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Los Angeles

Three Essays on Applied Microeconomics

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy in Economics

by

Yang Cao

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ABSTRACT OF THE DISSERTATION

Three Essays on Applied Microeconomics

by

Yang Cao

Doctor of Philosophy in Economics University of California, Los Angeles, 2016 Professor Adriana Lleras-Muney, Chair

In these essays, I study the following three topics in Applied Microeconomics using datasets of China: (1) The impact of political movements in the first thirty years of People's Republic of China on the intergenerational and multigenerational transmission of education; (2) The relationship between health insurance and households' consumption; (3) The effect of health insurance on out-of-pocket medical expenditures. The first chapter investigates the effect of family class origin on educational attainment and intra-family educational transmission process by using the newly released China Family Panel Study (CFPS) data. The paper focuses on three typical generations, those that completed their education before the beginning of the Maoist era, during the Land Reform and the Cultural Revolution, and after the end of the Cultural Revolution. Suffering from the class-based violence and discrimination, the members of landlord and rich-peasant families, who completed their education during the political movements, attained significantly lower education than the members of other families did. However, the offspring of landlord and rich peasant families are more likely to have higher educational achievement after the end of the Cultural Revolution. I also find evidence of a direct effect of grandfather's education on grandson's education beyond intervening causal mechanisms through fathers. This multigenerational effect on education is particularly strong within former landlord and rich-peasant families. The second chapter discusses the relationship between medical insurance and consumption. I set up a simple theoretical model to show that medical insurance acts as a buffer against possible health shocks, which makes precautionary saving less necessary and thus stimulates consumption. The China Health and Nutrition Survey is utilized in empirical tests. I find that the coefficient of insurance is significantly positive and that it is robust to alternative specifications. Moreover, I notice that cooperative insurance has the smallest effect among all kinds of insurance, which indicates that it is necessary to allocate more resources to this kind of insurance. I also provide evidence that the effect of insurance is greater for people with low income or who face a greater danger of health shock. The third chapter examines the effect of health insurance on out-of-pocket medical expenditures. In 1998, the Chinese government launched a health insurance reform to expand the health insurance coverage in urban China. The reform aimed at putting all urban employees into a new health insurance scheme, Urban Employee Health Insurance (UEHI). The new scheme was rolled out sequentially across different working units including government, state-owned enterprises, and private enterprises. This paper employs a difference-in-difference strategy to make use of this variation of eligibility across different working units and over time to identify the impact of reform. I find that the reform substantially increased the probability of being covered by health insurance and reduced the out-of-pocket medical expenditures of the employees of private enterprises. Besides, the reform significantly reduced the risk of exposure to catastrophic medical expenditures of the employees of both private enterprises and SOEs. The dissertation of Yang Cao is approved.

Sarah J Reber

Kathleen M McGarry

Moshe Buchinsky

Adriana Lleras-Muney, Committee Chair

University of California, Los Angeles

2016

To my parents and fiancee

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VITA

2010	B.A. in Economics, Peking University, Beijing, China
2012	M.A. in Economics, UCLA, Los Angeles, California.
2012	C.Phil. in Economics, UCLA, Los Angeles, California.
2013–2014	Economist, Harris Economics Group, Los Angeles, California
2013–2014	Economist, Edgeworth Economics, Los Angeles, California
2011-2015	Teaching Assistant, Department of Economics, UCLA, Los Angeles, California

CHAPTER 1

Family Class Origin, Social Discrimination, and Multigenerational Correlation of Education in Rural China

1.1 Introduction

The first thirty years of the People's Republic of China was an era filled with chaos and violence. To achieve the goal of "common prosperity", the Chinese Communist Party (CCP) launched a series of political and economic movements with the explicit purpose of reducing the class differences in family wealth, employment opportunities, and educational attainment. The "Great Proletarian Cultural Revolution", a social upheaval lasting from 1966 to 1976, was undoubtedly the most pronounced political movement, but it was not the first one. The Land Reform took place from 1950 to 1953 had enormous impacts in rural China. In the reform, land was confiscated from former landlords and redistributed to landless peasants and owners of small plots. More importantly, the Communist Party assigned a permanent "class" designation, inheritable in the male line, to each family on the basis of the family head's source of income, employment status, and political status. This class designation was called family class origin and was the most important political label during the first thirty years of the CCP regime. The four main family class origins in rural China were landlord, rich-peasant, middle-peasant, and poor-peasant. While the members of poor-peasant families were favored with all the social and economic opportunities, the members of landlord and rich-peasant families suffered severe class-based social discrimination. Because of the enormous emphasis by the CCP regime on "class struggle" as the most powerful weapon of socialist revolution, the discrimination against the landlord and rich-peasant class quickly deteriorated and was at its worst during the Cultural Revolution.

This paper examines the effect of family class origin on educational attainment in rural China and focuses on three typical generations, those that completed education before the beginning of the Maoist era, during the Land Reform and the Cultural Revolution, and after the end of the Cultural Revolution. By dividing the population into three generations, I can study both the short-term and long-term effects of family class origin. The question of interest is that how much state interventions matter in promoting educational equality. The governments of East European communist societies attempted to detached educational achievements from social origins by rapidly expanding the availability of education and by substantially reducing tuition fees (Simkus and Andorka, 1982). However, studies detect no systematic difference in educational achievements between then-communist East European countries and market-oriented countries (Blossfeld and Shavit, 1993). The state intervention in rural China was much more radical than the interventions in East Europe because, beside the similar educational expansion movements, family class origin was used as the major criterion to determine educational opportunities in rural China. The educational system strongly favored children from poor-peasant origin at the expense of children from landlord and rich-peasant origin. Therefore, if state interventions matter at all, it should matter in rural China (Deng and Treiman, 1997).

Empirical research of the impacts of policies in the Maoist era on educational attainment has been rare for two reasons. First, though the party partially acknowledged the mistakes in government's policies before the 1978 economic reform¹, family class origin and the Cultural Revolution are still sensitive subjects in China. Second, most data in China have very limited information of families' economic and political status in the Maoist era. Meng and Greogory (2002) studied the impact of the Cultural Revolution on educational attainment in urban China and found that the largest negative impact was on children with parents of lower educational achievement and lower occupational status, which is clearly not the case in rural areas. Deng and Treiman (1997) used the sample of multiple generation households² in 1982 census of China and found that, because of state intervention in education and the Cultural Revolution, the educational attainment of men was highly egalitarian with respect to social origins and has become increasingly so over time. However, Deng and Treiman did not study urban areas and rural areas separately. Moreover, they use father's occupation as a proxy for family class origin, which can be very misleading in some cases. For example, in their study, all peasants are regarded as from a same class, which is highly unlikely given so many different family

¹In 1978, the central government of China launched an economic reform to start the country's transition from a centralized planning economy to a market-oriented economy.

