

# **Essays on Development Economics in China**

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# Abstract

Recent research has stressed the role of historical events on economic development. This thesis aims at understanding impacts of historical events on China's current economic outcomes. The second chapter analyzes the effect of the number of brothers an individual has on that individual's household savings rate under the current underdeveloped household financial market in urban China. I show that having an additional brother reduces an individual's household savings rate by at least five percentage points. Brothers help households by (1) sharing risks, providing a source of informal borrowing and (2) sharing the cost of supporting parents. In the third and fourth chapter I investigate the long-term impact of the send-down policy. Under the send-down policy (1968–1978) during the Chinese Cultural Revolution, more than 16 million youths were forced to move to rural areas and carry out hard manual labor. I find that the sent-down males were significantly more likely to have had education upgrading after the Cultural Revolution. Conditional on education upgrading, the sent-down males earn higher income than the non-sent-down males who also received education upgrading.

# Preface

This dissertation is original, unpublished, independent work by the author, Weina Zhou.

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# Chapter 1

## Introduction

This thesis consists of three papers on the economics in China. The second chapter investigates the consequences of the weak household financial market in China and how it affects households' savings rate. The third and fourth chapter investigates the long term impact of a historical event in China: the send-down movement (1968-1978). The third chapter focuses on the effect of send-down on individuals' education and incomes. The fourth chapter focuses on the impact of send-down on a broader set of outcomes, such as subjective well-being, political attitude, and investment in children's education.

The second chapter analyzes the effect of the number of brothers an individual has on his/her household's saving rate under the current underdeveloped household financial market in urban China. I look at this question using data from the China General Social Survey (CGSS) that randomly samples a respondent by household, and provides information about income, expenditures, the number of

brothers and sisters each respondent has, and other social-economic characteristics. The estimates indicate that having an additional brother reduces an individual's household savings by at least 5 percentage points. Having more brothers helps by (1) sharing risks, providing a source of informal borrowing and (2) sharing the cost of supporting parents.

In the estimation, I exploit the fact that, under the natural selection of gender, the number of brothers an individual has is random, conditional on the total number of siblings. I argue that this identification strategy is valid for individuals born prior to the introduction of the One Child Policy in 1979 who also hold an urban area residence card. By contrast, the strategy may not be valid for other individuals because of sex selection due to selective abortion (in more recent years) or female infanticide (in rural areas). For individuals born after 1979, I use One Child policy fines to instrument the number of brothers. For individuals born after 1979, the One Child Policy fines are used as instruments for the number of brothers.

The fact that having more brothers reduces saving rate helps account for 30% of the increased aggregate saving rate in China between 1990 and 2005, because there was a large decrease in the average number of brothers per household during that time. This paper suggests that sisters play a minor role in affecting a household's saving rate in China, mainly because of cultural norms. This paper also suggests that the Chinese government might want to consider developing the household financial market as soon as possible due to the change in demographic structure.

Under the send-down policy (1968-1978) during the Chinese Cultural Revolution, more than 16 million youths were forced to move to rural areas and carry out hard manual labor. This study analyzes the long-term impact of such an experience on income when these youths reached 40-55 years of age. Sent-down males were significantly more likely to upgrade their education after the Cultural Revolution, which caused education interruption for an entire generation. The sent-down males who upgraded their education earn a 10% higher income than non-sent-down males who also upgraded their education. Conditional on education upgrading, the sent-down males are also more likely to have computers at home. These findings are robust against a variety of controls for family background. The send-down experience has had no significant impact on females.

Chapter 4 suggests that people who were sent down are significantly less likely to be happy in their lives and less likely to believe in the government's democratic capacity, compared to people who were not sent down. They are also less likely to become Communist Party members. However, the send-down experience does not affect individuals' political attitudes towards voting or in seeing ordinary people exercise power through decision making. Further, it has no significant effect on how individuals trust others. The potential reason for this could be that the send-down experience was caused by a decision made almost exclusively by one person—it was not caused by being cheated by strangers. Neither those who were sent down nor those who were not sent down have any experience in voting or seeing ordinary people make decisions. All of this evidence supports the idea of an experience-based process for formulating attitudes and beliefs.

The hard manual labor experience, however, induced people who were sent down to invest significantly more in their children's education in hopes of securing a better life for their children. The send-down experience could have made them better understand the hardships associated with doing manual labor and, thereby, facilitated the realization that only education could help their children avoid the experience of hard manual labor.

## **Chapter 2**

# **Brothers, Household Financial Markets and Savings Rate in China**

### **2.1 Introduction**

It is well documented that the corporate financial market in China is underdeveloped despite China's impressive GDP growth in recent decades (Song et al. 2011; Ayyagari et al. 2010; Guariglia et al. 2011; Chen et al. 2011; Allen et al. 2005). Private entrepreneurs usually find it difficult to borrow from banks and must rely largely on the financial resources from their own networks such as family members or relatives (Cai et al. 2013; Estrin and Prevezer 2011). To date, however, little attention has been paid to the household financial market even though the degree of development in the household financial market is no better than that of the corporate financial market. According to the 2009 China Family Panel Study,



even in Beijing, Shanghai, and Guangdong, China's most developed regions, more than 80% of debtors borrowed from family members or relatives in 2008, while fewer than 20% borrowed from financial institutions. At the same time, households also encounter large uncertainties. Health care reforms, pension reforms, and rising income uncertainties cause households to have high savings rates (Chamon and Prasad 2010; Chamon, Liu, and Prasad 2010). The household savings rate rose from 16 percent in 1990 to 24 percent in 2005 in urban areas.<sup>1</sup>

In developing countries where household financial markets are underdeveloped, research has provided evidence that shows how extended family members help each other by sending transfers and gifts to households that receive negative economic shocks (Fafchamps and Quisumbing 2008; Fafchamps 2008). However, so far it is unknown to what extent the existence of family members, which could represent *potential* transfers, affects a household's savings rate and whether the gender of the family members matters.

This paper explores the consequences of a weak household financial market by studying the effect of brothers, the most important members of a household in the extended family, on the household savings rate in urban China. This is one of the first papers to estimate the siblings' effect on a household's savings rate using micro level data.

Although individuals rely largely on their brothers under the current environment of increasing uncertainties and incomplete financial markets, population

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<sup>1</sup>The savings rate is defined as  $1 - \text{LivingExpenditure}/\text{DisposableIncome}$ . Data source: China Statistical Year Book.

control policies such as the One-Child Policy (1979) made the situation even worse. In contrast to the individuals born during the baby boom period (1945–1978), who on average have more than three siblings, the One-Child Policy generation have fewer or even no siblings.<sup>2</sup> They suffer from a lack of a family-based safety net in addition to incomplete financial markets. A simple calculation suggests that the decline in the average number of brothers can explain at least one-third of the increased aggregate household savings rate.

I estimate the brothers effect on household savings rate by using data from the China General Social Survey (CGSS) that randomly samples a respondent by household, and provides information about household income, expenditures, the number of brothers and sisters the respondent has, and other social-economic characteristics. See data appendix for detailed information of this data set and the relation of respondents with other household members.

In estimating the effect of the number of brothers of an individual on the individual's household savings rate, endogeneity problems arise: the number of brothers of a individual could potentially be correlated with that individual's unobserved characteristics such as his/her parents' preferred number of children. This paper found that conditional on the number of siblings of individuals, the gender of the siblings can be considered as a random assignment by nature for urban residents born during the baby boom (1945–1978)<sup>3</sup>. The gender assignments of siblings by nature help us to identify the effect of having a brother instead of a

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<sup>2</sup>Although the overall fertility rate was high during the baby boom period, it was low during the Chinese famine period (1959–1961).

<sup>3</sup>Urban residents are defined as individuals with urban resident cards.

sister (a *relative* effect).

The identification strategy relies on the assumption that conditional on the number of siblings, the gender of the siblings is only determined by nature. It is well known that China had a growing missing female problem in recent decades (Qian 2008; Anderson and Ray 2010). However, I find that it was unlikely that parents were able to control the gender of their children for a given family size among urban residents born during the baby boom (1945–1978).<sup>4</sup> The main reason is that ultrasound technology—a technology that can identify gender before birth—was introduced in the 1980s, which is after the baby boom. In addition, female infanticide was much more difficult to practice in urban areas. In this case, it was unlikely that urban households would risk criminal prosecution for son preference.

As a robustness check, for individuals born after the One-Child Policy (1979), I use within-region across-time variation in the One-Child Policy fine to instrument the number of brothers of individuals. As the One-Child Policy had a significant impact on the gender ratio and fertility decision (Ebenstein 2010), the One-Child Policy fine had a direct impact on the number of brothers that an individual has. The results of the IV estimation are consistent with the main results in this paper: having more brothers reduces a household's savings rate in urban China; brothers reduce the savings rate by sharing risks with the individual's household.

I find that having a brother instead of a sister reduces the household savings

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<sup>4</sup>The baby boom was induced by family planning policies introduced in the 1950s that carried on until the early 1970s.

rate by at least five percentage points. If sisters also behave like brothers and affect the household savings rate, the estimated *relative* effect would be a lower bound. That is, the absolute effect (i.e., having one more brother rather than not) would be larger than the relative effect (i.e., having a brother instead of a sister). The statistical evidence reveals that sisters have almost no effect on a household's savings rate for the baby boom generation. Therefore, the estimated *relative* effect of a brother is likely to be the same as the *absolute* effect. The lack of an effect of sisters on the savings rate may result from the relatively weak connections between female and male siblings, and between parents and daughters in Chinese culture. Having said this, interestingly, as the number of siblings declines because of the change in family planning policy, sisters also affect the savings rate like brothers for the young generation. Young households may use sisters as a substitute for brothers when there are too few brothers.

I show that brothers can reduce a household's savings rate through two channels: (1) sharing risks and extending borrowing limits, and (2) sharing the cost of supporting parents. In order to examine the effect of risk sharing/extending borrowing limits, this paper tests the effect that brothers have on households with different levels of (a) wage uncertainties, (b) bonus uncertainties, (c) health risks, (d) regional financial development and (e) income or asset levels. The estimation results are consistent with the risk-sharing/extending-borrowing-limits hypothesis: households that encounter larger wage and bonus uncertainties, have higher health risks, live in a financially less developed province, have lower incomes or have fewer assets have a larger brothers effect. The robust and consistent results

suggest a strong risk-sharing/extending-borrowing-limits effect of having brothers.

In Chinese culture, the expectation is that parents will be supported by their male children (Banerjee et al. 2013).<sup>5</sup> A household with several brothers would need to save less for their parents' risks, in particular risks from medical expenditure, which are largely shared among the brothers. To test the parent-supporting aspect, I utilize information on whether parents are deceased. Once parents have passed away, brothers no longer play a role in sharing parents' risks. The difference in the number of parents still living helps to identify the parent-supporting effect of brothers.

Recent papers have emphasized that change in the demographic structure could affect household savings rates because of the effect of the intergenerational support. Ge, Yang, and Zhang (2012) explore the regional variation in One-Child Policy fines to examine the effect of changing demographics on household savings rates. Choukhmane, Coeurdacier, and Jin (2013) estimate an OLG model incorporating endogenous fertility, intergenerational transfers and human capital accumulation, and find that changes in the demographics explain more than one-third of the rise in the aggregate savings rate. Banerjee, Meng, Porzio, and Qian (2013) suggest that the partial equilibrium model could overstate the effect of changing demographics on the savings rate. Wei and Zhang (2011) suggest that the rising gender ratio induced parents to save more for their male children,

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<sup>5</sup>This is the main reason why we observe a large increase in the male-female gender ratio of newborns after the "One-Child Policy."

helping them to secure a better outcome in the marriage market.

This is one of the first papers to emphasize that in addition to the intergenerational support effect, the risk-sharing effect among brothers could also explain why changes in demographics could raise the aggregate household savings rate. Furthermore, the role of risk sharing/extending the borrowing limits among family members could vary greatly depending on the gender of a family member. It discovers a gender difference in China in a new dimension.

This paper also helps to explain why there is mixed evidence regarding whether the decreasing dependency ratio could explain the rising savings rate. Modigliani and Cao (2004) use long-term national-level data and find that the decrease in both the young and old population contributes to the rising savings rate in China. On the other hand, Horioka and Wan (2007) use more recent data and find that the change in the dependency ratio does not explain the increasing savings rate adequately. This paper helps to solve the puzzle by emphasizing that individuals of prime age could save less because they have more brothers. The recent younger generation contributes to the high savings rate because they do not have siblings.

The paper proceeds as follows. Section 2.2 introduces the background to household financial markets, population policies, and the current savings rate in China. Section 2.3 introduces the identification strategies and presents the estimation results. Section 2.4 explores the reason that having more brothers could reduce the savings rate. Section 2.5 provides a robustness check for the identification strategy. Section 2.6 shows how much of the savings rate puzzle can be explained by the brothers effect. Section 2.7 concludes the paper. The Data

Appendix provides information on all the data used in this paper.

## **2.2 Background**

### **2.2.1 Financial Markets and Household Borrowing Resources**

It is a well-known fact that the corporate financial market in China is underdeveloped; private entrepreneurs have to rely largely on financial resources from their own networks such as family members or relatives (Ayyagari, Demirguc-Kunt, and Maksimovic 2010; Guariglia, Liu, and Song 2011; Chen, Ma, and Tang 2011; Song, Storesletten, and Zilibotti 2011; Allen, Qian, and Qian 2005). To date, little attention has been paid to the household financial market, even though the degree of development of this market is no better than that of the corporate financial market (Yao, Wang, Weagley, and Liao 2011; Coeurdacier, Guibaud, and Jin 2013).

Despite the fact that the real interest rate on domestic bank deposits has often been negative (Gordon and Li 2003; Lardy 2012), by using the China Household Finance Survey 2011, Gan (2012) suggests that the two main financial assets for households are bank deposits (58%), and cash holdings (18%). The rate of consumer loans issued by all financial institutions in China was nearly zero in 1997 (Chamon and Prasad 2010). Although it reached 2.2 trillion RMB at the end of 2005, mortgage loans amounted to about 80% of total loans.<sup>6</sup>

Households can also encounter significant uncertainties. Medical reforms, pension reforms and rising income uncertainties cause households to save more

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<sup>6</sup>The other major loan categories were auto loans and large durable goods loans.

because of the precautionary motive (Chamon and Prasad 2010; Chamon, Liu, and Prasad 2010). How do households in China finance themselves when they encounter negative shocks?

I use two different data sets to investigate how Chinese households finance themselves in the current underdeveloped household financial markets. The first data set comes from the Chinese Household Income Project (CHIP, see Data Appendix). The CHIP 2002 urban area survey asked, “If your household suddenly encountered difficulty and needed 10,000 RMB immediately, where or to whom would you turn first?”.<sup>7</sup> I report the results in Figure 2.1. More than 60% of the individuals chose “family members and relatives,” while fewer than 3% of the individuals chose “financial institutions.” It is very clear that family members and relatives are a household’s primary borrowing source. The results also suggest that the potential transfer or quasi-credit amount available among family members could also be very large. Note that 10,000 RMB is approximately 1,600 USD, which is more than half of the median household’s yearly income in the 2002 CHIP data.

The China Family Panel Study 2009 asked households if they actually borrowed money in 2008, if so the sources they borrowed from, and the reason that they borrowed. In total, 14% of the survey respondents had borrowed money in 2008. As was the case in the report using the 2002 CHIP data, “Relatives

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<sup>7</sup>There were nine answers to choose from: (1) family members and relatives, (2) friend, (3) other individuals, (4) work unit, (5) bank and credit union, (6) other financial institutions, (7) need no help, (8) anywhere I can borrow, (9) other. I aggregated (5) and (6) together and named this category “financial institutions,” and I aggregated (3) (4) (8) and (9) together as “other.”



and friends” was overwhelmingly the dominant borrowing resource for households. Conditional on borrowing money, 82.3% of the households borrowed from relatives and friends, while fewer than 20% of the borrowers borrowed from banks.<sup>8</sup> Note that this survey was conducted in Beijing, Shanghai and Guangdong provinces, China’s most financially developed areas. In other less developed areas, the proportion of households relying on family members could potentially be even larger.

The reasons for borrowing also varied from relatives to banks. In the CFPS data, housing was the main reason for borrowing from financial institutions, which accounts for 85%. In contrast, there were a wide range of reasons for borrowing from relatives and friends that were evenly distributed among “education”(18%), “medical treatment”(20%), “housing”(22%), “living expense”(15%), and “other”(26%).

It is worth noting that the housing loan market is quite developed in China, perhaps because of the government’s enforcement of housing reforms, which encourages individuals to buy houses. As the primary reason for people borrowing money from banks is housing, and mortgages are not considered to be an unexpected expense, relatives and friends become the only source of borrowing when a household encounters unexpected shocks.

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<sup>8</sup>Households had the following options to choose from in the survey: (1) banks (including credit unions), (2) relatives and/or friends, (3) loan from a private institution, and (4) other. Only 2% of households had borrowed from (3) or (4).

## 2.2.2 Facts: Household Savings Rate by Number of Brothers and Sisters

I use the China General Social Survey (CGSS) 2006 to construct household savings rate data. The CGSS 2006 data contain the total income, basic living expenditure, medical expenditure, and education expenditure information of individuals' households. Savings are calculated as the household total disposable income minus the sum of these three household expenditures. The savings rate is defined as savings divided by household total disposable income.<sup>9</sup> Appendix Table 1 shows detailed descriptive statistics of disposable incomes and expenditures. The average savings rate in 2006 was 26 percent for urban residents, which is the main sample used in this paper. It is only one percentage point higher than the savings rate computed by using the data in China Statistical Year book for urban households in 2006, 25 percent.<sup>10</sup>

Figure 2.2 presents the age profile of the household savings rate by the number of brothers and sisters of individuals. In the upper panel of Figure 2.2, I divide the individuals into two groups: individuals with zero or one brother, and individuals with two or more brothers. The figure clearly shows that individuals with zero or one brother have a higher savings rate than individuals with two or more brothers, for all age groups. There is a strong negative correlation between the number of

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<sup>9</sup>I compute the income taxes based on the Individual Income Tax Law of the People's Republic of China introduced in 2005. In an earlier version of this paper, I used income instead of disposable income. The estimation results using disposable income are almost identical to the results using (non-tax-deducted) income.

<sup>10</sup>When we compute the savings rate by using the data in China Statistical Year Book, the household savings rate is defined as  $1 - Expenditure/Income$ , where expenditure is per capita household living expenditure, and income is per capita household disposable income.

brothers and the household savings rate.

By contrast, the savings rate is quite similar regardless of the number of sisters of individuals (the lower panel of Figure 2.2), in particular for individuals aged over 35 years. It is interesting to note, however, that the pattern of the savings rate by number of sisters for young generations is close to that of the number of brothers: having fewer sisters is associated with a higher savings rate. As the number of siblings declines because of the change in family planning policy, young households may use sisters as a substitute for brothers when there is a shortage of brothers. Sisters might also start to play the same role as brothers and affect the household savings rate.

Figure 2.3 repeats the same exercise by using individuals with no living parents to avoid the potential concerns of the siblings' supporting-parents effect. The figure only presents savings rates for individuals aged over 40 years because there are very few individual with no living parents below this age. The figure suggests that even for individuals with no living parents, the number of brothers still has a strong negative correlation with the household savings rate. For the number of sisters, the correlation with the savings rate is not clear (the lower panel of Figure 2.3).

### **2.2.3 Changes in Demographics and China's Savings Rate Puzzle**

The number of siblings of individuals has changed dramatically during recent decades. Figure 2.4 presents the number of brothers and sisters of individuals by

individuals' year of birth for the CGSS 2006 data. The figure shows that individuals born in the 1950s and 1960s have on average more than three siblings (with 1.5 brothers and 1.5 sisters). In contrast, individuals born during the later 1970s and 1980s have fewer or even no siblings.

While the average number of siblings has been decreasing in recent decades, the household savings rate has been increasing. Figure 2.4 shows the average number of brothers of individuals from 1980 to 2005 as well as the trend in the household savings rate. The household savings rate increased dramatically during this period. It presents one of the largest puzzles in China's savings literature, which has attracted a lot of attention among researchers and policy makers: why has the savings rate in China increased substantially in recent decades. The figure suggests that the decline in the average number of brothers may be one of the solutions to this puzzle.

The change in the number of siblings of individuals is induced by the change in family planning policies in China. The population policies in China can be divided into three main stages: population expansion (1949–1972), voluntary birth control (1972–1978), and the One-Child Policy (1979–current).

After the founding of the People's Republic of China in 1949, policy makers promoted population growth. The Chinese government introduced many policies to encourage more births. For example, in 1952, the government published a regulation to restrict sterilization and abortions (Banerjee, Meng, Porzio, and Qian 2013). The policy allowed a female to have an abortion only if the female was over 35 or already had six or more children. Chairman Mao Zedong's famous saying

“the more people, the stronger we are” is still a well-known phrase in China, even for the current generation.

This large population growth was slowed by the second stage of family planning policies implemented in 1972. During this stage, the government used the slogan “later, spaced, and few”: “later” for later marriage, “spaced” for spaced birth, and “few” for fewer children. The policy emphasized birth spacing and did not place a cap on the total number of children; however, the population control policy at this stage was voluntary, and no punishment was meted out for violations. The decision to adopt birth control methods was left to the couples themselves. As a result of these population policies, China’s population almost doubled in just 30 years, increasing from 540 million in 1949 to 960 million in 1978.

The famous One-Child Policy stage represents the third stage of family planning policies. This policy was introduced in 1978 and applied to the babies born in 1979. In urban areas, each family was allowed only one child; however, in rural areas, a second child was allowed if the first child was not male. Any additional children resulted in large fines. Those families who violated the policy were required to pay monetary penalties and could be denied bonuses at their workplaces.

## **2.3 The Impact of the Number of Brothers on Households’ Savings Rate**

### **2.3.1 Identification**

Let us first consider the following equation:

$$SavingRate_i = \alpha Bro_i + X_i\gamma + \varepsilon_i \quad (2.1)$$

The definition of the savings rate is given in Section 2.2.2.  $Bro_i$  is the number of brothers of an individual.  $X_i$  is a set of individual characteristics and individual's household characteristics.  $\alpha$ , the coefficient on  $Bro_i$ , is the parameter we are interested in.  $Bro_i$  could be correlated with unobserved family characteristics, such as parents' economic conditions or their preferred number of children, which may be correlated with individual's household savings. Thus,  $\alpha$  cannot be consistently estimated through equation 1.

In order to identify the effect of brothers on the savings rate, I consider the following case. If individuals' parents cannot manipulate the gender of individuals' siblings, then given the number of siblings, the gender of siblings is only determined by nature. The number of brothers is not correlated with any unobserved characteristics for a given number of siblings.

If, given the number of siblings, having a brother instead of a sister is randomly assigned by nature, then the effect of having a brother instead of a sister on the savings rate can be interpreted as a randomly assigned treatment.  $\alpha$  can be consistently estimated through equation 2.2. See Appendix A.2 for proof. Keep in mind that the interpretation of  $\alpha$  is different in equation 2.2 from that in equation 2.1, as  $\alpha$  in equation 2.2 represents the effect on the savings rate of having a brother *instead* of a sister, for a given number of siblings.

$$SavingRate_i = \alpha Bro_i + \delta(Sib_i) + X_i\gamma + \varepsilon_i \quad (2.2)$$

The identification strategy compares the savings rate of individuals with different numbers of brothers but with the same number of siblings. The upper panel of Figure 2.6 presents this variation. The figure suggests that for each sibling group, having more brothers is associated with a lower savings rate. As the savings rate is defined as savings divided by income, one may be concerned that the negative correlation between the number of brothers and the savings rate (conditional on the number of siblings) could be driven by the income correlation. The lower panel of Figure 2.6 suggests that this is not a concern, as there is not a clear pattern of how income is correlated with the number of brothers given the number of siblings.

The assumption that, conditional on the number of siblings, the number of brothers is a random assignment requires that no predetermined family characteristics affect the assignment of the gender of the siblings (the only thing that can determine the gender of the siblings is nature). Several papers in the “missing female” literature indicate that Chinese households have a son preference and that the sex ratio of newborns became distorted significantly following the introduction of the One-Child Policy (1979) (Wei and Zhang 2011; Arnold and Liu 1986), because parents wanted to ensure that they had a son. The main reason for the son preference is that male children provide financial support to parents when parents get old. Parents “chose” the gender of their children by practicing sex-selective

abortion or female infanticide, which was a practice sometimes found in rural areas.

I found that by restricting the sample to urban residents, and those born before the One-Child Policy (1979) and after World War II (1945), the evidence suggests that the gender of individuals' siblings is exogenously assigned. In the rest of the paper, I call this sample the restricted sample.

