childcare was not a substitute for public childcare when the cost of public childcare increased. Informal childcare, defined as

an additional qualitative analysis, 30 telephone interviews were conducted with the working parents who responded to the survey and who used grandparents' childcare.

[50] Tyneside used to be a region with many heavy industries, but these have been largely replaced by call centres. This labour market change provides more job opportunities for female workers. Moreover, population mobility is not commonly seen in the North East, so working-age women will often have family support as grandparents tend to live nearby (Wheelock & Jones, 2002).

childcare provided by family members or friends and baby-sitters, is the option to which parents turn when costs increase, especially when grandmothers live nearby and there are small children in the household. Because Del Boca, Locatelli and Vuri (2005) used a matched sample in their study, one critical shortcoming is that there might be incorrect matches making their estimation inaccurate.

Hank and Buber (2009) used the 2004 Survey of Health, Ageing, and Retirement in Europe (SHARE) to investigate cross-national variations in grandparents' childcare in 10 continental European countries. They found some cross-national differences. Firstly, in southern European countries, co-residence is seen more often and grandparents' childcare in this case is a unique way of transferring resources, while co-residence is rare in Nordic countries. Secondly, respondents to the survey had different concepts or interpretations of grandparents' childcare. Thirdly, childcare and maternal employment patterns were different. Apart from the first finding that was estimated from a logit model, the other two were concluded from sample statistics; thus, it is too intuitive to be convincing.

Leibowitz et al. (1992) proposed the hypothesis that the availability of relatives would have a greater impact on mother's labour supply in the first few years after giving birth. In their work, using the National Longitudinal Survey of Youth in the U.S., they estimated the determinants of a mother returning to the labour market and childcare usage during the first two years of life. However, they found no significant relationship between mothers' labour force participation and grandparents living in the same household.

Later, Kolodinsky and Shirey (2000) revealed the impact of living with elderly parents on adult daughters' labour supply in the US using the Panel Study of Income Dynamics (PSID) data. They focused on two types of household, one in which adult daughters co-resided with elderly parents and another scenario in which adult daughters had living parents but did not co-reside with them. The authors concluded that co-residence with elderly parents increased adult daughters' labour supply significantly. However, due to the limitations of the data, their analysis did not give the reasons for this correlation. More specifically, as PSID data do not contain any health information, it is unclear whether the adult daughters' labour supply increased due to the elderly parents' help, or because the ill health of the elderly parents meant the daughters worked harder to pay the elderly parents' medical bills.

Focusing on the United Kingdom, Gray (2005) uses the British Household Panel Survey to address the role of grandparents' childcare in helping mothers to enter the labour market. She found that grandparents' childcare helped more mothers to return to the labour market and to work longer hours. However, Gray's analysis is similar to Wheelock and Jones's study, in that she also did not adopt an econometric analysis.

More recently, attention has been drawn to investigating the causal effect of grandparents' childcare on maternal employment. A common issue in these works is that grandparents' childcare has been treated as endogenous. The reason is twofold. The first factor is unobserved factors that influence the availability of grandparents' childcare, as well as mothers' labour force participation decisions. For example, grandparents' attitude

towards providing childcare is one of the unobserved factors. Traditional grandparents may be willing to share some of the responsibilities of raising their grandchildren, while modern grandparents may be unwilling to sacrifice their time to look after grandchildren. This situation is similar with regard to the mothers' labour force participation decision. Career-oriented women may choose to continue their work even without grandparents' help, and family-oriented women or mothers who care more about children's development may suspend their careers even when grandparenta' childcare is available. The mostly frequently used instrument mainly reflects the availability of grandparents, such as the distance from the grandparents, and a dummy variable indicating a living grandmother or the death of a grandmother.

Arpino, Pronzato and Tavares (2010) used the Multiscopo Family and Social Subjects wave 2003 to estimate the causal effect of grandparenta' childcare on mothers' labour force participation decisions in Italy. They created four dummy indicators using information regarding whether the mother's parents and in-laws were still alive as instruments, and found that, with the grandparents' help with childcare, mothers' increase their possibility of labour market participation by 39 percentage points. This positive effect was stronger for less-educated women. It was a good attempt to instrument the availability of grandparents' childcare, but their estimations omitted the variable bias because they did not model the mothers' income and the household income.

Drawing on the Generations and Gender Survey, Aassve, Arpino and Giosis (2012) looked at seven European countries to reveal the differences because the role of

grandparents' childcare varies across nations in Europe. Detailed explanations are given in their study regarding why grandparents' childcare should be considered endogenous, and they used two instruments to indicate grandparents' childcare, namely living grandmothers and the number of maternal siblings. They found differences in countries such as France, Germany and Hungary, in which grandparents' childcare helped mothers to increase their labour supply after controlling the endogeneity, while in Georgia, the Netherlands and Russia, there was no indication of a causal effect. The drawbacks of this study are obvious. Firstly, no income variables were included in the model, leading to an omitted variable bias. Secondly, the authors should have included a variable indicating each country's female labour force participation characteristics; for example, Russian family policies encourage women to stay at home rather than go out for work.

Using the National Longitudinal Survey of Youth 1979 in the US, Posadas and Vidal-Fernandez (2013) also created a dummy instrument indicating whether the maternal grandmother was still alive to take part in grandparents' childcare. They found that grandparents' childcare could help mothers to increase their likelihood of labour force participation by nine percentage points on average. However, this result used a fixed effect estimation instead of an IV estimation because the latter failed to give consistent results. This may have been partly due to the limitations of the data, as the authors did not include income variables; thus, a biased estimation is expected.

Compton and Pollak (2014) showed that married women with young children increased their labour supply if they lived near to grandmothers, either maternal or paternal, and

that the potential mechanism was the childcare transferred from grandmothers. In their work, they pointed out two endogeneity issues, one is from the simultaneous decision of childcare and mothers' labour force participation, and the other is from the potential endogeneity of family proximity. The authors believed the former endogeneity issue was commonly recognised in literature, but that the latter was generally ignored. They argued that the reasons for considering proximity as endogenous were that proximity could be influenced by some unobserved factors, such as family links or even the marriage market, and that these factors may also influence labour force participation in some way. Following the literature on childcare and mothers' labour force participation, they used the NSFH data and proximity as instruments for childcare provided by grandmothers, and found that mothers who had childcare help from grandmothers were 5.1 to 6.2 percentage points more likely to work in the paid labour force than were mothers who did not. To address the endogeneity of proximity, they used census data and created a sample of "military wives", civilian women with husbands serving in the US military, because they believed that, compared to other couples, proximity to military wives was more exogenous because their husbands' locations were determined by the US military. However, the authors failed to find a significant effect of proximity on military wives' labour force attachment, although they claimed proximity would be exogenous for these women. This is may be partly due to their initial consideration that proximity is not necessarily endogenous.

Although no existing studies directly examine the causal effect of grandparents' childcare on mothers' labour force participation in China, some literature pays attention either to

female labour force participation or to childcare. Chen, Short and Entwisle (2000) investigated the impact of the proximity of the grandparents' residence on mothers' childcare involvement using the CHNS wave 1991. They found that grandparents living in the household or nearby reduced the mothers' childcare load and this effect was more significant in rural areas than it was in urban areas. This study was a good attempt to investigate the availability of grandparents on childcare although it still had shortcomings in that this study did not take the grandparents' health into consideration. Also using the CHNS wave 1991, Short et al. (2002) expanded their research on childcare to maternal work and childcare involvement using both qualitative and quantitative methods. They claimed that both work compatibility and work intensity reduced mothers' childcare involvement but, on the other hand, grandmothers could greatly reduce mothers' childcare burdens.

Although their original aim was not to investigate the effect of the availability of grandparents on mothers' labour supply, Maurer-Fazio et al. (2011) confirmed the previous research carried out by Chen, Short and Entwisle (2000), in that elderly parents living in the household would increase mothers' labour force participation by up to 20 percentage points in China using the Chinese Population Census data.

The most recent work on maternal employment and childcare was conducted by Du and Dong (2013), who examined the labour force participation and childcare choices of urban Chinese women during the economic transition. Because the public childcare system experienced a reform after China launched the Economic Reform, mothers' access to

public childcare has been limited. Using six waves (1991, 1993, 1997, 2000, 2004 and 2006) from the CHNS, the authors found that access to informal caregivers became increasingly critical for women's labour force participation.

5.3 Methodology

5.3.1 Conceptual framework

Dependent variable in this chapter for estimation is mothers' labour force participation which takes the value of 1 if the mother is part of the labour force and 0 if not. This set up is slightly different from the previous chapter which investigates married women's labour force participation. This is because it is believed that grandparents' childcare only happens when there are grandchildren in the household and those married women who haven't gave birth to children may not receive grandparents' childcare support. The estimation model in this chapter is as follows:

$$MLFP_{it} = \beta_{i0} + \beta_{i1}GPC_{it} + \beta_{i3}Y_{it} + \beta_{i4}X_{it} + \varepsilon_{it} \quad (4)$$

where *i* denotes individuals and t denotes survey years. Similarly, mother's labour force participation focused in this estimation is defined the same as mothers taking paid job outside homes. More details can be found in Chapter 4 discussed in 4.3.1.

GPC stands for grandparents' childcare, and is the variable of interest. How grandparents' childcare defined in this chapter is based mainly on three questions from the data questionnaires. The first question was for adults and asked whether they took care of children aged six and younger in their households. The second question was for

children aged 6 and younger and asked whether the children were taken care of by people living outside the household, followed by another question asking where the care took place. For the first question, if the adults were the grandparents in the household[51] and their answer was yes, grandparents' childcare was recognised as taking place and this variable would be replaced with 1. For the second question, if the children answered yes and the care took place in the home of either the maternal or paternal grandparent or both, variable grandparents' childcare was replaced with 1.

Instead of including the number of children each mother had, the household structure was used, which is the vector Y_{it}. The reasons are twofold. Firstly, grandparents' childcare only happens when there is a child in household. In other words, there would not be a need for grandparents' childcare if the number of children in the household were 0. Secondly, childcare needs vary for different age groups of children. In order to reflect the effect of childcare needs on mothers' labour force participation rather than the effect of fertility on mothers' labour force participation, I think household structure is a better choice than is the number of children in the household. In the estimation, children will be divided into three groups based on their ages, namely 0-3, 4-6 and 7-16. Correspondingly, these groups represent children staying at home being looked after by their parents or grandparents, children going to kindergartens and children going to primary school.

[51]The household relationship is recognised via the variable of relationship to household head.

X_{it} is a vector for personal characteristics including age, education levels, health condition, an ethnic minority dummy, a non-agricultural registration dummy, the age of the youngest child, youngest male child, the mother's annual wage and other income. In addition, two dummy variables indicating other male and female members in the households were included in the model. The husband's income was also included for different estimations.

I expected children in the age group 0-3 to have the greatest influence on mothers' labour force participation than would the other two groups of children because childcare for children in this age group is more intensive. Furthermore, public childcare for children aged 3 and younger is relatively less available in China.

I also expected mothers' education levels, health condition, non-agricultural registration, age of youngest child, annual wage and having other female members in the household would be positively related to mothers' labour force participation. In particular, I believed other female members except mothers and grandmothers in the households, such as mother's siblings or other relatives, could also provide childcare and would allow mothers to increase their labour supply.

Finally, year dummy variables and province dummy variables were included to capture the year fixed effect and the province fixed effect.

5.3.2 Instruments

Following the literature, grandparents' childcare was treated as endogenous, and an IV estimation strategy was used.

Instruments in previous studies focused mainly on the availability of grandparents, particularly of grandmothers; therefore, the instruments indicated whether grandmothers were still alive. However, one important factor has been left out, which is the ability of grandparents to provide childcare. Some grandparents are seriously ill and need to be cared for rather than providing care. In this case, availability cannot reflect the possibility of grandparents' childcare. Moreover, I assumed that grandparents' childcare was only available when both grandmothers and grandfathers were healthy, because if one of them needed care, the other grandparent would not have much time to look after grandchildren.

The instrument in this chapter is an improvement regarding this issue. In essence, the instrument is a dummy variable derived from both the availability and ability of grandparents to provide care. Firstly, two variables indicating maternal and paternal grandparents' places of residence were created representing 'living in the same household', 'living in the same city' and 'living in different cities from the mothers'. Next, two variables indicating maternal and paternal grandparents' health status were created representing 'none of the grandparents needing care', 'one of the grandparents needing care' and 'both of the grandparents needing care'. Finally, the instrument was labelled 1 for one of the following four situations: (i) maternal grandparents living in the same household as mothers and neither of them needs care; (ii) paternal grandparents living in the same household as mothers and neither of them needs care; (iii) maternal grandparents living in the same city and neither of them needs care; and (iv) paternal grandparents living in the same city as mothers and neither of them needs care. Otherwise, the instrument is 0.

5.3.3 Estimation methods – Binary choice model with binary endogenous independent variable

Since the grandparents' childcare is endogenous, instrument estimation techniques need to be used. However, the two-stage least squares (2SLS) estimation assumes the dependent variables in the first and second stages are continuous while our model falls into a binary choice model with binary endogenous independent variable since the grandparents' childcare also takes value of 1 if there is, and 0 vice versa.

Angrist (2001) argued that 2SLS can simply deliver consistent estimators for models containing binary dependent variables and binary endogenous variables. He mentioned that a probit or logit estimation may seem more appropriate for 2SLS if the endogenous variable is binary, but the second stage estimation can be inconsistent unless the first stage conditional expectation function is totally correct.

Meanwhile, Wooldridge (2010) introduced a bivariate probit model for a limited dependent variable with endogenous regressors, typically specified for two probit models as:

$$y_1 = 1[\beta_1 X_1 + \varepsilon_1 > 0]$$

$$y_2 = 1[\beta_2 X_2 + \varphi y_1 + \varepsilon_2 > 0]$$

where y_2 is an endogeneous regressor for y_1. Consistent estimators can be obtained from separate probit models for the first and second stages with the assumption that the error terms, ε_1 and ε_2, are independent of X_1 and X_2 with a bivariate normal

distribution. However, if ε_1 and ε_2 are correlated, a joint maximum likelihood procedure is more efficient than are separate probit estimations.

Angrist (2001) also compared his empirical estimations on the labour supply consequences of a third child using 2SLS, IV probit and a bivariate probit approach. The results show that the IV probit model generates identical effects to the 2SLS estimate.

Therefore, in this study, 2SLS and IV probit estimations are used to deliver the main analysis, and the results are presented in the chaper while OLS and probit estimation results are presented in Appendix H-O.

5.4 Sample selection and statistics

5.4.1 Defining grandparents' childcare and sample selection

Before selecting the sample of this chapter, I firstly defined grandparents' childcare based on the CHNS questionnaires and the steps are illustrated in Figure 5.1. Generally, grandparents' childcare is identified in three generations households when grandparents answered "yes" to the question "During the past week, did you take care of children age 6 and younger in your household?" In two generations households, grandparents childcare is identified when children age 6 and younger answered "yes" to the question "During the past week, were you taken care of by people who do not live in your household?" and the childcare took place in either maternal grandparents' or paternal grandparents' home.

Of the 173,778 observations that were included in the raw longitudinal data set, male observations and those with missing information on gender were excluded. Following

this, 87,309 females' observations remained. Next, the data were narrowed down to women who were aged 16 to 55 and currently married. Individuals who were currently at school, or not working due to disability or retirement were excluded to place the focus on economically active women. Furthermore, females' observations were excluded if their youngest children were aged six and older because information about grandparents' childcare could not be tracked due to the design of the questionnaire[52]. Some other females' observations were also excluded because of uncertainty, such as an uncertain number of children or uncertain grandparents' childcare. Lastly, those observations with missing records for any of the regression variables were excluded. Unlike the sample selection in the previous chapter, I included farmers, hunters and fisher people in the whole sample and excluded them in the robustness check estimation. The process of sample selection is shown in Figure 5.2.

5.4.2 Sample and statistics

Before presenting the statistics of the sample, Table 5.1 demonstrates how the raw data looks like considering females age between 16 and 55 then Table 5.2 presents the characteristics of the sample, including further slit the sample into groups of women participate in the labour market and not, and women live with grandparents and not.

Firstly, comparing Table 5.1 and 5.2, it can be seen that labour force participation rate in the sample is higher than it is in the raw data, with a difference less than 10%. However, the ratio of receiving grandparents' childcare is much higher in the sample. This is

[52] Questions about childcare targeted children aged six and younger.

because the age range in the raw data is wider since it covers females aged from 16 to 55 while the sample covers females who have children age under 6. Therefore, the average age of females in the sample should be smaller, which also can be found in Table 5.2. For those females who are single and female who have children age above 6, the raw data does not contain information on grandparents' childcare, so the ratio on this variable is low. Another big difference is seen on the variable of age of youngest child, which is nearly a 10 years gap between the raw data and the sample. This is limited by the nature of CHNS questionnaires that only children age under 6 were asked about the informal childcare, so that the average age of youngest child is much smaller. Other variables statistics, such non-agricultural registration and ethnic minority, are very close in the raw data and sample.

From Table 5.2, mothers' labour force participation rate in the sample is 80%. 40% of mothers in the sample received childcare support from grandparents and a large difference was observed between mothers living with grandparents in the same household and those who did not. Mothers who lived with grandparents in the same household had nearly tripled the chances of gaining support from grandparents compared to those living in different households. However, mothers in good health were less likely to receive help from grandparents.

Another finding from Table 5.2 is that mothers live closer to their in-laws in this sample. Only 5% of the mothers lived with maternal grandparents in the same household and most of the mothers lived with maternal grandparents in the same city. However, nearly

half of the mothers lived with paternal grandparents in the same household and less than 10% of mothers lived in different cities from those of paternal grandparents.

Average age of mothers in this sample is 30 years old with 12% of them are ethnic minorities. 36% of mothers are holding non-agricultural registration and about half of the mothers report they are in good health conditions.

5.5 Results

In this section, only instrument estimation results are discussed while the OLS and probit estimation results are presented in Appendix H-O.

5.5.1 IV estimation results

According to the first stage estimation results in Tables 5.3 and 5.4, the instrument is positively and significantly related to grandparents' childcare, meaning that other things being equal, mothers living with healthy grandparents in the same household or in the same city had a 25 percentage points higher chance of receiving grandparents' childcare support.

Surprisingly, having a young child under the age of six does not influence the chance of mothers receiving childcare support from grandparents. This also reflects the fact that the possibility of receiving childcare from grandparents does not reply on how young the children are, but on the availability and capability of grandparents. Mothers' education levels, meanwhile, does not affect the chance of receiving childcare from grandparents neither, reflecting that childcare from grandparents neither is an outcome of culture rather

than education. On the other hand, healthy mothers tended to have a lower chance of receiving childcare support that other characters being the same, a healthy mother is 15 percentage points less likely to be helped by grandparents on childcare compared with a less healthy mother. While male members in the household seem not really helpful, female members can help out. Usually in China, most non-agricultural households are two generations families, which means except mothers, there may not be other female members, while in rural areas, agricultural households may be two generations as well as three generations families. Since the first stage estimation is about the chance of receiving childcare from grandparents, it can be understood that female members living in the household, especially in rural areas, will make effort on other family issues, such as cooking and cleaning, so that grandparents can provide childcare.

Grandparents with non-agricultural registration tended to be more positive about providing childcare; this was possibly due to the fact that grandparents with non-agricultural registration enjoy social benefits, such as pension and medical insurance, unlike grandparents with agricultural registrations, who are much less socially secure and have to work to cover their expenses. Income variables, however, do not influence the chance of receiving grandparents' childcare too much except mothers' non-labour income. This can be true that with more non-labour income, such as returns from investing stocks or rent income from real estate, the families have ability to provide higher standard life or more resources, such as health care to elderly parents.

The second stage estimation results showed that grandparents' childcare was positively and significantly related to mothers' labour force participation. As a result of grandparents' childcare, mothers increased their possibility of joining labour market by over 30 percentage points. This result is similar to the findings of Arpino et al. (2010; 2012) who concluded that grandparents' childcare could help mothers in Italy to increase their labour force participation by up to 40 percentage points; however, it is higher than the findings by Posadas and Vidal-Fernandez (2013), who concluded that grandparenta' childcare could help mothers in the US to increase their labour force participation by at least nine percentage points.

Education levels increased mothers' possibility of joining the labour market, and the higher the education level the mothers attained, the greater the effect on their labour force participation. With other variables being constant, a college or higher degree increased the possibility of mothers' labour force participation by up to 25 percentage points. A positive effect was also seen for the variables of good health and non-agricultural registration. Although having other female members in the household increased the chance of mothers receiving grandparents' childcare, it did not influence mothers' labour force participation.

Mothers' annual wages increased their possibility of labour force participation, while mothers' other income and husband's income reduced mothers' possibility of labour force participation. The magnitude of the negative effect of the husbands' income was less than

was the magnitude of the positive effect for the mothers' annual wages, showing that the mothers' earning power was stronger.

5.5.2 Urban-rural difference

To discover the urban-rural difference, the sample was divided into two sub-samples based on the interviewees' places of residence. Tables 5.5 to 5.8 present the 2SLS and IV-probit estimation results.

It can be seen that the magnitude of grandparents' childcare in rural areas is greater than it is in urban areas. In rural areas, grandparents' childcare can help mothers to increase their labour force participation by over 40 percentage points, while the amount is around 25 percentage points in urban areas. This is because public childcare systems are more popular in urban areas than they are in rural areas. Therefore, in urban areas, grandparents' childcare is supplementary while in rural areas, grandparents' childcare is relatively essential for mothers due to the incomplete childcare system.

The results also show some other differences. Firstly, mothers in urban areas are more likely to receive childcare from grandparents than are mothers in rural areas. Secondly, young children under the age of three reduce mothers' labour supply to a greater degree in urban areas than is the case in rural areas. Thirdly, good health is more important for mothers living in rural areas because, with the other variables remaining constant, good health can increase the possibility of labour force participation three times higher for mothers in rural areas than mothers in urban areas. Fifthly, mothers' labour force

participation decisions are more sensitive to income variables in rural areas than they are in urban areas.

5.5.3 Robustness check

In this section, mothers whose primary occupations were farmers, fisher people and hunters will be excluded from the sample. The IV estimation results are presented in Tables 5.9 and 5.10.

It can be seen that grandparents' childcare is still positively related to mothers' labour force participation and that its magnitude is greater than it is in the baseline estimation. Other things being equal, grandparents' childcare can increase mothers' possibility of joining the labour market by over 35 percentage points.

The first stage results are similar to the baseline estimation in that having children aged between seven and 16 reduces the chance of receiving grandparents' childcare, but the having children under the age of six did not affect this possibility. The mothers' health condition was still the most important factor that reduced the chance of receiving grandparents' childcare. With the other variables remaining constant, mothers in good health were about 20 percentage points less likely to receive the grandparents' support in terms of childcare.

Comparing second stage results with base line results, differences can also be seen on the variables of children age under three and age of youngest child. The magnitude of having children age under three has slightly increased, showing that having young child in the family will decrease mothers' labour force participation to a higher degree if mothers

working in regular patterns. With the youngest child getting bigger, however, mothers' labour force participation will increase.

5.5.4 Is grandparents' childcare over-controlled?

The most frequently used instruments for grandparents' childcare focus mainly on the availability of grandparents, i.e. whether grandparents are alive, particularly of grandmothers. In this section, estimations are carried out to investigate whether there is any over-control effect on grandparents' childcare. Two instruments will be used separately; one is a dummy variable indicating grandmothers, either maternal or paternal grandmothers, are alive and the other is a dummy variable indicating both grandparents, either maternal or paternal, are in good health condition. Results are presented in Table 5.11 to 5.14.

It can be seen that both instruments are positively and significantly related to grandparents' childcare. Mothers can have 40 percentage points higher chance of receiving childcare support when either maternal grandmothers or paternal grandmother are alive assuming other characters are the same as those mothers with grandmothers passed away. Similarly, using grandparents' health condition only as instrument, mothers can have 25 percentage points higher chance of receiving childcare from grandparents if both grandparents, either maternal or paternal, are in good health condition holding other variables constant.

Nevertheless, the two instruments are weak instrument in this sensitivity check since the F statistics from weak instrument test show that they are not strong enough to provide

consistent estimation results. For example, the magnitudes of effects from two instruments on grandparents' childcare are higher than those using the interactive instrument representing both the availability and capability of grandparents, leading to potential upward bias. In a word, the interactive instrument works well and there is no over-control effect for the grandparents' childcare.

5.6 Conclusion

Grandparents' childcare has attracted much attention from researchers. Literature on grandparents' childcare include research on grandparents' childcare as a supplementary childcare choice to formal childcare, on grandparental proximity to help mothers' to increase their labour supply or to decrease their childcare involvement, and on grandparents' childcare to help mothers to increase their labour force participation. One important issue related to grandparents' childcare is that it can be endogenous. The reasons are twofold. Firstly, grandparents' childcare and mothers' labour force participation decisions can simultaneously influence each other, such as via negotiations between mothers and grandparents. Secondly, unobserved factors can influence grandparents' decisions to provide childcare and mothers' decision to accept grandparents' childcare, such as grandparents' attitudes towards sacrificing time to look after grandchildren and mothers' attitudes towards formal and informal childcare. The mostly frequently used instruments in the literature mainly indicate the availability of grandparents; for example, living grandparents, particularly grandmothers.

In this chapter, the relationship between grandparents' childcare and mothers' labour force participation in China was examined by creating an instrument indicating both the availability and the ability of grandparents. The first stage results from 2SLS and IV-probit estimations show that mothers were less likely to receive grandparents' childcare if the grandparents lived far away and/or were not in good health.

The second stage results confirmed that the provision of childcare by grandparents increased mothers' possibility of labour force participation by more than 30 percentage points. Young children under the age of three reduces mothers' possibility of joining the labour market the most, as other things being equal, having a child under the age of three could reduce the mothers' possibility of labour force participation by more than 25 percentage points in the robustness check estimations.

An urban-rural difference was observed in the estimations. I found that mothers living in rural areas benefited more from grandparents' childcare. In rural areas, other things being equal, grandparents' childcare could help mothers to increase their possibility of labour force participation by up to 40 percentage points. This may be partly due to the incomplete public childcare system in rural areas, leading mothers to depend more on family support than do mothers living in urban areas.

A robustness check using a sample that excluded mothers who were farmers, fisher people and hunters showed that grandparents' childcare consistently helped mothers to increase their labour supply and the magnitude of this positive effect was even greater than it was in the previous estimations. Other things being equal, grandparents' childcare

can help mothers to increase their possibility of labour force participation by over 35 percentage points.

Finally, I also tested whether grandparents' childcare has been over-identified. Similar to previous research in the literature, I used the availability of grandmothers as an instrument. A dummy variable that took the value of 1 if the grandmothers were still alive was created, but the estimations show that this instrument is a weak instrument. The magnitudes of the estimation results were greater than they were when using the interaction term as an instrument. Therefore, the instrument in this chapter is an effective one for grandparents' childcare.

5.7 Shortcomings and future research

In this chapter, although the estimation results supported the hypothesis that grandparents' childcare can help mothers to increase their possibility of remaining in the labour market, there are still some limitations.

Firstly, although grandparents' childcare was defined based on three questions that asked both children and adults about childcare, the time period was "during the past week";[53]thus, if the childcare took place before this, such as two weeks or a month previously, I was unable to track this information regarding grandparents' childcare. This may lead to an under-identification of grandparents' childcare.

[53] Adults were asked, "During the past week, did you take care of children under the age of six?" and children were asked, "During the past week, were you taken care of by people who do not live in your household?"

Secondly, I did not distinguish between maternal and paternal grandparents when defining grandparents' childcare. There may be differences if grandparents' childcare can be distinguished and one form may predominate; for example, there may be a preference for maternal or paternal grandparents' childcare, or they may be equally important for mothers' labour force participation.

Thirdly, improvements to the instrument are still needed. As discussed above, grandparents' childcare is endogenous due to unobserved factors, and grandparents' attitude is one of them. In this chapter, the instrument used reflected availability and ability of grandparents without controlling for their attitudes. This may result in an over-estimation of the instrument for grandparents' childcare. For example, even though the grandparents are still alive and healthy, they may not be willing to sacrifice their time or may prefer to do other things in which they are interested. Furthermore, the real distance to the grandparents' houses could be used instead of a dummy variable indicating where the grandparents live.

Therefore, future work can be done to distinguish the effect of maternal grandparents and paternal grandparents, and to re-identify grandparents' childcare.

Figure 5. 1 Defining grandparents' childcare

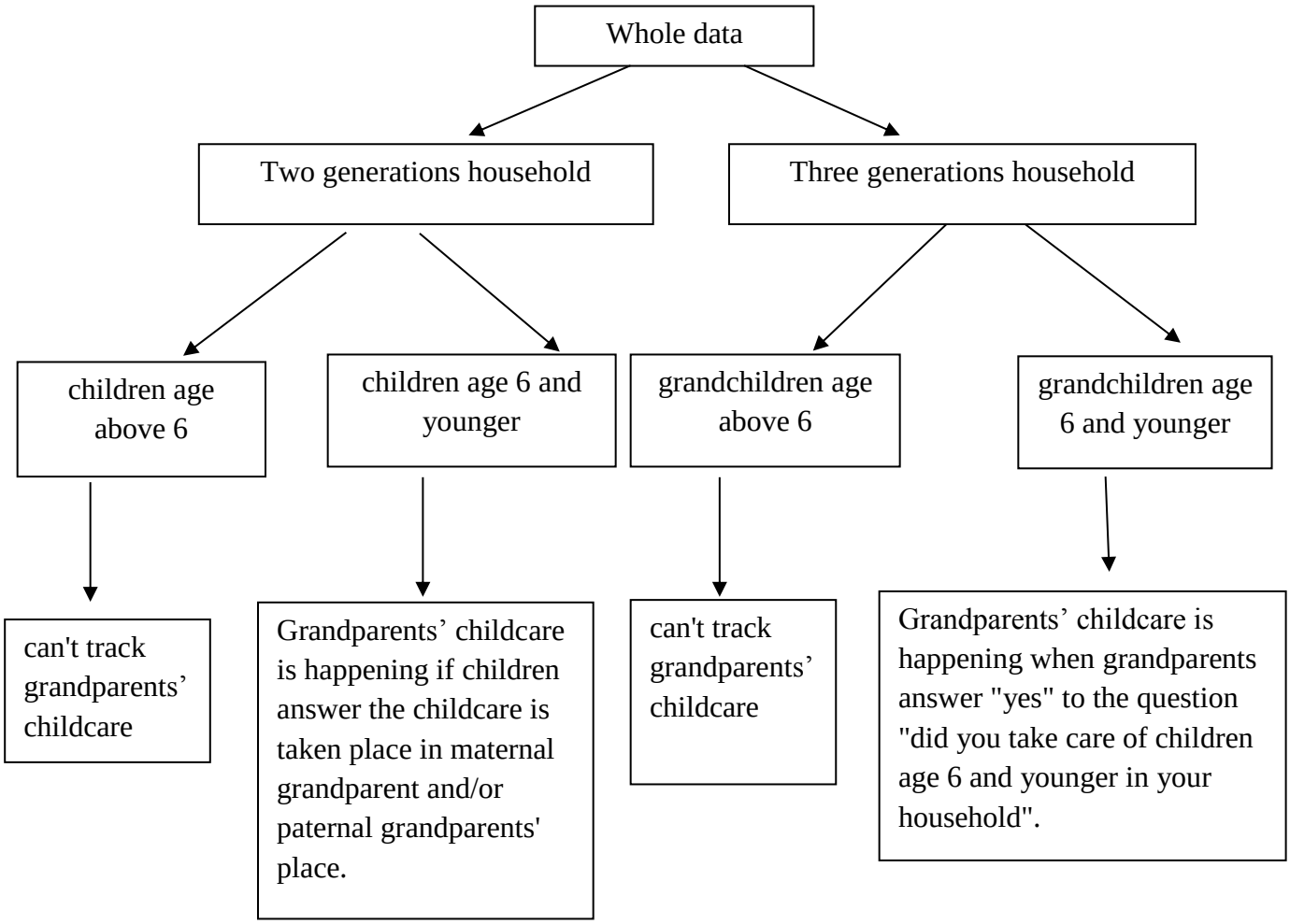


Figure 5. 2 Selection process of baseline sample

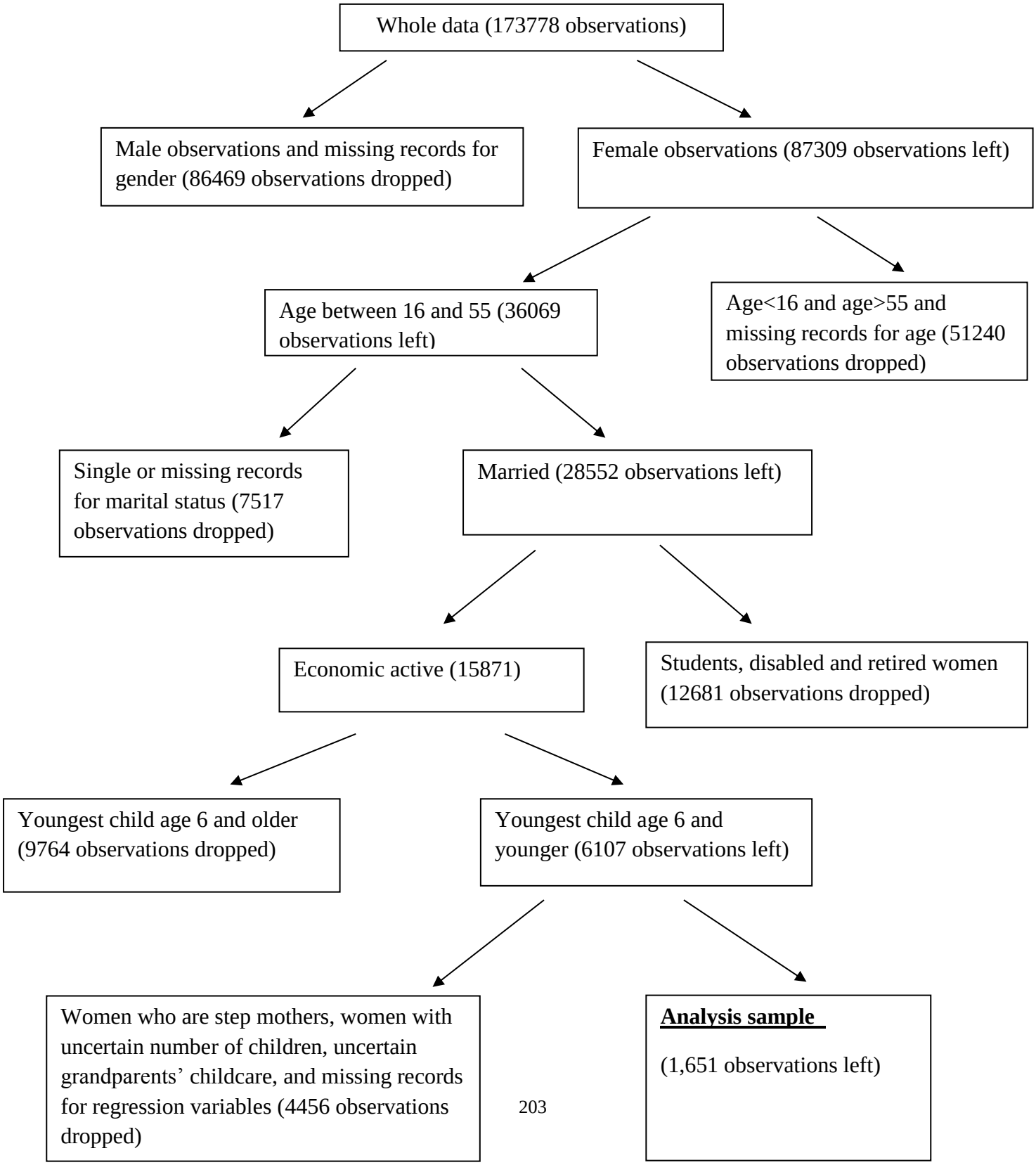


Table 5. 1 Descriptive statistics of key variables, raw data

	raw data	
Independent variable	Mean	Std. Dev.
Labour force participation rate (%)	79.36	40.48
Grandparents' childcare (dummy, 1=yes)	0.10	0.29
Have children age under 3 (dummy, 1=yes)	0.09	0.29
Have children age 4-6 (dummy, 1=yes)	0.11	0.31
Have children age 7-16 (dummy, 1=yes)	0.35	0.48
Age	36.33	10.86
Education categories (dummy, 1=yes)		
primary school	0.41	0.49
lower middle school	0.35	0.48
upper middle school	0.13	0.34
college or more	0.10	0.29
Ethnic minority (dummy, 1=yes)	0.12	0.32
Non-agriculture registration (dummy, 1=yes)	0.30	0.46
Health condition (good/excellent, 1=yes)	0.27	0.44
Age of youngest child	13.16	7.76
Male youngest child (dummy, 1=yes)	0.59	0.49
Maternal grandparents in the same household (dummy, 1=yes)	0.02	0.15
Maternal grandparents in the same city (dummy, 1=yes)	0.41	0.49
Maternal grandparents in other cities (dummy, 1=yes)	0.07	0.25
Paternal grandparents in the same household (dummy, 1=yes)	0.14	0.34
Paternal grandparents in the same city (dummy, 1=yes)	0.26	0.44
Paternal grandparents in other cities (dummy, 1=yes)	0.02	0.15
None of maternal grandparents needs health care (dummy, 1=yes)	1.46	0.50
None of paternal grandparents needs health care (dummy, 1=yes)	1.46	0.50
Other female adult in the household (dummy, 1=yes)	0.40	0.49
Other male adult in the household (dummy, 1=yes)	0.53	0.50
Women's annual wage	8.44	1.19
Women's other income	8.58	2.42
Husband's annual income	8.64	1.22
County (%)		
Liaoning	9.37	29.14
Heilongjiang	6.94	25.41
Jiangsu	11.16	31.48
Henan	10.59	30.77
Shandong	12.15	32.67
Hubei	11.37	31.75
Hunan	11.35	31.72
Guangxi	12.34	32.90
Guizhou	11.58	32.00
Beijing (joined the survey in 2011)	1.13	10.58
Shanghai (joined the survey in 2011)	1.07	10.28

Chongqing (joined the survey in 2011)	0.95	9.71
Year (%)		
1991	11.84	32.31
1993	11.13	31.45
1997	11.84	32.30
2000	13.14	33.79
2004	9.77	29.69
2006	9.36	29.13
2009	8.96	28.56
2011	11.21	31.55
Total observations	35,756	

Table 5. 2 Descriptive statistics of key variables, baseline sample

	whole sample		women with grandparents' childcare		women without grandparents childcare		Women live with grandparents in the same household		Woman and grandparents live in different households	
Independent variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Labour force participation rate (%)	87.22	33.40	87.85	33.82	85.46	33.13	88.06	34.66	86.10	32.40
Grandparents' childcare (dummy, 1=yes)	0.40	0.49	1.00	0.00	0.00	0.00	0.65	0.48	0.21	0.40
Have children age under 3 (dummy, 1=yes)	0.45	0.54	0.54	0.55	0.39	0.53	0.56	0.56	0.37	0.52
Have children age 4-6 (dummy, 1=yes)	0.67	0.47	0.55	0.45	0.76	0.47	0.56	0.47	0.74	0.44
Have children age 7-16 (dummy, 1=yes)	0.32	0.47	0.19	0.44	0.52	0.68	0.23	0.48	0.51	0.67
Age	30.43	4.34	29.16	3.58	31.27	4.58	29.47	4.06	31.16	4.40
Education categories (dummy, 1=yes)										
primary school	0.31	0.46	0.20	0.40	0.37	0.48	0.26	0.44	0.34	0.47
lower middle school	0.41	0.49	0.44	0.50	0.40	0.49	0.43	0.50	0.40	0.49
upper middle school	0.14	0.34	0.16	0.36	0.12	0.33	0.15	0.35	0.13	0.34
college or more	0.14	0.35	0.20	0.40	0.11	0.31	0.17	0.37	0.13	0.33
Ethnic minority (dummy, 1=yes)	0.12	0.32	0.12	0.32	0.11	0.32	0.13	0.34	0.11	0.31
Non-agriculture registration (dummy, 1=yes)	0.36	0.48	0.46	0.50	0.29	0.46	0.41	0.49	0.32	0.47
Health condition (good/excellent, 1=yes)	0.44	0.50	0.31	0.46	0.52	0.50	0.34	0.47	0.51	0.50
Age of youngest child	3.21	1.72	2.91	1.71	3.41	1.70	2.90	1.75	3.45	1.66
Male youngest child (dummy, 1=yes)	0.59	0.49	0.55	0.50	0.61	0.49	0.57	0.50	0.60	0.49
Maternal grandparents in the same household (dummy, 1=yes)	0.04	0.18	0.06	0.23	0.02	0.14	0.08	0.27	0.00	0.00
Maternal grandparents in the same city (dummy, 1=yes)	0.84	0.37	0.81	0.39	0.85	0.36	0.79	0.41	0.87	0.34
Maternal grandparents in other cities (dummy, 1=yes)	0.13	0.34	0.13	0.34	0.13	0.33	0.13	0.33	0.13	0.34
Paternal grandparents in the same household (dummy, 1=yes)	0.40	0.49	0.65	0.48	0.23	0.42	0.93	0.26	0.00	0.00
Paternal grandparents in the same city (dummy, 1=yes)	0.55	0.50	0.31	0.46	0.71	0.45	0.05	0.21	0.93	0.26
Paternal grandparents in other cities (dummy, 1=yes)	0.05	0.22	0.04	0.20	0.06	0.24	0.03	0.16	0.07	0.26
None of maternal grandparents needs health care (dummy, 1=yes)	0.93	0.25	0.93	0.26	0.93	0.25	0.93	0.25	0.93	0.26

None of paternal grandparents needs health care (dummy, 1=yes)	0.94	0.23	0.95	0.22	0.94	0.23	0.95	0.23	0.94	0.23
Other female adult in the household (dummy, 1=yes)	0.23	0.42	0.30	0.46	0.18	0.38	0.36	0.48	0.13	0.34
Other male adult in the household (dummy, 1=yes)	0.24	0.43	0.30	0.46	0.21	0.41	0.36	0.48	0.16	0.36
Women's annual wage	8.46	1.18	8.71	1.26	8.31	1.10	8.61	1.23	8.35	1.13
Women's other income	8.37	2.55	9.05	2.23	7.92	2.65	9.26	2.24	7.70	2.57
Husband's annual income	8.71	1.25	8.90	1.31	8.59	1.19	8.79	1.30	8.65	1.20
County (%)										
Liaoning	9.63	29.51	6.12	23.98	11.94	32.44	6.20	24.13	12.22	32.77
Heilongjiang	7.27	25.97	5.50	22.82	8.43	27.79	2.96	16.95	10.52	30.70
Jiangsu	11.08	31.40	15.60	36.31	8.12	27.33	14.08	34.81	8.82	28.37
Henan	12.05	32.57	10.09	30.14	13.34	34.02	12.54	33.14	11.69	32.15
Shandong	10.36	30.48	11.47	31.89	9.63	29.51	11.41	31.81	9.56	29.43
Hubei	11.99	32.50	9.33	29.10	13.74	34.45	12.54	33.14	11.58	32.02
Hunan	7.75	26.75	5.81	23.41	9.03	28.67	5.35	22.52	9.56	29.43
Guangxi	13.51	34.19	18.20	38.61	10.43	30.58	17.89	38.35	10.20	30.28
Guizhou	9.87	29.84	9.48	29.32	10.13	30.19	10.28	30.39	9.56	29.43
Beijing (joined the survey in 2011)	3.15	17.47	3.52	18.43	2.91	16.81	1.97	13.91	4.04	19.70
Shanghai (joined the survey in 2011)	2.30	15.00	3.98	19.55	1.20	10.91	3.94	19.48	1.06	10.26
Chongqing (joined the survey in 2011)	1.03	10.10	0.92	9.54	1.10	10.45	0.85	9.16	1.17	10.75
Year (%)										
1991	26.59	44.19	15.90	36.60	33.60	47.26	17.75	38.23	33.26	47.14
1993	13.87	34.57	7.80	26.83	17.85	38.32	10.28	30.39	16.58	37.21
1997	12.72	33.33	13.30	33.99	12.34	32.90	12.54	33.14	12.86	33.49
2000	10.54	30.71	13.76	34.48	8.43	27.79	11.69	32.15	9.67	29.57
2004	7.63	26.56	9.79	29.74	6.22	24.16	10.99	31.29	5.10	22.01
2006	6.72	25.05	9.63	29.53	4.81	21.42	9.01	28.66	4.99	21.80
2009	8.12	27.32	12.23	32.79	5.42	22.65	11.83	32.32	5.31	22.44
2011	13.81	34.51	17.58	38.10	11.33	31.72	15.92	36.61	12.22	32.77
Total observations	1651		654		997		710		941	

Table 5. 3 Effect of grandparents' childcare on mothers' labour force participation - 2SLS estimation

Explanatory variables	(1) grandparent's childcare	(1) mother's LFP	(2) grandparent's childcare	(2) mother's LFP	(3) grandparent's childcare	(3) mother's LFP	(4) grandparent's childcare	(4) mother's LFP
Grandparent's childcare		0.3110**		0.3005**		0.3061**		0.2975**
		(0.1267)		(0.1278)		(0.1275)		(0.1284)
Instrument-availability and capability of grandparents	0.2596***		0.2538***		0.2597***		0.2509***	
	(0.0505)		(0.0505)		(0.0506)		(0.0501)	
Having children under 3 (dummy, 1=yes)	0.0391	-0.1802***	0.0413	-0.1912***	0.0391	-0.1803***	0.0408	-0.1912***
	(0.0402)	(0.0647)	(0.0393)	(0.0611)	(0.0403)	(0.0626)	(0.0393)	(0.0601)
Having children age between 4-6 (dummy, 1=yes)	-0.0446	0.0660	-0.0283	0.0262	-0.0446	0.0607	-0.0288	0.0245
	(0.0292)	(0.0513)	(0.0294)	(0.0420)	(0.0293)	(0.0499)	(0.0294)	(0.0417)
Having children age between 7-16 (dummy, 1=yes)	-0.0797***	0.0766	-0.0503**	0.0196	-0.0797***	0.0688	-0.0507**	0.0173
	(0.0206)	(0.0666)	(0.0216)	(0.0478)	(0.0208)	(0.0649)	(0.0217)	(0.0480)
Age	0.0158	-0.0136	0.0004	0.0149	0.0158	-0.0115	0.0005	0.0151
	(0.0240)	(0.0334)	(0.0244)	(0.0293)	(0.0240)	(0.0324)	(0.0244)	(0.0287)
Age square	-0.0005	0.0006	-0.0003	0.0002	-0.0005	0.0005	-0.0003	0.0002
	（0.0004）	(0.0006)	(0.0004)	(0.0005)	(0.0004)	(0.0006)	(0.0004)	(0.0005)
Education categories								
Base case: primary school or less								
Lower middle school	0.0477	0.0690**	0.0452	0.0644**	0.0477	0.0679**	0.0465	0.0667**
	(0.0472)	(0.0293)	(0.0465)	(0.0282)	(0.0472)	(0.0261)	(0.0456)	(0.0258)
Upper middle school	0.0277	-0.0857	0.0884**	-0.0842	0.0777*	-0.0765	0.0902**	-0.0786
	(0.0396)	(0.0781)	(0.0391)	(0.0835)	(0.0396)	(0.0760)	(0.0392)	(0.0847)
College or more	0.0651	0.1556***	0.0423	0.1600***	0.0651	0.1656***	0.0434	0.1712***
	(0.0455)	(0.0456)	(0.0459)	(0.0451)	(0.0455)	(0.0450)	(0.0459)	(0.0448)
Health condition (good/excellent)	-0.1540***	0.2410***	-0.1531***	0.2206***	-0.1540***	0.2380***	-0.1530***	0.2106***

	(0.0243)	(0.0930)	(0.0368)	(0.0818)	(0.0245)	(0.0920)	(0.0368)	(0.0808)
Ethnic minority	0.0164	-0.00575	0.0432	-0.0311	0.0165	-0.00900	0.0429	-0.0302
	(0.0359)	(0.0474)	(0.0406)	(0.0603)	(0.0359)	(0.0462)	(0.0406)	(0.0594)
Non-agriculture registration	0.0874***	0.0635*	0.1100***	0.0680**	0.0874***	0.0690*	0.1110***	0.0730**
	(0.0290)	(0.0376)	(0.0292)	(0.0327)	(0.0290)	(0.0355)	(0.0292)	(0.0333)
Other female members in the household (dummy, 1=yes)	0.1070***	-0.1470	0.0603**	-0.0815	0.1070***	-0.1430	0.0595**	-0.0809
	(0.0301)	(0.0908)	(0.0301)	(0.0597)	(0.0301)	(0.0881)	(0.0301)	(0.0589)
Other male members in the household (dummy, 1=yes)	0.0391	-0.0275	0.0254	-0.0268	0.0391	-0.0281	0.0249	-0.0269
	(0.0298)	(0.0473)	(0.0291)	(0.0388)	(0.0299)	(0.0458)	(0.0291)	(0.0380)
Age of youngest child	0.0012	0.0117	0.0040	0.0074	0.0012	0.0104	0.0035	0.0068
	(0.0108)	(0.0146)	(0.0106)	(0.0135)	(0.0108)	(0.0141)	(0.0106)	(0.0131)
Male youngest child (dummy, 1=yes)	-0.0315	0.0621	-0.0392*	0.0637	-0.0315	0.0610	-0.0391*	0.0627
	(0.0224)	(0.0393)	(0.0218)	(0.0423)	(0.0224)	(0.0382)	(0.0218)	(0.0420)
Women's annual wage	0.0161	-0.0586***	-0.0071	-0.0565***	0.0160	0.0621***	-0.0020	0.0654***
	(0.0118)	(0.0177)	(0.0124)	(0.0155)	(0.0141)	(0.0187)	(0.0143)	(0.0154)
Women's other income	0.0340***	-0.0287	0.0307***	-0.0218	0.0340***	-0.0272	0.0307***	-0.0209
	(0.0047)	(0.0277)	(0.0045)	(0.0255)	(0.0047)	(0.0270)	(0.0045)	(0.0255)
Husband's income					0.0001	-0.0328**	-0.0094	-0.0348**
					(0.0122)	(0.0148)	(0.0119)	(0.0161)
Constant	0.2184	0.9795***	0.6987	0.4540	0.2152	1.0442***	0.7298	0.5629*
	(0.4036)	(0.3133)	(0.4172)	(0.3169)	(0.4055)	(0.3106)	(0.4207)	(0.3161)
County effect	No	No	Yes	Yes	No	No	Yes	Yes
Year effect	No	No	Yes	Yes	No	No	Yes	Yes
F-statistics on instrument	33.08	/	25.49	/	33.11	/	25.31	/
Observations	1651		1651		1651		1651	
R-squared	0.232	0.243	0.262	0.298	0.223	0.251	0.261	0.306

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB.