²The multiple generation households refer to the households with multiple generations living together.

class origins among the rural population. Sato and Li (2007) presented some pioneering work of the impact of family class origin on educational attainment with China Household Project data (CHIP 2002). They show that class-based discrimination during the Cultural Revolution did not last long enough to have a permanent effect on educational attainment across generations. However, their data only contain the information of coresident children, which can cause serious bias to their results.

This paper utilizes the newly released 2010 wave of China Family Panel Studies (CFPS), a nationally representative rural household survey, to investigates the effect of family class origin on educational attainment and intra-family educational transmission process. The major advantage of CFPS 2010 data set is that it reports educational attainment of both coresident and non-coresident family members, including cousins and children who do not live in households. The paper focuses on families with three typical generations. Those in the first generation completed their education before the Land Reform and thus were barely affected by the policies in the Maoist era. The second generation completed their education during the Maoist era, and thus were influenced by the early class-based political and educational policies, the strength of which were most pronounced during the Cultural Revolution. The third generation completed their education after the end of the Cultural Revolution. The paper focuses on male household members.

The results of OLS regressions confirm that the class-based discrimination and violence had a negatively significant impact on the educational attainment of the second generation of landlord and rich-peasant families. The males of landlord and rich-peasant families who completed their education during the Cultural Revolution had one less year of education and were eight percent less likely to obtain any upper secondary education than their poor-peasant counterparts, while the first generation of landlord and rich-peasants had almost two and half more years of education and were six percent more likely to complete upper secondary education than the first generation of poor-peasant families. However, the third generation of landlord and rich-peasant families rebounded after all the hardship and adversities suffered by their parents and had significantly higher educational achievement than the third generation of poor-peasant families. They had one more year of education and were 6 percent more likely to own an upper secondary certificate than the third-generation males of poor-peasant families. Two specific types of rebound were observed in the data. One is characterized by a common class-wide positive effect of being a member of a former landlord and rich-peasant family on educational attainment of the third generation. The other type emerges from a much stronger effect of grandfather's education on grandson's education in landlord and rich-peasant families than its effect in poor-peasant and middle-peasant families. The economic and social capital of the first generation of landlord and rich-peasant families was destroyed during the Maoist era, and thus should be of little importance for the educational success of the third generation. However, the cultural capital of the first generation may create a psychological rebound among landlord and rich-peasant family members.

This paper also adds to existing multi-generation research by empirically measuring the effect of grandfather's educational attainment on grandson's educational attainment. Most models of intergenerational transmissions assume a Markov process in which endowments and resources are transmitted sequentially from one generation to the next. Mare (2011) argued that two-generation models may not capture all the different ways in which family background affects children's outcomes. There is growing evidence that grandparents' resources have a direct effect on children's outcomes (Tinsley and Parke, 1987; Modin and Fritzell, 2009; Ferguson and Ready, 2011; Zeng and Xie, 2011). A key challenge for multigenerational research is to control the indirect transmission of capital from grandparents to parents and to isolate the direct effect of grandparents' capital on grandchildren. The state intervention in education during the Maoist era significantly reduced the intergenerational correlation of education in rural China, which provides a great opportunity to estimate the direct multgenerational effect of education. Hertz (2007) estimates the trend of intergenerational correlation of education in rural China (Figure 1.1^3). The figure shows that the correlation kept declining from the 1938 birth cohort to 1968 birth cohort, which almost perfectly matches the birth cohorts⁴ of people who were affected by policies during the Maoist era. Actually, my results show that the transmission of education from the first generation to the second generation in landlord and rich-peasant families was completely shut down during the Maoist era. Given the weak correlation between education of the first two generations, this paper finds a positive and statistically significant effect of grandfather's education on grandson's education. This multigenerational

³Hertz (2007) uses the 1995 Living Standards Measurement Surveys of World Bank to estimate the correlation between son's education and father's education, as well as the coefficient of the regression of son's education on father's education. Both coefficients and correlations are shown in Figure 1.1. The horizontal axis shows the birth cohorts of sons.

⁴I will show in this paper that people born between 1940 and 1965 were directly affected by the policies during the Maoist era.

effect was particularly strong in landlord and rich-peasant families. One more year in grandfather's education would lead to almost 0.2 more years in grandson's education in landlord and rich-peasant families. This coefficient is even larger than the father-son coefficients in many countries (Hertz, 2007).

The main contribution of this paper is that by utilizing the CFPS data, I was able to address the sample bias in previous studies because of a lack of information about non-coresident family members. To my knowledge, this paper is also the first study that discovered a positive and statistically significant effect of grandfather's educational attainment on grandson's educational attainment in China. The remainder of this paper proceeds as follows. Section 2 provides a brief review over the relevant economic and political movements during the Maoist era. Section 3 presents the conceptual framework of this study. Section 4 describes the data and presents the summary statistics. Section 5 shows the basic results of OLS regressions, and Section 6 offers a more detailed discussion. Section 7 concludes with policy implications.

1.2 Background

When people talk about political events in the first thirty years of the Chinese Communist Party (CCP) regime, the "Great Proletarian Cultural Revolution" is commonly seen as the most noticeable such event because of its long duration, high intensity and wide-spread impacts on many cohorts of the Chinese population. Although the Cultural Revolution was not officially unleashed by Mao Zedong and his agents until late 1966, a series of similar political actions had already taken place in rural China since 1949, at the beginning of the CCP regime. These political events include the Land Reform and Collectivization Movement (1950–1953), the Anti-Rightist Movement (1957–1959), the People's Commune Movement (1957), the Great Leap Forward (1958–1961), and the Four Cleanups Movement (1963–1966). These political moments were launched as preparation for the Cultural Revolution. In the Land Reform, the Communist Party assigned a permanent "class" designation, inheritable in the male line, to each family on the basis of the family head's source of income, employment status, and political status in the years just prior to Liberation (Unger (1982)). Families were officially classified into "good-class" origins, "middle-class" origins, and "bad-class" origins. Later, in the Cultural Revolution, the good class were designated the "revolutionary class" and the owners of the

country, and the middle class were announced to be the ally of the revolutionary class, while the bad class were treated as the "enemy class" (or "counterrevolutionary class"). During the Collectivization Movement and the People's Commune Movement, most of the wealth of badclass families was confiscated and redistributed among the good-class families. In the Anti-Rightist Movement and the Four Cleanups Movement, Chairman Mao and his agents repeatedly emphasized the importance of the suppression of the counterrevolutionaries, which set the tone for the violent "Class Struggle" in the Cultural Revolution.