There are several reasons that there is no gender distortion in the restricted sample. First, the ultrasound technology required for sex-selective abortions was only introduced in the 1980s; households before the 1980s had no reliable method for performing sex-selective abortions. Second, female infanticide occurred mainly in rural areas where households delivered babies at home. In urban areas, babies were usually delivered in hospitals. In this case, it was unlikely that urban households would risk criminal prosecution for son preference. Keep in mind that people born close to 1979 are unlikely to have siblings born after 1979 because of the One-Child Policy. Third, Chairman Mao largely enforced gender equality in China before he passed away in 1976 (Li 2000). "Women hold half of the sky" is his famous slogan to enforce gender equality. In urban areas, females enjoyed as many job opportunities as males. The greater degree of gender equality in general made parents in urban areas less likely to exhibit the same degree of son preference as before.

Two sets of statistical tests examine whether the gender of children is exogenously assigned in the restricted sample. Table 2.1 reports the proportion of male siblings given the number of siblings. The natural gender ratio is 106 males per



100 females (Jacobsen, Moller, and Mouritsen 1999). This implies that the natural proportion of male siblings is 51.5%. If parents practice son preference, this proportion would be significantly greater than 51.5%. The statistics computed in Table 2.1 show that the proportion of males is close to the natural level, regardless of individuals' number of siblings in the restricted sample.

Table 2.2 provides a test of the random assignment of the number of brothers conditional on the number of siblings. In column 1, where the number of siblings is not controlled for, the number of brothers is significantly correlated with the mother's years of education. The Wald test suggests that all of the family characteristics are jointly significant. In contrast, once the number of siblings is controlled for in column 2, no parental characteristic is significantly correlated with the number of brothers, and the Wald test suggests that they are not jointly significant. I repeat the same test for the proportion of male siblings (column 3) and obtain similar results. The results in Table 2.2 provide strong evidence that conditional on the number of siblings, the number of brothers is random among urban residents born between 1945-1978.

One may have concerns that parents might be practicing a son preference by adopting a stopping rule; that is to say, they keep having babies until they reach the desired number of boys. This is also unlikely to happen in the restricted sample. An easy way to see whether parents adopted a stopping rule is to check the gender of their last child. If parents adopted a stopping rule, we are more likely to observe that the youngest child is a male. Recall that the natural proportion of males is 51.5%. For urban residents born between 1945 and 1978, the proportion of males

as the youngest child of parents is 51.7% in the CGSS data and 50.4% in the CULS data (see Data appendix), and both are not significantly different from the natural proportion of males.<sup>11</sup>

One might also want to know the effect of sisters on a household's savings rate. Ideally, we want to include the number of sisters in the regression to estimate the impact of the number of sisters on the savings rate. However, such an estimate is not feasible because of the problem of collinearity (we cannot add both the number of brothers and sisters and siblings into one regression). As we control for the number of siblings,  $\alpha$  measures the difference between the effect of brothers and that of sisters. The coefficient on the number of siblings represents the effect of sisters with bias induced by endogeneity. See Appendix A.2 for the proof.

Although the true effect of sisters could not be estimated, from Figure 2.2, it is more likely that sisters have no effect on a household's savings rate. If this is the case, the estimated relative effect of brothers compared with that of sisters,  $\alpha$ , also equals the absolute effect of brothers. If sisters behave like brothers, by also playing a role with other siblings through risk sharing and supporting parents, the estimated brothers effect would be a lower bound of the absolute effect of brothers (see Appendix A.3).

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<sup>11</sup>The CGSS data do not provide the exact birth order of individuals' siblings, because it only lists the number of younger brothers and sisters, and older brothers and sisters. For this reason, I check the gender of an individual conditional on the individual being the youngest child in the family. The CULS 2001 data (see Data Appendix for details) provide the birth order of siblings. I restrict the sample to urban residents born between 1945 and 1978. The sample size of the CULS data is 5351.

### **2.3.2 Results: the Impact of the Number of Brothers on Household Savings Rate**

The estimation results of equation 2.2 are presented in Table 2.3. Error terms are clustered at county level. Column 1 uses nonurban residents data. The rest of the columns use urban residents data because of the identification strategy discussed in Section 2.3.1. Both columns 1 and 2 control for the number of siblings, years of education, gender, age, age squared, household income, and marital status.

In both urban and rural areas, we observe a negative effect of the number of brothers on the household savings rate. The coefficient on the number of brothers for the sample of urban residents is  $-0.048$  and statistically significant at the 1% level. This means that having one brother instead of one sister would, on average, reduce the savings rate by 4.8 percentage points. Interestingly, the magnitude of the brothers effect is larger in urban areas than in rural areas. The estimation results in the first two columns may suggest that urban households rely more on their brothers than their rural counterparts. Rural areas usually have less developed financial markets and experience higher risks associated with fluctuations in agricultural production. However, compared with urban households, rural households can usually share risks with village members in addition to their family members and relatives. The larger brothers effect in urban areas may be because of the relative scarcity of sources of risk sharing besides family and relatives. Keep in mind that the coefficient on brothers in the rural sample may be biased because of the potential female infanticide problem in rural areas.

Column 3 adds a large set of demographic and characteristic controls that

could potentially affect a household's savings rate: family size, parents-living-together dummy, Communist Party membership status, father's and mother's education, and a send-down dummy.<sup>12</sup> Chamon and Prasad (2010) indicate that increases in children's education expenses and housing reform caused households to save more. For this reason, column 4 adds the number of children and children's age group dummies in order to control for the potential education expense effect. Column 5 adds households' housing characteristics: a dummy variable indicates whether each household owns the house, the mortgage value (if the house is owned), and the value of the house that a household owns.<sup>13</sup> Note that by controlling for these housing variables, I also control for the household asset accumulation information because housing is the most important vehicle of household asset accumulation ( Wei and Zhang 2011). Column 6 uses a set of sibling dummies instead of the number of siblings. This relaxes the specification of the functional form of  $\delta(Sib_i)$  in equation 2.2.

In columns 2 to 6 of Table 2.3, the coefficient on the number of brothers is very stable at around  $-0.048$ . The fact that the coefficient on brothers is fairly constant also provides evidence that the number of brothers is unlikely to be correlated with family characteristics once we have controlled for siblings. If the number of

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<sup>12</sup>Send-down was a program during the Chinese Cultural Revolution (1967–1977) in which the government forced adolescents in urban areas to go to rural areas to do hard manual labor. Zhou (2013b) found that this event had a large impact on the send-down youths' income and ability to withstand hard work.

<sup>13</sup>The size of the mortgage is calculated as the percentage of the housing property that is still unpaid multiplied by the housing value. Own housing is defined as a house owned by a family member. Among urban individuals aged 28–60, 0.3% of individuals live with a working parent aged below 60; 5% of individuals live with married children.

brothers were correlated with any of the related individual and family characteristics used in the regressions, then the coefficient on the number of brothers should have changed considerably in columns 2 to 6.

One may worry about possible gender differences in the brothers effect. Males may be more likely than females to get help from their brothers. In the latter case, brother-in-laws of the female (i.e., the brothers of her husband) may be playing a more important role. I look for possible gender differences by introducing the variable “*Brothers of Female Respondents*” into the regression (column 7 of Table 2.3). This variable is generated by interacting *Brothers* with the *Female* respondent indicator dummy. The interaction variable *Brothers of Female Respondents* captures the brothers effect on females relative to males (the total brothers effect for females is the sum of the coefficients on the main *Brothers* variable and *Brothers of Female Respondents*.) The coefficient of this variable is 0.02. However, the standard error is relatively large, and the coefficient is not statistically different from zero. I conclude that the brothers effect on females is either equal to, or slightly smaller than, the brothers effect on males.

I further restrict the analysis to both individuals and individuals’ parents with urban resident cards. This ensures that the individuals were *born* in urban areas, where missing female problems are unlikely to occur. The sample becomes relatively small; however, the coefficient of brothers is still around 0.05 and statistically significant at the 1% level.

The population policy switched from encouraging fertility to voluntary birth control in 1972. The number of siblings of individuals declined gradually for

people born between 1972 and 1979 (Figure 2.4). In order to avoid the potential effect of this policy change, column 7 drops individuals born after 1971. Doing this also allows us to estimate a relatively consistent sample of individuals with a similar number of siblings. Column 8 drops individuals close to retirement age. The last column focuses solely on individuals who are between the ages of 35 and 50. In these columns, brothers have a strong negative effect on the household savings rate.

## **2.4 Why Brothers Reduce the Savings Rate: Risk Sharing/Extending Borrowing Limits and Supporting Parents**

In this section, I propose that brothers reduce the savings rate through two channels: (1) sharing their own risks and extending borrowing limits, and (2) sharing the risks of their parents. A theoretical framework is provided in the online appendix to support the arguments.

### **A. Individual-Level Income Uncertainties and Health Risks**

I use the degree of uncertainty that individuals encounter to test the risk-sharing/extending-borrowing-limits effect. If brothers play roles in sharing risks/extending borrowing limits, those individuals with larger uncertainties will have a larger brothers effect. Households with large uncertainties have a greater need to self-insure, so whether they have brothers (with whom they can share risks) will affect their savings rate considerably. By contrast, for those households with

fewer uncertainties, the presence of brothers might not matter so much; therefore, they are likely to have a small brothers effect. In equation 2.3, the size of  $\alpha_0$  is expected to be larger than the size of  $\alpha_1$ , where  $LargeUncertainty_i$  equals 1 if individual  $i$  encounters large uncertainties, and 0 otherwise;  $SmallUncertainty_i$  equals 1 if individual  $i$  encounters small uncertainties, and 0 otherwise.

$$SavingRate_i = \alpha_0 Bro_i \times LargeUncertainty_i + \alpha_1 Bro_i \times SmallUncertainty_i + \delta(Sib_i) + X_i \gamma + \varepsilon_i \quad (2.3)$$

I use individual income uncertainties and health risks as measures of the degree of uncertainty. The income uncertainty measures come from the questions in the survey, “Is your basic monthly wage stable?” and “Is your monthly bonus stable?” A individual can choose among three possible responses: “very unstable,” “a little unstable,” “stable.” The survey also asks, “How do you feel about the condition of your health?” The answers are “very satisfied,” “satisfied,” “not satisfied,” and “very unsatisfied.” Based on the answers, I evaluate the individual’s health condition as “very good,” “good,” “bad,” or “very bad.” A bad health condition, unstable wage or bonus implies that individuals encounter greater uncertainty.

The regression results are presented in columns 1 to 3 of Table 2.4. The results strongly support the risk-sharing hypothesis: households with a large income uncertainty or health risks have a larger brothers effect, whereas households with a small income uncertainty or health risks have a small brothers effect.

## **B. Regional Financial Development**

I test for the brothers effect of risk sharing/extending borrowing limits by exploring the regional variations in financial development. If the incomplete state of the financial market makes household members rely on their brothers, we should observe that households in financially developed regions have a smaller brothers effect than households in regions where the financial market is underdeveloped. This is because formal credit market information is relatively widely available in financially developed areas. In addition, households have more alternatives through which to borrow or lend funds in such areas. Therefore, households face a lower cost of accessing the financial market, and they can use the instruments available in financial markets to insure themselves. These households have less need to rely on brothers to borrow money or to share risks. In financially underdeveloped regions, the brothers effect should be large, because households have no other alternative for acquiring insurance or borrowing money.

I use the provincial-level insurance density and the number of foreign banks per capita in 2005 to measure regional financial development. See Appendix Table 2 for the statistics of these two variables. Insurance density is provincial level insurance premiums per capita.<sup>14</sup> Insurance density is used to capture overall development in the insurance market. The number of foreign banks per capita has direct and indirect effects on local financial development.<sup>15</sup>

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<sup>14</sup>The insurance premium is the sum of the private sector and public sector premia.

<sup>15</sup>The number of consumer loans was almost zero in 1997 when the Chinese financial market was in its infancy. The direct effect of foreign banks on the financial market is reflected in the



$$SavingRate_i = \beta_0 Bro_i + \beta_1 Bro_i \times FinancialDevelopment_i + \delta(Sib_i) + X_i\gamma + \varepsilon_i \quad (2.4)$$

Equation 2.4 is estimated. Note that the city dummies are included in all regressions in this paper in order to control for the regional fixed effect. For this reason, the provincial-level financial development indicators are not included in equation 2.4 because of collinearity with the city dummies.<sup>16</sup> Regional financial development is usually correlated with regional GDP growth. In order to avoid the potential concern that the brothers' effect is driven by economic growth instead of financial development, an interaction term of the number of brothers and regional GDP growth is also included to control for the potential economic growth effect. The error term is clustered at province level to control for the random shocks correlated within province.<sup>17</sup>

The results in columns 4 and 5 of Table 2.4 show that the brothers effect is way that foreign banks offer more services and financial products to consumers in the market. The indirect effect is the spillover effect. Foreign banks bring to China experience and knowledge accumulated in well-developed markets abroad. Local Chinese banks can enjoy a spillover effect by observing the foreign banks' ways of operating in the market and recruiting employees who have accumulated expertise from foreign banks. We observe that the number of foreign banks in each province is determined primarily by government policies rather than by local consumers' demand for financial instruments. The Chinese government first allowed foreign banks to establish branches in four cities in Guangdong and Fujian provinces. Only foreign currency businesses were allowed to operate at that time. The next city to acquire permission was Shanghai in 1990. In 1992, the government granted permission to an additional seven cities located in Liaoning Shandong, Jiansu, ZheJiang, Fujian, and Guodong provinces, and Tianjin municipality. In 1996, foreign banks were allowed to engage in business using Chinese currency in Shanghai. Later, this policy was extended to the provinces around Shanghai.

<sup>16</sup>Cities dummies (in total 50 cities) absorb all the variation at the city and province (a lower level of regional aggregation) level.

<sup>17</sup>The significance level remains unchanged if I cluster the error term at county level.

indeed smaller in financially less developed regions. For example, in a province with the smallest insurance density (density=1), having an additional brother reduces the savings rate by 9.1 percentage points ( $-0.093 + 0.002$ ); in a province with the largest insurance density (density=32), having an additional brother reduces the savings rate by only 2.9 percentage points ( $-0.093 + 32 \times 0.002$ ).

### **C. Supporting Parents**

In Chinese culture, parents are supported primarily by their male children (Banerjee, Meng, and Qian 2010; Lee and Xiao 1998; Yu, Yu, and Mansfield 1990; Ge, Yang, and Zhang 2012). By using China Health and Retirement Longitudinal Study (CHARLS) 2011 data, Table 2.5 shows that male children are more likely to live with their parents and to make more regular and nonregular transfers to parents.

Health care has become one of the major social issues in China in recent years. The rising private burden of health care is one of the main explanations of the high savings rate in China, in particular the high savings rate among the elderly (Chamon and Prasad 2010).<sup>18</sup> A household with several brothers would need to save less for their parents' risks—in particular, risks from medical expenditure, which is shared mainly among brothers. According to the CHARLS 2008 data, the conditional mean of transfers from male children to parents for medical expenses is almost twice the amount of that from female children: 2964 from male children

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<sup>18</sup>In 1978, out-of-pocket health spending was 20% of total health spending in China. In 2002, out-of-pocket health spending was 60% of total health spending (Yip and Hsiao 2008).

and only 1508 from female children.<sup>19</sup>

If children do save for their parents, then once their parents have passed away, a household need no longer save for its parents. I utilize this idea of brothers to identify the size of the brothers effect associated with supporting parents: I add (1) the number of a individual's-parents-deceased term and (2) an interaction term between the number of (individual's) brothers and the number of (individual's) deceased parents. If parents are deceased, brothers will no longer be playing a role in sharing the risks of parents; therefore, the higher the number of parents who have passed away, the smaller the size of the brothers effect. In Equation 2.5, we would expect  $\delta_2$  to have the opposite sign to  $\delta_1$ .

$$\begin{aligned} SavingRate_i = & \delta_1 Bro_i + \delta_2 Bro \times ParentDeceased_i + \delta_3 ParentDeceased_i \\ & + \delta(Sib_i) + X_i\gamma + \varepsilon_i \end{aligned} \quad (2.5)$$

Table 2.6 reports the estimation results. First note that  $\delta_3$  is significantly negative. This suggests that households do save for their parents: once a parent has passed away, a household saves less. Second, the brothers effect becomes smaller if the parents have passed away:  $\delta_2$  has the opposite sign to  $\delta_1$ . When both parents have passed away, having one brother reduces the savings rate by 0.028 ( $0.026 \times 2 - 0.8$ ), and when no parents have passed away (the brother-parents-deceased interaction term also equals zero), the size of the brothers effect reaches its maximum value,  $|- .08|$ .

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<sup>19</sup>The sample is restricted to parents who were aged over 60 years in 2008.

Column 2 uses the *One Parent Deceased* and *Two Parents Deceased* dummies instead of the number of parents deceased variable. The estimation results reveal that the supporting parents effect is linear in the number of parents: the coefficient on the two-parents-deceased interaction term (0.052) is almost twice that of the coefficient on the one-parent-deceased interaction term (0.019). Similarly, linearity is observed between the parents-deceased dummies (the noninteraction terms).

Note that two additional variables are also added to equation 2.5: the presence of male children of an individual, and whether a parent (of an individual) is living with that individual. The presence of male children reduces the household savings rate. This is consistent with the theory that male children carry out the duty of supporting parents. Bearing in mind that the financial support of the three generations is suggested here: individuals share the cost of supporting parents with their male siblings. At the same time, individuals also expect their own male children to support them and therefore reduce their current savings rate. Second, the parents-living-together dummy has a negative sign. Households who live with their parents usually pay a large portion of their parents' living expenses.<sup>20</sup> Thus, if a individual lives with his/her parents, his/her household saves less. On the other hand, children who live with their parents are most likely to inherit the parents' house after the parents have passed away. This leads to another important

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<sup>20</sup>According to the CLUS data, if a senior is living with his or her child, the senior only pays 58% of his/her own living expenses; 38% of the living expenses are paid by the family members who live with him/her. However, seniors not living with a child pay 88% of their own expenses; the remainder is shared by those children not living with their parents and other family members.

interpretation of the negative coefficient of the parents-living-together dummy: children who live with parents will save less because they can expect a higher future income.

Wei and Zhang (2011) suggests that parents tend to buy housing for their male children when they get married. One may worry that this may cause a potential endogeneity problem because given that parents' wealth is limited, individuals with fewer brothers (out of the total number of siblings) could anticipate a larger wealth inflow when they get married, and this may reduce the current savings rate. However, among urban residents aged 28–60, 97% of the individuals have married (including 6% who are divorced or whose spouse has passed away). Only fewer than 3% of individuals were never married, and their average age is 38. In addition, a set of detailed housing information is included in all the regressions. It is quite unlikely that Wei and Zhang (2011)'s suggestion could bias the results in this paper.

Other than purchasing housing for male children upon their marriage, it is quite rare for parents to provide transfers to their adult children in urban China. CHARLS 2011 data suggest that in urban China, only 0.2% of adult children aged above 23 receive regular transfers from parents, and only 2.6% of children receive nonregular transfers from their parents.

#### **D. Brothers Effect in Different Income and Asset Groups**

Low-income households usually have smaller emergency funds with which to protect themselves from risks. In addition, it is common in China, and probably

in most other financially underdeveloped countries, for banks to lend money only to households with stable jobs and high income. This is consistent with the literature that supports the idea that low-income households in developing countries are usually borrowing constrained and have difficulty accessing the formal credit market (Morduch 1995). Households with low incomes or few assets may have to rely mainly on their brothers; therefore, these households would have a large brothers effect.<sup>21</sup>

I divide households into low- and high-income groups depending on whether the household income is below or above the median of the overall income distribution of the sample. The household income levels are used to approximate the degree of demand for brothers because of extending borrowing limits or risk sharing. Column 1 of Table 2.7 reports the brothers effect for each income group. The brothers effect in the high-income group is calculated from the interaction term, high-income group dummy  $\times$  brothers; the brother's supporting parents effect in the high-income group is calculated from a triple interaction term: high-income group dummy  $\times$  brothers  $\times$  number of parents deceased. The results reveal that the brothers effect is driven mainly by the low-income group. The coefficients of both the number of brothers and its interaction term with the number of parents deceased are much larger in the low-income groups compared with the previous

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<sup>21</sup>The 2002 CHIP data suggest that high-income households might have accumulated enough emergency savings to insure themselves against a shock: 28% of the top-income tertile households stated that they had adequate savings in their bank to finance an emergency compared with only 8% in the low-income tertile. These data relate to the CHIP 2002 question "If your household suddenly encountered difficulty and needed 10,000 RMB immediately, where or to whom would you turn first?"

results (column 1 of Table 2.6). In contrast, both of these coefficients are not statistically different from zero in the high-income group. I further restrict samples to individuals with no living parents in column 2 to exclude the brothers' supporting-parents effect. Although the standard errors of the coefficients are large because of the small sample size, the results are consistent with what we expected: the low-income group has a much stronger effect of brothers compared with the high-income group.

I further confirm the heterogeneity of the brothers' effect by dividing households by their assets instead of by their incomes (columns 3 and 4).<sup>22</sup> Similar to columns 1 and 2, the brothers effect is larger in the low-asset group compared with the high-asset group, which confirms the strong risk-sharing/extending-borrowing-limits effect of brothers.

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<sup>22</sup>Besides income, assets are also an indicator of the demand for brothers, for potentially two reasons. First, a household with sufficient assets would be less likely to borrow money from brothers because it can finance consumption using its own emergency funds following shocks. Second, assets, especially housing assets, improve a household's ability to access the formal financial market because assets could act as collateral when borrowing money from banks. Most bank loans in China require collateral, and the only acceptable collateral for most banks is buildings or land (Gregory & Tenev 2001; Ayyagari et.al., Cousin 2006). Only 4% of commercial loans are secured by movable assets in China. The value of housing assets is generated by subtracting mortgage balances (unpaid amount) from the housing values owned by a household. Ideally, total assets value is a better indicator than housing assets value. As CGSS does not provide total asset data, I use housing value instead. This caveat is unlikely to cause problems because the rank of household total assets and the rank of housing assets are highly correlated. Using the 2002 CHIP data, I generate the three-level (low, medium, high) housing value asset rank and total asset rank. These two ranks are highly correlated: the correlation coefficient is 0.77 and significant at the 1% level.

## 2.5 Robustness Check

### 2.5.1 Son Preference

The identification strategy in this paper relies on parents with a son preference not acting on it by selecting the gender of their children. In this section, I test to what extent, if any, does the subjective preference of son bias our results by controlling an indicator of son preference.

The indicator comes from the question in the Family Survey of CGSS 2006: “If you are only allowed to have one child, do you prefer a boy or a girl.” A respondent can choose “Boy,” “Girl,” or “Both boy and girl are the same for me.” (The Family Survey of CGSS 2006 is a subset of the China General Social Survey.) The proportion of individual choices in each category is 20%, 12% and 67%, respectively, in the restricted sample. Based on the answer to this question, I generated a son-preference indicator and a daughter-preference indicator, where the indicator equals one if a individual chooses a specific gender. The gender preference question is only asked in the Family Survey of CGSS 2006, which is a relatively small sample. One limitation of this indicator is that the son preference is of individuals, not of individual’s parents. However, the literature has shown that the gender preference is largely transmitted from parents to children within a family (Escriche et al. 2004).

Table 2.8 reports the estimation results for the Family Survey sample. Column 1 does not control for the gender preferences, while column 2 controls for gender preferences. The coefficient of brothers in column 1 is very close to the coef-



ficient in column 2. The coefficient of both gender preference indicators is not statistically significant (the top panel of column 2). Interestingly, the estimated coefficient of son preference is the same as the coefficient of daughter preference. In the rest of the table, I repeat the same strategy in the estimation of the different channels of the brothers effect. The estimation results are almost identical with or without controlling for son preference and daughter preference. These estimation results suggest that the brothers effect on the savings rate is unlikely to be affected by the son preference.

### **2.5.2 Brothers Effect of Individuals Born After the One-Child Policy**

In the main sample, I use individuals who were born before the One-Child Policy to identify the brothers effect. In this section, I provide a robustness check for the main sample to show that for people born after the One-Child Policy, there is still a strong brothers effect.

Because of the missing female problem that started to prevail after the One-Child Policy, the control function approach is no longer valid for individuals born after the One-Child Policy. Instead, I use the One-Child Policy fines for unauthorized births in urban areas as an instrument for the number of brothers that a household has in urban areas. The One-Child Policy fines are set by local government. Ebenstein (2010) shows that the One-Child Policy fine had a significant impact on the gender ratio and fertility decisions. For this reason, we can expect a strong first-stage estimation.

Fines are set as a percentage of an individual's annual income for a certain number of years. Following Ebenstein (2010), I calculated the present value of total fines to obtain a single value, which represents the percentage of a parent's annual income needed to pay fully for an additional child.<sup>23</sup> The typical fine requires each parent to pay 10% of his/her annual income for 14 years, which, according to my calculations, is equivalent to 123% of the combined annual income of each parent.