Table 5. 4 Effect of grandparents' childcare on mothers' labour force participation - IV-probit estimation

Explanatory variables	(1)		(2)		(3)		(4)	
	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP
Grandparent's childcare		0.3479***		0.3403***		0.3596***		0.3505***
		(0.0794)		(0.0714)		(0.0786)		(0.0717)
Instrument-availability and capability of grandparents	0.2796***		0.2708***		0.2739***		0.2708***	
	(0.0534)		(0.0534)		(0.0534)		(0.0534)	
Having children under 3 (dummy, 1=yes)	0.0300	-0.1647**	0.0341	-0.1786**	0.0301	-0.1731**	0.0338	-0.1803**
	(0.0393)	(0.0419)	(0.0385)	(0.0428)	(0.0394)	(0.0415)	(0.0386)	(0.0426)
Having children age between 4-6 (dummy, 1=yes)	-0.0424	0.0151	-0.0259	0.0125	-0.0423	0.0114	0.0263	0.0146
	(0.0289)	(0.0228)	(0.0291)	(0.0224)	(0.0290)	(0.0227)	(0.0291)	(0.0224)
Having children age between 7-16 (dummy, 1=yes)	-0.0703***	0.0348*	-0.0435**	0.0324*	-0.0701***	0.0338*	-0.0438**	0.0324*
	(0.0205)	(0.0201)	(0.0214)	(0.0199)	(0.0207)	(0.0204)	(0.0215)	(0.0200)
Age	0.0141	0.0548***	0.0106	0.0597***	0.0140	0.0557***	0.0106	0.0604***
	(0.0239)	(0.0182)	(0.0241)	(0.0179)	(0.0239)	(0.0181)	(0.0241)	(0.0177)
Age square	-0.0005	-0.0009**	-0.0003	-0.0012**	-0.0005	-0.0010**	-0.0003	-0.0012**
	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)
Education categories								
Base case: primary school or less								
Lower middle school	0.0507	0.0548**	0.0500	0.0473**	0.0506	0.0524**	0.0509	0.0450**
	(0.0469)	(0.0216)	(0.0464)	(0.0210)	(0.0270)	(0.0216)	(0.0464)	(0.0209)
Upper middle school	0.0232	0.0640**	0.0221	0.0552*	0.0229	0.0514	0.0334	0.0102
	(0.0392)	(0.0308)	(0.0389)	(0.0308)	(0.0393)	(0.0309)	(0.0390)	(0.0309)
College or more	0.0159	0.1176***	0.0168	0.1390***	0.0156	0.1237***	0.0176	0.1420***
	(0.0443)	(0.0380)	(0.0451)	(0.0375)	(0.0443)	(0.0383)	(0.0450)	(0.0376)
Health condition (good/excellent, 1=yes)	-0.1475***	0.1137***	-0.1459***	0.1343***	-0.1473***	0.1079***	-0.1458***	0.1318***

	(0.0241)	(0.0228)	(0.0367)	(0.0313)	(0.0242)	(0.0233)	(0.0367)	(0.0313)
Ethnic minority	-0.0077	-0.0171	-0.0262	-0.0147	-0.0080	-0.0163	-0.0260	-0.0159
	(0.0349)	(0.0252)	(0.0400)	(0.0280)	(0.0349)	(0.0253)	(0.0399)	(0.0279)
Non-agriculture registration	0.1008***	0.0508**	0.1229***	0.0717***	0.1007***	0.0496**	0.1235***	0.0683**
	(0.0285)	(0.0229)	(0.0286)	(0.0232)	(0.0285)	(0.0229)	(0.0286)	(0.0233)
Other female members in the household (dummy, 1=yes)	0.0862***	0.0308	0.0467*	0.0158	0.0863***	0.0343	0.0861***	0.0159
	(0.0294)	(0.0228)	(0.0296)	(0.0222)	(0.0294)	(0.0229)	(0.0296)	(0.0221)
Other male members in the household (dummy, 1=yes)	0.0284	0.0101	0.0180	0.0165	0.0285	0.0076	0.0176	0.0076
	(0.0291)	(0.0214)	(0.0285)	(0.0206)	(0.0291)	(0.0214)	(0.0285)	(0.0204)
Age of youngest child	-0.0014	0.0115	-0.0037	0.0115	-0.0015	0.0101	-0.0033	0.0104
	(0.0106)	(0.0082)	(0.0104)	(0.0075)	(0.0106)	(0.0081)	(0.0104)	(0.0074)
Male youngest child (dummy, 1=yes)	0.0296	0.0351**	0.0275	0.0322**	0.0296	0.0364**	0.0375	0.0330**
	(0.0219)	(0.0167)	(0.0214)	(0.0163)	(0.0219)	(0.0166)	(0.0214)	(0.0162)
Women's annual wage	0.0168	0.0928***	0.0053	0.0992	0.0160	0.0942***	0.0015	0.0944***
	(0.0115)	(0.0079)	(0.0122)	(0.0085)	(0.0138)	(0.0069)	(0.0140)	(0.0077)
Women's other income	0.0274***	-0.0607**	0.0255***	-0.0618**	0.0274	-0.0604**	0.0255***	-0.0618**
	(0.0045)	(0.0039)	(0.0044)	(0.0039)	(0.0045)	(0.0039)	(0.0044)	(0.0038)
Husband's annual income					0.0013	-0.0265**	0.0069	-0.0242**
					(0.0120)	(0.0083)	(0.0118)	(0.0082)
County effect	No	No	Yes	Yes	No	No	Yes	Yes
Year effect	No	No	Yes	Yes	No	No	Yes	Yes
F-test on instrument	28.16	/	27.38	/	30.05	/	28.16	/
Wald test of exogeneity (p value in bracket)	3.18 (0.035)		3.64 (0.026)		3.10 (0.037)		3.36 (0.033)	
Observations	1651		1651		1651		1651	

Notes: Marginal effects are reported; Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB

Table 5. 5 Effect of grandparents' childcare on mothers' labour force participation – 2SLS estimation, urban areas

Explanatory variables	(1)		(2)		(3)		(4)	
	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP
Grandparent's childcare		0.2383**		0.2474**		0.2629**		0.2697**
		(0.1054)		(0.1047)		(0.1199)		(0.1177)
Instrument-availability and capability of grandparents	0.3966***		0.3886***		0.3950***		0.3873***	
	(0.1059)		(0.1064)		(0.1078)		(0.1092)	
Having children under 3 (dummy, 1=yes)	0.1703	-0.3543**	0.1756	-0.3611**	0.1698	-0.3526**	0.1745	-0.3622**
	(0.1293)	(0.1236)	(0.1301)	(0.1292)	(0.1292)	(0.1233)	(0.1305)	(0.1296)
Having children age between 4-6 (dummy, 1=yes)	0.0449	0.1639	0.0615	0.1566	0.0445	0.1627	0.0604	0.1596
	(0.1323)	(0.1727)	(0.1159)	(0.1755)	(0.1323)	(0.1724)	(0.1166)	(0.1730)
Having children age between 7-16 (dummy, 1=yes)	-0.1728***	0.0635	-0.1837**	0.0627	-0.1737***	0.0618	-0.1806**	0.0703
	(0.0678)	(0.1356)	(0.0877)	(0.1174)	(0.0681)	(0.1308)	(0.0897)	(0.1154)
Age	0.0136	0.0904**	0.0064	0.0865**	0.0121	0.0857*	-0.0067	0.0839**
	(0.0809)	(0.0435)	(0.0870)	(0.0415)	(0.0802)	(0.0473)	(0.0876)	(0.0403)
Age square	-0.0005	-0.0005**	-0.0002	-0.0005**	-0.0005	-0.0005**	-0.0002	-0.0005**
	(0.0013)	(0.0002)	(0.0014)	(0.0002)	(0.0013)	(0.0002)	(0.0014)	(0.0002)
Education categories								
Base case: primary school or less								
Lower middle school	0.0983	0.0253	0.1574	-0.0161	0.1033	0.0221	0.1558	-0.0188
	(0.1110)	(0.1401)	(0.1039)	(0.1286)	(0.1095)	(0.1307)	(0.1046)	(0.1261)
Upper middle school	0.0646	0.1387	0.1221	0.0948	0.0692	0.1335	0.1204	0.0911
	(0.1144)	(0.1408)	(0.1103)	(0.1274)	(0.1128)	(0.1311)	(0.1106)	(0.1246)
College or more	-0.0080	0.2947**	-0.0539	0.2546**	-0.0074	0.2926**	-0.0535	0.2542**
	(0.1164)	(0.1423)	(0.1114)	(0.1239)	(0.1150)	(0.1322)	(0.1119)	(0.1221)
Health condition (good/excellent, 1=yes)	-0.1904***	0.0972**	-0.2097**	0.0937**	-0.1795***	0.0942**	-0.1814**	0.0929**

	(0.0643)	(0.0463)	(0.0984)	(0.0454)	(0.0660)	(0.0455)	(0.0990)	(0.0449)
Ethnic minority	-0.1069	0.0696	-0.0221	0.0423	-0.1097	0.0666	-0.0235	-0.0365
	(0.0981)	(0.1230)	(0.1122)	(0.1157)	(0.0981)	(0.1175)	(0.1120)	(0.1152)
Non-agriculture registration	0.0407	0.1562*	0.0424	0.1576**	0.0414	0.1547*	0.0437	0.1513**
	(0.0835)	(0.0871)	(0.0821)	(0.0759)	(0.0844)	(0.0872)	(0.0824)	(0.0752)
Other female members in the household (dummy, 1=yes)	0.1153*	0.0080	-0.0300	0.0038	0.1162*	0.0074	-0.0308	0.0041
	(0.0603)	(0.0895)	(0.0797)	(0.0800)	(0.0607)	(0.0837)	(0.0798)	(0.0792)
Other male members in the household (dummy, 1=yes)	0.0606	-0.0165	0.0590	-0.0058	0.0643	-0.0201	0.0581	-0.0079
	(0.0620)	(0.0676)	(0.0597)	(0.0574)	(0.0621)	(0.0635)	(0.0598)	(0.0566)
Age of youngest child	-0.0232	0.0591***	-0.0159	0.0509***	-0.0222	0.0547***	-0.0161	0.0499***
	(0.0158)	(0.0202)	(0.0162)	(0.0170)	(0.0157)	(0.0189)	(0.0162)	(0.0168)
Male youngest child (dummy, 1=yes)	-0.0380	0.0380	0.0030	0.0042	-0.0371	0.0325	0.0026	0.0030
	(0.0494)	(0.0578)	(0.0502)	(0.0459)	(0.0495)	(0.0544)	(0.0503)	(0.0452)
Women's annual income	0.0314	0.0887***	-0.0517	0.0906***	0.0118	0.0813***	-0.0471	0.0965***
	(0.0317)	(0.0315)	(0.0373)	(0.0374)	(0.0399)	(0.0305)	(0.0413)	(0.0352)
Women's other income	0.0267***	-0.0658**	0.0238***	-0.0619**	0.0271***	-0.0742**	0.0237***	-0.0719**
	(0.0068)	(0.0165)	(0.0072)	(0.0134)	(0.0069)	(0.0158)	(0.0072)	(0.0133)
Husband's annual income					0.0290	-0.0697**	-0.0099	-0.0664**
					(0.0349)	(0.0318)	(0.0380)	(0.0313)
Constant	-0.1268	0.5915	1.0343	-0.9792	-0.2211	0.8072	1.0999	-0.7176
	(1.2553)	(1.4358)	(1.3751)	(1.4048)	(1.2589)	(1.3453)	(1.4219)	(1.4156)
County effect	No	No	Yes	Yes	No	No	Yes	Yes
Year effect	No	No	Yes	Yes	No	No	Yes	Yes
F-test on instrument	20.50	/	19.45	/	21.65	/	19.88	/
Observations	481		481		481		481	
R-squared	0.198	0.211	0.200	0.224	0.196	0.215	0.198	0.228

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB

.

Table 5. 6 Effect of grandparents' childcare on mothers' labour force participation – 2SLS estimation, rural areas

Explanatory variables	(1)		(2)		(3)		(4)	
	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP
Grandparent's childcare		0.4050***		0.3958***		0.4026***		0.3965***
		(0.1350)		(0.1469)		(0.1367)		(0.1474)
Instrument-availability and capability of grandparents	0.1438***		0.1486***		0.1505***		0.1530***	
	(0.0411)		(0.0418)		(0.0468)		(0.0483)	
Having children under 3 (dummy, 1=yes)	0.0757	-0.2205*	0.0780	-0.2215**	0.0765	-0.2210**	0.0788	-0.2220**
	(0.0861)	(0.1210)	(0.0855)	(0.1222)	(0.0865)	(0.1212)	(0.0858)	(0.1226)
Having children age between 4-6 (dummy, 1=yes)	0.0364	-0.1438	0.0320	-0.1486	0.0626***	-0.1409	0.0613***	-0.1456
	(0.0763)	(0.1176)	(0.0726)	(0.1251)	(0.0243)	(0.1139)	(0.0227)	(0.1250)
Having children age between 7-16 (dummy, 1=yes)	-0.0393	0.0547	-0.0196	0.0645	-0.0392	0.0576	-0.0193	0.0642
	(0.0616)	(0.1052)	(0.0620)	(0.0992)	(0.0616)	(0.1055)	(0.0619)	(0.0985)
Age	0.0531	0.0508***	0.0366	0.0653***	0.0532	0.0593***	0.0364	0.0651***
	(0.0464)	(0.0109)	(0.0483)	(0.0222)	(0.0464)	(0.0108)	(0.0484)	(0.0222)
Age square	-0.0011	-0.0012**	-0.0009	-0.0013**	-0.0011	-0.0012**	-0.0009	-0.0013**
	(0.0007)	(0.0006)	(0.0007)	(0.0006)	(0.0007)	(0.0006)	(0.0007)	(0.0006)
Education categories								
Base case: primary school or less								
Lower middle school	0.0175	0.0193	0.0236	0.0187	0.0176	0.0202	0.0236	0.0191
	(0.0712)	(0.1092)	(0.0716)	(0.1217)	(0.0713)	(0.1083)	(0.0716)	(0.1204)
Upper middle school	0.0090	0.0512*	0.0396	0.0533*	0.0095	0.0546*	0.0404	0.0556*
	(0.0785)	(0.0313)	(0.0780)	(0.0303)	(0.0785)	(0.0314)	(0.0778)	(0.0339)
College or more	0.0513	0.2590*	0.0297	0.2603*	0.0517	0.2523*	0.0300	0.2571*
	(0.0886)	(0.1454)	(0.0896)	(0.1458)	(0.0886)	(0.1462)	(0.0895)	(0.1454)
Health condition (good/excellent, 1=yes)	-0.2062***	0.2834***	-0.2258***	0.2915***	-0.2069***	0.2875***	-0.2253***	0.2907***

	(0.0545)	(0.0905)	(0.0803)	(0.0954)	(0.0545)	(0.0964)	(0.0603)	(0.1002)
Ethnic minority	-0.1027	0.0060	-0.0741	0.0137	-0.1038	-0.0023	-0.0759	0.0087
	(0.0736)	(0.1944)	(0.0814)	(0.1634)	(0.0740)	(0.1956)	(0.0815)	(0.1645)
Non-agriculture registration	0.0806**	0.0416**	0.1195**	0.0485**	0.0805**	0.0416**	0.1196**	0.0416**
	(0.0381)	(0.0203)	(0.0494)	(0.0291)	(0.0382)	(0.0214)	(0.0494)	(0.0208)
Other female members in the household (dummy, 1=yes)	0.1659***	0.0604**	0.1056**	0.0640**	0.1656***	0.0617**	0.1048**	0.0641**
	(0.0493)	(0.0287)	(0.0517)	(0.0281)	(0.0495)	(0.0283)	(0.0520)	(0.0279)
Other male members in the household (dummy, 1=yes)	0.0143	-0.0407	-0.0145	-0.0379	0.0138	-0.0440	-0.0154	-0.0400
	(0.0557)	(0.0795)	(0.0556)	(0.0867)	(0.0559)	(0.0792)	(0.0556)	(0.0868)
Age of youngest child	-0.0127	0.0603**	-0.0076	0.0546**	-0.0129	0.0590**	-0.0080	0.0538**
	(0.0139)	(0.0284)	(0.0139)	(0.0232)	(0.0140)	(0.0285)	(0.0139)	(0.0233)
Male youngest child (dummy, 1=yes)	0.0126	0.0554	-0.0037	0.0620	0.0128	0.0569	-0.0034	0.0625
	(0.0434)	(0.0608)	(0.0446)	(0.0655)	(0.0433)	(0.0604)	(0.0445)	(0.0649)
Women's annual income	0.0215	0.1227***	0.0019	0.1268***	0.0237	0.1276***	0.0058	0.1253***
	(0.0310)	(0.0517)	(0.0329)	(0.0480)	(0.0358)	(0.0555)	(0.0358)	(0.0483)
Women's other income	0.0357***	-0.0396	0.0333***	-0.0461	0.0356***	-0.0395	0.0332***	-0.0458
	(0.0083)	(0.0617)	(0.0085)	(0.0557)	(0.0084)	(0.0608)	(0.0086)	(0.0552)
Husband's annual income					-0.0031	-0.0815**	-0.0067	-0.0845**
					(0.0258)	(0.0349)	(0.0252)	(0.0389)
Constant	-0.6844	1.0290	-0.1974	0.0356	-0.6771	1.0750	-0.1642	0.1052
	(0.7911)	(1.4182)	(0.8584)	(1.2345)	(0.7958)	(1.3985)	(0.8705)	(1.2463)
County effect	No	No	Yes	Yes	No	No	Yes	Yes
Year effect	No	No	Yes	Yes	No	No	Yes	Yes
F-test on instrument	20.98	/	18.65	/	21.84	/	18.98	/
Observations	1170		1170		1170		1170	
R-squared	0.185	0.215	0.190	0.218	0.187	0.219	0.193	0.221

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB.

Table 5. 7 Effect of grandparents' childcare on mothers' labour force participation – IV-probit estimation, urban areas

Explanatory variables	(1)		(2)		(3)		(4)	
	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP
Grandparent's childcare		0.2605**		0.2742**		0.2642**		0.2800**
		(0.1221)		(0.1323)		(0.1232)		(0.1326)
Instrument-availability and capability of grandparents	0.3866***		0.3886***		0.3750***		0.3803***	
	(0.1073)		(0.1044)		(0.0988)		(0.0964)	
Having children under 3 (dummy, 1=yes)	0.1703	-0.3627**	0.1756	-0.3605**	0.1698	-0.3537**	0.1745	-0.3559**
	(0.1293)	(0.1150)	(0.1301)	(0.1057)	(0.1292)	(0.0975)	(0.1305)	(0.0981)
Having children age between 4-6 (dummy, 1=yes)	0.0449	0.0879	0.0515	0.0897	0.0445	0.0800	0.0504	0.0856
	(0.1323)	(0.0705)	(0.1159)	(0.0752)	(0.1323)	(0.0768)	(0.1166)	(0.0717)
Having children age between 7-16 (dummy, 1=yes)	-0.1728***	0.0734	-0.1837**	0.0353	-0.1737***	0.0750	-0.1806**	0.0337
	(0.0678)	(0.0826)	(0.0877)	(0.0918)	(0.0681)	(0.0855)	(0.0897)	(0.0893)
Age	0.0136	0.0881**	0.0064	0.0856***	0.0121	0.0846***	-0.0067	0.0812***
	(0.0809)	(0.0383)	(0.0870)	(0.0332)	(0.0802)	(0.0264)	(0.0876)	(0.0302)
Age square	-0.0005	-0.0006**	-0.0002	-0.0006**	-0.0005	-0.0006**	-0.0002	-0.0006**
	(0.0013)	(0.0003)	(0.0014)	(0.0003)	(0.0013)	(0.0003)	(0.0014)	(0.0003)
Education categories								
Base case: primary school or less								
Lower middle school	0.0983	0.0104	0.1574	0.0059	0.1033	0.0168	0.1558	0.0114
	(0.1110)	(0.0914)	(0.1039)	(0.0777)	(0.1095)	(0.0859)	(0.1046)	(0.0743)
Upper middle school	0.0646	0.0892	0.1221	0.1091	0.0692	0.0894	0.1204	0.1006
	(0.1144)	(0.0861)	(0.1103)	(0.0567)	(0.1128)	(0.0796)	(0.1106)	(0.0537)
College or more	-0.0080	0.2231***	-0.0539	0.2453***	-0.0074	0.2312***	-0.0535	0.2435***
	(0.1164)	(0.0859)	(0.1114)	(0.0654)	(0.1150)	(0.0785)	(0.1119)	(0.0633)
Health condition (good/excellent, 1=yes)	-0.1904***	0.0852**	-0.2097**	0.0906**	-0.1795***	0.0898**	-0.1814**	0.0920**

	(0.0643)	(0.0424)	(0.0984)	(0.0447)	(0.0660)	(0.0438)	(0.0990)	(0.0458)
Ethnic minority	-0.1069	-0.0608	-0.0221	-0.0037	-0.1097	-0.0652	-0.0235	-0.0015
	(0.0981)	(0.0855)	(0.1122)	(0.1021)	(0.0981)	(0.0831)	(0.1120)	(0.0983)
Non-agriculture registration	0.0407	0.1197*	0.0424	0.1267*	0.0414	0.1138*	0.0437	0.1228*
	(0.0835)	(0.0612)	(0.0821)	(0.0787)	(0.0844)	(0.0617)	(0.0824)	(0.0777)
Other female members in the household (dummy, 1=yes)	0.1153*	0.0651	0.1300*	0.0778	0.1162*	0.0637	0.1308*	0.0792
	(0.0603)	(0.0743)	(0.0797)	(0.0742)	(0.0607)	(0.0725)	(0.0798)	(0.0715)
Other male members in the household (dummy, 1=yes)	0.0606	0.0015	0.0590	0.0336	0.0643	-0.0081	0.0581	0.0208
	(0.0620)	(0.0548)	(0.0597)	(0.0455)	(0.0621)	(0.0544)	(0.0598)	(0.0446)
Age of youngest child	-0.0232	0.0483***	-0.0159	0.0465***	-0.0222	0.0468***	-0.0161	0.0435***
	(0.0158)	(0.0133)	(0.0162)	(0.0135)	(0.0157)	(0.0129)	(0.0162)	(0.0133)
Male youngest child (dummy, 1=yes)	-0.0380	0.0297	0.0030	0.0009	-0.0371	0.0276	0.0026	0.0026
	(0.0494)	(0.0457)	(0.0502)	(0.0397)	(0.0495)	(0.0459)	(0.0503)	(0.0395)
Women's annual income	0.0314	0.1026***	-0.0517	0.1004***	0.0118	0.1069***	-0.0471	0.1072***
	(0.0317)	(0.0237)	(0.0373)	(0.0277)	(0.0399)	(0.0255)	(0.0413)	(0.0270)
Women's other income	0.0267***	-0.0657**	0.0238***	-0.0604**	0.0271***	-0.0650**	0.0237***	-0.0603**
	(0.0068)	(0.0101)	(0.0072)	(0.0187)	(0.0069)	(0.0101)	(0.0072)	(0.0085)
Husband's annual income					0.0290	-0.0697**	-0.0099	-0.0529**
					(0.0349)	(0.0283)	(0.0380)	(0.0263)
County effect	No	No	Yes	Yes	No	No	Yes	Yes
Year effect	No	No	Yes	Yes	No	No	Yes	Yes
F-test on instrument	20.86	/	19.50	/	20.64	/	19.21	/
Wald test on endogeneity (p value in bracket)	4.56 (0.033)		3.83 (0.0404)		6.84 (0.0089)		3.07 (0.0445)	
Observations	481		481		481		481	

Notes: Marginal effects are reported; Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB.

Table 5. 8 Effect of grandparents' childcare on mothers' labour force participation – IV-probit estimation, rural areas

Explanatory variables	(1)		(2)		(3)		(4)	
	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP
Grandparent's childcare		0.3960***		0.3887***		0.4016***		0.4076***
		(0.0962)		(0.0954)		(0.1106)		(0.1055)
Instrument-availability and capability of grandparents	0.1568***		0.1444***		0.1555***		0.1430***	
	(0.0311)		(0.0318)		(0.0368)		(0.0323)	
Having children under 3 (dummy, 1=yes)	0.0757	-0.1993**	0.0780	-0.1985**	0.0765	-0.1996**	0.0788	-0.1989**
	(0.0861)	(0.0689)	(0.0855)	(0.0678)	(0.0865)	(0.0691)	(0.0858)	(0.0680)
Having children age between 4-6 (dummy, 1=yes)	0.0364	0.0571	0.0320	0.0586	0.0626***	0.05281	0.0613***	0.0503
	(0.0763)	(0.0517)	(0.0726)	(0.0552)	(0.0243)	(0.0513)	(0.0227)	(0.0576)
Having children age between 7-16 (dummy, 1=yes)	-0.0393	0.0260	-0.0196	0.0644	-0.0392	0.0249	-0.0193	0.0628
	(0.0616)	(0.0812)	(0.0620)	(0.0878)	(0.0616)	(0.0803)	(0.0619)	(0.0870)
Age	0.0531	0.0880*	0.0366	0.0846*	0.0532	0.0875*	0.0364	0.0849*
	(0.0464)	(0.0455)	(0.0483)	(0.0490)	(0.0464)	(0.0456)	(0.0484)	(0.0488)
Age square	-0.0011	-0.0010*	-0.0009	-0.0010*	-0.0011	-0.0010*	-0.0009	-0.0010*
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Education categories								
Base case: primary school or less								
Lower middle school	0.0175	0.0157	0.0236	0.0257	0.0176	0.0154	0.0236	0.0249
	(0.0712)	(0.0759)	(0.0716)	(0.0814)	(0.0713)	(0.0756)	(0.0716)	(0.0813)
Upper middle school	0.0090	0.0402	0.0396	0.0276	0.0095	0.0419	0.0404	0.0288
	(0.0785)	(0.0846)	(0.0780)	(0.0922)	(0.0785)	(0.0852)	(0.0778)	(0.0933)
College or more	0.0513	0.2332**	0.0297	0.2449**	0.0517	0.2357**	0.0300	0.2488**
	(0.0886)	(0.1060)	(0.0896)	(0.1114)	(0.0886)	(0.1049)	(0.0895)	(0.1126)
Health condition (good/excellent, 1=yes)	-0.2062***	0.2824***	-0.2258***	0.2813***	-0.2069***	0.2847***	-0.2253***	0.2825***

	(0.0545)	(0.0490)	(0.0803)	(0.0415)	(0.0545)	(0.0469)	(0.0603)	(0.0417)
Ethnic minority	-0.1027	0.0085	-0.0741	0.0001	-0.1038	0.0055	-0.0759	0.0028
	(0.0736)	(0.1124)	(0.0814)	(0.0947)	(0.0740)	(0.1152)	(0.0815)	(0.0984)
Non-agriculture registration	0.0806**	0.0530*	0.1195**	0.0508*	0.0805**	0.0544*	0.1196**	0.0508*
	(0.0381)	(0.0295)	(0.0494)	(0.0294)	(0.0382)	(0.0278)	(0.0494)	(0.0292)
Other female members in the household (dummy, 1=yes)	0.1659***	0.0697**	0.1056**	0.0612**	0.1656***	0.0618**	0.1048**	0.0601**
	(0.0493)	(0.0314)	(0.0517)	(0.0306)	(0.0495)	(0.0308)	(0.0520)	(0.0296)
Other male members in the household (dummy, 1=yes)	0.0143	-0.0266	-0.0145	-0.0301	0.0138	-0.0281	-0.0154	-0.0304
	(0.0557)	(0.0537)	(0.0556)	(0.0653)	(0.0559)	(0.0545)	(0.0556)	(0.0662)
Age of youngest child	-0.0127	0.0409	-0.0076	0.0403	-0.0129	0.0402	-0.0080	0.0402
	(0.0139)	(0.0276)	(0.0139)	(0.0259)	(0.0140)	(0.0265)	(0.0139)	(0.0258)
Male youngest child (dummy, 1=yes)	0.0126	0.0424	-0.0037	0.0543	0.0128	0.0439	-0.0034	0.0555
	(0.0434)	(0.0634)	(0.0446)	(0.0540)	(0.0433)	(0.0639)	(0.0445)	(0.0549)
Women's annual income	0.0215	0.2094***	0.0019	0.2164***	0.0237	0.2072***	0.0058	0.2133***
	(0.0310)	(0.0281)	(0.0329)	(0.0323)	(0.0358)	(0.0325)	(0.0358)	(0.0365)
Women's other income	0.0357***	-0.0271	0.0333***	-0.0285	0.0356***	-0.0273	0.0332***	-0.0285
	(0.0083)	(0.0140)	(0.0085)	(0.0128)	(0.0084)	(0.0136)	(0.0086)	(0.0126)
Husband's annual income					-0.0031	-0.0822**	-0.0067	-0.0895**
					(0.0258)	(0.0291)	(0.0252)	(0.0266)
County effect	No	No	Yes	Yes	No	No	Yes	Yes
Year effect	No	No	Yes	Yes	No	No	Yes	Yes
F-test on instrument	37.65	/	38.99	/	37.32	/	39.01	/
Wald test of endogeneity (p value in bracket)	3.86 (0.0235)		6.67 (0.0136)		2.98 (0.0345)		5.49 (0.0201)	
Observations	1170		1170		1170		1170	

Notes: Marginal effects are reported; Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB.

Table 5. 9 Robustness check, Effect of grandparents' childcare on mothers' labour force participation – 2SLS estimation

Explanatory variables	(1)		(2)		(3)		(4)	
	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP
Grandparent's childcare		0.3673***		0.3812***		0.3615***		0.3889***
		(0.1230)		(0.1257)		(0.1255)		(0.1294)
Instrument-availability and capability of grandparents	0.2801***		0.2808***		0.2861***		0.2832***	
	(0.0756)		(0.0747)		(0.0786)		(0.0762)	
Having children under 3 (dummy, 1=yes)	0.0820	-0.2162**	0.0846	-0.2201**	0.0969	-0.2383**	0.0980	-0.2365**
	(0.0680)	(0.0518)	(0.0678)	(0.0520)	(0.0677)	(0.0579)	(0.0682)	(0.0588)
Having children age between 4-6 (dummy, 1=yes)	0.0222	0.0522	0.0293	0.0568	0.0218	0.0538	0.0272	0.0573
	(0.0639)	(0.0394)	(0.0609)	(0.0433)	(0.0640)	(0.0402)	(0.0581)	(0.0430)
Having children age between 7-16 (dummy, 1=yes)	-0.0971**	0.0525	-0.0878*	0.0432	-0.0973**	0.0501	-0.0909*	0.0422
	(0.0489)	(0.0708)	(0.0486)	(0.0846)	(0.0490)	(0.0694)	(0.0496)	(0.0795)
Age	-0.0447	0.0826**	0.0319	-0.0884**	0.0446	0.0899**	0.0195	-0.0843*
	(0.0380)	(0.0405)	(0.0395)	(0.0434)	(0.0380)	(0.0491)	(0.0393)	(0.0508)
Age square	0.0010	-0.0020**	0.0008	-0.0020**	-0.0010	-0.0010**	-0.0006	-0.0010**
	(0.0006)	(0.0008)	(0.0006)	(0.0010)	(0.0006)	(0.0005)	(0.0006)	(0.0005)
Education categories								
Base case: primary school or less								
Lower middle school	0.0417	0.0075	0.0691	-0.0261	0.0418	0.0083	0.0625	-0.0075
	(0.0586)	(0.0798)	(0.0578)	(0.0940)	(0.0586)	(0.0775)	(0.0568)	(0.0835)
Upper middle school	0.0126	0.0873*	0.0519	0.0836*	0.0123	0.0897*	0.0511	0.0823*
	(0.0630)	(0.0525)	(0.0631)	(0.0517)	(0.0630)	(0.0522)	(0.0620)	(0.0507)
College or more	-0.0065	0.2077***	-0.0216	0.2516***	-0.0071	0.1817**	-0.0124	0.2304**
	(0.0673)	(0.0773)	(0.0670)	(0.0990)	(0.0673)	(0.0780)	(0.0658)	(0.0894)
Health condition (good/excellent, 1=yes)	-0.1955***	0.1653***	-0.1770***	0.1854**	-0.1898***	0.1649***	-0.1779***	0.1827***

	(0.0410)	(0.0432)	(0.0557)	(0.0555)	(0.0409)	(0.0444)	(0.0733)	(0.0598)
Ethnic minority	-0.0927	-0.0042	-0.0391	-0.0203	-0.0914	-0.0077	-0.0484	-0.0138
	(0.0588)	(0.0785)	(0.0637)	(0.0845)	(0.0591)	(0.0769)	(0.0632)	(0.0793)
Non-agriculture registration	0.0788**	0.0528***	0.0887**	0.0584***	0.0798*	0.0553***	0.0857**	0.0622***
	(0.0389)	(0.0182)	(0.0397)	(0.0183)	(0.0389)	(0.0198)	(0.0398)	(0.0200)
Other female members in the household (dummy, 1=yes)	0.1263***	0.0646	0.0930**	0.0629	0.1267***	0.0614	0.1251***	0.0641
	(0.0396)	(0.0530)	(0.0414)	(0.0510)	(0.0397)	(0.0511)	(0.0411)	(0.0509)
Other male members in the household (dummy, 1=yes)	0.0314	-0.0263	0.0129	-0.0361	0.0322	-0.0304	0.0166	-0.0445
	(0.0412)	(0.0499)	(0.0411)	(0.0547)	(0.0412)	(0.0487)	(0.0400)	(0.0493)
Age of youngest child	-0.0149	0.0565***	-0.0125	0.0580***	-0.0146	0.0541***	-0.0097	0.0504***
	(0.0103)	(0.0139)	(0.0103)	(0.0156)	(0.0103)	(0.0136)	(0.0104)	(0.0135)
Male youngest child (dummy, 1=yes)	-0.0120	0.0475	-0.0167	0.0433	-0.0121	0.0473	-0.0191	0.0450
	(0.0323)	(0.0396)	(0.0323)	(0.0454)	(0.0323)	(0.0386)	(0.0321)	(0.0416)
Women's annual wage	0.0292	0.1022***	0.0091	0.1058***	0.0253	0.1039***	-0.0138	0.1211***
	(0.0218)	(0.0263)	(0.0225)	(0.0291)	(0.0262)	(0.0262)	(0.0265)	(0.0301)
Women's other income	0.0305***	-0.0693**	0.0272***	-0.0632**	0.0305***	-0.0683**	0.0270***	-0.0696**
	(0.0051)	(0.0160)	(0.0052)	(0.0199)	(0.0051)	(0.0156)	(0.0052)	(0.0170)
Husband's income					0.0057	-0.0469**	0.0108	-0.0351*
					(0.0206)	(0.0226)	(0.0207)	(0.0216)
Constant	-0.6096	0.9100	-0.2272	0.4956	-0.6282	1.0045	0.3687	-0.3373
	(0.6271)	(0.7797)	(0.6629)	(0.8934)	(0.6332)	(0.7617)	(0.6883)	(0.8966)
County effect	No	No	Yes	Yes	No	No	Yes	Yes
Year effect	No	No	Yes	Yes	No	No	Yes	Yes
F-statistics on instrument	25.26	/	18.91	/	25.95	/	19.21	/
Observations	838		838		838		838	
R-squared	0.185	0.201	0.190	0.210	0.186	0.215	0.191	0.220

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB.

Table 5. 10 Robustness check, Effect of grandparents' childcare on mothers' labour force participation – IV-probit estimation

Explanatory variables	(1)		(2)		(3)		(4)	
	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP
Grandparent's childcare		0.3612***		0.3517***		0.3655***		0.3585***
		(0.0865)		(0.0854)		(0.0886)		(0.0878)
Instrument-availability and capability of grandparents	0.2811***		0.2709***		0.2967***		0.2823***	
	(0.0566)		(0.0547)		(0.0589)		(0.0558)	
Having children under 3 (dummy, 1=yes)	0.0820	-0.2655**	0.0846	-0.2622**	0.0969	-0.2700**	0.0980	-0.2655**
	(0.0680)	(0.0767)	(0.0678)	(0.0751)	(0.0677)	(0.0791)	(0.0682)	(0.0773)
Having children age between 4-6 (dummy, 1=yes)	0.0222	0.0533	0.0293	0.0523	0.0218	0.0559	0.0272	0.0543
	(0.0639)	(0.0404)	(0.0609)	(0.0412)	(0.0640)	(0.0408)	(0.0581)	(0.0414)
Having children age between 7-16 (dummy, 1=yes)	-0.0971**	0.0324	-0.0878*	0.0397	-0.0973**	0.0343	-0.0909*	0.0398
	(0.0489)	(0.0333)	(0.0486)	(0.0527)	(0.0490)	(0.0372)	(0.0496)	(0.0523)
Age	-0.0447	0.0778**	0.0319	0.0732**	0.0446	0.0866**	0.0195	0.0733**
	(0.0380)	(0.0343)	(0.0395)	(0.0363)	(0.0380)	(0.0342)	(0.0393)	(0.0362)
Age square	0.0010	0.0007***	0.0008	-0.0003**	-0.0010	-0.0007**	-0.0006	-0.0006**
	(0.0006)	(0.0002)	(0.0006)	(0.0002)	(0.0006)	(0.0003)	(0.0006)	(0.0003)
Education categories								
Base case: primary school or less								
Lower middle school	0.0417	0.0012	0.0691	-0.0025	0.0418	0.0004	0.0625	-0.0043
	(0.0586)	(0.0532)	(0.0578)	(0.0549)	(0.0586)	(0.0526)	(0.0568)	(0.0545)
Upper middle school	0.0126	0.0670*	0.0519	0.0599*	0.0123	0.0698*	0.0511	0.0601*
	(0.0630)	(0.0351)	(0.0631)	(0.0313)	(0.0630)	(0.0362)	(0.0620)	(0.0321)
College or more	-0.0065	0.1778***	-0.0216	0.1881***	-0.0071	0.1728***	-0.0124	0.1879***
	(0.0673)	(0.0610)	(0.0670)	(0.0642)	(0.0673)	(0.0575)	(0.0658)	(0.0638)
Health condition (good/excellent, 1=yes)	-0.1955***	0.1429***	-0.1770***	0.1432***	-0.1898***	0.1516***	-0.1779***	0.1517***

	(0.0410)	(0.0300)	(0.0557)	(0.0387)	(0.0409)	(0.0311)	(0.0733)	(0.0390)
Ethnic minority	-0.0927	0.0075	-0.0391	-0.0058	-0.0914	0.0015	-0.0484	-0.0073
	(0.0588)	(0.0530)	(0.0637)	(0.0561)	(0.0591)	(0.0538)	(0.0632)	(0.0564)
Non-agriculture registration	0.0688*	0.0342*	0.0887**	0.0359*	0.0688*	0.0358*	0.0757*	0.0369*
	(0.0389)	(0.0196)	(0.0397)	(0.0204)	(0.0389)	(0.0196)	(0.0398)	(0.0209)
Other female members in the household (dummy, 1=yes)	0.1263***	0.0605	0.0930**	0.0609	0.1267***	0.0608	0.1251***	0.0609
	(0.0396)	(0.0424)	(0.0414)	(0.0424)	(0.0397)	(0.0426)	(0.0411)	(0.0421)
Other male members in the household (dummy, 1=yes)	0.0314	-0.0162	0.0129	-0.0323	0.0322	-0.0207	0.0166	-0.0341
	(0.0412)	(0.0373)	(0.0411)	(0.0381)	(0.0412)	(0.0375)	(0.0400)	(0.0384)
Age of youngest child	-0.0149	0.0434***	-0.0125	0.0385***	-0.0146	0.0426***	-0.0097	0.0383***
	(0.0103)	(0.0103)	(0.0103)	(0.0108)	(0.0103)	(0.0100)	(0.0104)	(0.0106)
Male youngest child (dummy, 1=yes)	-0.0120	0.0378	-0.0167	0.0380	-0.0121	0.0394	-0.0191	0.0385
	(0.0323)	(0.0292)	(0.0323)	(0.0292)	(0.0323)	(0.0291)	(0.0321)	(0.0292)
Women's annual wage	0.0292	0.1238***	0.0091	0.1253***	0.0253	0.1003***	-0.0138	0.1052***
	(0.0218)	(0.0183)	(0.0225)	(0.0208)	(0.0262)	(0.0194)	(0.0265)	(0.0210)
Women's other income	0.0305***	-0.0636**	0.0272***	-0.0829**	0.0305***	-0.0634**	0.0270***	-0.0729**
	(0.0051)	(0.0082)	(0.0052)	(0.0185)	(0.0051)	(0.0082)	(0.0052)	(0.0085)
Husband's annual income					0.0057	-0.0424**	0.0108	-0.0556**
					(0.0206)	(0.0185)	(0.0207)	(0.0199)
County effect	No	No	Yes	Yes	No	No	Yes	Yes
Year effect	No	No	Yes	Yes	No	No	Yes	Yes
F-test on instrument	25.26	/	18.91	/	25.95	/	19.21	/
Wald test of exogeneity (p value in bracket)	8.80 (0.003)		7.58 (0.006)		7.26 (0.007)		6.89 (0.009)	
Observations	838		838		838		838	

Notes: Marginal effects are reported; Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB.

