ABSTRACT

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China, the most populous country in the world, has had high economic growth during the past two decades. While economic reforms in China have received a great deal of attention, researchers have paid far less attention to the effects of population policies. In this dissertation, I discuss the One-Child policy in China and its impact on human capital accumulation. I examine the impact of family size on parental health outcomes by exploiting the exogenous change in family size under the One-Child Policy in China. The results indicate that the number of children in a family significantly affects measures of health, such as weight and blood pressure. The impact of women's relative bargaining power on household food consumption and health outcomes are also examined in this dissertation. I find no significant effects of bargaining power and common preference could not be rejected.

POPULATION POLICY AND HUMAN CAPITAL ACCUMULATION IN CHINA

By

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Dedication

To my parents and the city of Chongqing.

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Table of Contents

List of Tables

List of Figures

Chapter 1: China and the One-Child Policy

China is the most populous nation in the world. It has more than 1.3 billion people, which accounts for one-fifth of the earth's total population. Any change in the population policy could have a big impact on Chinese society. The One-Child policy, enforced in 1979, restricted the number of children that a couple can have to only one for urban populations and typically two for farmers. This policy was a response to the rapid population growth in 1960s and 1970s and was considered to be a temporary policy at the time of introduction. But, almost 3 decades later, it was still in effect. In March 2008, China's National Population and Family Planning Commission announced that this policy would remain in place for at least another decade[1]. My dissertation discusses how this unique population policy could affect human capital accumulation in China. This chapter gives a brief background on the policy, the controversies related to the One-Child policy and its impact on fertility levels.

1.1 The One-Child Policy in China

1.1.1 History of Population Growth and Population Policy in China

Before the enforcement of the One-Child policy, there were several changes in the trends of population growth. In 1949, the population in China was approximately 540 million. It increased to approximately 1 billion at the end of 1970s. There were two periods of rapid population growth: One, from 1953 to 1958, and the other, from 1962 to 1973. During the first period, improved living standards made it affordable to raise more children. Approximately 85 million babies were born and the rate of natural increase is

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[1] "China Sticking With One-Child Policy." *The New York Times*, March 11, 2008.

23 ‰ per year[2]. The following three years were the famous Great Leap Forward period. China experienced a tragic famine due to the shortage of agricultural products. Approximately 20 million people died during this period and the birth rate was also very low. After the Great Famine, from 1962 to 1973, 220 million people were born and the rate of natural increase increased to 25.5‰ per year.

The population policies also varied in the different periods. After the establishment of the People's Republic of China in 1949, the main target of the government was to revive the economic activities and consolidate political power. There were a lot of problems that the Chinese government had to deal with at that time, such as poverty, shortage of food and disease control. Agricultural production was the focus of economic development and labor was a very important input into production. In order to encourage people to work hard and revive the economy, Chairman Mao declared it was good to have a large population. "More people, more power we will have" was a very popular proverb at that time. Births were encouraged; subsidies were given to people who had high birth parity. Some places did not allow abortion or sterilization. At the same time, due to the improvement in health services, the death rate decreased greatly. Together there was a rapid population growth in 1950s.

After the Great Famine (1958-1961), shortages of food declined. In 1962 and 1963, there was an extremely high birth rate. The rate of natural increase was 37.01‰ in 1962 and 43.37‰ in 1963. High birth rates made the government start to discourage births and design programs for population control. Committees for family planning were established in central and local governments. They distributed pills for contraception, improved the skills of sterilization and advertised the thoughts of "One kid is not too few; Two is great; Three are too much."

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[2] Data comes from China Statistical Yearbooks

However, these family planning programs were not in effect during the Cultural Revolution, which started in the middle of the 1960s. Governments did not have much power and population growth was out of control. It was not until 1973 that family planning programs were re-proposed. People were encouraged to have fewer children and longer birth spacing. A large number of contraception pills were distributed and one-child families were rewarded. Those programs turned out to be very helpful in the enforcement of the One-Child population control policy in late 1970s.

1.1.2 Family Planning and the One-Child Policy in China

The One-Child policy was introduced in China in 1979 as a response to the rapid population growth of the 1960s and 1970s with desperate predictions about its negative consequences. Although there were some family planning programs and people were encouraged to have fewer children before 1979, this strong birth control policy was still unexpected. When the policy was enforced in 1979, people did not understand why the number of children that a couple could have needed to be restricted to just one. Local governments were responsible for helping people understanding the necessity of this policy and providing contraceptive services, such as the Pill, IUDs, female sterilization, male sterilization. When a local government fulfilled the birth target, they received fiscal rewards from the central government; otherwise, they were heavily penalized (Short and Zhai, 1998). Local government officials could be demoted if too many above-quota births were found in their communities. Thus, local governments had a strong incentive to enforce the policy.

Generally, couples can not have a second baby after the policy was implemented. If they already had more than one child before 1979, they were not allowed to have any

3

additional children. Thus, the number of children that a couple could have was significantly decreased by this policy. Above quota births were heavily penalized. If people violated the policy, they were required to pay a very high penalty fee, which could be either a one-time payment or a continuing payment. For a regular payment, the above quota penalty ranged from 10 to 50 percent of the annual income of both husband and wife for a period ranging from 5 to 14 years (Li, 1995). Families violating this policy would also lose benefits, such as the subsidy given for the one-child family from the government. Some of the SOE (State Owned Enterprises) and government employees would also jeopardize their employment status or the chance to be promoted in the future. By erecting such economic incentives, the policy was effective for most families in China at that time. The population growth slowed as the fertility rate was decreased in Chinese society.

In order to allow population growth for certain groups of people, there were some exemption rules in the enforcement of this policy. Ethnic minority couples were allowed to have a second child while the ethnic Han, which accounts for more than 90% of total population, could not. People living in poor and remote areas, such as the mountainous area where the population was sparse, could have a second child. Couples with disabled children or couples who had hazardous occupations could have a second child.

Except for the difference between ethnic groups, the implementation of the One-Child policy was less strict in rural areas. First, there was a relaxation of the rule issued in the late 1980s for people living in rural areas if their first child was a girl. Second, the chance of detection if couples violated the policy was lower in rural areas where hiding kids was comparatively easy. Thus, the One-Child policy led to a larger decline in fertility for the ethnic Han and families that lived in urban areas. This variation in family size is used in the empirical part of this dissertation.

4

1.2 Motivation of the One-Child Policy

There are several reasons why the Chinese government chose such a strong population policy. First, there was fear that the rate of population growth was out of control. Policy makers projected what the population would be if the trend of population growth was maintained. They concluded that the population after two decades would reach a point that food available for each person would be very low and that people's productivity and political stability would be heavily affected. Second, low levels of human capital accumulation affect people's productivity and overall economic growth. The resource of public services is very limited. Many people don't have the opportunity to be enrolled in a high school or college. The government's concern of a child's quality could be reflected in the policy related to "Better Birth." They propagated the knowledge about giving birth and raising children, provided better obstetric and gynecologic services and other basic health facilities.

Using population policies and family planning programs to control population growth is not unique to China. Other developing countries have launched family planning as well. In Singapore, due to the poor endowment of natural resources, land shortage and poverty issues, a policy which does not allow couples to have more than two children was enforced in 1973. India, which is one of the most populous countries in the world, has enforced family planning policies to control rapid population growth as well. The Vietnam government issued a policy of "two-children-only" to avoid the population growing to an unsustainable level. The result of this dissertation could have very important implications for other developing countries, especially for those who have rapid population growth and a low level of human capital accumulation.

1.3 Effect on Fertility

After the enforcement of the One-Child policy, the total fertility rate (TFR) significantly decreased. In 1970, the TFR was 5.9 in China. It dropped to 1.8 in 2002. Some studies pointed out that there would also be a decline in the total fertility rate if there were no One-Child policy. During the process of economic development, children's quality became more and more important. Human capital investments were much more expensive than before. In order to make more investment on health and education to improve the quality of children, couples opted to have fewer children by themselves. Zhang (1990) and Schultz and Zeng (1995) pointed out that socioeconomic developments could account for some of the drop in the total fertility rate.

A strain of literature tries to identify the impact of the One-Child policy on the total fertility rate. McElroy and Yang (2000) used the data from the 1992 Household Economy and Fertility Survey and found that the number of children is significantly lower in counties with higher penalties on above-quota births in rural areas. Li and Zhang (2003) analyzed the role of fines associated with above-quota births in the determination of fertility. They find that there is a higher decline in fertility rates for richer families since the fine is based on income level and poor parents don't have much to lose if they need to pay a fine to have more children. The evidence indicates that fines play a very important role in birth decisions. In other words, the enforcement of the One-Child policy does significantly affect the fertility rate.

1.4 Missing Women and Gender Selection

Sen (1990, 1992) calculated that almost 50 million women in China were 'missing' in the population. Some other developing countries, such as India and Pakistan,

6

had this phenomenon as well. The total number of missing women in Asian countries was more than 100 million. This phenomenon would have a direct impact on the marriage market. Porter (2007) found that, in China, women tended to marry older and taller men when they become scarcer. There are two major competing theories that are used to explain gender imbalance in developing countries. They are biological impact and cultural influence.

The cultural influence mainly comes from the preference for son. In China, the traditional Confucianism in which sons are preferred has a big impact on Chinese culture. Sons are responsible for providing financial support for their retired parents. Generally, children inherit their father's last name rather than mothers. There are also economic concerns in gender preference. In rural areas, men are thought to be more helpful in farming and they generally have a stronger preference for sons when compared with the people who are living in the cities. Family planning policies, such as the One-Child policy, exacerbate this preference. Since the maximum number of children that a couple can have is restricted, people don't have many opportunities to try and get a boy. For the people who have a strong son preference, they have to choose selective abortion or infanticide. Thus, gender selection either through abortion or infanticide is thought to be the main reason for missing women. Coale (1984, 1991) and Coale and Banister (1994) found some possible evidence of female infanticide. Gu and Roy (1995) examined the sex ratio of aborted fetuses in China and found that the women who have only daughters would be more likely to have female fetuses aborted. Similarly, In China Census 1990, Gupta (2008) found that women who had already borne daughters had a much higher probability of bearing a son. Ebenstein (2007) showed that gender selection via infanticide and abortion is the principal explanation for the imbalance of the sex ratio. With the data from China Census 2000, he found that the sex ratio of the first birth was

close to the natural rate and the ratios steeply increased as the order of birth became higher.

It was only in recent years that another strain of the literature provided evidence that part of the imbalanced sex ratio should be attributed to biological factors. Hepatitis B virus (HBV) is a common disease in eastern and southern Asian Countries. Oster (2005) found that Hepatitis B could explain 75% missing women in China since the HBV infected mothers would be 1.5 times more likely to give birth to a boy. However, with a large dataset from Taiwan, Lin and Luoh (2007) found that hepatitis B infection raised the probability of having a son by only 0.25 percent. As a response to their research, Blumberg and Oster (2007) provided evidences that the effect of HBV on the sex ratio at birth was mainly driven by father's HBV status rather than mother's status. In summary, HBV does have an impact on sex ratio at birth, but it's hard to see how large the impact would be and how much of the gender imbalance could be explained.

1.5 China Health and Nutrition Survey

The lack of high quality survey data was a big problem for the empirical studies related to Chinese society. It was only in recent years we started to see more and more research focused on social and economic issues in China. The dissemination of the China Health and Nutrition Survey (CHNS) significantly improves the quality of the empirical studies related to China. The CHNS contains detailed information about individual health indicators, household income and expenditures, nutrition intake, women's marriage and birth history. These data would be very helpful in the examination of population policy and human capital accumulation in China. Thus, I use the CHNS for the empirical studies in this dissertation.

The CHNS was conducted by scholars with various backgrounds, including demography, nutrition, public health, economics, sociology and Chinese studies. Several organizations cooperated and collected the data together. They are the Carolina Population Center at the University of North Carolina at Chapel Hill, the National Institute of Nutrition and Food Hygiene in Beijing, and the Chinese Center for Disease Control and Prevention. This survey was designed to examine how the social and economic transformation of Chinese society affects peoples' health and nutrition status. The survey years are 1989, 1991, 1993, 1997, 2000, 2004 and 2006. Two more waves are supposed to be collected in 2009 and 2011.

The CHNS is collected in nine provinces in China, including the rapid developed east coast areas and the southwest inlands. Figure 1 shows a map of these areas. The darker shaded regions in the map are the provinces where the surveys were conducted. Those provinces vary substantially in geography, economic development and public resources. Counties and communities are randomly selected in each province. In surveys 1989, 1991, 1993 and 1997, there are 190 primary sampling units, which include 32 urban neighborhoods, 30 suburban neighborhoods, 32 towns, and 96 rural villages. Since 2000, the primary sampling units have increased to 216 with 36 urban neighborhoods, 36 suburban neighborhoods, 36 towns and 108 villages. In summary, there are approximately 4,400 households with a total of 16,000 individuals in each wave.

The CHNS consists of several questionnaires. They are the Household Survey, the Physical Examination, the Nutrition Survey, the Community Survey, and the Ever-Married Women Survey. The Household Survey contains the information about main household economic activities, such as occupation, wage rate and household annual income. The Physical Examination is taken by all the adults and children in the survey and provides the main health outcome variables examined in this dissertation. The

9

Nutrition Survey focuses on the amount of food consumption and nutrition intake. The Community Survey contains the information of local public services, such as the provision of health facilities. The Ever-Married Women Survey is available for surveys after 1993 and includes the information about women's histories of marriage, birth and pregnancy.

The data set constructed in this dissertation is restricted to married women who have ever given birth to at least one child in their life. The information of birth, pregnancy and marriage are collected only for women who are younger than 50 years old. Thus, the sample used in this dissertation is restricted to the women aged 18 to 50. The data of household annual income is not available so far for the CHNS after 2000 and the information of the Survey of Ever-Married Women is only available for the survey years after 1991. Thus, only three cross-section datasets (CHNS in 1993, 1997 and 2000) are used in the empirical studies in this dissertation.

Chapter 2: The Impact of the One-Child Policy on Parental Health Outcomes

2.1 Introduction

In the past three decades, poverty and under-nutrition were greatly alleviated, especially for some developing countries that used family planning policy to control the rapid growth of population. For example, in China, the total fertility rate[3] decreased from 5.9 in 1970 to 1.8 in 2002. This drop in fertility rate might contribute to the alleviation of under-nutrition in Chinese society. In the context of developing countries, family resources are very limited. Family size directly determines resources that could be allocated to each member. Fewer children in a family could significantly increase the mother's 'quality' through a higher expenditure on her health. Figure 2 shows that the fraction of underweight women decreased significantly from 1993 to 2000. People became healthier since the probability of having diseases associated with underweight is much lower. However, at the same time, the fraction of women who are overweight increased for all ages (Figure 3). Due to the decline of the fertility rate in Chinese society, the family resources that is available for each member increases and the probability to be overweight becomes higher. Similar trends are found for the indicators related to blood pressure (Figure 6, Figure 7). The impact of the One-Child policy on these health indicators is examined in this chapter.

It is well known both theoretically and empirically that family size has a negative impact on child's quality. However, few studies explore whether the number of children in a family affects the health status of their parent, especially the mothers who give births

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[3] The total fertility rate is the average number of births that a woman would have over her lifetime.

to those children. Given the constraint of family income and the increasing cost of raising children, the resource that could be spent on mothers is directly affected by the number of children they have. The more children a woman has, the fewer resources that could be allocated to her. This budget effect tends to be larger for people in developing countries where family budgets are often binding. In this chapter, I'll attempt to answer the following question: Does the number of children a woman has have an impact on her health outcomes through this budget mechanism?

Most studies related to the number of births and maternal health concentrate on how the maternal mortality is affected. Generally, they provide evidence that high-birth parity and short-birth spacing is associated with a high maternal mortality rate (Winikoff, 1983; EcKholm and Newland, 1977; Royston and Armstrong, 1989). For other health outcomes, Prentice, Whitehead and Paul (1981) find that neither increasing parity nor decreasing birth intervals has an impact on weight. Few studies have examined the long-term impact of births on a mother's health. This chapter will focus on how family size affects a mother's health through the economic budget constraint in the long run.

To identify the impact of family size on maternal health outcomes, there are two main difficulties. First, the causal relationship between family size and the mother's health outcomes is hard to be identified due to the endogeneity of the number of children. Generally, the number of children is not exogenous to a mother's health outcomes. Healthier mothers would be able to bear more children. This induces a non-zero correlation between family size and the error term in the identification of the effect of the number of children on health. Failure to solve this problem leads to an inconsistent estimation for this effect. The exogenous change in family size under the One-Child Policy helps to address this problem. Due to this policy, the number of children a couple can have is limited and the penalty for an above-quota birth is severe. The penalty could

be either in the form of unaffordable fines or through the negative impact on people's employment if they are working in the public sector. This policy was unforeseeable and had variations in the enforcement, allowing me to construct instruments for the number of children a woman has. A consistent estimate for the effect of family size on maternal health outcomes could be identified using a two-stage least square estimation. The empirical results with instruments show that family size significantly affects maternal health, such as weight and blood pressure. The mothers with fewer children have a lower probability to be underweight and have low blood pressure. At the same time, they have a higher chance to be overweight and have high blood pressure. I also find that these impacts are larger for less educated women and for mothers with a lower level of family income.

The second difficulty is to differentiate the budget effect from the biological influence of childbearing. The diseases, such as high blood pressure and diabetes, are not directly related to childbearing. However, maternal weight and body mass might be affected either through weight gain during childbearing or through the children's consumption of mothers' energy after the baby was born. To solve this problem, I use men as a comparison group and compare the impacts of the number of children on the father's health outcome with those of the mothers. As a family member, the father should also be affected by this policy if the budget effect exists. I find that family size has a very similar effect on both a wife's and a husband's health. Thus, the biological influence of childbearing on maternal health is not supported by my results. This suggests that the impact of the number of children on women mainly comes from the economic budget mechanism.

This chapter exploits the exogenous change in family size under the One-Child Policy, which is the most influential population policy in the world. However, there are not many empirical studies related to it. The lack of survey data at individual levels might

13

be the main reason for that. It was only in the recent years that the literature related to the One-Child policy emerged. Nevertheless, considering its large influence on people's lives, it's still under-explored. Besides China, the results in this empirical study also have important implications for other developing countries that have a large population and a low level of human capital accumulation. In those countries, the family budget is often binding. The resource constraint affects not only children's education and health, but also the mother's health and her labor supply. Currie and Madrian (1999) find that the connection between health and labor supply is more intense in developing countries where many prime-age adults are under-nourished and in poor health, especially in areas where malnutrition and infectious diseases are prevalent. Thus, understanding the factors that affect maternal health is very important. The results of this chapter could shed light on how the human capital accumulation could be improved in developing countries.

The organization of this chapter is the following. Section 2 summarizes the literature. Section 3 describes health indicators and provides descriptive statistics. Section 4 specifies the empirical strategies. Section 5 reports the estimation results. Section 6 compares the impact on men's and women's health outcomes. Section 7 summarizes the findings.

2.2 Literature Review

2.2.1 Childbearing and Health Outcomes

There are two mechanisms for the impact of the number of children on maternal health. One is the biological influence associated with childbearing. For example, health outcome indicators like underweight and overweight might be directly affected. On one hand, mothers gain weight during their pregnancy; on the other hand, a child consumes a

mother's energy and nutrition. It's hard to say which one dominates the other. Chopra and Camacho (1970) found that the mean weight of lactating women appeared to be slightly lower than that of nonlactating women in Central America and Panama. However, there is no evidence for the long-term biological impact of the number of births on maternal health. What's more, childbearing itself doesn't induce specific diseases, especially the ones that are discussed in this chapter, such as high blood pressure and diabetes. Another mechanism for the impact of family size is through the economic budget constraint. Mothers also have to face the competition of family resources. The more children they give birth to, the fewer resources they can have for their own. In a larger family, mothers might have a smaller investment on their health, and the pressure of caring for the kids could also deteriorate their health status. If this is true, I expect to see a negative impact of the number of children on maternal health outcomes.

Most of the related studies focus on how the birth parity and birth spacing affect maternal mortality rate. Generally, they find that women with high birth parity and short birth spacing face greater risks in pregnancy. Obstetrical risks are the most well-known mortality risk for mothers with extremely high parity births. A woman who has been pregnant five times before might have a much higher risk of dying when she gives the next birth than a woman who has been pregnant only once. Winikoff (1983), EcKholm and Newland (1977), Royston and Armstrong (1989) find evidence of high mortality rate for the mothers with high parity births. Several studies try to look at the impact of family planning policy on the maternal mortality rate, since those policies directly decreases the number of times a woman becomes pregnant and could decrease the pregnancy risk for mothers. Boerma (1987) and Chen et al. (1974) find that maternal mortality is reduced significantly under family planning.

For other health outcomes, Prentice, Whitehead and Paul (1981) use the data from Gambia and find that neither increasing parity nor decreasing birth intervals has an impact on weight. Chopra, Kevany and Thomson (1970) use the data from Central America and Panama and find that the mean weight of lactating women is slightly lower than that of nonlactating women. Very few studied ever looked at the long-term impact of the number of births on health through the budget mechanism, which is the focus of this chapter.

2.2.2 Endogeneity of Family Size

In order to get a consistent estimate for the impact of family size on women's health, the problem of endogeneity of family size should not be neglected. Maternal health status might affect the number of children they have. On one hand, healthier mothers are able to bear more children. On the other hand, the mother with bad health tends to receive a lower wage and have lower labor force participation. Their opportunity cost of childbearing is low and they tend to give birth to more children. Thus, a mother's health would have a negative impact on family size. The overall influence of a women's health on their fertility is ambiguous. Family size is not completely exogenous when we examine its impact on maternal health. Failure to solve this endogenous problem leads to an inconsistent estimate for the coefficient of the number of children.

Existing studies that discuss this endogeneity problem only focus on the causal relation between children's quality and family size. Rosenzweig and Wolpin (1980) use the natural occurrence of twins at the first birth to identify the effects of fertility on labor supply. Angrist and Evans (1998) use parental preferences for a mixed sex sibling composition to construct instruments for the number of children. The way that I address this problem is to exploit the One-Child Policy in China, which is unpredictable at the

16

time of introduction and has variations in the enforcement. Under this policy, the number of children a couple can have is limited and the penalty for an above-quota birth is severe. In this chapter, instruments for the number of children are constructed based on this policy. A consistent estimate for the impact of family size on maternal health could be identified in a two-stage least square regression.

2.2.3 Studies related to the One-Child policy

Due to the lack of survey data at an individual level, there are not many studies empirically discussing the consequences of the One-Child Policy. It was only in recent years that literature related to this policy emerged. Most research has been focused on the impact on fertility rate. Li and Zhang (2003) analyze the role of fines in the determination of fertility. They find that the effect of fines on above-quota births differs substantially across wealth levels. The fertility rate for a rich family is more affected by the One-Child policy than the poor family since the fine is based on the income of the family and poor parents don't have much to lose if they need to pay a fine to have an above-quota child.

Regarding the impact of this policy on human capital accumulation and labor supply, Qian (2004) uses the relaxation of the One-Child Policy in China to estimate the effect of family size on school enrollment and find that an additional sibling significantly increases school enrollment of the first child. Li, Zhang and Zhu (2005) find a negative correlation between family size and child educational attainment. Li, Zhang and Zhu (2006) examined the effect of fertility on parental labor supply and did not find that the exogenous variation in fertility had a significant effect on the labor supply of either men or women in rural China. My dissertation focuses on the impact of the number of children on maternal health outcome, which has not been discussed so far in the literature.

2.3 Health Indicators and Descriptive Statistics

2.3.1 Health Indicators

Health outcome variables that are examined in empirical studies include underweight and overweight indicators that are generated from Body Mass Index (BMI), low/high blood pressure indicators and diagnosed disease outcomes. BMI is a measure of body fat based on height and weight and applies to both adult men and women. It is equal to weight divided by height-squared. Since most Chinese, especially the women, are very slim, I didn't use the standard normal range of BMI, which is from 20 to 25. Another lower bound, a BMI of 18.5, is used for the definition of underweight and normal weight. Underweight women have BMIs below 18.5; Overweight women have BMIs above 25. The people with BMIs above 30 are considered to be obese.