The provincial level One-Child Policy fines have considerable regional and temporal differences. Provincial fixed effects and time fixed effects are included when using the instrumental variable. The provincial fixed effects control for provincial level time invariant factors such as provincial initial conditions. The years fixed effects control for the factors that uniformly affected all provinces in each year. This IV strategy identifies a local average treatment effect in the sense that it identifies the effect of households' parents who would have one more child if fines or bonuses were low, but not otherwise. For this group, the impact of the number of brothers might be large because they have strong preference for having children and have strong family ties.

In the IV estimation, the sample includes individuals born between 1979 and 1984 (22 to 27 years old in the data) and who are urban residents. We should bear in mind that the IV estimation results might not be very precise because of the small sample size (355 observations).

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<sup>23</sup>A 2% annual discount rate is applied to calculate the present value of fines. The One-Child Policy fine data are collected in Scharping (2003).

Column 1 of Table 2.9 presents the results of the first stage. Fines significantly reduce the number of brothers that a household has. Changing fines from zero to 100% of annual income reduces, on average, the number of brothers by 0.779, and this is statistically significant at the 1% level. The second-stage estimation results are reported in the remaining columns. The Anderson–Rubin weak IV robust 95% confidence intervals for key variables are provided in square brackets.

The IV estimation results are consistent with the findings by using the sample data from before the One-Child Policy: having an additional brother reduces savings rate (column 2). The results are also consistent with the previous findings that low-income or wage-unstable individuals have a larger brothers effect than high-income or wage-stable individuals, which implies that brothers play a role in sharing risks and extending the borrowing limit.<sup>24</sup> The estimation results, however, could not detect the supporting-parents effect (column 3), potentially because there are too few households with deceased parents given their young age (22–28).

## **2.6 How the Decline in the Number of Brothers in Households Could Explain the Savings Rate Puzzle**

Data from the China Statistical Year Book indicate that the average savings rate in urban areas increased from 16% in 1990 to 24% in 2005, where the average

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<sup>24</sup>Because of the small sample size, I divided households into two income groups (low and high) instead of three. For the same reason, I also group “wage very unstable” and “wage unstable” into one group.

savings rate is defined as “*average saving/average disposable income.*” In this section, I calculate, holding everything else constant, to what extent the change in the number of brothers can explain the change in the savings rate. I also assume that sisters have no effect on the savings rate.

From the estimation results of the previous sections, we know that the brothers effect depends on the number of living parents and their average incomes. Thus, I divide households into six groups: two income groups times three age groups. The two income groups are low and high; they are equally divided over the income distribution. The three age groups are ages 22–39, 40–49, and 50–60. The changes in the savings rate in each group depend on the average income, the number of parents deceased, the number of brothers and the estimated brothers effect in that group. The total change in average savings is the sum of the change in savings in each group weighted by each group’s density. Mathematically, it can be described in the following way.

$$\Delta \text{averagesaving} = \sum_A \sum_I \text{Inc}_{I,A} (\widehat{\text{broInc}}_{I,A} + \text{DP}_{I,A} \times \widehat{\text{broDP}}_{I,A}) \Delta \text{bro}_{I,A} f(I,A) \quad (2.6)$$

$A$  denotes the age group, and  $I$  denotes the income group.  $\text{Inc}$  is the average income.  $\text{DP}$  is the number of parents deceased.  $\nabla \text{bro}$  denotes the change in the number of brothers between 1990 and 2005.  $f(\cdot)$  is the density of each group.  $\widehat{\text{broInc}}$  is the estimated brothers effect.  $\widehat{\text{broDP}}$  is the estimated brother-supporting-parents effect. The statistics of these variables based on the CGSS

data are presented in Appendix Table 3. Note that only the statistics of the low-income groups are presented, because the savings rate of the high-income group is not affected by the number of brothers. The marriage rate is also used in the calculation in order to take into account the change in the number of brothers of both the husband and wife of a household.

The simple calculation suggests that declines in the number of brothers of households explained 34.7% of the increase in the aggregate savings rate from 1990 to 2005 in urban China. Be mindful that the estimated explained increase would be larger if sisters also behaved like brothers and affected the household savings rate.

## **2.7 Conclusion and Discussion**

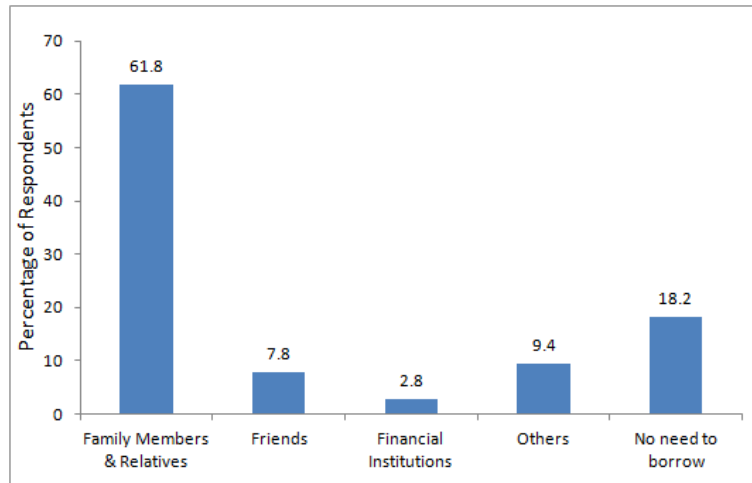
In this paper, I found that having one more brother of a individual reduces the individual's household savings rate by at least five percentage points in urban China. Brothers reduce the savings rate because they share the risks/extend borrowing limits, and share the cost of supporting their parents. The change in the number of brothers of households explained 34.7% of the increase in the household savings rate.

It is interesting to note that although China is the world's second largest economy, household financial markets are still underdeveloped even in urban areas. The Chinese government might consider developing household financial markets as soon as possible. The baby boom generation can rely on their siblings to finance themselves. They face few hurdles while household financial markets are

underdeveloped. However, the current and future younger generations have few siblings because of the One-Child Policy. They lack a family-based safety net and they carry the huge burden of supporting their parents. Developing household financial markets is a necessary and urgent task.

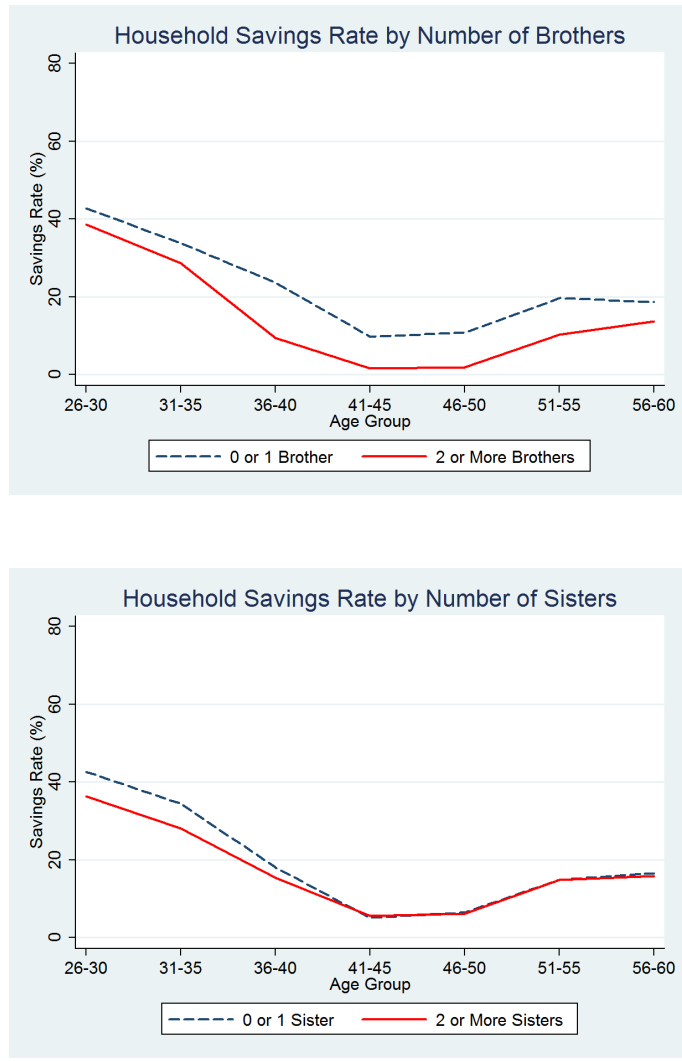
This paper is one of the first papers to estimate the number of siblings effect on the household savings rate. The results may not be limited to China only. It would be interesting to see whether other countries where households share risks with their siblings and children to support their parents financially, such as India and other East Asian countries, have a similar sibling effect on the savings rate. In addition, if these countries have cultures similar to that of China, that is to say, male siblings have stronger family ties compared with female siblings, we may also observe gender differences in the siblings effect on the savings rate.

**Figure 2.1:** Sources for Borrowing Money in Urban China: Self-Reports of Borrowing Resource if One Encounters a Negative Shock (Percentage of Respondents)



Note: The above results are calculated by the author based on a question in the Chinese Household Income Project 2002 Urban Sample: “If your household encountered an abrupt difficulty and needed 10,000 RMB immediately, who (where) would you turn to first?” Sample size: 6779.

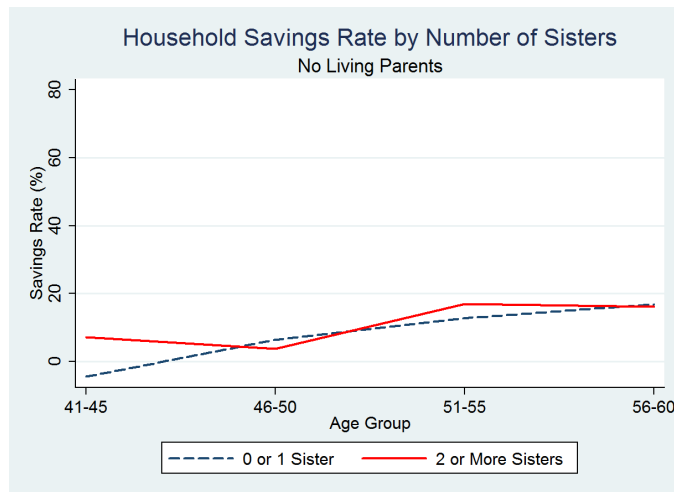
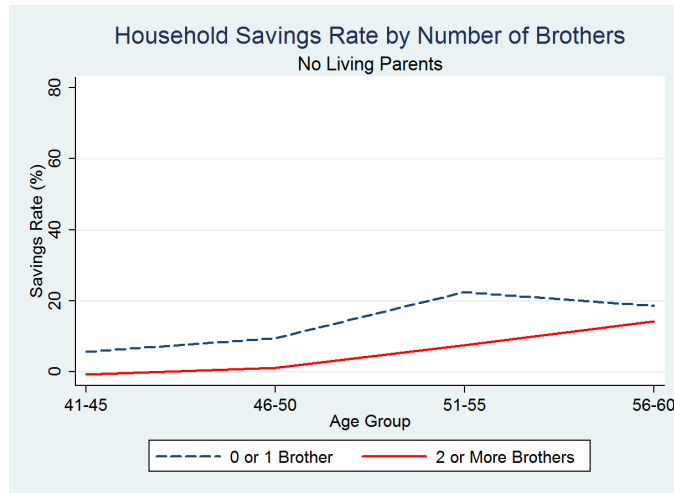
**Figure 2.2:** Age Profile Household Savings Rate by Number of Brothers and Sisters



Data source: China General Social Survey 2006. Total sample size: 6886. Sample size of individuals with more than one brother in each age group (from young to old): 111 299 571 685 416 515 469; zero or one brother: 613 628 640 573 406 481 482; more than one sister: 161 333 504 618 411 477 418; zero or one sister: 563 594 707 640 408 519 533

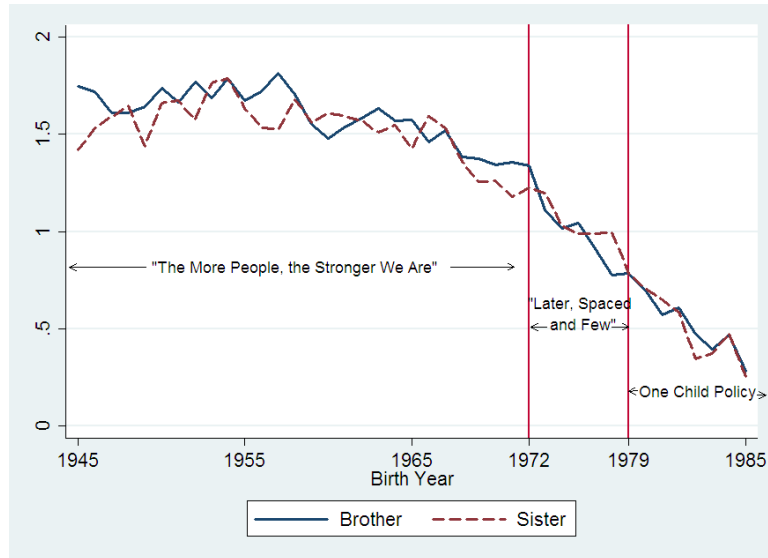


**Figure 2.3: Age Profile Household Savings Rate by Number of Brothers and Sisters - Households with No Living Parents**



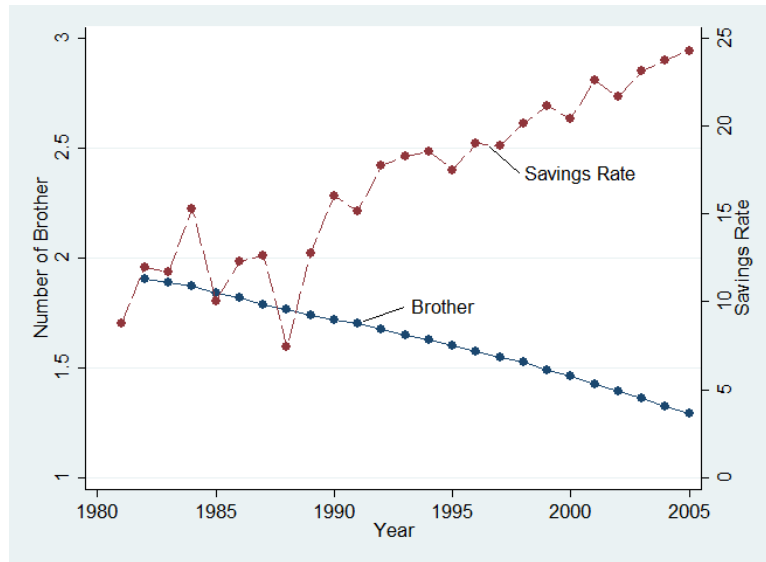
Data source: China General Social Survey 2006. Sample size: 1732. Sample size of individuals with more than one brother in each age group (from young to old): 152 145 266 295 ; zero or one brother: 117 131 250 376, more than one sister: 147 143 244 286; zero or one sister: 122 133 272 385

**Figure 2.4:** Number of Brothers and Sisters by Individuals' Birth Year



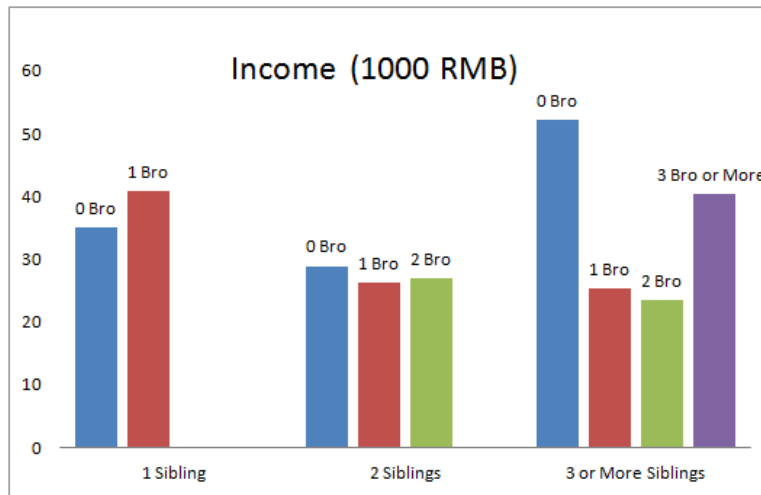
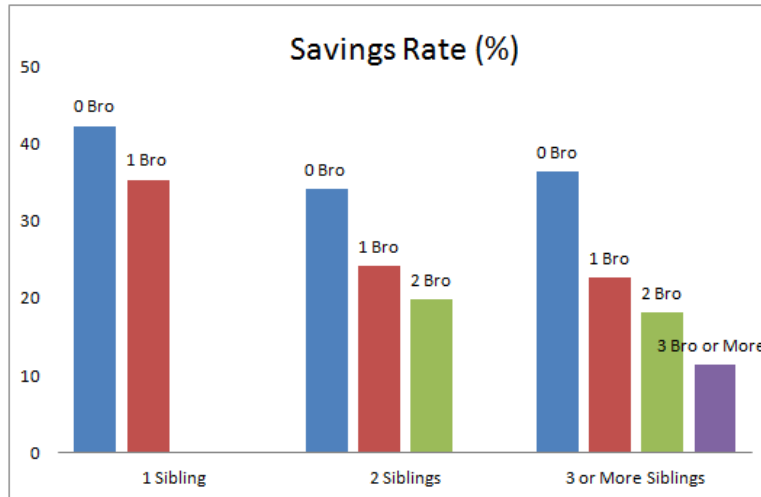
Data source: China General Social Survey 2006. Sample of urban area residents are used. Sample size: 3235

**Figure 2.5:** Number of Brothers and Household Savings Rate in Urban Areas



Note: The number of siblings are restricted to individuals aged 20-60. Death rates are used in order to compute the number of siblings in early years. Saving rate is defined as 1-living expenditure/disposable income. Saving rate and death rate data source: China Statistical Yearbook. Siblings data source: China General Social Survey 2006.

**Figure 2.6:** Source of Variation: Average Household Savings Rate by Number of Brothers for a Given Number of Siblings



Note: China General Social Survey 2006 is used. Sample is restricted to urban area residents born between 1945 to 1978.

**Table 2.1:** Fraction of Male Siblings by Total Number of Siblings

Number of Siblings	Obs	Fraction of Male	95% Conf. Interval
1	572	0.52	[ 0.50, 0.55]
2	846	0.52	[ 0.50, 0.53]
3	756	0.49	[ 0.48, 0.51]
4 or more	1085	0.48	[ 0.47, 0.49]

Note: China General Social Survey 2006 is used. Sample is restricted to urban area residents born between 1945 to 1978.

**Table 2.2:** Test of Random Assignment of the Number of Brothers Conditional on the Number of Siblings

	Dependent Variable		
	Brothers	Brothers	Fraction
Siblings		0.485*** (0.012)	-.009** (0.005)
Mother Education	-.042*** (0.009)	-.008 (0.006)	-.003 (0.003)
Father Education	-.010 (0.009)	0.008 (0.006)	0.004 (0.003)
Mother Communist Party	0.004 (0.068)	-.031 (0.052)	0.016 (0.022)
Father Communist Party	0.059 (0.133)	0.039 (0.098)	-.024 (0.045)
Mother Company Type	-.060 (0.06)	-.044 (0.043)	-.029 (0.02)
Father Company Type	0.056 (0.047)	-.014 (0.034)	-.007 (0.014)
Mother Occupation Skill Level	-.013 (0.025)	-.012 (0.02)	-.006 (0.009)
Father Occupation Skill Level	-.013 (0.02)	0.002 (0.014)	-.0002 (0.006)
Mother Occupation Dummies	Yes	Yes	Yes
Father Occupation Dummies	Yes	Yes	Yes
Obs.	2608	2608	2383
Wald statistics	9.32***	1.39	1.45

Note: China General Social Survey 2006 is used. Sample is restricted to urban area residents born between 1945 to 1978. The Wald test examines the joint significance of all the regressors in column 1. In column 2 and 3, number of siblings is not included in the Wald test; all other regressors are included. Standard errors are clustered at county level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 2.3: The Impact of Number of Brothers on Household Savings Rate**

	Dependent Variable: Savings Rate										
	Born 1946-1978 (Age 28-60)								Born before 1972 (Age 35-60)	Born after 1955 (Age 28-50)	Born 1956-1971 (Age 35-50)
	Rural	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Brothers	-.033* (0.018)	-.048*** (0.017)	-.048*** (0.016)	-.046*** (0.016)	-.046*** (0.016)	-.046*** (0.016)	-.056** (0.022)	-.057*** (0.02)	-.053*** (0.019)	-.066*** (0.019)	-.083*** (0.024)
Siblings	0.017 (0.012)	0.011 (0.01)	0.014 (0.01)	0.016 (0.01)	0.017 (0.01)						
Brothers of Female Respondents							0.021 (0.024)				
Years of Education	-.004 (0.006)	0.009* (0.005)	0.01** (0.005)	0.012** (0.005)	0.012** (0.005)	0.012** (0.005)	0.013** (0.005)	0.004 (0.005)	0.015** (0.007)	0.012** (0.005)	0.018** (0.008)
Household Income	1.935*** (0.371)	0.328*** (0.093)	0.335*** (0.09)	0.33*** (0.091)	0.333*** (0.092)	0.328*** (0.091)	0.328*** (0.092)	0.27*** (0.088)	0.315*** (0.093)	0.375*** (0.12)	0.354*** (0.123)
Basic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Detailed Backgrounds			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Children				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Housing					Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sibling Dummies						Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2364	2580	2539	2539	2502	2502	2502	1730	2067	1816	1381
R <sup>2</sup>	0.179	0.175	0.18	0.227	0.225	0.229	0.23	0.243	0.209	0.27	0.243

Note: China General Social Survey 2006 is used. Sample is restricted to individuals born between 1945 to 1978. Column 1 uses non-urban residents data. Column 2 to column 11 use urban area residents data. Standard errors are clustered at county level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Other variables included:

1. Basic Controls: female, age, age squared, marital status, years of education, household income and city dummies.
2. Detailed Backgrounds: mother education, father education, number of people in households, communist party membership and send-down dummy.
3. Children Information: number of children, children age group dummies: 0-6, 6-18 or 18 and above.

4. Housing Information: housing dummy, value of mortgage and value of housing.



**Table 2.4: Brother's Sharing Risks / Extending Borrowing Limits Effect**

	Dependent Variable: Savings Rate				
	(1)	(2)	(3)	(4)	(5)
<i>Stability of Income</i>					
Brothers × Wage Very Unstable	-.137*** (0.046)				
Brothers × Wage Unstable	-.049 (0.032)				
Brothers × Wage Stable	-.047 (0.032)				
Brothers × Bonus Very Unstable		-.114* (0.065)			
Brothers × Bonus Unstable		-.068* (0.037)			
Brothers × Bonus Stable		-.039 (0.034)			
<i>Personal Health</i>					
Brothers × Health Very Poor			-.158** (0.065)		
Brothers × Health Poor			-.127*** (0.031)		
Brothers × Health Normal			-.067*** (0.024)		
Brothers × Health Very Good			-.093** (0.037)		
<i>Regional Development</i>					
Brothers				-.093*** (0.026)	-.088*** (0.026)
Brothers × Insurance Density				0.002*** (0.0008)	
Brothers × # of Foreign Bank per Capita					0.032*** (0.008)
Obs.	1407	1013	2499	2499	2499
R <sup>2</sup>	0.337	0.314	0.254	0.248	0.248

Note: Sample is restricted to urban area residents born between 1945 to 1978. Standard errors are clustered at county level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Other variables included:

1. Basic Controls: siblings, female, age, age squared, marital status, years of education, household income and city dummies.
2. Detailed Backgrounds: mother education, father education, number of people in house-

holds, communist party membership and send-down dummy.

3. Children Information: number of children, children age group dummies: 0-6, 6-18 or 18 and above.
4. Housing Information: housing dummy, value of mortgage and value of housing.
5. Column 4 and 5 also include number of brothers  $\times$  provincial level growth regional product.

**Table 2.5: Gender Differences in Supporting Parents**

	Male	Female
<b>Living with Parents</b>		
Proportion	23.9 (0.5)	4.5 (0.3)
<b>Regular Transfers to Parents</b>		
Proportion	5.0 (0.6)	2.6 (0.4)
Conditional Mean	7322 (1903)	2833 (798)
<b>Non-regular Transfers to Parents</b>		
Proportion	32.2 (0.6)	31.8 (0.6)
Conditional Mean	2248 (160)	1146 (78)

Note: Authors' tabulation based on the China Health and Retirement Longitudinal Study 2011. Sample is restricted to parents who are above 60 years old, and their children are above 23 years old. There are 2410 individual level observations. Proportion represents percentage of individuals. Standard errors in parentheses.