1.2.1 The Land Reform and the "Classification" of Chinese People

In 1946, three years before the founding of the People's Republic of China (PRC), the CCP began to experiment with land reforms in areas under its control, such as the Jiangxi Soviet and Yan'an. In these experiments, the land of landlords was confiscated and then "returned" to poor peasants. These early reforms won the party millions of supporters in rural area and the leaders of the party realized that "class struggle" of this sort was the most powerful weapon they had to help them win the civil war. They began to intentionally stoke the hostility of poor peasants toward the landlord class. Mao Zedong said that "10 percent of the population own 80 percent of the land in the countryside. This would have to be changed." ⁵ Ren Bishi, an early leader of the party, stated in a speech in 1948 that for this change to be accomplished, "30 million landlords and rich peasants would have to be destroyed." (Rummel, 2007)

The first thing that the CCP regime did after the founding of the PRC was launching a nationwide land reform. Two very influential official documents were issued in 1950, the "Land Reform Law" (1950.6.30) and the "Decisions about the Classification of Family Class Origins" (1950.8.20). The "Land Reform Law" ruled that land should be confiscated from former landlords and redistributed to landless peasants and owners of small plots, as well as to the landlords themselves, who now had to till the land to earn a living. The "Decisions about the Classification of Family Class Origins" determined who were to be considered as "landlords", who as "poor peasants", and so on. The principal rules adopted for classifying family class origins are described below. Two main criteria were used: the amount of land owned by the

⁵Mao said the numbers were based on his field research in the early 1930s in the countryside of Jiangxi Province. However, these numbers have never been proved to be correct. According to recent research by Wu (1998), the landlord class in rural China accounted for about 6 percent of the population in the period before the founding of the PRC, and owned about 30 percent of the land.

household and the household's main source of income. The criteria for the amount of land varied significantly across regions,⁶ and so I only describe the latter criterion, the source of income here.

1. Landlord. Landlord families owned large amounts of land and technologically advanced agricultural equipment. The members of landlord families did not work on their own land, but hired others to work it for them. Their main source of income came from renting the land to others.

2. **Rich peasant.** Rich-peasant families owned land and advanced agricultural equipment. They hired a lot of labor to work for them. Rich-peasant families leased land from others. The members of rich-peasant families sometimes took part in agricultural work, but generally lived by "exploiting" those who worked for them.

3. **Middle peasant.** Middle-peasant families owned land and some agricultural equipment. Unlike landlords and rich peasants, they lived on their own labor without "exploiting" others. Some middle-peasant families leased land from others.

4. **Poor peasant**. Poor-peasant families owned little land or agricultural equipment. They lively almost completely by working land borrowed from others or selling their labor to rich peasants or landlords.

According to field research by historians (Zhang, 1988), the proportion of the population accounted for by landlords and rich peasants was about 10 percent, while the proportion of middle peasants and that of poor peasants were about 20 percent and 70 percent, respectively. Under the Land Reform Law, the land and other property of landlords and rich peasants were expropriated and redistributed so that each household in a rural village would have a holding of comparable size.⁷ In contrast to landlords and rich peasants, the land owned by middle peasants was protected by law. Therefore, middle peasants were protected, while the first-order effect of the Land Reform on landlords and rich peasants was a negative economic shock. However, the total effect was much beyond that. Class origin became an extremely important political label,

⁶Here is an example. The average amount of land owned by a landlord family in Jiangxi Province was about 12 mu (1 mu=666 square meters), while the number for Shandong Province was 200 mu.

⁷According to the Land Reform Law, all the land owned by landlords should be expropriated. Nevertheless, the policy regarding rich peasants was different, only the land rented by rich peasants should be expropriated and the land worked on by rich peasants themselves or the hired labor was protected by law. However, the law was not enforced very well. In most areas, rich peasants were treated the same as landlords (Feng, 2000).

which was automatically transferred from fathers to children. This political labeling system was active for about thirty years, until 1980, when the government announced the abolishment of the family class origin registration system. In the interim , family class origin influenced every aspect of people's life. Poor-peasant origin meant a free pass to senior upper secondary school, a decent job and a good chance to go to college or to join the CCP and become a member of the elite, while the offspring of landlord and rich-peasant families suffered severe social discrimination and class violence. For about thirty years, the offspring of landlord and rich-peasant families did not have the equal opportunity of education or employment to their poorpeasant and middle-peasant counterparts. As a matter of fact, even survival was sometimes a luxury for them. In 1976, the U.S. State Department estimated that about a million people with landlord or rich-peasant origin were killed under Mao even before the Culture Revolution (Shalom, 1984).

1.2.2 Economic and Political Movements after the Land Reform

Nationwide land reforms took place from late 1950 until the spring of 1953. 700 million mu of land and various production tools were "returned" to 300 million poor peasants who had had no land before the reform.⁸ Shortly after land was redistributed to poor peasantry, some important shifts emerged in the political agenda. Mao Zedong thought that the main obstacles to the development of agriculture in China were lack of advanced technology and equipment. Mao also pointed out that land in rural China was so scattered that sometimes it was difficult for a single family to use all its land efficiently. The CCP came to embrace the idea of collectivization to organize peasants into small teams to work together. These small teams, known as "mutual help teams", were gradually merged into local agrarian cooperatives and finally merged into People's Communes in the "Great Leap Forward".

The Collectivization Movement was very effective at improving agricultural production, and provided a risk-sharing mechanism against economic shocks, as poor rural families became richer. However, this accumulation of wealth made the CCP government nervous. The leaders were concerned that the government would lose control of the peasants if they kept becoming richer. The weapon of "class struggle" was picked up again. Mao said at a government

⁸The areas populated by ethnic minorities were not affected by the Land Reform initially. The Land Reforms in these areas were not completed until the "Great Leap Forward" (1957) (Li and Lok, 1995).

conference in 1956 that "individual prosperity should be considered shameful and common prosperity was the ultimate goal of socialism." ⁹To achieve the goal of common affluence, the chairman suggested, there were two ways. One was centralizing industrial and agricultural production, and the other was cleansing the populace to get rid of all the bourgeois elements. The first way led to the "Great Leap Forward" and the second way was finally boiled down into the "Great Cultural Revolution".