Table 5. 11 Over-control check, effect of grandparents' childcare on mothers' labour force participation, instrument of grandmothers being alive – 2SLS estimation

Explanatory variables	(1)		(2)		(3)		(4)	
	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP
Grandparent's childcare		0.4749**		0.5411**		0.4856**		0.5600**
		(0.2111)		(0.2515)		(0.2120)		(0.2529)
Instrument- grandparents alive	0.4055***		0.4089***		0.3988***		0.3985***	
	(0.0700)		(0.0850)		(0.0750)		(0.0899)	
Having children under 3 (dummy, 1=yes)	0.0915	-0.3004***	0.0880	-0.3072**	0.0931	-0.3134***	0.0887	-0.3145**
	(0.0683)	(0.1147)	(0.0655)	(0.1036)	(0.0681)	(0.1188)	(0.0656)	(0.1057)
Having children age between 4-6 (dummy, 1=yes)	0.0270	0.1772	0.0342	0.2518	0.0307	0.1929	0.0352	0.2610
	(0.0642)	(0.1204)	(0.0607)	(0.1756)	(0.0641)	(0.1239)	(0.0609)	(0.1773)
Having children age between 7-16 (dummy, 1=yes)	-0.0839*	0.0900	-0.0529	0.0672	-0.0844*	0.0982	-0.0534	0.0728
	(0.0480)	(0.0723)	(0.0478)	(0.1218)	(0.0482)	(0.0756)	(0.0479)	(0.1230)
Age	-0.0507	0.0556**	-0.0269	0.0511**	-0.0509	0.0603**	-0.0272	0.0614**
	(0.0386)	(0.0251)	(0.0401)	(0.0240)	(0.0386)	(0.0253)	(0.0402)	(0.2508)
Age square	0.0011**	-0.0015*	0.0011**	-0.0015*	0.0011**	-0.0015*	0.0011**	-0.0015*
	(0.0006)	(0.0009)	(0.0006)	(0.0009)	(0.0006)	(0.0009)	(0.0006)	(0.0009)
Education categories								
Base case: primary school or less								
Lower middle school	0.0655	0.0698	0.0659	0.0626	0.0661	0.0774	0.0662	0.0727
	(0.0579)	(0.1177)	(0.0561)	(0.1144)	(0.0579)	(0.1218)	(0.0562)	(0.1162)
Upper middle school	0.0884	0.0576	0.0865	0.0512	0.0379	0.0566	0.0865	0.0533
	(0.0627)	(0.1182)	(0.0619)	(0.1199)	(0.0626)	(0.1219)	(0.0619)	(0.1214)
College or more	0.0061	0.3714***	0.0299	0.3290***	0.0059	0.3717***	0.0302	0.3258***
	(0.0677)	(0.1199)	(0.0661)	(0.1139)	(0.0679)	(0.1243)	(0.0662)	(0.1158)
Health condition (good/excellent, 1=yes)	-0.1891***	0.4183***	-0.0243	0.3994***	-0.1834***	0.4117***	-0.0238	0.3956***

	(0.0404)	(0.0856)	(0.0723)	(0.0995)	(0.0409)	(0.0887)	(0.0723)	(0.1006)
Ethnic minority	-0.0617	-0.0581	-0.0200	-0.0423	-0.0559	-0.0415	-0.0190	-0.0338
	(0.0582)	(0.0986)	(0.0628)	(0.1615)	(0.0587)	(0.1032)	(0.0631)	(0.1636)
Non-agriculture registration	0.0632*	0.0654	0.1126***	0.0748	0.0631*	0.0500	0.1123***	0.0741
	(0.0383)	(0.0641)	(0.0391)	(0.1440)	(0.0383)	(0.0667)	(0.0392)	(0.1448)
Other female members in the household (dummy, 1=yes)	0.1144***	0.1793**	0.0618	0.1500	0.1167***	0.1968**	0.0627	-0.1587
	(0.0390)	(0.0759)	(0.0406)	(0.1189)	(0.0391)	(0.0803)	(0.0408)	(0.1208)
Other male members in the household (dummy, 1=yes)	0.0189	-0.0396	0.0022	-0.0315	0.0207	-0.0476	-0.0018	-0.0349
	(0.0403)	(0.0694)	(0.0393)	(0.1028)	(0.0401)	(0.0721)	(0.0392)	(0.1033)
Age of youngest child	0.0011	0.0086	0.0029	0.0031	0.0015	0.0072	0.0030	0.0021
	(0.0168)	(0.0290)	(0.0168)	(0.0446)	(0.0168)	(0.0300)	(0.0168)	(0.0450)
Male youngest child (dummy, 1=yes)	0.0296	0.0656	0.0378	0.0657	0.0307	0.0722	0.0380	0.0788
	(0.0321)	(0.0567)	(0.0319)	(0.0563)	(0.0321)	(0.0592)	(0.0319)	(0.0975)
Women's annual wage	0.0333	0.0971***	0.0124	0.0901***	0.0212	0.0949**	0.0152	0.0941**
	(0.0212)	(0.0369)	(0.0235)	(0.0338)	(0.0252)	(0.0407)	(0.0256)	(0.0369)
Women's other income	0.0324***	-0.0393**	0.0290***	-0.0670**	0.0327***	-0.0428***	0.0290***	-0.0683**
	(0.0050)	(0.0155)	(0.0052)	(0.0326)	(0.0051)	(0.0165)	(0.0052)	(0.0331)
Husband's income					0.0179	-0.0664***	0.0054	-0.0649***
					(0.0198)	(0.0156)	(0.0192)	(0.0116)
Constant	-1.0047	1.2810	-0.0445	-0.8453	-1.0621	1.5730	-0.0769	-0.5758
	(0.6579)	(1.0176)	(0.7173)	(1.8418)	(0.6628)	(1.0646)	(0.7308)	(1.8749)
County effect	No	No	Yes	Yes	No	No	Yes	Yes
Year effect	No	No	Yes	Yes	No	No	Yes	Yes
F-statistics on instrument	7.02	/	6.52	/	6.89	/	6.02	/
Observations	1651		1651		1651		1651	
R-squared	0.279	0.154	0.262	0.149	0.261	0.146	0.250	0.144

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB.

Table 5. 12 Over-control check, effect of grandparents' childcare on mothers' labour force participation, instrument of grandmothers being alive – IV-probit estimation

Explanatory variables	(1)		(2)		(3)		(4)	
	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP	grandparent's childcare	mother's LFP
Grandparent's childcare		0.4506***		0.4535***		0.4861***		0.4857***
		(0.0616)		(0.0623)		(0.0615)		(0.0624)
Instrument- grandparents alive	0.4059***		0.4056***		0.3897***		0.3895***	
	(0.0705)		(0.0715)		(0.0722)		(0.0734)	
Having children under 3 (dummy, 1=yes)	0.0915	-0.1932**	0.0880	-0.2518**	0.0931	-0.2115**	0.0887	-0.2603**
	(0.0683)	(0.0496)	(0.0655)	(0.0513)	(0.0681)	(0.0503)	(0.0656)	(0.0520)
Having children age between 4-6 (dummy, 1=yes)	0.0270	0.0901	0.0342	0.0958	0.0307	0.0923	0.0352	0.0901
	(0.0642)	(0.0946)	(0.0607)	(0.0980)	(0.0641)	(0.0968)	(0.0609)	(0.0997)
Having children age between 7-16 (dummy, 1=yes)	-0.0839*	0.0419	-0.0529	0.0501	-0.0844*	0.0458	-0.0534	0.0519
	(0.0480)	(0.0376)	(0.0478)	(0.0411)	(0.0482)	(0.0402)	(0.0479)	(0.0420)
Age	-0.0507	0.0831***	-0.0269	0.0855***	-0.0509	0.0849***	-0.0272	0.0828***
	(0.0386)	(0.0291)	(0.0401)	(0.0300)	(0.0386)	(0.0289)	(0.0402)	(0.0278)
Age square	0.0011**	-0.0009**	0.0011**	-0.0009**	0.0011**	-0.0009**	0.0011**	-0.0009**
	(0.0006)	(0.0004)	(0.0006)	(0.0004)	(0.0006)	(0.0004)	(0.0006)	(0.0004)
Education categories								
Base case: primary school or less								
Lower middle school	0.0655	0.0297	0.0659	0.0258	0.0661	0.0305	0.0662	0.0264
	(0.0579)	(0.0427)	(0.0561)	(0.0415)	(0.0579)	(0.0446)	(0.0562)	(0.0434)
Upper middle school	0.0884	0.0930*	0.0865	0.0915*	0.0379	0.0948*	0.0865	0.0925*
	(0.0627)	(0.0483)	(0.0619)	(0.0494)	(0.0626)	(0.0479)	(0.0619)	(0.0485)
College or more	0.0061	0.2066***	0.0299	0.1855***	0.0059	0.1956***	0.0302	0.1848***
	(0.0677)	(0.0546)	(0.0661)	(0.0535)	(0.0679)	(0.0545)	(0.0662)	(0.0546)

Health condition (good/excellent, 1=yes)	-0.1891***	0.3247***	-0.0243	0.3356***	-0.1834***	0.3158***	-0.0238	0.3105***
	(0.0404)	(0.0332)	(0.0723)	(0.0318)	(0.0409)	(0.0325)	(0.0723)	(0.0319)
Ethnic minority	-0.0617	-0.0287	-0.0200	-0.0256	-0.0559	-0.0269	-0.0190	-0.0235
	(0.0582)	(0.0421)	(0.0628)	(0.0418)	(0.0587)	(0.0425)	(0.0631)	(0.0420)
Non-agriculture registration	0.0632*	0.0512*	0.1126***	0.0568*	0.0631*	0.0535*	0.1123***	0.0579*
	(0.0383)	(0.0294)	(0.0391)	(0.0311)	(0.0383)	(0.0300)	(0.0392)	(0.0316)
Other female members in the household (dummy, 1=yes)	0.1144***	0.1275***	0.0618	0.1045***	0.1167***	0.1135***	0.0627	0.1011***
	(0.0390)	(0.0324)	(0.0406)	(0.0284)	(0.0391)	(0.0315)	(0.0408)	(0.0279)
Other male members in the household (dummy, 1=yes)	0.0189	-0.0054	0.0022	-0.0065	0.0207	-0.0058	-0.0018	-0.0069
	(0.0403)	(0.0309)	(0.0393)	(0.0324)	(0.0401)	(0.0315)	(0.0392)	(0.0330)
Age of youngest child	0.0011	0.0135	0.0029	0.0256	0.0015	0.0156	0.0030	0.0279
	(0.0168)	(0.0130)	(0.0168)	(0.0189)	(0.0168)	(0.0155)	(0.0168)	(0.0195)
Male youngest child (dummy, 1=yes)	0.0296	0.0172	0.0378	0.0246	0.0307	0.0195	0.0380	0.0259
	(0.0321)	(0.0254)	(0.0319)	(0.0312)	(0.0321)	(0.0267)	(0.0319)	(0.0319)
Women's annual wage	0.0333	0.0985***	0.0124	0.1005***	0.0212	0.0947***	0.0152	0.1021***
	(0.0212)	(0.0144)	(0.0235)	(0.0195)	(0.0252)	(0.0136)	(0.0256)	(0.0205)
Women's other income	0.0324***	-0.0600**	0.0290***	-0.0695**	0.0327***	-0.0632**	0.0290***	-0.0724**
	(0.0050)	(0.0041)	(0.0052)	(0.0052)	(0.0051)	(0.0047)	(0.0052)	(0.0055)
Husband's annual income					0.0179	-0.0584**	0.0054	-0.0559**
					(0.0198)	(0.0189)	(0.0192)	(0.0164)
County effect	No	No	Yes	Yes	No	No	Yes	Yes
Year effect	No	No	Yes	Yes	No	No	Yes	Yes
F-test on instrument	6.93	/	5.88	/	6.90	/	5.80	/
Wald test of exogeneity (p value in bracket)	6.23 (0.036)		6.58 (0.038)		6.39 (0.037)		6.64 (0.040)	
Observations	1651		1651		1651		1651	

Notes: Marginal effects are reported; Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB.

Table 5. 13 Over-control check, effect of grandparents' childcare on mothers' labour force participation, instrument of grandparents' health condition – 2SLS estimation

Explanatory variables	(1)		(2)		(3)		(4)	
	grandparents' childcare	mother's LFP	grandparents' childcare	mother's LFP	grandparents' childcare	mother's LFP	grandparents' childcare	mother's LFP
Grandparents' childcare		0.2774*		0.3419*		0.2900*		0.3475*
		(0.1584)		(0.1865)		(0.1685)		(0.1934)
Instrument - grandparents' health condition	0.2616***		0.2520***		0.2615***		0.2548***	
	(0.0857)		(0.0834)		(0.0857)		(0.0839)	
Having children under 3 (dummy, 1=yes)	0.0167	-0.2228***	0.0128	-0.2390***	0.0167	-0.2271***	0.0125	-0.2399***
	(0.0497)	(0.0551)	(0.0482)	(0.0781)	(0.0498)	(0.0601)	(0.0481)	(0.0802)
Having children age between 4-6 (dummy, 1=yes)	-0.0784*	0.1180	-0.0608	0.1233	-0.0784*	0.1240	-0.0613	0.1260
	(0.0442)	(0.0904)	(0.0436)	(0.1333)	(0.0443)	(0.0993)	(0.0436)	(0.1330)
Having children age between 7-16 (dummy, 1=yes)	-0.1410***	0.0837	-0.0983***	0.0980	-0.1410***	0.0986	-0.0983***	0.1040
	(0.0289)	(0.1400)	(0.0294)	(0.184)	(0.0291)	(0.1540)	(0.0294)	(0.1820)
Age	0.0330	0.0498**	0.0144	-0.00326	0.0330	-0.0227	0.0143	-0.0041
	(0.0248)	(0.0211)	(0.0252)	(0.0466)	(0.0248)	(0.0450)	(0.0253)	(0.0473)
Age square	-0.0008**	0.0006	-0.0005	0.0006	-0.0008**	0.0007	-0.0005	0.0006
	(0.0004)	(0.0009)	(0.0004)	(0.0011)	(0.0004)	(0.0009)	(0.0004)	(0.0011)
Education categories								
Basecase: primary school or less								
Lower middle school	0.0206	-0.0824	0.0293	-0.1030	0.0206	-0.0849	0.0207	-0.1040
	(0.0268)	(0.0570)	(0.0263)	(0.1010)	(0.0269)	(0.0624)	(0.0263)	(0.1020)
Upper middle school	0.0403	-0.0564	0.0391	-0.1130	0.0403	-0.0605	0.0411	-0.1160
	(0.0392)	(0.0873)	(0.0387)	(0.1750)	(0.0392)	(0.0958)	(0.0388)	(0.1760)
College or more	0.0548	0.3830***	0.0362	0.3964***	0.0548	0.3822***	0.0376	0.3958***
	(0.0455)	(0.0709)	(0.0459)	(0.0967)	(0.0455)	(0.0775)	(0.0458)	(0.0993)
Health condition (good/excellent, 1=yes)	-0.1480***	0.3920***	-0.1553***	0.4112***	-0.1480***	0.4050***	-0.1526***	0.4108***
	(0.0244)	(0.1480)	(0.0364)	(0.1558)	(0.0245)	(0.1620)	(0.0365)	(0.1575)

Ethnic minority	0.0235	-0.0031	0.0522	-0.0579	0.0235	-0.0101	0.0520	-0.0611
	(0.0356)	(0.0409)	(0.0404)	(0.113)	(0.0356)	(0.0454)	(0.0403)	(0.1130)
Non-agriculture registration	0.0773***	-0.0963	0.1000***	-0.1960	0.0773***	-0.1040	0.1010***	-0.2010
	(0.0292)	(0.0837)	(0.0293)	(0.1940)	(0.0292)	(0.0918)	(0.0293)	(0.1930)
Other female members in the household (dummy, 1=yes)	0.1080***	-0.1100	0.0614**	-0.1040	0.1080***	-0.1250	0.0606**	-0.1090
	(0.0301)	(0.1100)	(0.0301)	(0.122)	(0.0301)	(0.122)	(0.0301)	(0.1190)
Other male members in the household (dummy, 1=yes)	0.0344	-0.0132	0.0218	-0.0338	0.0344	-0.0201	0.0212	-0.0356
	(0.0297)	(0.0475)	(0.0290)	(0.0630)	(0.0297)	(0.0523)	(0.0290)	(0.0630)
Age of youngest child	0.0021	0.0167	0.0016	0.0134	0.0020	0.0156	0.0012	0.0129
	(0.0113)	(0.0122)	(0.0110)	(0.0177)	(0.0113)	(0.0132)	(0.0110)	(0.0181)
Male youngest child (dummy, 1=yes)	-0.0353	0.0524	-0.0420*	0.0814	-0.0353	0.0572	-0.0419*	0.0838
	(0.0223)	(0.0415)	(0.0218)	(0.0841)	(0.0223)	(0.0454)	(0.0218)	(0.0831)
Women's annual wage	0.0138	0.0935***	-0.0083	0.0905***	0.0137	0.0993***	-0.0030	0.0947***
	(0.0117)	(0.0182)	(0.0124)	(0.0236)	(0.0141)	(0.0205)	(0.0143)	(0.0223)
Women's other income	0.0348***	-0.0373***	0.0314***	-0.0352**	0.0348***	-0.0419**	0.0314***	-0.0430**
	(0.0047)	(0.0148)	(0.0045)	(0.0193)	(0.0047)	(0.0183)	(0.0045)	(0.0182)
Husband's income					0.0001	-0.0450***	-0.0096	-0.0499***
					(0.0121)	(0.0131)	(0.0118)	(0.0155)
Constant	-0.1400	0.0658**	0.4724	-0.1033	-0.140	1.149**	0.520	-0.0798
	(0.4212)	(0.4722)	(0.4400)	(0.0343)	(0.423)	(0.515)	(0.443)	(1.101)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	8.68	/	9.38	/	7.20	/	8.76	/
Observations	1,651		1,651		1,651		1,651	
R-squared	0.206	0.112	0.258	0.135	0.206	0.120	0.258	0.139

Notes: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Instrument used here is a dummy variable indicating both grandparents are in good health condition.

Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB.

Table 5. 14 Over-control check, effect of grandparents' childcare on mothers' labour force participation, instrument of grandparents' health condition – IV-probit estimation

	(1)		(2)		(3)		(4)	
Explanatory variables	grandparents' childcare	mother's LFP	grandparents' childcare	mother's LFP	grandparents' childcare	mother's LFP	grandparents' childcare	mother's LFP
Grandparents' childcare		0.3384*		0.3287*		0.3386*		0.3278*
		(0.1802)		(0.1834)		(0.1777)		(0.1822)
Instrument - grandparents' health condition	0.2616***		0.2520***		0.2615***		0.2548***	
	(0.0853)		(0.0825)		(0.0852)		(0.0829)	
Having children under 3 (dummy, 1=yes)	0.0167	-0.2194***	0.0128	-0.2351***	0.0167	-0.2232***	0.0125	-0.2369***
	(0.0495)	(0.0406)	(0.0476)	(0.0393)	(0.0495)	(0.0403)	(0.0476)	(0.0390)
Having children age between 4-6 (dummy, 1=yes)	-0.0784*	0.0380	-0.0608	0.0089	-0.0784*	0.0339	-0.0613	0.0070
	(0.0439)	(0.0394)	(0.0431)	(0.0315)	(0.0440)	(0.0373)	(0.0431)	(0.0311)
Having children age between 7-16 (dummy, 1=yes)	-0.1410***	-0.0211	-0.0983***	-0.0263	-0.1410***	-0.0237	-0.0983***	-0.0264
	(0.0288)	(0.0292)	(0.0291)	(0.0208)	(0.0289)	(0.0266)	(0.0291)	(0.0209)
Age	0.0330	0.0069	0.0144	0.0203	0.0330	0.0078	0.0143	0.0204
	(0.0247)	(0.0188)	(0.0250)	(0.0187)	(0.0247)	(0.0184)	(0.0250)	(0.0185)
Age square	-0.0008**	0.0001	-0.0005	-0.0002	-0.0008**	0.0001	-0.0005	-0.0002
	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)
Education categories								
Basecase: primary school or less								
Lower middle school	0.0206	-0.0420	0.0293	-0.0336	0.0206	-0.0394	0.0207	-0.0313
	(0.0267)	(0.0285)	(0.0260)	(0.0244)	(0.0267)	(0.0270)	(0.0260)	(0.0237)
Upper middle school	0.0403	0.0121	0.0491	0.0234	0.0403	0.0173	0.0411	0.0279
	(0.0390)	(0.0312)	(0.0383)	(0.0294)	(0.0390)	(0.0303)	(0.0384)	(0.0295)
College or more	0.0548	0.3128***	0.0362	0.3148***	0.0548	0.3134***	0.0376	0.151***
	(0.0452)	(0.0441)	(0.0453)	(0.0517)	(0.0453)	(0.0458)	(0.0453)	(0.0520)
Health condition (good/excellent, 1=yes)	-0.1480***	0.0873*	-0.1532***	0.0785**	-0.1480***	0.0818*	0.0053	0.0762**
	(0.0242)	(0.0442)	(0.0360)	(0.0315)	(0.0244)	(0.0491)	(0.0361)	(0.0314)

Ethnic minority	0.0235	0.0174	0.0522	0.0181	0.0235	0.0164	0.0520	0.0185
	(0.0354)	(0.0249)	(0.0399)	(0.0276)	(0.0354)	(0.0250)	(0.0399)	(0.0277)
Non-agriculture registration	0.0773***	-0.0372	0.1000***	-0.0567	0.0773***	-0.0361	0.1010***	-0.0541
	(0.0290)	(0.0330)	(0.0290)	(0.0352)	(0.0290)	(0.0312)	(0.0290)	(0.0335)
Other female members in the household (dummy, 1=yes)	0.1080***	-0.0185	0.0614**	-0.0073	0.1080***	-0.0192	0.0606**	-0.00783
	(0.0299)	(0.0328)	(0.0298)	(0.0231)	(0.0299)	(0.0309)	(0.0298)	(0.0228)
Other male members in the household (dummy, 1=yes)	0.0344	0.0123	0.0218	-0.0057	0.0344	0.0097	0.0212	-0.00717
	(0.0295)	(0.0210)	(0.0287)	(0.0208)	(0.0296)	(0.0211)	(0.0287)	(0.0208)
Age of youngest child	0.0021	0.0163*	0.0016	0.0162*	0.0001	0.0151	0.0012	0.0152*
	(0.0113)	(0.0096)	(0.0109)	(0.0091)	(0.0113)	(0.0094)	(0.0109)	(0.00891)
Male youngest child (dummy, 1=yes)	-0.0353	0.0298	-0.0320	0.0265	-0.0353	0.0310	-0.0319	0.0275
	(0.0222)	(0.0212)	(0.0216)	(0.0195)	(0.0222)	(0.0207)	(0.0216)	(0.0192)
Women's annual wage	0.0138	0.0902***	-0.0083	0.0896***	0.0137	0.0924***	-0.0030	0.0846***
	(0.0116)	(0.0176)	(0.0122)	(0.0126)	(0.0140)	(0.0124)	(0.0141)	(0.0095)
Women's other income	0.0348***	-0.0551***	0.0314***	-0.0550***	0.0348***	-0.0447***	0.0314***	-0.0470***
	(0.0047)	(0.0061)	(0.0045)	(0.0038)	(0.0047)	(0.0054)	(0.00445)	(0.0036)
Husband's income					0.0031	-0.0353**	-0.00964	-0.0346**
					(0.0120)	(0.0105)	(0.0117)	(0.0097)
Constant	-0.1400	-1.0894	0.4720	-0.8640***	-0.1400	-0.8300***	0.5203	-0.8640***
	(0.4219)	(0.1572)	(0.4350)	(0.0130)	(0.4200)	(0.0117)	(0.4381)	(0.0130)
County effect	No		Yes		No		Yes	
Year effect	No		Yes		No		Yes	
F-statistics on instrument	8.68	/	9.38	/	7.20	/	8.76	/
Wald test of exogeneity (p value in bracket)	2.86 (0.037)		2.70 (0.046)		3.25 (0.033)		3.10 (0.038)	
Observations	1,651		1,651		1,651		1,651	

Notes: Marginal effects are reported; robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Instrument used here is a dummy variable indicating both grandparents are in good health condition.

Women's annual income takes fitted value and logged, in RMB. Women's other income and husband's income take logged value, in RMB.

6. Maternal employment and children's health development in rural China

6.1 Introduction

Halving the proportion of people suffering from hunger between 1990 and 2015 is one of the United Nations Millennium Development Goals. Up until 2013, the proportion of underweight children under the age of five in developing countries has declined from 28% in 1990 to 17%[54]. China, according to the first Chinese Child (aged 0-6) Nutrition Report (2012), has achieved this goal and its proportion of underweight children under the age of five was 3.6% in 2010, far below the international level.

Another indicator described in the Chinese Child (aged 0-6) Nutrition Report (2012) is the stunted growth of children, which is measured by the children's height. The overall rate of stunted growth in China in 2010 was 9.9%, which is 70% lower than it was in 1990. Nevertheless, the report mentioned the large gap in the nutrition status between children living in urban and in rural areas. The proportion of underweight children in rural areas is two to three times higher than it is in urban areas, and the ratio doubles in impoverished rural areas.

Child nutrition in rural China has attracted much attention since it has been shown that children who experience poor health are more likely to have lower educational attainment, poorer health, and lower earning capacity in middle age (Currie &

[54] Data source: World Health Organisation http://www.who.int/mediacentre/factsheets/fs290/en/

Stabile, 2003; Currie, 2009). One group of children – 'left-behind children'[55] – is of particular interest. Various studies have made an effort to investigate how 'left-behind children' are affected by the absence of their parents, including research on physical health, mental health, time allocation and school attendance (Chang et al., 2011; He et al., 2012; F. Hu, 2012; Q. Li, Liu, & Zang, 2015; Mu & De Brauw, 2015; H. Zhang, Behrman, Fan, Wei, & Zhang, 2014; Zhao, Yu, Wang, & Glauben, 2014). In generally, left-behind children are more vulnerable in many aspects than are their peers who are living with parents.

Children who live with parents (one or both parents) in rural China, however, have received less attention. despite the fact that children in rural areas are more disadvantaged in terms of health development, few works have attempted to explore the possible mechanisms to improve rural children's nutrition and health status (Liu, 2008; Mangyo, 2008; Zhang, 2012). Maternal employment is one of the possible mechanisms that can influence children's health development, either positively or negatively. The positive effect of maternal employment on children's health development stems mainly from the income effect. With a greater chance of participating in a paid job, particularly in off-farm work, mothers can increase the total household income and then further increase the proportion of income allocated to children's nutritional intake and health costs (Thomas, 1990). On the other hand, the negative effect stems mainly from a decrease in the mothers' supervision time and/or food preparation time, which can change the children's nutritional intake or eating

[55] 'Left-behind children' are defined as children whose parents are both seeking jobs outside the hometown.

patterns. Other possible mechanisms in China, as stated in the Chinese Child (aged 0-6) Nutrition Report (2012), may also include implementing government anti-poverty projects, improving mothers' education levels and perfecting the health care system.

In this study, children aged 0-10 in rural china are the research targets, and how maternal employment, in other words mothers taking off-farm work, influences children's health development. Two indices are employed, the weight-to-age Z score (WAZ) and the height-to-age Z score (HAZ), to measure children's health status in the short term and in the long term, respectively. Children whose WAZ and/or HAZ measurements fall below -2 are considered underweight and/or stunted. The rational of using this cut-off value is the statistical definition of the central 95% of a distribution as the "normal" range, assuming the outcomes are approximately normally distributed.

When modelling the relationship between maternal employment and children's health development, one key issue is that maternal employment can be endogenous. The reasons are twofold. Firstly, maternal employment and children's health development can simultaneously influence each other. For example, a seriously ill or disabled child in the household will reduce the mothers' labour supply, as childcare for such child is more intensive than is normal care. Secondly, there are some factors cannot be controlled but which influence maternal labour supply, such as the attitude towards taking on off-farm work. Women in rural china are generally less educated, and even more so in impoverished rural areas; therefore, less-educated mothers may feel hesitant to take on off-farm work when the work requires some skill. At the same

time, mothers' negative attitude towards off-farm work may also be accompanied by negative attitudes towards nutrition or diet arrangements, for example, mothers in low income families tend to choose low nutrition food but which is cheap, and further influence children's health.

In this chapter, three different instruments are used to represent maternal employment. Two of them, access to bus stops and road conditions in villages, are selected from community level data and the last one is the age of the youngest child living in the family. In addition, as the mother is seen as the primary childcare provider, the direct consequence of mothers taking on off-farm work or changing their working patterns reduces childcare time and/or quality. Therefore, the effect of the mothers' work time on child health development is also estimated as a sensitive test to see if there any difference to the results that use the mothers' working status. Other sensitive tests, controlling different aspects including the parents' BMI and household infrastructure, are carried out to check the consistency of the maternal employment effect. For all base line and sensitivity tests, OLS and 2SLS estimation results will be presented in the following section.

This chapter makes two contributions to the literature. The first contribution is that this chapter is among the first attempts to model mothers' employment and child health development in rural China. The second contribution is the instruments selected from the Chinese Health and Nutrition Survey community level data. Previous instruments used by Liu and Dong (2011), who also use CHNS data and investigated child health development in rural China, are limited to reflecting external conditions and personal availability for work. The instruments used in this chapter

capture both the external convenience when seeking jobs outside of the village and reflect the mothers' personal nursing needs, which will influence the mothers' availability to work.

6.2 Literature and Methodology

6.2.1 Maternal employment and child health

In the literature, mothers have been stressed playing an important role in household productivity as well as determining household nutrition and health (Leibowitz, 1974). Early research focused on the relationship between mothers' schooling and nutrition, child health and family health (Behrman & Wolfe, 1984, 1987), and the determinants of child health development (Wolfe & Behrman, 1982). Although the World Bank (1980) has suggested that increased education of women may be an important means for improvement of nutrition and health in developing countries, Behrman and Wolfe (1987) pointed out that the impact of mothers' schooling on children's health has been overstated when mothers' childhood family background was added to the estimation.

At the same time, various research has been carried out investigating the relationship between socioeconomic status and health, both adult and children's health, through three approaches (Haan, Kaplan, & Camacho, 1987). The first approach is the individual behavioural risk factors such as smoking and social connections (Rose & Marmot, 1981), the second one is socioeconomic factors such as access to medical care (Berg, Ross, & Latourette, 1977) and health insurance coverage and the last one is socioenvironmental risk factors such as poverty area residence (Haan et al., 1987). Evidence from the above studies consistently shows that

poor condition on each approach can increase the risk of experiencing anti-healthy events.

One challenge of revealing the association between socioeconomic status and health is the gradient, or the mechanism that might explain the association (Adler et al., 1994). When it is studied, socioeconomic status is usually treated as a control variable rather than a variable to examine because it long has been believed that higher economic class can increase life expectancy (Antonovsky, 1967). However, Smith (1999) argued that there is a dual relation between health and economic status for two possible reasons. One is that savings may fall as poor health condition would decrease the current period income and/or increase the consumption of medical care expenses, the other is that, as marginal utility of consumption is decreasing with poor health (Lillard & Weiss, 1997), individuals will tend to consume less during the periods of experiencing poor health. This dual relation applies to health in childhood, too. By combining four data sources[56] and using chronic conditions of children[57] to reveal the gradient, Case, Lubotsky and Paxson (2002) found that chronic conditions of children are more prevalent at lower incomes for children age under 18.

More research can also be seen on the investigation of relationship between maternal employment and child health. For this relationship, a trade-off effect was first

[56] The four data sources are: National Health Interview Survey (NHIS), the 1988 Child Health Supplement to the NHIS, the Panel Study of the Income Dynamics (PSID) and associated 1997 Child Development Supplement of PSID.

[57] The chronic conditions the authors used include asthma, epilepsy, heart disease, hearing problem, bronchitis, hay fever, vision problem, digestive disorder and mental retardation.

suggested by Becker and Lewis (1973), who mentioned that maternal employment can increase the resources invested in children but decrease the parenting time.

On one hand, maternal employment increases family income, thus having a positive effect on child health (Case, Lubotsky, & Paxson, 2002; Currie, Shields, & Price, 2007; Murasko, 2008). For example, families can spent on more or better-quality food products and medical care, both of which are expected to produce positive health outcomes (McCracken & Brandt, 1987; Horton & Campbell, 1991). Furthermore, if mothers work and control their income, the effect of income on nutrition will be greater than they will from equivalent increments to the spouse's or other household income, as women have stronger preferences for child welfare. Through a systematic literature review, Mindin and Law (2009) concluded that there is a higher tendency of vaccination uptake and a higher rate of overweight in children with employed mothers (Alio & Salihu, 2005; P. M. Anderson, Butcher, & Levine, 2003; Hawkins, Cole, Law, & The Millennium Cohort Study Child Health Group, 2008). In particular, using National Longitudinal Survey of Youth and matching mothers and children in the data, Anderson Butcher and Levine (2003) presented that percentage of children age 3-11 being overweight is higher in groups of working mothers and the highest rate is observed in the group of full time working mothers. The authors used five techniques to investigate the relationship including a standard probit model, three differencing approaches to phase out fixed effects of mothers and children, and an instrument approach accounting for unobserved heterogeneity. Their probit estimation results show that a 10 hours increase in mothers' employment will increase the

likelihood of being overweight by 1.2 percentage points and the more intense mothers work, the higher possible of being overweight for children in high income families.

On the other hand, child health may be adversely affected by maternal employment, as working mothers may spend less time on certain activities related to health and nutrition, such as cooking and grocery shopping, and supervising children (Cawley & Liu, 2012; Fertig, Glomm, & Tchernis, 2009). According to Cawley & Liu (2012), maternal employment is associated with a substantial decrease on the time spent on the household activities. Using American Time Use Survey data, they found the working mothers spend 17 fewer minutes on cooking and 37 fewer minutes on caring children comparing with full-time mothers. Meanwhile, in terms of childcare, common substitutes for maternal care when mothers are not available are formal or informal childcare, such as babysitters, relatives or older children, but they may not guarantee the quality of care (Glick & Sahn, 1998; McGuire & Popkin, 1990).

One feature of research on maternal employment and child health is that, as socioeconomic status are positively related to child health, research directions are different towards developed and developing countries, or high and low income families. Most studies on developed countries focus on the relationship between maternal employment and children's diseases, injuries and obesity, while studies on developing countries are more concerned with children's nutrition in low income families.

For developed countries, obesity is an increasing concern as a working mother may raise a 'couch potato' child (Brown, Broom, Nicholson, & Bittman, 2010). Many

studies, from various countries and regions, suggest that maternal employment increases the childhood obesity risk as reductions in maternal time and supervision could lead to greater reliance on fast or less nutritious foods and less time spent on recreational activities (Anderson et al., 2003; Gwozdz et al., 2013; Phipps, Lethbridge, & Burton, 2006). A similar scenario appears in the relationship between maternal employment and children's diseases. Morrill (2011) found that maternal employment increased the probability of adverse health events such as overnight hospitalisations, asthma episodes, and injuries/poisonings for children aged seven to 17 in the United States. However, weak evidence was found for the occurrence of diseases. By examining Canadian mothers' maternity leave and duration of breastfeeding, Baker and Milligan (2008) found that extended maternity leave mandates increased the duration of breastfeeding, but they did not find a consistent impact of breastfeeding on most of their health measures. There is evidence of beneficial effects on the incidence of asthma, allergies and chronic conditions, but the effects do not persist to older ages.

For developing counties and low income families, child nutrition is the main concern. Gennetian et al. (2010) found that maternal employment decreased children's probability of being in good or excellent health by a modest amount in low-income families by using an exogenous increase in employment induced by the National Evaluation of Welfare-to-Work Strategies in United States. Using survey data from Conakry, the capital city of Guinea, and height-to-age Z-score as health index, Glick and Sahn (1998) found that additional time devoted by the mother to market work was associated with reductions in height-for-age ratios of children under five, but an

increase in the mothers' labour income led to increased child height in Guinea. Some other studies, however, concluded there is no connection between maternal employment and poorer nutritional status of children in developing countries. Leslie (1988) reviewed 25 studies from 16 developing countries and found no conclusive evidence linking maternal employment and children being under nutritional. Engle (1991) found no effect of maternal employment on children's anthropometric growth patterns, but children taken care of by preteen siblings had significantly lower weight-for-height ratios in Guatemala. Lamontagne et al. (1998) showed that children of employed mothers were better in terms of weight/height than were those whose mothers were not employed, but children with inadequate alternate child care (care by a preteen or care at the work place) had lower height-for-age ratios in Nicaragua.

6.2.2 Empirical research of Chinese case

A few studies have attempted to investigate the determinants of child health in China, including the income gradient, parents' education, insurance coverage, maternal employment and family planning policy.

As the prevalence of overweight children in China has increased, OCP has been criticized as a cause of this phenomenon. Yang (2007) investigated the relationship between the OCP and overweight children using three waves from the CHNS data, 1993, 1997 and 2000. The author adopted a two-step analysis strategy that the first step was only using wave 2000 to find the determinants of being overweight and the second step was using three waves to reveal the time trend of overweight risk. Urban-rural differences are also compared due to the fact that OCP is stricter for non-agricultural registration families. Finally, the author concluded that younger

and urban children are at a higher risk of being overweight but there is no difference between children from one child families and multi-children families.

Chen, Lei and Zhou (2010) investigated the income gradient of child health in China. One unique difference of their estimations to the previous studies is that the authors adopted an instrument approach. They argued that family income and child health are mutually related. Therefore exogenous sources of variation in family income are needed. The rural tax reform in China, began in 2000 which significantly increased farmers' income but were unrelated to children's health, was employed as instrument of family income. By using seven waves[58] of CHNS data and creating height-to-age Z-scores as the measure of child health, the authors concluded that under instrument specification, family income does have a significant and positive effect on child health in China.

Using the same data and the same time period, Liu and Dong (2011) modelled the relationship between maternal employment time, childcare substitution and child health in rural China. The authors also adopted an instrument estimation approaches and selected a few instruments from the CHNS community level data[59]. Three measures were created, weight-to-height, weight-to-age and height-to-age Z-scores, to represent child health development in short term and long term. After controlling family income, Liu and Dong found that both the weekly maternal working time and substitutions to maternal childcare had negative impacts on the three measures of child health.

[58] The seven waves are 1989, 1991, 1993, 1997, 2000, 2003 and 2006.

[59] More discussion of instruments used in Liu and Dong (2011) are presented in the next section.

As a consequence of relaxation on household registration system and migration, the number of left behind children in rural areas is continuously increasing. Mu and Brauw (2015) investigated parents' migration and child health and nutrition status in rural China using four waves from the CHNS data[60]. Similar to Liu and Dong (2011), Mu and Brauw also created three measures, weight-to-age, height-to-age and BMI-to-age Z-scores, to represent child health development in short term and long term. In their study, Mu and Brauw claimed that migration is endogenous as it is mutually related with left-behind individuals. For example, on one hand, left-behind members benefit from higher income of migrators and on the other hand, poor health status of family members can influence adult labours' willingness to seek higher paid jobs. Using wage growth rate in capital cities as instrument to migration, Mu and Brauw concluded that parents' migration has a positive effect on children's weight.

Comparing the studies of Liu and Dong (2011) and Mu and Brauw (2015), it can be found that the conclusions in the two studies are contrary. Liu and Dong (2011) claimed increasing mothers' working time had a negative impact on children's health, while Mu and Brauw claimed the parents' absence from families had a positive impact on children's weight. However, one important feature in Mu and Brauw's study is that they didn't control childcare time. As they had three scenarios in the analysis – mother migrants only, father migrants only and both parents migrant – children will be looked after by left-behind members. Therefore, estimation results would be biased if childcare time is missing in the model.

6.2.3 Endogeneity of maternal employment and instruments

[60] The four waves are 1997, 2000, 2004 and 2006.

While a wide range of observed child and parent characteristics are usually controlled for when assessing how maternal employment affects child health, a key challenge is that employment is likely to be endogenous: mothers of children with health problems may be more likely to work in order to pay for medical costs, or to work less if their children need more care (Powers, 2001).

Various instruments have been used to control for the endogeneity concerns of maternal employment. Anderson et al. (2003) used variations in state-level economic and policy contexts, such as state child care regulations, wages of child care workers, welfare benefit levels, the status of welfare reform in the state, and the annual unemployment rate in the state to identify the effect of mothers' work hours on the likelihood that a child would be overweight. Baker and Milligan (2008) considered extended maternity leave mandates to examine the breastfeeding duration and young children's health measures in Canada. Gennetian et al. (2010) addressed the issue using participation in an experimental welfare-to-work programme as an exogenous shock to maternal employment. Morrill (2011) used the child's youngest sibling's eligibility for kindergarten as an instrument to show maternal employment had far-reaching adverse effects on school-aged children's health.

Liu and Dong (2011) gave the first attempt to investigate how working mothers' working hours in rural China influenced children's health development. The instruments used in their research were selected from the CHNS community-level data and are: (i) the ratio of local service industry practitioners and its square term; (ii) the distance between the village and the train station; (iii) the ratio of families owning

televisions in the community; and (iv) the price of coal in the local market and household's average area of farm land.

6.2.4 Methodology

In this chapter, maternal employment is treated as one of the independent variables, which is opposite to the previous two chapters, to see how it would influence children's health development in rural China and the key equation can be written as:

$$CHealth_{it} = \beta_0 + \beta_1 ME_{it} + \beta_2 X_{it} + \beta_3 Y_{it} + \beta_4 Z_{it} + \varepsilon_{it} \quad (5)$$

where CHealth is a binary dependent variable indicating underweight or underheight if it is equal to 1. Children's weight-to-age Z-score (WAZ) and height-to-age Z-score (HAZ) [61] are calculated first using reference scores [62], and underweight and underheight are identified if the Z-scores are less than -2. The rational of using this cut-off value is the statistical definition of the central 95% of a distribution as the "normal" range. In particular, weight-to-age Z-score reflects children's short term health status and height-to-age Z score reflects children's long term health status (J. B. Anderson et al., 2009; WHO, 1997).

The reason of using weight-to-age Z-score (WAZ) and height-to-age (HAZ) Z-score as measurements of children's health status in this chapter is threefold. First, child anthropometric measurements have been proved as efficient tools assessing

[61] Z-score is calculated as Z-score = (observed value – median value of the reference population) / standard deviation of reference population. Source: World Health Organization.

[62] Reference scores used in this study are from the World Health Organization.
WAZ: http://www.who.int/childgrowth/standards/weight_for_age/en/
HAZ: http://www.who.int/childgrowth/standards/height_for_age/en/

nutritional status of children both in developed and developing countries. WAZ and HAZ are two commonly used measures, not only because they are easy and inexpensive to obtain, but also because they are comparable across ages and sexes. Second, the new WHO child growth standards released in April 2006 provide a worldwide common base for data analysis as the standards were developed assuming all children have the same potential of growth given an optimum start of life regardless of birth regions. Third, estimation results from using WAZ and HAZ are comparable with other works as they have been widely adopted when investigating children's health status (Y. Chen & Li, 2009; de Brauw & Mu, 2011; H. Liu, Fang, & Zhao, 2013; Mu & De Brauw, 2015).

ME is maternal employment; therefore β_1 is the coefficient of interest. In particular, this maternal employment refers to mothers' off farm works. Previously, discussion in section 4.3.1 has stated the reason of focusing on women taking paid jobs outside home for the estimations in chapter 4 that housewife mothers can balance their work and family issues such as childcare. Likewise, in this chapter, the reason of excluding mothers in rural areas working on farm land contains two similar concerns. The first one is that although mothers work on farm land, they don't have individual income and the revenue of selling crops directly goes into total household income. The second one is that farm land working is relatively flexible that mothers can adjust their working time and there is no trade-off between housework, such as cooking, and paid work for them.

X is a vector of a child's characteristics, including the child's age, gender, number of siblings, whether s/he is a 'left-behind child', whether s/he lives with grandparents

and the grandparents' health condition. Y is a vector capturing household income and wealth, and Z is a vector for community characteristics, including ordinary annual wage for female workers, whether there is a market and whether there is a health service in the village.