**Table 2.6:** The Impact of Number of Brothers on Household Savings Rates  
- the Effect of Supporting Parents

	Dependent Variable: Savings Rate	
Brother	-.080*** (0.026)	-.078*** (0.025)
Brother × # of Parents Deceased	0.026* (0.014)	
Brother × One Parent Deceased		0.019 (0.029)
Brother × Two Parent Deceased		0.052* (0.029)
# of Parents Deceased	-.081** (0.034)	
One Parent Deceased		-.085* (0.049)
Two Parents Deceased		-.160** (0.07)
Male Children Presence	-.047** (0.024)	-.048** (0.024)
Parents Live Together	-.106*** (0.038)	-.104*** (0.039)
Obs.	2500	2500
R <sup>2</sup>	0.247	0.247

Note: Sample is restricted to urban area residents born between 1945 to 1978. Standard errors are clustered at county level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Other variables included:

1. Basic Controls: siblings, female, age, age squared, marital status, years of education, household income and city dummies.
2. Detailed Backgrounds: mother education, father education, number of people in households, communist party membership and send-down dummy.
3. Children Information: number of children, children age group dummies: 0-6, 6-18 or 18 and above.
4. Housing Information: housing dummy, value of mortgage and value of housing.

**Table 2.7:** The Brother Effect in Different Income Groups and Asset Groups

	Dependent Variable: Savings Rate			
	All (1)	No Living Parents (2)	All (3)	No Living Parents (4)
<i>Low Income</i>				
Brothers	-.122*** (0.027)	-.054 (0.034)		
Brothers × # of Parents Deceased	0.039** (0.017)			
<i>High Income</i>				
Brothers	0.014 (0.016)	0.007 (0.038)		
Brothers × # of Parents Deceased	0.016 (0.014)			
<i>Low Asset</i>				
Brothers			-.090*** (0.026)	-.053 (0.043)
Brothers × # of Parents Deceased			0.028 (0.018)	
<i>High Asset</i>				
Brothers			-.056*** (0.022)	-.047 (0.033)
Brothers × # of Parents Deceased			0.019 (0.016)	
Obs.	2491	663	2312	615
R <sup>2</sup>	0.313	0.239	0.238	0.21

Note: Sample is restricted to urban area residents born between 1945 to 1978. Standard errors are clustered at county level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The brothers effect in high income group is calculated from the interaction term, high income group dummy × brothers. The brother's supporting parents effect in high income group is calculated from a triple interaction term: high income group dummy × brothers × number of parents deceased.

Other variables included:

1. Basic Controls: siblings, female, age, age squared, marital status, years of education, household income and city dummies.
2. Detailed Backgrounds: mother education, father education, number of people in households, communist party membership and send-down dummy.
3. Children Information: number of children, children age group dummies: 0-6, 6-18 or 18 and above.
4. Housing Information: housing dummy, value of mortgage and value of housing.

5. Presence of male children.
6. Column 1 and 3 also controls number of parents deceased and parents living together dummy.

**Table 2.8: Robustness Check: Son Preference**

	Dependent Variable: Savings Rate	
	Without Son, Daughter Preference	With Son, Daughter Preference
	(1)	(2)
<i>Basic Results</i>		
Brothers	-.089*** (0.027)	-.087*** (0.026)
Son Preference		0.057 (0.039)
Girl Preference		0.057 (0.054)
Obs.	927	927
<i>Supporting Parents</i>		
Brothers	-.109*** (0.04)	-.108*** (0.039)
Brothers × # of Parents Deceased	0.027 (0.017)	0.028* (0.017)
Obs.	927	927
<i>Individual Wage Risks</i>		
Brothers × Wage Unstable	-.078* (0.044)	-.078* (0.044)
Brothers × Wage Stable	-.010 (0.038)	-.010 (0.038)
Obs.	511	511
<i>Regional Financial Development</i>		
Brothers	-.134*** (0.045)	-.133*** (0.044)
Brothers × # of Foreign Bank per Capita	0.022* (0.013)	0.021* (0.013)
Obs.	927	927
<i>Income Heterogeneity</i>		
Brothers × Low Income Dummy	-.236*** (0.051)	-.236*** (0.051)
Brothers × High Income Dummy	-.029 (0.037)	-.029 (0.037)
Obs.	927	927

Note: The Family Survey of the China General Social Survey 2006 is used. Sample is restricted to urban area residents born between 1945 to 1978. Wage Unstable equals one if a respondent characterized his/her wage is very unstable or unstable; 0 otherwise. Wage stable equals one if a respondent characterized his/her wage is stable. Standard errors are clustered at county level. Standard errors are clustered at county level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Other variables included:

1. Basic Controls: siblings, female, age, age squared, marital status, years of education, household income and city dummies.
2. Detailed Backgrounds: mother education, father education, number of people in households, communist party membership and send-down dummy.
3. Children Information: number of children, children age group dummies: 0-6, 6-18 or 18 and above.
4. Housing Information: housing dummy, value of mortgage and value of housing.
5. Number of parents deceased, parents living together dummy and presence of male children.



**Table 2.9:** IV Estimation Results for Individuals Born after the One Child Policy

	1st Stage		2nd Stage			
	Brothers (1)		Savings Rate (2-6)			
	(1)	(2)	(3)	(4)	(5)	(6)
Fines	-0.779*** (0.269)					
Brothers		-0.373** (0.18) [-1.090, -0.035]	-0.359** (0.177) [-1.92, 0.045]			
Brothers × # of Parents Deceased			-0.261 (0.676)			
Brothers × Low Income Dummy				-0.510*** (0.181) [-1.745, -0.110]		
Brothers × High Income Dummy				-0.253 (0.175) [-1.56, 0.23]		
Brothers × Wage Unstable					-0.484** (0.219) [-1.785, 0.054]	
Brothers × Wage Stable					-0.377* (0.446) [-1.92, 0.082]	
Brothers × Bonus Unstable						-0.291 (0.215)
Brothers × Bonus Stable						-0.106 (0.166)
Birth Year & Province Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	355	355	355	355	300	236
1st Stage F Statistics		10.217	0.016	5.579	4.322	6.473

Note: Sample is restricted to urban area residents born between 1979-1984. Wage Unstable equals one if a respondent characterized his/her wage is very unstable or unstable; 0 otherwise. Wage stable equals one if a respondent characterized his/her wage is stable. Standard errors are clustered at county level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Other variables included:

1. Basic Controls: siblings, female, age, age squared, marital status, years of education, household income and city dummies.
2. Detailed Backgrounds: mother education, father education, number of people in households, communist party membership and send-down dummy.
3. Children Information: number of children, children age group dummies: 0-6, 6-18 or 18 and above.

4. Housing Information: housing dummy, value of mortgage and value of housing.
5. Number of parents deceased, parents living together dummy and presence of male children.

## **Chapter 3**

# **How Does a Hard Manual Labor Experience during Youth Affect Later Life? The Long-term Impact of the Send-down Program during the Chinese Cultural Revolution**

### **3.1 Introduction**

The adolescent and teenage years are important stages in the human lifespan. During these years, lifelong habits and personality traits are easily shaped or changed by the outside environment. A good environment fosters positive thinking, mo-

tivating individuals to perform to the best of their abilities, and to generate high returns for themselves (Borghans et al. 2008; Cunha and Heckman 2007). So far, most literature has focused on how a positive intervention could affect individual achievement later in life later (Rodríguez-Planas 2012; Schochet and McConnell 2008; Heckman and Kautz 2014). However, what if people undergo hard manual-labor experiences during adolescence?

During the 1960s and 1970s, under Mao Zedong's leadership, China underwent the famous Cultural Revolution. The government forced more than 16 million adolescents from urban areas to move to rural areas to carry out agricultural field work. This event is known as the "send-down movement."<sup>1</sup> The sent-down youths were forced to engage in hard manual labor in the fields for as long as 12 hours a day, 7 days a week (Zhou and Hou 1999). Although the sent-downs were allowed to return to urban areas after the Cultural Revolution, they were scarred by their difficult experience—an experience not shared by non-sent-down urban youths. This study investigates the long-term impact of such a challenging manual-labor experience on these youths when they had reached the ages of 40 to 55.

One might expect that such experiences, which adolescents endured for approximately five years, would have some effect on life outcomes, whether positive or negative. Surprisingly, if we compare the income of those sent down with those not sent down, conditional on individuals having graduated from high school (in-

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<sup>1</sup>High school in this paper refers to a school comprising grades 7 through 12; it includes both junior and senior high schools.

cluding junior high) during the Cultural Revolution, we see virtually no income difference between the two. This paper finds that a very important step has been neglected by previous literature, one that reveals a significant effect of the send-down experience. This key step is the upgrading of education after the Cultural Revolution.

For several years during the Cultural Revolution, many senior high schools and universities stopped admitting new students due to the governments education policy (Meng and Gregory 2002; Giles, Park, and Wang 2008; Han, Suen, and Zhang 2011).<sup>2</sup> This resulted in education interruption for teenagers graduating from junior and senior high schools during the Cultural Revolution. Han, Suen, and Zhang (2011) find that, after the Cultural Revolution, many of these individuals went back to school to reinvest in their human capital in order to compensate for their interrupted schooling. In this paper, I refer to this “re-schooling” movement as education upgrading. I find that, among individuals who graduated from high school during the Cultural Revolution, the sent-down males were more likely to have upgraded their education compared to the non-sent-down males. It appears that the hard manual labor experience has a strong positive effect on income. However, this effect is conditional on education upgrading. The sent-down males who upgraded their education earn a 10% higher income than non-sent-down males who also upgraded their education. However, for those who did not upgrade their education, the send-down experience negatively affects income be-

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<sup>2</sup>In the first 2 years of the Cultural Revolution, not only senior high schools and universities but also elementary and junior high schools were shut down.

cause of the loss of years of urban work experience.

Furthermore, consistent with the finding in income, conditional on education upgrading, the sent-down males are more likely to have computers at home than non-sent-down males are. The social economic environment changed dramatically after the Cultural Revolution, with computers being one of the new high technologies favored by the rapid economic growth. Knowing how to operate a computer could have positive affect on ones income; however, it is not easy for individuals aged 40 or 50 to learn such a new technology. The education-upgraded sent-down males may have acquired skills during the send-down that helped them adjust to changes in their environment. The results are robust against the exclusion of individuals living with their children. Falsification test shows that both sent-down males and non-sent-down males are equally likely to own other major home appliances, such as color TVs, air conditioners, or video cameras.

It is natural to believe that agricultural field work in rural areas should have no direct relation to academic education or urban work experience. One interpretation of the results is that the experience of years of forced hardship during their youth has helped the sent-down males develop an endurance or greater resistance to future adversity. Many documents have reported that the difficult send-down experience could have motivated these youths to study and work harder later in life (Yang 1992; Wang 2006; Liu 2012; Tang 2012). These documents reported that sent-down youths learned that life is tough and, further, that hard manual-labor experience made them stronger, helping them gain the ability to face adversity. Appendix B provides a conceptual framework to explain the empirical finding

that sent-down males are more likely to upgrade education, and-conditional upon education upgrading-why they earn higher incomes.

Almost every urban family had at least one child sent down (Bernstein 1977). The accumulated number of send-downs during the 1960s and 1970s was equivalent to 10.5% of the total non-farming population in 1979 (Pan 2002). During the Cultural Revolution, local governments had a quota of send-downs to fill every year (Pan 2002; Bernstein 1977; Singer 1971). The quota varied largely by year. Local government determined the send-down selection process based on the quota and the number of age eligible youths (junior or senior high school graduates in their graduation year). If the quota was high, all age eligible youths would be sent down. If the quota was low, the local government would allow families who had already sent away a proportion of their children to keep their current age eligible child.<sup>3</sup>

It has been well documented that parental social status or political capital did not prevent youth from privileged classes from being sent down, as Mao was enforcing social equality in China (Bernstein 1977; Singer 1971; Unger 1980; Zhou and Hou 1999; Xie et al. 2008). Some previous studies, however, have suggested that the send-down program might have discriminated against a group of children whose parents had college-level education.<sup>4</sup> In order to avoid potential bias induced by the selection of the policy, this study focuses only on children whose parents had less than or equal to 12 years of education. (Note that the

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<sup>3</sup>China had a huge baby boom after the war; the average number of children per family during the 1960s and 1970s was four (Zhou 2013a; Banerjee et al. 2010).

<sup>4</sup>Mao thought that high education was a main source of social inequality (Pan 2002).

results are robust when I restrict samples to those individuals whose parents had only equal to or less than 9 years of education.)

In estimating the send-down effect conditional on education upgrading, parents education and job information are used to approximate individuals ability which is unobserved to econometricians. In addition, I estimate a differential effect by adopting a difference-in-differences type of specification, which is served to control for the general difference between the send-downs and the non-send-downs (i.e., the difference between the two groups regardless of education-upgrading status), as well as the difference between the education-upgraded group and the non-education-upgraded group (regardless of the send-down experience).

One may still have concerns that the above two strategies may not fully solve the endogeneity problem in education upgrading choice. In the robustness check, I further use the relative number of full-time teachers during the Cultural Revolution (which was determined by the education policies during the Cultural Revolution) as IVs to instrument education upgrading choice. The IV estimation results are consistent with the findings in the OLS estimations.

The positive effects of the send-down experience on education and incomes found in this study are robust and statistically significant even when I: (1) control for family connections; (2) drop all the send-down samples of those able to return to urban areas before the end of the Cultural Revolution; (3) eliminate individuals whose parents had capitalist tendencies (worked in private firms or owned private firms); and (4) focus on individuals from disadvantaged family backgrounds. The robust and significant results suggest that the findings in this paper are unlikely to



be altered by the youths' family backgrounds.

Li et al. (2010) suggest that parents were allowed to choose which child to send away, and their empirical results suggest that parents chose to send away the child with the lower ability. If this were the case, the selection within family would cause a downward bias in the estimated send-down effect. Given the findings in Li et al. (2010), the estimated positive effect of the send-down experience suggested in this paper would be a lower bound. Li et al. (2010), however, discovered this parent selection effect from a twin study.<sup>5</sup> It is unlikely that the local government would have allowed parents much freedom in planning and choosing which child to send if the children were not twins, given that the local government had a send-down quota to fill each year, which varied considerably from year to year.<sup>6</sup>

This paper contributes to a large body of literature including research on the send-down experience, military service, households in the conflict environment, education, and adolescent development. In the send-down literature, papers have focused on the outcome of the send-down experience from different perspectives. By using the fact that parents were forced to choose one of their twins to send down, Li et al. (2010) identify the roles of altruism, favoritism, and guilt in parents' behavior towards their children. Among sociologists, Zhou and Hou (1999) along with Chen and Cheng (1999) report that the traumatic send-down experi-

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<sup>5</sup>Except for the first two years of the second stage of the send-down movement, the local government usually required at most only one child to be sent down from each family each year. Therefore, parents with twins had to choose one of the twins to be sent down.

<sup>6</sup>Bernstein (1977); Singer (1971); Unger (1980); Zhou and Hou (1999); Xie et al. (2008) suggest that the number of send-downs varied largely from year to year due to the changes in send-down policies. Figure 3.1 illustrates this variation.

ence had a positive effect on the future income of those sent down. However, Xie et al. (2008) suggest that the send-down experience does not affect their income. This paper focuses on education attainment after the send-down movement and suggests that education upgrading was a key factor that led to a large positive outcome following the send-down experience.

Because of the hardships induced by the send-down experience, the effects of the send-down experience might be comparable with the effect of military service on an individual. Studies suggest that military experience *combined* with financial support has a positive effect on education attainment for returning veterans (Bound and Turner 2002; Lemieux and Card 2001). On the other hand, there is mixed evidence across countries regarding the effect of military experience on income (Card and Cardoso 2011; Earnings and Records 1990; Joshua et al. 2011; Albrecht et al. 1999; Imbens and an der Klaauw 1995). This paper provides evidence that a forced hard experience might have a positive effect on education attainment without the financial support offered by associated programs, such as the “G.I. bill” in the US. Furthermore, the hard experience could have a positive effect on earnings depending on whether individuals upgraded their education after the hardship. Future research might seek to investigate the education-upgrading-dependent heterogeneous effect of military service in other countries.

The remainder of this paper is constructed as follows. After providing background information and documentation on the send-down policy in the following section, I introduce the process of sample restriction in Section 3. Section 4 describes the education interruption during the Cultural Revolution, the education-

upgrading movement after the Cultural Revolution, and the impact of the send-down experience on the choice to upgrade education. Sections 5 and 6 present the estimation results of the send-down effect on income and computer ownership, respectively. Section 7 provides the robustness check, and Section 8 concludes the paper.

## **3.2 Background**

### **3.2.1 The Send-down Policy**

The send-down movement is also known as the “rustication movement.” In Chinese, it was called “Shang Shan Xia Xiang,” meaning “going up to the mountains and down to the villages” (Bernstein 1977). The send-down program began in 1960 and ended around 1978.

Before 1967, the targets of the send-down program were workers, employees, and jobless city dwellers, as well as elementary and junior high school graduates. At this point, people were mostly persuaded—not forced—to go to rural areas. Voluntary send-down numbers dropped when urban people learnt more about the realities of rural life; they were troubled by the hardship of manual labor and the inability to support themselves (Pan 2002). Approximately one million individuals were sent down during this stage.

The second stage of the send-down movement was initiated by Mao’s speech in 1968: “It is necessary for educated young people to go to the countryside to be reeducated by the poor and lower middle class peasants. Cadres and other city

people should be persuaded to send their sons and daughters who have finished junior or senior high school, college, or university to the countryside”(Pan 2002). The second stage of the send-down movement came to be regarded as a political command. It was primarily forced rather than voluntary. More than 16 million individuals were sent down between 1968 and 1978. From economic administrators, cadres to students and their parents, if one refused to take part in the send-down program, they could be accused of opposing the great strategy of Chairman Mao (Zhang 2000; Pan 2002).<sup>7</sup>

The massive send-down movement resulted in 10.5% of China’s total non-farming population in 1979 being sent down(Pan 2002), with almost every urban family having at least one child sent down (Bernstein 1977). Every year, local governments had a quota of send-downs to fill (Pan 2002; Bernstein 1977; Singer 1971). The quota varied largely by year. Local government determined the send-down selection process based on the quota and the number of age eligible youths (junior or senior high school graduates in their graduation year). If the quota was high, all age eligible youths would be sent down. If the quota was low, the local government would allow families who had already sent away a proportion of their children to keep their current age eligible child.<sup>8</sup>

The blue bar of Figure 1 indicates the number of individuals sent down each year in the China General Social Survey (CGSS) 2003 data (see data appendix for

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<sup>7</sup>Pan (2002) documented that Mao was essentially anti-urban, anti-intellectual, and pro-rural. This was at the root of his support for the send-down movement.

<sup>8</sup>China had a huge baby boom after the war; the average number of children per family during the 1960s and 1970s was four (Zhou 2013a; Banerjee et al. 2010).

details). There was a substantial increase in the number of people sent down in 1968, the year Mao made his famous speech about the send-down policy. Statistics also show that the number of send-downs varied considerably from year to year—a variation caused by the differences in yearly send-down quotas (Pan 2002; Bernstein 1977; Singer 1971). The send-down policy was intensively executed throughout the country at the beginning of the second stage of the send-down. The number of sent-down youths decreased between 1970 and 1972 and reached another peak in 1974 and 1975.

The red line in Figure 1 indicates the total number of individuals sent down in each year, as reported in Pan (2002). The two data sources show a very similar tendency in the number of send-downs for each year. The send-down movement ended in 1978 when the new leadership of the Communist Party took control of the government and most of the sent-down youths were allowed to return to urban areas (Zhou and Hou 1999).<sup>9</sup>

### **3.2.2 Send-down Experience and Documentations**

Being sent down was an extremely difficult experience for affected adolescents. Several studies (Zhou and Hou 1999; Bernstein 1977; Li et al. 2010) have reported that most of the sent-down youths were forced to carry out hard manual labor in

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<sup>9</sup>In 1985, the government introduced a policy to compensate the sent-down youths, counting their work experience in rural areas as work experience in their current job. The money would be added to their salaries for the rest of their careers. However, salary increase due to work experience was minimal. In 2003, for example, government occupations paid only 1 RMB (0.15 USD) per year of work experience. Thus, five years of the send-down experience only counted for 5 RMB, which is less than 1% of the average income. In calculating salaries, many companies do not account for experience beyond 10 years. Thus, the send-down compensation policy is unlikely to considerably affect people's income and employment.

the fields for as long as 12 hours per day and 7 days per week. On average, they were forced to stay in rural areas for about five or six years. Disdain for the send-down policy was widely documented following the Cultural Revolution.

However, the forced years of hard manual labor could have helped urban youth develop a kind of endurance for, or resistance against, future hardships. In rural areas, without parental support, youth were forced to acclimate to an entirely different environment. The process of overcoming difficulty and surviving in a harsh environment at a young age proved to be an important life experience. A substantial number of documents report that the sent-down youths developed a tough working spirit through the hard manual labor experience (Yang 1992; Wang 2006; Liu 2012; Tang 2012). Wang 2006, for instance, reports as follows: *“Through the send-down experience in the rural area, we learned the spirit of hard work from peasants. We learned that life is tough. The hard experience made us stronger and trained us to have the ability to encounter difficulties ....”* Similarly, Liu 2012 documented a story of a sent-down individual who succeeded in later life. This sent-down male suggested that the hard training experience helped him to build a strong spirit for bearing hard work. China’s current president Xi Jinping was also sent down and received education upgrading after his return to the urban area. Xi Jinping describes the send-down experience as having motivated him to have the courage to face difficulties later in his life (Xi 2003).

### **3.3 Sample Restrictions**

In order to estimate the send-down effect, it is necessary to first investigate the characteristics and family backgrounds of those who were sent down. The ideal comparison group for those who were sent down should be a group of individuals who were not sent down but had similar characteristics and family backgrounds to those who were sent down during the Cultural Revolution.

#### **3.3.1 Treatment Group and Comparison Group**

I only focused on the second stage of the send-down (1968–1978) because this was a forced movement and was announced without anticipation. The targets of the second stage of the send-down program were urban junior and senior high school students upon their graduation. Therefore, the comparison group consists of urban residents who had graduated from junior and senior high school during the Cultural Revolution.<sup>10</sup>

The youngest send-downs were born in 1963 (graduated from junior high school in 1978) and the oldest send-downs were born in 1948 (graduated from senior high school in 1966).<sup>11</sup> This calculation of the birth years of the send-downs is supported by Figure 3.2. The figure presents the proportion of urban high school graduates sent to rural areas by year of birth. As illustrated in Figure 3.2, in the peak year, almost 50% of high school graduates were sent down.

In order to avoid potential cohort and age differences between the treatment

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<sup>10</sup>Urban residents are defined as individuals with an urban resident card.

<sup>11</sup>Because of the education interruption between 1966 and 1968, individuals sent down in 1968 included students who had graduated between 1966 and 1968 Meng and Gregory 2002.

and comparison groups, I restricted the comparison group to individuals born between 1948 and 1963. Note that these individuals were between 40 and 55 years old in the CGSS 2003 data.

### **3.3.2 Family Background**

The send-down movement during the second stage was forced and unavoidable. It has been well documented that parental social status or political capital did not prevent the youths in certain privileged classes from being sent down (Bernstein 1977; Singer 1971; Unger 1980; Zhou and Hou 1999; Xie et al. 2008). The children of many communist party leaders and government officials were also sent down. The daughter of Deng Xiaoping (China's Chairman in the 1980s) and the nephew of Zhou Enlai (China's first Prime Minister who served between 1949 and 1976) were among the privileged children not given preferential treatment.

Almost every family in the affected generation had at least one child sent down (Bernstein 1977). The send-down selection was *not* based on children's personal traits; however, previous literature suggests that the send-down program discriminated against a group of children whose parents had college-level education, capitalist tendencies, were working for a private organization, or owned a private business (Bernstein 1977; Pan 2002; Zhou and Hou 1999).<sup>12</sup>

The CGSS 2003 provides a detailed set of information about both parents when the respondents were 18 years old, which is very close to the time the respondents would have been selected to be sent down. The information includes

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<sup>12</sup> During the Cultural Revolution, university education was seriously criticized, as Mao believed high-level education to be a source of inequality.



mother's and father's (1) years of education, (2) Communist Party membership status, (3) leadership status—whether they were chief officers of a branch of government or leaders in the Communist Party, and (4) capitalist tendencies—whether they worked in a private sector or owned a business.

Table 3.1 presents descriptive statistics on the family backgrounds of those sent down and those not sent down. The regression results are reported in Table 3.2). I divide parent education into three groups: (1) equal to or less than junior high school, (2) senior high school, and (3) college-level or above. Paternal education is the only statistically significant family background element on send-down probability, such that children whose fathers had college-level education or higher were more likely to be sent down (column 2 of Table 3.2). Note that, among parents with senior high school education, the proportion of send-downs and non-send-downs is equally distributed.

In order to avoid a potential correlation between parents' education and personal unobserved characteristics, in all further regressions, I focus only on individuals whose parents (both father and mother) had 12 or fewer years of education. Note that the results in this paper are robust to the exclusion of people whose parents had more than 9 years of education or capitalist tendencies (see Section 3.7).