The indicators of being underweight, overweight and obese have a close relationship with food consumption. The most common cause of a person being underweight is malnutrition which is caused by inadequate food consumption. Being overweight and obese is generally caused by over-consumption of food. Childbearing might have a biological influence on a mother's weight. Women gain weight during the pregnancy. Children might be biologically taxing on a mothers' weight through breastfeeding. There are some other factors that could cause mothers to be underweight or overweight. Some mental or physical diseases could make a woman become underweight. Aging, stress, lack of exercise, metabolic disorder and hormonal imbalance could also induce being overweight and obese. Being underweight is an indicator of a bad health status since it is often a symptom of some underlying disease. The health issues associated with obesity are also well accepted. It is well known that obese people have a higher mortality rate and higher probability towards developing diabetes. Compare with

being underweight and being obese, the health implications of being overweight are more controversial. Most Chinese had been very slim and suffered from under-nutrition and poverty problem for a long time. Being overweight might be a signal for the improvement of living standard and nutrition intake. Thus, it might be a good thing for China.

The blood pressure information includes systolic pressure and diastolic pressure. The normal range is between 90 mmhg and 120 mmhg for systolic pressure, and between 45 mmhg and 80 mmhg for diastolic pressure. If a woman's blood pressure is lower than the left bounds of normal range, the health indicator of low blood pressure for her would be equal to one. A blood pressure higher than the right bounds indicates that she has high blood pressure. Low blood pressure, which is also called hypotension, is usually not a serious problem; although in some case it could be life threatening. The factors that could cause low blood pressure are nutrition deficiencies, dehydration, blood loss, severe infection and heart problems. Pregnancy might have an impact on this indicator since the blood pressure for women is likely to drop during the first 24 weeks of pregnancy[4]. But there is no evidence for any long-term impact of birth on blood pressure after the child is born. High blood pressure is also called hypertension, which is one of the risk factors for strokes and heart attacks. It usually has no symptoms and people could have it for years without knowing it. Aging, a diet that is high in fat and salt, being overweight or obese, stress, overdrinking or having high cholesterol[5] could induce this problem. Another set of health indicators are self-reported health outcomes, such as whether people are diagnosed with high blood pressure or diabetes.

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[4] This information is provided by the Mayo Foundation for Medical Education and Research

[5] Those factors are provided by Healthwise.

2.3.2 Descriptive Statistics

The trends of several health indicators with ages are described in Figure 2 to Figure 7. Figure 2 shows that the fraction of underweight women decreases from 1993 to 2000, especially for the women who are older than 28 years old. People become healthier since the probability of having diseases associated with underweight is much lower. However, at the same time, Figure 3 and Figure 4 indicate that the fraction of women who are overweight increases for all ages and the fraction of normal weight women decreases. Due to the decline of the fertility rate in Chinese society, the family resources that is available for each member increases and the probability to be overweight becomes higher. Similar trends are found for the indicators related to blood pressure. In Figure 5 and Figure 6, there are trends of decline in the share of women who have low blood pressure and who have normal blood pressure. In Figure 7, the fraction of less healthier women in terms of having high blood pressure increased for all the age groups.

Table 1 reports the means and standard deviations of health outcome variables, the number of children and the control variables. 19.5% of the mothers in the sample are underweight; 20.3% are overweight, and 2.6% are obese. The share of underweight women declines and the share of overweight women increases from the 1993 survey to the 2000 survey. A similar trend is found for blood pressure indicators. The fraction of mothers with low blood pressure decreased from 8.5% in the 1993 survey to 4.9% in the 2000 survey. The proportion of high blood pressure in women is 16.9% in the 1993 survey, 27.6% in the 1997 survey and 30.3% in the 2000 survey. The mean for the self-reported high blood pressure indicator is much lower than the indicator generated from the blood pressure records in physical examinations. The reason might be that some people who have high blood pressure did not see a doctor and do not know they have it. It could be due to the fact that the symptoms associated with high blood pressure are not

20

severe or they do not have convenient access to medical services. For diabetes indicators, only 0.2% of the mothers are diagnosed with it. The average number of children a woman has is 1.97 in the whole sample. 68.56% of them live in the rural area and 11.69% are ethnic minorities.

Figure 8 and Figure 9 describe the correlation between the number of children a woman has and her health status related to BMI and blood pressure. As the number of children decreases, the fraction of mothers who have normal weight and normal blood pressure increases. For women who have only one child, 72.63% of them have normal weight and 72.45% of them have normal blood pressure. For women with four children, those two numbers decline to 69.45% and 62.86%, respectively. In the graph for underweight women, as the number of children increases from 1 to 2, the fraction of women who are underweight declines a little bit and starts to increase as the number of children increases to 3. In the graph for overweight women, the change in the fraction of overweight women fluctuates with the number of children. It increases from 21.01% to 22.91%, as the number of children changes from 1 to 2, and goes back to the fraction for the One-Child women group as the number increases to 3. For the high blood pressure (hypertension) indicator, the share of women who have hypertension increases from 24.59% to 34.19% as the number of children changes from 1 to 4. The fraction of women who have low blood pressure does not vary much with the change in the number of children. Based on these graphs, mothers in a smaller family tend to have a better health outcome since the proportion of them to have normal weight and normal blood pressure is much higher.

2.4 Empirical Strategies

In order to estimate the effect of the number of children on maternal health, consider the following baseline model for OLS regressions:

$$Y = \beta_0 + \beta_1 Q + \beta_2 X + \beta_3 Z + \beta_4 P + \beta_5 U + \sum_{\substack{t=1993, \\ 1997,2000}} \alpha_t S_t + \sum_{\substack{t=1993, \\ 1997,2000}} \gamma_t S_t * U + \varepsilon \quad (1)$$

Y is a binary health outcome indicators, such as whether a woman is underweight. Q is number of children she has at the time of survey. X includes a set of woman-specific characteristic variables, such as age, birth year dummy, education, occupation and health habits, household annual income, etc. Among those variables, birth year dummies and age are used to capture cohort and aging effect. Z contains the variables related to children's characteristics, including the gender of the first child and the age of the youngest children. Childbearing might have an impact on the mother's weight in the short run. The age of the youngest child could be used to capture this short-term effect. Given the preference for a son in Chinese society, the gender of the first child could affect a mother's bargaining power within the family. The woman whose first birth is a boy might have a higher bargaining power and, as a result, could have more resources allocated to herself or spend more on health-related products for all family members. Thus, the gender of children, especially the first one, could impact a women's health outcome and is controlled in the main regression. P is a set of province dummies and U is a indicator for living in an urban area or not. They are used to capture the geographical difference in the provision of public health. S_t is a binary variable for each survey year to control the time effects. Considering the fact that time effect might be different for the urban areas and rural areas, the interactions between survey year dummies and the urban indicator are included.

22

In the sample, the women who have a larger number of children are generally older than the ones who have only one child. Figure A in the appendix shows the age distribution of the women with different numbers of children. The median age for the woman with one child is 33, for the woman with two children is 39, for the woman with three children is 44 and for the woman with four children is 47. Age and number of children are highly correlated. In order to adjust for the uneven distribution of age for different parity groups, weights are constructed and are used in the empirical analysis in this dissertation. The age distribution of each parity group is made to be the same as the one child group.

Due to the endogeneity of family size, the number of children a woman has needs to be instrumented. On one hand, healthier mothers are able to bear more children. On the other hand, mothers with bad health tend to have a lower accumulation of human capital and might receive lower wages and have lower job participation. Thus, their opportunity cost of childbearing is low and this might lead to a higher fertility rate. What's more, the low 'quality' mothers tend to be from a low-income family, where the price of children's quality is not high. This further increases the number of children in those families. Thus, to solve this endogeneity problem, an exogenous change in family size would be very helpful. The One-Child policy gives us an opportunity to achieve this. After the policy was implemented, if a woman already has one child or more, she is not allowed to have another one. Thus, couples who get married after the policy and couples who have their first child born after the policy would be the most affected people. Policy dummies are constructed and used as an instrument for the number of children in the estimation for the impact of family size on maternal health outcome.

Since the population of ethnic minorities is very low, the One-Child Policy was exempted for them. They are allowed to have a second child if they want. Although

ethnic minorities are also encouraged to have less numbers of children, they are much less affected compared with the ethnic Han, which accounts for approximately 92%[6] of all the population in China. For people living in rural areas, they are less affected than the urban population. The implementation of the policy is stricter in urban areas. Except for the penalty fee, the couple that is working in the public sector might lose the benefit associated with one child family and their future promotion opportunities if they have above-quota births. The relaxation of the One-Child policy in the late 1980s allows couples in some rural areas to have a second child if their first child is female. Thus, the indicators for the ethnic Han and whether living in urban areas are interacted with the policy dummy and the interaction terms are used as the instruments for the number of children a woman has.

Therefore, the specification of two-stage least square regression is the following:

$$Q = b_0 + b_1 Policy + b_2 Policy * Han + b_3 Policy * Urban +$$
$$b_4 X + b_5 Z + b_6 P + b_7 U + \sum_{\substack{t=1993, \\ 1997,2000}} \alpha_t' S_t + \sum_{\substack{t=1993, \\ 1997,2000}} \gamma_t' S_t * U + \varepsilon \qquad (2)$$

$$Y = \beta_0 + \beta_1 \hat{Q} + \beta_2 X + \beta_3 Z + \beta_4 P + \beta_5 U + \sum_{\substack{t=1993, \\ 1997,2000}} \alpha_t S_t + \sum_{\substack{t=1993, \\ 1997,2000}} \gamma_t S_t * U + \varepsilon \qquad (3)$$

Three sets of instruments for number of children are used. Each set contains a policy dummy, an interaction between the policy dummy and the indicator for the ethnic Han,[7] an interaction term between the policy dummy and the indicator for living in urban areas. A different definition for the policy dummy is used in each set of those instruments.

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[6] Data is from the 1% sample of the 1990 China Census.

[7] The indicator of Han equals 1 if both or one of the parents belong to ethnic Han; equals 0 if both of them are ethnic minorities.

They are defined based on the time of marriage, the time when they have their first child and when they are born.

2.4.1 Instrument #1: Marriage Before or After the One-Child Policy

The first instrument for the number of children is based on the year when a couple got married. The policy dummy equals 1 if a woman got married after 1974 and equals 0 if married before 1974. Generally, the couple that got married after 1979 is definitely subject to the policy since the maximum number of children they can have is only one. There are still some couples that married in the middle of the 1970s and don't have any children or have had only one child before 1979. Their number of children is constrained by the One-Child policy as well. For all the women in the sample, the mean interval between marriage and the first birth was 2.77 years and the median is 2 years; the mean interval between the first birth and the second birth was 3.59 years and the median is 3 years. Thus, there are on average 5 to 6 years between marriage and the second birth and I chose 1974 to be the cutoff year for the policy affected and unaffected groups. For the women who got married before 1974, the mean interval between marriage and the first birth was 2.09 years and the median is also 2 years; the mean interval between the first birth and the second birth was 2.98 years and the median is also 3 years.

Figure 10 shows that the fraction of having a second child starts to decline after the middle of the 1970s. From the comparison of the people who live in urban areas and those live in rural areas, there is an enlarged gap in the fraction of having a second child after 1974. People living in cities, where the implementation of the policy is very strict, have a much larger decline in the fraction to have a second child. Similarly, the comparison of proportion to have a second child between ethnic minority groups and the ethnic Han also indicates that the people who got married after the middle of the 1970s

25

are the most affected group. This supports the choice of 1974 to be the cutoff year for the definition of the policy dummy. Different critical years around 1974 are tested in the robustness check. There is no big difference in the estimates in the second stage for the cutoff years ranging from 1972 to 1976, but 1974 gives the best prediction for the number of children in the first stage.

2.4.2 Instrument #2: Having the First Child Before or After the One-Child Policy

The second instrument is defined based on the time when a woman has her first child. The policy dummy equals 1 if a woman has her first birth after 1976 and equals 0 if it happens before 1976. Generally, if a woman already has her first child, she's not allowed to have another one after 1979. These women are considered to be the policy-affected group. Some woman who had one child born before 1979 might have planned to have a second child several years later but could not do so due to the unexpected introduction of the One-Child Policy in 1979. They should also be included in the policy-affected group. Before the policy was enforced, the mean interval between the first birth and the second birth is 3.59 years. This is one of the reasons why I choose 1976 to be the cutoff year for the definition of the policy instrument.

Figure 11 describes how the fraction of having a second child changes with the year of the first birth. The fraction of women who have more than one child starts to decrease for the mothers who have their first child born after 1976. There is a larger decrease for the people living in urban areas, where the One-Child policy is more strictly implemented. The ethnic Han has a bigger decline in the fraction of women who have a second child after 1976. This reinforces the arguments for the choice of 1976 to be the cutoff year for the definition of the policy dummy. In the Robustness check, I choose the years from 1974 to 1978 as the alternative cutoff years to see whether the estimates are

sensitive. Results show that there is no big difference in the coefficient for the number of children, but the cutoff year of 1976 gives the best prediction for the number of the children in the first stage.

2.4.3 Instrument #3: Policy Affected Cohort or Unaffected Cohort

Since the couple themselves makes the marriage decision and the birth decision, they might not be completely exogenous and correlate with a woman's health status. Thus, an instrument that is based on the birth year could address this problem. Figure 12 shows that the fraction of people who have more than one child start to decrease faster for Han women who were born after 1949. Similarly, for the people living in urban areas, there is a larger decline in the proportion to have more than one child after 1949. Thus, 1949 is chosen as the cutoff year and a cohort dummy is defined to be equal to 1 if a woman was born after 1949 and be equal to 0 if before 1949. Other years close to 1949 are tested in the Robustness check.

Figure 13 shows the distribution of women by childbearing age. 90.3% of women have their first child born when they are younger than 30 years old. Among the mothers who have a second child, 74.5% of them had the second child before the age of 30. In 1979, the women who were born after 1949 are younger than 30 years old. These mothers are more affected by the One-Child Policy since they are in the ages that bear most of the births in a woman's life. This evidence supports the choosing of 1949 to be the cutoff year for the definition of policy dummy.

Table 2 shows the statistics for the number of children with different definitions for the policy affected and unaffected groups. The average number of children for mothers who got married earlier than 1974, who had her first child before 1976, and who

27

were born before 1949 is 2.9. For the policy-affected couples, their number of children is 1.8. Thus, family size is much smaller for them. Except for age, which is controlled in the main regression, there is no big difference in the means for the other explanatory variables.

2.5 Results

This section reports the estimation results for the effect of the number of children on maternal health by using a two-stage least square estimation (2SLS). Newey's (1987) minimum chi-squared estimation for the Probit model are tested to see whether the regression results are consistent under a different model setup. The estimates for marginal effect under the Probit model with instruments are very similar to those under 2SLS and are not sensitive to the model I use in the regression.

2.5.1 The Impact of Number of Children on Maternal Health

Table 3 reports the results in the first stage with different instruments. Each column represents a separate regression. Column 1 is the coefficients with the policy dummy based on the time of marriage. Generally, couples who got married after 1974 tend to have a much smaller family size. Their number of children is 28.6% smaller than the couples that married earlier. The interaction of the policy dummy and whether the mother lives in an urban area has a coefficient of -0.155, which suggests that the One-Child policy significantly decreased the number of children for urban women. The coefficient of the interaction of the policy dummy and the Han indicator is -0.084. The Han family is smaller for the couple that got married after 1974.

28

Column 2 shows the results for using the set of instruments based on the time of first birth. For the women who have her first child after 1976, their number of children is decreased by 16.4%. The coefficient for the interaction of the Han and the policy dummy is -0.213, which indicates that the Han couple who has their first child after 1976 tends to be more affected by the One-Child Policy and has a much smaller family. Column 3 is the first stage with instruments based on birth cohorts. For the Han women who were born after 1949, their number of children is lower by 16.7%. Couples living in urban areas also tend to have fewer children.

For all of these instruments, the R-squared in the first-stage regression is around 0.51-0.53. The F statistics is high and the corresponding P-values are 0.000, which suggests that the instruments are generally very powerful in the first stage. For the other control variables, the coefficient for the gender of the first child indicates that giving birth to a girl at the first birth has a significant positive impact on fertility level. Couples would like to have more children if their first kid is not a boy. People living in rural areas have more children and educated people have fewer.

Table 4 reports the main results in the second stage of 2SLS.[8] Each estimate corresponds to a coefficient for number of children in a different regression. Women's age, health habits (e.g., smoke or not), live in rural/urban area, birth year dummies, education, household income, gender of the first child, the age of the youngest child, survey year dummies, province dummies, etc, are controlled. For each health outcome indicator, the coefficients for the number of children with different instruments are listed. Column 1 lists the results for the health indicator of being underweight. The coefficients for the number of children are around 0.138 to 0.174. In other words, one more child in the family increases the probability for the mother to be underweight by about 13.8% to

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[8] More detailed results are listed in appendix Table A1 to Table A7

17.4%. Mothers in a one-child family are healthier since they are less likely to be underweight. However, in the regression for the health indicator of being overweight, having fewer children is associated with higher probability of being overweight. One less child significantly increases the probability of being overweight by 8.2% to 12.3%. The chance to be obese is negatively correlated with the number of children as well, although the effects are very small and not significant. It's hard to find a significant impact of family size on the indicator of obesity since the fraction of being obese is only 2.6%.

Comparing the results without instruments, the magnitude of the estimate is much larger after using the policy dummies. In column 1, the coefficient for number of children without IV is only 0.028, which is much lower than the estimates with policy instrument. This suggests that the error term in OLS is negatively correlated with the number of children. Healthier mothers tend to be able to bear more children. The results tend to be underestimated without using the instruments. Similarly, for the indicator of overweight, the effects are larger in 2SLS than the estimates without using the instruments. The Hausman test statistics for those estimates are very high and the corresponding p-values are equal to 0.000. This suggests that exogeneity does exist and the using of instruments is very necessary; otherwise, biased impact of number of children on maternal health outcome is estimated. The over identification test for the instruments supports the validity of these instruments.

In summary, mothers with fewer children have a lower probability of being underweight and having low blood pressure; at the same time, they have a higher chance of being overweight and having high blood pressure. These seemingly contradictory results would occur if a smaller family size increased the food consumption of mothers, leading to underweight women attaining a normal weight but normal weight women becoming overweight. Under the budget mechanism, fewer children under the One-Child

30

policy decrease the resource competition within the household. Not only children but also mothers themselves can have higher expenditure in food and health-related commodities. The under-nutrition problem in China is largely alleviated.

The fourth and fifth column in Table 4 are estimates for health indicators related to blood pressure. The number of children has a positive impact on the probability to have low blood pressure and a negative impact on the chance to have high blood pressure. In Column 4, having one less child decreases the chance to have low blood pressure by about 5.0%. Thus, on one hand, one-child mothers are healthier since they are less likely to have low blood pressure. On the other hand, family planning makes mothers less healthy since it increases the chance of having high blood pressure. For the health indicator of high blood pressure, the coefficients for the number of children are around -0.045 to -0.053. The last two columns in Table 4 are the estimates for self-reported health outcome indicators, such as whether an individual has ever been diagnosed with high blood pressure and diabetes. Results show that smaller family size increases the chance for having high blood pressure but decreases the probability of being diagnosed with diabetes. Since there are only 2% of the women in the sample diagnosed with high blood pressure and only 0.2% of them diagnosed with diabetes, it's hard to find the effects to be statistically significant.

For the other explanatory variables, the impacts of the age of the youngest children and a woman's age at first birth are close to zero and not significant at all. Mothers living in urban areas have better health outcomes. Higher household income decreases the probability of being underweight and having low blood pressure. Older people are more likely to be diagnosed with high blood pressure.

2.5.2 Sensitivity Tests

Next, I perform a Robustness check to test the sensitivity for the definition of the instruments. I use different cutoff years for each policy dummy. For the policy dummy based on the time of marriage, in addition to using 1974 as the cutoff year for the policy-affected group and unaffected group, I define another two sets of policy dummies with cutoff years of 1976 and 1972. The estimation results with those instruments are listed in Table 5 and Table 6. Table 5 is the estimates in the first stage. The first three columns are the coefficients for the policy dummy and its interaction terms with the ethnic Han and the urban indicator. With the other two cutoff years, the policy dummy is significant in explaining the number of children. But, the magnitude of estimates is smaller and R square of the regression is a little bit lower than the original cutoff year of 1974.

Second-stage results of the Robustness check are reported in Table 6. Each estimate corresponds to a β_1 in a different regression. With different cutoff years, the estimates are very similar and the variance of the estimates in the original setup for the instruments is a little bit smaller. Similarly, for the policy dummies based on the year of first birth and birth cohort, I do the same sensitivity test. Columns 4 to 6 in Table 5 are the first stage results for the policy dummy based on the time of first birth. The cutoff year of 1976 makes a better prediction for the number of children a woman has. The standard error for the estimates in the second stage is also a little smaller. Columns 7 to 9 in Table 5 are the results for the birth cohort dummy. Using the year 1949 as the cutoff year for the policy affected and unaffected groups fits the number of children better than the other cutoff years. There is no big difference in the second-stage regression for the impact of number of children on the maternal health outcomes.

2.5.3 The Impact of Number of Children on Women's Height

Since high birth parity is associated with a larger mortality risk for women, the mothers with a small number of births tend to have a higher chance to survive. Thus, healthier mothers would be selected into the sample and this selection problem might bias the estimate. Since women's height is predetermined and would not be affected by number of births, I use height as an alternative health outcome to test whether it is affected by family size. A statistically significant estimate would indicate the selection problem should not be ignored. The results in Table 7 are the estimates for the impact of the number of children on a mother's height.[9] The estimates are very close to zero and not significant at all. This suggests that a smaller family size does not significantly increase women's height. Thus, healthier mothers are not selected into the sample. Selection is not a big problem here and the main results provide consistent estimates for the impact of family size on maternal health outcomes.

2.5.4 The Impact of Number of Children by Education and Income Level

So far, I have only discussed the average treatment effect of family size. However, its impact might vary for different groups of people. For example, high-income families tend to have rich resources and their health status is less likely to be affected by the number of children since their budget is not binding. I grouped the mothers in the sample based on their education and income levels and estimated the impacts for each group.

Table 8 reports the first-stage results. The upper panel is for mothers grouped by education level. If a mother's years of education are less than or equal to 6 years, that is, her education is just at the level of elementary school or below, she is put into the less

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[9] More detailed results are listed in appendix Table A1 to Table A7

educated group. More educated group contains the women whose years of education are above 6. The second-stage results in Table 9 show that family size has significant impact on most maternal health outcomes for both the less educated and the more educated group. For the health indicator of being underweight, the effect is larger for the less educated women. In the regression results with policy instruments based on the year of first birth, one more child increases the probability to be underweight by 12.8% for the more educated women and 14.8% for the less educated women. With respect to the other health outcomes, the number of children has bigger effects for the less educated group but the difference is not very significant. Overall, the less educated women are more affected by family size.

The second-stage results for the impact of family size on health outcomes for different income groups are listed in Table 10. A low-income group is the one whose household income is below 25 percentile and a high-income group is the one whose household income is above 75 percentile. For the health indicator of being underweight, the impact of family size is much bigger for low-income groups. One less child decreases the chance to be underweight by 16.5% to 17.9%. For high-income groups, this number is only 8.2% to 12.0%. The impact on the probability to be overweight is significantly negative for both groups and the estimates for mothers in poor families have a larger magnitude. With respect to the indicator of low blood pressure, the difference in the magnitude between the groups is not very large; while, for high blood pressure, poor mothers are more affected.

In summary, the impact of the number of children tends to be larger for less educated women and for mothers with a lower family income. Education increases the knowledge about health and the level of human capital; higher income gives more

resources that could be invested in health. These could be the reason why we see the different degree of impact on the mothers grouped by education and income levels.