The "Great Leap Forward" campaign was launched in 1958, and quickly spread throughout rural China. The goal was to accelerate collectivization and dramatically increase the pace of industrial production. The unit by which this campaign was to be carried out was the "People's Commune". An experimental commune was established in Henan in 1958, after which communes spread throughout the country. Tens of millions of people were mobilized to produce a single commodity—steel—which was considered symbolic of industrialization. Approximate-ly 25,000 communes were set up, each with around 5,000 households. A typical pattern of production was small scale production, such as "backyard factories". The campaign was ended in 1961 and turned out to be a major economic failure and disaster, for several reasons First, because of lack of machinery and technology, the steel made by the communes was of low quality and had no economic value. Second, because most people left farming and devoted themselves into industrial production, in this period, the Chinese people suffered an extreme shortage of food over the three years after the launching of the campaign (1959-1962), which became known as the "Three Years of Natural Disasters".

Mao blamed the economic difficulty that the Chinese went through on the "bourgeois among people" and stated that "class struggle has never been so necessary". Upon his instruction, the CCP regime launched the Anti-Rightist Movement and the Four Cleanups Movement¹⁰. Through the Anti- rightist Movement, thousands of intellectuals were persecuted, imprisoned or sent to remote areas in western China to do heavy labor and to get "re-educated". In the Four Cleanups Movement, five family class origins were officially anointed as the "five red kinds", namely

1. Revolutionary cadres,

⁹The slogan of "Beating Down Four Freedoms" was come up with at the same conference, where "Four Freedoms" were the freedoms of renting rent, hiring labor, trading and contracting loans.

¹⁰The Four Cleanups Movement was also known as the Socialist Education Movement.

- 2. Revolutionary army men,
- 3. Revolutionary martyrs,
- 4. Pre-Liberation industrial workers and their families, and
- 5. Former poor and lower-middle peasant families.

Another five family class origins were officially classified as the "five black kinds"; they were

- 1. Families of former capitalists,
- 2. Families of rightists,
- 3. Rich peasant and landlord families,
- 4. Families of criminal offenders, and
- 5. Families of counterrevolutionaries.

After the advent of this framework, most kinds of discrimination and violence against people of bad-class origins, including rich peasants and landlords, became legal. Rich peasants and landlords were officially designated counterrevolutionaries and enemies of the people. On May 9, 1963, Mao made a famous speech in which he stated that "Rich peasants and landlords need to be re-educated by poor-and-lower-peasant class. For those who refused to correct their mistakes, we should wipe them out."

1.2.3 The Great Proletarian Cultural Revolution

After the failure of the "Great Leap Forward", China began a slow and difficult recovery from the economic turmoil. Partially acknowledging that the government's policies had been the cause of the hardship in the preceding years, Mao spent most of the time away from Beijing and acted only passively (Liang, 2013). However, he announced his return by launching the "Great Proletarian Cultural Revolution". On August 8, 1966, the party's Central Committee issued a famous document entitled "Decision Concerning the Great Proletarian Cultural Revolution", also known as the "Sixteen Points", to state the goals and the methods of the Cultural Revolution.

"Although the bourgeoisie has been overthrown, it is still trying to use the old ideas, cul-

ture, customs and habits of the exploiting classes to corrupt the masses, capture their minds and endeavor to stage a come-back. The proletariat must do the opposite and change the mental outlook of society. At present, our objective is to struggle against and overthrow those persons in authority who are taking the capitalist road, to criticize and repudiate the reactionary bourgeois academic "authorities" and the ideology of the bourgeoisie, to transform education, literature, art and all other parts of the superstructure not in correspondence with the socialist economic base, so as to facilitate the consolidation and development of the socialist system." (Sixteen Points, 1966)

Briefly speaking, the goal of the Cultural Revolution was to purge remnants of capitalist and traditional elements from Chinese society so as to preserve a "true" communist ideology in the country. Violent struggle was the main approach of this "revolution", and China's youth, many of them joined Mao's "Red Guards", were the main force in its revolutionary army. Thousands of Red Guards groups were formed in a few months, across the whole China (Walder, 2009; Perry and Li, 1997). Millions of people were persecuted in the violent struggles that ensured, and suffered various kinds of abuse including public humiliation, arbitrary imprisonment, torture, sustained harassment, and seizure of property. During this violent social convulsion, most schools and factories were shut down in the cities and thousands of secondary school students were sent down to the countryside to do manual labor and receive re-education from the people of poor-and-lower peasant class.¹¹

While there has been extensive research into the turmoil in urban China from 1967-1969, the extent of violence in rural areas has been underestimated and overlooked (Su, 2011). Based on recent research (Walder and Su, 2003; MacFarquhar and Schoenhals, 2009), rural China suffered at least as much as urban areas did during the early Cultural Revolution, and the impact lasted even longer than in the cities. In the revolution as it played out in rural China, the poor-and-lower peasant class were the revolutionary class; the middle-peasant class were their allies; and the landlord and rich-peasant class were the enemy class. Countless "revolutionary committees" were formed in the initial part of the Cultural Revolution, after which the Revolution entered its bloodiest phase in rural counties as the "cleansing of the class ranks" campaign got underway in 1968.

¹¹Students enrolled in lower or upper secondary schools, who should have graduated in 1967,1968, or 1969, were sent down to the countryside. These students became known as the "Old Three Class", as well as the "lost generation" in the Cultural Revolution.

"in some places it became a massive program against people of exploiting class backgrounds; in some places a campaign of retribution and murder against factional rivals; and in still others a campaign of torture and murder to uncover wholly imaginary mass conspiracies that could involve tens of thousands." (MacFarquhar and Schoenhals, 2009)

Thus, landlord and rich-peasant families were the main and almost the only target of violent struggle in rural China. During the Cultural Revolution, the members of landlord and rich-peasant families suffered the bloodiest violence and the most severe discrimination they had since 1949. Because of their fathers' family origin, the offspring of landlord and rich-peasant families never had equal opportunity with the offspring of middle-peasant and poor-peasant families in any social and economic activities, including education, employment, marriage, medical services, and party membership. During the worst years of violence, survival was the only goal of these former elite families.