As discussed above, maternal employment is endogenous due to a simultaneous influence on child health, and omitted variables such as mothers' attitudes towards off-farm work or children's health. Thus, an instrument estimation approach was adopted. Instruments used to represent maternal employment, which are discussed more specifically, are two dummy variables, one indicating access to bus stop in the village (1=yes) and the other one indicating paved road in the village (1=yes), and a continuous variable indicating the age of youngest child. So, similar to chapter 5, the estimations in this chapter also fall into a binary dependent variable with binary endogenous regressor model. To deliver the consistent estimation results, 2SLS is used and the principle of using this technique is the same discussed in section 5.3.3. Besides, probit and ivprobit estimation results are presented in the appendix P-Z assisting the OLS and 2SLS results in the main text.

6.2.5 Instruments

There are three limitations to Liu and Dong (2011)'s instruments. Firstly, trains are not the first choice for people living in rural areas when seeking work opportunities outside the village; thus, the distance to the train station is not a good reflection of taking on off-farm work. Secondly, the ratio of families owning televisions may also be related to child health, as owning a television reflects household wealth and television programmes can increase women's knowledge of nutrition. Thirdly, the

instruments in their work all involved the external environment of off-farm work, such as the ratio of local service industry practitioners reflecting the demand in the local labour market, not indicating women's personal characteristics such as willingness or attitudes.

In this chapter, I employed three different instruments, also derived from the CHNS community level data, considering both the external environment and personal situations. Two are related to public infrastructure, namely whether there is a bus stop, and road conditions in the village in which the woman resides. Public transport is particularly important in rural China, since it is the first choice for most people. Public transport in rural area includes buses, which link villages to towns and counties, coaches, which link counties and cities, and trains, which also link counties and cities[63]. The instrument of the bus stop has been used in a study investigating the relationship between maternal employment and fertility (Fang, Eggleston, Rizzo, & Zeckhauser, 2013). The results showed that bus stops have proved to be a valid instrument for maternal employment and can increase the possibility of being employed by up to 10%.

Road conditions also affect the chances of going from the village to some places that are more developed. It can be understood that good road conditions, such as paved roads, will increase the convenience and frequency of commuting between village and towns, counties and cities. The third instrument is the age of the youngest child in the family, which is an important determinant of the mother's availability to work,

[63] Different from coach stations, as not every county has train stations due to the railway network, and not all trains stop at some of the country train stations, especially the express and high-speed services.

because the mother is normally the first childcare provider, especially during the early stage of childhood.

It may be criticised that bus stops and road conditions can influence children's health development because more developed rural areas are enjoying more access to bus stops and higher quality roads. In fact, bus stops and road construction are centrally planned by the government. "Village to Village" is a major programme planned by the central Chinese government aiming to develop new paved roads, thus improving the coverage of electricity, water, telephone lines and the Internet in rural China. Essentially, the instruments of the bus stops and road conditions take binary values where indicates there is a bus stop in the village or neighbourhood and that paved roads are ready for use in the village separately.

6.3 Sample selection and variables

The research object in this chapter is children in Rural China aged between 0 to 10, either living with or without parents in the household. The main reason for the focus on children of this age is that weight-to-age reference data are not available beyond age 10 and children experience pubertal growth spurts when they are over 10 years' old. It may appear they have excess weight according to the weight-to-age indicator, but in fact they are just tall[64].

On the other hand, the reason of focusing children in rural areas is twofold. Firstly, the first Chinese Child (aged 0-6) Nutrition Report (2012) claimed that nutrition status and health development of children in rural areas are worse than children in urban

[64] World Health Organization, http://www.who.int/growthref/who2007_weight_for_age/en/.

areas, while children in urban areas are more concerned with obesity. Besides, unlike in rural areas, resources are much more available in urban areas, such as food variation and health care products, therefore children in urban areas are less likely to be malnourished. The second reason, which is also a key reason, is that when household's income is low, mothers' work and income can play an important role on household's consumption, especially on food and nutrition.

Figure 6.1 demonstrates our sample selection progress. First, all individuals in urban site have been excluded, and the sample was then reduced to individuals aged 10 and younger. Similar to the previous two chapters, mother and children were matched based on three questions: (i) does your mother live in this household? (ii) who is your mother in this household? (iv) what is the relationship between you and your mother?[65] Then mothers' information, for example age, work status and education levels were obtained for each child in the sample.

After matching the data, information about the children's number of siblings can be obtained, which is another important factor influencing children's health development. Selecting criteria for the remaining sample was purely based on the availability of data, and observations with missing data for any of the variables were deleted from the sample.

Three sub-samples were created for sensitivity tests. The first sub-sample used mothers' working hours, the second further controlled for parents' BMIs and household infrastructure, and the last looked at mother and grandparents' allocated

[65] Three options are provided for children to choose: biological mother, step-mother and adopted mother.

time for food preparation instead of the maternal work decision. In each sub-sample, observations with missing data for the control variables were excluded.

Like the previous two chapters, a table containing statistics of raw data will be presented firstly as the comparison to the samples. Statistics of key variables are presented for children aged under 10 in Table 6.1 and sample statistics are presented in Table 6.2. Again, no tremendous difference is observed but the maternal employment rate in the sample is slightly lower than the raw data, which might be due to the missing information of variables. For example, during the matching process of mothers and children, observations were excluded from the sample if there is any uncertainty.

In the sample, proportion of underweight children is about 12-13% and this number is double for underheight children, revealing that children in rural China are more vulnerable in terms of long-term health development. The statistics in this chapter pertaining to underweight and underheight are in line with facts presented in the Chinese Child (age 0-6) Nutrition Report, which indicate that, on the country level, the stunting rate is twice the number of those who are underweight. Gender distributions of children in all four samples were about half and half, and over 30% of children were living with grandparents. Left-behind children in our sample accounted for only about 4%, which is far below the official survey number in 2010[66].

[66] Extrapolating from the 6th National Census Data, the Report of Rural Left Behind Child and Urban Migrated Child developed by the China Women's Federation and Research Center of Population and Development in Renmin University of China concluded that over 61 million children (aged between 0 and 18) are left behind in rural areas, with one or both parents working away from home. The

Twenty-five per cent of mothers in rural China take on off-farm work, and this ratio varies slightly across the three sensitive test samples. Average education in years for the mothers in our sample was 6.40 with a standard deviation of 3.77, which means most mothers in our sample received primary school to junior middle school education. Time allocated to working and making food were 5.25 hours per day for mothers taking on off-farm work and 0.66 hours per day for all mothers in our sample. Mothers were also divided into two groups, living with and without grandparents, to see if there were any differences in time allocation between them. Mothers in the former group those who lived with grandparents, worked 50% longer per day and spent 50% less time making food than did mothers in the latter group. On the other hand, grandparents spent double the amount of time making food in a three-generation household or provide help with daily meals.

Three variables indicated household characteristics, owning a refrigerator, access tap water and having a flush toilet, had different proportions in our sample. About 50% of the children in our sample reported that they had tap water, but only 3% of children reported having a flush toilet in the house. Another interesting figure in our sample is

proportion is 37.7% for children in rural China and 21.88% for the total number of children in China. http://acwf.people.com.cn/n/2013/0510/c99013-21437965.html

The proportions of left-behind children in our sample and the proportions of left-behind children in the 6th National Census Data are not comparable. Our sample contains seven waves, namely 1991, 1997, 2000, 2004, 2006 and 2009, while the 6th National Census Data was carried out in 2010. Observations with missing data were excluded from our sample, which means some left-behind children can be excluded due to selection criteria. However, as the research interest of this study is not the left-behind children, it is not necessary to take further actions to track these excluded children who answered no to the question "Does your mother live in this household?"

that, from Table 6.2, owning a refrigerator in rural China is more popular than building a flush toilet.

Community infrastructure – market, health services, bus stops and road conditions – varied slightly across the samples. In general, 60% of communities had a market and a bus stop in the village, slightly higher than the proportion of having health services and paved roads.

A table showing statistics of children's weight-to-age and height-to-age Z scores, including a t-test to reveal the difference between groups of children with mothers working off-farm and a group of children with agricultural mothers is also presented. It can be seen in Table 6.3 that the health conditions of children whose mothers taking off-farm work are better than their peers whose mothers taking farm work, and the difference is significant at 1% level.

Distributions of WAZ and HAZ in the baseline sample are plotted in Figure 6.2. It shows that children's long term health development, i.e. height, is worse comparing to the short term index, i.e. weight in the baseline sample. To further test the normality of WAZ and HAZ, Figure 6.3 and 6.4 are conducted using standardized normal probability plot, and the distribution of WAZ and HAZ are compared with the ideal theoretical normal distribution, which are the solid lines coloured in red. In each figure, WAZ and HAZ are identified as normal distributed since the dots of WAZ and HAZ observations fall almost into straight lines, which also almost replot the theoretical normal distribution line.

Except graphically test the distribution of WAZ and HAZ, Shapiro-Wilk test is also employed to numerically test the distribution of the indices. The null hypothesis of Shapiro-Wilk test is that the population is normally distributed and if p-value is less than the chosen significance level, the null hypothesis is rejected and there is evidence that the data tested is not from a normally distributed population. On the contrary, if the p-value is greater than the chosen significance level, the null hypothesis that the data tested is from a normally distributed population cannot be rejected.

The two bottom lines of Table 6.2 report the test results for the samples. It is confirmed that baseline sample as well as the three sensitivity test samples are all normally distributed.

6.4 Results

6.4.1 Primary analysis of effect of maternal employment on children's health

In this section, baseline results from the baseline sample that contained 4,512 observations (2975 children in total) are presented. OLS results are firstly presented followed by the 2SLS results to reveal the consistent estimators due to the endogeneity of the mothers' work decisions[67]. Tables 6.4 and 6.5 show the results of maternal employment on short-term health development (underweight), and Tables 6.6 and 6.7 show the results for long-term health development (underheight).

Firstly, comparing columns 1 and 2 of OLS estimation results for short term and long term health status in Table 6.4 and 6.6 respectively, it is found that maternal

[67] To accompany the estimations, probit and IVprobit estimations are also carried out. Results are presented in Appendix P- S.

employment is more important for children's long term development that with mothers taking off-farm work, children can have 6 percentage points less possible being underheight.

Next, comparing columns 1 and 2 in the instrument estimation results, the second stages results show that there is a downward bias towards the estimation of maternal employment. Magnitudes of the effect of maternal employment on both short term and long term health development have been increased. By taking off-farm work, mothers can reduce the possibility of their children being underweight by eight percentage points and being underheight by 16 percentage points.

Looking at the first stage results of column 1 and 2 in the four tables, instrument variables, bus stops and paved roads in the village, are strongly related to the possibility of mothers taking on off-farm work. F statistics for the instruments show that the instruments are valid, and the Sargan test results show that instruments are not over-identifying the endogenous variable. With a bus stop in the village, mothers can increase their possibility of taking on off-farm work by up to eight percentage points, while paved roads in the village can increase the possibility by up to 14 percentage points. Interestingly, being as the instrument, age of youngest child plays a negative role on the possibility of mothers taking off-farm work although the effect size is smaller than the other two instruments. It can be true in this estimation since the sample contains children in rural China, where multi-siblings are common. When a new baby was born in a family, mother can receive childcare even from her big children so that she can work outside that home. With the children growing bigger,

rural mothers may lose helping hands on family issues when their children go to school, so mothers need to stay home and look after the families.

Other first stage results are within the expectation that being co-resident with grandparents or having healthy grandparents can help mothers to increase their labour supply, as well as the local community wage rate and market in the village. With a market in the village, rural mothers can have 5 percentage points higher chance of taking off-farm work comparing to those mothers living in the villages without a market. On the other hand, sibling numbers, household income and household wealth reduce the chance of mothers taking off-farm working. Especially family wealth, represented by owning a refrigerator in the household, can reduce up to 30 percentage points' possibilities for mothers seeking a paid job outside home.

Other second stage results confirm that left-behind children are more vulnerable. With other variable equal, a child who are left behind in rural areas are 10 percentage poins and 14 percentage points more likely to be underweight and underheight. Children from multi-sibling families are also at higher risk of being underdeveloped although the magnitudes of this negative effect are much smaller than they are of being left behind.

As expected, household income and owning refrigerators in the household can improve children's health development, either in short term or long term. With a 10% increase in household annual income, children will be about 7 percentage points lower possible being underweight and 9 percentage points lower possible being underheight.

This possibility is even higher if a household owns a refrigerator as it represents both family wealth and food hygiene.

Comparing the effects for underweight and underheight, it can be easily found that maternal employment played a more important role in children's long-term health development, as the magnitude of its negative effect in terms of being underheight was twice as great as was the negative effect with regard to children being underweight. Besides, even though household income and family wealth are controlled, mothers' off-farm work is still negatively related to the possibility of children being underdeveloped. This could be because mothers can influence children's diets or nutritional intake through their own income, or their intrahousehold bargaining power in terms of resource allocation (Thomas, 1990). Therefore, in sensitivity test 1, mothers' annual wage is further controlled to see whether this negative effect would change.

Columns 3 and 4 in the Table 6.4 to 6.7 in this section are another primary analysis by excluding left--behind children from the sample. No major changes in magnitude or significance were found when comparing these results to the previous results, both first stage and second stage. After excluding the left behind children, maternal employment can reduce the possibility of being underweight and underheight by up to 10 and 20 percentage points, respectively.

6.4.2 Sensitivity test 1 – Mother's working hours and income

The main aim of sensitivity test 1 is to see whether the mothers' working hours mattered in terms of children's health. Meanwhile, previous estimation results show

that maternal employment could encourage children's health development, even though household income is controlled. Therefore, I divided the total household income into the mother's annual wage and other household income to see whether there was any change in this negative effect of mothers' off-farm work.

Table 6.10 to 6.13 show the 2SLS results for the underweight and underheight estimations[68]. In Table 6.10 and 6.12, the far left columns are the baseline results containing the fundamental variables in the model. Compared with the primary analysis, the baseline results in this sensitivity test do not change significantly in terms of magnitude, direction of influence and significance.

From the IV estimation, it can be seen that, after controlling for years of the mothers' education, maternal employment still reduces children's underweight or underheight conditions significantly, with the only exception being that the magnitude is slightly less than are baseline results, indicating that the mothers' education level could influence children's health via the employment channel.

The first stage results show that access to a bus stop or having paved roads in the village are more important in terms of increasing working hours. With paved roads in the village, mothers can increase their working hours by 50%. For example, other things being equal, a mother living in a village with paved roads can work 2.5 hours longer than can another mother who works five hours per day and who lives in a village without paved roads. Apart from higher community wages for female workers and the existence of a market in the community, healthy grandparents can also help

[68] Probit and IVprobit estimation results are presented in Appendix T-W.

with mothers' work decisions or working hours. By contrast, mothers from wealthy families tend to reduce their labour supply, especially in terms of working hours, and mothers from families that own refrigerators will reduce their working time by up to 80 percentage points.

From second stage results, effect of mothers' working hours on children's health development is not as important as mothers' off-farm work decisions, as the parameters are insignificant for both children's weight and height. The possible explanations are twofold. First, in this sensitivity test sample, the mothers' average daily working hours less than are the normal working hours in urban areas and, as left-behind children are excluded, the mothers in this sample were working locally; therefore it is realistic for mothers to look after children when they take on off-farm work. Secondly, if mothers took on agricultural work before they transferred to off-farm work, a change in work intensity would not influence children's health development (Morrill, 2011).

More interesting results can be observed after dividing the household's total income into the mother's own wage income and the household's other income. Looking at columns 7 and 8 in Tables 6.11 and 6.13, other variables being equal, maternal employment can reduce the possibilities of children being underweight by 5 percentage points and being underheight by 21 percentage points with maternal income controlled. Comparing the numbers with the previous section, magnitude of the negative effect on underweight has decreased slightly but on underheight remains pretty much the same. Together with the high significance of maternal employment, it is showing that, mothers can improve children's health status through other channels

rather than only through the income effect. This can be understood as, in addition to mothers' intrahousehold bargaining power in terms of resource allocation, working mothers can improve their children's health status through other channels, such as via the nutritional information they receive from work or from other community activities. Thus, after controlling for the mothers' own wage income, maternal employment can reduce the possibility of children being underweight by seven percentage points.

6.4.3 Sensitivity test 2 – Parents' BMI and household infrastructure

In this sensitivity test, the aim is to see how maternal employment affects children's health when parents' health status, such as the parents' BMI, or external the environment, such as the household infrastructure, is controlled. Tables 6.14 to 6.19 present the OLS and 2SLS results[69]. Similarly to sensitivity test 1, the baseline results are provided in the far left columns except Table 6.17 and 6.19. Comparing the baseline results from the previous tests, no major difference is observed.

The first stage results continue suggesting that instrument variables are significantly related to maternal employment in rural areas. With a bus stop and paved road in the village, mothers can have over 20 percentage points higher chance of finding an off-farm work assuming other characters are the same. Living with elderly parents and elderly parents are in good health condition also can help mothers increase their participation in the labour market that holding other variables constant, mothers living with elderly parents can have 3 more percentage points chance being employed by a paid job.

[69] Probit and IVprobit estimation results are presented in Appendix X-AA.

In this sensitivity test, maternal employment still reduce the possibility of children being underweight or underheight significantly, and the effect size for underheight is much bigger than it is for underweight. With other variables constant, off-farm working mothers can lower the chance of their children being underheight by up to 20 percentage points.

Parents' BMI is also highly significant in terms of children's health, particularly with regard to weight. The higher the parents' BMI, the less likely the children are to be underweight. The mother's BMI is slightly more important than is the father's BMI, as mothers with higher BMIs can reduce the chances of children being underdeveloped. This can be understood because, within the normal range of BMIs, mothers with higher BMIs are healthier and their dietary patterns will also influence their children. An association between parents' BMI and children's BMI has been investigated in clinical studies, and a positive relationship has been confirmed (Lindkvist, Ivarsson, Silfverdal, & Eurenius, 2015; Ohlund, Hernell, Hörnell, Stenlund, & Lind, 2010).

On the other hand, water, hygiene and sanitation are confirmed as the basis of health (Bartram & Cairncross, 2010), especially in rural China where the health care system is relatively weak (Zhong, 2007). Two dummy variables indicating access to tap water and having a flush toilet in the household are included to control for household infrastructure.

From the second stage results, having tap water available in the household is more important as it improves children's health, with a greater effect in long term. Flush

toilets, however, did not influencing children's health in this sensitivity test. This can be understood from the fact that flush toilets are not popular in rural China, as can also be seen from our sample statistics, as only 3% of children reported they had a flush toilet installed in their households.

Another interesting finding of this sensitivity test is that magnitude of the negative effects of maternal employment after controlling for household infrastructure is the smallest, implying that working mothers from families with relatively modern facilities have a smaller impact on their children's health. This can be understood because a family that owns modern equipment or which is benefiting from modern facilities either has good socioeconomic status or is located in one of the more developed rural areas. As a result, the effect of maternal employment on children's health development would decrease slightly since there is less room in external environment or factors for working mothers to improve.

6.4.4 Sensitivity test 3 – Mother and grandparents' food-making time

From sensitivity test 1, it is found that mothers' working hours did not influence children's health development. Thus, in this sensitivity test, mothers' food-making time is used instead to estimate whether the time they allocated to this household activity mattered.

In daily family life, household food preparation situations can be summarized according to three categories: (i) mothers only; (ii) mothers and other adults; and (iii) other adults only. In particular, other adults include husbands, grandparents, other relatives and nannies. The fact is, in many societies, including in China, women play

an important role in food production, selection, purchasing and processing. Therefore, I also controlled for grandmothers' food-making time in this sensitivity estimation. From sample statistics, mothers' food-making time is shorter when they are living with grandparents, and the first stage estimation results show that healthy grandparents can help with mothers' labour supply. Tables 6.20 and 6.21 present estimation results for underweight and underheight, respectively.

In each table, 4 estimations results are demonstrated that column 1 and 2 are 2SLS estimations and column 3 and 4 are OLS estimations with mothers' food making time which is treated as exogenous in this sensitivity test. One may argue that mothers' food making time could be endogenous as it can be simultaneously influenced with children's health status. For example, a sick child may increase mothers' food making time since the child needs more nutrition and it may also decrease mothers' food making time since the child needs to be cared. The reason of mothers' food making time is treated as exogenous here is that, in rural China, food making time is mainly determined by the resources that a family have access, i.e. food varieties and amount.

It can be seen that mother's food-making time is highly correlated to children's health development. A one-hour increase in mothers' food-making time can reduce the possibility of children being underweight or underheight by about three and six percentage points, respectively. Grandparents' time, however, does not influence children's health outcomes, which can be understood as it is easier for younger generations to accept new cooking materials or recipes, and then further improve the daily nutritional arrangement. Thus, the effort mothers' put into making food is crucial.

Meanwhile, although it is a smaller effect compared to the negative effect when using maternal employment, it is reasonable to understand that time spent making food could not improve the quality of children's nutritional intake unless good cooking ingredients are used. Therefore, the mothers' income and purchasing power is more important for improving children's health development.

6.4.5 Health care and children's development

Looking at all the tables of the estimation results, there is no clue indicating the importance of having a health service in the village on children's health development in rural China. The results in this chapter seem contrary to many health reports or literature, which show that a community based health service is very effective in terms of assessing, diagnosing, preventing and managing children's diseases (*Disease Control Priorities in Developing Countries 2nd edition*, 2006; Ismail, Immink, Mazar, & Nantel, 2003; UNICEF, 1990), and is also positively related to local children's health outcomes or satisfying local children's special health care needs (McPherson et al., 2004). This point of finding indicates the weak health care provision in rural China, which was discussed in Section 3 institutional background.

However, rural areas in China are still underdeveloped and rural families are relatively backward especially on household income. To a great extent, health care system could not ensure rural residents' health but ultimately the household income can.

6.5 Conclusion

In this chapter, impact of maternal employment on children's health development in rural China using CHNS data has been investigated and an instrument estimation approach is used. Endogeneity of maternal employment when modelling this relationship can be due to various factors, such as simultaneous influence between maternal employment and children's health condition, i.e. a serious ill child can reduce mother's labour supply as s/he needs more care, at the same time mother may increase labour supply to cover child's medical costs. Omitted variables are another factor that can cause endogeneity, such as mothers' attitudes towards off-farm work, less-educated mothers may feel reluctant to take on off-farm works if skills are required, and this negative attitude towards off-farm work will also influence children's health by mothers' nutrition and diet arrangements.

Many instruments have been used in an attempt to solve this endogeneity problem, such as youngest child's eligibility of entering kindergarten. Liu and Dong (2010), who also carried out an investigation on mothers' off-farm working time and children's health development in rural China, select 4 variables from CHNS community level data as instruments and they found increase in maternal working time are negatively related to children's health.

However, Liu and Dong's instrument are limited at reflecting external environment as well as personal availability for mothers to seek off-farm work. In this chapter, I employed three different instruments from CHNS community level data, accessing to a bus stop in the village, having paved road in the village and age of mothers' youngest child to address both external and internal issues. By using 2SLS and IV-probit estimators, results show that maternal employment can significantly reduce

the possibility of children being underweight and underheight even after controlling mothers' education level, mothers' own wage income, parents' health condition and household infrastructure. This can be understood that except these channels, active mothers can improve their children's health condition through experiences they learned from their colleagues, information they received from work or community activities (Jenna & Elizabeth, 2009).

Sensitivity tests show that, in terms of time allocation, mothers' food making time is very important to children's health development but mothers' working time and grandparents' food making time are not. With one hour increase in mother's food making time, children will have 3 and 6 percentage points lower possibility of being underdeveloped in short term and long term.

Some policy implications can be draw based on the results in this chapter. First, infrastructure construction like road improvement in rural areas is beneficial for people who intend to seek jobs locally or outside their hometown as it can significantly increase the possibility of participating in labour market. Second, creating more working opportunities in rural areas not only can help local economic development, but also help mothers improve children's health. Third, healthcare system improvement in rural China is another important dimension of reform, not only providing more health services, but also strengthening the publicising health and nutrition information to rural households.

6.6 Shortcomings and future research

The estimations in this section still has shortcomings. First, left behind children are excluded in the sensitivity test due to data limitations. As mothers' demographic characteristics are controlled in sensitivity tests, such as mothers' education, and mothers' own annual wage income, the information on left behind child's mother cannot be tracked. Second, mothers' time allocation is not explored so that it is not known about the effect of mothers' activities, i.e. household production, market work, active leisure and child care, on children's health development. Third, children's health status are simply identified as under development or not, rather than compartmentalized children's height and weight into percentile.

Therefore, future research can focus on the following aspects. The first aspect is investigating children's nutrition outcomes and eating patterns to see what is (are) the mechanism(s) through which maternal employment can influence children's health development. CHNS is a good example of data that can be used in this area of research. However, challenges still exist due to its nature of data collection. Health and nutrition survey in CHNS is a consecutive three days trail during which detailed household food consumption data collected are randomly allocated from Monday to Sunday. Criticism of nutrition data in CHNS is that it may not be representative. The second aspect is examining how mothers' time allocation and/or supervision can influence children's time allocation and then further children's health status, for example, mothers' time on household activities and childcare, and children's time on physical activities and sedentary activities. The third aspect is estimating children's health using quantile regressions to see how maternal employment can influence children's health development in different statuses.

Except investigating the effect of maternal employment, another dimension of future research can be evaluating the effect of health insurance coverage on children's health development in rural China since the health insurance in rural China has experienced a few stages of reforms.

Figure 6. 1 Selection progress of baseline sample in Chapter 3

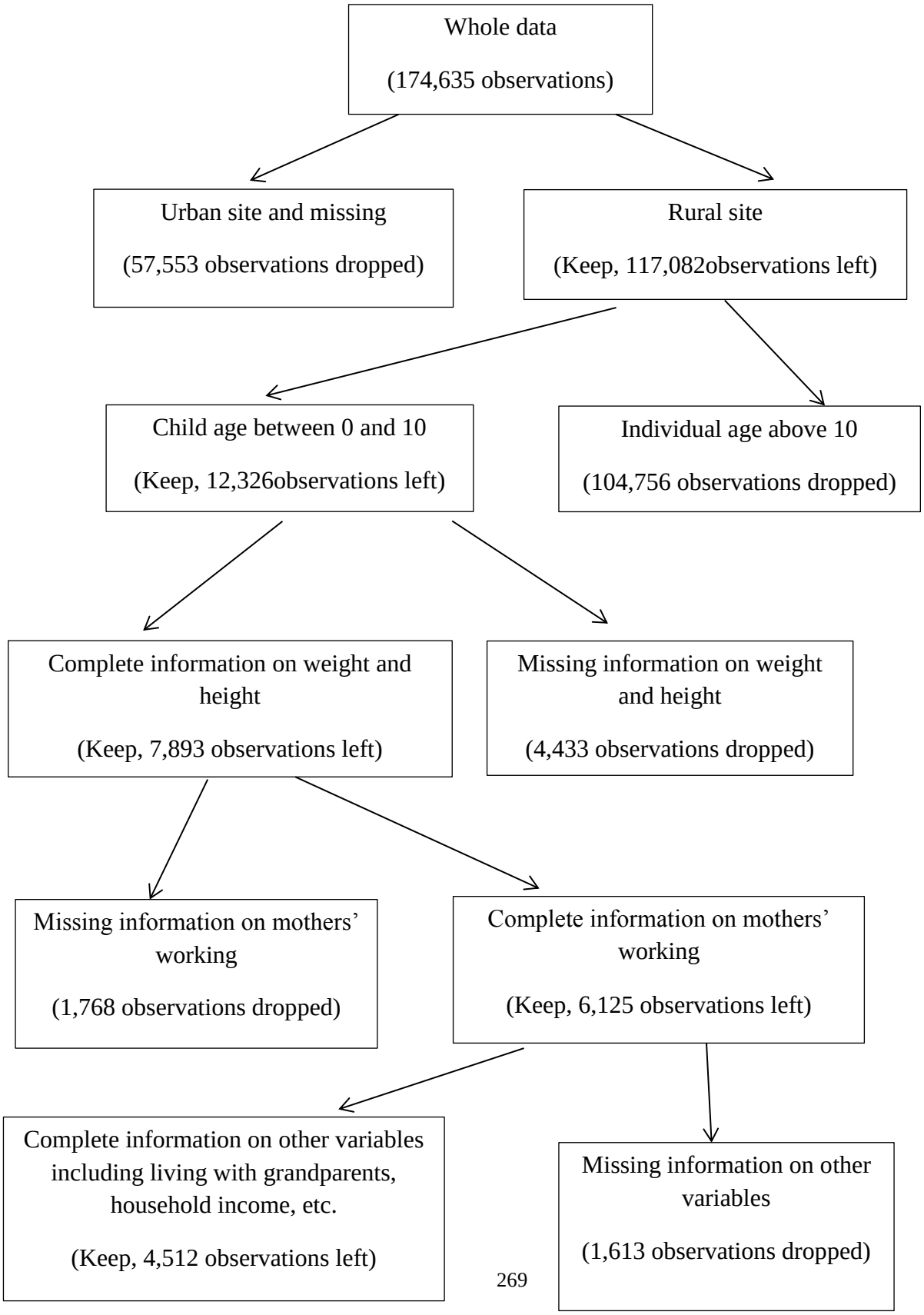


Figure 6. 2 K-density distributions of HAZ and WAZ in baseline sample

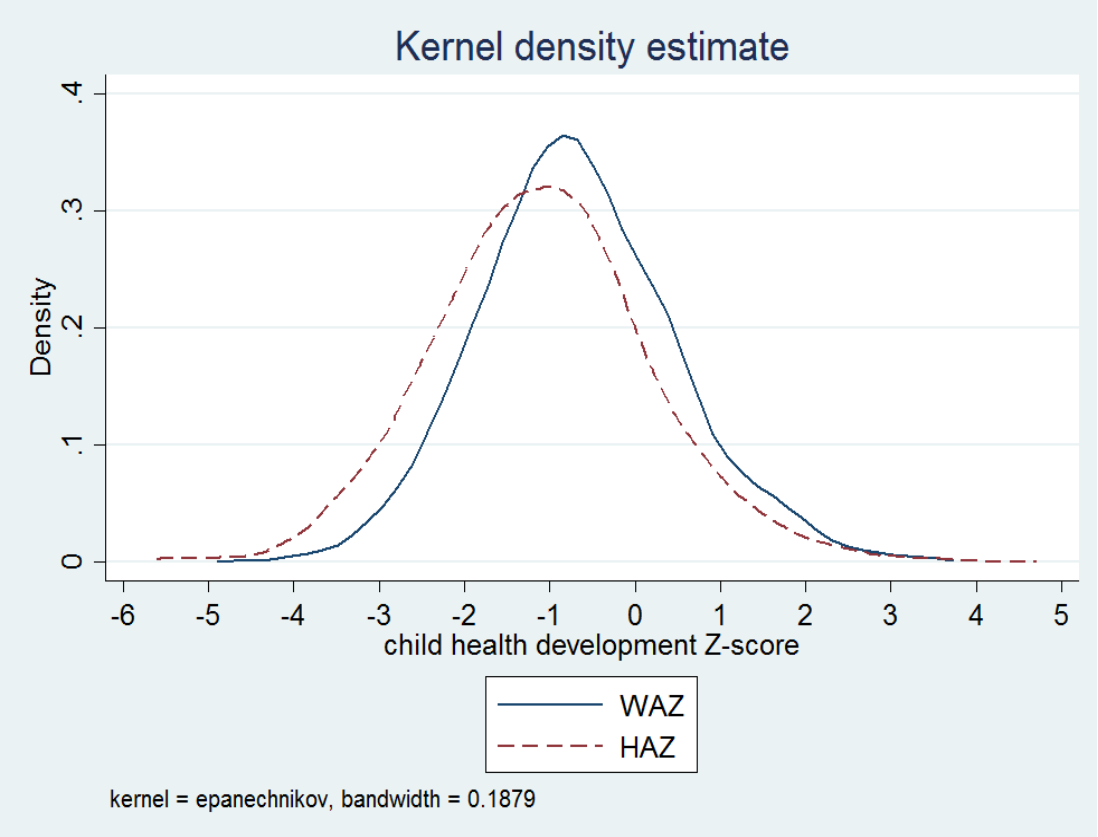


Figure 6. 3 Plot test of normality of WAZ, baseline sample

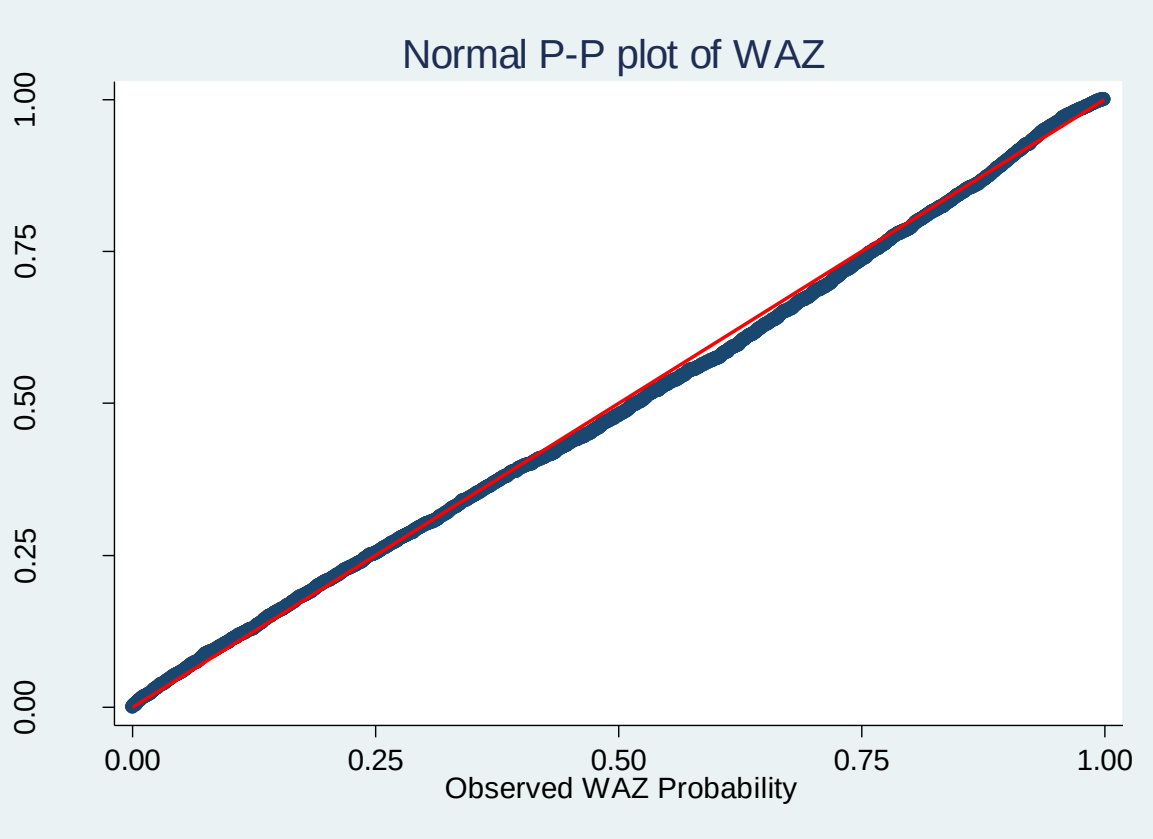


Figure 6. 4 Plot test of normality of HAZ, baseline sample

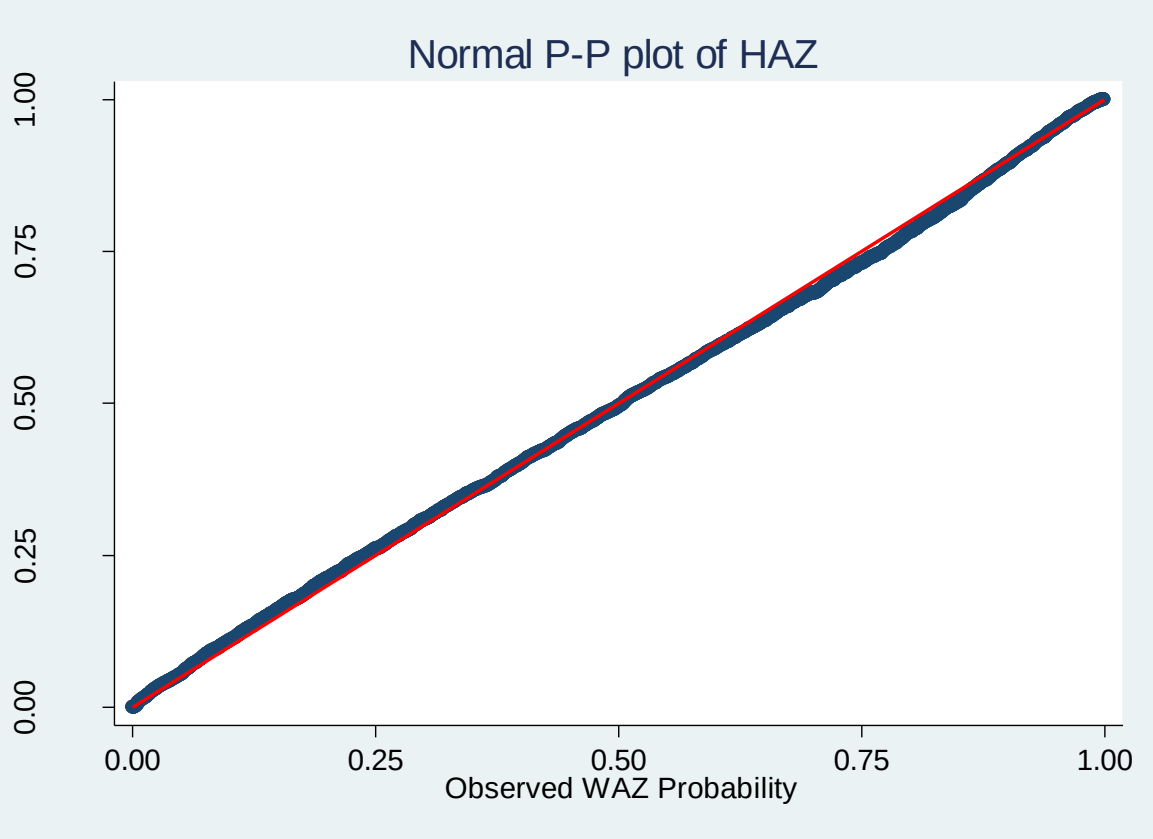


Table 6. 1 Descriptive statistics of key variables, raw data

	raw data	
Explanatory variables	Mean	Standard Deviation
Underweight children (%)	13.82	34.51
Underheight children (%)	27.37	36.14
Maternal employment (taking off-farm work, %)	32.87	46.97
Age	5.28	2.88
Left behind children (%)	4.67	21.10
Co-resident with grandparents (%)	34.57	47.56
Female child (1=yes, %)	46.49	49.88
Number of siblings	0.64	0.89
Mothers' education years	7.42	3.95
Household income (logged value)	9.50	0.92
Owning refrigerator in household (1=yes, %)	30.60	46.08
Wage per year for ordinary female worker in the community (logged value)	8.62	0.70
Market in village (1=yes, %)	53.96	49.84
Health service in village (1=yes, %)	44.29	49.67
Mother's working hours （maternal employment=1)	3.45	3.21
Mother's working hours (living without grandparents)	3.74	3.24
Mother's working hours (living with grandparents)	3.02	2.69
Mother's age	32.32	7.92
Mother's individual income	8.23	1.17
Other household income	1.12	0.98
Mother's BMI	21.94	2.84
Father's BMI	21.93	2.75
Tap water in household	58.68	49.24
Flushing toilet in household	3.49	18.34
Mother's time for buying, preparing and cooking food （in hours)	0.77	2.04
Mother's time for buying, preparing and cooking food (living without grandparents, in hours)	1.02	2.42
Mother's time for buying, preparing and cooking food (living with grandparents, in hours)	0.68	2.00
Grandparents' time for buying, preparing and cooking food (in hours)	1.63	2.70
Grandparents' health status (both are excellent/good, 1=yes, %)	30.96	46.23
Access to bus stop (1=yes, %)	61.82	48.58
Paved road (1=yes, %)	54.74	49.78

Age of youngest sibling	4.81	2.85
Year dummy (%)		
1991	15.78	36.45
1993	13.26	33.92
1997	10.62	30.82
2000	8.54	27.95
2004	7.25	25.93
2006	7.38	26.14
2009	7.76	26.76
Province dummy (%)		
Liaoning	7.78	26.79
Heilongjiang	4.28	20.25
Jiangsu	8.94	28.53
Shandong	8.19	27.43
Henan	14.06	34.77
Hubei	12.02	32.52
Hunan	10.81	31.06
Guangxi	15.92	36.59
Guizhou	14.06	34.76
Total Observations	16,979	

Table 6. 2 Descriptive statistics of key variables, baseline sample

	baseline sample		sample of sensitive test 1		sample of sensitive test 2		sample of sensitive test 3	
Explanatory variables	Mean	Standard Deviation	Mean	Standard Deviatio	Mean	Standard Deviation	Mean	Standard Deviation
Underweight children (%)	12.50	33.08	13.48	34.15	13.41	34.09	12.05	32.56
Underheight children (%)	23.71	42.54	25.10	43.37	25.17	43.41	23.25	42.25
Maternal employment (taking off-farm work, %)	25.13	43.38	20.46	40.34	27.07	44.44	24.32	42.91
Age	5.68	2.78	5.81	2.72	5.79	2.72	5.68	2.79
Left behind children (%)	3.77	13.20	/	/	/	/	1.98	13.94
Co-resident with grandparents (%)	36.33	48.10	33.93	47.35	36.59	48.18	39.59	48.91
Female child (1=yes, %)	44.88	49.74	45.08	49.76	45.29	49.79	45.25	49.78
Number of siblings	0.56	0.91	0.48	0.87	0.51	0.87	0.47	0.85
Mothers' education years	/	/	6.40	3.77	6.62	3.82	/	/
Household income (logged value)	9.52	0.90	9.49	0.81	9.55	0.83	9.50	0.90
Owning refrigerator in household (1=yes, %)	20.19	40.15	16.70	37.30	18.90	39.16	19.74	39.81
Wage per year for ordinary female worker in the	8.53	0.72	8.45	71.25	8.47	0.71	8.51	0.73
Market in village (1=yes, %)	60.64	48.86	60.35	48.93	60.94	48.80	61.48	48.67
Health service in village (1=yes, %)	49.69	50.00	48.27	49.98	48.00	49.97	49.50	50.00
Mother's working hours （maternal employment=1)			5.25	3.29	/	/	/	/
Mother's working hours (living without grandparents)			4.24	3.78				

Mother's working hours (living with grandparents)			6.33	2.21				
Mother's age			31.95	5.82	31.82	5.76	/	/
Mother's individual income					8.12	0.54	/	/
Other household income					1.43	0.78	/	/
Mother's BMI					21.73	2.77	/	/
Father's BMI					21.81	2.68	/	/
Tap water in household					49.46	50.01	/	/
Flushing toilet in household					3.08	17.29	/	/
Mother's time for buying, preparing and cooking food （in hours)							0.66	1.93
Mother's time for buying, preparing and cooking food (living without grandparents, in hours)							0.75	2.11
Mother's time for buying, preparing and cooking food (living with grandparents, in hours)							0.51	1.61
Grandparents' time for buying, preparing and cooking							1.16	2.29
Grandparents' health status (both are excellent/good, 1=yes, %)	31.14	46.31	29.53	45.62	30.59	46.09	34.18	47.44
Access to bus stop (1=yes, %)	58.89	49.21	58.88	49.21	59.76	49.05	58.10	49.35
Paved road (1=yes, %)	48.76	49.99	44.01	49.65	46.04	49.85	47.55	49.95
Age of youngest sibling	5.14	2.77	5.19	2.74	5.21	2.73	5.10	2.78
Year dummy (%)								

1991	26.35	44.06	30.44	46.02	30.35	45.99	27.06	44.43
1993	22.43	41.72	25.01	43.32	24.56	43.05	23.06	42.13
1997	14.25	34.96	14.76	35.47	14.97	35.69	14.58	35.29
2000	11.77	32.23	11.27	31.63	10.64	30.84	11.77	32.23
2004	8.95	28.56	6.74	25.07	7.22	25.88	8.35	27.66
2006	7.31	26.04	5.40	22.60	5.39	22.58	6.76	25.11
2009	8.93	28.52	6.38	24.44	6.88	25.31	8.42	27.77
Province dummy (%)								
Liaoning	9.26	29.00	9.39	29.18	8.67	28.15	9.5	29.32
Heilongjiang	5.59	22.97	5.61	23.01	6.37	24.42	5.75	23.28
Jiangsu	10.26	30.35	10.52	30.69	11.38	31.77	10.21	30.28
Shandong	8.55	27.97	8.88	28.46	8.84	28.39	8.69	28.17
Henan	13.16	33.81	12.13	32.66	10.94	31.22	13.22	33.88
Hubei	13.14	33.79	14.55	35.27	13.65	34.34	13.11	33.75
Hunan	9.15	28.84	9.03	28.67	8.81	28.35	9.13	28.8
Guangxi	14.74	35.45	14.16	34.87	15.55	36.24	14.62	35.34
Guizhou	16.13	36.79	15.71	36.40	15.79	36.47	15.77	36.45
Total Observations	4,512		3,339		2,940		3,733	
Shapirol-Wilk test for normality of WAZ	0.221		0.284		0.298		0.242	
Shapirol-Wilk test for normality of HAZ	0.264		0.301		0.310		0.278	

Table 6. 3 HAZ and WAZ comparisons between children with off-farm working mothers and children with farm working mothers

	Off-farm work mothers				Farm work mothers				
	Mean	Standard Deviation	Min	Max	Mean	Standard Deviation	Min	Max	Difference
Weight-to-age Z score	-0.69	1.29	-4.59	3.35	-1.24	1.29	-5.32	3.74	-0.42***
Height-to-age Z score	-0.37	1.11	-3.94	3.42	-0.79	1.17	-5.72	4.72	-0.55***
Observations		1,134				3,378			

Table 6. 4 Primary analysis, effect of maternal employment on child health development – underweight & OLS estimation

Dependent variable: underweight (1=yes)	(1)	(2)	(3)	(4)
Explanatory variables	OLS			
Maternal employment (1=yes)	-0.0221*	-0.0195*	-0.0225*	-0.0206*
	(0.0114)	(0.0117)	(0.0116)	(0.0119)
Age	0.0046	0.0043	0.0041	0.0038
	(0.0068)	(0.0068)	(0.0069)	(0.0069)
Age square	0.0008	0.0008	0.0008	0.0009
	(0.0006)	(0.0006)	(0.0007)	(0.0007)
Left behind child (1=yes)	0.0884***	0.0901***		
	(0.0258)	(0.0264)		
Co-resident with grandparents (1=yes)	-0.0044	-0.0059	0.0059	-0.0046
	(0.0135)	(0.0134)	(0.0135)	(0.0134)
Left behind child * Co-resident with	0.0434	0.0539		
	(0.0644)	(0.0677)		
Grandparents' health condition (1=both excellent/good)	-0.0106	-0.0099	-0.0116	-0.0105
	(0.0122)	(0.0121)	(0.0124)	(0.0123)
Female child (1=yes)	0.0234**	0.0212**	0.0235**	0.0216**
	(0.0098)	(0.0096)	(0.0099)	(0.0097)
Sibling number	0.0151*	0.0160*	0.0143*	0.0149*
	(0.0080)	(0.0080)	(0.0081)	(0.0082)
Household total annual income	-0.0468**	-0.0482**	-0.0472**	-0.0488**
	(0.0053)	(0.0054)	(0.0054)	(0.0054)
Owning refrigerator in household (1=yes)	-0.0652**	-0.0660**	-0.0668**	-0.0679**
	(0.0108)	(0.0111)	(0.0111)	(0.0114)
Ordinary annual wage for female worker in	-0.0160**	-0.0200**	-0.0157*	-0.0199**
	(0.0075)	(0.0092)	(0.0077)	(0.0093)
Market in community (1=yes)	0.0103	0.0105	0.0095	0.0094
	(0.0106)	(0.0109)	(0.0107)	(0.0111)
Health service in village (1=yes)	0.0032	0.0050	0.0032	0.0054
	(0.0099)	(0.0100)	(0.0101)	(0.0101)
Year effect	No	Yes	No	Yes
County effect	No	Yes	No	Yes
Observations	4,512	4,512	4,344	4,344
R-squared/Pseudo R-squared	0.235	0.281	0.235	0.281

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Household annual income and ordinary annual wage for female worker in community takes logged value, in RMB.