In summary, I restrict samples to individuals who (1) were born between 1948 and 1963, (2) were junior high school or senior high school graduates between 1966 and 1978, (3) were sent down after 1967 if they were sent down, and (4) did not have parents with more than 12 years of education. Note that the restricted

sample is used to conduct analyses henceforth.<sup>13</sup> Further sample restrictions are employed in the robustness checks.

## 3.4 Education

### 3.4.1 Education Interruption during the Cultural Revolution

The Chinese Cultural Revolution (1966–1977) caused a large-scale education interruption (Meng and Gregory 2002; Giles et al. 2008; Han et al. 2011). During the first two years of the Cultural Revolution, schools at all levels were closed and admission of new students was stopped. Although high schools were gradually reopened as of 1968, admission of students to universities resumed only after 1969 and on a small scale. Academics-based entrance examinations were not available for any level of school during the Cultural Revolution.

Table 3.3 shows the number of students by education level for each year.

The education policy during the Cultural Revolution significantly affected the number of students enrolled in universities and senior high schools. The student ratio of university to senior high school to junior high school was 1:2:9 in 1960 (i.e., for every 9 junior high school students, there were 2 senior high school students and 1 university student). This number jumped to 1:73:479 in 1970 and went back to 1:18:58 in 1978 when the Cultural Revolution ended. A substantial number of individuals lost the opportunity to go to university, and some could not

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<sup>13</sup>Nine individuals in the sample were able to return to school after entering the labor force *during* the Cultural Revolution. As returning to school *during* the Cultural Revolution was an uncommon event, I drop this sample for potential endogeneity, although the estimation results do not change when it is included.

even enter senior high school.<sup>14</sup>

### **3.4.2 Education Upgrading after the Cultural Revolution**

After the Cultural Revolution, the education system resumed normal operation. Schools that were closed during the Cultural Revolution were reopened. There was high demand for reinvesting in education among individuals who had experienced education interruption because of the Cultural Revolution (Han et al. 2011). Based on this demand, China gradually increased the number of institutions offering degree programs to people in the labor force. Some programs, such as adult education, offered courses at night or on weekends to accommodate students' schedules. The degree programs included senior high school degrees and 3- and 4-year university bachelor degrees.<sup>15</sup> Many individuals utilized these options to go back to school to compensate for their lost opportunities.

In this paper, I refer to the reinvestment in education as “education upgrading.” Specifically, education upgrading applies to individuals who left school during the Cultural Revolution but acquired a higher degree of education—senior high

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<sup>14</sup>The number of students in university, senior high school and junior high school was 962000, 1675000, 8585000 in 1960, 48000, 3497000, 22922000 in 1970 and 856000, 15531000, 49952000 in 1978, data source: Comprehensive Statistical Data and Materials on 50 years of New China. Note that due to the population expansion policy during the 1950s and 1970s, the number of individuals aged between 10 to 20 has increased from 140 million in 1960 to 235 million in 1978. The absolute number of students in elementary schools and high schools has also increased due to the expansion of population.

<sup>15</sup>Adult education initially started in China in the 1950s on a very small scale owing to low demand. During the Cultural Revolution, adult education, both general and technical, was regarded as heresy and nearly stopped entirely. After the Cultural Revolution, especially after 1980, it was restored and quickly came to be offered by large-scale institutions (Duke 1987). The length of the degree program offered in the adult education system was approximately equal to that of the normal degree program.

school or university—after the Cultural Revolution. According to the CGSS 2003 data, almost one-fifth of the affected generation upgraded their education after the Cultural Revolution.

### 3.4.3 The Send-down Effect on Education Upgrading

In the restricted sample of the CGSS data (See Section 3.3), 24.1% of sent-down males upgraded their education, compared to 19.6% of the non-sent-down males (Table 3.4). For females, the difference between the two groups was smaller—15.9% of the sent-down group and 14.4% of the non-sent-down group upgraded their education. Conditional on education upgrading, on average, the sent-downs began upgrading their education in 1985, one year earlier than the non-sent-downs.

I use a probit model to test whether the send-down experience statistically raised the probability of upgrading one's education. The results are presented in Table 3.5.

$$EduUpgrade_i = \beta_0 Senddown_i + \beta_1 F_i + X_i \gamma + u_i \quad (3.1)$$

$EduUpgrade_i$  is a dummy variable that equals one if an individual's education was upgraded after the Cultural Revolution and zero otherwise.  $Senddown_i$  is a dummy variable that equals one if an individual has been sent down and zero otherwise.  $X_i$  is a set of observed individual characteristics. It includes the number of years of education an individual received before 1978, age, years of Communist Party membership, and province dummies. The CGSS 2003 data reports individuals' full education history, including the start and end years of each education

program. The education-upgrading and years of education before 1978 dummies are constructed from these education history data. Age represents the difficulty of returning to school because of biological reasons. The education system went back to normal in 1978 and gradually expanded thereafter. The older the individual, the more difficult it was to return to school.  $u_i$  is an error term clustered at the province level.

$F_i$  is a measure of family background that controls individual  $i$ 's unobserved ability. It is a linear function of both father's and mother's years of education, Communist Party membership, leadership status, and capitalist tendencies. The squared term of parents' years of education is also included. Note that, as long as send-down status is not correlated with family background or ability, excluding  $F_i$  from the regression should not affect the coefficient of  $senddown_i$ .

Columns 1 through 6 only use male samples. In the first column, none of the family background variables are controlled. The estimated result suggests that the send-down experience increased the probability of individuals receiving education upgrading by 10%. From columns 2 through 6, more and more family background variables are controlled. The send-down coefficient is highly significant. It is also fairly constant and close or equal to 10%. This suggests that the send-down selection is unlikely to be correlated with family background or ability in the restricted sample; otherwise, we would observe large changes in the magnitude of the send-down coefficient.

Several years of hard manual labor could have cultivated a strong motivation to avoid manual labor later in life among those sent down, thereby encouraging

their pursuit of higher levels of education upon their return to urban areas. They knew that higher education could substantially increase their chances of avoiding hard manual labor.

In female samples (column 7), the coefficient is much smaller with a large standard error. The non-significance of the send-down coefficient among females can be explained as follows: when female send-downs returned to urban areas, they had already reached 23 years of age, a typical age for Chinese women to get married. Most of the females, therefore, spent more time looking to get married and raise children than to further their education. However, after they were married and had children, it became more difficult for them to go back to school than the males did.

### **3.5 The Send-down Effect on Income**

The long-term send-down effect on income could be ambiguous. It could be positive because the hard manual labor experience could have motivated those sent down to work harder later in their lives. On the other hand, an average five-year loss of urban work experience and network connections could have a negative impact.

Table 3.6 reports the average incomes of the send-down group and the non-send-down group by gender. If we only examine the numbers in the first panel of Table 3.6, it appears that the send-down experience had no impact on income for either gender. However, when I further divide income by whether individuals upgraded their education, there is a large difference between the income of those

sent down and those not sent down. For males who upgraded their education, the average income of the send-down group is 1587 RMB, higher than the income of the non-send-down group by 343 RMB. In contrast, for those who did not upgrade their education, the sent-down males earn an income 165 RMB lower than the non-sent-down males.

The pattern of income difference in the female samples is similar to that in the male samples. However, the magnitude of the difference is not as large.

### 3.5.1 Identification

Given the income differences described in Table 3.6, which suggest a large positive effect of the send-down experience, conditional on education upgrading, I use the following regression model to estimate the send-down effect on income for males.

$$Income_i = \alpha_0 Senddown_i \times EduU pgrade_i + \alpha_1 Senddown_i + \alpha_2 EduU pgrade_i + \alpha_3 F_i + X_i \gamma + \varepsilon_i \quad (3.2)$$

$Income_i$  is the log monthly income of the individual  $i$ .  $EduU pgrade_i$  is an education-upgrading indicator dummy that is equal to one if one received education upgrading and zero otherwise.  $X_i$  is a set of individual characteristics that includes total work experience, total years of education, employment status, age, number of years of Communist Party membership, and province dummies. Same as in Equation 3.1,  $F_i$  is a function of family background that controls for unob-

served ability.

Equation 3.2 is a difference-in-difference type regression model.  $\alpha_1$  estimates the general difference between send-downs and non-send-downs (i.e., the difference between the two groups regardless of education-upgrading status). For example, losing several years of urban work experience during send-down represents a common experience between education-upgraded and non-education-upgraded send-downs. Note that, if the send-down policy generated any other differences between the send-downs and the non-send-downs, these differences are also captured by  $\alpha_1$ . The difference between the education-upgraded group and the non-education-upgraded group (regardless of the send-down experience) is included in  $\alpha_2$ . Note that the total years of education includes the years of education upgrading. Therefore, the dummy variable  $EduUpgrad_i$  captures the additional premium of an individual having upgraded their education.

$\alpha_0$  is the variable of interest. The income differences illustrated in the third row of Table 3.6 is captured by  $\alpha_0$ .  $\alpha_0$  estimates the differential effect, which is the additional difference between send-downs and non-send-downs among only those who had upgraded their education.

### **3.5.2 Estimation Results**

The OLS estimation results of Equation 3.2 are reported in Table 3.7. Column 1 includes Send-down, Education Upgrading, and their interaction term, without any additional controls. Column 2 through column 8 include controls for individual characteristics and family backgrounds to assess robustness.



Through columns 1–9,  $\alpha_0$ , the coefficient of the interaction between send down and education upgrading is significant and stays around 0.2. The magnitude is also twice the magnitude of the negative send-down coefficient (columns 3–8). This suggests that, conditional on education upgrading, the send-down experience has a strong positive effect on income for males. It is worth noting that the conditional difference between the send-downs and the non-send-downs is robust even after controlling for occupation dummies (columns 7–8).

The send-down coefficient is negative and significant at 10% from columns 3–8. In column 9, where I excluded the years of send-down experience from total work experience, the negative coefficient for send-down becomes smaller and non-significant. This suggests that the negative effect of send-down could be driven by the loss of urban area work experience. In rural areas, the send-downs were usually assigned to do agricultural work. The agricultural-work experience would hardly contribute to an urban job.

The coefficient of the education-upgrading dummy is positive but non-significant. The results suggest that there is no additional premium for upgrading education among non-send-downs. This is not surprising, as the number of years of education upgrading is included in the total years of education. In addition,  $F_i$  controls for unobserved ability. The education-upgrading dummy might only capture the difference in education quality before and after 1978. The education quality after the Cultural Revolution was, in general, higher than that during the Cultural Revolution. However, if we account for the fact that when those individuals upgraded their education, they had already reached the age of 30 and likely had a

daytime job, we might not observe a substantial increase in return to education among non-send-downs.

Column 8 adds a government-related work place indicator and its interaction term with send down. After the Cultural Revolution, if the government provided any informal compensation for people who were sent down, sent-down individuals who work in a government-related workplace would be more likely to have a higher income. The non-significance of the send-down by government interaction term suggests that it is unlikely that the government compensated the sent-down people in any informal manner. Similar to the estimation results in Table 3.5, the send-down experience does not have a significant effect on females (column 10).

### **3.6 The Send-down Effect on Computer Ownership**

After the Cultural Revolution, China had a series of economic reforms. The social economic environment changed dramatically. As an example, computers are one of the new technologies favored by rapid economic and technological growth.

Knowing how to use a computer could have potentially benefited individuals during the period of socioeconomic and technological growth. However, learning to use a computer might have been a challenge for both the send-down and the non-send-down groups. Computers made their presence in China in the early 1990s and came to prevail only after 2000. It takes time and effort to learn to use a computer even for the young, let alone for individuals who are 40 or 50 years old. Owning a computer could serve as an indicator of an individual's ability to quickly adapt to technological change.

The CGSS data ask respondents various home appliances they own: computers, color TVs, air conditioners, and video cameras. Unlike computers, home appliances such as color TV, air conditioners, and video cameras require little or no learning skills and bring almost no benefit to an individual's earnings or employment opportunities. As the send-down experience should have no effect on ownership of these non-skill-related appliances, I estimate this effect using falsification tests in my investigation of the send-down effect on computer ownership.

Panel A of Table 3.8 presents the statistics of the dummy variable computer ownership by gender, send-down experience, and education-upgrading status. In the education-upgraded male samples, the sent-down group has 20% more individuals have computers than the non-sent-down group. There is a similar tendency in the female sample; however, the difference is much smaller. In panel B, the estimation results suggest that, conditional on education upgrading, the sent-down males own more computers than non-sent-down males do. However, there are no significant differences in ownership of other major household appliances.

One may have a concern that computers are used by the children of respondents rather than the respondents themselves. In order to limit this bias, I restricted the samples to individuals who are not living with their children or do not have children. The regression results are presented in the last column of Table 3.8. The estimation results are consistent with the finding in column 1, although the standard errors increased because of the small sample size.

## **3.7 Robustness Check**

### **3.7.1 IV**

A potential concern in the identification strategy is that parents education and job information can not fully control for unobserved ability, and in addition, the difference-in-difference type of specification can not fully control for the general difference between education upgraded group and non-education upgraded group. If this is the case, it would result in endogeneity in education-upgrading choice. For this reason, I use exogenous variation from the school closure policy during the Cultural Revolution to instrument the education-upgrading choice. Introducing IVs helps solve the endogeneity problem; the trade-off is that it only identifies a local effect.

Individuals upgraded their education because their education was interrupted during the Cultural Revolution. During the Cultural Revolution, at least two exogenous factors determined whether a senior high school student could move on to university after having graduated: the number of full-time teachers employed at the university and the number of senior high school students. The former measures the number of universities or schools that had not been closed; the latter measures the number of individuals that could potentially compete for admission. The number of full-time teachers was exogenous because it was determined by education policies during the Cultural Revolution, such as school closures. The number of students can be considered exogenous because it was affected by the education policy as well as by the population expansion policies during the 1950s

and 1960s.<sup>16</sup>

I divide the number of full-time university teachers by the number of senior high school students to measure the possibility of education interruption that a senior high school student could have experienced education interruption during the Cultural Revolution. If there were relatively fewer full-time university teachers for the number of senior high school students in the region in which the senior student graduated, it would be more likely that this student's education was interrupted. The student would, therefore, be more likely to have sought education upgrading after the Cultural Revolution. It might seem plausible to divide number of university teachers by the population to calculate the per capita number of teachers, rather than dividing the number of teachers by the number of senior high school students. Note, however, that only a subset of the population had possibility of attending university; only senior high school students could potentially have this opportunity. Therefore, dividing the number of university teachers by the number of senior high school students would better capture competitiveness.

By the same logic, I use the ratio of senior high school teachers to junior high school students to measure the probability of a junior high school student experiencing education interruption. The teacher-student ratios varied across province and years. I match the teacher-student ratio with the individuals' end-of-schooling year (during the Cultural Revolution), the level of schools these individuals could potentially attend (either university or high school), and the province in which

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<sup>16</sup>The Chinese government introduced population expansion policies during the 1950s and 1960s, which resulted in substantial population growth.

they lived. For example, the measure for XiaoMing, who graduated from a senior high school in Shanghai in 1972, is the university teacher to senior high school student ratio in Shanghai in 1972, while the measure for HaiLiang, who graduated from a junior high school in Beijing in 1969, is the senior high school teacher to junior high school student ratio in Beijing in 1969. In the rest of the paper I refer to this instrument as “Teacher Ratio.”

The variation is based on the differences in Teacher Ratio across the years within each province. Note that province dummies are included in all regressions in this paper. They control for all provincial-level time-invariant factors.

Because the Teacher Ratio measures the probability of students having gone to upper degree schools during the Cultural Revolution, the smaller the Teacher Ratio, the more likely an individual’s education was interrupted during the Cultural Revolution, and therefore, the more likely an individual would have chosen to upgrade their education after the Cultural Revolution. That is, we would expect Teacher Ratio to have a negative effect on education upgrading.

I also interact Teacher Ratio with age and use it as the second instrument variable. As shown in Section 3.4.3, age is also an important factor affecting education upgrading. When the education system resumed normality, the older the individual, the higher the cost of education upgrading. This could be due to both biological reasons and family reasons, such as raising children. As they grow older, individuals would be less likely to upgrade their education. Therefore, the “lost opportunity” effect might diminish with age. In the first stage, therefore, we would expect the coefficient of the interaction between teacher ratio and age to

have an opposite sign to the teacher ratio coefficient.

Table 3.9 reports the IV estimation results. Birth year dummies are included to control for cohort effects.<sup>17</sup> In column 1, the coefficient for *TeacherRatio* is negative and its interaction term with age is positive. This is consistent with what I expected: individuals who graduated in a low provincial teacher ratio year during the Cultural Revolution were more likely to have experienced education interruption; therefore, they would have been more likely to upgrade their education after the Cultural Revolution. This lost opportunity effect diminishes if the individual was older.

I further divide samples by non-send-down and send-down (columns 2 and 3) instead of reporting the regression results of the interaction between send-down and education upgrading. Thereby, we can gain a better understanding of how the teacher ratio, the (“lost opportunity”), affects each group. Section 3.4.3 suggested that the harsh manual-labor experience induced the sent-downs to upgrade their education. Similarly, the estimation results in columns 2 and 3 suggest that the sent-downs were more affected by the “lost opportunity” than were the non-sent-down individuals. The size of the coefficient for teacher ratio within the send-down group is much larger than that of the non-send-down group.

The second stage estimation results are consistent with the OLS results. Conditional on education upgrading, sent-down males earn significantly more income and are more likely to own a computer than those who also received education

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<sup>17</sup>CGSS 2003 is a one year individual level data, therefore birth year dummies are equivalent to age dummies.

upgrading but had not been sent down. The size of the IV estimates is larger than that of the OLS estimates. The estimation results in column 3 indicate that an education-upgraded sent-down male will earn a 35% higher income compared to one who also received education upgrading but had no send-down experience (subtract 0.18 from 0.53 in column 4).

The IV estimates are more than two times greater than the OLS estimates. One reason is that the instruments identify a local average treatment effect. People might upgrade their education for many reasons, such as new schools opening near their home. However, the compilers in the IV strategy are those who upgraded their education only because of the education interruption. The compilers likely would have been qualified to go to upper-level school had there been no Cultural Revolution. Compared to those who would have been disqualified for higher education regardless of the education policies, the compilers potentially have a higher return to education. They had been denied the opportunity to achieve their desired level of education. In addition, by going to rural areas to carry out hard manual labor, they were set back significantly. The joint experience of education interruption and hard manual labor could have motivated some send-downs to upgrade their education and work harder once they regained the opportunity to do so.

### **3.7.2 Other Robustness Checks**

Social networks play an important role in affecting individuals' wage and employment opportunities in China (Wang 2013). Several years away from urban areas



could have potentially weakened the network of connections among sent-downs, thereby causing an income discrepancy compared with non-sent-downs. The first robustness check exercise adds a family connection indicator in the regression to control for any potential correlation between the sent-downs and social networks. The indicator comes from the survey question “How many of your relatives or friends helped get you your job?” The estimation results are presented in panel A of Table 4.7. The coefficients of both *Senddown* alone and its interaction term with *EduUpgrade* remain nearly unchanged from corresponding estimations in previous tables. This suggests that family connections are unlikely to affect our estimation results.

Early in the 1970s, the government began allowing some sent-down youths to return to urban areas if they could find a job or if they were accepted at a school in an urban area. Li et al. (2010) and Zhou and Hou (1999) suggest that well-connected families were able to get their children back to urban areas earlier than others. Thus, it is possible that controlling the family connection indicator may not fully solve the problem here. In order to avoid the potential endogeneity problem resulting from early return events, I dropped all sent-down individuals who were able to return to urban areas before the end of the Cultural Revolution.<sup>18</sup> These results are presented in panel B of Table 4.7. The results suggest that family connections and early returns are unlikely to have affected the estimated send-down effects. The coefficients for send-down and its interaction term remain statistically significant and the sizes approximated those previously estimated.

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<sup>18</sup> This accounts for 29% of the total male send-down population in the data.

I further tested the send-down effect among individuals with different family backgrounds. Specifically, I focused on the following family backgrounds: (1) parents who did not work in a private firm and did not own a private business (i.e., did not have capitalist tendencies); (2) parents who were not Communist Party members; (3) parents with only junior high school education or lower; (4) father who worked in nongovernment sectors; and (5) father who was in an unskilled white collar or blue collar occupation. In (4) and (5), I do not restrict by mother's work place or occupation because relatively few individuals had a working mother when they were 18 years old.

Samples (2) through (5) include individuals with "disadvantaged" family backgrounds. Children from these family backgrounds likely had less political power, less government-related connections, and/or less motivation for higher education. From the estimation results in the previous sections, we generated several significant positive effects for the send-down experience: sent-down males are more likely to have upgraded their education and, conditional on education upgrading, they earn higher incomes and are more likely to have computers at home. Therefore, I focus on individuals with "disadvantaged" family backgrounds, investigating whether the positive effects of the send-down experience could be driven by differences in family backgrounds.

The results are reported in the remaining panels in Table 4.7. All the coefficients in Table 4.7 have the correct sign, and all of them are not statistically different from the regression results in the previous sections. Overall, the results reported in Table 4.7 suggest that the send-down effects are robust against various

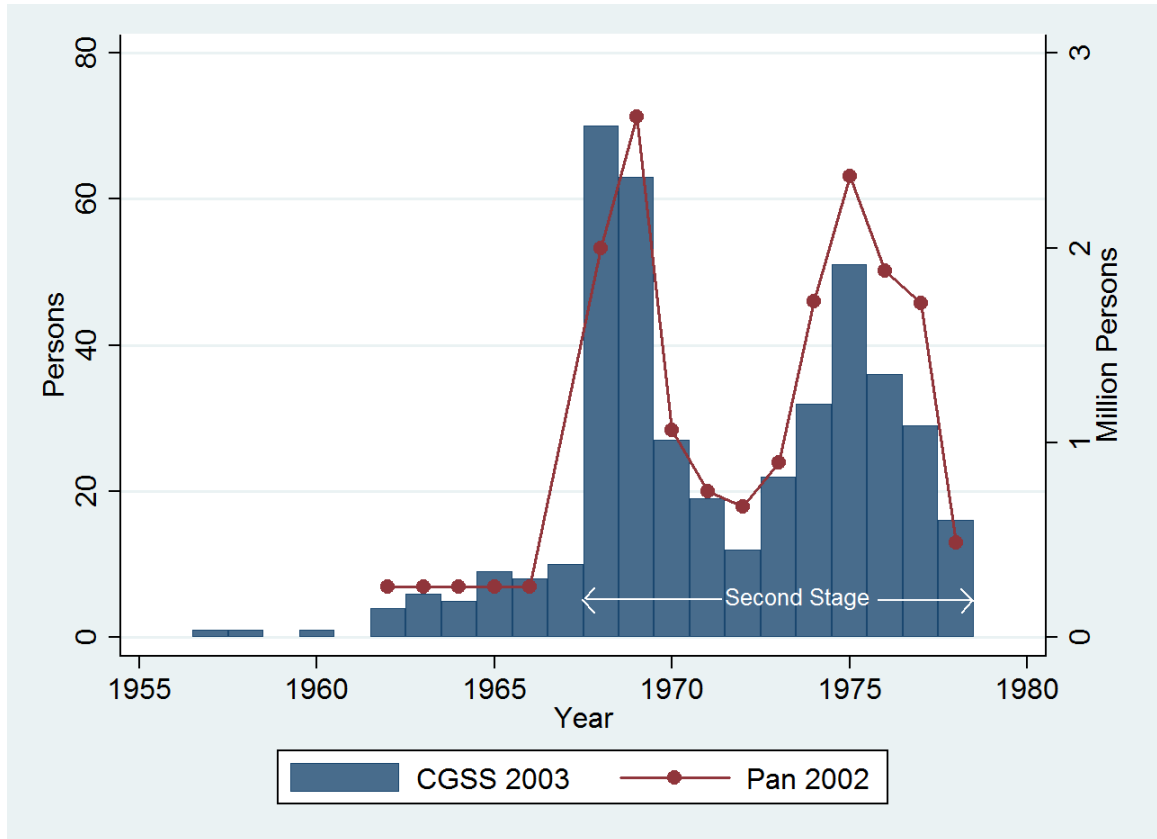
types of family backgrounds.

### **3.8 Conclusion**

The forced send-down movement affected more than 16 million urban youths in China. Several years of manual labor experience in rural areas were undeniably hard on those urban youths who were, on average, only 17 years old when they were sent down. The loss of years of urban work experience caused a negative effect on income. However, the estimation results suggest that the hard manual labor experience induced those urban youths to upgrade their education after the Cultural Revolution, and conditional on upgrading education, the send-downs earn higher incomes than the non-send-downs.