2.5.5 Re-identification of the Ethnic Minority

According to the data from China Census, the ethnic minority population increased more than 30% from 1982 to 1990. Since there are some benefits associated with this minority group, such as the exemption from the One-Child policy and a lower requirement for advanced education, people have incentives to claim themselves to be ethnic minority if they are eligible. Some people did change their ethnic identity after the One-Child policy was enforced. This re-identification might affect the exogeneity of the instrumental variables used in this chapter. However, there are three main reasons that we don't need to worry about this problem. First, the requirements for the change of ethnic identities are very strict. People cannot choose to belong to an ethnic group that is different from their parents. And only the people who are older than twenty years old can apply for re-identification. Second, the people who are eligible and who have incentives to change their ethnic identities are the children of mixed marriages. One of their parents belongs to the ethnic Han, and the other belongs to the ethnic minority. Compared with the total population, the number of these eligible people is very small. The mixed couples are only 3.5% of all the married couples[10]. Third, the One-Child policy was enforced in 1979. People who were eligible and had wanted to change their ethnic identities would have done so right after the policy was announced. The change in the minority population from 1982 to 1990 also indicates that the 1980s should be the time when most re-identifications were made. The datasets used in this chapter are collected in 1993, 1997 and 2000. We did not expect people to change their identities during this period. In short,

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[10] Data is from the 1990 China Census. In the northeastern and southwestern provinces that have a large minority population, this fraction is 7.9%.

the ethnic groups that their parents belonged to determine a person's identity. Furthermore, the requirement to be exempted from the One-Child policy is very strong. Both of the parents need to be ethnic minorities. The ethnic re-identification after the One-Child policy was enforced would not affect the exogeneity of ethnic indicator and the empirical results in this chapter.

2.6 Women vs. Men

Consistent estimates for the effects of family size on maternal health are obtained with the help of instruments. However, I still didn't differentiate the biological mechanism from the economic budget impact of the number of children on health. Childbearing itself might have a direct impact on body weight. On the one hand, women gain weight during pregnancy; On the other hand, children might be biologically taxing to a mothers' weight throughout breastfeeding. The total impact is not clear because we don't know which direction will dominate in the long run. No matter how childbearing affects maternal health, the father's health status should not be biologically influenced. Thus, in this section, I use men as a comparison group and estimate the impact of the number of children on the father's health outcomes. The regression results for husbands support the budget connection between family size and maternal health.

For all women in the sample, I matched each mother with her husband and put all husbands together to make a comparison group. Table 11 reports the statistics of the health indicators for both men and women. For the husbands, 18.7% of them had a BMI lower than 18.5, 18.9% had a BMI over 25, and 2.4% were obese. For the wives, these numbers are 19.5%, 20.3% and 2.6%, respectively. Men are healthier than women since higher fraction of men has normal weight and lower fraction is underweight and overweight. For blood pressure indicators, the fraction of men who have low blood

36

pressure (1.9%) is much lower than that for women, which is 6.0%. However, 39.5% of fathers have high blood pressure, compared with a fraction of 25.3% for mothers. For the diagnosed health outcome, 2.8% of men have high blood pressure while only 2.0% of women have it. Based on all of these numbers, fathers are healthier than mothers in terms of BMI and low blood pressure, but more of them have high blood pressure than their wives.

Table 12 and Table 13 report estimation results for men. The estimates for women are listed for comparison. The number of children is statistically significantly (at level 1%) in explaining underweight and overweight indicators for the husbands. Having fewer children decreases the probability to have a BMI lower than 18.5 and increases the chance of having a BMI over 25. The estimate for the impact on the probability to be underweight for men is 1-3% lower than that for women. The estimate for being overweight is close to the one for women. Having more children is associated with a lower probability of being overweight. In the estimates for blood pressure indicators, there is very small impact of family size on the probability to have low blood pressure for men. With instruments based on birth cohort, the men's high blood pressure indicator is impacted by number of children in a similar way as women.

In summary, most health outcome variables, such as being underweight, being overweight and having high blood pressure have very similar estimates for both men and women, while low pressure varies a little. If a family resource is equally distributed within the family, the main difference between men and women is that women bear children while men don't. If childbearing itself has an impact on maternal health, there should be different impact of family size on wives and husbands, especially for the health indicators related to BMI. Since the impact of the number of children on health outcomes for men and women is very similar, childbearing itself doesn't have a biological impact

37

on maternal health outcomes. This suggests that the influence of family size on maternal health is mainly through the economic budget mechanism; that is, having more children decrease the resource allocated to mothers and affects their health outcomes.

2.7 Conclusion

In this chapter, I examine the impact of family size on maternal health by exploiting exogenous changes in family size under the One-Child policy in China. With the data from the China Health and Nutrition Survey in 1993, 1997 and 2000 and several sets of instruments based on the One-Child policy are generated and a consistent estimate for the impact of number of children on maternal health outcomes is obtained. Empirical results with instruments suggest that family size has a statistically significant effect on maternal health outcomes. Mothers with fewer children have a lower probability of being underweight and having low blood pressure. At the same time, they have a higher probability to be overweight and have high blood pressure. These seemingly contradictory results would occur if a smaller family size increased food consumption of mothers leading to underweight women attaining a normal weight but normal weight women becoming overweight. Thus, the One-Child Policy makes women heavier and contributes a lot to the alleviation of under-nutrition problem in China.

I also find that the impact of the number of children is larger for less educated women and for mothers with a lower level of family income. Family income directly affects resource constraint. A rich family is less impacted by family size. This supports the mechanism of budget effect, since this effect should be larger for women with limited family income. Educated people tend to have more knowledge about health and receive higher wages. These might be the reason why the impact of the One-Child policy is smaller on them. The empirical results for husbands support that there is no significant

biological impact of childbearing on maternal health. All the effects of number of children mainly comes from the economic budget mechanism; that is, having more children decreases the resource allocated to mothers and affects their health outcomes.

Chapter 3: Bargaining Power and Within Household Resource Allocation

3.1 Introduction

In the previous chapter, I examined the impact of family size on parental health. Under the framework of the economic budget mechanism, common preference within the household is assumed. This chapter relaxes this assumption and allows each member of the family to have different utility functions. Under the common preference assumption, all the family income is pooled and who controls it doesn't matter since the preference for each member is the same. Household utility function is maximized with the pooling income. However, if the person who controls the family resource is not completely altruistic to the other members of the family or the preference for each member is different, when it comes to the consumption decision, bargaining power would be very important. If the mothers have some power in a family's consumption decisions, they might make more investment on food expenditures or allocate more resource to herself (Thomas, 1990, 1992). The collective model (Chappori, 1998, 1992; Manser and Brown, 1979, 1980; McElroy and Horney, 1981; Lundberg and Pollak, 1993) allows separate utility functions among household members. The empirical estimation for the collective models, especially the household bargaining power model, is an important supplementary analysis for the second chapter, in which common preference is assumed.

The lack of information for bargaining power within the household makes the examination of bargaining power model very difficult. A good measure needs to be able to reflect the relative power between husband and wife and is not affected by the outcome variables such as consumption patterns. In this chapter, I propose a unique measure for

women's relative bargaining power. It is related to the gender of the children a woman has. In China, there is a long-standing social norm that a son is generally preferred in families. Women who give birth to boys would have a higher status within the family. There are cultural and economic reasons for this preference. The traditional Confucianism in which sons are preferred has a big impact on Chinese culture. Sons are responsible to provide financial support for their retired parents. Generally, children inherit the last name of father's family, not the one from their mother's family. With respect to economic concerns, in rural areas, men are thought to be more helpful in farming. The rural population has a stronger preference for sons compared with the people who are living in the cities. If considering the marriage cost when the children grow up, girls would be more expensive since the bride's family is supposed to pay a dowry to the groom's family. In urban areas, discrimination against female workers exists as well. Rozelle et al (2002) finds that wages received by women is substantially lower than their male counterparts in the data collected in 230 villages in 8 provinces in China.

Thus, in Chinese society, the gender of children that a woman has could reflect her status within the family. To test whether giving birth to a boy is a good measure for a woman's relative bargaining power, I estimated its impact on the mother's role in household consumption decisions for durable goods. The results in an Ordered-Probit estimation suggest that giving birth to a boy significantly increases a mothers' role in a family's decision related to the consumption of radio, TV, washer, fridge and sewing machine. Therefore, gender of children could be a good measure for a mother's relative bargaining power. I use it to test whether the common preference should be rejected and whether there is an unequal distribution of resources within the family.

The empirical results suggest that there are no significant impacts of women's relative bargaining power on household food consumption. The estimated coefficient of

41

giving birth to a boy is not significant in explaining household monthly consumption of rice, wheat flour, cooking oil, meat, sugar, and so on. So, common preference could not be rejected and no evidence is found for the existence of different preferences between mothers and fathers on food consumption. In the estimation of the effects of women's relative bargaining power on an individual's health outcome, giving birth to a boy is not significant in explaining both mother's and father's health outcomes, such as being underweight, being overweight, low blood pressure and high blood pressure. Similarly, for the relative health indicators between husbands and wives, a woman's relative bargaining power has no statistically significant impacts as well, except for the indicator of high blood pressure in the direction that women are relatively less healthy than their husbands. The factors that affect the probability of having high blood pressure are more complicated than the other indicators such as being underweight and being overweight. Aging and a diet that is high in salt and fat could induce high blood pressure. For the indicators that have a closer relationship with the resource allocation within the family, such as being underweight, we do not find that they are significantly impacted by the gender of children that a woman has. Thus, the assumptions of equal resource allocation within the family in the second chapter could not be rejected.

The organization of this chapter is the following. Section 2 summarizes the theoretical and empirical studies on unitary model and collective model. Section 3 discusses the measures for women's relative bargaining power and provides evidence from the CHNS. Section 4 describes the data. Section 5 specifies the empirical strategy and presents the estimation results for the impact of women's relative bargaining power on household food consumption. Section 6 provides the estimation results for the effect of giving birth to a boy on an individual's health outcome. Section 7 contains brief conclusions.

3.2 Literature Review

The theoretical models of household behavior could date back to the neoclassical or common preference model, where family incomes are pooled and neoclassical household utility function is maximized subject to household total income constraint (Becker, 1974, 1981; Samuelson, 1956). However, if the household members have different utility functions, the assumption of common preference will not be accepted. A collective decision-making framework relaxes this assumption and allows separate utility function within the household. The collective model treats each household member as a single entity. They might have different preferences and spend money in a different way than other members. In literature, there are two major groups of collective models.

The first group is Pareto-efficient model. Chappori (1988, 1992) proposes a collective model in which husband and wife have separate utility functions and household decisions are assumed to be Pareto efficient. The internal decision-making could be characterized as a process that couples share their non-labor income and, then, choose labor supply and consumption to maximize their own utility. Thus, the contribution to the total income could affect the share of recourses that will be allocated to each member. The second group of collective models borrows from the analytical tool in game theory. Manser and Brown (1979, 1980) and McElroy and Horney (1981) use a Nash bargaining specification to demonstrate the existence of household demand functions and analyze various bargaining rules for decision-making. A separate utility function is assumed for both husband and wife. Bargaining power determines the resource allocation and consumption patterns. Divorce or separation is the threat point and outside option. Lundberg and Pollak (1993) introduce the "separate spheres" bargaining model, in which the threat point is a noncooperative equilibrium within marriage. The noncooperative

outcomes are the responsibilities based on the traditional gender roles and gender role expectations.

In the empirical examinations of how households allocate resources among their members, there is a group of studies focusing on whether mothers and fathers allocate financial resources differently. Thomas (1990) uses a survey data on family health and nutrition in Brazil to analyze the effect of resource allocation within a family. He finds that, compared with the father's income, a mother's unearned income has a bigger impact on household calorie consumption, protein intake, fertility, child mortality and weight. Thomas also finds that the effect of a mother's income on child survival probabilities is almost twenty times bigger than the father's. Phipps and Burton (1998) uses the 1992 Statistics Canada Family Expenditure Survey to test whether an additional dollar of male income is spent in the same way as female income. They find that additional female income is associated with more resources spent on restaurant food and childcare. With the data from Cote D'Ivoire Living Standards Measurement Survey, Duflo and Udry (2003) show that the gender of the recipient of a rainfall shock affects the composition of expenditure. The rainfall that favors the female crops increases household food consumption, while the rainfall that favors the male crops does not. Those are the main empirical studies related to collective models. Most of them focus on the examination of female/male income on household consumption patterns and children's health.

There is another group of literature which studies the microcredit programs to examine within household resource allocation. Duflo (2003) uses the data from the expansion of the social pension program in South Africa and finds that stipends paid to women significantly affect children's weight for height and there is no effect if men receive this large cash transfer. Khandker (1998) uses the data from three main

microcredit programs in Bangladesh and finds that women's credit has a larger impact on children's nutrition than men's credit. Credit to women significantly increases height for age for both boys and girls. Agostino (2006) examines Mexico's PROGRESA program, in which money is only distributed to women, and find there is a big improvement in children health outcomes. He finds that children covered by this program experienced an 18% decrease in iron-deficiency and 12% rate of illness.

Some other empirical studies related to the collective model discuss how women's relative bargaining power, reflected by the nonwage or unearned income they receive, influence labor supply. McElroy and Horney (1981) use National Longitudinal Survey data and find no significant impact of nonwage income accruing to the husband, wife and other members of the household on their labor supply. Schultz (1988, 1989, 1990) uses the household expenditure data from Thailand and find that a woman's unearned income has a significantly larger negative impact on her labor force participation than does her husband's unearned income.

Most of these empirical studies reject the common preference model and suggest that the bargaining power, reflected by relative income between wife and husband, has impacts on consumption patterns and labor force participation. A mother's bargaining power increases with the income or unearned income she receives. However, using female income as a measure for bargaining power to test its impact would be problematic. Duflo (2005) pointed out that the families in which mothers earn a large share of income are quite different from those in which mothers do not. There might also be a problem of an inconsistent estimator due to the high correlation between husband's income and wife's income. For women who have a higher income or unearned income, their husbands always receive a high wage or unearned income as well. These couples have a

higher expenditure on food might be the direct result of income effect and doesn't necessarily mean that women have a higher bargaining power and they would like to spend more on food. In this chapter, I propose a very unique measure for women's relative bargaining power, which has nothing to do with relative income levels. This measure is whether a mother has ever given birth to a boy. In Chinese society, where son preference is very common, giving birth to a boy would have a big influence on a woman's status and her bargaining power in consumption decisions within the family. I test that the common preference model by using the gender of children as a measure for women's relative bargaining power and examine its impacts on household food consumption and individual's health outcomes.

3.3 Measure for Bargaining Power

3.3.1 Gender of Children and Women's Bargaining Power

The lack of information for the comparative bargaining power between the wives and the husbands makes the examination of its impact on the resource allocation within the family very difficult. Current literature only uses women's unearned income or income as a proxy for their relative bargaining power. But, a woman's contribution to family income is not the only thing that influences her bargaining power. In this chapter, I propose a measure that is related to a mother's contribution of 'boy' in the next generation.

There is a long-standing social norm in China that a woman's status in the family increases if she gives birth to a boy. This son preference is not unique to China. It also exists in some other Asian countries, like India and South Korea. There are several

46

widely accepted reasons to explain this phenomenon. First, the traditional Confucianism in which sons are preferred has big impact on Chinese culture. Sons are responsible for providing financial support for their retired parents. Generally, children inherit the last name of father's family, not the one of mother's family. Second, in rural areas, men are thought to be more helpful in farming and they generally have a stronger preference for a son compared with the people who live in the cities. If considering the marriage cost after the children grow up, girls would be more expensive since the bride's family is supposed to pay the dowry to the groom's family. In urban areas, there is also discrimination against female workers. Wages received by women is substantially lower than the men with similar characteristics (Rozelle et al, 2002; Gustafsson and Li, 1998; Maurer-Fazio and Hughes, 2002).

Thus, due to these cultural and economic reasons, sons are generally preferred and a woman who has ever given birth to a boy might receive more concerns and respect from the other members of the family, especially the parents or grandparents of her husband. The amount of intergenerational resources transfer might be affected. Thus, a woman's status within the family would be increased if she gives birth to a boy. The One-Child policy, enforced in 1979, makes this preference stronger, since the number of children that a couple can have is restricted to only one. Given the existence of a birth quota, the people who want to have a boy might not have another chance to try if their first child is a girl. Therefore, in one-child families, gender of the only child might be more important and has a bigger impact on a woman's status within the family.

3.3.2 Evidence from CHNS

The consumption data in the China Health and Nutrition Survey (CHNS) makes it possible to test whether giving birth to a boy could be a good measure for a mother's relative bargaining power. The CHNS contains some information related to the household decision-making process, such as who decides for the purchasing of durable goods. For example, people are asked who in their household decided to buy a TV. The provided choices are husband, wife or both. These answers could reflect a woman's relative bargaining power within the family. Figure 14 shows how the answers distribute in those three choices for the consumption decision of eight durable goods (radio, black/white television, color television, washing machine, refrigerator, sewing machine, electric fan and camera). Wives made the decision to buy a black/white television in 422 (out of 4590) families, to buy color television in 188 (out of 2612) families, to buy a washer in 588 (out of 3289) families and to buy fridge in 139 (out of 1632) families. Figure 15 presents the percentage for each answer in the total number of people who respond to that question. For most of these durable goods, both husband and wife make decisions in more than 60% families. Women decide in approximately 8% families for black/white television, color television, fridge, electric fan and camera. In the purchasing of a washer and a sewing machine, wives, who are the major person to use them, seem to have more power in the decision-making. The percentage of families where women decide is 16.7% for washers, and is 21.7% for sewing machines.

The above information could be used as outcome variables to test whether giving birth to a boy is an effective measure for a woman's relative bargaining power within the family. I estimate the impact of giving birth to a boy on the answers to the decision-making of durable goods. The dependent variables are the answers to the survey question of 'who in your household decided to buy each item.' They equal 1 if only the husband makes the decision; equal 2 if both husband and wife decide; equal 3 if only the wife decides. The value of 3 corresponds to the highest level of bargaining power for women

in the family. In summary, there are 3 values for each dependent variable and they are ordered in the degree of a woman's relative bargaining power. An Ordered-Probit model is used to estimate the impact of gender of children on women's relative bargaining power in household consumption decisions.

Table 14 present the regression results in the Ordered-Probit model for consumption decisions. Each column corresponds to the marginal effects for the outcome of "Mothers Decide" in a separate regression. For the purchasing of radios, televisions, washers, sewing machines and electric fans, giving birth to a boy significantly increases a woman's bargaining power in decision-making. For example, the probability of a radio-purchasing decision made by a mother would be increased by 3.8% if she has ever given birth to a boy. Sewing machines are mainly used by women and the marginal effect of giving birth to a boy on the purchasing decision of this product is 6.8%, which is larger than all the other significant effects. Among other explanatory variables, urban indicator and years of schooling have significant influences on a mother's role in decision-making. Women living in the urban area and the more educated females have more power in the family's big consumption decisions.

The One-Child policy restricts the number of children a couple can have. The gender of the only child that a woman gives birth to should have higher influence on her status in the family after the enforcement of this policy in 1979. The impact of gender of children on a mothers' role in household consumption decision-making would be larger. The regressions in Table 15 include a policy dummy, which equals 1 if a woman is affected by the policy and equals 0 if not. In Chapter 1, three ways to define the policy dummy are discussed. Regressions in Table 15 use the policy dummy based on the year of marriage. If a woman got married before 1974, the One-Child policy has very little

impact on her (policy dummy equals 0); if married after 1974, she was considered to belong to the policy-affected group (policy dummy equals 1). The interaction term between giving birth to a boy and the policy dummy is also included in the regression. Both policy dummy and giving birth to a boy have positive and significant impacts on a mother's role in the decisions of purchasing radios, black/white televisions, color televisions and refrigerators. These results indicate that the One-Child policy affected birth cohorts have higher bargaining power than the policy unaffected cohorts. After the enforcement of the One-Child policy, a woman's status within the family increased. The interaction term between giving birth to a boy and the policy dummy is only significant for the purchasing of washers, fridges and electronic fans. The sign of its marginal effect varies. The impact of giving birth of a boy is not significantly different before and after the One-Child policy. These results are not sensitive to the definition of the policy dummy. Similar results are found for the policy dummies based on the year of first birth and the year when a woman was born. Due to the economic and cultural reasons, son preference might be stronger for the families in rural areas and the impact of giving birth to a boy might be larger for them. Table 16 presents the regression results for the purchasing decisions in the rural areas. Table 17 lists the marginal effects with the control of the policy dummy and its interaction term with the gender of children. Compared with Table 14 and Table 15, Table 16 and Table 17 present larger marginal effects of giving birth to a boy on a woman's role in consumption decisions, which means that the son preference is more prevalent in rural areas and a mother's status with the family would be more affected by whether she has ever given birth to a boy.

Based on those results from Table 14 to Table 17, giving birth to a boy has significant impacts on a mother's role in a family's consumption decisions. These results support the statement that, in Chinese society where son preference exists, the gender of children could influence the mother's status in the family. Thus, giving birth to a boy

50

could be a good measure for women's relative bargaining power. In the following empirical estimation of the impacts of bargaining power on food consumption and health outcomes, whether a woman has ever given birth to a boy is used as a measure for a mother's relative bargaining power. With this unique measure, the common preference model and the assumption of equal resource allocation within household could be tested. An alternative measure, whether the first child is a boy, is also examined to see whether it affect a woman's role in consumption decisions. Similar results are found and whether a woman has ever given birth to a boy is more significant in explaining mothers' power in the purchasing of durable goods.

3.4 Descriptive Statistics

The data set I use in this chapter is also from the China Health and Nutrition Survey in 1993, 1997 and 2000. The household nutrition survey in the CHNS contains detailed information about household food consumption. Specifically, the amounts of seven types of foods purchased in one month are collected. These amounts are the sum of the food obtained from various sources, such as the product bought from the market and the food produced by the households themselves. These food consumptions are major sources of nutrition and calories for all household members. Rice, wheat flour, other grains, cooking oil, eggs, meat and sugar are included. Table 18 shows the mean and standard deviation for the monthly food consumptions in one month. The average amount consumed for rice, wheat flour, and other grains are 31.6 kg, 15.3 kg and 4.8 kg, respectively. Approximately 2.0 kg eggs and 3.5 kg cooking oil are purchased for a family in a month. The average consumption of meat, including pork, beef and lamb, is 3.9 kg.

51

The Survey of Physical Examination provides the information about an individual's health status. Three groups of health indicators are constructed. The first group of indicators is generated according to people's Body Mass Index (BMI). People are considered to be underweight if their BMI is lower than 18.5. If their BMI is over 25, they are overweight. The second group of health indicators is based on the results of blood pressure tests. The normal range of blood pressure is between 90 and 120 mmhg for systolic pressure, and between 45 and 80 mmhg for diastolic pressure. If a person has blood pressures lower than the left bounds of the normal range, they are considered to have low blood pressure. If they have blood pressures higher than the upper bounds of the normal range, they would have high blood pressure. The third group of indicators is self-reported health outcomes. People are asked whether they have ever been diagnosed with specific diseases. The health indicator used in the empirical analysis includes the answers to whether they are diagnosed with diabetes and whether they are diagnosed with high blood pressure.

Table 11 compares the health outcomes for husband and wife in the dataset. For the indicator of being underweight, 19.5% of women have BMI below 18.5; while, for men, this number is 18.7%. 20.3% of mothers and 18.9% of fathers are overweight. For these indicators, men are healthier than women since the fraction of them who are underweight and overweight is smaller. With respect to the indicators of blood pressure, approximately 6% of women have low blood pressure, which is 4% higher than that for men. The biggest difference in the health outcomes between men and women comes from the indicator of high blood pressure. The fraction of husbands who have high blood pressure is 39.5%, which is almost 14% higher than that for wives.