Table 6. 5 Primary analysis, effect of maternal employment on child health development – underweight & 2SLS estimation

Dependent variable: underweight (1=yes)	2SLS							
	(1)		(2)		(3)		(4)	
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)		-0.0668*		-0.0829*		-0.0773**		-0.0904**
		(0.0354)		(0.0457)		(0.0360)		(0.0430)
Instrument - bus stop	0.0747***		0.0702***		0.0856***		0.0725***	
	(0.0115)		（0.0127）		(0.0118)		(0.0132)	
Instrument - paved road	0.1255***		0.1344***		0.1350***		0.1500***	
	(0.0122)		（0.0124）		(0.0127)		(0.0130)	
Instrument - age of youngest child	-0.0260***		-0.0235***		-0.0282***		-0.0254***	
	(0.0036)		（0.0036）		(0.0036)		(0.0036)	
Age	0.0067	0.0050	0.0070	0.0063	0.0003	0.0050	0.0005	0.0058
	(0.0090)	(0.0072)	（0.0088）	(0.0072)	(0.0092)	(0.0072)	(0.0090)	(0.0071)
Age square	-0.0021***	0.0007	-0.0020***	0.0007	-0.0019**	0.0008	-0.0017**	0.0008
	(0.0008)	(0.0007)	（0.0008）	(0.0007)	(0.0008)	(0.0007)	(0.0008)	(0.0007)
Left behind child (1=yes)	-0.0836*	0.0895***	-0.0855*	0.1040***				
	(0.0462)	(0.0265)	（0.0451）	(0.0276)				
Co-resident with grandparents (1=yes)	0.0596***	-0.0062	0.0437***	-0.0017	0.0665***	0.0080	0.0539***	0.0004
	(0.0161)	(0.0143)	（0.0160）	(0.0139)	(0.0166)	(0.0145)	(0.0165)	(0.0143)
Left behind child * Co-resident with grandparents	0.0544**	0.0440	0.0552**	0.0586				
	(0.0266)	(0.0650)	（0.0291）	(0.0686)				
Grandparents' health condition (1=both	0.0429***	-0.0108	0.0451***	-0.0110	0.0317**	-0.00857	0.0412***	-0.0130
	(0.0137)	(0.0123)	(0.0138)	(0.0124)	(0.0140)	(0.0126)	(0.0143)	(0.0125)
Female child (1=yes)	0.0189	0.0146	0.0196	0.0125	0.0154	0.0156	0.0171	0.0132
	(0.0113)	(0.0099)	（0.0111）	(0.0096)	(0.0117)	(0.0100)	(0.0115)	(0.0098)
Sibling number	-0.0268***	0.0144*	-0.0267***	0.0146*	-0.0205**	0.0152*	-0.0182**	0.0157*
	(0.0083)	(0.0081)	（0.0085）	(0.0082)	(0.0088)	(0.0086)	(0.0089)	(0.0086)

Household total annual income	-0.0442***	-0.0662***	-0.0395***	-0.0655***	-0.0572***	-0.0687***	-0.0530***	-0.0667***
	(0.0072)	(0.0061)	（0.0071）	(0.0059)	(0.0074)	(0.0065)	(0.0074)	(0.0063)
Owning refrigerator in household (1=yes)	-0.2590***	-0.0614***	-0.2585***	-0.0676***	-0.3240***	-0.0724***	-0.3280***	-0.0743***
	(0.0191)	(0.0223)	（0.0194）	(0.0224)	(0.0191)	(0.0248)	(0.0196)	(0.0250)
Ordinary wage for female worker in community	0.0428***	-0.0062	0.0454***	0.0094	0.0375***	-0.0101	0.0345***	0.0082
	(0.0082)	(0.0079)	（0.0099）	(0.0094)	(0.0086)	(0.0077)	(0.0103)	(0.0096）
Market in village (1=yes)	0.0428***	0.0102	0.0432***	0.0143	0.0593***	0.0049	0.0550***	0.0111
	(0.0120)	(0.0118)	（0.0123）	(0.0120)	(0.0124)	(0.0123)	(0.0128)	(0.0124)
Health service in village (1=yes)	-0.0123	0.0036	-0.0073	0.0045	-0.0126	0.0041	-0.0143	0.0060
	(0.0116)	(0.0100)	（0.0117）	(0.0101)	(0.0120)	(0.0101)	(0.0122)	(0.0102)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	4512		4512		4344		4344	
F statistics on instrument	109.65	/	72.96	/	115.30	/	74.37	/
R-squared	0.260	0.236	0.297	0.276	0.262	0.236	0.257	0.074
Sargan Test (p value in bracket)	2.67 (0.297)		3.67 (0.159)		2.67 (0.297)		3.67 (0.159)	

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Income variables take logged value, in RMB.

Marginal effects are presented for IV-Probit estimations.

Instruments are access to bus stop (1=yes), paved road (1=yes) and age of youngest child.

Table 6. 6 Primary analysis, effect of maternal employment on child health development – underheight & OLS estimation

Dependent variable: underheight (1=yes)	(1)	(2)	(3)	(4)
Explanatory variables	OLS			
Maternal employment (1=yes)	-0.0558**	-0.0613**	-0.0596**	-0.0653**
	(0.0147)	(0.0149)	(0.0148)	(0.0150)
Age	0.0045	0.0047	0.0054	0.0060
	(0.0093)	(0.0093)	(0.0094)	(0.0094)
Age square	-0.0015*	-0.0015*	-0.0016*	-0.0016*
	(0.0008)	(0.0008)	(0.0009)	(0.0008)
Left behind child (1=yes)	0.1020***	0.1260***		
	(0.0389)	(0.0406)		
Co-resident with grandparents (1=yes)	0.0164	0.0004	0.0142	-0.0025
	(0.0170)	(0.0170)	(0.0171)	(0.0171)
Left behind child * Co-resident with	0.0083	0.0470		
	(0.0813)	(0.0890)		
Grandparents' health condition (1=both excellent/good)	-0.0128	-0.0131	-0.0124	-0.0124
	(0.0154)	(0.0153)	(0.0155)	(0.0155)
Female child (1=yes)	-0.0016	-0.0052	-0.0018	-0.0050
	(0.0124)	(0.0121)	(0.0126)	(0.0122)
Sibling number	0.0169*	0.0161*	0.0190*	0.0185*
	(0.0095)	(0.0095)	(0.0097)	(0.0097)
Household annual income	-0.0452**	-0.0433**	-0.0459**	-0.0438**
	(0.0073)	(0.0072)	(0.0074)	(0.0073)
Owning refrigerator in household (1=yes)	-0.0612**	-0.0616**	-0.0592**	-0.0588**
	(0.0152)	(0.0156)	(0.0156)	(0.0159)
Ordinary annual wage for female worker in	-0.0546**	-0.0499**	-0.0531**	-0.0478**
	(0.0100)	(0.0126)	(0.0101)	(0.0126)
Market in village (1=yes)	0.0086	0.0164	0.0103	0.0182
	(0.0134)	(0.0137)	(0.0136)	(0.0140)
Health service in village (1=yes)	0.0025	0.0123	0.0015	0.0120
	(0.0126)	(0.0126)	(0.0128)	(0.0127)
Year effect	No	Yes	No	Yes
County effect	No	Yes	No	Yes
Observations	4,512	4,512	4,344	4,344
R-squared/Pseudo R-squared	0.259	0.311	0.257	0.310

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Income variables take logged value, in RMB.

Table 6. 7 Primary analysis, effect of maternal employment on child health development – underheight & 2SLS estimation

Dependent variable: underheight (1=yes)	2SLS							
	(1)		(2)		(3)		(4)	
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)		-0.1360*		-0.1660**		-0.1790**		-0.1900***
		(0.0794)		(0.0797)		(0.0736)		(0.0734)
Instrument - bus stop	0.0747***		0.0702***		0.0856***		0.0725***	
	(0.0115)		(0.0127)		(0.0118)		(0.0132)	
Instrument - road type	0.1255***		0.1344***		0.1350***		0.1500***	
	(0.0122)		(0.0124)		(0.0127)		(0.0130)	
Instrument - age of youngest child	-0.0260***		-0.0235***		-0.0282***		-0.0254***	
	(0.0036)		(0.0036)		(0.0036)		(0.0036)	
Age	0.0067	0.0072	0.0070	0.0080	0.0003	0.0093	0.0005	0.0093
	(0.0090)	(0.0099)	(0.0088)	(0.0097)	(0.0092)	(0.0099)	(0.0090)	(0.0097)
Age square	-0.0021***	-0.0017*	-0.0020***	-0.0017**	-0.0019**	-0.0018**	-0.0017**	-0.0018**
	(0.0008)	(0.0009)	(0.0008)	(0.0009)	(0.0008)	(0.0009)	(0.0008)	(0.0009)
Left behind children (1=yes)	-0.0836*	0.1200***	-0.0855*	0.1440***				
	(0.0462)	(0.0390)	(0.0451)	(0.0415)				
Co-resident with grandparents (1=yes)	0.0596***	0.0228	0.0437***	0.0069	0.0665***	0.0225	0.0539***	0.0055
	(0.0160)	(0.0180)	(0.0160)	(0.0177)	(0.0166)	(0.0183)	(0.0165)	(0.0181)
left behind children * Co-resident with	0.0542**	0.0284	0.0552*	0.0688				
	(0.0244)	(0.0845)	(0.0291)	(0.0925)				
Grandparents' health condition	0.0429***	-0.0069	0.0451***	-0.0075	0.0317**	-0.0075	0.0412***	-0.0159
	(0.0137)	(0.0129)	(0.0138)	(0.0130)	(0.0140)	(0.0159)	(0.0143)	(0.0159)
Female child (1=yes)	0.0189	0.0025	0.0196	0.0038	0.0154	0.0017	0.0171	-0.0025
	(0.0113)	(0.0125)	(0.0111)	(0.0122)	(0.0117)	(0.0127)	(0.0115)	(0.0124)
Sibling number	-0.0268***	0.0169*	-0.0267***	0.0150*	-0.0205**	0.0178*	-0.0282***	0.0186*
	(0.0083)	(0.0097)	(0.0085)	(0.0097)	(0.0088)	(0.0103)	(0.0089)	(0.0102)

Household income	-0.0442***	-0.0708***	-0.0395***	-0.0782***	-0.0572***	-0.0843***	-0.0530***	-0.0902***
	(0.0072)	(0.0082)	(0.0071)	(0.0079)	(0.0074)	(0.0088)	(0.0074)	(0.0084)
Owning refrigerator in household (1=yes)	-0.2590***	-0.0884***	-0.2585***	-0.0883***	-0.324***	-0.0949***	-0.3280***	0.0941***
	(0.0191)	(0.0284)	(0.0194)	(0.0284)	(0.0191)	(0.0314)	(0.0196)	(0.0315)
Ordinary wage for female worker in community	0.0428***	-0.0566***	0.0454***	-0.0502***	0.0275***	-0.0634***	0.0245**	-0.0515***
	(0.0082)	(0.0103)	(0.0099)	(0.0128)	(0.0086)	(0.0101)	(0.0103)	(0.0129)
Market in village (1=yes)	0.0428***	0.0121	0.0432***	0.0220	0.0593***	0.0085	0.0550***	0.0210
	(0.0120)	(0.0145)	(0.0123)	(0.0149)	(0.0124)	(0.0152)	(0.0128)	(0.0154)
Health service in village (1=yes)	-0.0123	0.0031	-0.0073	0.0122	-0.0126	0.0024	-0.0143	0.0137
	（0.0116)	(0.0127)	(0.0117)	(0.0126)	(0.0120)	(0.0129)	(0.0122)	(0.0129)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	4512		4512		4344		4344	
F statistics on instrument	109.65	/	72.96	/	87.52	/	57.67	/
R-squared	0.260	0.254	0.297	0.302	0.222	0.040	0.257	0.040
Sargan Test (p value in bracket)	2.81 (0.245)		2.19 (0.243)		2.93 (0.240)		2.20 (0.234)	

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Income variables take logged value, in RMB.

Marginal effects are presented for IV-Probit estimations.

Instruments are access to bus stop (1=yes) and paved road (1=yes).

Table 6. 8 Sensitivity test 1, effect of maternal employment, mothers' working hours and mothers' income on child health development – underweight & OLS estimation

Dependent variable: underweight (1=yes)	(1)		(2)		(3)		(4)	
Explanatory variables	OLS							
Maternal employment (1=yes)	-0.0496***	-0.0341**	-0.0404***	-0.0341**			-0.0499***	-0.0351**
	(0.0140)	(0.0146)	(0.0140)	(0.0146)			(0.0141)	(0.0146)
Mother's working hours					-0.0248	-0.0209		
					(0.0194)	(0.0020)		
Age	0.0056	0.0065	0.0050	0.0068	0.0044	0.0065	0.0046	0.00601
	(0.0084)	(0.0084)	(0.0085)	(0.0085)	(0.0085)	(0.0085)	-0.0085	(0.0085)
Age square	0.0008	0.0008	0.0008	0.0008	0.0009	0.0008	0.0009	0.0008
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	-0.0008	(0.0008)
Mother's age			0.0048	0.0043	0.0043	0.0040	0.0051	0.0040
			(0.0038)	(0.0036)	(0.0038)	(0.0036)	-0.0039	(0.0037)
Mother's age square			-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
			(0.0001)	(0.0001)	(0.0001)	(0.0001)	-0.0001	(0.0001)
Co-resident with grandparents	-0.0001	-0.0127	-0.0154	-0.0140	-0.0033	-0.0158	0.0011	-0.0116
	(0.0164)	(0.0164)	(0.0162)	(0.0163)	(0.0162)	(0.0162)	(0.0164)	(0.0164)
Grandparents' health condition (1=both excellent/good)	-0.0137	-0.0225	-0.0133	-0.0217	-0.0143	-0.0213	-0.0135	-0.0217
	(0.0148)	(0.0147)	(0.0148)	(0.0147)	(0.0149)	(0.0147)	(0.0148)	(0.0147)
Mother's education years			-0.0455***	-0.0457**	-0.0462***	-0.0454***	-0.0452***	-0.0449***
			(0.0019)	(0.0019)	(0.0018)	(0.0018)	(0.0021)	(0.0021)
Female child (1=yes)	0.0068	0.0022	0.0067	0.0020	0.0069	0.0021	0.0064	0.0019
	(0.0118)	(0.0115)	(0.0118)	(0.0115)	(0.0118)	(0.0115)	(0.0118)	(0.0115)
Sibling number	0.0170*	0.0175*	0.0175*	0.0172*	0.0174*	0.0173*	0.0169*	0.0171*
	(0.0102)	(0.0103)	(0.0097)	(0.0099)	(0.0097)	(0.0099)	(0.0102)	(0.0104)
Household annual income	-0.0695***	-0.0645***	-0.0698***	-0.0651***	-0.0708***	-0.0661***		

	(0.0081)	(0.0084)	(0.0081)	(0.0084)	(0.0081)	(0.0084)		
Mother's annual wage							-0.0362**	-0.0405**
							(0.0152)	(0.0175)
Other household income							-0.0355***	-0.0344***
							(0.0084)	(0.0085)
Owning refrigerator in household (1=yes)	-0.0576***	-0.0286**	-0.0576***	-0.0687***	-0.0676***	-0.0400***	-0.0556***	-0.0674***
	(0.0138)	(0.0145)	(0.0138)	(0.0145)	(0.0139)	(0.0143)	(0.0139)	(0.0145)
Ordinary annual wage for female worker in community	-0.0009	0.0141	0.0004	0.0144	0.0002	0.0140	-0.0001	0.0143
	(0.0090)	(0.0104)	(0.0089)	(0.0104)	(0.0089)	(0.0104)	(0.0092)	(0.0104)
Market in village (1=yes)	0.0165	0.0157	0.0171	0.0170	0.0155	0.0151	0.0163	0.0159
	(0.0127)	(0.0131)	(0.0127)	(0.0131)	(0.0126)	(0.0131)	(0.0127)	(0.0132)
Health service in village (1=yes)	-0.0063	0.0003	-0.0066	-0.0007	-0.0060	0.0019	-0.0062	0.0008
	(0.0121)	(0.0121)	(0.0121)	(0.0121)	(0.0121)	(0.0121)	(0.0121)	(0.0121)
Year effect	No	Yes	No	Yes	No	Yes	No	Yes
County effect	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,339	3,339	3,339	3,339	3,339	3,339	3,339	3,339
R-squared/Pseudo R-squared	0.237	0.287	0.237	0.287	0.236	0.286	0.238	0.288

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Income variables take logged value, in RMB. Mother's annual wage takes fitted value.

Table 6. 9 Sensitivity test 1, effect of maternal employment, mothers' working hours and mothers' income on child health development – underheight & OLS estimation

Dependent variable: underheight (1=yes)	(1)		(2)		(3)		(4)	
Explanatory variables	OLS							
Maternal employment(1=yes)	-0.0949***	-0.0856***	-0.0845***	-0.0852***			-0.0946***	-0.0865***
	(0.0177)	(0.0181)	(0.0177)	(0.0181)			(0.0177)	(0.0182)
Mother's working hours					-0.0095	-0.0061		
					(0.0125)	(0.0125)		
Age	-0.0006	0.0023	0.0005	0.0045	-0.0006	0.0036	0.0002	0.0034
	(0.0116)	(0.0116)	(0.0117)	(0.0116)	(0.0116)	(0.0116)	(0.0117)	(0.0116)
Age square	-0.0010	-0.0012	-0.0010	-0.0013	-0.0010	-0.0013	-0.001	-0.0012
	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	（0.0010）	（0.0010）
Mother's age			-0.0012	-0.0009	-0.0022	-0.0018	-0.0013	-0.0018
			(0.0060)	(0.0062)	(0.0060)	(0.0062)	（0.0061）	（0.0062）
Mother's age square			0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
			(0.0001)	(0.0001)	(0.0001)	(0.0001)	（0.0001）	（0.0001）
Co-resident with grandparents	-0.0085	-0.0105	-0.0076	-0.0136	-0.0022	-0.0181	-0.0089	-0.0106
	(0.0208)	(0.0207)	(0.0206)	(0.0206)	(0.0207)	(0.0206)	(0.0208)	(0.0207)
Grandparents' health condition (1=both excellent/good)	-0.0118	-0.0283	-0.0115	-0.0277	-0.0135	-0.0279	-0.0115	-0.0274
	(0.0182)	(0.0183)	(0.0183)	(0.0183)	(0.0183)	(0.0184)	(0.0183)	(0.0183)
Mother's education years			-0.0313***	-0.0381***	-0.0325***	-0.0395***	-0.0314***	-0.0389***
			(0.0023)	(0.0023)	(0.0023)	(0.0023)	(0.0025)	(0.0025)
Female child (1=yes)	-0.0023	-0.0097	-0.0024	-0.0099	-0.0019	-0.0096	-0.0025	-0.0098
	(0.0147)	(0.0143)	(0.0147)	(0.0143)	(0.0147)	(0.0143)	(0.0147)	(0.0143)
Sibling number	0.0110	0.0104	0.0184	0.0044	0.0180	0.0046	0.0104	0.0096
	(0.0121)	(0.0119)	(0.0117)	(0.0116)	(0.0118)	(0.0117)	(0.0121)	(0.0119)

Household annual income	-0.0816***	-0.0809***	-0.0820***	-0.0805***	-0.0837***	-0.0824***		
	(0.0106)	(0.0108)	(0.0106)	(0.0108)	(0.0105)	(0.0107)		
Mother's annual wage							-0.0415**	0.0431**
							(0.0175)	(0.0195)
Household other income							-0.0236**	-0.0232**
							(0.0110)	(0.0110)
Owning refrigerator in household (1=yes)	-0.0475**	-0.0806***	-0.0779***	-0.0818***	-0.0659***	-0.0725***	-0.0772***	-0.0708***
	(0.0188)	(0.0196)	(0.0187)	(0.0195)	(0.0185)	(0.0192)	(0.0191)	(0.0196)
Ordinary annual wage for female worker in community	-0.0492***	-0.0446***	-0.0484***	-0.0441***	-0.0472***	-0.0447***	-0.0489***	-0.0444***
	(0.0118)	(0.0141)	(0.0118)	(0.0141)	(0.0117)	(0.0141)	(0.0120)	(0.0141)
Market in village (1=yes)	0.0224	0.0340**	0.0232	0.0258	0.0202	0.0222	0.0226	0.0245
	(0.0159)	(0.0163)	(0.0159)	(0.0163)	(0.0158)	(0.0163)	(0.0159)	(0.0163)
Health service in village (1=yes)	-0.0013	0.0142	-0.0010	-0.0149	-0.0009	-0.0166	-0.0008	0.0150
	(0.0151)	(0.0149)	(0.0151)	(0.0149)	(0.0151)	(0.0150)	(0.0152)	(0.0149)
Year effect	No	Yes	No	Yes	No	Yes	No	Yes
County effect	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,339	3,339	3,339	3,339	3,339	3,339	3,339	3,339
R-squared/Pseudo R-squared	0.26	0.32	0.260	0.320	0.257	0.317	0.260	0.321

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Income variables take logged value, in RMB. Mother's annual wage takes predicted value.

Table 6. 10 Sensitivity test 1, effect of maternal employment, mothers' working hours and mothers' income on child health development – underweight & 2SLS estimation

Dependent variable: underweight (1=yes)	2SLS							
	(1)		(2)		(3)		(4)	
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)		-0.0772**		-0.0716**		-0.0693***		-0.0712***
		(0.0318)		(0.0330)		(0.0210)		(0.0226)
Mother's working hours								
Instrument - bus stop	0.0588***		0.0520***		0.0434***		0.0453***	
	(0.0121)		(0.0136)		(0.0118)		(0.0132)	
Instrument - road type	0.125***		0.1290***		0.1190***		0.118***	
	(0.0135)		(0.0137)		(0.0131)		(0.0132)	
Instrument - age of youngest child	-0.0223***		-0.0212***		-0.0196***		-0.0190***	
	(0.0037)		(0.0037)		(0.0037)		(0.0038)	
Age	-0.0129	0.0061	-0.0143	0.0075	-0.0099	0.0043	-0.0112	0.0064
	(0.0096)	(0.0085)	(0.0094)	(0.0085)	(0.0094)	(0.0086)	(0.0092)	(0.0085)
Age square	-0.0004	0.0008	-0.0001	0.0007	-0.0004	0.0009	-0.0002	0.0008
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Mother's age					0.0116***	0.0039	0.0100***	0.00404
					(0.0037)	(0.0040)	(0.0036)	(0.0038)
Mother's age square					-0.0002***	-0.0001	-0.0001***	-0.0001
					(0.0001)	(0.0001)	(0.0001)	(0.0001)
Co-resident with grandparents (1=yes)	0.0524***	-0.0036	0.0521***	-0.0135	0.0232***	-0.0069**	0.0245***	-0.0048
	(0.0177)	(0.0172)	(0.0177)	(0.0172)	(0.0018)	(0.0030)	(0.0018)	(0.0031)
Grandparents' health condition (1=both excellent/good)	-0.0199	-0.0102	0.0359**	-0.0211	0.0519***	-0.0027	0.0481***	-0.0122
	(0.0141)	(0.0149)	(0.0144)	(0.0150)	(0.0172)	(0.0175)	(0.0172)	(0.0173)
Mother's education years					0.0272*	-0.0330**	0.0248*	-0.0314**

					(0.0139)	(0.0149)	(0.0142)	(0.0148)
Female child (1=yes)	0.00330	0.0078	0.0062	0.0026	0.0036	0.0073	0.0056	0.0021
	(0.0120)	(0.0118)	(0.0117)	(0.0115)	(0.0117)	(0.0118)	(0.0114)	(0.0115)
Sibling number	-0.0272***	0.0173*	-0.0295***	0.0068	-0.0291***	0.0182*	-0.0130	0.0070
	(0.0090)	(0.0104)	(0.0091)	(0.0103)	(0.0091)	(0.0105)	(0.0092)	(0.0104)
Household income	-0.0463***	-0.0656***	-0.0466***	-0.0660***	-0.0296***	-0.0614***	-0.0306***	-0.0643***
	(0.0089)	(0.0091)	(0.0090)	(0.0093)	(0.0088)	(0.0086)	(0.0089)	(0.0089)
Mother's annual wage								
Other household income								
Owning refrigerator in household (1=yes)	-0.2426***	-0.0883**	-0.2413***	-0.0831**	-0.3690***	-0.0790**	-0.3520***	-0.0789**
	(0.0230)	(0.0404)	(0.0234)	(0.0397)	(0.0233)	(0.0388)	(0.0235)	(0.0377)
Ordinary annual wage for female worker in	0.0164*	-0.0036	0.0209**	0.0134	0.0278***	0.0002	0.0234**	0.0145
	(0.0086)	(0.0088)	(0.0100)	(0.0106)	(0.0084)	(0.0091)	(0.0097)	(0.0105)
Market in village (1=yes)	0.0623***	0.0090	0.0537***	0.0148	0.0476***	0.0124	0.0460***	0.0152
	(0.0126)	(0.0147)	(0.0131)	(0.0146)	(0.0124)	(0.0143)	(0.0128)	(0.0145)
Health service in village (1=yes)	0.0320***	-0.0042	0.0463***	0.0014	-0.0190	-0.0043	-0.0172	0.0013
	(0.0124)	(0.0123)	(0.0127)	(0.0126)	(0.0121)	(0.0123)	(0.0123)	(0.0125)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	3,354		3,354		3,354		3,354	
F statistics on instrument	75.34	/	69.60	/	72.34	/	63.55	/
R-squared	0.286	0.233	0.323	0.286	0.326	0.035	0.365	0.088
Sargan Test (p value in bracket)	3.05 (0.215)		2.99 (0.230)		2.98 (0.230)		2.33 (0.211)	

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Income variables (household annual income and ordinary annual wage for female worker in community) take logged value, in RMB.

Instruments are access to bus stop (1=yes), paved road (1=yes) and age of youngest child.

Table 6. 11 Sensitivity test 1, effect of maternal employment, mothers' working hours and mothers' income on child health development – underweight & 2SLS estimation (continued)

Dependent variable: underweight (1=yes)	2SLS							
	（5）		（6）		（7）		（8）	
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)						-0.0458***		-0.0510***
						(0.0185)		(0.0205)
Mother's working hours		-0.0003		-0.0108				
		(0.0184)		(0.0197)				
Instrument - bus stop	0.2120**		0.3360***		0.0430***		0.0439***	
	(0.0851)		(0.0985)		(0.0118)		(0.0131)	
Instrument - road type	0.5690***		0.4860***		0.1180***		0.1180***	
	(0.0921)		(0.0917)		(0.0131)		(0.0132)	
Instrument - age of youngest child	-0.1110***		-0.0954***		-0.0189***		-0.0184***	
	(0.0271)		(0.0265)		(0.0037)		(0.0038)	
Age	-0.1270*	0.0043	-0.1260*	0.0058	-0.0096	0.00432	-0.0114	0.0064
	(0.0712)	(0.0085)	(0.0678)	(0.0085)	(0.0094)	(0.0086)	(0.0092)	(0.0085)
Age square	0.0037	0.0009	0.0048	0.0009	-0.0004	0.0009	-0.0002	0.0008
	(0.0061)	(0.0008)	(0.0058)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Mother's age	0.0165	0.0040	0.0068	0.0038	0.0093**	0.0044	0.0076**	0.0039
	(0.0279)	(0.0039)	(0.0263)	(0.0036)	(0.0038)	(0.0041)	(0.0038)	(0.0038)
Mother's age square	-0.0002**	-0.0001	-0.00001	-0.0001	-0.0001***	-0.0001	-0.0001**	-0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Co-resident with grandparents (1=yes)	0.1160***	-0.0069**	0.1250***	-0.0042	0.0206***	-0.0064**	0.0215***	-0.0050*
	(0.0128)	(0.0030)	(0.0128)	(0.0033)	(0.0022)	(0.0029)	(0.0022)	(0.0030)
Grandparents' health condition (1=both excellent/good)	0.2317*	-0.0025	0.2219*	-0.0132	0.0516***	-0.0028	0.0478***	-0.0122
	(0.1220)	(0.0165)	(0.1190)	(0.0164)	(0.0172)	(0.0175)	(0.0171)	(0.0173)
Mother's education years	0.2590***	-0.0429**	0.3450***	-0.0445**	0.0256*	-0.0433**	0.0235*	-0.0413**

	(0.1000)	(0.0155)	(0.1020)	(0.0161)	(0.0139)	(0.0149)	(0.0141)	(0.0148)
Female child (1=yes)	0.0502	0.0072	0.0500	0.0023	0.0048	0.0069	0.0070	0.0022
	(0.0859)	(0.0118)	(0.0830)	(0.0115)	(0.0116)	(0.0118)	(0.0114)	(0.0115)
Sibling number	-0.2800***	0.0182	-0.1380**	0.0059	-0.0290***	0.0183*	-0.0113	0.0071
	(0.0601)	(0.0113)	(0.0597)	(0.0108)	(0.0090)	(0.0105)	(0.0092)	(0.0104)
Household income	-0.1530**	-0.0613***	-0.1550**	-0.0635***				
	(0.0628)	(0.0087)	(0.0622)	(0.0090)				
Mother's annual wage					0.0705***	-0.0509***	0.0810***	-0.0507***
					(0.0198)	(0.0068)	(0.0205)	(0.0089)
Other household income					-0.0246***	-0.0403***	-0.0265***	-0.0446***
					(0.0087)	(0.0088)	(0.0088)	(0.0089)
Owning refrigerator in household (1=yes)	-0.7870***	-0.0885**	-0.7530***	-0.0803**	-0.3610***	-0.0783**	-0.3460***	-0.0791**
	(0.1710)	(0.0417)	(0.1690)	(0.0395)	(0.0237)	(0.0385)	(0.0236)	(0.0374)
Ordinary annual wage for female worker in	0.1130*	0.0002	0.1230*	0.0156	0.0326***	0.0014	0.0326***	0.0145
	(0.0596)	(0.0090)	(0.0699)	(0.0108)	(0.0084)	(0.0094)	(0.0097)	(0.0105)
Market in village (1=yes)	0.2360***	0.0125	0.1980**	0.0162	0.0480***	0.0121	0.0458***	0.0152
	(0.0912)	(0.0143)	(0.0925)	(0.0144)	(0.0124)	(0.0143)	(0.0127)	(0.0145)
Health service in village (1=yes)	-0.0940	-0.0043	-0.0920	-0.0008	-0.0100	-0.0039	-0.0172	0.0013
	(0.0889)	(0.0126)	(0.0901)	(0.0134)	(0.0121)	(0.0124)	(0.0123)	(0.0125)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	3,354		3,354		3,354		3,354	
F statistics on instrument	56.65	/	45.64	/	78.12	/	68.94	/
R-squared	0.193	0.035	0.248	0.082	0.328	0.035	0.368	0.088
Sargan Test (p value in bracket)	1.41 (0.689)		1.27 (0.359)		3.07 (0.216)		2.68 (0.267)	

Notes: The same as Table 6.7.

Table 6. 12 Sensitivity test 1, effect of maternal employment, mothers' working hours and mothers' income on child health development – underheight & 2SLS estimation

Dependent variable: underheight (1=yes)	2SLS							
	(1)		(2)		(3)		(4)	
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)		-0.1323**		-0.1338**		-0.1670**		-0.2110**
		(0.0597)		(0.0600)		(0.0810)		(0.0911)
Mother's working hours								
Instrument - bus stop	0.0588***		0.0520***		0.0434***		0.0453***	
	(0.0121)		(0.0136)		(0.0118)		(0.0132)	
Instrument - road type	0.1250***		0.1290***		0.1190***		0.1180***	
	(0.0135)		(0.0137)		(0.0131)		(0.0132)	
Instrument - age of youngest child	-0.0223***		-0.0212***		-0.0196***		-0.0190***	
	(0.0037)		(0.0037)		(0.0037)		(0.0038)	
Age	0.0129	0.0020	-0.0143	0.0044	-0.0099	0.0011	-0.0112	0.0047
	(0.0096)	(0.0119)	(0.0094)	(0.0118)	(0.0094)	(0.0118)	(0.0092)	(0.0117)
Age square	0.0004	-0.0011	-0.0001	-0.0013	-0.0004	-0.0011	-0.0002	-0.0013
	(0.0008)	(0.0011)	(0.0008)	(0.0010)	(0.0008)	(0.0011)	(0.0008)	(0.0010)
Mother's age					0.0116***	-0.0006	0.0100***	-0.0001
					(0.0037)	(0.0062)	(0.0036)	(0.0063)
Mother's age square					-0.0002***	-0.0001	-0.0001***	-0.0001
					(0.0001)	(0.0001)	(0.0001)	(0.0001)
Co-resident with grandparents (1=yes)	0.0524***	0.0145	0.0521***	-0.0034	0.0232***	-0.0094***	0.0245***	-0.0047
	(0.0177)	(0.0219)	(0.0177)	(0.0218)	(0.0018)	(0.0035)	(0.0018)	(0.0037)
Grandparents' health condition (1=both excellent/good)	-0.0199	-0.0077	-0.0359**	-0.0299	0.0519***	0.0129	0.0481***	-0.0033
	(0.0141)	(0.0184)	(0.0144)	(0.0187)	(0.0172)	(0.0221)	(0.0172)	(0.0218)
Mother's education years					0.0872***	-0.0410***	0.0848***	-0.0400**

					(0.0139)	(0.0183)	(0.0142)	(0.0185)
Female child (1=yes)	0.0033	-0.0014	0.0062	-0.0094	0.0036	-0.0020	0.0056	-0.0099
	(0.0120)	(0.0148)	(0.0117)	(0.0144)	(0.0117)	(0.0147)	(0.0114)	(0.0143)
Sibling number	-0.0272***	0.0170	-0.0095	0.0080	-0.0291***	0.0186	-0.0230**	0.0076
	(0.0090)	(0.0124)	(0.0091)	(0.0120)	(0.0091)	(0.0124)	(0.0092)	(0.0121)
Household income	-0.0463***	-0.0733***	-0.0466***	-0.0767***	-0.0296***	-0.0692***	-0.0306***	-0.0649***
	(0.0089)	(0.0119)	(0.0090)	(0.0119)	(0.0088)	(0.0113)	(0.0089)	(0.0115)
Mother's annual wage								
Other household income								
Owning refrigerator in household (1=yes)	-0.2426***	-0.0180	-0.2413***	0.0365	-0.3690***	-0.0191	-0.3520***	-0.0372
	(0.0230)	(0.0503)	(0.0234)	(0.0491)	(0.0233)	(0.0483)	(0.0235)	(0.0468)
Ordinary wage for female worker in	0.0164*	-0.0549***	0.0209**	-0.0119	0.0278***	-0.0494***	0.0234**	-0.0108
	(0.0086)	(0.0117)	(0.0100)	(0.0143)	(0.0084)	(0.0119)	(0.0097)	(0.0142)
Market in village (1=yes)	0.0623***	0.0229	0.0537***	0.0403**	0.0476***	0.0254	0.0460***	0.0405**
	(0.0126)	(0.0180)	(0.0131)	(0.0179)	(0.0124)	(0.0175)	(0.0128)	(0.0178)
Health service in village (1=yes)	-0.0320***	-0.0027	-0.0463***	0.0109	0.0290**	-0.0012	0.0372***	0.0116
	(0.0124)	(0.0155)	(0.0127)	(0.0158)	(0.0121)	(0.0155)	(0.0123)	(0.0156)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	3339		3339		3339		3339	
F statistics on instrument	78.59	/	77.03	/	76.58	/	75.37	/
R-squared	0.286	0.046	0.323	0.106	0.326	0.256	0.365	0.311
Sargan Test (p value in bracket)	2.45 (0.301)		2.22 (0.318)		2.41 (0.309)		2.27 (0.321)	

Notes: The same Table 6.7.

Table 6. 13 Sensitivity test 1, effect of maternal employment, mothers' working hours and mothers' income on child health development – underheight & 2SLS estimation (continued)

Dependent variable: underheight (1=yes)	2SLS							
	（5）		（6）		(7)		(8)	
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)						-0.1680**		-0.2120**
						(0.0811)		(0.0912)
Mother's working hours		-0.0337		-0.0381				
		(0.0224)		(0.0245)				
Instrument - bus stop	0.2120**		0.3360***		0.0430***		0.0439***	
	(0.0851)		(0.0985)		(0.0118)		(0.0131)	
Instrument - road type	0.5690***		0.4860***		0.1180***		0.1180***	
	(0.0921)		(0.0917)		(0.0131)		(0.0132)	
Instrument - age of youngest child	-0.1110***		-0.0954***		-0.0189***		-0.0184***	
	(0.0271)		(0.0265)		(0.0037)		(0.0038)	
Age	-0.1270*	-0.0011	-0.1260*	0.0012	-0.0096	0.0011	-0.0114	0.0044
	(0.0712)	(0.0119)	(0.0678)	(0.0123)	(0.0094)	(0.0118)	(0.0092)	(0.0117)
Age square	0.0037	-0.0009	0.0048	-0.0010	-0.0004	-0.0011	-0.0002	-0.0013
	(0.0061)	(0.0011)	(0.0058)	(0.0011)	(0.0008)	(0.0011)	(0.0008)	(0.0010)
Moher's age	0.0165	-0.0020	0.0068	-0.0017	0.0093**	-0.0008	0.0076**	-0.0010
	(0.0279)	(0.0060)	(0.0263)	(0.0062)	(0.0038)	(0.0062)	(0.0038)	(0.0063)
Mother's age square	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001***	-0.0001	-0.0001**	-0.0001
	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Co-resident with grandparents (1=yes)	0.1160***	-0.0094***	0.1250***	-0.0026	0.0206***	-0.0096***	0.0215***	-0.0059*
	(0.0128)	(0.0036)	(0.0128)	(0.0040)	(0.0022)	(0.0034)	(0.0022)	(0.0036)
Grandparents' health condition (1=both excellent/good)	0.3317***	0.0053	0.3219***	-0.0114	0.0516***	0.0130	0.0478***	-0.0034
	(0.1220)	(0.0212)	(0.1190)	(0.0217)	(0.0172)	(0.0221)	(0.0171)	(0.0218)
Mother's education years	0.2590***	-0.0485**	0.3450***	-0.0454**	0.0856***	-0.0109	0.0835***	-0.0295

	(0.1000)	(0.0193)	(0.1020)	(0.0209)	(0.0139)	(0.0183)	(0.0141)	(0.0185)
Female child (1=yes)	0.0502	-0.0011	0.0500	-0.0087	0.0048	-0.0019	0.0070	-0.0094
	(0.0859)	(0.0149)	(0.0830)	(0.0149)	(0.0116)	(0.0148)	(0.0114)	(0.0144)
Sibling number	-0.2800***	0.0141	-0.2380***	0.0021	-0.0290***	0.0185	-0.0213**	0.0082
	(0.0601)	(0.0135)	(0.0597)	(0.0129)	(0.0090)	(0.0124)	(0.0092)	(0.0121)
Household income	-0.1530**	-0.0690***	-0.1550**	-0.0621***				
	(0.0628)	(0.0115)	(0.0622)	(0.0121)				
Mother's annual wage					0.0705***	-0.0451**	0.0810***	-0.0448**
					(0.0198)	(0.0197)	(0.0205)	(0.0218)
Other household income					-0.0246***	-0.0297**	-0.0265***	-0.0295**
					(0.0087)	(0.0115)	(0.0088)	(0.0115)
Owning refrigerator in household (1=yes)	-0.9870***	-0.0139	-0.7530***	-0.0671	-0.3610***	-0.0194	-0.3460***	-0.0353
	(0.1710)	(0.0523)	(0.1690)	(0.0515)	(0.0237)	(0.0480)	(0.0236)	(0.0464)
Ordinary wage for female worker in	-0.1130*	-0.0486***	0.1230*	-0.0060	0.0326***	-0.0500***	0.0226**	-0.0111
	(0.0596)	(0.0119)	(0.0699)	(0.0149)	(0.0084)	(0.0122)	(0.0097)	(0.0142)
Market in village (1=yes)	0.2360***	0.0253	0.1980**	0.0433**	0.0480***	0.0255	0.0458***	0.0405**
	(0.0912)	(0.0176)	(0.0925)	(0.0184)	(0.0124)	(0.0175)	(0.0127)	(0.0178)
Health service in village (1=yes)	0.1940**	-0.00287	0.2920***	0.0023	0.0300**	-0.0013	0.0372***	0.0115
	(0.0889)	(0.0159)	(0.0901)	(0.0173)	(0.0121)	(0.0155)		(0.0156)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	3339		3339		3339		3339	
F statistics on instrument	56.12	/	53.90	/	78.12	/	74.33	/
R-squared	0.293	0.238	0.248	0.237	0.328	0.256	0.368	0.311
Sargan Test (p value in bracket)	3.88 (0.226)		3.69 (0.267)		2.64 （0.288）		2.59 （0.281）	

Notes: The same as Table 6.7.