The Cultural Revolution created disastrous turmoil in China society. Political loyalty and correctness became the focus of every social and economic activity. Millions of people were murdered and there was no progress in economic development. The central government realized that the revolution had to be stopped. After Mao's death and the arrest of the "Gang of Four" ¹²in 1976, the new government led by Deng Xiaoping gradually began to dismantle the Maoist policies associated with the Cultural Revolution. In 1981, the Party declared that the Cultural Revolution was

"responsible for the most severe setback and the heaviest losses suffered by the Party, the country, and the people since the founding of the People's Republic." (Resolution on CPC History (1949-81))

Although there is no official end date of the Cultural Revolution, the idea that it ended in 1977, when production and education resumed and economy began to recover, is widely accepted. In 1979, people with "bad" family class origins, who had been considered to be unsavory elements, counterrevolutionaries, and criminals, were announced to be innocent. However, the damage had been done and the impact was profound.

¹²The Gang of Four was a political faction composed of four Chinese Communist Party officials. They came to prominence during the Cultural Revolution (1966–76) and were later charged with a series of treasonous crimes. The gang's leading figure was Mao Zedong's last wife Jiang Qing. The other members were Zhang Chunqiao, Yao Wenyuan, and Wang Hongwen.

1.2.4 The Educational System in Rural China

Since 1922, China had run a school system very similar to that of the United States, with 6 years of primary school, 3 years of lower secondary school, 3 years of upper secondary school, and 4 years of college education. Although this system was frequently subject to policy interference, it remained unchanged for most of the period and in most areas of China. The only significant change was that secondary education was divided into academic track and vocational track, which is an important feature of the educational system in Europe. The educational system in China had traditionally operated in a highly centralized way under the rule of the national Department of Education. The same curriculum, textbooks, and teaching for a given level were used in all schools. Students had to take admission exams for promotion to a higher level of education took place in June of every year. In short, intellectual competence was the only criterion for advancement in pre-Communist exam system of China (Deng and Treiman, 1997).

In contrast, in the first thirty years of the CCP regime, academic performance was no longer the only criterion that governed education advancement. Family class origin and political loyalty were another two, and were crucially important during most of the Maoist era (Shirk, 1982; Unger, 1982). A speech given by Mao in 1955 supported the idea of using family class origin as a criterion in education advancement. As he said, "currently 70 percent of the university students are from landlord families or bourgeois families. This situation needs to be changed." ¹³ Nominally, the use of family class origin as an admission criterion was intended to narrow the gaps in educational attainment and income between different social classes. The children of landlord and rich-peasant families were more likely to do well on their entry exams than the children of poor-peasant and middle-peasant families, went the thinking, because their parents had a higher education level and could spend more time and money on their children's education. If family class origin was used as a criterion alongside academic performance, it might seem true that the children of different classes had comparable opportunities to go to college. However, things eventually moved to the opposite extreme: family class origin became the only criterion for school admission. In the Cultural Revolution, in contrast, the offspring of landlord and rich-peasant families were completely denied the opportunity of college education and had

¹³This number has never been justified. We will see in the data later that the offspring of landlord/rich-peasant families were more likely to have a college education than other groups, but the proportion was still much lower than 70 percent.

very little chance of advancing from lower secondary school to upper secondary school (Unger, 1982).

Besides employing family class origin as an important enrollment criterion, the CCP government utilized another technique to promote educational equality: expanding the educational system in the countryside. Thousands of schools were built from 1950 through the 1970s, and tens of thousands of graduates of lower or upper secondary schools in cities were sent down to the countryside to be teachers. Until 1970, almost every commune had its own lower secondary school, and every village had its own elementary school. In contrast to what was happening in the cities, there was a legitimate "Great Leap Forward" at this point in education in the countryside. Just like the failure of the "Great Leap Forward", however, many schools were shut down after the end of the Cultural Revolution.

The educational system returned to what it had been like before the Maoist era; universities began to recruit students, once again using the national entry exam. Academic performance once again became the only criterion for advancement through the educational system.

1.3 Research Framework

To study the impacts of the political movements discussed in the previous section on the intergenerational transmission of education within families, I divide the whole Chinese population into three generations: the first generation (the grandfather generation), who finished their education before the influence of any policies of the CCP regime kicked in; the second generation (the father generation) who grew up and were educated during the Maoist era, thus were heavily affected by the policies of the central government; the third generation (the child generation), whose education process was not affected. The analysis below follows this three-generation set-up. Here are two interesting topics that may occur to us regarding the series of political movements taking place in China from the early 1950s until the late 1970s.

First, we could study the long-term effects of these political movements by comparing the educational attainment of the offspring of different social classes who was not directly affected by the political turmoil. Two interesting related questions are.

(1). How did the families of former landlord and rich-peasant families react to class-based

social discrimination after the end of the Cultural Revolution, and did they try to protest by investing more in their children's education than the former poor-peasant and middle-peasant families?

(2). How did former poor-peasant families react to their loss of privilege after the end of the Cultural Revolution, and were they able to pass any advantage from the education they had acquired in the first 30 years of the CCP regime to their offspring?

These questions are meaningful because the answers to them help us understand how effective state intervention to promote education equality really is. The social-engineering-type intervention of the CCP regime during the Maoist era might be the biggest one in human history. It lasted for nearly 30 years, and directly affected a whole generation of the biggest population in the world. It not only expanded the educational system as most state interventions did, but it also intentionally gave priority to educating the offspring of those who had lower educational attainment, and intentionally made it extremely difficult for the offspring of former elite families to access upper-level education. Since 1977, the party has overthrown almost all the policies it relied on in the first 30 years of the regime and the educational system has been restored to something similar to what it was before the intervention of the central government, a fact that enables relatively clean identification of the long-term effects of state intervention. Meanwhile, I am interested in these questions because they give answers to how oppressed people react to "long standing deprivation". When talking about the long-term effect of state intervention in education or about former elite families' long-run reaction to the class-based discrimination that they experienced in the Mao period, I focus on two axes, direction and intensity. If I assume that the offspring of landlord and rich-peasant families would push back and rebound against the class-based social discrimination in education during the Maoist era, then I can have the following two hypotheses.

(1) The strength of rebound positively correlates with the degree of discrimination (the rebound is stronger where the previous generation suffered more greatly from discrimination),

(2) The strength of rebound negatively correlates with the degree of discrimination (a cultural resignation, or fatalism, rather than rebound or protest, is likely to occur where severe discrimination existed).

I borrow the terms of Sato and Li (2007) to call the first hypothesis the "Proportional Effect

Hypothesis" and the second hypothesis the "family resignation hypothesis".