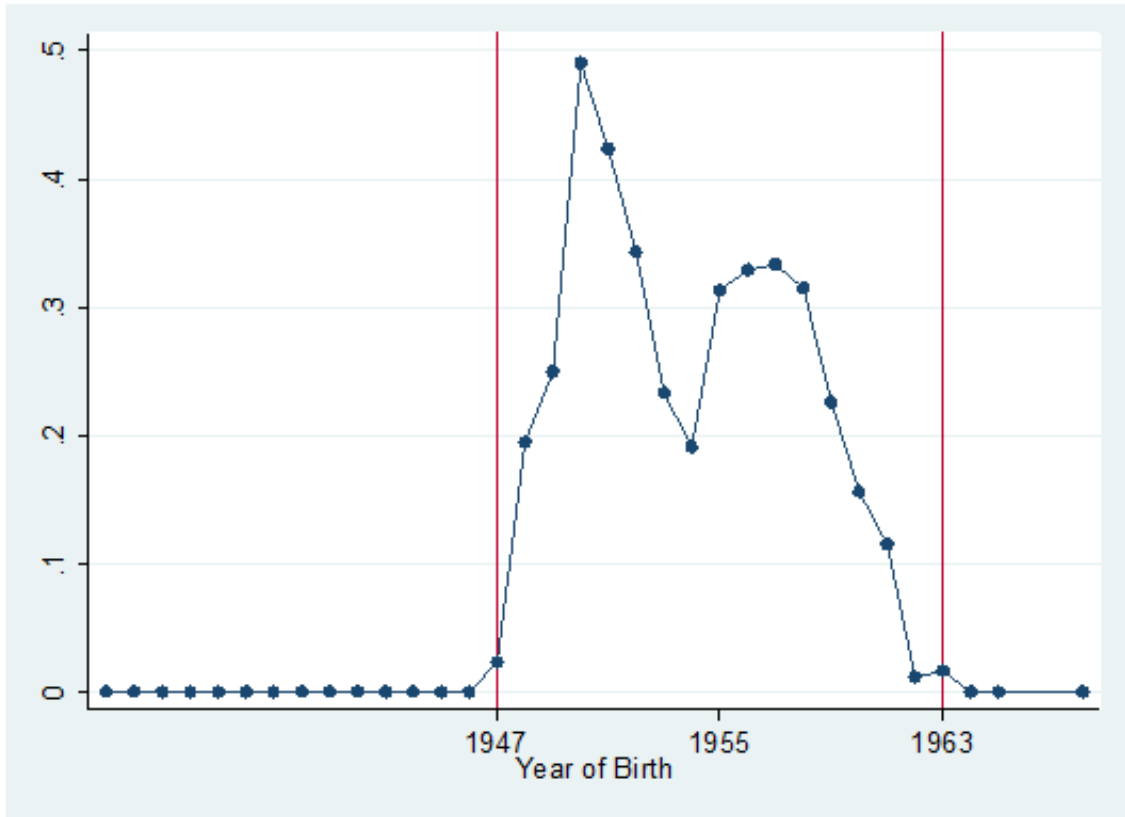
In the current political environment, no policy makers would consider initiating a similar send-down movement again. However, the send-down event might elucidate some important factors in the education of teenage children. Hard mental and physical training might not be as detrimental as once thought. Children experiencing difficulties and overcoming these difficulties independently might become stronger and work harder in their later life, just as numerous send-downs have described how the hard send-down experience had cultivated in them a strong spirit (Yang 1992; Wang 2006; Liu 2012; Tang 2012). More evidence is needed to understand how adversities could affect youth and shape their path in the future. Future study could focus more on the effect of adversity during adolescence or childhood. It would also be interesting to compare the short term and long term effect of adversities.

**Figure 3.1:** Number of Youth Sent to Rural Areas by Year



Note: The blue bars shows the number of individuals were sent to rural areas each year reported in the individual level survey data, China General Social Survey 2003. The red line shows the total number of individuals were sent to rural areas each year. It is calculated by author based on the data reported in Pan (2002).

**Figure 3.2:** Send-down Proportion by Year of Birth



Note: The proportion is among junior high school and senior high school graduates in urban areas.  
Data sources: China General Social Survey 2003.

**Table 3.1:** Individual Characteristics and Family Background during the Cultural Revolution

Variable	Send-down		Non-send-down	
	Mean	Standard Deviation	Mean	Standard Deviation
	(1)	(2)	(3)	(4)
<b>Family Backgrounds at Age 18</b>				
<i>Father:</i>				
Years of Education	6.22	4.66	5.09	4.45
Proportion of Junior High School or below	0.84	0.37	0.88	0.326
Proportion of Senior High School	0.08	0.27	0.08	0.26
Proportion of College or above	0.08	0.28	0.05	0.21
Proportion of Leader	0.05	0.21	0.03	0.17
Proportion with Communist Party Membership	0.31	0.46	0.28	0.45
Proportion with Capitalism Traits	0.02	0.13	0.02	0.15
<i>Mother:</i>				
Years of Education	3.37	4.29	2.84	4.05
Proportion of Junior High School or below	0.92	0.27	0.94	0.23
Proportion of Senior High School	0.05	0.23	0.04	0.18
Proportion of College or above	0.02	0.15	0.02	0.14
Proportion of Leader	0.01	0.08	0.00	0.06
Proportion with Communist party membership	0.07	0.26	0.06	0.23
Proportion with Capitalism Traits	0.01	0.11	0.01	0.08
Send-down Duration	5.33	3.41		
Age upon send-down	17.95	1.39		
Female	0.55	0.50	0.46	0.50
Proportion Junior High School Graduates	0.66	0.47	0.65	0.48
Obs.	333		970	

Note: I restrict samples to individuals who (1) were born between 1948 and 1963, (2) were junior high school or senior high school graduates between 1966 and 1978, (3) were sent down after 1967 if they were sent down.

**Table 3.2:** Probit Estimation of Send-down

	Dependent Variable: Send-down	
	(1)	(2)
<b>Family Backgrounds at Age 18</b>		
<i>Father:</i>		
Years of Education	0.01*** (0.003)	
Senior High School		0.01 (0.05)
College or above		0.16* (0.10)
Leader	0.04 (0.06)	0.07 (0.07)
Communist Party Membership	0.02 (0.03)	0.02 (0.04)
Capitalism Traits	-0.08 (0.10)	-0.06 (0.11)
<i>Mother:</i>		
Years of Education	0.002 (0.003)	
Senior High School		0.09 (0.07)
College or above		-0.09 (0.07)
Leader	-0.03 (0.14)	-0.03 (0.14)
Communist Party Membership	0.01 (0.07)	0.03 (0.07)
Capitalism Traits	0.10 (0.20)	0.08 (0.19)
Obs.	1203	1203
Pseudo R <sup>2</sup>	0.11	0.11

Note: Marginal effects are reported. Dependent variable Send-down is a dummy variable equal to one if an individual were sent down, 0 otherwise. All regressions control for age, gender, education degree during the Cultural Revolution and province dummies. I restrict samples to individuals who (1) were born between 1948 and 1963, (2) were junior high school or senior high school graduates between 1966 and 1978, (3) were sent down after 1967 if they were sent down. Province dummies

are included. Standard errors in parentheses are clustered at the province level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .



**Table 3.3:** Number of Students (10,000 person)

	University	Senior High	Junior High
1960	96.2	167.5	858.5
1961	94.7	153.3	698.5
1962	83.0	133.9	618.9
1963	75.0	123.5	638.1
1964	68.5	124.7	729.4
1965	67.4	130.8	803.0
1966	53.4	137.3	1112.5
1967	40.9	136.5	1097.2
1968	25.9	140.8	1251.5
1969	10.9	189.1	1832.4
1970	4.8	349.7	2292.2
1971	8.3	558.7	2568.9
1972	19.4	858.0	2724.4
1973	31.4	923.3	2523.2
1974	43.0	1002.7	2647.6
1975	50.1	1163.7	3302.4
1976	56.5	1483.6	4352.9
1977	62.5	1800.0	4979.9
1978	85.6	1553.1	4995.2

Data source: Comprehensive Statistical Data and Materials on 50 years of New China.

**Table 3.4:** Education Upgrading

	Male		Female	
	Send-down	Non-Send-down	Send-down	Non-Send-down
Proportion Edu Upgrade	24.1%	19.7%	15.9%	14.4%
among junior high	20.2%	16.4%	14.8%	12.3%
among senior high	31.9%	25.3%	17.9%	18.7%
Age Upgraded	31	30	31	29
Year Upgraded	1985	1986	1985	1986

Note: I restrict samples to individuals who (1) were born between 1948 and 1963, (2) were junior high school or senior high school graduates between 1966 and 1978, (3) were sent down after 1967 if they were sent down. (4) did not have parents with more than 12 years of education.

**Table 3.5:** Probit Estimation: the Impact of Send-down Experience on Education Upgrading

	Dependent Variable: Education Upgrade						
	(1)	(2)	Male (1)-(6)		(5)	(6)	Female (7)
Send-down	0.10*** (0.04)	0.09*** (0.03)	0.09*** (0.03)	0.09*** (0.03)	0.09*** (0.03)	0.10*** (0.04)	0.02 (0.05)
Years of Education Before 1978	-.01* (0.01)	-.02** (0.01)	-.02** (0.01)	-.02** (0.01)	-.02** (0.01)	-.02** (0.01)	-.01 (0.01)
Age	-.01*** (0.004)	-.01*** (0.01)	-.01*** (0.01)	-.01*** (0.01)	-.01*** (0.01)	-.01*** (0.004)	-.06 (0.06)
Parents Education		Y	Y	Y	Y	Y	Y
Parents Education Squared			Y	Y	Y	Y	Y
Parents Communist Party				Y	Y	Y	Y
Parents Leaders					Y	Y	Y
Parents Capitalism						Y	Y
Obs.	618	618	618	618	618	618	562
Pseudo R <sup>2</sup>	0.20	0.21	0.22	0.22	0.22	0.23	0.20

Note: Marginal effects are reported. The dependent variable is a dummy indicator equal to one if an individual upgraded education after the Cultural Revolution, zero otherwise. All regressions control for years of communist party member and province dummies. I restrict samples to individuals who (1) were born between 1948 and 1963, (2) were junior high school or senior high school graduates between 1966 and 1978, (3) were sent down after 1967 if they were sent down, (4) did not have parents with more than 12 years of education. Province dummies are included. Standard errors in parentheses are clustered at the province level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 3.6:** Descriptive Statistics of Monthly Income by Gender and Education Upgrading

	Send-down		Non-send-down	
	Mean (1)	Standard Deviation (2)	Mean (3)	Standard Deviation (4)
Male	1011	762	1023	1043
Female	757	593	792	624
Male				
Education Upgraded	1587	1034	1244	711
Not Education Upgraded	795	485	960	1113
Female				
Education Upgraded	1181	830	1067	531
Not Education Upgraded	659	476	733	627

Note: I restrict samples to individuals who (1) were born between 1948 and 1963, (2) were junior high school or senior high school graduates between 1966 and 1978, (3) were sent down after 1967 if they were sent down, (4) did not have parents with more than 12 years of education. Unit: RMB.

**Table 3.7: The Impact of Send-down Experience on Income**

	Dependent Variable: Income									
	Male(1)-(9)									Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Send-down × EduUpgrade	0.2*	0.2*	0.2**	0.19**	0.19**	0.19**	0.2**	0.2**	0.2**	-0.09
	(0.1)	(0.1)	(0.1)	(0.09)	(0.09)	(0.09)	(0.09)	(0.1)	(0.09)	(0.11)
Send-down	-0.03	-0.07	-0.10*	-0.10*	-0.10*	-0.09*	-0.09*	-0.09	-0.04	-0.02
	(0.08)	(0.06)	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.09)
Edu Upgrade	0.42***	0.07	0.07	0.07	0.07	0.06	0.05	0.05	0.05	0.13
	(0.07)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.09)	(0.09)	(0.09)	(0.1)
Send-down × Government								0.00		
								(0.2)		
Total Years of Education		0.06***	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***	0.08***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
Experience		0.02***	0.02***	0.02***	0.01***	0.01***	0.02***	0.02***		0.02***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)		(0.01)
Parents Education			Y	Y	Y	Y	Y	Y	Y	Y
Parents Communist Party				Y	Y	Y	Y	Y	Y	Y
Parents Leaders					Y	Y	Y	Y	Y	Y
Parents Capitalism						Y	Y	Y	Y	Y
Occupation Dummies							Y	Y	Y	Y
Government								Y		
Experience w/o SD Years									Y	
Obs.	583	583	583	583	583	583	571	571	571	505
R <sup>2</sup>	0.07	0.41	0.42	0.43	0.43	0.43	0.45	0.45	0.45	0.39

Note: All regressions control for years of communist party member, employment status and province dummies. Column 9 uses experience, which excludes send-down years. Government is a dummy variable which equals to one if an individual works in government related work place or state-owned firms. I restrict samples to individuals who (1) were born between 1948 and 1963, (2) were junior high school or senior high school graduates between 1966 and 1978, (3) were sent down after 1967 if they were sent down, (4) did not have parents with more than 12 years of education. Standard errors in parentheses are clustered at the province level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 3.8:** The Impact of Send-down on Having Computers

<i>Panel A: Descriptive Statistics of Computers at Home</i>					
	Male		Female		
	Send-down	Non-send-down	Send-down	Non-send-down	
Education Upgraded	0.59 (0.09)	0.39 (0.05)	0.50 (0.10)	0.45 (0.06)	
Not Education Upgraded	0.21 (0.04)	0.24 (0.02)	0.31 (0.04)	0.29 (0.02)	
<i>Panel B: Regression Results of Home Appliances</i>					
	Computers	Color TVs	Air Conditioners	Video Cameras	Computers
Send-down × EduUpgrade	0.24** (0.115)	0.028 (0.027)	-.050 (0.083)	0.033 (0.037)	0.396* (0.209)
Send-down	-.031 (0.029)	0.007 (0.016)	0.067 (0.056)	0.005 (0.018)	-.005 (0.068)
Edu Upgrade	0.043 (0.046)	-.015 (0.023)	0.047 (0.061)	-.026 (0.017)	-.097 (0.187)
Obs.	619	619	619	619	136
R <sup>2</sup>	0.31	0.21	0.33	0.20	0.54

Note: Standard deviations are presented in parentheses of panel A. The regression in the last column of Panel B uses only individuals who are not living with children or they don't have children. All regressions control for individual income, household income, number of children, age of the youngest child, presence of female children, one digit occupation dummies, years of education, experience, years of communist party member, employment status, family backgrounds. I restrict samples to individuals who (1) were born between 1948 and 1963, (2) were junior high school or senior high school graduates between 1966 and 1978, (3) were sent down after 1967 if they were sent down, (4) did not have parents with more than 12 years of education. Province dummies are included. Standard errors in parentheses are clustered at the province level in panel B. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 3.9:** The Impact of Send-down Experience on Males' Income and Computer Ownership (IV)

	1st Stage			2nd Stage							
	All	Non-Send-down	Send-down	Income (4)	Income (5)	Income (6)	Income (7)	Computer (8)	Color TVs (9)	Air Conditioners (10)	Video Cameras (11)
Teacher Ratio	-.02** (0.009)	-.02*** (0.009)	-1.57** (0.62)								
Teacher Ratio × Age	0.0004** (0.0002)	0.0004** (0.0002)	0.03** (0.01)								
Send-down × Teacher Ratio	0.01 (0.03)										
Send-down × EduUpgrade				0.53** (0.22) [0.06,1.06]	0.36** (0.17) [-0.02,1.09]	0.52** (0.25) [-0.01,1.35]	0.45** (0.19) [0.03,0.97]	0.734*** (0.262) [0.28,1.12]	0.115 (0.85)	0.508 (0.511)	-.101 (0.085)
Send-down	0.03 (0.11)			-.18* (0.10)	-.04 (0.09)	-.13 (0.08)	-.11 (0.1)	-.118 (0.076)	0.148 (0.184)	-.041 (0.125)	0.041 (0.03)
Send-down × Government							-.21 (0.22)				
EduUpgrade				-.48 (0.41)	-.38 (0.38)	-.66 (0.45)	-.46 (0.37)	-.255 (0.869)	-1.400 (1.678)	-.505 (1.204)	-.016 (0.09)
Experience w/o SD Years					Y						
Occupation Dummies					Y	Y		Y	Y	Y	Y
Government							Y				
All Family Backgrounds	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
F-Statistics	10.42	3.71	3.67								
Obs.	542	423	119	542	542	532	542	581	581	581	581

Note: All regressions control for total years of education, experience, age, years of communist party member, employment status and province dummies. Only male sample are used. Column 5 uses experience, which excludes send-down years. Government is a dummy variable which equals to one if an individual works in government related work place or state-owned firms. I restrict samples to individuals who (1) were born between 1948 and 1963, (2) were junior high school or senior high school graduates between 1966 and 1978, (3) were sent down after 1967 if they were sent down, (4) did not have parents with more than 12 years of education. Standard errors in parentheses

are clustered at the province level. Anderson-robin weak IV robust 90% confidence intervals were presented in square parentheses. \*\*\*  
p<0.01, \*\* p<0.05, \* p<0.1.



**Table 3.10: Other Robustness Checks**

	Dependent Variables		
	Education Upgrade (1)	Income (IV) (2)	Computers (IV) (3)
<i>Panel A. Family Connection Controlled</i>			
Send-down × EduUpgrade		0.51* (0.27)	0.80*** (0.30)
Send-down	0.10*** (0.04)	-0.18* (0.09)	-0.13* (0.08)
Obs.	617	541	580
<i>Panel B. Early Return Dropped</i>			
Send-down × EduUpgrade		0.48** (0.21)	1.08* (0.65)
Send-down	0.11** (0.05)	-0.18** (0.07)	-0.18 (0.13)
Obs.	577	507	540
<i>Panel C. Parents Working in Private Firms Dropped</i>			
Send-down × EduUpgrade		0.49* (0.26)	0.68*** (0.25)
Send-down	0.10** (0.04)	-0.16* (0.09)	-0.09 (0.08)
Obs.	600	527	565
<i>Panel D. Parents Non-communist Party Member</i>			
Send-down × EduUpgrade		0.96* (0.52)	1.27 (1.12)
Send-down	0.09* (0.05)	-0.28*** (0.09)	-0.24 (0.18)
Obs.	417	401	432
<i>Panel E. Parents with Junior High Education or Below</i>			
Send-down × EduUpgrade		0.69*** (0.16)	0.94*** (0.25)
Send-down	0.08** (0.04)	-0.16** (0.08)	-0.14* (0.07)
Obs.	550	498	535
<i>Panel F. Father in Non-government Sector Only</i>			
Send-down × EduUpgrade		0.41** (0.21)	0.83*** (0.31)
Send-down	0.09** (0.04)	-0.13* (0.08)	-0.13* (0.07)
Obs.	590	508	561
<i>Panel G. Father Non-skilled White or Blue Color Occupation</i>			
Send-down × EduUpgrade		0.83* (0.50)	1.26* (0.67)
Send-down	0.09* (0.05)	-0.26** (0.11)	-0.17 (0.11)
Obs.	487	436	419

Note: Only male samples are used. All regressions control for experience, age, years of communist party member, employment status, family backgrounds and province dummies. In addition, column 1 controls for years of education during the Cultural Revolution; column 2 and 3 controls for years of education; Column 3 further controls for personal income, household income, number of children, age of the youngest child, presence of female children, one digit occupation dummies, experience. Column 1 reports the marginal effect of the probit model. I restrict samples to individuals who (1) were born between 1948 and 1963, (2) were junior high school or senior high school graduates between 1966 and 1978, (3) were sent down after 1967 if they were sent down, (4) did not have parents with more than 12 years of education. Standard errors in parentheses are clustered at the province level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

## **Chapter 4**

# **The Long-term Impact of the Send-down Experience: Happiness in Life, Political Attitudes, and Investment in Children**

### **4.1 Introduction**

The send-down movement (1968-1978) during the Chinese Cultural Revolution caused more than 16 million adolescents in urban areas to move to rural areas to carry out hard manual labor. The traumatic experience significantly affected the education attainment of those people who were sent down and their income (Chapter 3). This paper investigates the send-down effect on outcomes other than

education and income. Specifically, it investigates the feeling of happiness in the lives of those who were sent down, their political attitudes, and their investment in the education of their children.

The hard manual experience during adolescence certainly did not make the sent-down youth happy during the send-down period. However, it is unclear how such a traumatic experience would impact the youths' feelings about life when they reached age 40s or 50s. This paper suggests that the traumatic experience during adolescence has had a surprisingly long-lasting effect. Even decades after the traumatic experience, those who were sent down still feel significantly less happy about their lives than do those who were not sent down. The hard experience during adolescence could have permanently fostered bitterness in the minds of those sent down.

This paper also investigates the effect of the send-down experience on the political attitudes of those who were sent down. The send-down movement was initiated by Chairman Mao Zedong during the Cultural Revolution. The sent-down youth experienced great hardship because of a decision made by a few individuals in government. Would such a traumatic experience enforced by a strongly dictatorial government affect individuals' beliefs in democracy and their attitudes towards the government? This paper suggests that the sent-down group are less likely to agree with the statement that "*democracy means the government should make decisions on behalf of the people.*" Furthermore, this paper finds that individuals who experienced send-down are less likely to become members of the Communist Party. The communist political party has ruled the People's Republic

of China since the republic was established in 1949.

This paper further investigates the impact of the send-down on investment in the education of the next generation. This paper uses the education fees paid “apart from the tuition uniformly regulated by the state and the local government” as a measure of the investment made towards children’s education. This paper suggests that the sent-down males invested more in their children’s education regardless of their own education-upgrading choices. Their hard manual-labor experience as adolescents could have taught them the bitterness of hard manual labor. They hope for a better education and therefore a better life for their children.

The data used in this paper comes from the China General Social Survey 2003. The send-down was forced in the second stage of the send-down movement(1968-1978) and its target were junior and senior high school graduates. Furthermore, Chapter 3 provides suggestive evidence that send-down selection was random if restrict to individuals who’s parents have less than 12 years of education. Following the estimation strategy used in Chapter 3, this paper makes the following sample restriction in order to identify the send-down treatment effect. I restrict samples to individuals who (1) were born between 1948 and 1963, (2) were junior high school or senior high school graduates between 1968 and 1978, (3) were sent down after 1967 if they had been sent down, (4) did not have parents with more than 12 years of education, and (5) were not able to return to school before 1978 after they had entered the labor force. Further sample restriction would be conducted in the robustness checks. The estimation results are robust to various types of family backgrounds. The effect is much stronger upon males than it is upon

females.

In the rest of the paper, sections 2, 3, and 4 investigate the send-down experience on happiness in life, political attitudes, and investment in children's education, respectively. Section 5 provides the robustness checks. The final section concludes the paper.

## 4.2 Happiness

Happiness in life, as an important measure of well-being, has attracted more and more attention from economists and policy makers in recent decades (Gleibs et al. 2013; Helliwell and Wang 2012). Researchers are questioning what factors could explain the differences in happiness after controlling for health, wealth, and marital status as those others. Helliwell and Huang (2008), using cross-country-level data, suggest that the quality of a political institution could be an important factor in an individual's well-being or lack thereof.

The sent-down youth were forced by the government to move to rural areas and to carry out hard manual labor in the fields. They worked 12 hours a day, 7 days a week (Zhou and Hou 1999). This overbearing experience of the send-down during their adolescence certainly did not make of the youths happy individuals, and it was unclear just how much effect such a traumatic experience would still have on their feelings about life when they turned 40 or 50 years old.

The CGSS 2003 asks, "*Generally speaking, how do you personally feel about your life?*" Respondents can choose one of the following five options: 1) Very unhappy 2) Unhappy 3) So-so 4) Happy 5) Very happy. The basic descriptive statis-

tics by the send-down experience are presented in Table 4.1. Table 4.2 presents the estimation results by using ordered logit models. I divide the sample by gender. Columns 1 and 4 include basic controls; columns 2 and 5 add a set of detailed personal characteristics such as employment status, family income, occupation, and information regarding the children; columns 3 and 6 further include a set of detailed information of both parents of respondents: education, communist party membership, a dummy variable equals one if mother or father was a senior manager a leader in the work place; a dummy variable equals one if either mother or father worked in a private firm or owned a private business.

Table 4.2 suggests that those who were sent down are significantly less likely to be happy than are those who were not sent down. Moreover, sent-down males experiences a greater negative effect than did the sent-down females. Education and income have positive effects on happiness in life. This is consistent with most of the findings in recent research (Frijters et al. 2013; Clark et al. 2008). It is worth noticing that Communist party members are also significantly happier than non-Communist Party members.

The results in this section suggest that a traumatic experience during adolescence could have surprisingly long-lasting effects. Even decades after the traumatic experience, the sent-down group still feels significantly less happy about life than does the non-sent-down group.