Table 6. 14 Sensitivity test 2, effect of maternal employment, parents' BMI and household infrastructure on child health development – underweight & OLS estimation

Dependent variable: underweight (1=yes)	(1)		(2)		(3)		(4)	
Explanatory variables	OLS							
Maternal employment (1=yes)	-0.0376**	-0.0325**	-0.0382**	-0.0326**	-0.0376**	-0.0346**	-0.0525***	-0.0423***
	(0.0148)	(0.0151)	(0.0148)	(0.0151)	(0.0147)	(0.0150)	(0.0154)	(0.0157)
Age	0.0072	0.0078	0.0064	0.0080	0.0050	0.0071	0.0051	0.0067
	(0.0087)	(0.0088)	(0.0088)	(0.0088)	(0.0088)	(0.0088)	(0.0088)	(0.0088)
Age square	0.0007	0.0007	0.0007	0.0007	0.0009	0.0008	0.0008	0.0008
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Mother's age			0.0046	0.0038	0.0044	0.0050	0.0044	0.0037
			(0.0038)	(0.0037)	(0.0039)	(0.0037)	(0.0038)	(0.0037)
Mother's age square			-0.0001	-0.0001	-0.0001*	-0.0001*	-0.0001	-0.0001
			(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Co-resident with grandparents (1=yes)	0.0083	-0.0024	0.0084	-0.0029	-0.0013	-0.0057	-0.0055	-0.0037
	(0.0173)	(0.0173)	(0.0171)	(0.0172)	(0.0169)	(0.0171)	(0.0172)	(0.0172)
Grandparents' health condition (1=both excellent/good)	-0.0103	-0.0157	-0.0098	-0.0149	-0.0132	-0.0170	-0.0132	-0.0170
	(0.0156)	(0.0154)	（0.0156）	（0.0154）	(0.0154)	(0.0153)	(0.0154)	(0.0153)
Mother's education years			-0.0442***	-0.0435*	-0.0412***	-0.0467***	-0.0450***	-0.0442***
			(0.0020)	(0.0020)	(0.0019)	(0.0020)	(0.0020)	(0.00199)
Female child (1=yes)	0.0084	0.0062	0.0082	0.0058	0.0082	0.0061	0.0088	0.0067
	(0.0124)	(0.0122)	(0.0125)	(0.0122)	(0.0123)	(0.0121)	(0.0124)	(0.0122)
Sibling number	0.0215*	0.0108	0.0196*	0.0177*	0.0187*	0.0179*	0.0186*	0.0183*
	(0.0111)	(0.0113)	(0.0106)	(0.0109)	(0.0105)	(0.0109)	(0.0106)	(0.0109)
Household total annual income	-0.0506**	-0.0550**	-0.0868***	-0.0855***	-0.0864***	-0.0852***	-0.0863***	-0.0853***
	(0.0215)	(0.0217)	(0.0085)	(0.0087)	(0.0084)	(0.0087)	(0.0085)	(0.0087)
Owning refrigerator in household (1=yes)	-0.0633***	-0.0645***	-0.0833***	-0.0851**	-0.0930***	-0.0940***	-0.0950***	-0.0982***
	(0.0147)	(0.0152)	(0.0147)	(0.0152)	(0.0149)	(0.0153)	(0.0149)	(0.0154)
Ordinary annual wage for female worker in community	0.0011	0.0148	0.0014	0.0151	-0.0094	-0.0155	-0.0019	-0.0132
	(0.0095)	(0.0112)	(0.0095)	(0.0112)	(0.0093)	(0.0111)	(0.0095)	(0.0112)

Market in community (1=yes)	0.0123	0.0081	0.0129	0.0093	0.0084	0.0067	0.0098	0.0066
	(0.0134)	(0.0137)	(0.0134)	(0.0137)	(0.0132)	(0.0136)	(0.0133)	(0.0136)
Health service in village (1=yes)	-0.0023	0.0001	-0.0026	0.0005	-0.0032	-0.0013	-0.0018	-0.0025
	(0.0127)	(0.0127)	(0.0127)	(0.0128)	(0.0125)	(0.0127)	(0.0127)	(0.0128)
Mother's BMI					-0.0153***	-0.0210***		
					(0.0021)	(0.0021)		
Father's BMI					-0.0134***	-0.0189***		
					(0.0022)	(0.0022)		
Tap water in household							-0.0629***	-0.0403***
							(0.0143)	(0.0150)
Flush toilet in household							-0.0312	-0.0401
							(0.0341)	(0.0350)
Year effect	No	Yes	No	Yes	No	Yes	No	Yes
County effect	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2940	2940	2940	2940	2940	2940	2940	2940
R-squared/Pseudo R-squared	0.236	0.283	0.236	0.283	0.266	0.296	0.244	0.287

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

All income variables take logged value, in RMB. Mother's annual wage takes fitted value.

Table 6. 15 Sensitivity test 2, effect of maternal employment, parents' BMI and household infrastructure on child health development – underheight & OLS estimation

Dependent variable: underheight (1=yes)	(1)		(2)		(3)		(4)	
Explanatory variables	OLS							
Maternal employment (1=yes)	-0.0723***	-0.0783***	-0.0718***	-0.0764***	-0.0638***	-0.0736***	-0.0821***	-0.0776***
	(0.0186)	(0.0187)	(0.0186)	(0.0188)	(0.0185)	(0.0188)	(0.0192)	(0.0193)
Age	-0.0002	0.0004	0.0008	0.0028	-0.0003	-0.0024	-0.0009	-0.0035
	(0.0125)	(0.0124)	(0.0126)	(0.0125)	(0.0126)	(0.0125)	(0.0126)	(0.0125)
Age square	-0.0011	-0.0011	-0.0013	-0.0013	-0.0011	-0.0013	-0.0014	-0.0014
	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)
Mother's age			-0.0001	-0.0004	0.0015	0.0001	0.0004	0.0006
			(0.0064)	(0.0066)	(0.0063)	(0.0065)	(0.0064)	(0.0066)
Mother's age square			-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
			(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Co-resident with grandparents (1=yes)	0.0162	-0.0016	0.0133	-0.0060	-0.0077	-0.0072	-0.0096	-0.0072
	(0.0221)	(0.0220)	(0.0220)	(0.0220)	(0.0219)	(0.0220)	(0.0221)	(0.0220)
Grandparents' health condition (1=both excellent/good)	-0.0319*	-0.0458**	-0.0322*	-0.0458**	-0.0348*	-0.0468**	-0.0320**	-0.0457**
	(0.0191)	(0.0191)	(0.0192)	(0.0192)	(0.0190)	(0.0191)	(0.0192)	(0.0192)
Mother's education years			-0.0389***	-0.0362**	-0.0379***	-0.0353**	-0.0372***	-0.0361**
			(0.0032)	(0.0035)	(0.0032)	(0.0035)	(0.0032)	(0.0035)
Female child (1=yes)	-0.0003	-0.0041	-0.0002	-0.00420	0.0012	0.0038	0.0014	0.0047
	(0.0156)	(0.0153)	(0.0156)	(0.0153)	(0.0156)	(0.0153)	(0.0156)	(0.0153)
Sibling number	0.0329**	0.0212	0.0269**	0.0225**	0.0262**	0.0226*	0.0267**	0.0226*
	(0.0133)	(0.0134)	(0.0128)	(0.0130)	(0.0128)	(0.0130)	(0.0128)	(0.0131)
Household annual income	-0.0531***	-0.0564***	-0.0545***	-0.0588**	-0.0542***	-0.0588***	-0.0545***	-0.0588***
	(0.0113)	(0.0116)	(0.0113)	(0.0116)	(0.0112)	(0.0115)	(0.0113)	(0.0116)
Owning refrigerator in household (1=yes)	-0.0598***	-0.0650***	-0.0618***	-0.0699***	-0.0866***	-0.0881***	-0.0689***	-0.0699***

	(0.0196)	(0.0203)	(0.0196)	(0.0202)	(0.0197)	(0.0203)	(0.0200)	(0.0206)
Ordinary annual wage for female worker in community	-0.0465***	-0.0120	-0.0452***	-0.0116	-0.0391***	-0.0113	-0.0462***	-0.0107
	(0.0127)	(0.0153)	(0.0127)	(0.0153)	(0.0127)	(0.0154)	(0.0127)	(0.0154)
Market in community (1=yes)	0.0141	0.0157	0.0167	0.0197	0.0133	0.0187	0.0155	0.0202
	(0.0171)	(0.0174)	(0.0170)	(0.0174)	(0.0170)	(0.0174)	(0.0170)	(0.0174)
Health service in village (1=yes)	0.0025	0.0118	0.00183	0.0121	0.0013	0.0115	0.0023	0.0099
	(0.0160)	(0.0160)	(0.0161)	(0.0160)	(0.0160)	(0.0160)	(0.0161)	(0.0160)
Mother's BMI					-0.0220***	-0.0248***		
					(0.0027)	(0.0027)		
Father's BMI					-0.0028	-0.0026		
					(0.0028)	(0.0028)		
Tap water in household							-0.0419**	-0.0423**
							(0.0174)	(0.0179)
Flush toilet in household							0.0501	0.0588
							(0.0506)	(0.0512)
Year effect	No	Yes	No	Yes	No	Yes	No	Yes
County effect	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2940	2940	2940	2940	2940	2940	2940	2940
R-squared/Pseudo R-squared	0.261	0.313	0.260	0.311	0.27	0.312	0.262	0.312

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

All income variables take logged value, in RMB. Mother's annual wage takes fitted value.

Table 6. 16 Sensitivity test 2, effect of maternal employment, parents' BMI and household infrastructure on child health development – underweight & 2SLS estimation

Dependent variable: underweight (1=yes)	2SLS							
	(1)		(2)		(3)		(4)	
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)		-0.0587*		-0.0602*		-0.0542*		-0.0577*
		（0.0309）		(0.0344)		(0.0306)		(0.0340)
Instrument - bus stop	0.0802***		0.0709***		0.0605***		0.0604***	
	(0.0143)		(0.0158)		(0.0139)		(0.0152)	
Instrument - road type	0.1470***		0.1610***		0.1390***		0.1470***	
	(0.0158)		(0.0159)		(0.0153)		(0.0153)	
Instrument - age of youngest child	-0.0299***		-0.0274***		-0.0260***		-0.0244***	
	(0.0045)		(0.0044)		(0.0045)		(0.0044)	
Age	-0.0119	0.0069	-0.0105	0.0086	-0.0083	0.0053	-0.0076	0.0079
	(0.0113)	(0.0089)	(0.0110)	(0.0089)	(0.0111)	(0.0090)	(0.0108)	(0.0089)
Age square	-0.0010	0.0008	-0.0009	0.0007	-0.0010	0.0008	-0.0009	0.0007
	(0.0010)	(0.0008)	(0.0009)	(0.0008)	(0.0009)	(0.0008)	(0.0009)	(0.0008)
Moher's age					0.0127***	0.0034	0.0117***	0.0032
					(0.0041)	(0.0041)	(0.0041)	(0.0038)
Mother's age square					-0.0002***	-0.0001	-0.0002***	-0.0001
					(0.0001)	(0.0001)	(0.0001)	(0.0001)
Co-resident with grandparents (1=yes)	0.0695***	0.0031	0.0587***	-0.0038	0.0272***	-0.0061**	0.0284***	-0.0040
	(0.0204)	(0.0182)	(0.0206)	(0.0180)	(0.0020)	(0.0031)	(0.0021)	(0.0032)
Grandparents' health condition (1=both good/excellent)	0.0351**	-0.0063	0.0501***	-0.0142	0.0671***	0.0040	0.0518***	-0.0027
	(0.0167)	(0.0159)	(0.0170)	(0.0158)	(0.0198)	(0.0186)	(0.0200)	(0.0181)
Mother's education years					0.0323*	-0.0390**	0.0347**	-0.0344**
					(0.0163)	(0.0157)	(0.0166)	(0.0156)
Female child (1=yes)	0.0113	0.0087	0.0138	0.0061	0.0104	0.0082	0.0118	0.0057

	(0.0141)	(0.0125)	(0.0137)	(0.0121)	(0.0136)	(0.0125)	(0.0133)	(0.0121)
Sibling number	-0.0121	0.0212*	0.0038	0.0102	-0.0167	0.0223**	-0.0026	0.0103
	(0.0116)	(0.0111)	(0.0117)	(0.0112)	(0.0115)	(0.0111)	(0.0118)	(0.0113)
Household income	-0.0619***	-0.0731***	-0.0609***	-0.0769***	-0.0423***	-0.0794***	-0.0427***	-0.0752***
	(0.0105)	(0.0097)	(0.0107)	(0.0098)	(0.0104)	(0.0092)	(0.0106)	(0.0094)
Owning refrigerator in household (1=yes)	-0.3990***	-0.0953***	0.4020***	-0.0891**	0.3360***	-0.0868**	0.3360***	-0.0856**
	(0.0233)	(0.0352)	(0.0238)	(0.0347)	(0.0237)	(0.0338)	(0.0239)	(0.0329)
Ordinary annual wage for female worker	-0.0256**	-0.0013	0.0215*	0.0124	-0.0391***	0.0022	0.0138	0.0134
	(0.0103)	(0.0095)	(0.0117)	(0.0114)	(0.0101)	(0.0099)	(0.0114)	(0.0114)
Market in village (1=yes)	0.0706***	0.0042	0.0655***	0.0067	0.0538***	0.0069	0.0549***	0.0068
	(0.0149)	(0.0155)	(0.0153)	(0.0153)	(0.0146)	(0.0151)	(0.0148)	(0.0152)
Health service in village (1=yes)	-0.0128	-0.0015	-0.0255*	0.0010	-0.0101	-0.0017	-0.0148	0.0008
	(0.0145)	(0.0128)	(0.0149)	(0.0128)	(0.0142)	(0.0128)	(0.0144)	(0.0127)
Mother's BMI								
Father's BMI								
Tap water in household								
Flush toilet in household								
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	2940		2940		2940		2940	
F statistics on instrument	92.23	/	60.93	/	109.83	/	72.93	/
R-squared	0.286	0.231	0.321	0.283	0.332	0.232	0.369	0.284
Sargan Test (p value in bracket)	2.55 （0.254）		2.68 （0.267）		2.35 （0.248）		2.47 （0.260）	

Notes: The same as Table 6.7.

Table 6. 17 Sensitivity test 2, effect of maternal employment, parents' BMI and household infrastructure on child health development – underweight & 2SLS estimation (continued)

Dependent variable: underweight (1=yes)	2SLS							
	(5)		(6)		(7)		(8)	
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)		-0.0654**		-0.0683**		-0.0500**		-0.0516**
		(0.0316)		(0.0317)		(0.0250)		(0.0257)
Instrument - bus stop	0.0636***		0.0595***		0.0457***		0.0467***	
	(0.0140)		(0.0152)		(0.0138)		(0.0152)	
Instrument - road type	0.1360***		0.144***		0.1240***		0.1310***	
	(0.0153)		(0.0153)		(0.0151)		(0.0150)	
Instrument - age of youngest child	-0.0250***		-0.0238***		-0.0256***		-0.0236***	
	(0.0045)		(0.0044)		(0.0044)		(0.0044)	
Age	-0.0072	0.0027	-0.0068	0.0061	-0.0091	0.0048	-0.0097	0.0067
	(0.0111)	(0.0091)	(0.0108)	(0.0090)	(0.0110)	(0.0090)	(0.0107)	(0.0089)
Age square	-0.0011	0.0011	-0.0009	0.0009	-0.0009	0.0008	-0.0007	0.0008
	(0.0010)	(0.0008)	(0.0009)	(0.0008)	(0.0009)	(0.0008)	(0.0009)	(0.0008)
Moher's age	0.0124***	0.0046	0.0114***	0.0039	0.0116***	0.0038	0.0105**	0.0032
	(0.0042)	(0.0041)	(0.0042)	(0.0039)	(0.0041)	(0.0041)	(0.0041)	(0.0038)
Mother's age square	-0.0002***	-0.0001	-0.0002***	-0.0001	-0.0002***	-0.0001	-0.0002***	-0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Coresident with grandparents (1=yes)	0.0269***	-0.0076**	0.0281***	-0.0054*	0.0255***	-0.0057*	0.0259***	-0.0044
	(0.0020)	(0.0031)	(0.0021)	(0.0032)	(0.0020)	(0.0031)	(0.0020)	(0.0032)
Grandparents' health condition (1=both good/excellent)	0.0685***	-0.0076	0.0524***	-0.0082	0.0583***	0.0048	0.0453**	-0.0028
	(0.0198)	(0.0185)	(0.0199)	(0.0181)	(0.0198)	(0.0184)	(0.0199)	(0.0181)
Mother's education years	-0.0162	-0.0116	-0.0341**	-0.0151	-0.0146	-0.0087	-0.0325**	-0.0144
	(0.0163)	(0.0156)	(0.0166)	(0.0155)	(0.0163)	(0.0156)	(0.0165)	(0.0156)
Female child (1=yes)	0.0113	0.0077	0.0128	0.0057	0.0104	0.0089	0.0128	0.0066
	(0.0136)	(0.0124)	(0.0132)	(0.0121)	(0.0135)	(0.0124)	(0.0131)	(0.0121)

Sibling number	-0.0162	0.0225**	-0.0028	0.0111	-0.0184	0.0206*	-0.0015	0.0108
	(0.0115)	(0.0110)	(0.0118)	(0.0112)	(0.0117)	(0.0111)	(0.0119)	(0.0113)
Household income	-0.0418***	-0.0714***	-0.0422***	-0.0768***	-0.0421***	-0.0768***	-0.0421***	-0.0747***
	(0.0104)	(0.0092)	(0.0106)	(0.0094)	(0.0104)	(0.0094)	(0.0105)	(0.0095)
Owning refrigerator in household (1=yes)	-0.3270***	-0.0843**	-0.3290***	-0.0833**	-0.3080***	-0.0821**	-0.3000***	-0.0800**
	(0.0240)	(0.0334)	(0.0241)	(0.0330)	(0.0240)	(0.0342)	(0.0241)	(0.0329)
Ordinary wage for female worker in	0.0412***	0.0124	0.0141	0.0136	0.0421***	-0.0022	0.0098	0.0117
	(0.0101)	(0.0099)	(0.0114)	(0.0113)	(0.0103)	(0.0102)	(0.0113)	(0.0114)
Market in village (1=yes)	0.0551***	-0.0023	0.0563***	0.0006	0.0508***	0.0073	0.0479***	0.0049
	(0.0146)	(0.0151)	(0.0148)	(0.0153)	(0.0146)	(0.0150)	(0.0148)	(0.0150)
Health service in village (1=yes)	-0.0103	-0.0016	-0.0140	-0.0002	-0.0055	0.0018	-0.0154	0.0025
	(0.0142)	(0.0126)	(0.0144)	(0.0127)	(0.0142)	(0.0127)	(0.0144)	(0.0128)
Mother's BMI	0.0023	-0.0158***	0.0027	-0.0114***				
	(0.0027)	(0.0022)	(0.0027)	(0.0022)				
Father's BMI	0.0071**	-0.0144***	0.0082***	-0.0094***				
	(0.0029)	(0.0023)	(0.0029)	(0.0024)				
Tap water in household					0.0240	-0.0393**	0.0220	-0.0388*
					(0.0150)	(0.0195)	(0.0150)	(0.0209)
Flush toilet in household					0.0601	-0.0297	0.0493	-0.0389
					(0.0428)	(0.0350)	(0.0415)	(0.0359)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	2940		2940		2940		2940	
F statistics on instrument	104.27	/	70.56	/	111.86	/	75.08	/
R-squared	0.330	0.251	0.363	0.294	0.345	0.243	0.381	0.287
Sargan Test (p value in bracket)	1.28 (0.358)		1.27 (0.359)		3.07 (0.216)		2.68 (0.267)	

Notes: The same as Table 6.7.

Table 6. 18 Sensitivity test 2, effect of maternal employment, parents' BMI and household infrastructure on child health development – underheight &2SLS estimation

Dependent variable: underheight (1=yes)	2SLS							
	(1)		(2)		(3)		(4)	
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)		-0.1440**		-0.1342*		-0.1705**		-0.1956**
		(0.0668)		(0.0601)		(0.0874)		(0.0949)
Instrument - bus stop	0.0802***		0.0709***		0.0605***		0.0604***	
	(0.0143)		(0.0158)		(0.0139)		(0.0152)	
Instrument - road type	0.1470***		0.1610***		0.1390***		0.1470***	
	(0.0158)		(0.0159)		(0.0153)		(0.0153)	
Instrument - age of youngest child	-0.0299***		-0.0274***		-0.0260***		-0.0244***	
	(0.0045)		(0.0044)		(0.0045)		(0.0044)	
Age	-0.0119	0.0019	-0.0105	0.0086	-0.0083	0.0006	-0.0076	0.0029
	(0.0113)	(0.0128)	(0.0110)	(0.0089)	(0.0111)	(0.0128)	(0.0108)	(0.0127)
Age square	-0.0010	-0.0013	-0.0009	0.0007	-0.0010	-0.0012	-0.0009	-0.0013
	(0.0010)	(0.0011)	(0.0009)	(0.0008)	(0.0009)	(0.0011)	(0.0009)	(0.0011)
Moher's age					0.0127***	-0.0004	0.0117***	-0.0007
					(0.0041)	(0.007)	(0.0041)	(0.0067)
Mother's age square					-0.0002***	0.0001	-0.0002***	0.0001
					(0.0001)	(0.0001)	(0.0001)	(0.0001)
Co-resident with grandparents (1=yes)	0.0695***	0.0207	0.0587***	-0.0038	0.0272***	-0.0079**	0.0284***	-0.0037
	(0.0204)	(0.0234)	(0.0206)	(0.0180)	(0.0020)	(0.0037)	(0.0021)	(0.0037)
Grandparents' health condition (1=both excellent/good)	0.0351**	-0.0286	0.0501***	-0.0142	0.0671***	0.0192	0.0518***	0.0038
	(0.0167)	(0.0193)	(0.0170)	(0.0158)	(0.0198)	(0.0236)	(0.0200)	(0.0229)
Mother's education years					0.0473***	-0.0323*	0.0347**	-0.0483**
					(0.0163)	(0.0192)	(0.0166)	(0.0194)
Female child (1=yes)	0.0113	0.0006	0.0138	0.0061	0.0104	0.0003	0.0118	-0.0039
	(0.0141)	(0.0157)	(0.0137)	(0.0121)	(0.0136)	(0.0156)	(0.0133)	(0.0153)

Sibling number	-0.0121	0.0309**	0.0038	0.0102	-0.0167	0.0326**	-0.0026	0.0202
	(0.0116)	(0.0134)	(0.0117)	(0.0112)	(0.0115)	(0.0133)	(0.0118)	(0.0134)
Household income	-0.0619***	-0.0747***	-0.0609***	-0.0769***	-0.0423***	-0.0714***	-0.0427***	-0.0724***
	(0.0105)	(0.0128)	(0.0107)	(0.0098)	(0.0104)	(0.0123)	(0.0106)	(0.0125)
Owning refrigerator in household (1=yes)	-0.3990***	-0.0909***	-0.4020***	-0.0991***	-0.3360***	-0.0988**	-0.3360***	0.0906**
	(0.0233)	(0.0334)	(0.0238)	(0.0347)	(0.0237)	(0.0417)	(0.0239)	(0.0406)
Ordinary annual wage for female worker in	0.0256**	-0.0538***	0.0215*	0.0124	0.0391***	-0.0490***	0.0138	-0.0126
	(0.0103)	(0.0127)	(0.0117)	(0.0114)	(0.0101)	(0.0131)	(0.0114)	(0.0156)
Market in village (1=yes)	0.0706***	0.0133	0.0655***	0.0067	0.0538***	0.0150	0.0549***	0.0209
	(0.0149)	(0.0193)	(0.0153)	(0.0153)	(0.0146)	(0.0188)	(0.0148)	(0.0190)
Health service in village (1=yes)	-0.0128	0.0028	-0.0255*	0.0010	-0.0101	0.0028	-0.0148	0.0119
	(0.0145)	(0.0161)	(0.0149)	(0.0128)	(0.0142)	(0.0161)	(0.0144)	(0.0161)
Mother's BMI								
Father's BMI								
Tap water in household								
Flush toliet in household								
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	2,940		2,940		2,940		2,940	
F statistics on instrument	92.23	/	60.93	/	104.27	/	70.56	/
R-squared	0.286	0.054	0.321	0.083	0.332	0.26	0.369	0.309
Sargan Test (p value in bracket)	1.82 (0.288)		1.65 (0.301)		1.68 (0.326)		1.34 (0.349)	

Notes: The same as Table 6.7.

Table 6. 19 Sensitivity test 2, effect of maternal employment, parents' BMI and household infrastructure on child health development – underheight &2SLS estimation (continued)

Dependent variable: underheight (1=yes)	2SLS							
	(5)		(6)		(7)		(8)	
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)		-0.1642**		-0.1741**		-0.1400*		-0.1470**
		(0.0788)		(0.0874)		(0.0710)		(0.0727)
Instrument - bus stop	0.0636***		0.0595***		0.0457***		0.0467***	
	(0.0140)		(0.0152)		(0.0138)		(0.0152)	
Instrument - road type	0.1360***		0.1440***		0.124***		0.131***	
	(0.0153)		(0.0153)		(0.0151)		(0.0150)	
Instrument - age of youngest child	-0.0250***		-0.0238***		-0.0256***		-0.0236***	
	(0.0045)		(0.0044)		(0.0044)		(0.0044)	
Age	-0.0072	-0.0013	-0.0068	0.0022	-0.0091	0.0009	-0.0097	0.0030
	(0.0111)	(0.0128)	(0.0108)	(0.0127)	(0.0110)	(0.0128)	(0.0107)	(0.0126)
Age square	-0.0011	-0.0010	-0.0009	-0.0012	-0.0009	-0.0012	-0.0007	-0.0013
	(0.0009)	(0.0011)	(0.0009)	(0.0011)	(0.0009)	(0.0011)	(0.0009)	(0.0011)
Moher's age	0.0124***	0.0006	0.0114***	-0.0003	0.0116***	-0.0005	0.0105**	-0.0011
	(0.0042)	(0.0065)	(0.0042)	(0.0066)	(0.0041)	(0.0066)	(0.0041)	(0.0067)
Mother's age square	-0.0002***	0.0001	-0.0002***	0.0001	-0.0002***	0.0001	-0.0002***	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Co-resident with grandparents (1=yes)	0.0269***	-0.0089**	0.0281***	-0.0042	0.0255***	-0.0076**	0.0259***	-0.0041
	(0.0020)	(0.0037)	(0.0021)	(0.0038)	(0.0020)	(0.0038)	(0.0020)	(0.0038)
Grandparents' health condition (1=both excellent/good)	0.0685***	0.0109	0.0524***	0.0017	0.0583***	0.0171	0.0453**	0.0014
	(0.0198)	(0.0236)	(0.0199)	(0.0230)	(0.0198)	(0.0236)	(0.0199)	(0.0229)
Mother's education years	0.0462***	-0.0343*	0.0341**	-0.0487**	0.0446***	-0.0413**	-0.0325**	-0.0476**
	(0.0163)	(0.0190)	(0.0166)	(0.0194)	(0.0163)	(0.0192)	(0.0165)	(0.0194)
Female child (1=yes)	0.0113	0.0002	0.0128	-0.0034	0.0104	0.0002	0.0128	-0.0043
	(0.0136)	(0.0156)	(0.0132)	(0.0153)	(0.0135)	(0.0156)	(0.0131)	(0.0153)

Sibling number	-0.0162	0.0328**	-0.0028	0.0205	-0.0184	0.0317**	-0.0015	0.0205
	(0.0115)	(0.0132)	(0.0118)	(0.0134)	(0.0117)	(0.0134)	(0.0119)	(0.0134)
Household income	-0.0418***	-0.0327***	-0.0422***	-0.0230*	-0.0421***	-0.0302**	-0.0421***	-0.0230*
	(0.0104)	(0.0122)	(0.0106)	(0.0125)	(0.0104)	(0.0125)	(0.0105)	(0.0126)
Owning refrigerator in household (1=yes)	-0.3270***	-0.0958**	-0.3290***	-0.0972**	-0.3080***	-0.0985**	-0.3000***	-0.0938**
	(0.0240)	(0.0410)	(0.0241)	(0.0407)	(0.0240)	(0.0423)	(0.0241)	(0.0406)
Ordinary annual wage for female worker	0.0412***	-0.0415***	0.0141	-0.0122	0.0421***	-0.0512***	0.0098	-0.0125
	(0.0101)	(0.0132)	(0.0114)	(0.0156)	(0.0103)	(0.0133)	(0.0113)	(0.0156)
Market in village (1=yes)	0.0551***	0.0087	0.0563***	0.0188	0.0508***	0.0154	0.0479***	0.0197
	(0.0146)	(0.0189)	(0.0148)	(0.0192)	(0.0146)	(0.0189)	(0.0148)	(0.0189)
Health service in village (1=yes)	-0.0103	0.0028	-0.0140	0.0116	-0.0055	0.0035	-0.0154	0.0103
	(0.0142)	(0.0160)	(0.0144)	(0.0161)	(0.0142)	(0.0161)	(0.0144)	(0.0161)
Mother's BMI	0.0023	-0.0123***	0.0027	-0.0147***				
	(0.0027)	(0.0027)	(0.0027)	(0.0028)				
Father's BMI	0.0071**	-0.0097***	0.0082***	-0.0096***				
	(0.0029)	(0.0029)	(0.0029)	(0.0030)				
Tap water in household					0.0220	-0.0503**	0.0220	-0.0532**
					(0.0150)	(0.0234)	(0.0150)	(0.0248)
Flush toilet in household					0.0601	0.0440	0.0493	0.0518
					(0.0428)	(0.0515)	(0.0415)	(0.0519)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	2,940		2,940		2,940		2,940	
F statistics on instrument	111.86	/	75.08	/	114.22	/	75.24	/
R-squared	0.334	0.271	0.371	0.312	0.349	0.26	0.389	0.311
Sargan Test (p value in bracket)	2.59 (0.215)		1.78 (0.304)		1.44 (0.328)		2.64 (0.205)	

Notes: The same as Table 6.7.

Table 6. 20 Sensitivity test 3, effect of maternal employment and food making time on children's health development - underweight, 2SLS & OLS estimation

Dependent variable: underweight(1=yes)	(1)		(2)		(3)	(4)
Explanatory variables	2SLS				OLS	
Maternal employment (1=yes)		-0.0697**		-0.0809**		
		(0.0302)		(0.0371)		
Mother's food making time					-0.0260***	-0.0246***
					(0.0025)	(0.0027)
Grandparent's food making time * co-resident with grandparents					-0.0021	-0.0027
					(0.0031)	(0.0031)
Instrument - bus stop	0.0854***		0.0697***			
	(0.0128)		(0.0143)			
Instrument - road type	0.1160***		0.1310***			
	(0.0138)		(0.0140)			
Instrument - age of youngest child	-0.0277***		-0.0252***			
	(0.0038)		(0.0037)			
Age	0.0059	0.0050	0.0063	0.0066	0.0033	0.0036
	(0.0098)	(0.0078)	(0.0096)	(0.0078)	(0.0074)	(0.0074)
Age square	-0.0023***	0.0006	-0.0022***	0.0005	0.0008	0.0008
	(0.0009)	(0.0007)	(0.0008)	(0.0007)	(0.0007)	(0.0007)
Left behind children (1=yes)	-0.0208	0.0870***	-0.0156	0.0896***	0.0905***	0.0939***
	(0.0492)	(0.0278)	(0.0487)	(0.0290)	(0.0272)	(0.0281)
Co-resident with grandparents (1=yes)	0.1290***	-0.0053	0.1090***	0.0078	-0.0142	-0.0050
	(0.0247)	(0.0211)	(0.0242)	(0.0203)	(0.0189)	(0.0188)
Left behind child * Co-resident with grandparents	0.0169	0.1030	0.0443	0.0972	0.1050	0.0988
	(0.1420)	(0.0876)	(0.1420)	(0.0930)	(0.0884)	(0.0935)

Grandparents' health condition (1=both excellent/good)	0.0479***	0.0069	0.0580***	-0.0077	-0.0114	-0.0006
	(0.0162)	(0.0148)	(0.0166)	(0.0149)	(0.0147)	(0.0147)
Female child (1=yes)	0.0017	0.0189*	0.0031	0.0137	0.0179*	0.0134
	(0.0125)	(0.0108)	(0.0123)	(0.0105)	(0.0107)	(0.0104)
Sibling number	-0.0356***	0.0074	-0.0193*	-0.0063	0.0090	-0.0043
	(0.0110)	(0.0103)	(0.0109)	(0.0101)	(0.0101)	(0.0101)
Household total annual income	-0.0617***	-0.0666***	-0.0583***	-0.0641***	-0.0491***	-0.0490***
	(0.0080)	(0.0074)	(0.0080)	(0.0072)	(0.0059)	(0.0060)
Owning refrigerator in household (1=yes)	-0.3260***	-0.0650**	-0.3320***	-0.0617**	-0.0820***	-0.0642***
	(0.0208)	(0.0283)	(0.0212)	(0.0289)	(0.0108)	(0.0110)
Ordinary annual wage for female worker in community	0.0246***	-0.0160**	0.0257**	0.0022	-0.0155*	0.0014
	(0.0093)	(0.0081)	(0.0111)	(0.0105)	(0.0079)	(0.0100)
Market in village (1=yes)	0.0554***	0.0057	0.0539***	0.0141	0.0035	0.0079
	(0.0134)	(0.0135)	(0.0136)	(0.0134)	(0.0113)	(0.0115)
Health service in village (1=yes)	0.0217*	0.0029	0.0223*	0.0058	0.0033	0.0082
	(0.0130)	(0.0109)	(0.0131)	(0.0110)	(0.0107)	(0.0108)
Year effect	No	No	Yes	Yes	No	Yes
County effect	No	No	Yes	Yes	No	Yes
Observations	3733		3733		3733	3733
F statistics on instrument	91.86	/	60.58	/	/	/
R-squared/Pseudo R-squared	0.233	0.232	0.276	0.281	0.231	0.283

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Income variables (household income and Ordinary annual wage for female worker in community) take logged value, in RMB.

Instruments are access to bus stop (1=yes), paved road (1=yes) and age of youngest child.

Table 6. 21 Sensitivity test 3, effect of maternal employment and food making time on children's health development - underheight, 2SLS & OLS estimation

Dependent variable: underheight(1=yes)	(1)		(2)		(3)	(4)
Explanatory variables	2SLS				OLS	
Maternal employment (1=yes)		-0.1670*		-0.1540*		
		(0.0859)		(0.0861)		
Mother's food making time					-0.0560***	-0.0546***
					(0.0026)	(0.0027)
Grandparent's food making time * co-resident with grandparents					-0.0021	-0.0027
					(0.0031)	(0.0031)
Instrument - bus stop	0.0854***		0.0697***			
	(0.0128)		(0.0143)			
Instrument - road type	0.1160***		0.1310***			
	(0.0138)		(0.0140)			
Instrument - age of youngest child	-0.0277***		-0.0252***			
	(0.0038)		(0.004)			
Age	0.0059	0.0115	0.0063	0.0114	0.0033	0.0036
	(0.0098)	(0.0107)	(0.0096)	(0.0105)	(0.0074)	(0.0074)
Age square	-0.0023***	-0.0019**	-0.0022***	-0.0019**	0.0008	0.0008
	(0.0009)	(0.0010)	(0.0008)	(0.0009)	(0.0007)	(0.0007)
Left behind children	-0.0208	0.1240***	-0.0156	0.1590***	0.0905***	0.0939***
	(0.0492)	(0.0408)	(0.0487)	(0.0428)	(0.0272)	(0.0281)
Co-resident with grandparents	0.1290***	-0.0146	0.1090***	-0.0117	-0.0142	-0.0050
	(0.0247)	(0.0265)	(0.0242)	(0.0254)	(0.0189)	(0.0188)
Left behind child * Co-resident with grandparents	0.0169	-0.0324	0.0443	-0.0153	0.1050	0.0988
	(0.1420)	(0.0552)	(0.1420)	(0.0649)	(0.0884)	(0.0935)

Grandparents' health condition (1=both excellent/good)	0.0479***	0.0074	0.0580***	-0.0120	0.0114	0.0006
	(0.0162)	(0.0188)	(0.0166)	(0.0191)	(0.0147)	(0.0147)
Female child (1=yes)	0.0017	-0.0025	0.0031	-0.0092	0.0149	0.0134
	(0.0125)	(0.0136)	(0.0123)	(0.0132)	(0.0107)	(0.0104)
Sibling number	-0.0356***	0.0332***	-0.0193*	0.0209*	0.0090	0.0043
	(0.0110)	(0.0127)	(0.0109)	(0.0124)	(0.0101)	(0.0101)
Household total annual income	-0.0617***	-0.0722***	-0.0583***	-0.0785***	-0.0709***	-0.0750***
	(0.0080)	(0.0099)	(0.0080)	(0.0094)	(0.0089)	(0.0089)
Owning refrigerator in household (1=yes)	-0.3260***	-0.0769***	-0.3320***	-0.0794***	-0.0820***	-0.0842***
	(0.0208)	(0.0156)	(0.0212)	(0.0160)	(0.0108)	(0.0110)
Ordinary annual wage for female worker in community	0.0246***	-0.0613***	0.0257**	-0.0209	-0.0165**	-0.0214**
	(0.0093)	(0.0107)	(0.0111)	(0.0140)	(0.0079)	(0.0100)
Market in village (1=yes)	0.0554***	0.0184	0.0539***	-0.0321*	0.0035	0.0079
	(0.0134)	(0.0165)	(0.0136)	(0.0167)	(0.0113)	(0.0115)
Health service in village (1=yes)	0.0217*	0.0020	0.0223*	0.0155	0.0033	0.0082
	(0.0130)	(0.0140)	(0.0131)	(0.0138)	(0.0107)	(0.0108)
Year effect	No	No	Yes	Yes	No	Yes
County effect	No	No	Yes	Yes	No	Yes
Observations	3733		3733		3733	3733
F statistics on instrument	91.86	/	60.58	/	/	/
R-squared/Pseudo R-squared	0.233	0.251	0.276	0.112	0.231	0.283

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Mother's annual income takes fitted value and household other income excludes mother's income. All income variables take logged value,

Instruments are access to bus stop (1=yes), paved road (1=yes) and age of youngest child.

7. Conclusion

The OCP, a unique population growth control experiment in China, has provided a good foundation for research on fertility and female labour force participation. Starting from this point, three chapters using CHNS data are included in this thesis to investigate how fertility and grandparents' childcare can influence mothers' labour force participation and how mothers' labour supply can influence children's health development.

When modelling the relationship between fertility and female labour force participation, one fundamental issue is the endogeneity of fertility, either due to an omitted variable, such as attitude, or a simultaneous influence on both female labour force participation and fertility. This feature also applies to grandparents' childcare when modelling the effect of grandparents' childcare on mothers' labour force participation, and maternal employment when modelling the effect of maternal employment on children's health development.

For each endogenous variable, I have employed different instruments to represent them in the estimations, and all the instruments are strong and effective. In general, the research in this thesis has shown that women will reduce their labour supply when they have more children, but mothers will increase their labour supply if they can receive childcare support from grandparents. In particular, women in rural areas are more vulnerable than women in urban areas, in that they have lower possibility of returning to the labour market if they have more children. I also found evidence of mothers' employment having a positive effect on children's health, in that children

will be less likely to be underweight and/or underheight if their mothers take on off-farm work.

The main contribution of this thesis is it is among the first to investigate female labour force participation in China from the perspective of the OCP and to investigate how maternal employment could impact on children's health development in rural China. Instruments used in this thesis are the second contribution, in that they open up new channels representing endogenous variables and result in more precise results from the estimations.

The main limitation of this thesis is that migrant women are not identified in Chapters 4 and 5, and left-behind children are excluded in Chapter 6. That means that future work is needed to explore the more specific effects of migrant mothers' labour force participation and left-behind children's health development.

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Appendix

A. Matching mothers and children

Basically, mothers and children are matched based on two inter-household links in the CHNS data, one is the relationship to the household head from the individual survey and the other is mother's line number from the child survey. Children were asked three questions about their mothers: (i) does your mother live in this household, (ii) what is your mother's name, which will be recorded as line number in the data, and (iii) what is the relationship with your mother. For the last question, three options are available for children to choose, (i) biological mother; (ii) step-mother; and (iii) adopted mother.

The strategy is to created identical ID numbers for mother and children so that biological mother and children would be blocked together. However, the trick is that not all the households have clear record of household relationship, for example, some households change their household head because the previous one passed away. This household alteration usually happens in rural households in the data and most of the rural households have a big family which means the relationship to household head is complicated after the household head alteration.

Therefore, the first step is to clean and restore the household relationship that has been recorded the first time. Then, for those households with only two generations, I can simply use the household relationship to identify mothers and children and further count the number of children the households have. For those households with three or

even more generations, I can only identify mothers and children in the presence of linkage between mothers and children.

One problem related to this matching process is that in some households, it is possible to have the case of absence of child(ren). That is to say, in the first wave, the data contains information of one child but in the next wave, this child is not recorded. The consequences of the absence of child(ren) is that it can lead to a misleading fertility number obtained from this strategy. The solution is to use the maximum number of children counted for a mother.

B. Effect of household structure on female labour force participation - OLS estimation, whole sample

Explanatory variables	(1)	(2)	(3)	(4)
Age	0.0413***	0.0428***	0.0459***	0.0430***
	(0.0082)	(0.0080)	(0.0081)	(0.0080)
Age2	-0.0006***	-0.0006***	-0.0007***	-0.0006***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Household structure				
basecase: no child				
number of child under 3	-0.0635***	-0.0839***	-0.0802***	-0.0848***
	(0.0180)	(0.0175)	(0.0180)	(0.0175)
number of child under 6	-0.0183*	-0.0180*	-0.0177*	-0.0175*
	(0.0114)	(0.0114)	(0.0114)	(0.0113)
number of child under 12	-0.0209**	-0.0234**	-0.0212**	-0.0266**
	(0.0105)	(0.0116)	(0.0104)	(0.0116)
number of child under 16	0.0177	0.0193	0.0187	0.0197
	(0.0144)	(0.0144)	(0.0143)	(0.0144)
Education categories				
Base case: primary or less				
Lower middle school	0.0123	0.0223	0.0229	0.0213
	(0.0149)	(0.0146)	(0.0147)	(0.0146)
Upper middle school	0.0459***	0.0668***	0.0580***	0.0691***
	(0.0151)	(0.0149)	(0.0151)	(0.0150)
College or more	0.1328***	0.1392***	0.1329***	0.1397***
	(0.0157)	(0.0154)	(0.0155)	(0.0154)
Health condition (good/ excellent)	0.0746***	0.0706***	0.0762***	0.0705***
	(0.0084)	(0.0157)	(0.0082)	(0.0157)
Ethnic minority	-0.0241*	-0.0253*	-0.0257*	-0.0247*
	(0.0150)	(0.0155)	(0.0149)	(0.0155)
Non-agriculture registration	0.0709**	0.0693**	0.0702**	0.0698**
	(0.0310)	(0.0310)	(0.0310)	(0.0310)
Co-resident with adult children	-0.0399**	-0.0402**	-0.0405**	-0.0410**
	(0.0199)	(0.0201)	(0.0205)	(0.0206)
Co-resident with elderly parents	0.0541*	0.0572*	0.0567*	0.0574*
	(0.0300)	(0.0308)	(0.0302)	(0.0309)
Women's annual wage	0.0977***	0.1110***	0.1095***	0.1250***
	(0.0238)	(0.0241)	(0.0238)	(0.0240)
Women's other income	-0.1281***	-0.1233***	-0.1293***	-0.1234***
	(0.0023)	(0.0026)	(0.0025)	(0.0026)
Husband's income			-0.0476***	-0.0405***
			(0.0046)	(0.0067)
Constant	-0.4309**	-0.9400***	-0.4214**	-0.9772***
	(0.2040)	(0.2050)	(0.2040)	(0.2160)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	5029	5029	5029	5029
R-squared	0.318	0.362	0.335	0.364

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Women's annual income takes fitted value. All income variables take logged value and in RMB.

C. Effect of household structure on female labour force participation - probit estimation, whole sample

Explanatory variables	(1)	(2)	(3)	(4)
Age	0.0482***	0.0640***	0.0631***	0.0660***
	(0.0125)	(0.0178)	(0.0175)	(0.0197)
Age2	-0.0007***	-0.0009***	-0.0009***	-0.0010***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Household structure				
basecase: no child				
number of child under 3	-0.0863***	-0.150***	-0.128***	-0.156***
	(0.0277)	(0.0389)	(0.0399)	(0.0474)
number of child under 6	-0.0195*	-0.0181*	-0.0185*	-0.0174*
	(0.0115)	(0.0117)	(0.0116)	(0.0119)
number of child under 12	-0.0214**	-0.0244**	-0.0227**	-0.0243**
	(0.0106)	(0.0123)	(0.0108)	(0.0125)
number of child under 16	0.0176	0.0182	0.0181	0.0191
	(0.0157)	(0.0153)	(0.0155)	(0.0156)
Education categories				
basecase: primary or less				
lower middle school	0.0318	0.0358	0.0426	0.0462
	(0.0269)	(0.0380)	(0.0340)	(0.0409)
upper middle school	0.0483***	0.0651***	0.0437***	0.0661***
	(0.0182)	(0.0233)	(0.0133)	(0.0234)
College or more	0.1338**	0.1383**	0.1361***	0.1435**
	(0.0281)	(0.0341)	(0.0330)	(0.0374)
health condition (good/ excellent)	0.0735***	0.0757**	0.0754***	0.0782**
	(0.0264)	(0.0400)	(0.0313)	(0.0440)
Ethnic minority	-0.0405*	-0.0530*	-0.0571**	-0.0572*
	(0.0253)	(0.0297)	(0.0302)	(0.0316)
Non-agriculture registration	0.0685**	0.0645**	0.0655**	0.0649**
	(0.0282)	(0.0288)	(0.0301)	(0.0310)
Co-resident with adult children	-0.0329*	-0.0340*	-0.0390*	-0.0400*
	(0.0189)	(0.0199)	(0.0220)	(0.0225)
Co-resident with elderly parents	0.0512*	0.0525*	0.0545*	0.0557*
	(0.0310)	(0.0320)	(0.0325)	(0.0329)
Women's annual wage	0.0915***	0.1174***	0.0916***	0.1200***
	(0.0205)	(0.0290)	(0.0235)	(0.0302)
Women's other income	-0.1102***	-0.1139***	-0.1279***	-0.1226**
	(0.0270)	(0.0279)	(0.0235)	(0.0254)
Husband's income			-0.0504***	-0.0526***
			(0.0144)	(0.0184)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	5029	5029	5029	5029
Pseudo R-squared	0.300	0.378	0.335	0.382

Notes: Marginal effects are reported. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Women's annual income takes fitted value. All income variables take logged value and in RMB.