Second, we can study the multigenerational effect of education by focusing on the effect of grandfathers' education on grandchildren's education. Assume that we use the following three simple linear models to characterize the multigenerational effect of education within a family,

$$Educ_{2} = \alpha_{0} + \alpha_{12} * Educ_{1},$$

$$Educ_{3} = \beta_{0} + \beta_{23} * Educ_{2},$$

$$Educ_{3} = \gamma_{0} + \gamma_{31} * Educ_{1}.$$

Coefficient α_{12} captures the effect of the first generation's education on the education of the second generation. Coefficient β_{23} captures the effect of the second generation's education on the education of the third generation. Coefficient γ_{31} captures the effect of the first generation's education on the education of the third generation. There are two hypotheses regarding the effect of the first generation's education on the education. There are two hypotheses regarding the effect of the first generation's education on the education of the third generation. The first states that grandfathers' education can only influence the educational attainment of their grandchildren through the second generation (the fathers), in a Markovian chain, so I call it Markovian Hypothesis. If the Markovian Hypothesis holds, then the effect of grandfathers' education on grandchildren's education is

$$\gamma_{31} = \alpha_{12} * \beta_{23}.$$

The other hypothesis states that grandfathers' education can influence grandchildren's education directly, not through the second generation; I call this the Non-Markovian Hypothesis. Under this hypothesis, if I assume that this direct effect is θ , based on the Non-Markovian Hypothesis, the effect of grandfathers' education on grandchildren's education is

$$\gamma_{31}=\alpha_{12}*\beta_{23}+\theta.$$

The interesting question here is whether the direct effect θ exists or not. Ideally, we could run three simple regressions and test the hypothesis $\gamma_{31} = \alpha_{12} * \beta_{23}$; however, since fathers' education is often endogenous, the estimators of α_{12} and β_{23} would be upwardly biased, making this a bad approach. However, what happened in China in the first 30 years of the CCP regime provides a great "natural experiment", an opportunity to test the validity of the Non-Markovian hypothesis. State intervention in education and class-based social discrimination significantly weaken the correlation between the education of the first and the second generations. In this case, α_{12} would be much smaller than the coefficient if there was no intervention. Ideally, α_{12} could be zero if the channel between the first two generations was completely shut down, which gives us a great opportunity to test the significance of the direct effect of the grandfathers' education on the educational attainment of grandchildren beyond intervening causal mechanisms through the fathers. Figure 1.2 illustrates the two hypotheses and how the Land Reform and the Cultural Revolution affected the transmission of education.

1.4 Data Description and Historical Cohorts

This study draws upon data from the 2010 baseline survey of the China Family Panel Studies (CFPS), a nationally representative, annual longitudinal survey of Chinese communities, families, and individuals. Designed to collect individual-, family-, and community-level longitudinal data in contemporary China, the CFPS project was launched in 2010 by the Institute of Social Science Survey (ISSS) of Peking University. The studies focus on the economic, as well as the non-economic, wellbeing of the Chinese population, with a wealth of information covering such topics as economic activities, education outcomes, family dynamics and relationships, migration, and health. The study covers 25 provinces and their administrative equivalences in China, excluding only Hong Kong, Macao, Taiwan, Qinghai, Xinjiang, Tibet, Inner Mongolia, Ningxia and Hainan, most of which are non-representative areas of China. Figure 1.3 illustrates the sampling structure of CFPS and explains why it is representative of the whole China population.¹⁴ There are two advantages of utilizing CFPS data to conduct this study. First, the survey provides detailed information about family class origins. Second, the survey contains information about education and occupation for all family members, no matter whether they are living in or outside the household. Therefore, the whole educational profile of the second and the third generation is available, which is a major advantage compared to the study of Sato and Li (2007) who only had information for family members living in households.

The first thing this empirical study to do is determining family class origin from the data. Since family class origin was inherited through the male line, I determine it as grandfather's reported class origin if the information is available. If the grandfather's origin information is not

¹⁴Henan, Gansu, Liaoning, and Guangdong are the four provinces with large samples. These four provinces are the most representative areas of central, western, northern and southeastern China, respectively.

available,¹⁵ I use the father's reported origin. If neither the grandfather nor the father has available family class origin information, I use the origins reported by the third generation. Only households with clearly-defined family class origins are retained in my sample, which includes 427 landlord and rich-peasant families, 1,376 middle-peasant families and 5,360 poor-peasant families from 25 provinces, 159 counties and 581 villages. Table 1.1 shows the distribution of family class origins in my sample. landlord and rich peasant families account for 6 percent of all the households included in the analysis, while the numbers for poor-peasant class and middle-peasant class are 19 percent and 75 percent. This distribution is very close to the distribution I discussed in the previous section. The table also shows the number of male observations for each generation for a given family class origin.¹⁶

To better utilize the impact of the political events in the Maoist era, I divide the sample into four historical cohorts based on the timing of different political events and on admission age to lower secondary school (13 years old).

1. **Pre-Maoist Cohort** (born before 1940). This cohort had reached 13 years old when the Land Reform was completed in 1953. Since very few people attended upper secondary school or colleges during the Maoist era, I concluded that this cohort were barely affected by the political events starting from 1950.

2. **Mid-Maoist Cohort** (born between 1940 and 1954). This cohort reached the age of 13 after the completion of the Land Reform and the beginning of the Cultural Revolution. This cohort went through all the political events discussed in the previous section except the Cultural Revolution. This is also the first cohort influenced by the Maoist state intervention in the educational system.

3. Late-Maoist Cohort (born between 1955 and 1964). This cohort reached 13 years old after the launch of the Cultural Revolution. The members of landlord and rich-peasant class in this cohort suffered the most severe discrimination and the worst violence.

4. **Post-Reform Cohort** (born between 1965 and 1984). This cohort reached 13 years old after the ending of the Cultural Revolution, when the old educational system and admission criterion had been adopted again and the family class origin system had been abolished. Note

¹⁵The survey only has family class origin information of members living in the household.

¹⁶Note that the most observations exist for the second generation. The reason is that household heads are males in the second generation, and the education information for all the brothers of household heads is available in data. However, if the brothers do not live in the households, I do not have information on their children.

that I set the left bound at the year 1984 to take into account the fact that people born after 1984 may still have not finished their education yet.

Table 1.2 summarizes the distribution of the male household members belonging to each historical cohort and the historical events associated with that cohort's formative years.

1.5 Empirical Results

In this section, I will report the basic results of my empirical analysis. Since in traditional Chinese culture, boys and girls were treated very differently, and education was considered not important for women in China for almost 2,000 years,¹⁷ even in rich families, a tradition that still prevailed in rural China during the Maoist era. Therefore, I only use education information for the males of the first generation and the second generation in the analysis.