To compare the health status between men and women, I match each couple's information and then take the difference of health indicators to generate the relative health indicators, which are used as outcome variables in the estimation. Relative health indicators are defined to be the difference between the wife's health outcome and the husband's outcome, i.e., $I_{wife} - I_{husband}$, I_{wife} ($I_{husband}$) equals 1 if the wife (husband) has normal weight; equals 0, otherwise. There are three values for the relative health outcome variables: -1, 0 and 1. Other relative health variables are defined in the same way. A value of -1 means that women are healthier than men for this indicator; a value of 1 indicates that men are healthier; a value of 0 means that they have the same outcome for this indicator. Table 19 gives the mean and standard deviations for the relative health indicators. Generally, the group of the women who have ever given birth to a boy has a better relative health outcome since the mean values of health indicators are lower than those for the women whose children are all girls.

3.5 The Impact of Bargaining Power on Food Consumption

In this section, I estimate the impact of women's relative bargaining power, measured by whether they've ever given birth to a boy, on household monthly food consumption. The regression is the following:

$$Y = \beta_0 + \beta_1 Give\_Birth\_To\_A\_Boy + \alpha X + \sum_{\substack{t=1993, \\ 1997,2000}} \alpha_t S_t + \sum_{\substack{t=1993, \\ 1997,2000}} \gamma_t S_t * U + \varepsilon \qquad (4)$$

Y is the amount consumed for a specific food in one month. $Give\_Birth\_To\_A\_Boy$ is binary indicator, which equals one if a woman has ever given

birth to a boy and equals zero if not. X are all the other control variables, including a woman's specific characteristic variables, such as age, birth year dummies, education, number of children, occupation and health habits, and the characteristics of the household such as whether they are living in rural or urban areas, which province they live in, household annual income, etc. S_t is a binary variable for each survey year to control the time effects. Considering the fact that time effect might be different for urban and rural areas, the interactions between survey year dummies and urban indicator are included.

In order to see whether there is a different impact before and after the enforcement of the One-Child policy, the policy dummy and the interaction term between the policy dummy and giving birth to a boy are included in the regression as explanatory variables. The regression specification is the following:

$$Y = \beta_0 + \beta_1 Give\_Birth\_To\_A\_Boy + \beta_2 Policy\_Dummy +$$
$$\beta_3 Give\_Birth\_To\_A\_Boy * Policy\_Dummy + \alpha X + \sum_{\substack{t=1993, \\ 1997,2000}} \alpha_t S_t + \sum_{\substack{t=1993, \\ 1997,2000}} \gamma_t S_t * U + \varepsilon$$

(5)

β_1 and β_3 are the estimates of interest. Table 20 presents the estimation results of the impact of gender of children on major food consumptions in the family. The amounts consumed for rice, wheat flour, cooking oil, eggs, meat, sugar are the dependent variables. The significant impacts of women's bargaining power on food consumption are only found for rice and wheat flour. Giving birth to a boy increases the consumption of them. The number of children has statistically significant and positive effect on almost all the food consumptions, especially on the amount of rice and wheat flour. The more children in a family, the more food would be consumed. Compared to the rural population, people

54

living in the urban areas consume more cooking oil, eggs, meat and sugar and less rice, wheat flour and other grains. High income families eat more rice, eggs and meat. Educated mothers purchase more eggs and meat; at the same time, they have a lower demand for rice and wheat flour.

Table 21 shows the results with the policy dummy defined based on the year of marriage. Giving birth to a boy and its interaction term with the policy dummy do not have a significant impact on food consumption. The signs of the coefficients of the policy dummy are all positive, which indicate that more food is consumed after the One-Child policy, but this effect is not significant. Women's relative bargaining power, represented by whether they've ever given birth to a boy, has no significant in explaining the monthly food consumption in a family. The coefficient for the interaction term also indicates that, for the mothers who are affected by the One-Child policy, their bargaining power does not have a significant impact on family's food consumption. Similar regression analysis has been made for the people living in rural areas, where a woman's bargaining power is more affected by the gender of their children. No significant impacts of giving birth to a boy and its interaction term with the policy dummy are found. All of these results suggest that mothers don't have significantly different preferences from their husbands in food consumption.

In the next section, health outcomes for mothers and fathers are examined, which allows us to test whether more resources are allocated to mothers if they have more bargaining power and whether there is equal distribution of resource within the family.

55

3.6 The Impact of Bargaining Power on Health Outcomes

In order to test the assumption of equal distribution of family resources, individual health outcomes are examined. Similar to the specification in the previous section, the regression equation for the impact of bargaining power on an individual's health outcome and relative health outcome is the following: (H is the health outcome variable.)

$$H = \beta_0 + \beta_1 Give\_Birth\_To\_A\_Boy + \beta_2 Policy\_Dummy +$$
$$\beta_3 Give\_Birth\_To\_A\_Boy * Policy\_Dummy + \alpha X + \sum_{\substack{t=1993, \\ 1997, 2000}} \alpha_t S_t + \sum_{\substack{t=1993, \\ 1997, 2000}} \gamma_t S_t * U + \varepsilon \qquad (6)$$

In the estimation for the impact of child's gender on relative health outcomes, I use a Multinomial-Logit model to estimate the impact on the relative health outcomes between wives and husbands. The dependent variables are the difference between the health indicator for wives and that for husbands ($I_{wife} - I_{husband}$). A value of 0 for relative health indicator means that both mother and father have the same health outcome. Relative health with a value of 1 indicates that mother's outcome equals 1 and father's outcome equals 0; a value of -1 means mother's outcome is 0 and father's outcome is 1. In the example for the underweight indicator, if relative health outcome equals 1, the wife is underweight while the husband is not. Thus, the husband is healthier when relative health equals "1". Similarly, if the relative health outcome equals -1, it means that the mother is not underweight while the father is. In this situation, women are healthier than their male counterparts.

56

Table 22 and Table 23 report the estimates for the impact of women's relative bargaining power, measured by whether she has ever given birth to a boy, on individual's health outcomes, such as being underweight, being overweight, having low blood pressure and having high blood pressure. For most of them, no statistically significant impact of women's relative bargaining power are found, except for men's indicator of being underweight and whether he is diagnosed with high blood pressure, husbands are more likely to have those problems if their wives ever gave birth to a boy. Table 24 and Table 25 present the estimates for the impact of women's relative bargaining power on relative health indicators. The only significant impact is found for the indicators related to blood pressure in the direction that wives are more likely to have high blood pressure compared with their husbands. Women are less likely to have worse health outcomes related to high blood pressure if their first child is a boy. But for the direction that mothers have better high blood pressure outcomes and all the other health indicators, no significant impact of women's relative bargaining power is found. Similar regression analysis has been made for the people living in rural areas, where a woman's bargaining power is more affected by the gender of their children. No significant impacts of giving birth to a boy and its interaction term with the policy dummy on health indicators are found. Therefore, based on those results, the common preference model could not be rejected. Family resource is equally distributed within the family.

3.7 Conclusions

In this chapter, I propose a unique measure for women's relative bargaining power and examine its impact on household food consumption and on an individual's health outcomes. The measure I used is related to the gender of the children a woman has. Due to some cultural and economic reasons, there is a long standing social norm in China and sons are generally preferred. Women's health status would be increased if they give

57

birth to a boy. I use the woman's role in making household decisions for the consumption of durable goods to test whether giving birth to a boy could be a good measure for a mother's relative bargaining power. The results in an Ordered-Probit estimation suggest that mothers have more power in decisions related to the consumption of radios, TVs, washers, fridges and sewing machines if they have ever given birth to a boy. Thus, gender of children could be a good measure for a mother's relative bargaining power. It is used to test whether the common preference should be rejected and whether there is unequal distribution of resources within the family.

The estimation results of the impact of women's relative bargaining power, measured by whether they've ever given birth to a boy, on the food consumptions suggest that there is no significant impact of bargaining power on a family's food consumptions. The estimated coefficients of giving birth to a boy are not significant in explaining monthly food consumption for the whole family. Therefore, no evidence is found for the different preferences between mothers and fathers. For the estimation of the effects of women's relative bargaining power on individual's health outcomes, the estimates are also not significant for most of the health indicators, such as being underweight, being overweight, low blood pressure and high blood pressure. Similarly, for the relative health indicators between husbands and wives, whether women have ever given birth to a boy, has no statistically significant impact, except for the indicator of high blood pressure in the direction that women are relatively less healthy than their husbands. The factors that affect the probability of having high blood pressure are more complicated than the other indicators such as underweight and overweight. Aging and a diet that is high in salt and fat could induce high blood pressure. For the indicators that have a closer relationship with the resource allocation in the family, we do not find that they are impacted by women's relative bargaining power. Thus, there is no evidence for unequal resource

allocation within the family. This result supports the validity of the assumptions of equal resource allocation and common preference within the household in the first chapter.

Chapter 4: Conclusions

Low levels of human capital stock in developing countries have been a big problem for their economic development for a long time. China, the most populous country in the world, records a fast growing period during the past two decades. Studies on China's economy would have great implication for other developing countries. Compared with the economic reforms in China, other public policies are far less noticed by researchers. In this dissertation, I discuss the population policy in China and its impact on human capital accumulation. The One-Child policy is by far the most influential population policy in the world. Although there are a lot of criticisms about this policy and its consequences, it does have contributions to the human capital accumulation in China. In a smaller family, more resources could be spent on each member. People could have more opportunity to get advanced education and better health services. The increased productivity definitely would have contribution to the overall economic growth.

In the examination of the impact of family size on parental health outcomes, I exploit exogenous change in family size under the One-Child policy in China. With the data from China Health and Nutrition Survey in 1993, 1997 and 2000 and the method of instrumental variables, I find that family size has a statistically significant effect on parental health outcomes. Mothers with fewer children have lower probability to be underweight and have low blood pressure. At the same time, they have a higher probability to be overweight and have high blood pressure. These seemingly contradictory results would occur if smaller family size increased food consumption of mothers leading to underweight women attaining a normal weight but normal weight women becoming overweight. Thus, the One-Child Policy makes women heavier and contributes a lot to the alleviation of the under-nutrition problem and the increase of human capital stock in China.

The change in the magnitude of the estimates for the impact of family size indicates that the estimates would be inconsistent if the endogeneity of the number of children is neglected. The exogenous variation of family size under the One-Child policy could be very helpful in the empirical studies related to the impact of the change in fertility or family size on an individual's human capital stock and investment.

In chapter 2, I also find that the impact of the number of children is larger for less educated women and for mothers with a lower level of family income. Family income directly determines resource constraint. Rich families are less impacted by family size. This evidence supports the mechanism of budget effect, since this effect should be larger for women with limited family income. Educated people tend to have more knowledge about health and receive higher wages. These might be the reason why the impact of the One-Child policy is smaller on them.

If the family resource is equally allocated in the family, husbands should also be affected by family size in a similar way; otherwise, at least part of the impact of the number of children should be attributed to some other factors, such as the biological influence of childbearing. The empirical results for husbands suggest that there is no significant biological impact of childbearing on maternal health. The main effects of the number of children come from the economic budget mechanism; that is, more children decrease the resource allocated to mothers and affect their health outcomes.

In the comparison of a husband's and a wife's health outcomes, equal resource allocation is assumed within the family. Under the framework of an economic budget mechanism, common preference within the household is assumed. With this assumption, all the family income is pooled and who controls the family's income doesn't matter since the preference for each member is the same. However, if the person who controls

61

the family resource is not completely altruistic to the other members of the family or the preference for each member is different, when it comes to the consumption decision, bargaining power would be very important. What I did next is to relax the assumption of common preference, allowing each member of the family to have different utility functions and test whether there is unequal resource allocation with the family.

Existing empirical studies related to this use female income as a measure for women's relative bargaining power in the family. However, the families where mothers earn a large share of income are quite different and income is not the only contribution of mothers. In this dissertation, I propose a very unique measure for the bargaining power, which is related to the gender of children that a woman has. Given the One-Child policy and the preference for sons in China, whether a mother has ever given birth to a boy could be a good measure for her relative bargaining power within the family. I use a woman's role in making household decisions for the consumption of durable goods to test whether giving birth to a boy is a good measure for mother's relative bargaining power.

The results in an Ordered-Probit estimation suggest that mothers have more power in decisions related to the consumption of radios, TVs, washers, fridges and sewing machines if they have ever given birth to a boy. These results suggest that giving birth to a boy significantly increases a mother's role in those consumption decision-makings and could be a good measure for women's relative bargaining power. Therefore, the income earned by mothers is not the only contribution of them to the family. Giving birth to a 'boy' would be another important contribution of women in a society where a son preference is prevalent. I do not find evidence that this son preference is significantly larger after the One-Child policy. This result also suggests that there is no big role for the

population policy to play in the improvement of a woman's social status and alleviation of the discrimination against girls.

In the estimation results of the impact of women's relative bargaining power, measured by whether they've ever given birth to a boy, on major food consumption, there is no significant impact of bargaining power. The estimated coefficients of giving birth to a boy are not significant in explaining monthly food consumption for the whole family. Therefore, resources in the hand of mothers do not result in a larger consumption in food. Common preference between mothers and fathers could not be rejected.

For the estimation of the effects of women's relative bargaining power on individual's health outcomes, the estimates are also not significant for most of the health indicators, such as being underweight, being overweight, low blood pressure and high blood pressure. Similarly, for the relative health indicators between husbands and wives, whether the woman has ever given birth to a boy, has no statistically significant impacts, except for the indicator of high blood pressure in the direction that women is relatively less healthy than their husbands. For the indicators that have closer relationships with the resource allocation in the family, we do not find that they are impacted by women's relative bargaining power. Thus, there is no evidence for unequal resource allocation within the family. This result supports the validity of the assumptions of equal resource allocation and common preference within the household in the second chapter.

In summary, I find that the One-Child policy makes people less likely to being underweight and contributes a lot to the alleviation of under-nutrition problem in China. Giving birth to a boy significantly affects a woman's social status, but it has no impact on resource allocation within the family. Traditional culture has big influences on people's

63

gender preference. Removing the One-Child policy would have no significant effect on the alleviation of discrimination against girls.

Figures

Figure 1: A Map of the Provinces in China Health and Nutrition Survey

Source: This map is provided by Carolina Population Center.

Figure 2: the Fraction of Women Who are Underweight in 1993 and 2000
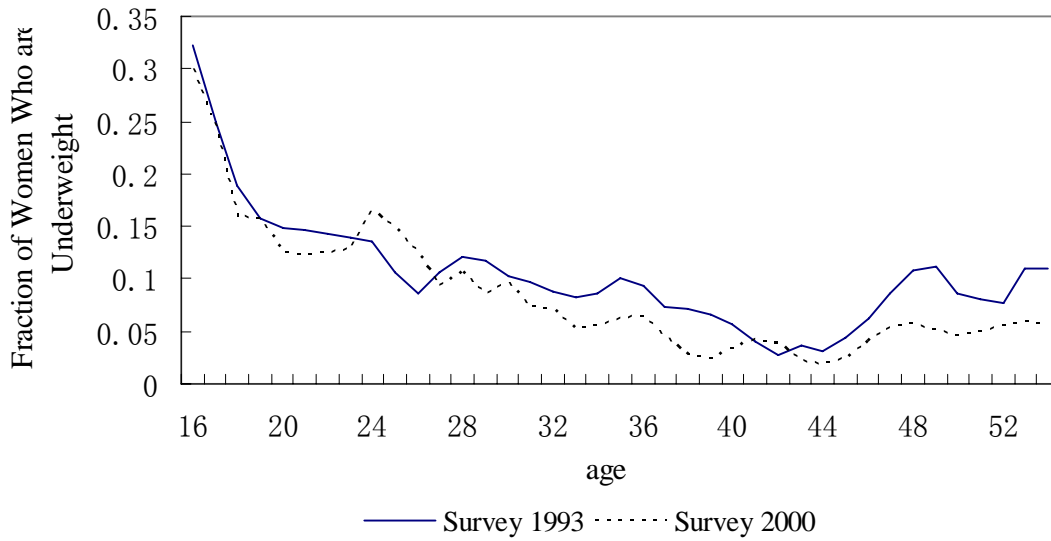
Figure 3: the Fraction of Women Who are Overweight in 1993 and 2000
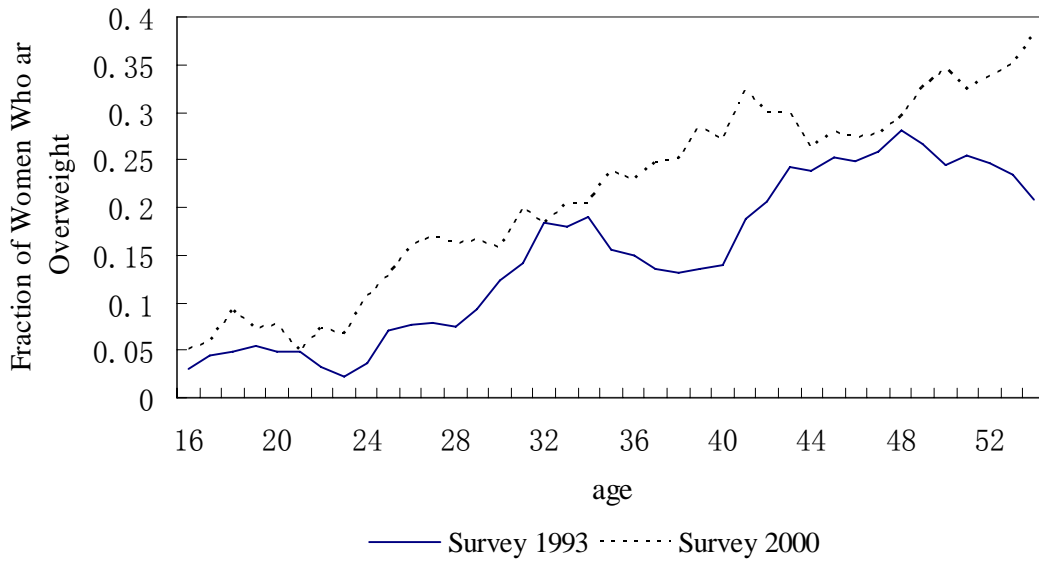
Figure 4: the Fraction of Women Who Have Normal Weight in 1993 and 2000
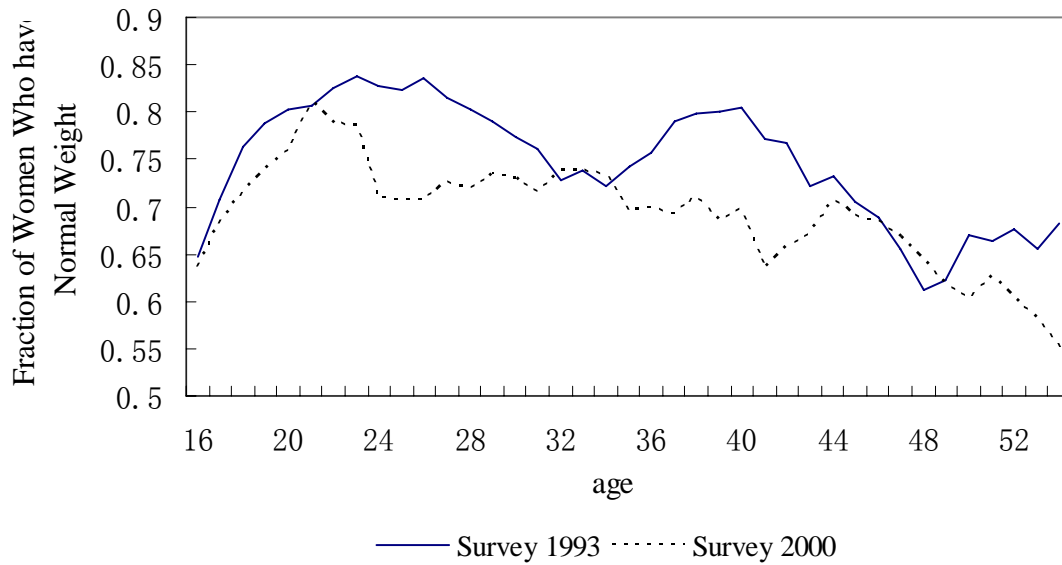
Figure 5: the Fraction of Women Who Have Normal Blood Pressure in 1993 and 2000

67
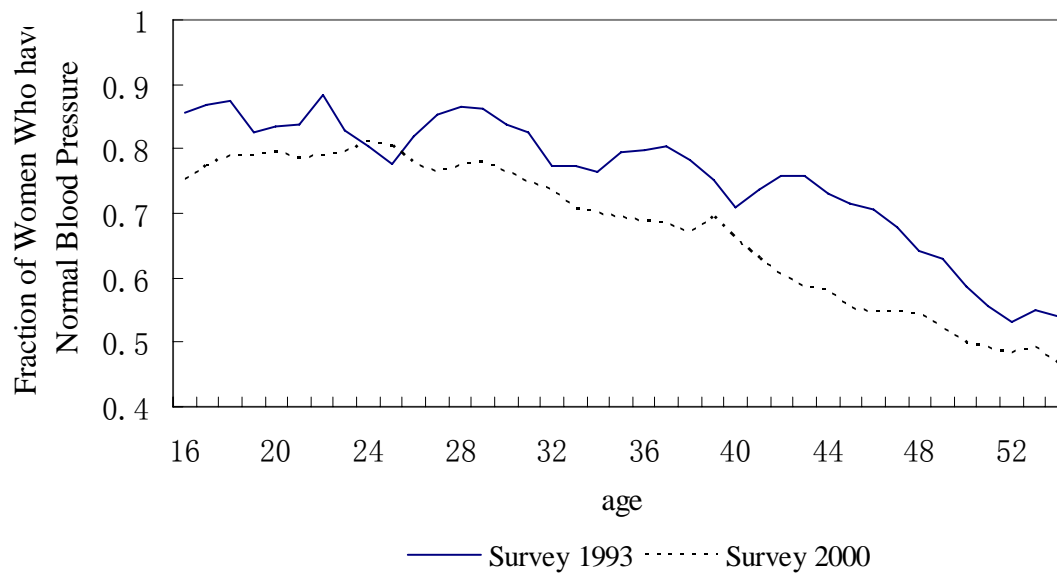
Figure 6: the Fraction of Women Who Have Low Blood Pressure in 1993 and 2000
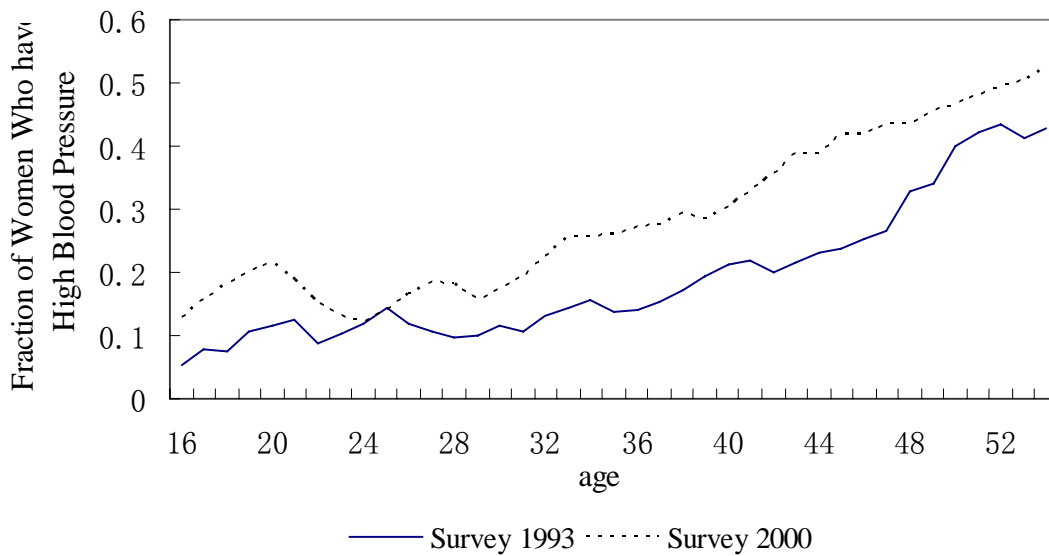
Source: Author's calculations from CHNS.