D. Effect of household structure on female labour force participation - OLS estimation, urban areas

Explanatory variables	(1)	(2)	(3)	(4)
Age	0.0299**	0.0357***	0.0300**	0.0356***
	(0.0123)	(0.0116)	(0.0123)	(0.0116)
Age2	-0.0004**	-0.0004***	-0.0004**	-0.0004***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Household structure				
Base case: no child				
number of child under 3	-0.0617*	-0.0685**	-0.0619*	-0.0678**
	(0.0355)	(0.0328)	(0.0353)	(0.0328)
number of child under 6	-0.0033	-0.0049	-0.0012	-0.0052
	(0.0277)	(0.0267)	(0.0276)	(0.0267)
number of child under 12	-0.0489**	-0.0470**	-0.0508**	-0.0465**
	(0.0240)	(0.0229)	(0.0238)	(0.0229)
number of child under 16	0.0238	0.0256	0.0228	0.0248
	(0.0248)	(0.0255)	(0.0367)	(0.0256)
Education categories				
Base case: primary or less				
Lower middle school	0.0054	0.0288	0.0082	0.0283
	(0.0258)	(0.0249)	(0.0257)	(0.0249)
Upper middle school	0.0373	0.0801***	0.0345	0.0796***
	(0.0271)	(0.0260)	(0.0269)	(0.0260)
College or more	0.1600***	0.2061***	0.1578***	0.2056***
	(0.0258)	(0.0260)	(0.0255)	(0.0259)
Health condition (good/ excellent)	0.0626***	0.0748***	0.0689***	0.0749***
	(0.0145)	(0.0217)	(0.0146)	(0.0217)
Ethnic minority	-0.0214	-0.0268	-0.0241	-0.0271
	(0.0325)	(0.0328)	(0.0324)	(0.0328)
Non-agriculture registration	0.0773***	0.0654***	0.0747***	0.0655***
	(0.0255)	(0.0249)	(0.0256)	(0.0249)
Co-resident with adult children	-0.0410	-0.0419	-0.0408	-0.0412
	(0.0293)	(0.0281)	(0.0292)	(0.0282)
Co-resident with elderly parents	0.0363**	0.0494***	0.0406**	0.0493***
	(0.0174)	(0.0181)	(0.0175)	(0.0181)
Women's annual wage	0.0972***	0.0989***	0.0936***	0.0927***
	(0.0088)	(0.0115)	(0.0077)	(0.0101)
Women's other income	-0.1001***	-0.1002***	-0.1001***	-0.1002***
	(0.0020)	(0.0019)	(0.0020)	(0.0019)
Husband's income			-0.0408***	-0.0466***
			(0.0106)	(0.0115)
Constant	0.3931	-0.5583**	0.4922*	-0.5255*
	(0.2530)	(0.2522)	(0.2611)	(0.2716)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	2411	2411	2411	2411
R-squared	0.283	0.384	0.288	0.384

Notes: The same as Appendix B.

E. Effect of household structure on female labour force participation - probit estimation, urban areas

Explanatory variables	(1)	(2)	(3)	(4)
Age	0.0289***	0.0399***	0.0296***	0.0408***
	(0.0096)	(0.0089)	(0.0096)	(0.0066)
Age2	-0.0004***	-0.0005***	-0.0004***	-0.0005***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Household structure				
Base case: no child				
number of child under 3	-0.0613**	-0.0653**	-0.0585*	-0.0656**
	(0.0310)	(0.0281)	(0.0311)	(0.0286)
number of child under 6	0.0060	0.0029	0.0061	0.0066
	(0.0277)	(0.0262)	(0.0277)	(0.0174)
number of child under 12	-0.0433**	-0.0447**	-0.0448**	-0.0539**
	(0.0205)	(0.0190)	(0.0205)	(0.0191)
number of child under 16	0.0276	0.0246	0.0273	0.0261
	(0.0260)	(0.0256)	(0.0260)	(0.0251)
Education categories				
Base case: primary or less				
lower middle school	0.0037	0.0219	0.0071	0.0287
	(0.0196)	(0.0181)	(0.0195)	(0.0135)
upper middle school	0.0328	0.0620***	0.0295	0.0686***
	(0.0220)	(0.0204)	(0.0219)	(0.0154)
College or more	0.2111***	0.2348***	0.2052***	0.2654***
	(0.0298)	(0.0271)	(0.0294)	(0.0220)
health condition (good/ excellent)	0.0676***	0.0659**	0.0654***	0.0693**
	(0.0164)	(0.0264)	(0.0164)	(0.0221)
Ethnic minority	-0.0246	-0.0162	-0.0264	-0.0154
	(0.0300)	(0.0312)	(0.0300)	(0.0321)
Non-agriculture registration	0.0525***	0.0399**	0.0510***	0.0356**
	(0.0182)	(0.0177)	(0.0183)	(0.0178)
Co-resident with adult children	-0.0366	-0.0367	-0.0353	-0.0345
	(0.0246)	(0.0250)	(0.0245)	(0.0273)
Co-resident with elderly parents	0.0342*	0.0432**	0.0378*	0.0376*
	(0.0183)	(0.0181)	(0.0184)	(0.0133)
Women's annual wage	0.0917***	0.0901***	0.0964***	0.0975***
	(0.0089)	(0.0097)	(0.0079)	(0.0064)
Women's other income	-0.1000***	-0.1000***	-0.1002***	-0.1002***
	(0.0018)	(0.0017)	(0.0018)	(0.0013)
Husband's income			-0.0378***	-0.0484***
			(0.0097)	(0.0067)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	2411	2411	2411	2411
Pseudo R-squared	0.233	0.315	0.234	0.357

Notes: The same as Appendix C.

F. Effect of household structure on female labour force participation - OLS estimation, rural areas

Explanatory variables	(1)	(2)	(3)	(4)
Age	0.0558***	0.0539***	0.0578***	0.0551***
	(0.0125)	(0.0126)	(0.0125)	(0.0125)
Age2	-0.0007***	-0.0007***	-0.0008***	-0.0007***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Household structure				
Base case: no child				
number of child under 3	-0.1464***	-0.1651***	-0.1474***	-0.1645***
	(0.0307)	(0.0308)	(0.0307)	(0.0308)
number of child under 6	-0.0452**	-0.0506**	-0.0473**	-0.0502**
	(0.0209)	(0.0220)	(0.0209)	(0.0220)
number of child under 12	-0.0325	-0.0359	-0.0352	-0.0656
	(0.0296)	(0.0300)	(0.0297)	(0.0300)
number of child under 16	0.0408	0.0479	0.0424	0.0471
	(0.0306)	(0.0307)	(0.0307)	(0.0307)
Education categories				
Base case: primary or less				
lower middle school	0.0207	0.0363	0.0233	0.0356
	(0.0223)	(0.0225)	(0.0223)	(0.0225)
upper middle school	0.0588**	0.0742***	0.0597**	0.0750***
	(0.0249)	(0.0247)	(0.0249)	(0.0248)
College or more	0.1748***	0.2382***	0.1770***	0.2394***
	(0.0266)	(0.0289)	(0.0265)	(0.0289)
health condition (good/ excellent)	0.0824***	0.0774**	0.0785***	0.0767**
	(0.0165)	(0.0384)	(0.0166)	(0.0384)
Ethnic minority	-0.0227	-0.0175	-0.0264	-0.0184
	(0.0252)	(0.0267)	(0.0252)	(0.0268)
Non-agriculture registration	0.0543***	0.0559***	0.0543***	0.0577***
	(0.0181)	(0.0180)	(0.0181)	(0.0179)
Co-resident with adult children	-0.0658**	-0.0532**	-0.0632**	-0.0512*
	(0.0272)	(0.0269)	(0.0271)	(0.0269)
Co-resident with elderly parents	0.0249	0.0241	0.0267	0.0232
	(0.0175)	(0.0182)	(0.0174)	(0.0182)
Women's annual wage	0.0819***	0.0891***	0.0847***	0.0888***
	(0.0088)	(0.0100)	(0.0081)	(0.0093)
Women's other income	-0.1320***	-0.1301***	-0.1318***	-0.1311***
	(0.0024)	(0.0024)	(0.0024)	(0.0024)
Husband's income			-0.0333***	-0.0255**
			(0.0099)	(0.0107)
Constant	-0.0310	-0.307	0.0272	-0.2137
	(0.2363)	(0.2443)	(0.2382)	(0.2523)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	2618	2618	2618	2618
R-squared	0.272	0.313	0.276	0.315

Notes: The same as Appendix B.

G. Effect of household structure on female labour force participation - probit estimation, rural areas

Explanatory variables	(1)	(2)	(3)	(4)
Age	0.0463***	0.0479***	0.0479***	0.0486***
	(0.0099)	(0.0099)	(0.0099)	(0.0099)
Age2	-0.0006***	-0.0006***	-0.0006***	-0.0006***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Household structure				
Base case: no child				
number of child under 3	-0.1382***	-0.1568***	-0.1382***	-0.1560***
	(0.0252)	(0.0254)	(0.0252)	(0.0254)
number of child under 6	-0.0462**	-0.0435**	-0.0476**	-0.0432**
	(0.0208)	(0.0201)	(0.0208)	(0.0201)
number of child under 12	-0.0314	-0.0326	-0.0318	-0.0332
	(0.0280)	(0.0283)	(0.0280)	(0.0282)
number of child under 16	0.0421	0.0431	0.0432	0.0449
	(0.0294)	(0.0296)	(0.0294)	(0.0296)
Education categories				
Base case: primary or less				
Lower middle school	0.0187	0.0309	0.0204	0.0315
	(0.0194)	(0.0213)	(0.0194)	(0.0213)
Upper middle school	0.0551**	0.0690***	0.0549**	0.0688
	(0.0232)	(0.0228)	(0.0232)	(0.0227)
College or more	0.2253***	0.2728***	0.2267***	0.2729***
	(0.0350)	(0.0356)	(0.0349)	(0.0355)
Health condition (good/ excellent)	0.0868***	0.0826**	0.0841***	0.0823**
	(0.0177)	(0.0364)	(0.0178)	(0.0364)
Ethnic minority	-0.0200	-0.0230	-0.0247	-0.0243
	(0.0232)	(0.0246)	(0.0232)	(0.0247)
Non-agriculture registration	0.0544***	0.0526***	0.0560***	0.0542***
	(0.0165)	(0.0166)	(0.0164)	(0.0165)
Co-resident with adult children	-0.0739**	-0.0627**	-0.0714***	-0.0608**
	(0.0253)	(0.0255)	(0.0253)	(0.0255)
Co-resident with elderly parents	0.0251	0.0322	0.0265	0.0311
	(0.0188)	(0.0215)	(0.0187)	(0.0214)
Women's annual wage	0.0837***	0.0907***	0.0910***	0.0963***
	(0.0087)	(0.0095)	(0.0085)	(0.0092)
Women's other income	-0.1020***	-0.1002***	-0.1017***	-0.1001***
	(0.0021)	(0.0021)	(0.0021)	(0.0021)
Husband's income			-0.0315***	-0.0331**
			(0.0094)	(0.0096)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	2618	2618	2618	2618
Pseudo R-squared	0.276	0.321	0.279	0.322

Notes: The same as Appendix C.

H. Effect of grandparents' childcare on mothers' labour force participation - OLS estimation

Explanatory variables	(1) lfp	(2) lfp	(3) lfp	(4) lfp
Grandparent's childcare	0.1418***	0.1361***	0.1417***	0.1350***
	(0.0184)	(0.0185)	(0.0184)	(0.0185)
Having children under 3 (dummy, 1=yes)	-0.0603*	-0.0720**	-0.0629*	-0.0732**
	(0.0331)	(0.0327)	(0.0329)	(0.0327)
Having children age between 4-6 (dummy, 1=yes)	0.0187	0.0106	0.0156	0.0119
	(0.0209)	(0.0214)	(0.0208)	(0.0214)
Having children age between 7-16 (dummy, 1=yes)	0.0194	0.0199	0.0133	0.0111
	(0.0136)	(0.0147)	(0.0136)	(0.0146)
Age	0.0440**	0.0462**	0.0454**	0.0464**
	(0.0185)	(0.0188)	(0.0183)	(0.0186)
Age square	-0.0005*	-0.0006**	-0.0005*	-0.0006**
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Education categories				
Base case: primary school or less				
Lower middle school	0.0487**	0.0404**	0.0453**	0.0372*
	(0.0198)	(0.0196)	(0.0198)	(0.0197)
Upper middle school	0.0617**	0.0627**	0.0638**	0.0675**
	(0.0296)	(0.0290)	(0.0296)	(0.0291)
College or more	0.1200***	0.1409***	0.1256***	0.1444***
	(0.0355)	(0.0360)	(0.0356)	(0.0360)
Health condition (good/excellent, 1=yes)	0.0871***	0.0826***	0.0816***	0.0824***
	(0.0170)	(0.0230)	(0.0172)	(0.0230)
Ethnic minority	-0.0146	-0.0134	-0.0103	-0.0126
	(0.0236)	(0.0286)	(0.0237)	(0.0285)
Non-agriculture registration	0.0619**	0.0609**	0.0603**	0.0586**
	(0.0257)	(0.0252)	(0.0256)	(0.0252)
Other female members in the household (dummy, 1=yes)	0.0322	0.0226	0.0339	0.0247
	(0.0235)	(0.0235)	(0.0235)	(0.0235)
Other male members in the household (dummy, 1=yes)	-0.0133	-0.0030	-0.0107	-0.0044
	(0.0216)	(0.0214)	(0.0216)	(0.0213)
Age of youngest child	0.0126	0.0109	0.0113	0.0098
	(0.0084)	(0.0082)	(0.0084)	(0.0082)
Male youngest child (dummy, 1=yes)	0.0271	0.0247	0.0277*	0.0250
	(0.0167)	(0.0165)	(0.0167)	(0.0164)
Women's annual wage	0.0831***	0.0814***	0.0870***	0.0881***
	(0.0063)	(0.0071)	(0.0054)	(0.0066)
Women's other income	-0.05833***	-0.05851***	-0.0581***	-0.0584***
	(0.0047)	(0.0046)	(0.0046)	(0.0045)
Husband's income			-0.0253***	-0.0241***
			(0.0073)	(0.0075)
Constant	0.9845***	0.5435*	1.0493***	0.6543**
	(0.3103)	(0.3156)	(0.3067)	(0.3145)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	1651	1651	1651	1651
R-squared	0.192	0.234	0.196	0.238

Notes: The same as Appendix H.

I. Effect of grandparents' childcare on mothers' labour force participation - probit estimation

Explanatory variables	(1) lfp	(2) lfp	(3) lfp	(4) lfp
Grandparent's childcare	0.1390***	0.1237***	0.1394***	0.1240***
	(0.0177)	(0.0173)	(0.0176)	(0.0173)
Having children under 3 (dummy, 1=yes)	-0.0608**	-0.0693***	-0.0648***	-0.0719***
	(0.0287)	(0.0280)	(0.0284)	(0.0277)
Having children age between 4-6 (dummy, 1=yes)	0.0112	0.0153	0.0176	0.0184
	(0.0215)	(0.0221)	(0.0214)	(0.0220)
Having children age between 7-16 (dummy, 1=yes)	0.0202	0.0196	0.0135	0.0222
	(0.0150)	(0.0154)	(0.0152)	(0.0154)
Age	0.0568***	0.0560***	0.0580***	0.0569***
	(0.0176)	(0.0178)	(0.0174)	(0.0175)
Age square	-0.0008***	-0.0008***	-0.0008***	-0.0008***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Education categories				
Base case: primary school or less				
Lower middle school	0.0488**	0.0457**	0.0467**	0.0434**
	(0.0203)	(0.0198)	(0.0203)	(0.0198)
Upper middle school	0.0548*	0.0532**	0.0501*	0.0588**
	(0.0291)	(0.0288)	(0.0292)	(0.0290)
College or more	0.1250***	0.1416***	0.1309***	0.1464***
	(0.0364)	(0.0368)	(0.0366)	(0.0370)
Health condition (good/excellent, 1=yes)	0.0926***	0.0785***	0.0875***	0.0790***
	(0.0187)	(0.0225)	(0.0190)	(0.0230)
Ethnic minority	-0.0188	-0.0209	-0.0177	-0.0211
	(0.0246)	(0.0274)	(0.0247)	(0.0274)
Non-agriculture registration	0.0469**	0.0514**	0.0461**	0.0500**
	(0.0210)	(0.0204)	(0.0209)	(0.0203)
Other female members in the household (dummy, 1=yes)	0.0306**	0.0348**	0.0302**	0.0340**
	(0.0133)	(0.0139)	(0.0133)	(0.0138)
Other male members in the household (dummy, 1=yes)	-0.0106	-0.0172	-0.0109	-0.0183
	(0.0145)	(0.0149)	(0.0145)	(0.0148)
Age of youngest child	0.0115	0.0120	0.0101	0.0107
	(0.0078)	(0.0074)	(0.0077)	(0.0074)
Male youngest child (dummy, 1=yes)	0.0298*	0.0259*	0.0313**	0.0276*
	(0.0157)	(0.0154)	(0.0156)	(0.0153)
Women's annual wage	0.0905***	0.0981***	0.0922***	0.0998***
	(0.0075)	(0.0077)	(0.0064)	(0.0069)
Women's other income	-0.0652***	-0.0654***	-0.0648***	-0.0651***
	(0.0028)	(0.0026)	(0.0027)	(0.0026)
Husband's income			-0.0261***	-0.0276***
			(0.0079)	(0.0079)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	1651	1651	1651	1651
Pseudo R-squared	0.128	0.172	0.135	0.179

Notes: The same as Appendix I.

J. Effect of grandparental childcare on mothers' labour force participation - OLS estimation, urban areas

Explanatory variables	(1)	(2)	(3)	(4)
Grandparent's childcare	0.0824**	0.0787**	0.0823**	0.0789**
	(0.0377)	(0.0382)	(0.0377)	(0.0384)
Having children under 3 (dummy, 1=yes)	-0.3335***	-0.3494***	-0.3324***	-0.3484***
	(0.1245)	(0.1298)	(0.1249)	(0.1309)
Having children age between 4-6 (dummy, 1=yes)	0.1136*	0.1124*	0.1126*	0.1106*
	(0.0692)	(0.0641)	(0.0694)	(0.0647)
Having children age between 7-16 (dummy, 1=yes)	0.0324	0.0235	0.0401	0.0067
	(0.0733)	(0.0817)	(0.0727)	(0.0823)
Age	0.0702**	0.0697**	0.0625*	0.0681**
	(0.0388)	(0.0314)	(0.0383)	(0.0304)
Age square	-0.0006*	-0.0006*	-0.0006*	-0.0006*
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Education categories				
Base case: primary school or less				
Lower middle school	0.1060	0.0872	0.0975	0.0807
	(0.1066)	(0.1028)	(0.1055)	(0.1016)
Upper middle school	0.1926*	0.1768*	0.1836*	0.1887*
	(0.1076)	(0.1048)	(0.1065)	(0.1036)
College or more	0.2374**	0.2369**	0.2394**	0.2437**
	(0.1004)	(0.1126)	(0.1001)	(0.1125)
Health condition (good/excellent, 1=yes)	0.0945***	0.0966***	0.0933***	0.0936***
	(0.0389)	(0.0376)	(0.0317)	(0.0390)
Ethnic minority	0.0066	0.0066	0.0117	0.0134
	(0.0734)	(0.0797)	(0.0756)	(0.0806)
Non-agriculture registration	0.1793**	0.1663**	0.1775**	0.1641**
	(0.0798)	(0.0814)	(0.0795)	(0.0811)
Other female members in the household (dummy, 1=yes)	0.0581	0.0579	0.0523	0.0492
	(0.0431)	(0.0481)	(0.0428)	(0.0478)
Other male members in the household (dummy, 1=yes)	-0.0423	-0.0503	-0.0432	-0.0551
	(0.0428)	(0.0448)	(0.0425)	(0.0453)
Age of youngest child	0.0399***	0.0409***	0.0381***	0.0402***
	(0.0126)	(0.0127)	(0.0124)	(0.0125)
Male youngest child (dummy, 1=yes)	0.0076	0.0107	0.0072	0.0102
	(0.0358)	(0.0363)	(0.0357)	(0.0363)
Women's annual wage	0.1048***	0.1069***	0.1038***	0.1029***
	(0.0210)	(0.0274)	(0.0225)	(0.0264)
Women's other income	-0.0777***	-0.0773***	-0.0766**	-0.0766**
	(0.0068)	(0.0065)	(0.0067)	(0.0064)
Husband's income			-0.0580**	-0.0461*
			(0.0235)	(0.0237)
Constant	1.4718	1.3535	1.5160	1.4831
	(0.9660)	(1.0789)	(0.9570)	(1.0723)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	408	408	408	408
R-squared	0.210	0.237	0.211	0.239

Notes: The same as Appendix H.

K. Effect of grandparental childcare on mothers' labour force participation - probit estimation, urban areas

Explanatory variables	(1)	(2)	(3)	(4)
Grandparent's childcare	0.0662**	0.0651**	0.0668**	0.0653**
	(0.0338)	(0.0327)	(0.0339)	(0.0329)
Having children under 3 (dummy, 1=yes)	-0.2156***	-0.2231***	-0.2135***	-0.2192**
	(0.0830)	(0.0841)	(0.0829)	(0.0838)
Having children age between 4-6 (dummy, 1=yes)	0.1075*	0.1055*	0.1061*	0.1029*
	(0.0606)	(0.0601)	(0.0602)	(0.0597)
Having children age between 7-16 (dummy, 1=yes)	0.0234	0.0501	0.0283	0.0478
	(0.0688)	(0.0574)	(0.0662)	(0.0547)
Age	0.0677*	0.0742**	0.0617*	0.0784**
	(0.0340)	(0.0398)	(0.0328)	(0.0375)
Age square	-0.0009*	-0.0009*	-0.0009*	-0.0009*
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Education categories				
Base case: primary school or less				
Lower middle school	0.0470	0.0593	0.0352	0.0489
	(0.0571)	(0.0357)	(0.0556)	(0.0349)
Upper middle school	0.1119**	0.1026***	0.1045**	0.0920***
	(0.0437)	(0.0286)	(0.0414)	(0.0282)
College or more	0.2271***	0.2379***	0.2320***	0.2454***
	(0.0749)	(0.0759)	(0.0747)	(0.0754)
Health condition (good/excellent, 1=yes)	0.0912***	0.0949***	0.0951***	0.1002***
	(0.0375)	(0.0398)	(0.0396)	(0.0334)
Ethnic minority	0.0216	0.0370	0.0305	0.0346
	(0.0622)	(0.0408)	(0.0586)	(0.0362)
Non-agriculture registration	0.1092**	0.0921*	0.1067**	0.0891*
	(0.0471)	(0.0485)	(0.0471)	(0.0485)
Other female members in the household (dummy, 1=yes)	0.0497	0.0446	0.0487	0.0467
	(0.0438)	(0.0357)	(0.0417)	(0.0324)
Other male members in the household (dummy, 1=yes)	-0.0273	-0.0399	-0.0253	-0.0355
	(0.0401)	(0.0304)	(0.0393)	(0.0290)
Age of youngest child	0.0357***	0.0308***	0.0337***	0.0280***
	(0.0103)	(0.0081)	(0.0100)	(0.0079)
Male youngest child (dummy, 1=yes)	0.0040	0.0081	0.0052	0.0115
	(0.0347)	(0.0275)	(0.0340)	(0.0265)
Women's annual wage	0.1196***	0.1144***	0.1233***	0.1251***
	(0.0192)	(0.0170)	(0.0197)	(0.0172)
Women's other income	-0.0819***	-0.0890***	-0.0804**	-0.0877**
	(0.0042)	(0.0035)	(0.0040)	(0.0033)
Husband's income			-0.0603**	-0.0607*
			(0.0326)	(0.0314)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	408	408	408	408
Pseudo R-squared	0.228	0.34	0.195	0.352

Notes: The same as Appendix I.

L. Effect of grandparental childcare on mothers' labour force participation - OLS estimation, rural areas

Explanatory variables	(1)	(2)	(3)	(4)
Grandparent's childcare	0.1287***	0.1296***	0.1280***	0.1293***
	(0.0320)	(0.0308)	(0.0320)	(0.0309)
Having children under 3 (dummy, 1=yes)	-0.2363***	-0.2257***	-0.2436***	-0.2322***
	(0.0885)	(0.0861)	(0.0884)	(0.0857)
Having children age between 4-6 (dummy, 1=yes)	-0.0566	-0.0582	-0.0542	-0.0520
	(0.0774)	(0.0821)	(0.0765)	(0.0814)
Having children age between 7-16 (dummy, 1=yes)	0.0672	0.0761	0.0664	0.0755
	(0.0582)	(0.0586)	(0.0582)	(0.0587)
Age	0.0701*	0.0769*	0.0815*	0.0870**
	(0.0426)	(0.0427)	(0.0424)	(0.0425)
Age square	-0.0002**	-0.0002**	-0.0002**	-0.0002**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education categories				
Base case: primary school or less				
Lower middle school	0.0372	0.0355	0.0387	0.0366
	(0.0697)	(0.0701)	(0.0692)	(0.0695)
Upper middle school	0.0607	0.0586	0.0657	0.0626
	(0.0749)	(0.0784)	(0.0750)	(0.0784)
College or more	0.1845**	0.2141**	0.1870**	0.2159**
	(0.0887)	(0.0926)	(0.0884)	(0.0920)
Health condition (good/excellent, 1=yes)	0.1576***	0.1375**	0.1472***	0.1309**
	(0.0491)	(0.0648)	(0.0497)	(0.0647)
Ethnic minority	-0.103	-0.0779	-0.112*	-0.0855
	(0.0630)	(0.0643)	(0.0636)	(0.0638)
Non-agriculture registration	0.0796*	0.0712*	0.0789*	0.0805*
	(0.0439)	(0.0427)	(0.0440)	(0.0428)
Other female members in the household (dummy, 1=yes)	0.0645**	0.0619**	0.0634**	0.0608**
	(0.0286)	(0.0305)	(0.0287)	(0.0305)
Other male members in the household (dummy, 1=yes)	-0.0176	-0.0259	-0.0179	-0.0268
	(0.0368)	(0.0377)	(0.0364)	(0.0373)
Age of youngest child	0.0469***	0.0468***	0.0455***	0.0454***
	(0.0123)	(0.0118)	(0.0124)	(0.0120)
Male youngest child (dummy, 1=yes)	0.0675*	0.0626*	0.0694*	0.0642*
	(0.0381)	(0.0379)	(0.0380)	(0.0379)
Women's annual wage	0.1218***	0.1188***	0.1169***	0.1336***
	(0.0234)	(0.0245)	(0.0228)	(0.0240)
Women's other income	-0.0622***	-0.0651***	-0.0524***	-0.0535***
	(0.0071)	(0.0059)	(0.0071)	(0.0059)
Husband's income			-0.0840***	-0.0837***
			(0.0198)	(0.0198)
Constant	-0.0421	-0.0568	-0.0335	0.0482
	(0.6992)	(0.8002)	(0.6905)	(0.7946)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	430	430	430	430
R-squared	0.135	0.233	0.145	0.238

Notes: The same as Appendix H.

M. Effect of grandparental childcare on mothers' labour force participation - probit estimation, rural areas

Explanatory variables	(1)	(2)	(3)	(4)
Grandparent's childcare	0.1130***	0.1159***	0.1141***	0.1166**
	(0.0314)	(0.0319)	(0.0312)	(0.0317)
Having children under 3 (dummy, 1=yes)	-0.1992***	-0.2231***	-0.2167***	-0.1928***
	(0.0693)	(0.0841)	(0.0698)	(0.0654)
Having children age between 4-6 (dummy, 1=yes)	-0.0492	-0.0455	-0.0532	-0.0488
	(0.0397)	(0.0301)	(0.0393)	(0.0374)
Having children age between 7-16 (dummy, 1=yes)	0.0781	0.0900	0.0764	0.0883
	(0.0547)	(0.0557)	(0.0545)	(0.0558)
Age	0.0853*	0.0802*	0.0841*	-0.0811*
	(0.0423)	(0.0410)	(0.0421)	(0.0411)
Age square	-0.0003*	-0.0003*	-0.0003*	-0.0003*
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Education categories				
Base case: primary school or less				
Lower middle school	0.0439	0.0436	0.0439	0.0413
	(0.0609)	(0.0611)	(0.0605)	(0.0610)
Upper middle school	0.0660	0.0633	0.0694	0.0649
	(0.0594)	(0.0593)	(0.0588)	(0.0593)
College or more	0.1959**	0.2379***	0.1945**	0.2062***
	(0.0799)	(0.0759)	(0.0799)	(0.0786)
Health condition (good/excellent, 1=yes)	0.1598***	0.1076**	0.1514***	0.1241**
	(0.0496)	(0.0516)	(0.0499)	(0.0580)
Ethnic minority	-0.1084	-0.0694	-0.1174	-0.0718
	(0.0690)	(0.0699)	(0.0699)	(0.0703)
Non-agriculture registration	0.0837*	0.0869**	0.0816*	0.0764*
	(0.0417)	(0.0417)	(0.0417)	(0.0417)
Other female members in the household (dummy, 1=yes)	0.0677**	0.0618**	0.0658**	0.0624**
	(0.0292)	(0.0305)	(0.0293)	(0.0306)
Other male members in the household (dummy, 1=yes)	-0.0142	-0.0274	-0.0154	-0.0281
	(0.0362)	(0.0360)	(0.0358)	(0.0359)
Age of youngest child	0.0488***	0.0509***	0.0475***	0.0508***
	(0.0119)	(0.0115)	(0.0119)	(0.0115)
Male youngest child (dummy, 1=yes)	0.0785**	0.0654*	0.0816**	0.0664*
	(0.0396)	(0.0392)	(0.0397)	(0.0392)
Women's annual wage	0.1168***	0.1139***	0.1142***	0.1212***
	(0.0244)	(0.0250)	(0.0243)	(0.0256)
Women's other income	-0.0632***	-0.0586***	-0.0633***	-0.0583***
	(0.0069)	(0.0068)	(0.0068)	(0.0067)
Husband's income			-0.0862***	-0.0858***
			(0.0297)	(0.0289)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	430	430	430	430
Pseudo R-squared	0.131	0.271	0.145	0.237

Notes: The same as Appendix I.

N. Robustness check using sample excluding farmer, fisher and hunters – OLS estimation

Explanatory variables	(1) lfp	(2) lfp	(3) lfp	(4) lfp
Grandparent's childcare	0.1087***	0.1023***	0.1098***	0.1029***
	(0.0386)	(0.0385)	(0.0386)	(0.0385)
Having children under 3 (dummy, 1=yes)	-0.2578***	-0.2669***	-0.2595***	-0.2689***
	(0.0698)	(0.0695)	(0.0700)	(0.0698)
Having children age between 4-6 (dummy, 1=yes)	0.0849	0.0824	0.0893	0.0866
	(0.0638)	(0.0655)	(0.0637)	(0.0655)
Having children age between 7-16 (dummy, 1=yes)	-0.0201	-0.0344	-0.0208	-0.0348
	(0.0435)	(0.0429)	(0.0436)	(0.0430)
Age	0.0855***	0.0840***	0.0845***	0.0843***
	(0.0335)	(0.0354)	(0.0333)	(0.0352)
Age square	0.0017***	-0.0017***	-0.0017***	-0.0017***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Education categories				
Base case: primary school or less				
Lower middle school	0.0529	0.0520	0.0496	0.0489
	(0.0567)	(0.0566)	(0.0564)	(0.0563)
Upper middle school	0.1123*	0.1206**	0.1108*	0.1190**
	(0.0595)	(0.0607)	(0.0593)	(0.0605)
College or more	0.2056***	0.2359***	0.2047***	0.2346***
	(0.0625)	(0.0642)	(0.0624)	(0.0639)
Health condition (good/excellent, 1=yes)	0.1391***	0.1434***	0.1330***	0.1335***
	(0.0337)	(0.0423)	(0.0345)	(0.0429)
Ethnic minority	-0.0267	-0.0047	-0.0324	-0.0082
	(0.0474)	(0.0494)	(0.0480)	(0.0495)
Non-agriculture registration	0.0611*	0.0682**	0.0606*	0.0682**
	(0.0349)	(0.0339)	(0.0349)	(0.0340)
Other female members in the household (dummy, 1=yes)	0.0898***	0.0884***	0.0890***	0.0872***
	(0.0233)	(0.0247)	(0.0233)	(0.0247)
Other male members in the household (dummy, 1=yes)	-0.0193	-0.0318	-0.0181	-0.0310
	(0.0253)	(0.0260)	(0.0253)	(0.0260)
Age of youngest child	0.0430***	0.0439***	0.0414***	0.0425***
	(0.0087)	(0.0086)	(0.0088)	(0.0086)
Male youngest child (dummy, 1=yes)	0.0355	0.0260	0.0363	0.0267
	(0.0262)	(0.0261)	(0.0261)	(0.0261)
Women's annual wage	0.1035***	0.1086***	0.1023***	0.1019***
	(0.0156)	(0.0162)	(0.0156)	(0.0159)
Women's other income	-0.0894***	-0.0873***	-0.0844***	-0.0869***
	(0.0051)	(0.0047)	(0.0051)	(0.0047)
Husband's income			-0.0336**	-0.0300**
			(0.0148)	(0.0147)
Constant	0.5803	0.4398	0.6745	0.5694
	(0.5503)	(0.5848)	(0.5478)	(0.5878)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	838	838	838	838
R-squared	0.156	0.206	0.158	0.208

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Women's annual income takes fitted value and logged, in RMB; income variables take logged value, in RMB.

O. Robustness check using sample excluding farmer, fisher and hunters - probit estimation

Explanatory variables	(1) lfp	(2) lfp	(3) lfp	(4) lfp
Grandparent's childcare	0.1020***	0.1018***	0.1039***	0.1033***
	(0.0369)	(0.0361)	(0.0368)	(0.0361)
Having children under 3 (dummy, 1=yes)	-0.1935***	-0.2007***	-0.1975***	-0.2041***
	(0.0494)	(0.0495)	(0.0496)	(0.0497)
Having children age between 4-6 (dummy, 1=yes)	0.0620	0.0627	0.0687	0.0682
	(0.0447)	(0.0449)	(0.0446)	(0.0450)
Having children age between 7-16 (dummy, 1=yes)	-0.0267	-0.0462	-0.0283	-0.0472
	(0.0377)	(0.0366)	(0.0376)	(0.0364)
Age	0.1027***	0.1069***	0.1016***	0.1076***
	(0.0302)	(0.0311)	(0.0298)	(0.0307)
Age square	-0.0024***	-0.0024***	-0.0024***	-0.0024***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Education categories				
Base case: primary school or less				
Lower middle school	0.0367	0.0374	0.0312	0.0294
	(0.0417)	(0.0411)	(0.0414)	(0.0406)
Upper middle school	0.1031**	0.1101**	0.1013**	0.1077**
	(0.0472)	(0.0472)	(0.0469)	(0.0469)
College or more	0.2134***	0.2363***	0.2126***	0.2339***
	(0.0531)	(0.0526)	(0.0528)	(0.0523)
Health condition (good/excellent, 1=yes)	0.1388***	0.1442***	0.1334***	0.1339***
	(0.0321)	(0.0379)	(0.0326)	(0.0385)
Ethnic minority	-0.0182	0.0227	-0.0223	-0.0292
	(0.0416)	(0.0433)	(0.0418)	(0.0432)
Non-agriculture registration	0.0473*	0.0504*	0.0482*	0.0196
	(0.0287)	(0.0299)	(0.0287)	(0.0298)
Other female members in the household (dummy, 1=yes)	0.0891***	0.0890***	0.0865***	0.0860***
	(0.0225)	(0.0234)	(0.0224)	(0.0232)
Other male members in the household (dummy, 1=yes)	-0.0163	-0.0293	-0.0162	-0.0298
	(0.0259)	(0.0259)	(0.0256)	(0.0255)
Age of youngest child	0.0423***	0.0417***	0.0407***	0.0403***
	(0.0080)	(0.0077)	(0.0080)	(0.0077)
Male youngest child (dummy, 1=yes)	0.0357	0.0283	0.0378	0.0301
	(0.0263)	(0.0254)	(0.0261)	(0.0253)
Women's annual wage	0.1095***	0.1029***	0.1018***	0.1019***
	(0.0156)	(0.0154)	(0.0158)	(0.0157)
Women's other income	-0.0763***	-0.0728***	-0.0701***	-0.0759***
	(0.0039)	(0.0036)	(0.0038)	(0.0036)
Husband's income			-0.0362**	-0.0312**
			(0.0149)	(0.0146)
County effect	No	Yes	No	Yes
Year effect	No	Yes	No	Yes
Observations	838	838	838	838
Pseudo R-squared	0.164	0.219	0.167	0.221

Notes: Marginal effects are reported; Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Women's annual income takes fitted value and logged, in RMB; income variables take logged value, in RMB.

P. Primary analysis, effect of maternal employment on child health development – underweight & probit estimation

Dependent variable: underweight (1=yes)	(1)	(2)	(3)	(4)
Explanatory variables	Probit			
Maternal employment (1=yes)	-0.0253*	-0.0230*	-0.0261*	-0.0213*
	（0.0133）	(0.0134)	(0.0136)	(0.0136)
Age	0.0099	0.0100	0.0094	0.0095
	（0.0079）	(0.0079)	(0.0080)	(0.0081)
Age square	0.0002	0.0002	0.0003	0.0003
	（0.0007）	(0.0007)	(0.0007)	(0.0007)
Left behind child (1=yes)	0.1287**	0.1405**		
	（0.0652）	(0.0613)		
Co-resident with grandparents (1=yes)	-0.0061	-0.0055	0.0081	-0.0039
	（0.0132）	(0.0127)	(0.0133)	(0.0129)
Left behind child * Co-resident with grandparents	0.0569	0.0836		
	（0.1203）	(0.1171)		
Grandparents' health condition (1=both	-0.0082	-0.0075	-0.0089	-0.0077
	(0.0105)	(0.0103)	(0.0105)	(0.0103)
Female child (1=yes)	0.0237**	0.0215**	0.0234**	0.0213**
	（0.0096）	(0.0093)	(0.0098)	(0.0095)
Sibling number	0.0142**	0.0155**	0.0149**	0.0140**
	（0.0069）	(0.0066)	(0.0070)	(0.0068)
Household total annual income	-0.0469***	-0.0484***	-0.0473***	-0.0489***
	（0.0056）	(0.0056)	(0.0057)	(0.0057)
Owning refrigerator in household (1=yes)	-0.0632***	-0.0622***	-0.0661***	-0.0650***
	（0.0167）	(0.0169)	(0.0172)	(0.0173)
Ordinary annual wage for female worker in	-0.0155**	-0.0169*	-0.0152*	-0.0170*
	(0.0073)	(0.0091)	(0.0074)	(0.0092)
Market in community (1=yes)	0.0116	0.0124	0.0102	0.0111
	(0.0106)	(0.0108)	(0.0107)	(0.0110)
Health service in village (1=yes)	0.0034	0.0045	0.0033	0.0044
	(0.0098)	(0.0099)	(0.0100)	(0.0101)
Year effect	No	Yes	No	Yes
County effect	No	Yes	No	Yes
Observations	4,512	4,512	4,344	4,344
R-squared/Pseudo R-squared	0.252	0.317	0.251	0.316

Notes：Marginal effects are presented. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Household annual income and ordinary annual wage for female worker in community takes logged value, in

Q. Primary analysis, effect of maternal employment on child health development – underheight & probit estimation

Dependent variable: underheight (1=yes) *Explanatory variables*	(1)	(2)	(3)	(4)
	Probit			
Maternal employment (1=yes)	-0.0631***	-0.0707***	-0.0679***	-0.0757***
	（0.0168）	（0.0167）	(0.0170)	(0.0170)
Age	0.0044	0.0042	0.0052	0.0052
	（0.0092）	(0.0091)	(0.0093)	(0.0092)
Age square	-0.0015*	-0.0015*	-0.0016*	-0.0016*
	（0.0008）	(0.0008)	(0.0009)	(0.0008)
Left behind child (1=yes)	0.1416**	0.1570**		
	（0.0661）	(0.0682)		
Co-resident with grandparents (1=yes)	0.0201	0.0041	0.0183	0.0016
	（0.0167）	(0.0164)	(0.0169)	(0.0166)
Left behind child * Co-resident with grandparents	0.0137	0.0584		
	（0.1313）	(0.1344)		
Grandparents' health condition (1=both	-0.0050	-0.0053	-0.0051	-0.0051
	(0.0149)	(0.0148)	(0.0150)	(0.0150)
Female child (1=yes)	-0.0012	-0.0046	-0.0016	-0.0047
	（0.0123）	(0.0120)	(0.0125)	(0.0121)
Sibling number	0.0162*	0.0149*	0.0181*	0.0171*
	（0.0088）	(0.0085)	(0.0090)	(0.0087)
Household annual income	-0.0456***	-0.0449***	-0.0462***	-0.0455***
	（0.0076）	(0.0075)	(0.0077)	(0.0076)
Owning refrigerator in household (1=yes)	-0.0830***	-0.0839***	-0.0798***	-0.0789***
	（0.0195）	(0.0196)	(0.0198)	(0.0199)
Ordinary annual wage for female worker in	-0.0523***	-0.0420***	-0.0510***	-0.0401***
	（0.0094）	(0.0114)	(0.0095)	(0.0115)
Market in village (1=yes)	0.0085	0.0154	0.0100	0.0168
	（0.0133）	(0.0135)	(0.0135)	(0.0137)
Health service in village (1=yes)	0.0048	0.0168	0.0038	0.0163
	（0.0126）	(0.0127)	(0.0128)	(0.0128)
Year effect	No	Yes	No	Yes
County effect	No	Yes	No	Yes
Observations	4,512	4,512	4,344	4,344
R-squared/Pseudo R-squared	0.258	0.312	0.255	0.311

Notes：The same as Appendix P.

R. Primary analysis, effect of maternal employment on child health development – underweight & IV-probit estimation

Dependent variable: underweight (1=yes)	IV-probit							
	(1)		(2)		(3)		(4)	
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)		-0.0666*		-0.0831*		-0.0723**		-0.0914**
		（0.0353）		（0.0427）		(0.0348)		(0.0394)
Instrument - bus stop	0.0744***		0.0715***		0.0725***		0.0725***	
	（0.0117）		（0.0127）		(0.0132)		(0.0132)	
Instrument - paved road	0.1256***		0.1345***		0.1500***		0.1500***	
	（0.0123）		（0.0124）		(0.0130)		(0.0130)	
Instrument - age of youngest child	-0.0260***		-0.0229***		0.0254***		0.0254***	
	（0.0035）		（0.0036）		(0.0036)		(0.0036)	
Age	0.0067	0.0103	0.0075	0.0124	0.0005	0.0506	0.0005	0.0613
	（0.0090）	（0.0083）	（0.0088）	（0.0083）	(0.0090)	(0.0416)	(0.0090)	(0.0438)
Age square	-0.0021***	0.0002	-0.0020***	0.0001	-0.0017**	0.0016	-0.0017**	0.0008
	（0.0008）	（0.0007）	（0.0007）	（0.0007）	(0.0008)	(0.0036)	(0.0008)	(0.0038)
Left behind child (1=yes)	-0.0837*	0.1292***	-0.0852*	0.1464***				
	（0.0462）	（0.0357）	（0.0449）	（0.0328）				
Co-resident with grandparents (1=yes)	0.0596***	-0.0077	0.0436***	-0.0008	0.0539***	-0.0447	0.0539***	-0.0027
	（0.0160）	（0.0141）	（0.0159）	（0.0134）	(0.0165)	(0.0717)	(0.0165)	(0.0720)
Left behind child * Co-resident with grandparents	0.0544**	0.0566	0.0546**	0.0887				
	（0.0262）	（0.1211）	（0.0287）	（0.1191）				
Grandparents' health condition (1=both	0.0429***	-0.0136	0.0455***	-0.0138	0.0412***	-0.0457	0.0412***	-0.0732
	(0.0137)	(0.0198)	(0.0139)	(0.0199)	(0.0143)	(0.0605)	(0.0143)	(0.0628)
Female child (1=yes)	0.0190	0.0148	0.0195	0.0130	0.0171	0.0778	0.0171	0.0696
	（0.0113）	（0.0097）	（0.0110）	（0.0095）	(0.0115)	(0.0495)	(0.0115)	(0.0510)
Sibling number	-0.0268***	0.0136*	-0.0265***	0.0140**	-0.0152*	0.0709*	-0.0152*	0.0267
	（0.0083）	（0.0070）	（0.0085）	（0.0068）	(0.0089)	(0.0372)	(0.0089)	(0.0379)
Household income	-0.0442***	-0.0664***	-0.0394***	-0.0652***	0.0530***	-0.0679**	0.0530***	-0.0672***
	（0.0071）	（0.0063）	（0.0071）	（0.0062）	(0.0074)	(0.0134)	(0.0074)	(0.0147)
Owning refrigerator in household (1=yes)	-0.2590***	-0.0910***	-0.2584***	-0.0924***	-0.3280***	-0.0900***	-0.3280***	-0.0920*
	（0.0191）	（0.0250）	（0.0193）	（0.0244）	(0.0196)	(0.0280)	(0.0196)	(0.0276)
Ordinary wage for female worker in community	0.0428***	-0.0055	0.0454***	0.0063	0.0445***	-0.0469	0.0445***	0.0287

	（0.0082）	（0.0077）	（0.0098）	（0.0095）	(0.0103)	(0.0374)	(0.0103)	(0.0511)
Market in village (1=yes)	0.0428***	0.0113	0.0431***	0.0168	0.0550***	0.0258	0.0550***	0.0702
	（0.0120）	（0.0116）	（0.0123）	（0.0119）	(0.0128)	(0.0602)	(0.0128)	(0.0638)
Health service in village (1=yes)	-0.0123	0.0039	-0.0073	0.0038	-0.0143	0.0218	-0.0143	0.0271
	（0.0116）	（0.0099）	（0.0117）	(0.0101）	(0.0122)	(0.0505)	(0.0122)	(0.0543)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	4512		4512		4344		4344	
F statistics on instrument	99.31	/	63.89	/	109.63	/	75.81	/
Sargan Test (p value in bracket)	2.33 (0.316)		3.16 (0.194)		2.67 (0.297)		3.67 (0.159)	
Wald test of exogeneity (p value in bracket)	6.48 (0.047)		6.58 (0.038)		6.23 （0.049）		6.40 （0.040）	

Notes: Marginal effects are presented for IV-Probit estimations. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Income variables take logged value, in RMB.