1.5.1 Summary Statistics and Graphical Evidence

Table 1.3 shows some summary statistics for the education of males of each family class origin group by historical cohort. We can see that landlord and rich-peasant families had a clear advantage in the pre-Maoist era. They had almost two more years of schooling than the middlepeasant class and almost three years more than the poor-peasant class. There were significantly fewer illiterate males in the landlord and rich-peasant class than in the other two classes, and the landlord and rich-peasant class had the highest percentages of people completing each education level among all three classes. However, this promising situation reversed for the midand late-Maoist cohort. The males of landlord and rich-peasant class had the fewest years of schooling and the lowest percentage of upper secondary school and college enrollment. Then, things reversed again for the post-reform cohort. Although the difference between the educational attainment of landlord and rich-peasant class and that of middle-peasant class is unclear, the landlord and rich peasant class clearly regain their advantage over the poor-peasant class here.

¹⁷There are several reasons for this fact. First, receiving education was considered as the only approach to be a government official, while government positions were only offered to men. Second, skills of making a living were much more useful than education for most of the time during China's history. Third, a married woman was no longer seen as a member of her parents' family, so the parents might find the investment in girls' education was not worthwhile.

Figure 1.4 shows the time trends for years of schooling of participants by family class origin, in 5-year cohorts. The figure clearly visualizes the changes overtime discussed above. When we look at the first three cohorts, the figure shows that male members of landlord and rich-peasant families have 2 more years of education on average than males of middle-peasant families, and almost 3 more than males of poor-peasant families. Then starting with the 1940-1944 cohort, which was the first one affected by the policies of the Maoist era, the advantage of landlord and rich-peasant background in education was gone, and the middle-peasant class became the most-educated class. This development is unsurprising, since the middle-peasant class were actually the wealthiest class after the Land Reform and, as the allies of the revolutionary class, were less concerned about their safety in violent class struggles. The trend for landlord and rich-peasant continues going downward, while the trends for the other two classes keep climbing. The 1955-1959 cohort reached 13 years of age in the first five years of the Cultural Revolution, the worst years for the landlord and rich-peasant class during this decade of turmoil. In this cohort, the males of landlord and rich-peasant families had one less year of education than the males of the poor-peasant class, and had two less years than the males of the middle-peasant class. Among all the men born between 1950 and 1964, those of the landlord and rich-peasant class had the fewest average years of education. However, males of the landlord and rich-peasant class, born in the next five years, regained their advantage in educational attainment over the poor-peasant class. Ten years later, the landlord and rich-peasant class was once again the most-educated class in rural China. Besides years of schooling, I used another measure of educational attainment, an indicator variable distinguishing those who did and did not obtain any upper secondary education. Figure 1.5 shows the trend in the percentage of males who had an upper secondary school certificate by family class origin. The trend is very similar to the trend for years of schooling.¹⁸

As the evidence presented above shows, there was a marked decline and indeed a disappearance of the advantage in educational attainment of the landlord and rich-peasant class during the Maoist era. However, it appears that for males born after 1965, which I call the post-reform cohort, the effects of all the political movements and the state intervention in education discussed above have been completely eliminated, and the offspring of landlord and rich-peasant

¹⁸The percentage of the landlord/rich peasant class dropped dramatically for the 1930-1934 cohort. An explanation for this observation is the civil war between the Communists and Nationalists, since this cohort of people would have reached 16 years of age between 1946 and 1950.

families have rebounded to regain their advantage over both the middle- and the poor-peasant class.

1.5.2 Ordinary Least Square Results

In this subsection, I will present the OLS regression results for the following two regressions,

$$Educ_{c} = \alpha_{0} + \alpha_{1} * Educ_{f} + \alpha_{2} * Educ_{f} * D(middle) + \alpha_{3} * Educ_{f} * D(rich) + \alpha_{4} * X + e,$$

and

$$Educ_{gc} = \beta_0 + \beta_1 * Educ_f + \beta_2 * Educ_f * D(middle) + \beta_3 * Educ_f * D(rich)$$
$$+ \beta_4 * Educ_{gf} + \beta_5 * Educ_{gf} * D(middle) + \beta_6 * Educ_{gf} * D(rich)$$
$$+ \beta_7 * X + u,$$

in which $Educ_c$, $Educ_f$, and $Educ_{gf}$ respectively represents the education of children, fathers and grandfathers; D(middle) and D(rich) are class origin dummy variables with the poorpeasant class as the excluded control group; and X represents other individual-level and countylevel control variables. Note that all father-son pairs were able to enter the first regression, including grandfather-father pairs.¹⁹ Two measures of educational attainment were used: years of education completed and a dummy variable for whether or not the individual finished upper secondary education. 24,054 father-son pairs were used in the two-generation regression, and 5,004 grandfather-father-son triplets were used in the three-generation regression.

Table 1.4 shows the results of two-generation regressions of son's years of school completed on family class origin and father's years of school completed. Son's age was controlled for the common trend in education of all three classes. County fixed effects were applied and robust standard errors were clustered at county level.²⁰ Columns (1), (3), (5), and (7) show the mean differences in years of schooling between the sons of different classes by historical cohorts. We can see a similar trend as we saw in table 1.3 and figure 1.4: For the pre-Maoist cohort, the landlord and rich-peasant class were 2.5 years ahead of the poor-peasant class in average years of schooling. Then, the mid-Maoist cohort of the landlord and rich-peasant

¹⁹I also run the regression with only father-son pairs which show up as the first two generations of all the grandfather-father-son triplets, and achieved similar results.

²⁰Counties were the lowest-level administration units that had their own "revolution committees" in the Cultural Revolution. "Revolution committees" were in charge of making policies and to a great degree of directing the persecution and violence, so the degrees of discrimination varied at county level.

class lost this advantage and declined to the same level as the poor-peasant class. With all the policies favoring them in the Cultural Revolution, the late-Maoist cohort of poor peasants obtained a significant 0.85-year advantage in years of schooling over the landlords and rich peasants. However, turning to the post-reform cohort, the former elite class rebounded until it had one more year of education than the poor-peasant class on average. The interactions between father's education and family origin are included in other regressions.

Column (2) reports the result for pre-Maoist-cohort sons. The coefficients of landlord/richpeasant origin and father's years of education are significant, but there is no difference in effect of father's education on son's education among the three classes. Family class origin is a good proxy for family's economic status in pre-Maoist era. The findings imply that education is transmitted in landlord and rich-peasant families both through the family's economic status and through the previous generation's education.