Figure 8: The Fraction of Women Who Are Normalweight / Underweight / Overweight
and the Number of Children They Have
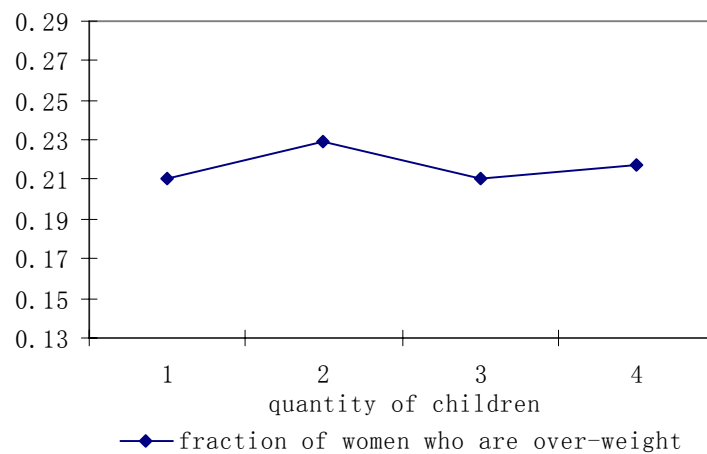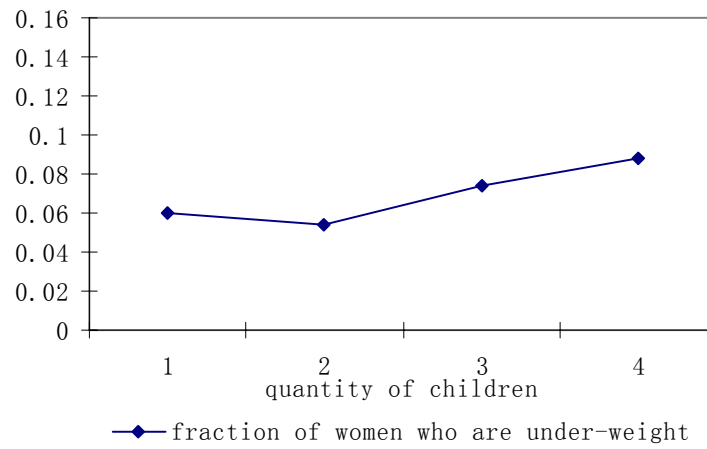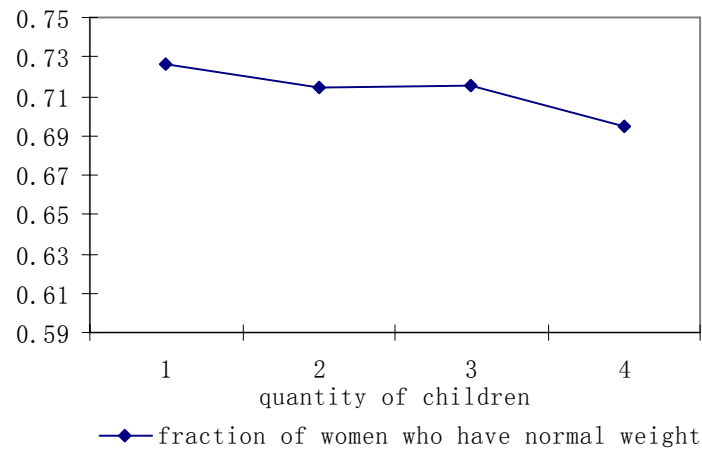
Source: Author's calculations from CHNS, 1993-2000.

Figure 9: The Fraction of Women Who Have Normal Blood Pressure / Low Blood Pressure / High Blood Pressure and the Number of Children They Have
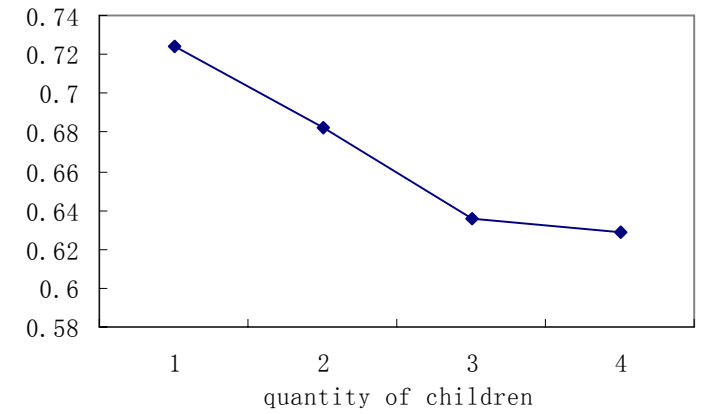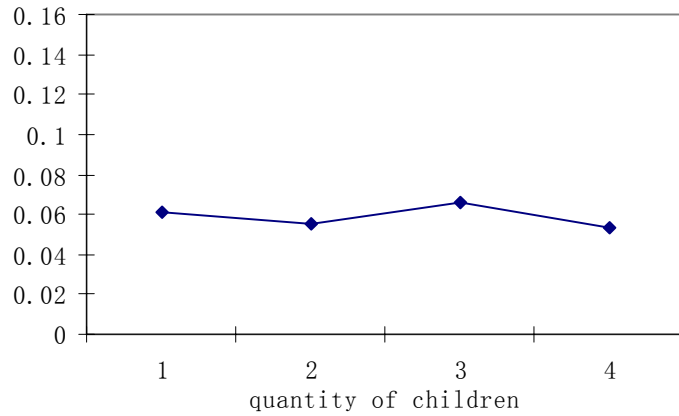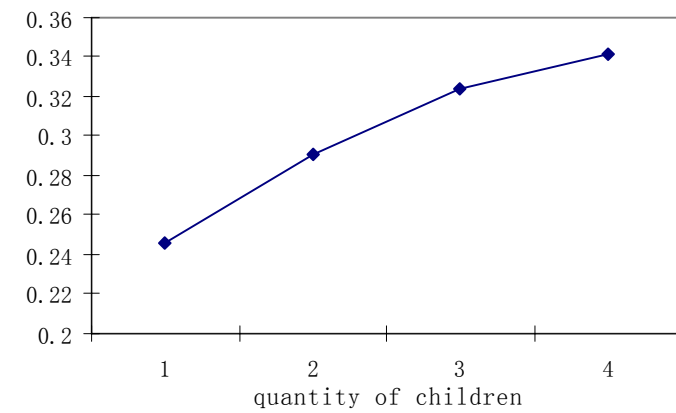
Source: Author's calculations from CHNS, 1993-2000.

Figure 10: Marriage Year and the Fraction of Having a second Child
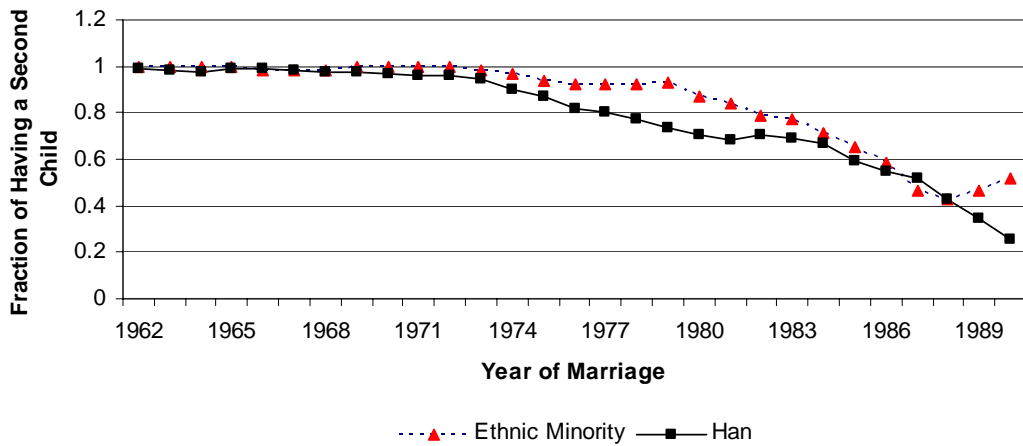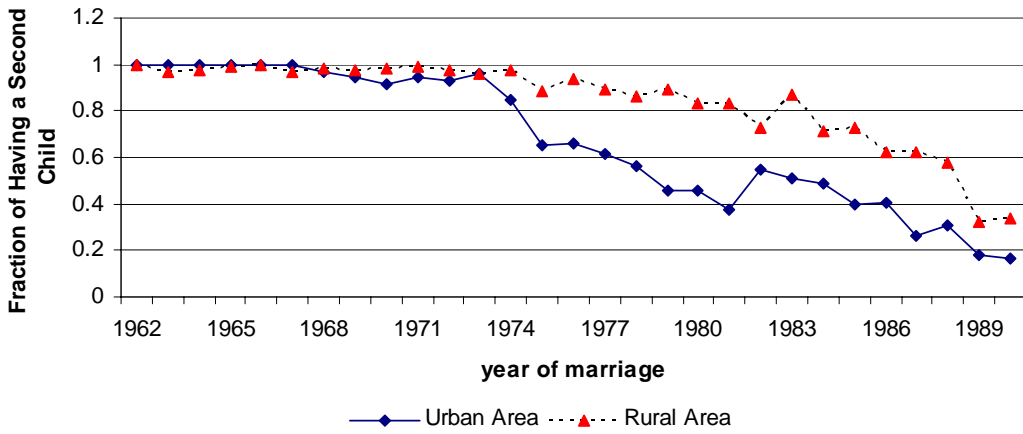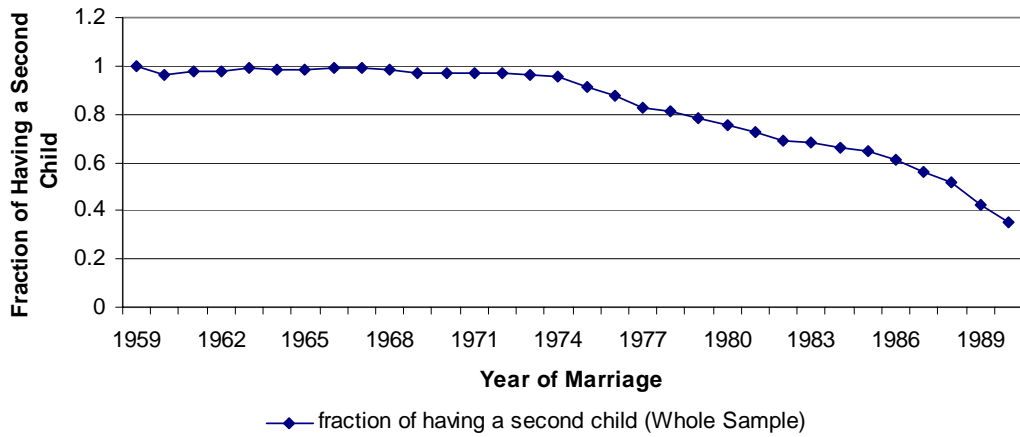
Source: Author's calculations from CHNS, 1993-2000.

Figure 11: Year of the First Birth and the Fraction of Having a Second Child
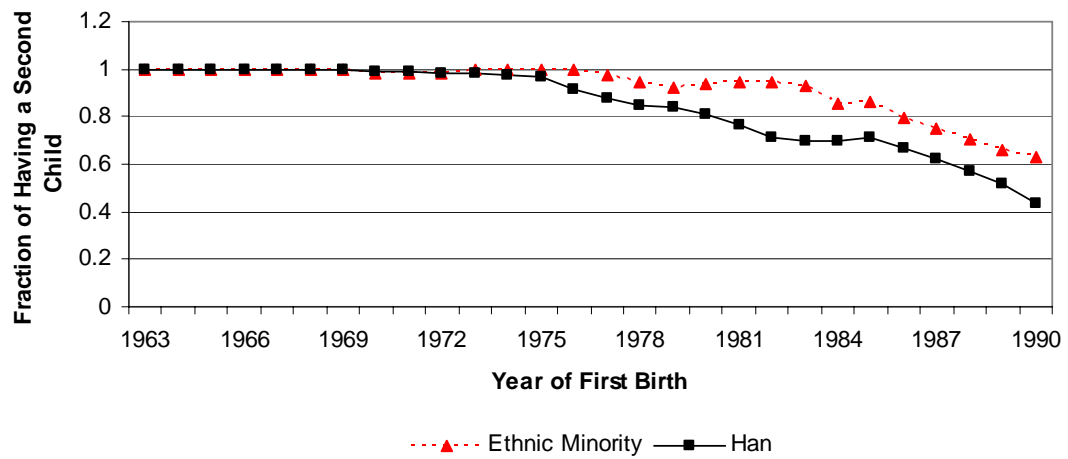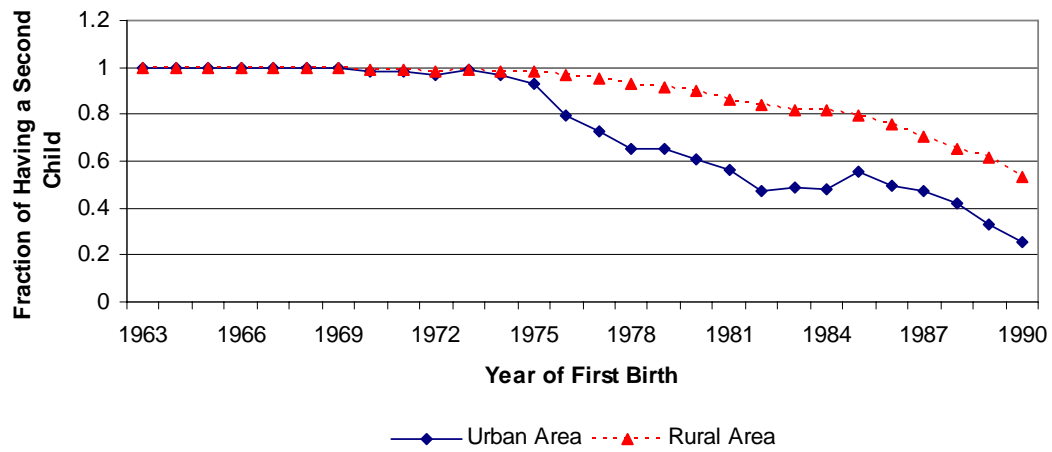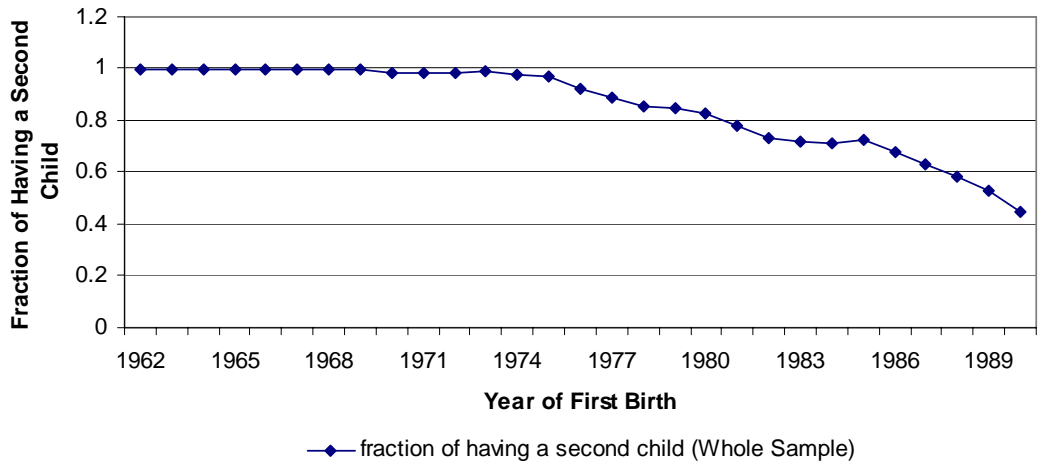
Source: Author's calculations from CHNS, 1993-2000.

Figure 12: Birth Cohort and the Fraction of Having a Second Child
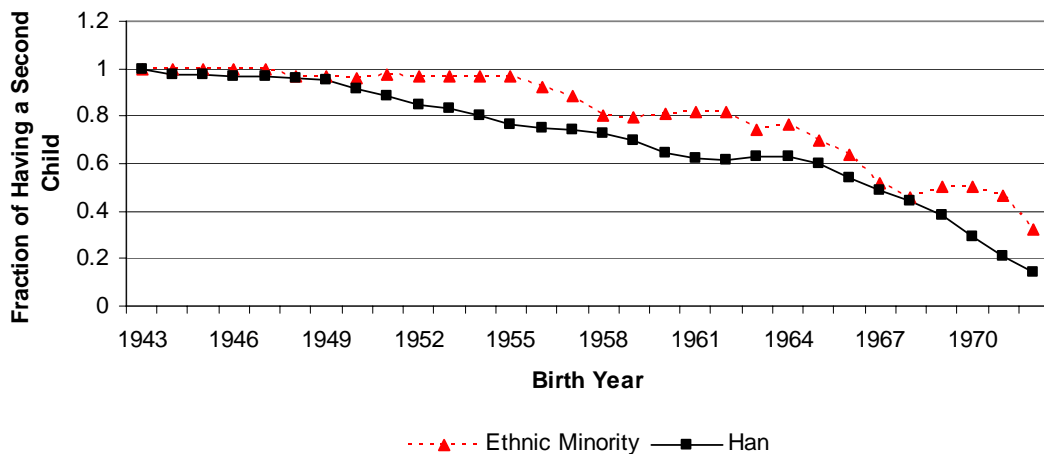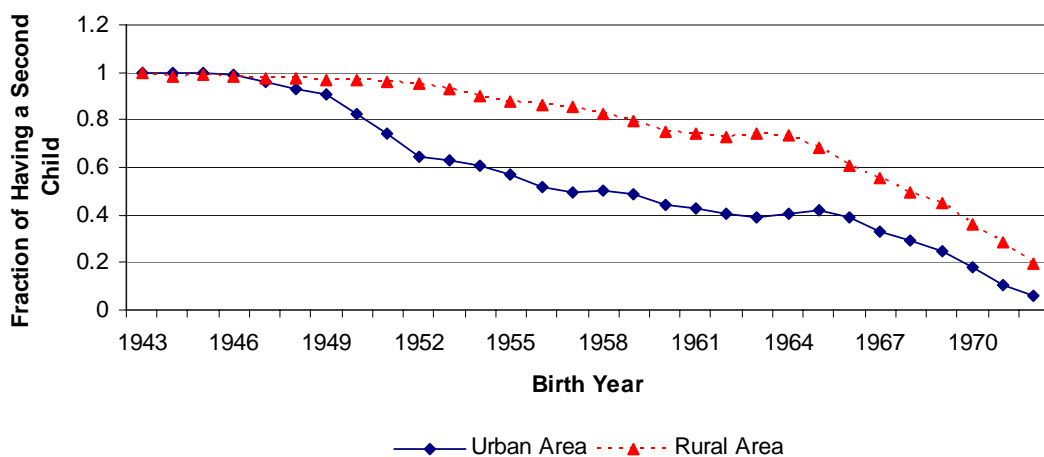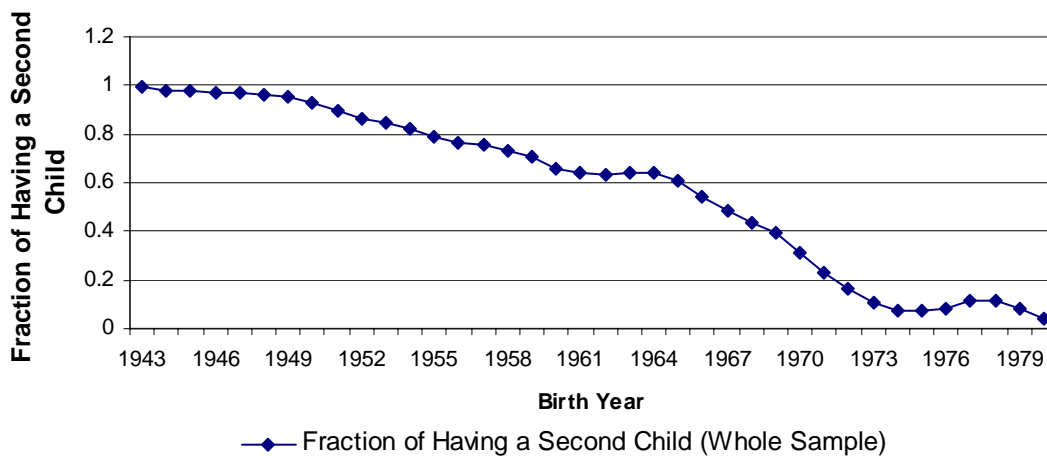
Source: Author's calculations from CHNS, 1993-2000.

Figure 13: Distribution of Women by Birth Age

a. PDF
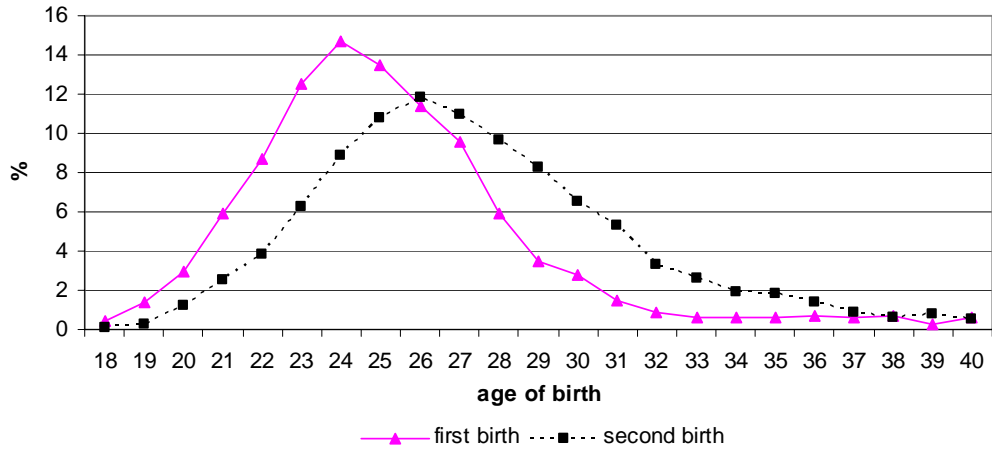
b. CDF
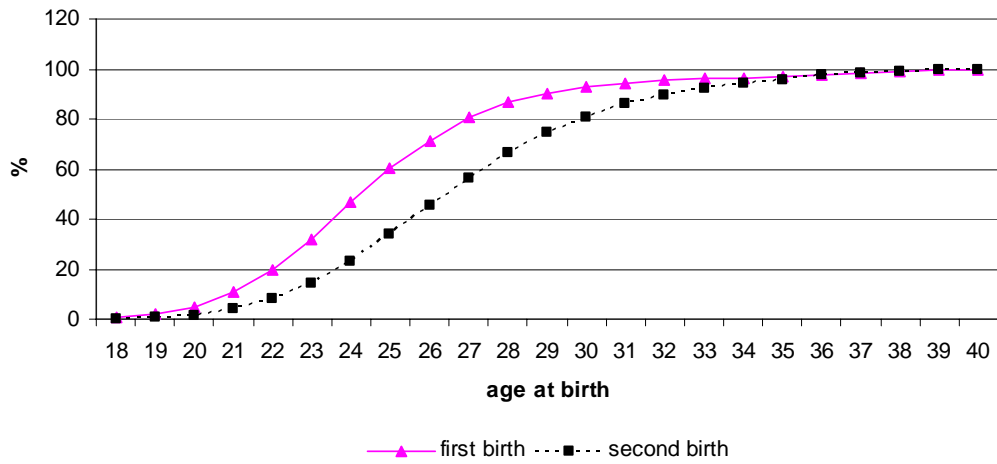
Source: Author's calculations from CHNS, 1993-2000.