Instruments are access to bus stop (1=yes), paved road (1=yes) and age of youngest child.

S. Primary analysis, effect of maternal employment on child health development – underheight & IV-probit estimation

Dependent variable: underheight (1=yes)	IV-Probit							
	(1)		(2)		(3)		(4)	
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)		-0.1441*		-0.1915**		-0.1643**		-0.2065*
		(0.0787)		(0.0837)		(0.0743)		(0.0870)
Instrument - bus stop	0.0760***		0.0754***		0.0856***		0.0725***	
	(0.0116)		(0.0135)		(0.0118)		(0.0132)	
Instrument - road type	0.1250***		0.1331***		0.1350***		0.1500***	
	(0.0123)		(0.0127)		(0.0127)		(0.0130)	
Instrument - age of youngest child	-0.0258***		-0.0224***		-0.0282**		-0.0254**	
	(0.0036)		(0.0037)		(0.0036)		(0.0036)	
Age	0.0069	0.0072	0.0079	0.0081	0.0003	0.0319	0.0005	0.0324
	(0.0090)	(0.0097)	(0.0088)	(0.0095)	(0.0092)	(0.0326)	(0.0090)	(0.0340)
Age square	-0.0021***	-0.0017*	-0.0020***	-0.0018**	-0.0019**	-0.0062**	-0.0017**	-0.0065*
	(0.0008)	(0.0009)	(0.0007)	(0.0009)	(0.0008)	(0.0030)	(0.0008)	(0.0031)
left behind child (1=yes)	-0.0831*	0.1677**	-0.0842*	0.1823**				
	(0.0461)	(0.0711)	(0.0449)	(0.0736)				
Co-resident with grandparents (1=yes)	0.0596***	0.0264	0.0436***	0.0114	0.0665***	0.0906	0.0539***	0.0369
	(0.0160)	(0.0176)	(0.0159)	(0.0170)	(0.0166)	(0.0605)	(0.0165)	(0.0627)
Left behind child * Co-resident with grandparents	0.0536**	0.0416	0.0532*	0.0459				
	(0.0242)	(0.1364)	(0.0287)	(0.1397)				
Mother's education years	0.0466***	-0.0291**	0.0482***	-0.0252***	-0.0317**	-0.0223	-0.0412**	-0.0437
	(0.0016)	(0.0029)	(0.0017)	(0.0032)	(0.0140)	(0.0517)	(0.0143)	(0.0540)
Female child (1=yes)	0.0188	0.0003	0.0192	0.0030	0.0154	0.0077	0.0171	-0.0064
	(0.0113)	(0.0124)	0.0110	(0.0120)	(0.0117)	(0.0424)	(0.0115)	(0.0438)
Sibling number	-0.0267***	0.0152*	-0.0262***	0.0145*	-0.0205**	0.0547*	-0.0082	0.0216
	(0.0083)	(0.0090)	(0.0085)	(0.0087)	(0.0088)	(0.0322)	(0.0089)	(0.0329)
Household income	-0.0442***	-0.0710***	-0.0394***	-0.0787***	-0.0572**	-0.0488	-0.0530**	-0.0406
	(0.0071)	(0.0086)	(0.0071)	(0.0084)	(0.0074)	(0.0308)	(0.0074)	(0.0322)
Owning refrigerator in household (1=yes)	-0.2591***	-0.0851***	-0.2583***	-0.0847***	-0.3240**	-0.2130*	-0.3280**	-0.0005
	(0.0191)	(0.0311)	(0.0193)	(0.0319)	(0.0191)	(0.1160)	(0.0196)	(0.1260)
Ordinary wage for female worker in community	0.0428***	-0.0540***	0.0453***	-0.0520***	-0.0275**	-0.2040**	0.0145	-0.0808*

	(0.0082)	(0.0097)	(0.0098)	(0.0117)	(0.0086)	(0.0327)	(0.0103)	(0.0429)
Market in village (1=yes)	0.0426***	0.0119	0.0429***	0.0221	0.0593***	0.0311	0.0550***	0.0782
	(0.0120)	(0.0143)	(0.0123)	(0.0146)	(0.0124)	(0.0504)	(0.0128)	(0.0539)
Health service in village (1=yes)	-0.0124	0.0053	-0.0073	0.0163	-0.0126	0.0143	-0.0143	0.0627
	(0.0116)	(0.0126)	(0.0116)	(0.0127)	(0.0120)	(0.0433)	(0.0122)	(0.0463)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	4512		4512		4344		4344	
F statistics on instrument	99.31	/	63.89	/	84.39	/	53.26	/
Sargan Test (p value in bracket)	2.16 (0.340)		2.14 (0.294)		2.28 (0.310)		2.26 (0.300)	
Wald test of exogeneity (p value in bracket)	6.16 (0.042)		5.51 (0.045)		4.95 (0.047)		4.57 (0.049)	

Notes: Marginal effects are presented for IV-Probit estimations. Robust standard errors in parentheses. *** p<0.01, ** p<0.05,

Income variables take logged value, in RMB.

Instruments are access to bus stop (1=yes) and paved road (1=yes).

T. Sensitivity test 1, Effect of maternal employment, mothers' working hours and mothers' income on child health development – underweight & probit estimation

Dependent variable: underweight (1=yes)	(1)		(2)		(3)		(4)	
Explanatory variables	Probit							
Maternal employment (1=yes)	-0.0645***	-0.0415**	-0.0651***	-0.0414**			-0.0646***	-0.0415**
	(0.0189)	(0.0191)	(0.0189)	(0.0191)			(0.0189)	(0.0191)
Mother's working hours					-0.0058	-0.0053		
					(0.0047)	(0.0047)		
Age	0.0118	0.0141	0.0111	0.0142	0.0121	0.0134	0.0107	0.0138
	(0.0099)	(0.0098)	(0.0100)	(0.0098)	(0.0101)	(0.0101)	(0.0100)	(0.0099)
Age square	0.0003	0.0001	0.0003	0.0001	0.0004	0.0002	0.0003	0.0001
	(0.0009)	(0.0008)	(0.0009)	(0.0008)	(0.0008)	(0.0008)	(0.0009)	(0.0008)
Mother's age			0.0052	0.0054	0.0049	0.0050	0.0054	0.0051
			(0.0044)	(0.0043)	(0.0046)	(0.0046)	(0.0044)	(0.0043)
Mother's age square			-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
			(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Co-resident with grandparents	-0.0007	-0.0139	-0.0007	-0.0144	-0.0040	-0.0041	-0.0007	-0.0128
	(0.0163)	(0.0156)	(0.0163)	(0.0156)	(0.0159)	(0.0156)	(0.0164)	(0.0157)
Grandparents' health condition (1=both	-0.0155	-0.0142	-0.0152	-0.0228	-0.0159	-0.0220	-0.0155	-0.0229
	(0.0142)	(0.0140)	(0.0142)	(0.0140)	(0.0143)	(0.0140)	(0.0142)	(0.0140)
Mother's education years			-0.0536***	-0.0545***	-0.0471***	-0.0473***	-0.0448***	-0.0444***
			(0.0018)	(0.0018)	(0.0019)	(0.0019)	(0.0021)	(0.0021)
Female child (1=yes)	0.0059	0.0009	0.0061	0.0009	0.0058	0.0055	0.0056	0.0005
	(0.0116)	(0.0112)	(0.0116)	(0.0112)	(0.0116)	(0.0111)	(0.0116)	(0.0112)
Sibling number	0.0162*	0.0071	0.0155*	0.0156*	0.0163*	0.0205**	0.0161*	0.0162*
	(0.0089)	(0.0084)	(0.0085)	(0.0081)	(0.0083)	(0.0085)	(0.0089)	(0.0084)
Household annual income	-0.0697***	-0.0652***	-0.0602***	-0.0661***	-0.0621***	-0.0679***		
	(0.0083)	(0.0084)	(0.0083)	(0.0084)	(0.0083)	(0.0084)		
Mother's annual wage							-0.0386**	-0.0390**
							(0.0184)	(0.0187)
Other household income							-0.0365***	-0.0347***
							(0.0084)	(0.0084)

Owning refrigerator in household (1=yes)	-0.0866***	-0.0577**	-0.0868***	-0.0885***	-0.0920***	-0.0828***	-0.0841***	-0.0861***
	(0.0223)	(0.0233)	(0.0224)	(0.0234)	(0.0211)	(0.0229)	(0.0224)	(0.0233)
Ordinary annual wage for female worker in	-0.0002	0.0125	0.0006	0.0128	0.0101	0.0115	0.0007	0.0129
	(0.0088)	(0.0106)	(0.0087)	(0.0105)	(0.0099)	(0.0104)	(0.0088)	(0.0105)
Market in village (1=yes)	0.0169	0.0181	0.0176	0.0192	0.0145	0.0150	0.0168	0.0183
	(0.0127)	(0.0130)	(0.0127)	(0.0130)	(0.0112)	(0.0115)	(0.0127)	(0.0130)
Health service in village (1=yes)	-0.0065	-0.0011	-0.0068	-0.0004	-0.0070	-0.0072	-0.0065	-0.0004
	(0.0119)	(0.0119)	(0.0120)	(0.0120)	(0.0119)	(0.0119)	(0.0120)	(0.0120)
Year effect	No	Yes	No	Yes	No	Yes	No	Yes
County effect	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,339	3,339	3,339	3,339	3,339	3,339	3,339	3,339
R-squared/Pseudo R-squared	0.251	0.317	0.253	0.287	0.251	0.320	0.254	0.322

Notes: the same as Appendix P.

U. Sensitivity test 1, Effect of maternal employment, mothers' working hours and mothers' income on child health development – underheight & probit estimation

Dependent variable: underheight (1=yes)	(1)		(2)		(3)		(4)	
Explanatory variables	Probit							
Maternal employment(1=yes)	-0.1150***	-0.1050***	-0.0849***	-0.0846***			-0.1143***	-0.1049***
	(0.0225)	(0.0225)	(0.0225)	(0.0225)			(0.0225)	(0.0225)
Mother's working hours					-0.0018	-0.0084		
					(0.0031)	(0.0033)		
Age	-0.0010	0.0013	0.0003	0.0037	0.0020	0.0029	0.0014	0.0028
	(0.0113)	(0.0111)	(0.0114)	(0.0111)	(0.0111)	(0.0111)	(0.0114)	(0.0111)
Age square	-0.0010	-0.0012	-0.0010	-0.0013	-0.0013	-0.0012	-0.0010	-0.0012
	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Mother's age			-0.0016	-0.0017	-0.0025	-0.0027	-0.0011	-0.0019
			(0.0058)	(0.0059)	(0.0060)	(0.0059)	(0.0058)	(0.0060)
Mother's age square			0.0001	-0.0001	-0.0001	0.0001	0.0001	0.0001
			(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Co-resident with grandparents	0.0137	-0.0077	-0.0132	-0.0092	-0.0086	-0.0150	-0.0142	-0.0073
	(0.0204)	(0.0197)	(0.0203)	(0.0196)	(0.0203)	(0.0197)	(0.0205)	(0.0197)
Grandparents' health condition (1=both excellent/good)	-0.0103	-0.0230	-0.0099	-0.0222	-0.0108	-0.0220	-0.0102	-0.0222
	(0.0177)	(0.0174)	(0.0178)	(0.0174)	(0.0178)	(0.0174)	(0.0178)	(0.0174)
Mother's education years			-0.0309***	-0.0377***	-0.0320	-0.0390***	-0.0303***	-0.0379***
			(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0025)	(0.0025)
Female child (1=yes)	-0.0030	-0.0100	-0.0029	-0.0101	0.0124	-0.0098	-0.0033	-0.0104
	(0.0146)	(0.0141)	(0.0146)	(0.0141)	(0.0022)	(0.0141)	(0.0146)	(0.0141)
Sibling number	0.0190*	0.0085	0.0167	0.0033	0.0165	0.0035	0.0186	0.0072
	(0.0111)	(0.0106)	(0.0108)	(0.0104)	(0.0109)	(0.0104)	(0.0112)	(0.0106)
Household annual income	-0.0816***	-0.0802***	-0.0818***	-0.0810***	-0.0833***	-0.0828***		
	(0.0108)	(0.0108)	(0.0108)	(0.0108)	(0.0251)	(0.0107)		
Mother's annual wage							-0.0410**	-0.0388***
							(0.0203)	(0.0239)
Household other income							-0.0307***	-0.0300***

							(0.0109)	(0.0109)
Owning refrigerator in household (1=yes)	-0.0729***	-0.0746***	-0.0733***	-0.0849***	-0.0958***	-0.0908***	-0.0714***	-0.0735***
	(0.0255)	(0.0262)	(0.0254)	(0.0260)	(0.0251)	(0.0256)	(0.0257)	(0.0261)
Ordinary annual wage for female worker in community	-0.0479***	-0.0460***	-0.0471***	-0.0456***	-0.0463***	-0.0465***	-0.0466***	-0.0457***
	(0.0112)	(0.0128)	(0.0111)	(0.0128)	(0.0112)	(0.0129)	(0.0113)	(0.0128)
Market in village (1=yes)	0.0222	0.0325**	0.0229	0.0239	0.0209	0.0212	0.0223	0.0228
	(0.0158)	(0.0159)	(0.0158)	(0.0158)	(0.0158)	(0.0158)	(0.0158)	(0.0159)
Health service in village (1=yes)	0.0008	0.0179	-0.0013	-0.0190	0.0021	0.0203	0.0016	0.0189
	(0.0150)	(0.0151)	(0.0151)	(0.0151)	(0.0151)	(0.0151)	(0.0151)	(0.0151)
Year effect	No	Yes	No	Yes	No	Yes	No	Yes
County effect	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,339	3,339	3,339	3,339	3,339	3,339	3,339	3,339
R-squared/Pseudo R-squared	0.259	0.321	0.259	0.313	0.256	0.317	0.259	0.321

Notes: the same as Appendix P.

V. Sensitivity test 1, Effect of maternal employment, mothers' working hours and mothers' income on child health development – underweight & IV-probit estimation

Dependent variable: underweight (1=yes)	(1)		(2)		(3)		(4)	
					IV-probit			
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)						-0.0626**		-0.0694**
						(0.0243)		(0.0276)
Mother's working hours		-0.0080		-0.0607				
		(0.0862)		(0.1060)				
Instrument - bus stop	0.2160**		0.3380***		0.0438***		0.0445***	
	(0.0848)		(0.0980)		(0.0118)		(0.0131)	
Instrument - road type	0.5650***		0.4820***		0.1170***		0.1170***	
	(0.0919)		(0.0914)		(0.0131)		(0.0132)	
Instrument - age of youngest child	-0.1110***		-0.0954***		-0.0189***		-0.0184***	
	(0.0271)		(0.0265)		(0.0037)		(0.0037)	
Age	-0.1290*	0.0478	-0.1280*	0.0668	-0.0099	0.0483	-0.0117	0.0715
	(0.0711)	(0.0483)	(0.0677)	(0.0513)	(0.0093)	(0.0486)	(0.0091)	(0.0514)
Age square	0.0039	0.0019	0.0049	0.0009	-0.0004	0.0019	-0.0001	0.0006
	(0.0061)	(0.0041)	(0.0058)	(0.0044)	(0.0008)	(0.0041)	(0.0008)	(0.0044)
Moher's age	0.0166	0.0209	0.0068	0.0249	0.0094**	0.0227	0.0076**	0.0265
	(0.0279)	(0.0213)	(0.0263)	(0.0220)	(0.0038)	(0.0221)	(0.0038)	(0.0228)
Mother's age square	-0.0002	-0.0003	-0.0001	-0.0004	-0.0001***	-0.0003	-0.0001**	-0.0004
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0001)	(0.0003)
Co-resident with grandparents (1=yes)	0.0348	-0.0134	0.0246	-0.0712	0.0520***	-0.0190	0.0482***	-0.0681
	(0.1220)	(0.0792)	(0.1190)	(0.0812)	(0.0171)	(0.0838)	(0.0171)	(0.0856)
Grandparents' health condition (1=both	0.2570**	-0.0696	0.3440***	-0.0760	0.0352**	-0.0747	-0.0332**	-0.1190
	(0.0997)	(0.0716)	(0.1010)	(0.0788)	(0.0138)	(0.0688)	(0.0141)	(0.0734)
Mother's education years	0.1150***	-0.0333**	0.1240***	-0.0400**	0.0205***	-0.0306**	0.0213***	-0.0334**
	(0.0128)	(0.0133)	(0.0127)	(0.0178)	(0.0022)	(0.0134)	(0.0022)	(0.0157)
Female child (1=yes)	0.0500	0.0299	0.0499	0.0044	0.0049	0.0273	0.0070	0.0026
	(0.0855)	(0.0560)	(0.0826)	(0.0577)	(0.0116)	(0.0560)	(0.0113)	(0.0581)
Sibling number	-0.2790***	0.0464	-0.1380**	0.0254	-0.0289***	0.0465	-0.0112	0.0327

	(0.0601)	(0.0474)	(0.0596)	(0.0462)	(0.0090)	(0.0439)	(0.0092)	(0.0441)
Household income	0.1530**	-0.0777**	0.1540**	-0.0813**				
	(0.0626)	(0.0322)	(0.0620)	(0.0374)				
Mother's annual wage					0.0706***	-0.0500**	0.0809***	-0.0490**
					(0.0197)	(0.0236)	(0.0205)	(0.0214)
Other household income					0.0245***	-0.0344***	0.0262***	-0.0353***
					(0.0086)	(0.0119)	(0.0087)	(0.0121)
Owning refrigerator in household	-0.7993***	-0.2630**	-0.7570***	-0.2620**	-0.3620***	-0.2410***	-0.3460***	-0.2300***
	(0.1710)	(0.1040)	(0.1690)	(0.1200)	(0.0236)	(0.0800)	(0.0236)	(0.0750)
Ordinary wage for female worker in	0.1140*	0.0026	0.1210*	0.0727	0.0328***	0.0112	0.0123	0.0666
	(0.0595)	(0.0425)	(0.0697)	(0.0560)	(0.0084)	(0.0438)	(0.0097)	(0.0551)
Market in village (1=yes)	0.2370***	0.0626	0.1990**	0.1010	0.0483***	0.0590	0.0461***	0.0940
	(0.0908)	(0.0678)	(0.0921)	(0.0720)	(0.0123)	(0.0678)	(0.0127)	(0.0738)
Health service in village (1=yes)	0.1970**	-0.0236	0.2950***	-0.0170	0.0305**	-0.0197	0.0378***	-0.0009
	(0.0885)	(0.0597)	(0.0897)	(0.0690)	(0.0120)	(0.0587)	(0.0122)	(0.0647)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	3,354		3,354		3,354		3,354	
F statistics on instrument	56.65	/	45.64	/	78.12	/	68.94	/
Wald test on endogeneity (p value in	2.21 （0.034）		3.16 （0.017）		2.67 （0.024）		3.00 （0.019）	
Sargan Test (p value in bracket)	1.41 (0.689)		1.27 (0.359)		3.07 (0.216)		2.68 (0.267)	

Notes: Marginal effects are presented for IV-Probit estimations. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Income variables (household income, mothers' annual wage, household other income and ordinal annual wage for female workers) take logged value, in

Instruments are access to bus stop (1=yes) and paved road (1=yes)

W. Sensitivity test 1, Effect of maternal employment, mothers' working hours and mothers' income on child health development – underheight & IV-probit estimation

Dependent variable: underheight (1=yes)	(1)		(2)		(3)		(4)	
	IV-probit							
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)						-0.1634***		-0.1922***
						(0.0573)		(0.0527)
Mother's working hours		-0.0724		-0.0728				
		(0.0719)		(0.0731)				
Instrument - bus stop	0.2160**		0.3380***		0.0438***		0.0445***	
	(0.0848)		(0.0980)		(0.0118)		(0.0131)	
Instrument - road type	0.5650***		0.4820***		0.1170***		0.1170***	
	(0.0919)		(0.0914)		(0.0131)		(0.0132)	
Instrument - age of youngest child	-0.1110***		-0.0954***		-0.0189***		-0.0184***	
	(0.0271)		(0.0265)		(0.0037)		(0.0037)	
Age	-0.1290*	-0.0049	-0.1280*	-0.0004	-0.0099	0.0026	-0.0117	0.0136
	(0.0711)	(0.0380)	(0.0677)	(0.0383)	(0.0093)	(0.0384)	(0.0091)	(0.0400)
Age square	0.0039	-0.0028	0.0049	-0.0029	-0.0004	-0.0035	-0.0001	-0.0045
	(0.0061)	(0.0034)	(0.0058)	(0.0035)	(0.0008)	(0.0035)	(0.0008)	(0.0036)
Moher's age	0.0166	-0.0069	0.0068	-0.0067	0.0094**	-0.0012	0.0076**	-0.0024
	(0.0279)	(0.0188)	(0.0263)	(0.0188)	(0.0038)	(0.0198)	(0.0038)	(0.0214)
Mother's age square	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001***	-0.0001	-0.0001**	-0.0001
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0003)
Co-resident with grandparents (1=yes)	0.2048*	0.0322	0.2246*	0.0274	0.0520***	0.0617	0.0482***	0.0051
	(0.1220)	(0.0681)	(0.1190)	(0.0674)	(0.0171)	(0.0723)	(0.0171)	(0.0746)
Grandparents' health condition (1=both excellent/good)	0.2570**	-0.0567	0.3440***	-0.1420**	0.0552***	-0.0339	0.0532***	-0.0893
	(0.0997)	(0.0607)	(0.1010)	(0.0612)	(0.0138)	(0.0594)	(0.0141)	(0.0623)
Mother's education years	0.1150***	-0.0287**	0.1240***	-0.0320**	0.0205***	-0.0289**	0.0213***	-0.0353***
	(0.0128)	(0.0127)	(0.0127)	(0.0149)	(0.0022)	(0.0117)	(0.0022)	(0.0139)
Female child (1=yes)	0.0500	-0.0080	0.0499	-0.0304	0.0049	-0.0115	0.0070	-0.0376
	(0.0855)	(0.0483)	(0.0826)	(0.0476)	(0.0116)	(0.0488)	(0.0113)	(0.0502)

Sibling number	-0.2790***	0.0383	-0.1380**	0.0045	-0.0289***	0.0555	-0.0112	0.0192
	(0.0601)	(0.0425)	(0.0596)	(0.0381)	(0.0090)	(0.0389)	(0.0092)	(0.0385)
Household income	-0.1530**	-0.0686**	-0.1540**	-0.0709**				
	(0.0626)	(0.0295)	(0.0620)	(0.0309)				
Mother's annual wage					0.0706***	-0.0516**	0.0809***	0.0597**
					(0.0197)	(0.0241)	(0.0205)	(0.0257)
Other household income					0.0245***	-0.0313**	0.0262***	-0.0378***
					（0.0086）	(0.0139)	(0.0087)	(0.0141)
Owning refrigerator in household	-0.9930***	-0.1250**	-0.7570***	-0.1270**	-0.3620***	-0.1380**	-0.3460***	-0.1430**
	(0.1710)	(0.0610)	(0.1690)	(0.0610)	(0.0236)	(0.0630)	(0.0236)	(0.0629)
Ordinary wage for female worker in	0.1140*	-0.1580***	0.1210*	-0.0234	0.0328***	-0.1620***	0.0123	-0.0464
	(0.0595)	(0.0371)	(0.0697)	(0.0456)	(0.0084)	(0.0386)	(0.0097)	(0.0461)
Market in village (1=yes)	0.2370***	0.0931	0.1990**	0.0490	0.0483***	0.0908	0.0461***	0.0500
	(0.0908)	(0.0660)	(0.0921)	(0.0540)	(0.0123)	(0.0577)	(0.0127)	(0.0613)
Health service in village (1=yes)	0.1970**	-0.0109	0.2950***	-0.0007	0.0305**	-0.0031	0.0378***	0.0425
	(0.0885)	(0.0516)	(0.0897)	(0.0586)	(0.0120)	(0.0514)	(0.0122)	(0.0569)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	3339		3339		3339		3339	
F statistics on instrument	35.55	/	25.68	/	90.46	/	63.00	/
Wald test on endogeneity	3.29 (0.040)		4.95 (0.026)		1.46 (0.049)		3.57 (0.038)	
Sargan Test (p value in bracket)	3.67 (0.216)		3.58 (0.238)		2.69 （0.285）		2.64 （0.271）	

Notes: The same as appendix V.

X. Sensitivity test 2, effect of maternal employment, parents' BMI and household infrastructure on child health development – underweight & probit estimation

Dependent variable: underweight (1=yes)	(1)		(2)		(3)		(4)	
Explanatory variables	Probit							
Maternal employment (1=yes)	-0.0418**	-0.0357**	-0.0423**	-0.0361**	-0.0406**	-0.0348**	-0.0541***	-0.0437***
	(0.0171)	(0.0171)	(0.0172)	(0.0171)	(0.0168)	(0.0169)	(0.0174)	(0.0173)
Age	0.0128	0.0148	0.0117	0.0146	0.0090	0.0127	0.0107	0.0134
	(0.0103)	(0.0101)	(0.0104)	(0.0102)	(0.0106)	(0.0103)	(0.0104)	(0.0102)
Age square	0.0002	0.0001	0.0002	0.0001	0.0005	0.0003	0.0003	0.0001
	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
Mother's age			0.0046	0.0043	0.0060	0.0051	0.0042	0.0040
			(0.0043)	(0.0042)	(0.0044)	(0.0041)	(0.0042)	(0.0041)
Mother's age square			-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
			(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Co-resident with grandparents (1=yes)	0.0077	-0.0044	-0.0088	-0.0035	-0.0012	-0.0069	-0.0065	-0.0046
	(0.0172)	(0.0164)	(0.0172)	(0.0164)	(0.0166)	(0.0161)	(0.0172)	(0.0164)
Grandparents' health condition (1=both excellent/good)	-0.0108	-0.0158	-0.0104	-0.0145	-0.0122	-0.0144	-0.0097	-0.0140
	(0.0148)	(0.0144)	(0.0148)	(0.0144)	(0.0143)	(0.0141)	(0.0148)	(0.0144)
Mother's education years			-0.0416***	-0.0435***	-0.0415***	-0.0436***	-0.0447***	-0.0040
			(0.0018)	(0.0018)	(0.0018)	(0.0018)	(0.0018)	(0.0019)
Female child (1=yes)	0.0077	0.0054	0.0077	0.0051	0.0087	0.0067	0.0078	0.0058
	(0.0123)	(0.0118)	(0.0123)	(0.0118)	(0.0121)	(0.0117)	(0.0123)	(0.0118)
Sibling number	0.0205**	0.0107	0.0203**	0.0100	0.0213**	0.0110	0.0187*	0.0104
	(0.0097)	(0.0092)	(0.0096)	(0.0093)	(0.0093)	(0.0091)	(0.0097)	(0.0092)
Household total annual income	-0.0574***	-0.0565***	-0.0873***	-0.0862***	-0.0857***	-0.0857***	-0.0876***	-0.0868***
	(0.0116)	(0.0117)	(0.0088)	(0.0087)	(0.0086)	(0.0087)	(0.0088)	(0.0087)
Owning refrigerator in household (1=yes)	-0.0887***	-0.0835**	-0.0884***	-0.0820***	-0.0731***	-0.0794***	-0.0985***	-0.0981***
	(0.0220)	(0.0227)	(0.0220)	(0.0226)	(0.0223)	(0.0228)	(0.0219)	(0.0225)
Ordinary annual wage for female worker in community	0.0018	0.0112	0.0017	0.0116	0.0089	0.0115	0.0014	0.0102
	(0.0093)	(0.0114)	(0.0092)	(0.0114)	(0.0092)	(0.0113)	(0.0093)	(0.0115)

Market in community (1=yes)	0.0130	0.0105	0.0127	0.0104	0.0056	0.0052	0.0090	0.0073
	(0.0134)	(0.0137)	(0.0134)	(0.0137)	(0.0131)	(0.0135)	(0.0134)	(0.0136)
Health service in village (1=yes)	-0.0013	0.0008	-0.0016	-0.0016	-0.0037	-0.0015	-0.0023	-0.0029
	(0.0126)	(0.0126)	(0.0126)	(0.0127)	(0.0124)	(0.0126)	(0.0127)	(0.0128)
Mother's BMI					-0.0175***	-0.0133***		
					(0.0027)	(0.0027)		
Father's BMI					-0.0162***	-0.0113***		
					(0.0029)	(0.0028)		
Tap water in household							-0.0569***	-0.0339**
							(0.0131)	(0.0132)
Flush toilet in household							-0.0300	-0.0320
							(0.0382)	(0.0385)
Year effect	No	Yes	No	Yes	No	Yes	No	Yes
County effect	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2940	2940	2940	2940	2940	2940	2940	2940
R-squared/Pseudo R-squared	0.251	0.317	0.251	0.318	0.296	0.340	0.260	0.321

Notes: Marginal effects are presented for Probit estimations. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
All income variables take logged value, in RMB. Mother's annual wage takes fitted value.

Y. Sensitivity test 2, effect of maternal employment, parents' BMI and household infrastructure on child health development – underheight & probit estimation

Dependent variable: underheight (1=yes)	(1)		(2)		(3)		(4)	
Explanatory variables	Probit							
Maternal employment (1=yes)	-0.0798***	-0.0879***	-0.0796***	-0.0877***	-0.0716***	-0.0848***	-0.0890***	-0.0887***
	(0.0210)	(0.0208)	(0.0210)	(0.0208)	(0.0208)	(0.0208)	(0.0214)	(0.0213)
Age	0.0001	0.0003	-0.0001	0.0011	-0.0019	0.0005	-0.0001	0.0017
	(0.0121)	(0.0118)	(0.0122)	(0.0119)	(0.0122)	(0.0119)	(0.0122)	(0.0119)
Age square	-0.0012	-0.0012	-0.0012	-0.0012	-0.0010	-0.0011	-0.0012	-0.0012
	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)
Mother's age			-0.0007	-0.0015	0.0008	-0.0009	-0.0011	-0.0016
			(0.0059)	(0.0060)	(0.0059)	(0.0060)	(0.0059)	(0.0060)
Mother's age square			0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
			(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Co-resident with grandparents (1=yes)	0.0186	-0.0026	0.0188	-0.0026	0.0128	-0.0033	0.0158	-0.0035
	(0.0218)	(0.0209)	(0.0218)	(0.0209)	(0.0216)	(0.0209)	(0.0219)	(0.0210)
Grandparents' health condition (1=both excellent/good)	-0.0291	-0.0402**	-0.0295	-0.0402**	-0.0316*	-0.0409**	-0.0286	-0.0403**
	(0.0188)	(0.0184)	(0.0189)	(0.0185)	(0.0186)	(0.0184)	(0.0188)	(0.0185)
Mother's education years			-0.0386***	-0.0361***	-0.0387***	-0.0362***	-0.0388***	-0.0359**
			-0.0023	(0.0023)	(0.0023)	(0.0023)	(0.0023)	(0.0023)
Female child (1=yes)	-0.0001	-0.0040	-0.0008	-0.0042	0.0007	-0.0031	-0.0012	-0.0049
	(0.0155)	(0.0151)	(0.0156)	(0.0151)	(0.0155)	(0.0152)	(0.0155)	(0.0151)
Sibling number	0.0311**	0.0197*	0.0311**	0.0193	0.0309**	0.0194	0.0302**	0.0193
	(0.0122)	(0.0118)	(0.0122)	(0.0118)	(0.0121)	(0.0118)	(0.0122)	(0.0119)
Household annual income	-0.0330***	-0.0265**	-0.0331***	-0.0265**	-0.0309***	-0.0260**	-0.0332***	-0.0266**
	(0.0116)	(0.0115)	(0.0116)	(0.0115)	(0.0115)	(0.0115)	(0.0117)	(0.0115)
Owning refrigerator in household (1=yes)	-0.0850***	-0.0315	-0.0857***	-0.0311	-0.0692***	-0.0292	-0.0920***	-0.0306
	(0.0256)	(0.0259)	(0.0256)	(0.0259)	(0.0257)	(0.0260)	(0.0258)	(0.0261)
Ordinary annual wage for female worker in community	-0.0456***	-0.0155	-0.0457***	-0.0153	-0.0405***	-0.0153	-0.0472***	-0.0144
	(0.0120)	(0.0140)	(0.0120)	(0.0140)	(0.0121)	(0.0140)	(0.0121)	(0.0141)

Market in community (1=yes)	0.0130	0.0143	0.0130	0.0145	0.0102	0.0137	0.0118	0.0152
	(0.0170)	(0.0170)	(0.0170)	(0.0170)	(0.0169)	(0.0170)	(0.0170)	(0.0170)
Health service in village (1=yes)	0.00537	0.0177	0.0050	0.0182	0.0036	0.0172	0.0056	0.0158
	(0.0160)	(0.0161)	(0.0160)	(0.0162)	(0.0160)	(0.0162)	(0.0162)	(0.0163)
Mother's BMI					-0.0129***	-0.0050		
					(0.0030)	(0.0031)		
Father's BMI					-0.0111***	-0.0029		
					(0.0032)	(0.0032)		
Tap water in household							-0.0403**	-0.0416**
							(0.0167)	(0.0168)
Flush toilet in household							0.0392	0.0474
							(0.0432)	(0.0422)
Year effect	No	Yes	No	Yes	No	Yes	No	Yes
County effect	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2940	2940	2940	2940	2940	2940	2940	2940
R-squared/Pseudo R-squared	0.258	0.313	0.258	0.313	0.269	0.314	0.260	0.313

Note: The same as appendix X.

z. Sensitivity test 2, effect of maternal employment, parents' BMI and household infrastructure on child health development – underweight & IV-probit estimation

Dependent variable: underweight (1=yes)	(1)		(2)		(3)		(4)	
	IV-probit							
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)		-0.0638**		-0.0610**		-0.0558**		-0.0552**
		(0.0270)		(0.0285)		(0.0242)		(0.0245)
Instrument - bus stop	0.0651***		0.0614***		0.0467***		0.0483***	
	(0.0139)		(0.0152)		(0.0138)		(0.0151)	
Instrument - road type	0.136***		0.1440***		0.1250***		0.1310***	
	(0.0153)		(0.0153)		(0.0150)		(0.0150)	
Instrument - age of youngest child	-0.0253***		-0.0242***		-0.0259***		-0.0241***	
	(0.0045)		(0.0044)		(0.0044)		(0.0044)	
Age	-0.0073	0.0357	-0.0067	0.0649	-0.0092	0.0502	-0.0096	0.0703
	(0.0110)	(0.0539)	(0.0108)	(0.0553)	(0.0110)	(0.0518)	(0.0107)	(0.0537)
Age square	-0.0011	0.0034	-0.0009	0.0016	-0.0009	0.00161	-0.0007	0.0008
	(0.0009)	(0.0045)	(0.0009)	(0.0047)	(0.0009)	(0.00440)	(0.0009)	(0.0046)
Mother's age	0.0121***	0.0228	0.0111***	0.0251	0.0113***	0.0187	0.0101**	0.0213
	(0.0042)	(0.0226)	(0.0042)	(0.0227)	(0.0041)	(0.0213)	(0.0041)	(0.0220)
Mother's age square	-0.0002***	-0.0003	-0.0002***	-0.0004	-0.0002***	-0.0002	-0.0002***	-0.0004
	(0.0001)	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0003)
Co-resident with grandparents (1=yes)	0.0686***	-0.0528	0.0528***	-0.0499	0.0585***	0.0203	0.0458**	-0.0230
	(0.0197)	(0.0881)	(0.0199)	(0.0893)	(0.0198)	(0.0892)	(0.0199)	(0.0894)
Grandparents' health condition (1=both excellent/good)	0.0166	-0.0559	0.0345**	-0.0715	0.0150	-0.0466	0.0330**	-0.0739
	(0.0163)	(0.0719)	(0.0165)	(0.0761)	(0.0163)	(0.0724)	(0.0165)	(0.0763)
Mother's education years	0.0269***	-0.0361***	0.0282***	-0.0251	0.0256***	-0.0273*	0.0260***	-0.0201
	(0.0020)	(0.0137)	(0.0021)	(0.0160)	(0.0020)	(0.0145)	(0.0020)	(0.0163)
Female child (1=yes)	0.0111	0.0402	0.0125	0.0347	0.0102	0.0378	0.0125	0.0303
	(0.0135)	(0.0607)	(0.0132)	(0.0626)	(0.0134)	(0.0601)	(0.0131)	(0.0620)
Sibling number	-0.0159	0.1140**	-0.0031	0.0597	-0.0183	0.0940**	-0.0018	0.0543
	(0.0115)	(0.0465)	(0.0118)	(0.0485)	(0.0117)	(0.0474)	(0.0119)	(0.0484)

Household income	-0.0417***	-0.1070**	-0.0420***	-0.0935*	-0.0420***	-0.0939**	-0.0420***	-0.0869*
	(0.0104)	(0.0458)	(0.0106)	(0.0501)	(0.0103)	(0.0469)	(0.0105)	(0.0505)
Owning refrigerator in household (1=yes)	-0.3270***	-0.0850**	-0.3290***	-0.0830**	-0.3070***	-0.0830**	-0.3000***	-0.4960***
	(0.0239)	(0.0340)	(0.0240)	(0.0350)	(0.0239)	(0.0340)	(0.0240)	(0.1860)
Ordinary annual wage for female worker	0.0440***	0.0624	0.0094	0.0586	0.0448***	-0.0015	0.0051	0.0534
	(0.0101)	(0.0476)	(0.0115)	(0.0600)	(0.0102)	(0.0487)	(0.0114)	(0.0599)
Market in village (1=yes)	0.0547***	-0.0137	0.0566***	0.0121	0.0504***	0.0336	0.0481***	0.0400
	(0.0145)	(0.0727)	(0.0148)	(0.0791)	(0.0146)	(0.0719)	(0.0148)	(0.0776)
Health service in village (1=yes)	-0.0111	-0.0102	-0.0149	-0.0035	-0.0063	0.0130	-0.0164	0.0144
	(0.0142)	(0.0624)	(0.0144)	(0.0678)	(0.0141)	(0.0619)	(0.0144)	(0.0673)
Mother's BMI	0.0022	-0.0889***	0.0026	-0.0721***				
	(0.0027)	(0.0135)	(0.0027)	(0.0146)				
Father's BMI	0.0075***	-0.0850***	0.0087***	-0.0621***				
	(0.0029)	(0.0144)	(0.0029)	(0.0155)				
Tap water in household					0.0260	-0.0456**	0.0230	-0.0410**
					(0.0150)	(0.0200)	(0.0150)	(0.0200)
Flush toilet in household					0.0586	-0.1570	0.0509	-0.1660
					(0.0416)	(0.1880)	(0.0405)	(0.2030)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	2940		2940		2940		2940	
F statistics on instrument	103.22	/	69.21	/	107.38	/	73.83	/
Wald test on endogeneity (p value in	2.18 (0.041)		2.22 (0.037)		2.73 (0.033)		3.00 (0.030)	
Sargan Test (p value in bracket)	1.26 (0.354)		1.30 (0.355)		3.00 (0.219)		2.60 (0.270)	

Notes: Marginal effects are presented. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

All income variables take logged value, in RMB. Mother's annual wage takes fitted value.

Instruments are access to bus stop (1=yes) and paved road (1=yes)

AA. Sensitivity test 2, effect of maternal employment, parents' BMI and household infrastructure on child health development – underheight & IV-probit estimation

Dependent variable: underheight (1=yes)	(1)		(2)		(3)		(4)	
	IV-probit							
Explanatory variables	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
Maternal employment (1=yes)		-0.1570**		-0.1632**		-0.1522**		-0.1682**
		(0.0741)		(0.0776)		(0.0761)		(0.0726)
Instrument - bus stop	0.0651***		0.0614***		0.0467***		0.0483***	
	(0.0139)		(0.0152)		(0.0138)		(0.0151)	
Instrument - road type	0.1360***		0.1440***		0.1250***		0.1310***	
	(0.0153)		(0.0153)		(0.0150)		(0.0150)	
Instrument - age of youngest child	-0.0253***		-0.0242***		-0.0259***		-0.0241***	
	(0.0045)		(0.0044)		(0.0044)		(0.0044)	
Age	-0.0073	-0.0060	-0.0067	0.0072	-0.0092	0.0033	-0.0096	0.0108
	(0.0110)	(0.0419)	(0.0108)	(0.0429)	(0.0110)	(0.0414)	(0.0107)	(0.0428)
Age square	-0.0011	-0.0033	-0.0009	-0.0043	-0.0009	-0.0043	-0.0007	-0.0046
	(0.0009)	(0.0038)	(0.0009)	(0.0038)	(0.0009)	(0.0037)	(0.0009)	(0.0038)
Mother's age	0.0121***	0.0030	0.0111***	0.0004	0.0113***	-0.0008	0.0101**	-0.0019
	(0.0042)	(0.0205)	(0.0042)	(0.0217)	(0.0041)	(0.0203)	(0.0041)	(0.0219)
Mother's age square	-0.0002***	0.0001	-0.0002***	0.0001	-0.0002***	0.0001	-0.0002***	0.0001
	(0.0001)	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0003)
Co-resident with grandparents (1=yes)	0.0686***	0.0439	0.0528***	0.0098	0.0585***	0.0668	0.0458**	0.0077
	(0.0197)	(0.0782)	(0.0199)	(0.0780)	(0.0198)	(0.0771)	(0.0199)	(0.0778)
Grandparents' health condition (1=both excellent/good)	-0.0166	-0.1070*	-0.0345**	-0.1540**	-0.0150	-0.0965	-0.0330**	-0.1520**
	(0.0163)	(0.0630)	(0.0165)	(0.0657)	(0.0163)	(0.0630)	(0.0165)	(0.0658)
Mother's education years	0.0269***	-0.0283**	0.0282***	-0.0115	0.0256***	-0.0232*	0.0260***	-0.0102
	(0.0020)	(0.0124)	(0.0021)	(0.0143)	(0.0020)	(0.0126)	(0.0020)	(0.0147)
Female child (1=yes)	0.0111	0.0025	0.0125	-0.0099	0.0102	-0.0036	0.0125	-0.0157
	(0.0135)	(0.0523)	(0.0132)	(0.0536)	(0.0134)	(0.0519)	(0.0131)	(0.0535)
Sibling number	-0.0159	0.1040**	-0.0031	0.0668	-0.0183	0.0977**	-0.0018	0.0672
	(0.0115)	(0.0411)	(0.0118)	(0.0422)	(0.0117)	(0.0416)	(0.0119)	(0.0423)

Household income	-0.0417***	-0.1030**	-0.0420***	-0.0752*	-0.0420***	-0.0996**	-0.0420***	-0.0755**
	(0.0104)	(0.0428)	(0.0106)	(0.0457)	(0.0103)	(0.0438)	(0.0105)	(0.0368)
Owning refrigerator in household	-0.3270***	-0.0930**	-0.3290***	-0.0982**	-0.3070***	-0.1000**	-0.3000***	-0.0932**
	(0.0239)	(0.0410)	(0.0240)	(0.0450)	(0.0239)	(0.0430)	(0.0240)	(0.0445)
Ordinary annual wage for female worker in community	0.0440***	-0.1380***	0.0094	-0.0494	0.0448***	-0.1660***	0.0051	-0.0478
	(0.0101)	(0.0424)	(0.0115)	(0.0497)	(0.0102)	(0.0421)	(0.0114)	(0.0497)
Market in village (1=yes)	0.0547***	0.0367	0.0566***	0.0761	0.0504***	0.0553	0.0481***	0.0793
	(0.0145)	(0.0634)	(0.0148)	(0.0677)	(0.0146)	(0.0621)	(0.0148)	(0.0669)
Health service in village (1=yes)	-0.0111	0.0117	-0.0149	0.0531	-0.0063	0.0166	-0.0164	0.0467
	(0.0142)	(0.0540)	(0.0144)	(0.0580)	(0.0141)	(0.0539)	(0.0144)	(0.0584)
Mother's BMI	0.0022	-0.0433***	0.0026	-0.0157				
	(0.0027)	(0.0103)	(0.0027)	(0.0112)				
Father's BMI	0.0075***	-0.0372***	0.0087***	-0.0066				
	(0.0029)	(0.0112)	(0.0029)	(0.0121)				
Tap water in household					0.0226	-0.0680*	0.0226	-0.0667**
					(0.0150)	(0.0353)	(0.0150)	(0.0313)
Flush toilet in household					0.0586	0.1440	0.0509	0.1890
					(0.0416)	(0.1450)	(0.0405)	(0.1500)
Year effect	No		Yes		No		Yes	
County effect	No		Yes		No		Yes	
Observations	2,940		2,940		2,940		2,940	
F statistics on instrument	99.89	/	69.21	/	107.38	/	75.24	
Wald test on endogeneity	3.01 (0.030)		2.79 (0.037)		3.02(0.032)		2.85 （0.038）	
Sargan Test (p value in bracket)	2.36 (0.205)		1.89 (0.298)		1.55 (0.318)		2.60 (0.200)	

Notes: The same as appendix Y.