### **4.3 Political Attitudes**

Piketty (1995) provides a theoretical framework and suggests that people formu-

late and modify their attitudes towards government policy based on their personal experience of it. Recent empirical evidence has shown that belief in or lack of confidence in government could be modified through aggregate-level economic shocks or business cycles (Stevenson 2011; Grosjean et al. 2013). The send-down movement provides an opportunity to test the level to which a bad experience caused by the government affects individual's attitude to this government. In particular, when the bad experience has resulted from a decision taken by a dictatorial government, it would be interesting to know how this decision has affected the individuals' belief in the government's ability to have a democracy.

The CGSS asks respondents whether they agree or disagree with the statement that "*Democracy means the government should be for the people.*" The original Chinese means to ask respondents whether they believe in government that government could achieve democracy. The regression results presented in Table 4.3 show that individuals who were sent down are significantly less likely to agree with the statement. The effect is stronger for males than for females.

The sent-down experience also resulted in those sent down being less likely to become members of the Communist Party as compared to those who were not sent down (Table 4.4). The Communist party has been the ruling political party in China since the birth of the People's Republic of China. Although the new leaders of the Communist party had promised to bring China great prosperity after the Cultural Revolution, the past mistakes of the government held a strong persistent effect on people's choice not to become party members. In keeping with the previous findings, the effect is stronger upon males than it is upon females.



The results suggest that experiencing a government-caused bad outcome could have significant impacts on individuals' political attitudes. Note that the estimations compare the sent-down youths to the non-sent-down youths in the same cohort, those latter having known about the send-down movement and perhaps having had friends or siblings who were sent-down. Individuals who experienced the bad outcome have significantly different political attitudes compared to the group that did not experience the bad outcome but only knew of its existence. This finding may suggest a significant "experiencing" effect relative to the "knowledge effect."

The survey also asks respondents whether they agree or disagree with the following statements regarding democracy: "*It will be democracy only when ordinary people have direct voices and decision-making powers on important state and local matters.*" "*It is also democracy if ordinary people have the right to vote for their own representatives and to discuss important state and local matters.*"

The regression results in Table 4.5 show that the send-down experience does not affect individuals' opinion in regard to letting ordinary people have decision-making powers or voting. The send-down experience only informed a limitation in the government's ability in making democracy. Interestingly, however, such a experience resulted from a dictatorship does not make people think that letting ordinary people exercise power through decision making or voting are better solutions. A potential reason for these results is that there is no difference between the send-downs and the non-send-downs in experiencing seeing ordinary people exercise power through decision making or voting.

The CGSS also asks “Generally speaking, how much do you trust strangers?” Respondents are given five options: “Highly untrusted, Untrusted, So-so, Trusted, Highly trusted.”

The regression results presented in Table 4.5 suggest that the send-down experience does not have an impact on trust. It is well known that the slave trade caused Africa to have a low level of social trust (Nunn and Wantchekon 2011). Being sent down and being enslaved are both traumatic experiences (though being sent down may not be as traumatic as being enslaved). There are fundamental differences in the causes of such experiences. Individuals become slaves because they have been cheated and sold by strangers, neighbors, relatives, and even the local government. Such an experience has caused the low level of general trust in Africa. However, a traumatic experience caused by a dictatorial government has nothing to do with mistrust of strangers, neighbors, or relatives. This finding further confirms the suggestion that attitudes and beliefs are formulated by personal experience.

#### **4.4 Intergenerational Effect: Investment in the Next Generation’s Education**

Could the hard manual experience during youth affect individuals’ education investment towards their children? Ideally, we would like to have the information of total education expenditure on children to estimate the send-down effect. In the absence of the total education expenditure in the data set, I use the following measure as the best alternative measure I can find. The CGSS 2003 asks, “Apart from

tuition uniformly regulated by the state and the local government, did your family ever make sponsorship contributions, pay self-financing fees, or pay charges for choosing a school to attend?”

After the Cultural Revolution, the education system went back to normal.<sup>1</sup> Tuition is regulated by the state and the local government. However, apart from the regulated tuition, both public schools and private schools are allowed to charge students additional fees (Tsang 2001). These additional fees are referred to as “sponsorship fees.” Some call it “school-choosing fees” or “self-financing fees.” Sponsorship fees vary according to the level of the schools and the students’ academic achievement when entering the school. Often, in public schools, students are charged sponsorship fees if they want to go to a particular school but do not meet the required academic standing. Private schools usually charge fees other than the government-regulated tuition fees in order to offset their operating costs.<sup>2</sup> These fees are sometimes called the “self-financing fees.” Most fees are set by schools when students are accepted at that school.

The sponsorship fees caused a large social problem.<sup>3</sup> Starting around 2005, the government introduced policies to regulate sponsorship fees; however, parents

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<sup>1</sup> Students are assigned to the local public elementary and junior high schools in their own vicinities; however, for entering top schools in the local level (town, city, or province), merit-based entrance exams are usually required. Entrance exams are required for entering senior high schools and universities.

<sup>2</sup> Private schools counted for a very small proportion in the total educational institutions in China in the early 2000s. Private schools were all abandoned during the Cultural Revolution due to Mao’s legislation policies. The development of private schools in China began in the later 1990s.

<sup>3</sup>Charmon and Prasad suggest that rising education expenditure caused the rising household saving rate.

deem the fees to still be far beyond the acceptable level.<sup>4</sup> If a student wants to go to a better school, the probability of this student having to pay sponsorship fees is higher.<sup>5</sup>

In the restricted samples, the proportion of the individuals answered that they had paid sponsorship fees to schools for their own children at least once in the past is 23%, which is a very large proportion.<sup>6</sup> The conditional mean of the total sponsorship fees ever paid is 6294 RMB, which is more than a quarter of the yearly household income in 2002. The survey also asks the reasons why sponsorship fees were paid. Conditional on having ever paid sponsorship fees, 64% of the respondents said the fees were for attending a better school or for having failed to pass the entrance examinations. Less than 1% of the individuals gave relocation due to job transfer as the reason for paying the fees. About 38% of the respondents gave other unknown reasons.

The upper panel of Table 4.6 reports the descriptive statistics of the sponsorship-fee payments by send-down and gender. It first presents the statistics of fees paid for any reason (attending a better school, relocation, or other). Then I calculate the fees without taking into account the fees paid for relocation or other unknown

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<sup>4</sup>According to an investigation conducted by the National Bureau of Statistics of China, 90% of the parents think that sponsorship fees are too high (Wang 2004). In 2011, the Beijing government abandoned the sponsorship-fee system in all public-founded kindergartens.

<sup>5</sup>We can know this tendency even from policy regulations. Government usually allows top level schools to collect more sponsorship fees. For example, in 2005 the HuBei provincial government introduced a policy for high schools which dictated that the maximum percentage of enrolled students that a school can collect sponsorship fees from in the top provincial-level schools, top city-level schools, and other schools was limited to 30%, 20%, and 10%, respectively (Ma 2007).

<sup>6</sup>Of those sponsorship fees, 7% were paid to private schools, the remaining were paid to public schools.

reason, and I call the remaining subgroup “Attending Better Schools.” For both categories, the fees paid by the sent-down males are much higher than those paid by the non-sent-down males, regardless of their own education-upgrading choices. The difference between the sent-down and the non-sent-down in the female sample is much smaller than it is in the male sample.

In the lower panel of Table 4.6, I present the regression results of the sponsorship-fee payment. In addition to the basic controls included in the income regressions, I also control for personal income, household income, the ratio of personal income to household income, number of children, children’s gender, and children’s age.<sup>7</sup> The ratio of personal income to household income is included for the consideration of potential household bargaining power between husband and wife. The regression results further confirm the suggestion in the upper panel that the send-down experience significantly increased the sponsorship-fee payments in the male sample.

The sent-down group knows the bitterness of doing hard manual labor through their own painful experience. As a potential explanation for the estimation results, the send-down experience made them invest more in their children’s education in order to help their children avoid hard manual labor in their lives and to have a better future; they might hope that their children could have a better education which would in turn lead to a better life.

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<sup>7</sup>children’s gender is defined as presence of female children, children’s age is defined as the age of the youngest child if there is more than one child.

## 4.5 Robustness Check

Following Zhou (2013b), this paper provides the following robustness check. Panel A adds a family connection indicator; the indicator comes from the survey question “how many of your relatives or friends helped you get your job?” Panel B drops all the individuals who were able to return to urban areas before the end of the Cultural Revolution. I further test the send-down effect among individuals with different family backgrounds. Specifically, I focus on the following family backgrounds: (1) parents who were not working in a private firm and did not own a private business (did not have capitalist tendency); (2) parents who were not communist party members; (3) parents with only junior high school education or lower; (4) father who was working in nongovernment sectors; and (5) father who was in an unskilled white-collar occupation or blue-collar occupation. In (4) and (5) I do not restrict by mother’s work place or occupation because relatively few individuals had a working mother when they were 18 years old.

The estimation results of robustness checks are presented in Table 4.7. The coefficients are almost all statistically significant at least at the 10% level. Overall, the results reported in Table 4.7 suggest that the send-down effects are robust to a variety of controls for family background.

## 4.6 Conclusion

The send-down experience forced by the government had a surprisingly long-lasting effect on the well-being of those sent down and their attitudes towards the government. Those who were sent down are significantly less likely to be happy

in their lives than their counterparts who were not sent down; they are less likely to believe in the government's ability to have a democracy. They are also less likely to become Communist Party members. However, the send-down experience does not affect individuals' political attitude towards voting or in seeing ordinary people exercise power through decision making; it also has no significant impact on how individuals trust others. The potential reason for this could be that the send-down experience was caused by a decision made by almost only one person in the government; it was not caused by being cheated by strangers; neither those who were sent down nor those who were not sent down have any experience in voting or seeing ordinary people make decisions. All this evidence supports the idea of an experience-based process for formulating attitudes and beliefs.

The hard manual labor experience, however, induced those sent down to invest significantly more in their children's education in the hope of helping their children have a better life. The send-down experience could have made those sent down learn the hardship of doing manual labor and hence made them come to realize that only education could help their children avoid the experience of hard manual labor.

**Table 4.1:** Descriptive Statistics, by Send-down Experience

	Send-down		Non-send-down	
	Mean	Std. Dev.	Mean	Std. Dev.
Happiness (1=Very Unhappy, 5=Very Happy)	3.14	0.77	3.25	0.78
Democracy Means Government Should Make Decisions (1=Agree, 0=Disagree)	0.72	0.45	0.77	0.42
Proportion of Communist Party Member	0.22	0.41	0.26	0.44
Democracy Means Voting (1=Agree, 0=Disagree)	0.87	0.33	0.89	0.31
Democracy Means Ordinary People Have Decision Power (1=Agree, 0=Disagree)	0.67	0.47	0.68	0.47
Trust (1=Highly Untrusted, 5=Highly Trusted)	2.13	0.65	2.17	0.63
Sponsorship Fee	2.47	7.45	1.77	4.92
Sponsorship Fee for Better School	2.00	6.69	1.29	4.29
Obs.	304		918	

Note: I restrict samples to individuals who (1) were born between 1948 and 1963, (2) were junior high school or senior high school graduates between 1968 and 1978, (3) were sent down after 1967 if they had been sent down, (4) did not have parents with more than 12 years of education, and (5) were not able to return to school before 1978 after they had entered the labor force.



**Table 4.2:** Ordered Logit Regression Results: the Impact of the Send-down Experience on Life Happiness

	Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)
Send-down	-.005 (0.003)	-.005** (0.002)	-.005** (0.002)	-.004* (0.003)	-.004* (0.003)	-.005* (0.003)
Education	0.001 (0.002)	0.002 (0.003)	0.001 (0.003)	0.002 (0.003)	0.003 (0.004)	0.003 (0.003)
Income	0.005** (0.002)	0.004** (0.001)	0.005** (0.002)	0.007*** (0.002)	0.006*** (0.001)	0.006*** (0.001)
Communist Party	0.004* (0.002)	0.003* (0.001)	0.003 (0.002)	0.004* (0.002)	0.003* (0.002)	0.003** (0.002)
Age	0.001* (0.0004)	0.001** (0.0003)	0.001** (0.0003)	0.0003 (0.002)	0.0004 (0.008)	0.0004 (0.009)
Detailed Characteristics		Y	Y		Y	Y
Family Backgrounds			Y			Y
Obs.	641	615	615	581	553	553

Note: The table shows ordered logit regressions on the dependent variable, life happiness, scaled from 1 to 5. Marginal effects are reported. Only the restricted samples are used. Detailed Characteristics includes household income, employment status, one digit occupation dummies, number of children, age of the youngest child, presence of female children. Family Backgrounds includes the following information of both parents when individuals were 18 years old: years of education, Communist Party membership status, an indicator of leadership in company or Communist Party, an indicator of owning private firms or working in private firms. Province dummies are included. Standard errors in parentheses are clustered at the province level. \*\*\* statistically significant at 1% , \*\* statistically significant at 5%, \* statistically significant at 10%.

**Table 4.3:** Probit Regression Results: Democracy Means Government Should Make Decisions on Behalf of People

	Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)
Send-down	-.101** (0.050)	-.117** (0.055)	-.118** (0.055)	-.047 (0.045)	-.049 (0.046)	-.058 (0.045)
Education	-.053*** (0.011)	-.049*** (0.012)	-.047*** (0.043)	-.033*** (0.011)	-.028** (0.045)	-.029** (0.047)
Income	0.018 (0.025)	0.028 (0.029)	0.025 (0.028)	0.048 (0.040)	0.063 (0.040)	0.052 (0.039)
Communist Party	-.083* (0.047)	-.046 (0.067)	-.041 (0.057)	-.104** (0.041)	-.049 (0.044)	-.054 (0.045)
Age	-.002 (.005)	-.0001 (0.006)	-.0004 (0.006)	-.003 (0.004)	-.002 (0.006)	-.001 (0.007)
Detailed Characteristics		Y	Y		Y	Y
Family Backgrounds			Y			Y
Obs.	583	551	551	583	551	551

Note: The dependent variable equals one if a respondent agrees with the statement “Democracy means government should make decisions on behalf of people”, zero otherwise. Marginal effects are reported. Only the restricted samples are used. Detailed Characteristics includes household income, employment status, one digit occupation dummies, number of children, age of the youngest child, presence of female children. Family Backgrounds includes the following information of both parents when individuals were 18 years old: years of education, Communist Party membership status, an indicator of leadership in company or Communist Party, an indicator of owning private firms or working in private firms. Province dummies are included. Standard errors in parentheses are clustered at the province level. \*\*\* statistically significant at 1% , \*\* statistically significant at 5%, \* statistically significant at 10%.

**Table 4.4:** Probit Regression Results: the Impact of the Send-down Experience on Communist Party Membership Status

	Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)
Send-down	-.108** (0.045)	-.108** (0.044)	-.093** (0.047)	-.007 (0.036)	-.008 (0.036)	-.006 (0.034)
Education	0.101*** (0.015)	0.102*** (0.016)	0.091*** (0.016)	0.051*** (0.007)	0.051*** (0.008)	0.042*** (0.008)
Income	0.048 (0.031)	0.052 (0.032)	0.052* (0.032)	0.049*** (0.016)	0.046*** (0.015)	0.0375*** (0.014)
Age	0.028*** (0.005)	0.028*** (0.005)	0.021*** (0.005)	0.014*** (0.004)	0.014*** (0.004)	0.012** (0.004)
Detailed Characteristics		Y	Y		Y	Y
Family Backgrounds			Y			Y
Obs.	640	640	612	573	572	527

Note: The dependent variable equals one if a respondent is a Communist Party member, zero otherwise. Marginal effects are reported. Only the restricted samples are used. Detailed Characteristics includes household income, employment status, one digit occupation dummies, number of children, age of the youngest child, presence of female children. Family Backgrounds includes the following information of both parents when individuals were 18 years old: years of education, Communist Party membership status, an indicator of leadership in company or Communist Party, an indicator of owning private firms or working in private firms. Province dummies are included. Standard errors in parentheses are clustered at the province level. \*\*\* statistically significant at 1% , \*\* statistically significant at 5%, \* statistically significant at 10%.

**Table 4.5:** The Impact of the Send-down Experience on Other Attitudes

	Dependent Variable		
	Ordinary People's Decision Power	Voting	Trust
<i>Male</i>			
Send-down	-.064 (0.067)	-.128 (0.198)	0.015 (0.019)
Obs.	491	564	615
<i>Female</i>			
Send-down	0.006 (0.057)	-.042 (0.047)	0.002 (0.028)
Obs.	470	473	553

Note: Only Males sample are used. The dependent variable in column 1 equals one if a respondent agree with the statement “It will be democracy only when ordinary people have direct voices and decision power on important state and local matters”, zero otherwise. The dependent variable in column 2 equals one if a respondent agree with the statement “It is also democracy if ordinary people have rights to vote for their own representatives to discuss important state and local matters”, zero otherwise. The dependent variable in column 3 is a measure of “Trust against strangers”, scaled 15. Marginal effects are reported. Only the restricted samples are used. Education, Income, Communist Party member status, age, province dummies, as well as the Detailed Characteristics and the Family Backgrounds are included. Standard errors in parentheses are clustered at the province level. \*\*\* statistically significant at 1% , \*\* statistically significant at 5%, \* statistically significant at 10%.

**Table 4.6:** Intergenerational Impact of Send-down: Investment on Children's Education

<i>Descriptive Statistics: Sponsorship Fee Paid</i>						
	Male			Female		
	Mean	Standard Deviation		Mean	Standard Deviation	
<i>All Reasons</i>						
Send-down	2.99	8.60		2.01	6.26	
Non-send-down	1.73	4.50		1.66	4.69	
<i>For Attending a Better School</i>						
Send-down	2.35	7.49		1.69	5.91	
Non-send-down	1.25	3.97		1.19	3.77	
<i>Dependent Variable: Sponsorship Fee Paid</i>						
	Male (1)-(3)			Female (4)-(6)		
	All (1)	Better School (2)	Better School (3)	All (4)	Better School (5)	Better School (6)
Send-down	2.40** (1.03)	2.18** (1.02)	2.02* (1.19)	0.05 (0.73)	0.15 (0.66)	-.08 (0.74)
Send-down × EduUpgrade			0.96 (3.52)			1.44 (2.04)
Edu Upgrade	1.75 (1.08)	0.82 (0.91)	0.65 (0.65)	0.98 (1.50)	-.12 (0.95)	-.57 (0.7)
All Family Backgrounds	Y	Y	Y	Y	Y	Y
Obs.	472	472	472	409	409	409

Note: Unit of Sponsorship Fee is 1000 RMB. All regressions control for individual income, household income, number of children, age of the youngest child, presence of female children, bargaining power, years of education, experience, years of communist party member, employment status, family backgrounds and province dummies. Only the restricted samples are used. Standard errors in parentheses are clustered at the province level. \*\*\* statistically significant at 1% , \*\* statistically significant at 5%, \* statistically significant at 10%.

**Table 4.7: Robustness Check**

	Dependent Variables			
	Happiness	Democracy by Government	Community Party Membership Status	Sponsorship Fee (Better School)
	(1)	(2)	(3)	(4)
<i>Panel A. Family Connection Controlled</i>				
Send-down	-.005* (0.003)	-.115** (0.050)	-.091* (0.048)	2.04** (0.990)
Obs.	615	536	612	464
<i>Panel B. Early Return Dropped</i>				
Send-down	-.008** (0.004)	-.100* (0.059)	-.110** (0.044)	2.32* (1.27)
Obs.	575	519	572	439
<i>Panel C. Parents Working in Private Firms Dropped</i>				
Send-down	-.006* (0.003)	-.115** (0.051)	-.085 (0.052)	2.12** (1.03)
Obs.	599	536	597	451
<i>Panel D. Parents Non-communist Party Member</i>				
Send-down	-.006** (0.002)	-.104** (0.050)	-.162*** (0.038)	1.44* (0.74)
Obs.	449	399	442	333
<i>Panel E. Parents with Junior High Education or Below</i>				
Send-down	-.005* (0.003)	-.110** (0.048)	-.091* (0.049)	1.88* (1.05)
Obs.	563	495	560	428
<i>Panel F. Father in Non-government Sector Only</i>				
Send-down	-.005* (0.003)	-.098** (0.048)	-.109** (0.044)	1.88** (0.94)
Obs.	592	527	588	444
<i>Panel G. Father Non-skilled White or Blue Color Occupation</i>				
Send-down	-.005* (0.003)	-.082* (0.043)	-.123** (0.051)	2.11** (1.06)
Obs.	489	428	487	367

Note: Marginal effects are reported in column 1-3. Only the restricted samples are used. Education, Income, age, province dummies, as well as the Detailed Characteristics and the Family Backgrounds are included. Column 1, 2, 4 controls for Communist Party member status. Standard errors in parentheses are clustered at the province level. \*\*\* statistically significant at 1% , \*\* statistically significant at 5%, \* statistically significant at 10%.

## **Chapter 5**

### **Conclusions**

This thesis provides several interesting results about how policies introduced several decades ago could affect current individuals' economic outcomes, well-beings and political attitudes. It provides us with an important path to understand the current economic outcomes, and maybe the origins of the social conflicts as well. Knowing the existence of the events and studying those events may not be so difficult. However, it may require fundamental changes in order to utilize what we have learned.



# Bibliography

- Albrecht, J. W., P.-A. Edin, M. Sundstrom, and S. B. Vroman (1999). Career Interruptions and Subsequent Earnings: A Reexamination Using Swedish Data. *Journal of Human Resources* 34(2), 294–311. → pages 71
- Allen, F., J. Qian, and M. Qian (2005). Law, Finance, and Economic Growth in China. *Journal of Financial Economics* 77(1), 57–116. → pages 5, 12
- Anderson, S. and D. R. Ray (2010). Missing Women: Age and Disease. *Review of Economic Studies* 77(4), 1262–1300. → pages 8
- Arnold, F. and Z. Liu (1986). Fertility, Sex Preference, and Family Planning in China. *Population and Development Review* 12(2), 221–246. → pages 20
- Ayyagari, M., A. Demirguc-Kunt, and V. Maksimovic (2010). Formal Versus Informal Finance: Evidence from China. *Review of Financial Studies* 23(8), 3048–3097. → pages 5, 12
- Banerjee, A., X. Meng, T. Porzio, and N. Qian (2013). Fertility Change and Household Savings in China: Evidence from a General Equilibrium Model and Micro Data. Working Paper. → pages 10, 17
- Banerjee, A., X. Meng, and N. Qian (2010). The Life Cycle Model and Household Savings : Micro Evidence from Urban China. Working Paper. → pages 31, 68, 73
- Bernstein, T. (1977). *Up to the Mountains and Down to the Villages: The Transfer of Youth from Urban to Rural China*. Yale University Press. → pages 68, 70, 72, 73, 74, 77
- Borghans, L., A. L. Duckworth, J. J. Heckman, and B. T. Weel (2008). The Economics and Psychology of Personality Traits. *Journal of Human Resources* 43(4), 972–1059. → pages 65

- Bound, J. and S. Turner (2002). Going to War and Going to College: Did World War II and the G. I. Bill Increase Educational Attainment for Returning Veterans? *Journal of Labor Economics* 20(4). → pages 71
- Cai, H., H. Li, A. Park, and L. Zhou (2013). Family Ties and Organizational Design: Evidence from Chinese Private Firms. *The Review of Economic Statistics* 95, 850–867. → pages 5
- Card, D. and A. R. Cardoso (2011). Can Compulsory Military Service Raise Civilian Wages? Evidence from the Peacetime Draft in Portugal. *IZA Discussion Paper* (5915). → pages 71
- Chamon, M., K. Liu, and E. Prasad (2010). Income Uncertainty and Household Savings in China. Working Paper. → pages 6, 13
- Chamon, M. D. and E. S. Prasad (2010). Why Are Saving Rates of Urban Households in China Rising? *American Economic Journal: Macroeconomics* 2(1), 93–130. → pages 6, 12, 13, 25, 31
- Chen, K. and X. Cheng (1999). Comment On Zhou & Hou: A Negative Life Event With Positive Consequences? *American Sociological Review* 64(1), 37–40. → pages 70
- Chen, Y., Y. Ma, and K. Tang (2011). The Chinese Financial System at the Dawn of The 21st Century: An Overview. *The IEB International Journal of Finance* 2, 2–41. → pages 5, 12
- Choukhmane, T., N. Coeurdacier, and K. Jin (2013). The One-Child Policy and Household Savings. LSE Working Papers. → pages 10
- Clark, A. E., P. Frijters, and M. A. Shields (2008). Relative Income, Happiness, Utility: An Explanation for the Easterlin Paradox and Other Puzzles. *Journal of Economic Literature* 46(1), 95–144. → pages 116
- Coeurdacier, N., S. Guibaud, and K. Jin (2013). Credit Constraints and Growth in a Global Economy. LSE Working Papers. → pages 12
- Cunha, F. and J. Heckman (2007, May). The Technology of Skill Formation. *American Economic Review* 97(2), 31–47. → pages 65