Figure 14: The Number of People Who Choose Each Answer (Husband, Wife or Both) to the Question of Who in Your Household Decided to Buy This Item
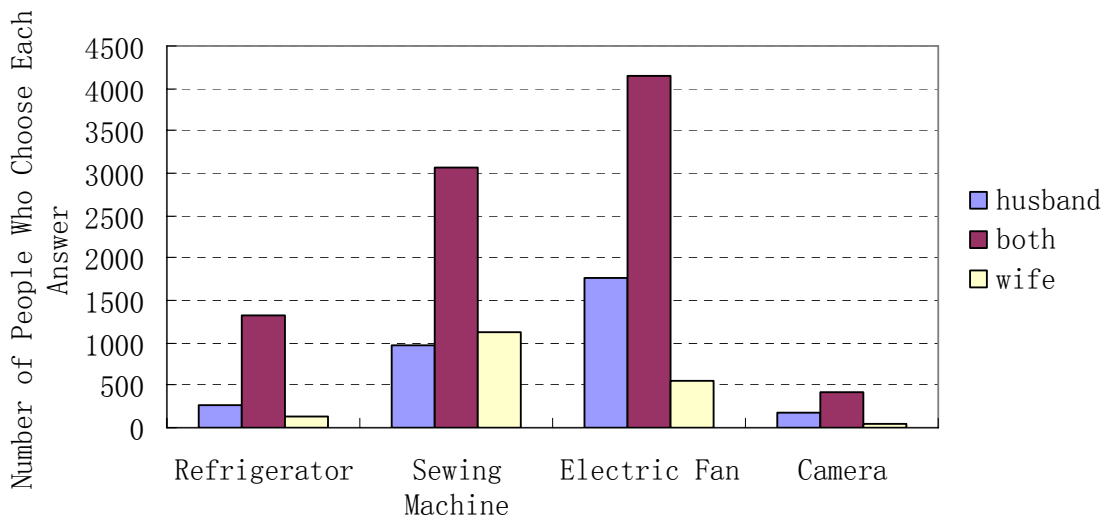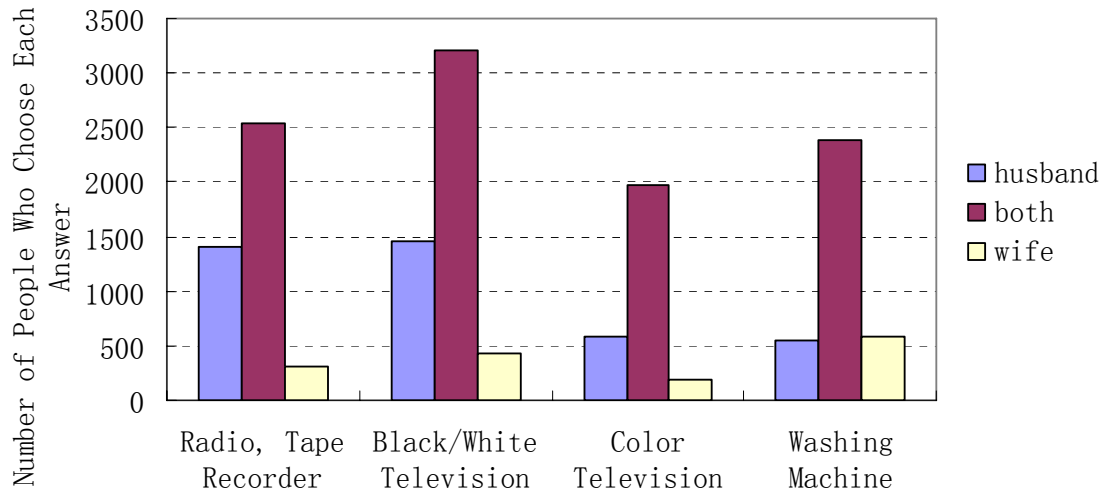
Figure 15: The Percentage of People Who Choose Each Answer (Husband, Wife or Both) to the Question of Who in Your Household Decided to Buy This Item
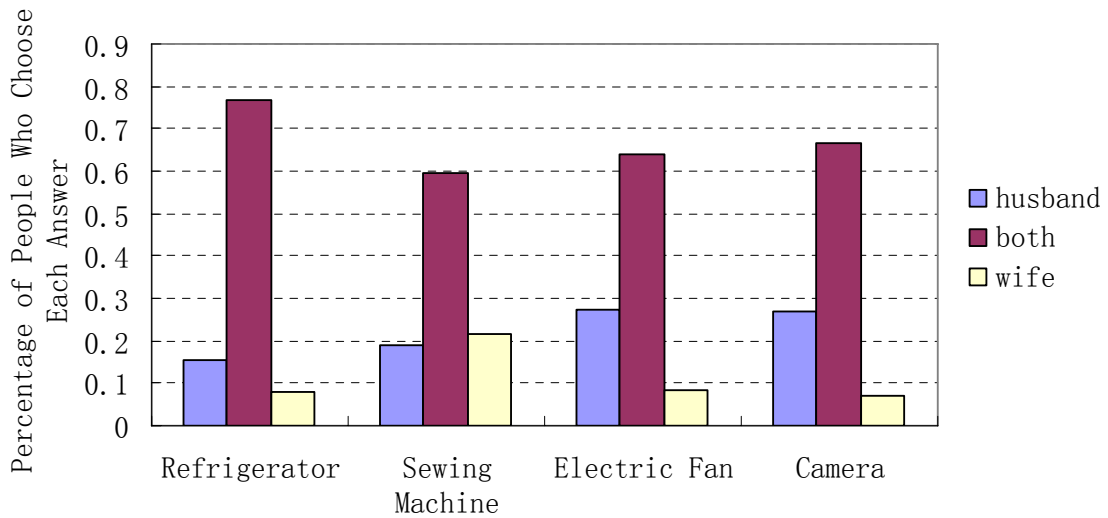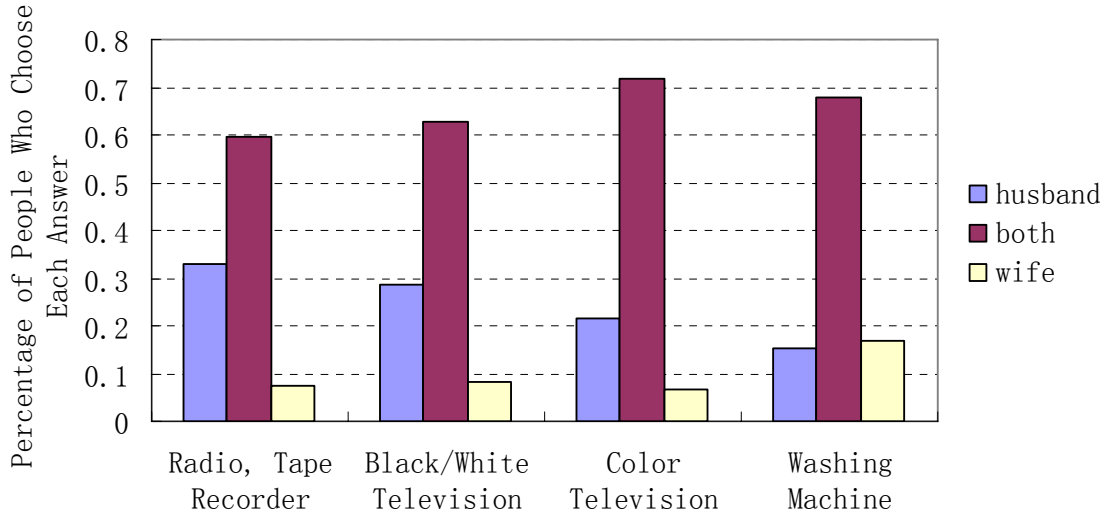
Source: Author's calculations from CHNS, 1993-2000.

Tables

Table 1: Descriptive Statistics of CHNS, 1993-2000.

Variables	Survey Year			Total
	1993	1997	2000	
Number of Children	2.066	1.850	1.672	1.966
	(0.918)	(0.864)	(0.779)	(1.047)
BMI	22.089	22.541	23.017	22.467
	(2.932)	(2.973)	(3.112)	(3.020)
Underweight	0.253	0.183	0.158	0.195
(BMI<=18.5)	(0.435)	(0.387)	(0.364)	(0.396)
Overweight	0.160	0.198	0.243	0.203
(BMI>=25)	(0.367)	(0.399)	(0.429)	(0.402)
Obese	0.017	0.026	0.034	0.026
(BMI>=30)	(0.129)	(0.160)	(0.181)	(0.160)
Low Blood Pressure	0.085	0.051	0.049	0.060
	(0.279)	(0.221)	(0.216)	(0.238)
High Blood Pressure	0.169	0.276	0.303	0.253
	(0.375)	(0.447)	(0.460)	(0.435)
Diagnosed with high	0.017	0.014	0.027	0.020
blood pressure	(0.129)	(0.119)	(0.163)	(0.140)
Diagnosed with	N/A	0.002	0.003	0.002
diabetes		(0.042)	(0.053)	(0.048)
Living in Rural Area	0.714	0.656	0.689	0.686
	(0.452)	(.475)	(0.463)	(0.464)
Ethnic Minorities	0.115	0.111	0.125	0.117
	(0.319)	(0.314)	(0.331)	(0.321)
Years of Education	6.177	6.757	7.505	6.854
	(3.898)	(3.882)	(3.750)	(3.877)
Household Annual	0.0636	1.456	1.252	1.134
Income (10000RMB)	(0.613)	(1.088)	(0.994)	(0.991)
Age	36.960	37.227	38.187	37.496
	(6.902)	(7.457)	(7.399)	(7.291)
Birth year	1956.04	1959.773	1961.813	1959.387
	(6.902)	(7.457)	(7.399)	(7.645)
First Child is Female	0.470	0.477	0.479	0.474
	(0.499)	(0.500)	(0.500)	(0.499)
Smoke	0.046	0.049	0.049	0.048
	(0.210)	(0.217)	(0.217)	(0.214)
N	2677	2507	2553	7727

Note: Standard deviations are shown in parenthesis.

Table 2: A Comparison of the Number of Children for Policy Affected and Unaffected Group
(Mean and Standard Deviation)

	IV: marriage		IV: first birth		IV: cohort		Total
	Before	After	Before	After	Before	After	
Number of Children	2.92	1.81	2.98	1.85	2.98	1.82	1.966
	(0.80)	(0.83)	(0.78)	(0.83)	(0.85)	(0.81)	(1.047)
Observations	2128	5599	1821	5906	1784	5943	7727

Table 3: First Stage Results

	Dependent variables: Number of Children		
Independent Variable	IV: Marriage	IV: First Birth	IV: Cohort
Instrumental Variables:			
Policy Dummy * Han	-0.084	-0.213***	-0.167***
	(0.052)	(0.053)	(0.064)
Policy Dummy * Urban	-0.155***	-0.056	-0.121**
	(0.042)	(0.042)	(0.052)
Policy Dummy	-0.286***	-0.164***	-0.072
	(0.054)	(0.054)	(0.064)
Control Variables:			
First Child is a Girl	0.199***	0.202***	0.191***
	(0.015)	(0.015)	(0.015)
Han	0.014	0.106**	0.091
	(0.047)	(0.047)	(0.061)
Urban	-0.182***	-0.298***	-0.209***
	(0.049)	(0.053)	(0.060)
Years of Schooling	-0.050***	-0.051***	-0.054***
	(0.002)	(0.002)	(0.002)
Household Annual Income	0.013	0.015	0.030*
	(0.017)	(0.018)	(0.017)
Age	0.126***	0.123***	0.130***
	(0.024)	(0.024)	(0.024)
Age Squared	-0.001***	-0.001***	-0.000**
	(0.000)	(0.000)	(0.000)
Birth Year Dummies	Yes	Yes	Yes
Province Indicator	Yes	Yes	Yes
Survey Year Dummies	Yes	Yes	Yes
Survey Year * Urban	Yes	Yes	Yes
Observations	7727	7727	7727
R-squared	0.53	0.53	0.51
F Statistics	143.02	142.31	141.55
(Prob > F)	0.0000	0.0000	0.0000

Note: Standard errors are shown in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: The Impact of Family Size on Maternal Health
(Coefficients for the Number of Children in the 2nd Stage Regression)

	Dependent Variables						
	Underweight (BMI<=18.5)	Overweight (BMI>=25)	Obese (BMI>=30)	Low blood pressure	High blood pressure	Diagnosed High Blood Pressure	Diagnosed Diabetes
IV: Year of Marriage	0.138***	-0.091***	-0.003	0.050***	-0.053***	-0.011*	0.001
	(0.016)	(0.015)	(0.005)	(0.010)	(0.016)	(0.006)	(0.003)
IV: Year of First Birth	0.144***	-0.082***	-0.005	0.048***	-0.053***	-0.007	0.002
	(0.016)	(0.014)	(0.005)	(0.010)	(0.016)	(0.006)	(0.003)
IV: Birth Cohort	0.174***	-0.123***	-0.005	0.055***	-0.045***	-0.010*	-0.001
	(0.017)	(0.016)	(0.006)	(0.011)	(0.017)	(0.006)	(0.003)
Without IV	0.028***	-0.027***	-0.002	0.009**	-0.007	-0.001	0.002*
	(0.006)	(0.006)	(0.002)	(0.004)	(0.006)	(0.002)	(0.001)
Observations	7727	7727	7727	7727	7727	7526	4516

Note: Standard errors are shown in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Sensitivity Test: First Stage Results

Independent Variable	IV: Marriage			IV: First Birth				IV: Cohort	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Policy Dummy * Han Nationality	-0.084	-0.094	-0.081	-0.213***	-0.246***	-0.208***	-0.167***	-0.174***	-0.152***
	(0.052)	(0.069)	(0.058)	(0.053)	(0.051)	(0.048)	(0.064)	(0.054)	(0.049)
Policy Dummy * Urban	-0.155***	-0.160***	-0.153***	-0.056	-0.059	-0.057	-0.121**	-0.074**	-0.125**
	(0.042)	(0.047)	(0.035)	(0.042)	(0.039)	(0.037)	(0.052)	(0.030)	(0.056)
Policy Dummy	-0.286***	-0.248***	-0.233***	-0.164***	-0.119**	-0.136***	-0.072	-0.065	-0.077
	(0.054)	(0.052)	(0.052)	(0.054)	(0.053)	(0.051)	(0.064)	(0.058)	(0.066)
Observations	7727	7727	7727	7727	7727	7727	7727	7727	7727
R-squared	0.53	0.52	0.52	0.53	0.52	0.52	0.51	0.51	0.51

Dependent variables: Number of Children

* Note: Note: Standard errors are shown in parentheses.   * significant at 10%; ** significant at 5%; *** significant at 1%.

Definition of policy dummy for each regression :

(1) Policy Dummy =1 if the mother got married after 1974; 0 otherwise;

(2) Policy Dummy =1 if the mother got married after 1976; 0 otherwise;

(3) Policy Dummy =1 if the mother got married after 1972; 0 otherwise;

(4) Policy Dummy =1 if the mother had her first child after 1976; 0 otherwise;

(5) Policy Dummy =1 if the mother had her first child after 1978; 0 otherwise;

(6) Policy Dummy =1 if the mother had her first child after 1974; 0 otherwise;

(7) Policy Dummy =1 if the mother was born after 1949; 0 otherwise;

(8) Policy Dummy =1 if the mother was born after 1951; 0 otherwise;

(9) Policy Dummy =1 if the mother was born after 1947; 0 otherwise.

Table 6: Sensitivity Test: The Impact of Family Size on Maternal Health
(Coefficient for the Number of Children in 2nd Stage)

Cutoff Year	Underweight (BMI<=18.5)	Overweight (BMI>=25)	Obese (BMI>=30)	Low blood pressure	High blood pressure	Diagnosed High Blood Pressure	Diagnosed Diabetes
IV: Marriage Year							
(1). 1974	0.138***	-0.091***	-0.003	0.050***	-0.053***	-0.011*	0.001
	(0.016)	(0.015)	(0.005)	(0.010)	(0.016)	(0.006)	(0.003)
(2). 1976	0.133***	-0.103***	-0.003	0.049***	-0.043***	-0.008	-0.001
	(0.016)	(0.015)	(0.005)	(0.010)	(0.016)	(0.006)	(0.003)
(3). 1972	0.146***	-0.126***	-0.007	0.048***	-0.037**	-0.007	-0.002
	(0.017)	(0.016)	(0.006)	(0.010)	(0.017)	(0.006)	(0.003)
IV: First Birth Year							
(4). 1976	0.144***	-0.082***	-0.005	0.048***	-0.053***	-0.007	0.002
	(0.016)	(0.014)	(0.005)	(0.010)	(0.016)	(0.006)	(0.003)
(5). 1978	0.148***	-0.093***	-0.004	0.050***	-0.029*	-0.003	0.001
	(0.017)	(0.015)	(0.005)	(0.010)	(0.016)	(0.006)	(0.003)
(6). 1974	0.159***	-0.119***	-0.007	0.051***	-0.028	-0.005	-0.001
	(0.017)	(0.016)	(0.006)	(0.010)	(0.017)	(0.006)	(0.003)
IV: Birth Cohort							
(7). 1949	0.174***	-0.123***	-0.005	0.055***	-0.045***	-0.010*	-0.001
	(0.017)	(0.016)	(0.006)	(0.011)	(0.017)	(0.006)	(0.003)
(8). 1951	0.175***	-0.120***	-0.005	0.056***	-0.058***	-0.011*	-0.003
	(0.017)	(0.016)	(0.006)	(0.011)	(0.017)	(0.006)	(0.003)
(9). 1947	0.176***	-0.143***	-0.010*	0.054***	-0.052***	-0.012*	-0.004
	(0.017)	(0.016)	(0.006)	(0.011)	(0.017)	(0.006)	(0.003)
Observations	7727	7727	7727	7727	7727	7526	4516

* Note: Definition of policy dummy for each regression :

(1) Policy Dummy =1 if the mother got married after 1974; 0 otherwise; (2) Policy Dummy =1 if the mother got married after 1976; 0 otherwise; (3) Policy Dummy =1 if the mother got married after 1972; 0 otherwise; (4) Policy Dummy =1 if the mother had her first child after 1976; 0 otherwise; (5) Policy Dummy =1 if the mother had her first child after 1978; 0 otherwise; (6) Policy Dummy =1 if the mother had her first child after 1974; 0 otherwise; (7) Policy Dummy =1 if the mother was born after 1949; 0 otherwise; (8) Policy Dummy =1 if the mother was born after 1951; 0 otherwise; (9) Policy Dummy =1 if the mother was born after 1947; 0 otherwise.

Table 7: The Impact of the Number of Children on Height
(Coefficient for the Number of Children in the 2nd Stage)

	Height
IV: Marriage Year	0.007
	(0.005)
IV: First Birth Year	0.008
	(0.006)
IV: Birth Cohort	0.006
	(0.005)
Without IV	-0.001
	(0.001)
Observations	7727

Note: Standard errors are shown in parentheses.

Table 8: First Stage Results for the Heterogeneous Treatment Effect

	Dependent Variables: Number of Children					
	Less Educated Vs. Educated					
	IV: Marriage		IV: First Birth		IV: Cohort	
	Less Educ.	More Educ	Less Educ	More Educ	Less Educ	More Educ
Policy Dummy * Han	−0.256***	−0.136***	−0.341***	−0.131***	−0.239***	−0.156***
	(0.044)	(0.039)	(0.046)	(0.041)	(0.038)	(0.039)
Policy Dummy * Urban	−0.235***	−0.382***	−0.202***	−0.367***	−0.210***	−0.385***
	(0.038)	(0.024)	(0.040)	(0.026)	(0.033)	(0.024)
Policy Dummy	−0.090*	−0.127**	−0.047	−0.116**	−0.114**	−0.016
	(0.052)	(0.056)	(0.054)	(0.058)	(0.050)	(0.059)
Observations	3908	3819	3964	3828	4029	3907
R-squared	0.47	0.45	0.47	0.45	0.45	0.44
	Poor Vs. Rich					
	IV: Marriage		IV: First Birth		IV: Cohort	
	Poor	Rich	Poor	Rich	Poor	Rich
Policy Dummy * Han	−0.072	−0.262***	−0.083	−0.288**	−0.107*	−0.253***
	(0.067)	(0.098)	(0.071)	(0.113)	(0.060)	(0.089)
Policy Dummy * Urban	−0.114***	−0.363***	−0.061	−0.369***	−0.114**	−0.345***
	(0.031)	(0.044)	(0.065)	(0.050)	(0.058)	(0.042)
Policy Dummy	−0.007	−0.092	−0.032	−0.029	−0.037	−0.099
	(0.082)	(0.108)	(0.087)	(0.124)	(0.083)	(0.101)
Observations	1397	1471	1413	1487	1430	1497
R-squared	0.46	0.58	0.45	0.58	0.45	0.57

Note: Standard errors are shown in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Less Educated: Years of Schooling<=6; More Educated: Years of Schooling>6.

Poor: family income is lower than 25 percentile; Rich: family income is higher than 75 percentile.

Table 9: The Impact of Family Size on Maternal Health: Less Educated vs. More Educated Women
(Coefficient for the Number of Children in the 2nd Stage)

	Dependent Variables							
	Underweight (BMI<=18.5)		Overweight (BMI>=25)		Low blood pressure		High blood pressure	
	Less Educ	More Educ	Less Educ	More Educ	Less Educ	More Educ	Less Educ	More Educ
IV: Year of Marriage	0.148***	0.138***	-0.090***	-0.085***	0.042***	0.040***	-0.081***	-0.021
	(0.021)	(0.025)	(0.020)	(0.022)	(0.013)	(0.014)	(0.022)	(0.023)
IV: Year of First Birth	0.148***	0.128***	-0.088***	-0.082***	0.045***	0.036***	-0.074***	-0.032
	(0.021)	(0.024)	(0.020)	(0.022)	(0.013)	(0.014)	(0.022)	(0.023)
IV: Birth Cohort	0.177***	0.161***	-0.118***	-0.108***	0.046***	0.041***	-0.079***	-0.008
	(0.023)	(0.026)	(0.021)	(0.023)	(0.015)	(0.014)	(0.024)	(0.024)
Without IV	0.065***	0.035***	-0.035***	-0.046***	0.002	0.005	-0.022**	-0.013
	(0.010)	(0.010)	(0.008)	(0.010)	(0.003)	(0.004)	(0.011)	(0.012)
Observations	3908	3819	3908	3819	3908	3819	3908	3819

Note: Standard errors are shown in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1% .

Less Educated: Years of Schooling<=6; More Educated: Years of Schooling>6.

Table 10: The Impact of Family Size on Maternal Health: Poor vs. Rich Women
(Coefficient for the Number of Children in the 2nd Stage)

	Dependent Variables							
	Underweight (BMI<=18.5)		Overweight (BMI>=25)		Low blood pressure		High blood pressure	
	Poor	Rich	Poor	Rich	Poor	Rich	Poor	Rich
IV: Year of Marriage	0.165***	0.082***	-0.131***	-0.065**	0.050	0.033*	0.129***	-0.052
	(0.046)	(0.031)	(0.036)	(0.030)	(0.032)	(0.019)	(0.043)	(0.032)
IV: Year of First Birth	0.173***	0.105***	-0.148***	-0.097***	0.048	0.037**	0.111**	-0.057*
	(0.046)	(0.031)	(0.037)	(0.030)	(0.033)	(0.019)	(0.044)	(0.032)
IV: Birth Cohort	0.179***	0.120***	-0.127***	-0.113***	0.038	0.031	0.108**	-0.030
	(0.046)	(0.033)	(0.036)	(0.033)	(0.032)	(0.020)	(0.043)	(0.035)
Without IV	0.059***	0.033**	-0.025**	-0.017	0.006	-0.002	0.012	-0.043**
	(0.017)	(0.016)	(0.012)	(0.015)	(0.005)	(0.006)	(0.019)	(0.020)
Observations	1430	1497	1430	1497	1430	1497	1430	1497

Note: Standard errors in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Poor: family income is lower than 25 percentile; Rich: family income is higher than 75 percentile.