- Earnings, L. and A. Records (1990). Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records. *American Economics Review* 80(3), 313–336. → pages 71
- Ebenstein, A. (2010). The “Missing Girls” of China and the Unintended Consequences of the One Child Policy. *The Journal OF Human Resource* 45(1), 87–115. → pages 8, 38, 39
- Escriche, L., G. Olcina, and R. Sanchez (2004). Gender Discrimination and Intergenerational Transmission of Preferences. *Oxford Economic Papers* 56(3), 485–511. → pages 37
- Estrin, S. and M. Prevezer (2011). The role of informal institutions in corporate governance: Brazil, Russia, India, and China compared. *Asia Pacific Journal of Management* 28, 41–67. → pages 5
- Fafchamps, M. (2008). Risk Sharing Between Households. *Handbook of Social Economics*, 1255–1279. → pages 6
- Fafchamps, M. and A. R. Quisumbing (2008). Risk Sharing Between Households. *Handbook of Development Economics*, 3187–3247. → pages 6
- Frijters, P., J. P. Haisken-denew, and M. A. Shields (2013). Money Does Matter! Evidence from Increasing Real Income and Life Satisfaction in East Germany Following Reunification. *American Economic Review* 94(3), 730–740. → pages 116
- Gan, L. (2012). Findings from the China Household Finance Survey. Working Paper. → pages 12
- Ge, S., D. T. Yang, and J. Zhang (2012). Population Policies, Demographic Structural Changes, and the Chinese Household Saving Puzzle. IZA Discussion Papers 7026. → pages 10, 31
- Giles, J., A. Park, and M. Wang (2008). The Great Proletarian Cultural Revolution, Disruptions to Education, and Returns to Schooling in Urban China. World Bank Policy Research Working Paper 4729. → pages 66, 79
- Gleibs, I. H., T. a. Morton, A. Rabinovich, S. A. Haslam, and J. F. Helliwell (2013, March). Unpacking the Hedonic Paradox: A Dynamic Analysis of the Relationships between Financial Capital, Social Capital and Life Satisfaction. *The British Journal of Social Psychology* 52(1), 25–43. → pages 115

- Gordon, R. H. and W. Li (2003). Government as a Discriminating Monopolist in the Financial Market: The Case of China. *Journal of Public Economics* 87(2), 283–312. → pages 12
- Grosjean, P., F. Ricka, and C. Senik (2013, May). Learning, Political Attitudes and Crises: Lessons from Transition Countries. *Journal of Comparative Economics* 41(2), 490–505. → pages 117
- Guariglia, A., X. Liu, and L. Song (2011). Internal Finance and Growth: Microeconomic Evidence on Chinese Firms. *Journal of Development Economics* 96(1), 79–94. → pages 5, 12
- Han, J., W. Suen, and J. Zhang (2011). Picking up the Losses: The Impact of the Cultural Revolution on Human Capital Re-investment in Urban China. World Bank Policy Research Working Paper 4729. → pages 66, 79, 80
- Heckman, J. J. and T. Kautz (2014). Fostering And Measuring Skills: Interventions That Improve Character And Condition. NBER Working Paper 19656. → pages 65
- Helliwell, J. F. and H. Huang (2008, July). How's Your Government? International Evidence Linking Good Government and Well-Being. *British Journal of Political Science* 38(04), 595–619. → pages 115
- Helliwell, J. F. and S. Wang (2012). The State of World Happiness. *World Happiness Report*, pp. 10–57. → pages 115
- Horioka, C. Y. and J. Wan (2007). The Determinants of Household Saving in China: A Dynamic Panel Analysis of Provincial Data. *Journal of Money, Credit and Banking* 39(8), 2077–2096. → pages 11
- Imbens, G. and W. an der Klaauw (1995). Evaluating the Cost of Conscription in the Netherlands. *Journal of Business & Economic Statistics* 13(2), 207–215. → pages 71
- Jacobsen, R., H. Moller, and A. Mouritsen (1999). Natural Variation in the human Sex Ratio. *Human Reproduction* 14(12), 3120–5. → pages 22
- Joshua, D., S. H. Chen, J. S. Long, B. J. D. Angrist, and J. Song (2011). Long-term Consequences of Vietnam-Era Conscription: New Estimates Using Social Security Data. *American Economic Review* 101(3), 334–38. → pages 71

- Lardy, N. (2012). Interest Rate Liberalization and the International Role of the RMB. Working Paper. → pages 12
- Lee, Y. and Z. Xiao (1998). Children's Support for Elderly Parents in Urban and Rural China: Results from a National Survey. *Journal of Cross-Cultural Gerontology* 13, 39–62. → pages 31
- Lemieux, T. and D. Card (2001, May). Education, Earnings, and the Canadian 'G.I. Bill'. *Canadian Journal of Economics* 34(2), 313–344. → pages 71
- Li, H., M. Rosenzweig, and J. Zhang (2010). Altruism, Favoritism, and Guilt in the Allocation of Family Resources: Sophie's Choice in Mao's Mass Send-Down Movement. *Journal of Political Economy* 118(1), 1–38. → pages 70, 74, 94
- Li, X. (2000). Where Do We Go during 50 Years?– A Review on Chinese Women's Liberation and Development Process. *Zhejiang Academic Journal* 2. → pages 21
- Liu, X. (2012). Shi Nian Zhi Qing Yi Sheng Cai Fu . *West China Development* (04). → pages 67, 75, 96, 149
- Ma, Y. (2007). From Order to Fairness: Guideline of Alleviating the Burden of Charge for Higher School Selection. *China Education Economics annual meeting, papers and proceedings*, 544–549. → pages 121
- Meng, X. and R. G. Gregory (2002, July). The Impact of Interrupted Education on Subsequent Educational Attainment: A Cost of the Chinese Cultural Revolution. *Economic Development and Cultural Change* 50(4), 935–959. → pages 66, 76, 79
- Modigliani, F. and S. L. Cao (2004). The Chinese Saving Puzzle And Life-Cycle Hypothesis. *Journal of Economic Literature* 42(1), 145–170. → pages 11
- Morduch, J. (1995). Income Smoothing and Consumption Smoothing. *Journal of Economic Perspectives* 9(3), 103–114. → pages 35
- Nunn, B. N. and L. Wantchekon (2011). The Slave Trade and the Origins of Mistrust in Africa. *American Economic Review* 101, 3221–3252. → pages 119

- Pan, Y. (2002). An Examination of the Goals of the Rustication Program in the People's Republic of China. *Journal of Contemporary China* 11(31), 361–379. → pages 68, 72, 73, 74, 77, 97
- Piketty, T. (1995). Social Mobility and Redistributive Politics. *Quarterly Journal of Economics* CX(3), 551–584. → pages 116
- Qian, N. (2008). Missing Women and the Price of Tea in China: The Effect of Sex-Specific Earnings on Sex Imbalance. *The Quarterly Journal of Economics* 123(3), 1251–1285. → pages 8
- Rodriguez-Planas, N. (2012). Longer-term impacts of mentoring, educational services, and learning incentives: Evidence from a randomized trial in the United States. *American Economic Journal: Applied Economics* 4, 121–139. → pages 65
- Scharping, T. (2003). Birth Control in China 1949-2000. *New York, Routledge Curzon*. → pages 39
- Schochet, Peter Z., J. B. and S. McConnell (2008). Does Job Corps work? Impact Findings from the National Job Corps Study. *American Economic Review* 98, 1864–1886. → pages 65
- Singer, M. (1971). Educated Youth and the Cultural Revolution in China. *Michigan Papers in Chinese Studies* 10. → pages 68, 70, 73, 74, 77
- Song, Z., K. Storesletten, and F. Zilibotti (2011). Growing Like China. *American Economics Review* 101, 196–233. → pages 5, 12
- Stevenson, B. (2011). Trust in Public Institutions over the Business Cycle. NBER Working Paper 16891. → pages 117
- Tang, Z. (2012). “Zhi Qing” Shi Bi Cai Fu . *Business Weekly* (12). → pages 67, 75, 96, 149
- Tsang, M. C. (2001). School Choice In The People's Republic Of China. Teacher's College Columbia University Working Paper (June). → pages 120
- Unger, J. (1980). Bending the School Ladder : The Failure of Chinese Educational Reform in the 1960s. *Comparative Education Review* 24(2), 221–237. → pages 68, 70, 77

- Wang, H. (2006). Zhi Qing Jing Li Rang Wo Jian Reng Bu Ba . *China State Farms* (09). → pages 67, 75, 96, 149
- Wang, S.-Y. (2013). Marriage Networks, Nepotism, and Labor Market Outcomes in China. *American Economic Journal: Applied Economics* 5(3), 91–112. → pages 93
- Wang, T. (2004). Ge Di Qu Qiou Ji Gao Zhong Ze Xiao Fei Shou Qu Qing Kuang de Diao Cha. *China Statistics*, 60. → pages 121
- Wei, S.-J. and X. Zhang (2011). The Competitive Saving Motive: Evidence from Rising Sex Ratios and Savings Rates in China. *Journal of Political Economy* 119(3), 511–564. → pages 10, 20, 25, 34
- Xi, J. (2003). Fu Jian Bo Shi Fen Cai, Volumn 1. *Hai Chao She Ying Yi Shu Chu Ban She 1*. → pages 75
- Xie, Y., Y. Jiang, and E. Greenman (2008). Did Send-down Experience Benefit Youth? A Reevaluation of the Social Consequences of Forced Urban-rural Migration during China's Cultural Revolution. *Social Science Research* 37(2), 686–700. → pages 68, 70, 71, 77
- Yang, F. (1992). Hui Cheng Zhi Qing Sheng Cun Xian Zhuang Pou Xi . *China State Farms* (01). → pages 67, 75, 96, 149
- Yao, R., F. Wang, R. O. Weagley, and L. Liao (2011). Household Saving Motives: Comparing American and Chinese Consumers. *Family and Consumer Sciences Research Journal* 40(1), 28–44. → pages 12
- Yip, W. and W. C. Hsiao (2008). The Chinese Health System at a Crossroads. *Health affairs (Project Hope)* 27(2), 460–8. → pages 31
- Yu, L. C., Y. Yu, and P. K. Mansfield (1990). Gender and Changes in Support of Parents in China: Implications for the One-Child Policy. *Gender and Society* 4(1), 83–89. → pages 31
- Zhang, X. (2000). *Children of the Cultural Revolution: Family Life and Political Behavior in Mao's China*. Boulder, Colo. : Westview Press, 200. → pages 73
- Zhou, W. (2013a). Brothers, Household Financial Markets and China's Saving Rate. Working Paper. → pages 68, 73

- Zhou, W. (2013b). How Does A Traumatic Experience During Youth Affect Later Life?  
The Long Term Impact of the Send-down Program during the Chinese Cultural Revolution. Working Paper. → pages 25, 123
- Zhou, X. and L. Hou (1999). Children of the Cultural Revolution: The State and the Life Course in the People's Republic of China. *American Sociological Review* 64(1), 12–36. → pages 65, 68, 70, 74, 77, 94, 115



# Appendix A

## Appendix for Chapter 2

### A.1 Data

The primary data source for this study is the China General Social Survey (CGSS) 2006 urban areas sample. It is an individual-level cross-sectional dataset. The data were collected jointly by the Sociology Department of People's University of China and the Hong Kong University of Science and Technology Survey Research Center. It covered 24 provinces and 4 municipalities. Only three autonomous provinces were not included in the survey: Tibet, Qinghai, and Ninxia. The survey was conducted based on a probabilistic sample. The stratification design was based on the 2000 population census.

According to the CGSS documentation, the survey only asked one randomly selected household member, between 19 and 70 years old, to answer all the questions. I dropped all students from the CGSS sample. Among urban area residents who born between 1945–1978 (aged 28–60 in 2006), 91% of respondents are married and 7.3% of respondents were living alone. In the following cases, respondents may not be counted as household head: a respondent is living with a sibling or with working parents under 60 years old. Fortunately, only 1.4% of respondents are living with siblings. This suggests that brothers are most likely to be the members of extended families of respondents. Furthermore, only 0.3% of the respondents live with a working parent under age 60. The estimation results remain essentially unchanged when these 1.7% of respondents are excluded from the sample. Situation in which a respondent lived with her/his uncle or aunt might also be of concern. Unfortunately, aunts and uncles were not part of the list of possible relationships with the respondent that are queried in the CGSS

questionnaire. This might be due to the fact that, in urban areas, it is quite rare for an individual to live with an uncle or aunt. Furthermore, since only 0.3% of respondents lived with working parents under 60, it is unlikely that any significant number of respondents lived with an uncle or aunt who is working and under 60 years old.

The basic summary statistics for all variables used in the regression are presented in Appendix Table 2.

Three other supplementary datasets are used in this chapter China Family Panel Study (CFPS), Chinese Household Income Project (CHIP) urban area sample, and Chinese Health and Retirement Longitudinal Study (CHARLS). CFPS was conducted by the Peking University Institute of Social Science survey in Beijing, Shanghai, and Guangdong province. This study was also based on a probabilistic sample and stratified design. It is currently available for the 2008 and 2009 series. CHIP was conducted under the auspices of the Chinese Academy of Social Science. The sampling frame is a subsample of the official household survey conducted by the National Bureau of Statistics (NBS). The 2002 CHIP survey is used in this study. CHARLS was conducted by the National School of Development (China Center for Economic Research) at Peking University. Currently, only the 2008 survey is available. The provincial-level data were primarily collected from the China Statistical Year Book published by the NBS. The provincial-level financial development data were collected from the Almanac of China's Finance and Banking. The China Urban Labor Survey (CULS) was administered from November 2001 to January 2002 in five large Chinese cities: Shanghai, Shenyang, Wuhan, Xian, and Fuzhou. The survey was administered by the Institute for Population Studies at the Chinese Academy of Social Sciences (CASS-IPS), in collaboration with local offices of the NSB in each of the five cities.

## A.2 Proof of the Identification Strategy

In this appendix, I show that under the assumption that  $\varepsilon_i$  is conditional independence of number of brothers given number of siblings; that is,

$$\varepsilon_i \perp bro_i | sib_i.$$

$\alpha$  can be consistently estimated in the following equation. (For simplicity I ignore other controls.)

$$Y_i = \alpha bro_i + \delta(sib_i) + \varepsilon_i \tag{A.1}$$

where  $\delta(sib_i)$  is a function of  $sib_i$ .

Proof:

Use the definition of conditional independence, we have

$$\begin{aligned} f(\varepsilon_i|sib_i, bro_i) &= \frac{f(\varepsilon_i bro_i|sib_i)}{f(bro_i|sib_i)} \\ &= \frac{f(\varepsilon_i|sib_i)f(bro_i|sib_i)}{f(bro_i|sib_i)} \\ &= f(\varepsilon_i|sib_i) \end{aligned}$$

where  $f(\cdot)$  is the density function. Thus,

$$\begin{aligned} E(\varepsilon_i|sib_i, bro_i) &= \int_{\varepsilon_i} \varepsilon f(\varepsilon_i|sib_i, bro_i) d\varepsilon_i \\ &= \int_{\varepsilon_i} \varepsilon f(\varepsilon_i|sib_i) d\varepsilon_i \\ &= E(\varepsilon_i|sib_i) \end{aligned}$$

Since  $E(\varepsilon_i|sib_i)$  is a function of  $sib_i$ , let

$$\tilde{\delta}(sib_i) = E(\varepsilon_i|sib_i)$$

where  $\tilde{\delta}(sib_i)$  is an unknown function of  $sib_i$ .

Assume

$$Y_i = \alpha bro_i + \beta sib_i + \varepsilon_i$$

Since  $E(\varepsilon_i|sib_i, bro_i)$  is not depend on  $bro_i$ , we have

$$\begin{aligned} E(Y_i|bro_i, sib_i) &= \alpha bro_i + \beta sib_i + E(\varepsilon_i|sib_i, bro_i) \\ &= \alpha bro_i + \beta sib_i + \tilde{\delta}(sib_i) \end{aligned}$$

Thus,  $\alpha$  can be consistently estimated under equation A.1, where  $\delta(sib_i) =$

$\beta sib_i + \tilde{\delta}(sib_i)$ .  $\delta(sib_i)$  is a control function, in order to consistently estimate  $\alpha$ .

### A.3 Relative Effect of Number of Brothers

In this section, I show that if sisters have an effect on savings rate, I can still have the difference of the effect between brothers and sisters. Suppose we are interested in estimating equation A.2. (For simplicity I ignore other controls).

$$Y_i = \alpha_b bro_i + \alpha_s sis_i + \varepsilon_i \quad (A.2)$$

where  $sib_i$  is the number of sisters.

$\alpha_b$  and  $\alpha_s$  cannot be consistently estimated because  $bro_i$  and  $sib_i$  are correlated with the error term  $\varepsilon_i$ . For this reason, we use the control function approach explained in appendix C by adding a function of  $sib_i$  into equation A.2. We can have

$$E(Y_i | bro_i, sis_i, sib_i) = \alpha_b bro_i + \alpha_s sis_i + \delta(sib_i)$$

Due to collinearity,  $\alpha_b$  and  $\alpha_s$  cannot be estimated together. However,

$$\begin{aligned} E(Y_i | bro_i, sib_i, sis_i) &= \alpha_b bro_i + \alpha_s (sib_i - bro_i) + \delta(sib_i) \\ &= (\alpha_b - \alpha_s) bro_i + \delta'(sib_i) \end{aligned}$$

where  $\delta'(sib_i) = \delta(sib_i) + \alpha_s sib_i$ . Thus we can still identify the effect of brothers relative to sisters which is  $\alpha_b - \alpha_s$ .

Table A.1: Household Expenditure and Total Income

Age Group	Living Cost	Education Expenditure	Medical Expenditure	Disposable Income
25-30	12219	541	660	33859
30-35	11950	1324	824	30976
35-40	11790	2203	1119	30040
40-45	10745	3830	885	24953
45-50	12144	4218	1109	26261
50-55	11429	2267	1539	24891
55-60	12043	882	1755	27360

Note: Chinese RMB is presented in the table. Exchange rate in 2006: 1 US Dollar = 7.97 RMB. China General Social Survey 2006 is used. Sample is restricted to urban area residents born between 1946-1978.

Table A.2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max	Unit
Savings Rate	2634	0.260	0.545	-5.000	0.947	
Number of Brothers	2634	1.432	1.188	0	8	
Number of Siblings	2634	2.823	1.745	0	9	
Year of Education	2581	10.244	3.057	1	22	
Age	2634	43.992	8.925	29	60	
Household Yearly Income	2634	0.285	0.332	0.009	6	100,000 RMB
Marital Status	2634	0.908	0.289	0	1	
Female	2634	0.527	0.499	0	1	
Mother's Years of Education	2609	4.746	3.620	1	17	
Father's Years of Education	2597	6.447	3.810	1	17	
Family Size	2634	2.867	1.039	1	9	
Communist Party	2634	0.126	0.332	0	1	
Send-down	2634	0.113	0.317	0	1	
Number of Parents Deceased	2608	0.809	0.837	0	2	
Presence of Male Children	2634	0.528	0.499	0	1	
Parents Live Together	2634	0.161	0.368	0	1	
Children Age <6	2634	0.097	0.296	0	1	
Children Age 6–12	2634	0.169	0.374	0	1	
Children Age 12–18	2634	0.179	0.384	0	1	
Children Age >18	2634	0.116	0.320	0	1	
Number of Children	2634	1.070	0.665	0	6	
No House	2634	0.306	0.461	0	1	
Value of Mortgage	2616	0.013	0.130	0	4.9	100,000 RMB
Value of Other Houses	2612	0.124	0.772	0	20	100,000 RMB
Father's Huko	2634	0.696	0.460	0	1	
Mother's Huko	2634	0.647	0.478	0	1	
Mother's Company Owner Ship	2634	0.552	0.839	0	2	
Father's Company Owner Ship	2634	1.099	0.941	0	2	
Mother's Skill Level	2631	0.291	0.884	0	4	
Father's Skill Level	2632	0.857	1.457	0	4	
Father's Communist Party	2634	0.139	0.346	0	1	
Mother's Communist Party	2634	0.031	0.174	0	1	
Provincial Level Data:						
Number of the Branches of Foreign Banks	28	0.360	0.761	0	3.093	
Insurance Density	28	7.171	9.157	1.030	32.930	100 RMB / Person

Table A.3: Statistics Used for Calculating Increased Savings Rate due to Decreased Number of Brothers

	Age Group		
	22-39	40-49	50-60
$\widehat{broInc}_{l,A}$	-0.069	-0.116	-0.155
$\widehat{broDP}_{l,A}$	0.037	0.025	0.057
Average Income (100,000RMB)	0.12	0.11	0.12
Distribution of Each Group	0.18	0.17	0.16
Marriage Rate	0.78	0.87	0.85
Decreased Number of Brothers	0.71	0.32	0.45

Note: The statistics of low income households are presented.

# Appendix B

## Appendix for Chapter 3

### B.1 Data

The main data used in this paper are the China General Social Survey (CGSS) 2003. The CGSS 2003 data are also part of the East Asian General Social Survey. The data were collected jointly by the Hong Kong University of Science and Technology Survey Research Center and the Sociology Department of People's University of China. CGSS 2003 was an individual level survey and was conducted in city areas. It covered 24 provinces and four municipalities. Only three autonomous provinces were not included in the survey: Tibet, Qinghai, and Ninxia.<sup>1</sup> The survey was conducted based on a probabilistic sample and stratified design.

### B.2 Conceptual Framework

Upgrading education is a time- and energy-consuming endeavor for individuals who are already 30 years old. Such individuals often have a job during the day and a family to take care of at home. However, as suggested by numerous documents, such as Yang (1992); Wang (2006); Liu (2012); Tang (2012), the send-down experience improved their capability to bear such hardships. Therefore, for the send-downs, exerting effort toward upgrading education is not as costly as it might be among non-send-downs. Because of the low cost of exerting effort,

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<sup>1</sup>Qinghai is a province next to Tibet. Ninxia is another minority province located in inland China. The 2003 survey was conducted in October and November.



send-downs are more likely to upgrade education and exert more effort toward further studies. If the return to education depends on the effort put into study, we would also find that send-downs who upgraded education would on average earn higher incomes compared to non-send-downs who also upgraded their education. The following simple model illustrates the above idea.

$e_i$  is the effort an individual  $i$  put into study when upgrading their education.  $e_i$  is non-negative; it equals 0 if individual  $i$  choose not to upgrade their education. An individual chooses the level of effort to maximize his/her utility.

$$\max_{e_i} w(e_i, a_i) - C(e_i) \quad (\text{B.1})$$

The wage function  $w(\cdot)$  depends on an individual's effort in study and his ability  $a_i \in A$ , where  $A$  is the space of ability. Both send-downs and non-send-downs draw  $a$  from same distribution  $F(\cdot)$ . The wage function satisfies properties  $w_a > 0, w_e > 0, w_{ea} > 0$ . The last condition indicates that the return to effort is increasing in ability. There is a trade-off in exerting effort: exerting effort towards studying can increase wages; however, exerting such effort is costly. Denote the cost function as  $C(e_i)$  of effort. This satisfies the condition  $C_e(\cdot) > 0$  and  $C_{ee}(\cdot) < 0$ . For the send-down group, providing additional effort is less costly. A simple cost function for send-downs could be  $C(e_i) - \theta e_i$  with  $\theta > 0$ . For simplicity, the wage function does not depend on experience. (We can think of this is as a case in which we compare individuals with identical years of experience.)

The first-order condition of Equation B.1 is

$$w_e(e_i, a_i) = C_e(e_i) \quad \forall a_i \in A \quad (\text{B.2})$$

Let  $a^{*NS}$  where  $a^{*S}$  denotes the ability of the marginal individual who is indifferent to upgrade education for the non-send-down group,  $NS$  and the send-down group,  $S$  respectively. This satisfies

$$w_e(0, a^{*NS}) = C_e(0)$$

$$w_e(0, a^{*S}) = C_e(0) - \theta$$

We have  $a^{*S} < a^{*NS}$ , since  $w_e(0, a^{*S}) < w_e(0, a^{*NS})$  and  $w_{e_i, a_i} > 0$ . Thus, for any increasing CDF of  $a$ ,  $F(\cdot)$

$$1 - F(a^{*S}) > 1 - F(a^{*NS})$$

That is, more people in the send-down group upgraded their education.

Denote the solution of the first-order condition as  $e_i^S(a_i)$  for send-down group and  $e_i^{NS}(a_i)$  for non-send-down group. Combine first-order conditions with the assumption that send-downs have lower marginal cost of effort, we have

$$w_{e_i}(e_i^{NS}(a_i), a_i) > w_{e_i}(e_i^S(a_i), a_i) \quad \forall a_i > a^{*S}$$

Thus, for a given ability, send-downs earn higher income than non-send-downs

$$w(e_i^{NS}(a_i), a_i) < w(e_i^S(a_i), a_i) \quad \forall a_i > a^{*S}$$

For individuals who do not upgrade education, their incomes are same (given same years of experience).