Table 11: A Comparison of Women and Men's Health Outcomes
(Mean and Standard Deviation)

	Women	Men
Health Indicators		
Underweight	.195	.187
(BMI<18.5)	(.396)	(.390)
Overweight	.203	.189
(BMI>=25)	(.402)	(.392)
Obese	.026	.024
(BMI>=30)	(.160)	(.153)
Low Blood Pressure	.060	.019
	(.2389)	(.138)
High Blood Pressure	.253	.395
	(.435)	(.489)
Diagnosed with high	.020	.028
blood pressure	(.140)	(.196)
Other Characteristics		
Years of Education	6.380	8.026
	(3.939)	(3.331)
Smoke or Not	0.032	0.730
	(0.177)	(0.444)
Age	40.000	40.150
	(7.290)	(7.986)

Table 12: First Stage Results for Men and Women

	Dependent variables: Number of Children					
	IV: Marriage		IV: First Birth		IV: Cohort	
	Men	Women	Men	Women	Men	Women
Policy Dummy	-0.082	-0.084	-0.155***	-0.213***	-0.141***	-0.167***
* Han	(0.054)	(0.052)	(0.044)	(0.053)	(0.046)	(0.065)
Policy Dummy	-0.162***	-0.155***	-0.070	-0.056	-0.141**	-0.121**
* Urban	(0.045)	(0.042)	(0.047)	(0.042)	(0.055)	(0.052)
Policy Dummy	-0.245***	-0.286***	-0.169***	-0.164***	-0.088	-0.072
	(0.050)	(0.054)	(0.051)	(0.054)	(0.057)	(0.064)
Observations	7727	7727	7727	7727	7727	7727
R-squared	0.51	0.53	0.51	0.53	0.48	0.51

Note: Standard errors are shown in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 13: The Impact of Family Size on Health Outcomes: Men vs. Women
(Coefficients of the Number of Children in the 2nd Stage Regression)

	Dependent Variables							
	Underweight (BMI<=18.5)		Overweight (BMI>=25)		Low blood pressure		High blood pressure	
	Men	Women	Men	Women	Men	Women	Men	Women
With IV								
Marriage Year	0.128***	0.138***	-0.080***	-0.091***	0.008	0.050***	-0.026	-0.053***
	(0.017)	(0.016)	(0.015)	(0.015)	(0.006)	(0.010)	(0.019)	(0.016)
First Birth Year	0.115***	0.144***	-0.084***	-0.082***	0.005	0.048***	-0.032*	-0.053***
	(0.017)	(0.016)	(0.015)	(0.014)	(0.006)	(0.010)	(0.019)	(0.016)
Birth Cohort	0.160***	0.174***	-0.102***	-0.123***	-0.000	0.055***	-0.064***	-0.045***
	(0.019)	(0.017)	(0.017)	(0.016)	(0.007)	(0.011)	(0.022)	(0.017)
Without IV	0.032***	0.028***	-0.032***	-0.027***	0.003	0.009**	-0.009	-0.007
	(0.007)	(0.006)	(0.006)	(0.006)	(0.003)	(0.004)	(0.009)	(0.006)
Observations	7727	7727	7727	7727	7727	7727	7727	7727

Note: Standard errors are shown in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 14: The Impact of Giving birth to a Boy on Women's Role in Consumption Decisions
(Marginal Effect in the Ordered-Probit Model)

Independent Variables	Dependant Variable: Who decide = 3 if wife decides; =2 if Both husband and Wife decide; =1 if husband decides.			
	(1) Radio, Tape Recorder	(2) Black/White Television	(3) Color Television	(4) Washing Machine
Give Birth to a Boy	0.038***	0.045***	0.022**	0.033*
	(0.011)	(0.015)	(0.009)	(0.020)
Number of Children	-0.022***	-0.007	-0.006	0.008
	(0.006)	(0.006)	(0.006)	(0.012)
Ethnic Han	0.004	0.002	0.001	-0.009
	(0.009)	(0.008)	(0.008)	(0.018)
Living in Urban Area	0.038***	0.027***	0.003	0.088***
	(0.010)	(0.010)	(0.015)	(0.022)
Smoke or not	0.071**	0.052	0.125***	0.009
	(0.036)	(0.033)	(0.048)	(0.060)
Household Annual Income	-0.030***	-0.034***	-0.012*	0.032*
	(0.011)	(0.010)	(0.007)	(0.018)
Years of Schooling	0.003**	0.001	0.003***	0.009***
	(0.001)	(0.001)	(0.001)	(0.003)
Birth Year	-0.004	0.007	-0.002	-0.007
	(0.004)	(0.005)	(0.003)	(0.008)
Age	-0.006	0.011	0.009	-0.029
	(0.008)	(0.008)	(0.008)	(0.018)
Age-Squared	0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Province Dummy	Yes	Yes	Yes	Yes
Occupation Dummy	Yes	Yes	Yes	Yes
Observations	4256	5086	2743	3524

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 14 (cont.): The Impact of Giving birth to a Boy on Women's Role in Consumption Decisions
(Marginal Effect in the Ordered-Probit Model)

Independent Variables	Dependant Variable: Who decide = 3 if wife decides; =2 if Both husband and Wife decide; =1 if husband decides.			
	(5) Refrigerator	(6) Sewing Machine	(7) Electric Fan	(8) Camera
Give Birth to a Boy	0.016	0.068***	0.032***	0.016
	(0.018)	(0.023)	(0.011)	(0.020)
Number of Children	-0.003	-0.005	-0.011**	-0.048***
	(0.011)	(0.013)	(0.005)	(0.014)
Ethnic Han	-0.005	0.029	0.025*	0.018
	(0.033)	(0.025)	(0.014)	(0.029)
Living in Urban Area	0.014	0.029	0.009	0.011
	(0.016)	(0.022)	(0.008)	(0.009)
Smoke or not	0.023	-0.016	0.112**	0.011
	(0.048)	(0.034)	(0.048)	(0.048)
Household Annual Income	-0.032**	-0.028*	-0.024***	-0.001
	(0.016)	(0.018)	(0.009)	(0.018)
Years of Schooling	0.004*	0.006*	0.002*	0.003
	(0.002)	(0.003)	(0.001)	(0.002)
Birth Year	-0.009	0.008	-0.001	0.008
	(0.006)	(0.009)	(0.004)	(0.011)
Age	-0.007	0.006	-0.011	0.003
	(0.016)	(0.020)	(0.008)	(0.017)
Age-Squared	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Province Dummy	Yes	Yes	Yes	Yes
Occupation Dummy	Yes	Yes	Yes	Yes
Observations	1718	5146	6479	625

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 15: The Impact of Giving birth to a Boy on Women's Role in Consumption
Decisions with Policy Dummy
(Marginal Effect in the Ordered-Probit Model)

Independent Variables	Dependant Variable: Who decide = 3 if wife decides; =2 if Both husband and Wife decide; =1 if husband decides.			
	(1) Radio, Tape Recorder	(2) Black/White Television	(3) Color Television	(4) Washing Machine
Give Birth to a Boy	0.047***	0.068***	0.056***	0.053***
	(0.022)	(0.016)	(0.019)	(0.019)
Policy Dummy	0.005	0.003	0.048**	0.040**
	(0.026)	(0.041)	(0.021)	(0.018)
Give Birth to a Boy * Policy Dummy	-0.006	-0.023	-0.030	-0.045**
	(0.025)	(0.033)	(0.024)	(0.021)
Number of Children	-0.029***	-0.008	-0.006	0.005
	(0.009)	(0.007)	(0.008)	(0.007)
Ethnic Han	0.004	0.003	0.003	-0.006
	(0.010)	(0.018)	(0.012)	(0.008)
Living in Urban Area	0.069***	0.033***	0.009	0.033*
	(0.023)	(0.012)	(0.028)	(0.020)
Smoke or not	0.070**	0.052*	0.120***	0.083
	(0.036)	(0.033)	(0.047)	(0.059)
Household Annual Income	-0.030***	-0.037***	-0.012*	0.031*
	(0.013)	(0.010)	(0.007)	(0.018)
Years of Schooling	0.003*	0.001	0.003**	0.008***
	(0.001)	(0.001)	(0.001)	(0.003)
Birth Year	-0.004	0.007	-0.003	-0.009
	(0.003)	(0.005)	(0.003)	(0.008)
Age	-0.006	0.011	0.008	-0.031*
	(0.077)	(0.008)	(0.007)	(0.017)
Age-Squared	0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Province Dummy	Yes	Yes	Yes	Yes
Occupation Dummy	Yes	Yes	Yes	Yes
Observations	4256	5086	2743	3524

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

89

Table 15 (Cont.): The Impact of Giving birth to a Boy on Women's Role in Consumption
Decisions with Policy Dummy
(Marginal Effect in the Ordered-Probit Model)

Independent Variables	Dependant Variable: Who decide = 3 if wife decides; =2 if Both husband and Wife decide; =1 if husband decides.			
	(5) Refrigerator	(6) Sewing Machine	(7) Electric Fan	(8) Camera
Give Birth to a Boy	0.048**	0.090**	0.032***	0.016
	(0.022)	(0.044)	(0.011)	(0.020)
Policy Dummy	0.028***	0.005	-0.036**	-0.019
	(0.009)	(0.009)	(0.015)	(0.030)
Give Birth to a Boy *	-0.062**	-0.009	0.039**	-0.005
Policy Dummy	(0.028)	(0.022)	(0.019)	(0.032)
Number of Children	0.001	0.003	-0.013**	-0.049***
	(0.009)	(0.005)	(0.005)	(0.014)
Ethnic Han	-0.025	-0.003	0.026*	0.018
	(0.046)	(0.004)	(0.014)	(0.029)
Living in Urban Area	-0.008	0.002	0.009	0.021
	(0.017)	(0.003)	(0.012)	(0.022)
Smoke or not	0.009	-0.015**	0.116**	0.013
	(0.049)	(0.007)	(0.049)	(0.048)
Household Annual	-0.031**	0.002	-0.024***	-0.001
Income	(0.015)	(0.002)	(0.009)	(0.018)
Years of Schooling	0.003	-0.002	0.002**	0.003
	(0.002)	(0.002)	(0.001)	(0.003)
Birth Year	-0.018**	-0.001	-0.000	0.009
	(0.008)	(0.003)	(0.003)	(0.011)
Age	-0.015	-0.000	-0.011	0.004
	(0.017)	(0.000)	(0.007)	(0.017)
Age-Squared	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Province Dummy	Yes	Yes	Yes	Yes
Occupation Dummy	Yes	Yes	Yes	Yes
Observations	1718	5146	6479	625

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 16: The Impact of Giving birth to a Boy on Women's Role in Consumption
Decisions in Rural Areas
(Marginal Effect in the Ordered-Probit Model)

Independent Variables	Dependant Variable: Who decide			
	= 3 if wife decides; =2 if Both husband and Wife decide; =1 if husband decides.			
	(1) Radio, Tape Recorder	(2) Black/White Television	(3) Color Television	(4) Washing Machine
Give Birth to a Boy	0.051**	0.085***	0.034**	0.043
	(0.021)	(0.026)	(0.016)	(0.040)
Number of Children	-0.003	-0.008	-0.002	0.020
	(0.012)	(0.006)	(0.011)	(0.017)
Ethnic Han	0.045	0.034	0.011	-0.017
	(0.032)	(0.030)	(0.015)	(0.025)
Smoke or not	0.052	0.031	0.064	0.035
	(0.042)	(0.033)	(0.051)	(0.026)
Household Annual	-0.055***	-0.043***	-0.027**	0.008
Income	(0.015)	(0.012)	(0.012)	(0.029)
Years of Schooling	0.002	0.001	0.004*	0.010**
	(0.002)	(0.001)	(0.002)	(0.004)
Birth Year	-0.001	0.011**	-0.003	-0.005
	(0.005)	(0.005)	(0.004)	(0.010)
Age	-0.003	0.013	0.021	-0.037
	(0.010)	(0.008)	(0.010)	(0.023)
Age-Squared	0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Province Dummy	Yes	Yes	Yes	Yes
Occupation Dummy	Yes	Yes	Yes	Yes
Observations	1796	2173	1060	846

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 16 (cont.): The Impact of Giving birth to a Boy on Women's Role in Consumption Decisions in Rural Areas
(Marginal Effect in the Ordered-Probit Model)

Independent Variables	Dependant Variable: Who decide = 3 if wife decides; =2 if Both husband and Wife decide; =1 if husband decides.			
	(5) Refrigerator	(6) Sewing Machine	(7) Electric Fan	(8) Camera
Give Birth to a Boy	0.040	0.079**	0.066***	0.014
	(0.039)	(0.034)	(0.021)	(0.018)
Number of Children	-0.011	-0.004	-0.011	-0.018
	(0.020)	(0.010)	(0.007)	(0.021)
Ethnic Han	-0.022	0.004	0.038	0.011
	(0.058)	(0.005)	(0.034)	(0.039)
Smoke or not	0.006	-0.003	0.005	0.056
	(0.065)	(0.004)	(0.008)	(0.063)
Household Annual Income	-0.089**	-0.047**	-0.032*	-0.022*
	(0.044)	(0.018)	(0.020)	(0.013)
Years of Schooling	0.001	0.002	0.001	0.001
	(0.005)	(0.004)	(0.002)	(0.003)
Birth Year	-0.005	-0.002	-0.003	0.011
	(0.009)	(0.004)	(0.005)	(0.014)
Age	-0.023	0.001	-0.011	0.004
	(0.029)	(0.003)	(0.008)	(0.020)
Age-Squared	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Province Dummy	Yes	Yes	Yes	Yes
Occupation Dummy	Yes	Yes	Yes	Yes
Observations	429	1046	2369	78

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 17: The Impact of Giving birth to a Boy on Women's Role in Consumption
Decisions with Policy Dummy in Rural Areas
(Marginal Effect in the Ordered-Probit Model)

Independent Variables	Dependant Variable: Who decide = 3 if wife decides; =2 if Both husband and Wife decide; =1 if husband decides.			
	(1) Radio, Tape Recorder	(2) Black/White Television	(3) Color Television	(4) Washing Machine
Give Birth to a Boy	0.045**	0.091***	0.055**	0.079**
	(0.022)	(0.029)	(0.022)	(0.039)
Policy Dummy	0.014	0.001	0.035*	0.087**
	(0.020)	(0.017)	(0.018)	(0.043)
Give Birth to a	-0.003	-0.011	-0.001	-0.032
Boy * Policy Dummy	(0.023)	(0.019)	(0.022)	(0.046)
Number of Children	-0.027***	-0.008	-0.007	0.023
	(0.009)	(0.028)	(0.007)	(0.031)
Ethnic Han	0.001	0.034	0.015	0.006
	(0.017)	(0.030)	(0.014)	(0.025)
Smoke or not	0.054	0.030	0.053	0.056
	(0.043)	(0.033)	(0.047)	(0.055)
Household Annual	-0.055***	-0.043)**	-0.027**	0.004
Income	(0.020)	(0.021)	(0.011)	(0.028)
Years of Schooling	0.002	0.001	0.003*	0.010
	(0.002)	(0.004)	(0.002)	(0.011)
Birth Year	-0.002	0.011	-0.002	-0.009**
	(0.005)	(0.030)	(0.004)	(0.004)
Age	-0.003	0.013	0.020*	-0.040
	(0.010)	(0.037)	(0.010)	(0.037)
Age-Squared	0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Province Dummy	Yes	Yes	Yes	Yes
Occupation Dummy	Yes	Yes	Yes	Yes
Observations	1796	2173	1060	846

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 17 (Cont.): The Impact of Giving birth to a Boy on Women's Role in Consumption
Decisions with Policy Dummy in Rural Areas
(Marginal Effect in the Ordered-Probit Model)

Independent Variables	Dependant Variable: Who decide			
	= 3 if wife decides; =2 if Both husband and Wife decide; =1 if husband decides.			
	(5) Refrigerator	(6) Sewing Machine	(7) Electric Fan	(8) Camera
Give Birth to a Boy	0.090**	0.065***	0.043**	0.036
	(0.044)	(0.023)	(0.019)	(0.029)
Policy Dummy	0.012	-0.006	-0.006	-0.026
	(0.040)	(0.032)	(0.017)	(0.035)
Give Birth to a Boy *	-0.023	0.032	0.027**	-0.009
Policy Dummy	(0.065)	(0.052)	(0.022)	(0.039)
Number of Children	0.011	-0.005	-0.012	-0.069
	(0.021)	(0.013)	(0.010)	(0.014)
Ethnic Han	-0.040	0.028	0.038*	0.012
	(0.060)	(0.025)	(0.044)	(0.039)
Smoke or not	0.019	-0.012	0.039	0.060
	(0.052)	(0.036)	(0.067)	(0.064)
Household Annual	-0.088	-0.027*	-0.032*	-0.022
Income	(0.065)	(0.018)	(0.019)	(0.022)
Years of Schooling	0.003	0.006*	0.002	0.002
	(0.005)	(0.003)	(0.002)	(0.003)
Birth Year	-0.006	0.008	-0.004	0.012
	(0.013)	(0.009)	(0.003)	(0.011)
Age	-0.012	-0.007	-0.012	0.004
	(0.026)	(0.020)	(0.013)	(0.019)
Age-Squared	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Province Dummy	Yes	Yes	Yes	Yes
Occupation Dummy	Yes	Yes	Yes	Yes
Observations	429	1046	2369	78

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 18: Descriptive Statistics of Food Consumption

Name of Food Purchased	Mean (500g)	Standard Deviation	Obs
Rice	63.132	55.995	6164
Wheat Flour	30.630	60.534	6164
Other Grains	9.542	52.725	6164
Cooking Oil	6.929	5.567	6164
Eggs	3.891	5.002	6164
Meat (Pork, Beef and Lamb)	7.779	7.586	6164
Sugar	1.196	1.753	6164

Table 19: Giving Birth to Boy and Relative Health Outcomes
(Mean and Standard Deviation)

	Giving Birth to a Boy	Not Giving Birth to a Boy
Women's Health Indicators:		
Underweight	0.216	0.207
	(0.412)	(0.405)
Overweight	0.190	0.208
	(0.392)	(0.406)
Low Blood Pressure	0.063	0.062
	(0.249)	(0.253)
High Blood Pressure	0.239	0.252
	(0.427)	(0.437)
Diagnosed High Blood	0.019	0.023
Pressure	(0.138)	(0.151)
Men's Health Indicators:		
Underweight	0.192	0.214
	(0.395)	(0.414)
Overweight	0.172	0.160
	(0.379)	(0.368)
Low Blood Pressure	0.021	0.020
	(0.145)	(0.150)
High Blood Pressure	0.373	0.365
	(0.484)	(0.481)
Diagnosed High Blood	0.031	0.026
Pressure	(0.173)	(0.210)
Relative Health Indicators:		
$I_{wife} - I_{husband}$		
Underweight	0.024	-0.007
	(0.541)	(0.541)
Overweight	0.018	0.047
	(0.512)	(0.512)
Low Blood Pressure	0.042	0.042
	(0.276)	(0.261)
High Blood Pressure	-0.133	-0.113
	(0.553)	(0.579)
Diagnosed High Blood	-0.015	0.001
Pressure	(0.202)	(0.207)
observations	4012	3715

Table 20: The Impact of Women's Relative Bargaining Power on Household Monthly Food Consumptions

Independent Variables	Dependant Variables						
	(1) Rice	(2) Wheat Flour	(3) Other Grains	(4) Cooking Oil	(5) Eggs	(6) Meat (Pork, Beef and Lamb)	(7) Sugar
Give Birth to a Boy	2.517*	2.389*	0.032	-0.056	0.142	0.032	0.041
	(1.421)	(1.279)	(0.744)	(0.152)	(0.124)	(0.202)	(0.046)
Number of Children	15.304***	3.119***	-0.408	0.817***	0.430***	0.515***	0.134***
	(0.947)	(0.852)	(0.495)	(0.101)	(0.083)	(0.135)	(0.031)
Ethnic Han	-19.799***	19.068***	6.169***	0.742***	1.639***	0.247	0.532***
	(2.239)	(2.015)	(1.172)	(0.239)	(0.196)	(0.319)	(0.072)
Living in Urban Area	-2.902*	-5.889***	-2.911***	1.214***	1.297***	2.334***	0.173***
	(1.701)	(1.531)	(0.891)	(0.181)	(0.149)	(0.242)	(0.055)
Smoke or not	-19.675***	7.563**	-0.349	0.474	0.253	-0.481	-0.195
	(3.853)	(3.466)	(2.014)	(0.411)	(0.337)	(0.549)	(0.124)
Household Income	13.106***	-10.629***	-2.309***	1.689***	0.975***	3.761***	0.486***
	(1.515)	(1.364)	(0.793)	(0.162)	(0.133)	(0.216)	(0.049)
Years of Education	-1.192***	-2.187***	-0.715***	0.005	0.126***	0.278***	0.005
	(0.203)	(0.183)	(0.106)	(0.022)	(0.018)	(0.029)	(0.007)
Birth Year	-2.340***	-0.153	-0.579***	0.201***	0.287***	-0.131**	0.005
	(0.406)	(0.366)	(0.213)	(0.043)	(0.036)	(0.058)	(0.013)
Age	-0.438	-0.988	-0.882	0.167	0.442***	-0.502***	-0.077**
	(1.171)	(1.054)	(0.614)	(0.125)	(0.103)	(0.167)	(0.038)
Age Square	-0.040***	0.009	0.005	-0.000	-0.001	0.005**	0.001**
	(0.015)	(0.013)	(0.008)	(0.002)	(0.001)	(0.002)	(0.000)
Province Dummy	6164	6164	6164	6164	6164	6164	6164
Observations	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 21: The Impact of Women's Relative Bargaining Power on Household Monthly Food Consumptions with Policy Dummy

Independent Variables		Dependant Variables					
	(1) Rice	(2) Wheat Flour	(3) Other Grains	(4) Cooking Oil	(5) Eggs	(6) Meat	(7) Sugar
Give Birth to a Boy	1.833	2.716	-0.665	0.007	-0.079	0.047	0.058
	(2.090)	(1.882)	(1.095)	(0.223)	(0.183)	(0.298)	(0.068)
Policy Dummy	1.752	2.365	1.463	0.282	-0.195	0.184	0.009
	(2.559)	(2.304)	(1.342)	(0.273)	(0.224)	(0.365)	(0.083)
Give Birth to a Boy * Policy Dummy	-1.101	0.545	-1.308	0.131	0.120	0.023	0.032
	(2.829)	(2.548)	(1.483)	(0.302)	(0.248)	(0.403)	(0.092)
Number of Children	15.065***	3.205***	-0.375	0.795***	-0.435***	0.522***	-0.134***
	(0.949)	(0.855)	(0.497)	(0.101)	(0.083)	(0.135)	(0.031)
Ethnic Han	-19.858***	19.088***	6.180***	0.736***	1.637***	0.248	0.532***
	(2.237)	(2.015)	(1.173)	(0.239)	(0.196)	(0.319)	(0.072)
Living in Urban Area	-3.015*	-5.849***	-2.892***	1.203***	1.294***	2.337***	0.173***
	(1.700)	(1.531)	(0.892)	(0.181)	(0.149)	(0.242)	(0.055)
Smoke or not	-19.356***	7.449**	-0.394	0.503	0.260	-0.490	-0.196
	(3.851)	(3.467)	(2.014)	(0.411)	(0.338)	(0.549)	(0.124)
Household Income	12.899***	-10.554***	-2.285***	1.671***	0.971***	3.767***	0.487***
	(1.515)	(1.365)	(0.793)	(0.162)	(0.133)	(0.216)	(0.049)
Years of Education	-1.053***	-2.237***	-0.733***	0.018	0.129***	0.274***	0.004
	(0.207)	(0.186)	(0.109)	(0.022)	(0.018)	(0.030)	(0.007)
Birth Year	-2.079***	-0.248	-0.608***	0.223***	0.291***	-0.138**	0.004
	(0.413)	(0.372)	(0.217)	(0.044)	(0.036)	(0.059)	(0.013)
Age	-0.069	-1.122	-0.915	0.197	0.448***	-0.512***	-0.079**
	(1.175)	(1.058)	(0.617)	(0.125)	(0.103)	(0.167)	(0.038)
Age Square	-0.046***	0.012	0.005	-0.001	-0.002	0.005**	0.001**
	(0.015)	(0.013)	(0.008)	(0.002)	(0.001)	(0.002)	(0.000)
Province Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6164	6164	6164	6164	6164	6164	6164

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 22: The Impact of Women's Relative Bargaining Power on Individual's Health Outcomes Related to BMI

Independent Variables	Dependant Variables			
	Underweight (BMI<18.5)		Overweight (BMI>25)	
	Women	Men	Women	Men
Giving Birth to a Boy	-0.016	0.011	0.011	-0.006
	(0.020)	(0.020)	(0.019)	(0.018)
Policy Dummy	0.036	0.060***	-0.060***	-0.067***
	(0.022)	(0.021)	(0.021)	(0.019)
Giving Birth to a Boy *	0.003	-0.003	0.003	0.001
Policy Dummy	(0.023)	(0.023)	(0.023)	(0.021)
Number of Children	0.030***	0.024***	-0.034***	-0.027***
	(0.007)	(0.007)	(0.007)	(0.006)
Living in Urban Areas	-0.027**	-0.019	0.025**	0.029***
	(0.012)	(0.012)	(0.012)	(0.011)
Years of Schooling	0.004***	-0.004**	0.000	0.013***
	(0.002)	(0.002)	(0.001)	(0.002)
Household Income	-0.021*	-0.001	0.004	0.029***
	(0.011)	(0.011)	(0.011)	(0.010)
Age	-0.019***	-0.010***	0.019***	0.016***
	(0.002)	(0.002)	(0.002)	(0.002)
Smoke or not	-0.003	0.007	0.003	-0.023**
	(0.029)	(0.011)	(0.028)	(0.010)
Ethnic Han	-0.032*	-0.027	0.024	0.040***
	(0.016)	(0.017)	(0.016)	(0.015)
Birth Year Dummies	Yes	Yes	Yes	Yes
Province Indicators	Yes	Yes	Yes	Yes
Survey Year Dummies	Yes	Yes	Yes	Yes
Survey Year * Urban	Yes	Yes	Yes	Yes
Occupation Dummy	Yes	Yes	Yes	Yes
Observations	7727	7727	7727	7727

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 23: The Impact of Women's Relative Bargaining Power on Health Outcomes Related to Blood Pressure

Independent Variables	Low Blood Pressure (hypotension)		High Blood Pressure (hypertension)		Diagnosed with High Blood Pressure	
	Women	Men	Women	Men	Women	Men
Giving Birth to a Boy	-0.021*	0.009	0.014	-0.012	0.008	-0.012
	(0.012)	(0.007)	(0.021)	(0.024)	(0.007)	(0.010)
Policy Dummy	-0.021	-0.006	0.040*	-0.085***	0.011	0.004
	(0.013)	(0.008)	(0.023)	(0.025)	(0.008)	(0.010)
Giving Birth to a Boy *	0.029**	-0.016*	-0.018	0.010	-0.006	0.007
Policy Dummy	(0.014)	(0.008)	(0.024)	(0.027)	(0.008)	(0.011)
Number of Children	0.005	0.009**	-0.006	-0.008	-0.005*	-0.009***
	(0.004)	(0.004)	(0.008)	(0.007)	(0.003)	(0.003)
Living in Urban Areas	0.019***	0.012***	-0.009	-0.003	0.005	0.024***
	(0.007)	(0.004)	(0.013)	(0.014)	(0.004)	(0.006)
Years of Schooling	-0.002*	-0.002***	-0.003*	0.005**	0.001*	0.002**
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Household Income	0.003	-0.001	0.014	-0.012	-0.000	-0.004
	(0.007)	(0.004)	(0.012)	(0.013)	(0.004)	(0.005)
Age	-0.008***	-0.001**	0.030***	0.035***	0.004***	0.004***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Smoke or not	0.002	-0.005	0.048	0.019	0.009	-0.007
	(0.018)	(0.004)	(0.030)	(0.014)	(0.010)	(0.005)
Ethnic Han	-0.016	-0.005	0.077***	0.045**	0.014**	-0.006
	(0.010)	(0.006)	(0.017)	(0.020)	(0.006)	(0.008)
Birth Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province Indicators	Yes	Yes	Yes	Yes	Yes	Yes
Survey Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Observations	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7727	7727	7727	7727	7526	7526

Note: Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 24: The Impact of Women's Relative Bargaining Power on Relative Health
Outcomes Related to BMI
(Coefficients in Mlogit model)

	Dependant variable: $I_{wife} - I_{husband}$			

$I_{wife} = 1$ if wife is under/overweight; =0, otherwise.

$I_{husband} = 1$ if wife is under/overweight; =0, otherwise.

($I_{wife} - I_{husband} = 0$ is the base outcome)

Independent Variables	Underweight (BMI<18.5)		Overweight (BMI>25)	
	$I_{wife} - I_{husband} = -1$	$I_{wife} - I_{husband} = 1$	$I_{wife} - I_{husband} = -1$	$I_{wife} - I_{husband} = 1$
Giving Birth to a Boy	0.096	-0.061	-0.115	0.034
	(0.148)	(0.159)	(0.179)	(0.134)
Policy Dummy	0.333**	0.086	-0.153	-0.270**
	(0.143)	(0.145)	(0.161)	(0.135)
Giving Birth to a Boy	-0.098	-0.093	0.087	0.037
* Policy Dummy	(0.172)	(0.179)	(0.201)	(0.161)
Number of Children	0.338***	0.220***	-0.438***	-0.281***
	(0.049)	(0.049)	(0.061)	(0.051)
Living in Urban Areas	0.001	0.037	0.180*	0.159*
	(0.091)	(0.087)	(0.094)	(0.087)
Wife's Years of	-0.019	0.025**	0.046***	0.022*
Schooling	(0.012)	(0.012)	(0.014)	(0.013)
Husband's Years of	-0.012	-0.010	0.065***	-0.032**
Schooling	(0.014)	(0.014)	(0.016)	(0.014)
Household Income	0.053	-0.062	0.157*	0.004
	(0.082)	(0.086)	(0.083)	(0.081)
Wife's Age	-0.074***	-0.046***	0.040***	0.043***
	(0.013)	(0.013)	(0.015)	(0.013)
Husband's Age	0.044***	-0.003	0.003	0.006
	(0.011)	(0.012)	(0.013)	(0.012)
Smoke Indicators	Yes	Yes	Yes	Yes
Ethnic Dummies	Yes	Yes	Yes	Yes
Birth Year Dummies	Yes	Yes	Yes	Yes
Province Indicators	Yes	Yes	Yes	Yes
Survey Year Dummies	Yes	Yes	Yes	Yes
Survey Year * Urban	Yes	Yes	Yes	Yes
Occupation Dummy	Yes	Yes	Yes	Yes
Observations	7727	7727	7727	7727

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 25: The Impact of Women's Relative Bargaining Power on Relative Health Outcomes Related to Blood Pressure
(Coefficients in Mlogit model)

Independent Variables	Dependant variable: $I_{wife} - I_{husband}$. ($I_{wife} - I_{husband} = 0$ is the base outcome)					
	Low Blood Pressure (hypotension)		High Blood Pressure (hypertension)		Diagnosed with High Blood Pressure	
	$I_{wife} - I_{husband} = -1$	$I_{wife} - I_{husband} = 1$	$I_{wife} - I_{husband} = -1$	$I_{wife} - I_{husband} = 1$	$I_{wife} - I_{husband} = -1$	$I_{wife} - I_{husband} = 1$
Giving Birth to a Boy	0.169	-0.542**	0.024	0.261	-0.035	0.450
	(0.378)	(0.242)	(0.121)	(0.189)	(0.280)	(0.308)
Policy Dummy	-0.268	-0.427**	0.015	0.824***	0.101	-0.148
	(0.386)	(0.208)	(0.117)	(0.165)	(0.286)	(0.369)
Giving Birth to a Boy *	-0.686	0.600**	-0.166	-0.497**	-0.315	-0.026
Policy Dummy	(0.456)	(0.272)	(0.141)	(0.196)	(0.360)	(0.413)
Number of Children	0.032	0.152**	-0.251***	-0.142**	-0.424***	-0.138
	(0.140)	(0.073)	(0.043)	(0.058)	(0.125)	(0.138)
Living in Urban Areas	0.525**	0.272**	-0.096	-0.185*	0.798***	0.292
	(0.232)	(0.129)	(0.074)	(0.104)	(0.192)	(0.230)
Wife's Years of	-0.055	-0.048***	0.008	-0.037***	-0.013	0.055
Schooling	(0.035)	(0.018)	(0.010)	(0.014)	(0.028)	(0.034)
Husband's Years of	-0.038	0.021	0.037***	0.009	0.054*	0.022
Schooling	(0.037)	(0.021)	(0.012)	(0.016)	(0.030)	(0.037)
Household Income	0.004	0.065	0.021	0.256***	0.033	0.071
	(0.233)	(0.120)	(0.070)	(0.084)	(0.180)	(0.176)
Wife's Age	-0.083**	-0.080***	0.023**	0.072***	0.043*	0.154***
	(0.034)	(0.019)	(0.011)	(0.015)	(0.026)	(0.039)
Husband's Age	0.020	0.016	0.021**	0.008	0.110***	0.007
	(0.029)	(0.017)	(0.010)	(0.014)	(0.019)	(0.033)
Smoke Indicators	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Birth Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province Indicators	Yes	Yes	Yes	Yes	Yes	Yes
Survey Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Survey Year * Urban	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7727	7727	7727	7727	7526	7526

Note: Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Appendices

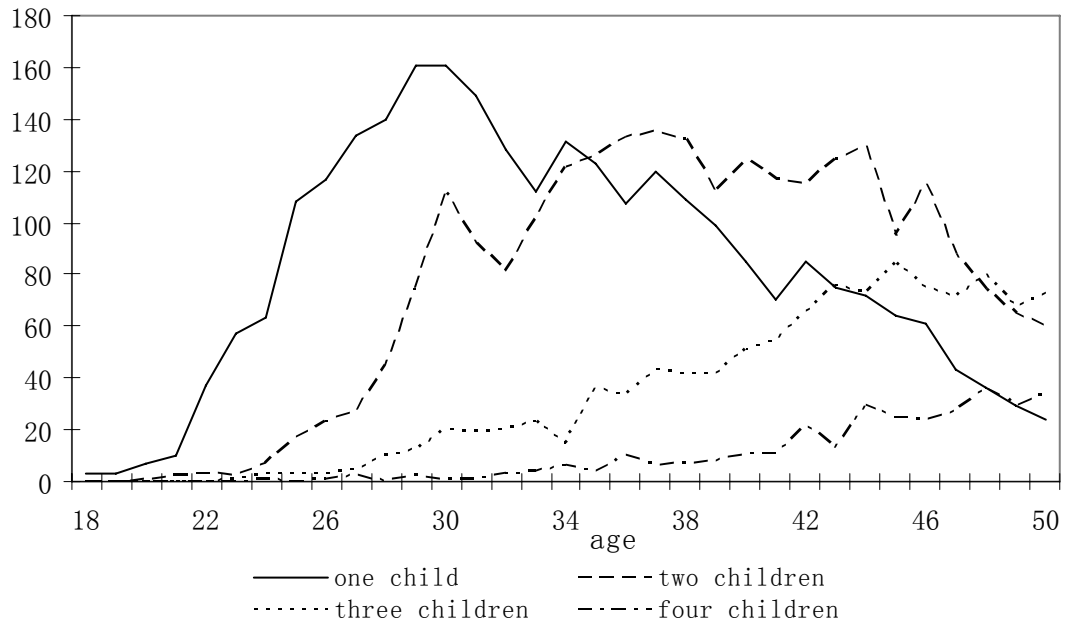Figure A: The Distribution of Age for Each Parity Group

Table A1: The Impact of Family Size on the Indicator of Underweight

Independent Variable:	Dependent variables: Underweight			
	IV: Year of Marriage	IV: Year of First Birth	IV: Birth Cohort	Without IV
Number of Children	0.138***	0.144***	0.174***	0.028***
	(0.016)	(0.016)	(0.017)	(0.006)
Living in Urban Area	-0.064***	-0.089***	-0.565	-0.020*
	(0.018)	(0.022)	(0.455)	(0.011)
Years of Schooling	-0.003	-0.006*	-0.084	0.004***
	(0.003)	(0.003)	(0.073)	(0.001)
Household Annual Income	-0.029***	-0.024**	-0.088	-0.018*
	(0.011)	(0.011)	(0.066)	(0.010)
Age	-0.030**	-0.035***	0.004	-0.036***
	(0.012)	(0.012)	(0.048)	(0.011)
Smoke or Not	0.017	0.031	0.055	0.032
	(0.027)	(0.027)	(0.080)	(0.026)
Ethnic Han (majority)	-0.057***	-0.064***	-0.370	-0.024
	(0.018)	(0.019)	(0.291)	(0.015)
Gender of the First Child	Yes	Yes	Yes	Yes
Birth Year Dummies	Yes	Yes	Yes	Yes
Province Indicators	Yes	Yes	Yes	Yes
Survey Year Dummies	Yes	Yes	Yes	Yes
Survey Year * Urban	Yes	Yes	Yes	Yes
Observations	7727	7727	7727	7727

Note: Standard errors are shown in parentheses.

Table A2: The Impact of Family Size on the Indicator of Overweight

Independent Variable:	Dependent variables: Overweight			
	IV: Year of Marriage	IV: Year of First Birth	IV: Birth Cohort	Without IV
Number of Children	-0.091***	-0.082***	-0.123***	-0.027***
	(0.015)	(0.014)	(0.016)	(0.006)
Living in Urban Area	0.072***	0.085***	0.095***	0.018*
	(0.016)	(0.018)	(0.028)	(0.010)
Years of Schooling	0.009***	0.010***	0.012***	-0.000
	(0.002)	(0.003)	(0.004)	(0.001)
Household Annual Income	0.022**	0.022**	0.024**	0.017*
	(0.010)	(0.011)	(0.011)	(0.010)
Age	0.025***	0.031***	0.032***	0.014**
	(0.008)	(0.008)	(0.009)	(0.007)
Smoke or Not	0.026	0.043*	0.037	0.042*
	(0.026)	(0.026)	(0.026)	(0.024)
Ethnic Han (majority)	0.072***	0.079***	0.088***	0.040***
	(0.017)	(0.017)	(0.022)	(0.014)
Gender of the First Child	Yes	Yes	Yes	Yes
Birth Year Dummies	Yes	Yes	Yes	Yes
Province Indicators	Yes	Yes	Yes	Yes
Survey Year Dummies	Yes	Yes	Yes	Yes
Survey Year * Urban	Yes	Yes	Yes	Yes
Observations	7727	7727	7727	7727

Note: Standard errors are shown in parentheses.

Table A3: The Impact of Family Size on the Indicator of Obesity

Independent Variable:	IV: Year of Marriage	IV: Year of First Birth	IV: Birth Cohort	Without IV
	Dependent variables: Obese			
Number of Children	-0.003	-0.005	-0.005	-0.002
	(0.005)	(0.005)	(0.006)	(0.002)
Living in Urban	0.004	0.002	0.021**	-0.008**
Area	(0.006)	(0.006)	(0.010)	(0.004)
Years of	0.003***	0.003***	0.005***	0.001
Schooling	(0.001)	(0.001)	(0.001)	(0.000)
Household Annual	0.008**	0.008**	0.009**	0.006*
Income	(0.004)	(0.004)	(0.004)	(0.003)
Age	0.005*	0.006**	0.009***	0.002
	(0.003)	(0.003)	(0.003)	(0.002)
Smoke or Not	0.007	0.006	0.004	0.006
	(0.009)	(0.009)	(0.009)	(0.009)
Ethnic Han (majority)	0.014**	0.013**	0.024***	0.006
	(0.006)	(0.006)	(0.008)	(0.005)
Gender of the First Child	Yes	Yes	Yes	Yes
Birth Year Dummies	Yes	Yes	Yes	Yes
Province Indicators	Yes	Yes	Yes	Yes
Survey Year Dummies	Yes	Yes	Yes	Yes
Survey Year * Urban	Yes	Yes	Yes	Yes
Observations	7727	7727	7727	7727

Note: Standard errors are shown in parentheses.

Table A4: The Impact of Family Size on the Indicator of Low Blood Pressure

Independent Variable:	IV: Year of Marriage	IV: Year of First Birth	IV: Birth Cohort	Without IV
	Dependent variables: Low Blood Pressure			
Number of Children	0.050***	0.048***	0.055***	0.009**
	(0.010)	(0.010)	(0.011)	(0.004)
Living in Urban	0.025**	0.005	-0.012	0.011
Area	(0.011)	(0.013)	(0.090)	(0.007)
Years of	-0.000	-0.004**	-0.007	-0.003***
Schooling	(0.002)	(0.002)	(0.014)	(0.001)
Household Annual	0.001	-0.002	-0.004	-0.002
Income	(0.007)	(0.007)	(0.012)	(0.006)
Age	-0.018**	-0.015**	-0.013	-0.015**
	(0.007)	(0.007)	(0.011)	(0.007)
Smoke or Not	-0.008	-0.014	-0.013	-0.014
	(0.016)	(0.016)	(0.017)	(0.016)
Ethnic Han (majority)	-0.014	-0.030***	-0.040	-0.025***
	(0.011)	(0.012)	(0.059)	(0.009)
Gender of the First Child	Yes	Yes	Yes	Yes
Birth Year Dummies	Yes	Yes	Yes	Yes
Province Indicators	Yes	Yes	Yes	Yes
Survey Year Dummies	Yes	Yes	Yes	Yes
Survey Year * Urban	Yes	Yes	Yes	Yes
Observations	7727	7727	7727	7727

Note: Standard errors are shown in parentheses.

Table A5: The Impact of Family Size on the Indicator of High Blood Pressure

Independent Variable:	Dependent variables: High Blood Pressure			
	IV: Year of Marriage	IV: Year of First Birth	IV: Birth Cohort	Without IV
Number of Children	-0.053***	-0.053***	-0.045***	-0.007
	(0.016)	(0.016)	(0.017)	(0.006)
Living in Urban	-0.044***	-0.020	-0.024	-0.007
Area	(0.017)	(0.018)	(0.028)	(0.011)
Years of	-0.009***	-0.005*	-0.005	-0.002
Schooling	(0.002)	(0.003)	(0.004)	(0.001)
Household Annual	0.013	0.014	0.015	0.017
Income	(0.011)	(0.011)	(0.011)	(0.010)
Age	0.006	0.012	0.006	0.010
	(0.008)	(0.008)	(0.009)	(0.007)
Smoke or Not	0.049*	0.045*	0.045*	0.043*
	(0.027)	(0.026)	(0.026)	(0.026)
Ethnic Han (majority)	0.060***	0.076***	0.075***	0.086***
	(0.017)	(0.018)	(0.022)	(0.015)
Gender of the First Child	Yes	Yes	Yes	Yes
Birth Year Dummies	Yes	Yes	Yes	Yes
Province Indicators	Yes	Yes	Yes	Yes
Survey Year Dummies	Yes	Yes	Yes	Yes
Survey Year * Urban	Yes	Yes	Yes	Yes
Observations	7727	7727	7727	7727

Note: Standard errors are shown in parentheses.

Table A6: The Impact of Family Size on the Indicator of Diagnosed with High Blood Pressure

Independent Variable:	Dependent variables: Diagnosed with High Blood Pressure			
	IV: Year of Marriage	IV: Year of First Birth	IV: Birth Cohort	Without IV
Number of Children	-0.011*	-0.007	-0.010*	-0.001
	(0.006)	(0.006)	(0.006)	(0.002)
Living in Urban	0.001	0.024***	0.165	0.004
Area	(0.006)	(0.008)	(0.134)	(0.004)
Years of	0.000	0.005***	0.029	0.001***
Schooling	(0.001)	(0.001)	(0.023)	(0.000)
Household Annual	0.003	0.008*	0.029	0.005
Income	(0.004)	(0.004)	(0.022)	(0.004)
Age	0.015***	0.017***	0.026*	0.015***
	(0.004)	(0.004)	(0.014)	(0.004)
Smoke or Not	0.012	0.023**	0.010	0.024**
	(0.009)	(0.010)	(0.027)	(0.009)
Ethnic Han (majority)	0.014**	0.031***	0.126	0.017***
	(0.006)	(0.007)	(0.091)	(0.005)
Gender of the First Child	Yes	Yes	Yes	Yes
Birth Year Dummies	Yes	Yes	Yes	Yes
Province Indicators	Yes	Yes	Yes	Yes
Survey Year Dummies	Yes	Yes	Yes	Yes
Survey Year * Urban	Yes	Yes	Yes	Yes
Observations	7526	7526	7526	7526

Note: Standard errors are shown in parentheses.

Table A7: The Impact of Family Size on the Indicator of Diagnosed with Diabetes

Independent Variable:	Dependent variables: Diagnosed with Diabetes			
	IV: Year of Marriage	IV: Year of First Birth	IV: Birth Cohort	Without IV
Number of Children	0.001	0.002	-0.001	0.002*
	(0.003)	(0.003)	(0.003)	(0.001)
Living in Urban	0.008***	0.009**	-0.031	0.005**
Area	(0.003)	(0.003)	(0.327)	(0.002)
Years of	0.001*	0.001*	-0.007	0.000
Schooling	(0.001)	(0.001)	(0.065)	(0.000)
Household Annual	0.001	0.001	-0.007	0.000
Income	(0.002)	(0.002)	(0.061)	(0.002)
Age	-0.002	-0.004	0.004	-0.002
	(0.003)	(0.003)	(0.055)	(0.003)
Smoke or Not	-0.003	-0.003	-0.001	-0.003
	(0.005)	(0.005)	(0.023)	(0.005)
Ethnic Han (majority)	0.006*	0.006*	-0.024	0.003
	(0.003)	(0.004)	(0.244)	(0.003)
Gender of the First Child	Yes	Yes	Yes	Yes
Birth Year Dummies	Yes	Yes	Yes	Yes
Province Indicators	Yes	Yes	Yes	Yes
Survey Year Dummies	Yes	Yes	Yes	Yes
Survey Year * Urban	Yes	Yes	Yes	Yes
Observations	4516	4516	4516	4516

Note: Standard errors are shown in parentheses.

Table A8: The Impact of Family Size on Height

Independent Variable:	Dependent variables: Height			
	IV: Year of Marriage	IV: Year of First Birth	IV: Birth Cohort	Without IV
Number of Children	0.007	0.008	0.006	-0.001
	(0.005)	(0.006)	(0.005)	(0.001)
Living in Urban	0.003	0.009***	-0.011	-0.003**
Area	(0.002)	(0.003)	(0.021)	(0.001)
Years of	0.003***	0.004***	0.001	0.002***
Schooling	(0.000)	(0.000)	(0.003)	(0.000)
Household Annual	0.003**	0.005***	0.002	0.003**
Income	(0.001)	(0.002)	(0.003)	(0.001)
Age	0.003	0.002	0.004	0.003**
	(0.002)	(0.002)	(0.002)	(0.002)
Smoke or Not	0.017***	0.015***	0.016***	0.016***
	(0.004)	(0.004)	(0.004)	(0.003)
Ethnic Han (majority)	0.028***	0.033***	0.019	0.024***
	(0.002)	(0.003)	(0.014)	(0.002)
Gender of the First Child	Yes	Yes	Yes	Yes
Birth Year Dummies	Yes	Yes	Yes	Yes
Province Indicators	Yes	Yes	Yes	Yes
Survey Year Dummies	Yes	Yes	Yes	Yes
Survey Year * Urban	Yes	Yes	Yes	Yes
Observations	7727	7727	7727	7727

Note: Standard errors are shown in parentheses.

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