Column (4) reports the results for mid-Maoist-cohort sons and pre-Maoist-cohort fathers. Class-based social discrimination is confirmed by the changes to the coefficients. The coefficient of the landlord/rich-peasant class origin is no longer statistically significant since their assets were confiscated and their economic advantage was gone. The coefficient of father's education is still significant, but much smaller than in the regression of the pre-Maoist cohort, which confirms my argument that the policies in Maoist era weakened the father-son correlation in education. It is noteworthy that with a negatively significant coefficient for the interaction of father's education and landlord/rich-peasant origin, the correlation between father's education and son's education in the landlord and rich-peasant class is almost zero, which suggests that the landlord and rich-peasant class' transmission path through the previous generation's education was completely shut down.

Column (6) reports the results for late-Maoist-cohort sons and pre-Maoist-cohort fathers, which are similar to the results for the previous cohort. The coefficient of landlord/rich-peasant origin is negatively significant at the 1 percent level, implying that class-based discrimination was more severe in the late-Maoist cohort than in the mid-Maoist cohort. The correlation between son's education and father's education is even weaker than in the previous cohort and the correlation for the landlord and rich-peasant class is still close to zero.

Columns (8), (9) and (10) report the results for the sons of post-reform cohort, while column (8) corresponds to the fathers of pre-Maoist cohort; column (9) corresponds to the fathers
of mid-Maoist cohort; and column(10) corresponds to the fathers of late-Maoist cohort. Therefore, we have three coefficients of landlord/rich-peasant origin. The coefficients in column (9) and column (10) are significant, while the coefficient in column (8) is insignificant. It is clearly shown that sons of landlord and rich-peasant families who completed education in the post-reform era are more likely to achieve higher educational level. The finding also implies a psychological rebound of landlord and rich-peasant class against the class-based discrimination during the Maoist era. I use the word "psychological", since with all the adversities they went through in the past 25 years, landlord and rich-pesant families had nothing to rely on except their stronger incentives to encourage their sons education to make up for what they had lost. The coefficient in column (8) is insignificant since the fathers of pre-Maoist cohort did not suffer from discrimination. The coefficient in column (10) is the largest among the three, which suggests that there might be a positive correlation between the degree of discrimination and the strength of rebound and partially confirms the "Proportional Effect Hypothesis" discussed in the research framework section.

If we focus on the middle-peasant class, we will find that the middle-peasant class is just like another poor-peasant class with higher educational attainment. The coefficients of middle-peasant origin in columns (1), (3), (5), and (7) are all positively significant and at a comparable level, which means the middle-peasant class had a stable advantage in educational attainment over the poor-peasant class. This confirms that the middle-peasant class did not suffer the discrimination and violence during the Maoist era, and their higher economic status gave them higher educational status than the poor-peasant class. The coefficients of the interaction between father's education and middle-peasant origin are all positive in Columns (8), (9) and (10), which implies that the middle-peasant class value the educational attainment they obtained during the Maoist era and have a more positive attitude towards their offspring's education than the poor-peasant class.

The results of regressions with dummy variable for whether or not the individual finished upper secondary education as the dependent variable are reported in table 1.5. Father's and grandfather's education are still measured by years of school completed. To avoid the bias from the county fixed effect, I used a linear probability model instead of a probit or logit model.²¹ The results are very similar to the years of schooling regressions and all the implications

²¹Fixed effects cannot typically be added to a traditional probit model without inducing bias in the coefficients

discussed above can be applied as well.

Table 1.6 shows the results of three-generation regressions of son's or daughter's years of school completed on family class origin, father's years of schooling and grandfather's years of schooling. Counties' GDP per capita and family wealth are also controlled in these regressions. Columns (1), (2), and (3) report the results for sons and Column (4), (5), and (6) report the results for daughters. All sons and daughters here belong to the post-reform cohort and all grandfathers belong to the pre-Maoist cohort. Columns (2), (5) correspond to the fathers of the mid-Maoist cohort, and columns (3) and (6) to the fathers of the late-Maoist cohort.

The coefficients of grandfather's education in columns (1), (2), and (3) are positive and statistically significant, which suggests a direct effect of grandfather's education on grandson's education beyond the effect on father's education in poor-peasant families (the omitted group). Given the weak correlation between the educational attainment of the first two generations, the coefficients of grandfather's education would have been much smaller if there was no direct effect and the Markovian Hypothesis was correct. The multigenerational effect was particularly strong within landlord and rich-peasant families. As column (3) shows, father's education has no effect on son's education in landlord and rich-peasant families if the father belongs to the late-Maoist cohort, while the coefficient of grandfather's education is almost 0.2 and statistically significant. We can also observe a positively significant effect of grandfather's education on daughter's education in landlord and rich-peasant families. As column (4) shows that one more year in grandfather's education would lead to about 0.22 more year in daughter's education. As I mentioned in the discussion about table 1.4, the channel of transmission of education between the first two generations of landlord and rich-peasant families was completely shut down, so the positively significant multigenerational effect of education in landlord and rich-peasant families is strong evidence that grandfather's education can influence their grandchildren's education directly.

Table 1.6 also shows a rebound in the educational attainment of the offspring of landlord and rich-peasant families. The coefficients of father's education are all positive and statistically significant for both the middle-peasant class and the poor-peasant class. Therefore, it is not that poor peasants and middle peasants gave up their advantages acquired during the Maoist era, but

and standard errors. This is known in econometrics as incidental parameters bias and has been understood as a complication for nonlinear maximum likelihood models (Lancaster, 2000).

it is that the rich-peasant class pushed back to close the gap. It is interesting that two different types of rebounds are observed. One is a common effect throughout the whole landlord and rich-peasant class, which is captured by the coefficient of landlord/rich-peasant origin. I call this type of rebound "psychological rebound" because it most likely comes from a kind of psychological orientation shared by the entire class to protest the discrimination and violence against them during the Maoist era. This type of rebound is most pronounced if the second generation belongs to the late-Maoist cohort. The other type of rebound is through a much stronger effect of grandfather's education than its effect in poor-peasant and middle-peasant families. Since landlord and rich-peasant families lost all their economic and social capital during the Maoist era, the high educational level of the first generation was not transferred into high economic and social status of the second generation. In this situation, the high educational attainment of the first generation is most likely to represent a kind of family culture in which people value education and have high willingness to invest in education. I call this type of rebound "family culture rebound"; it is most pronounced if the second generation belong to mid-Maoist cohort. These two types rebounds can be observed among both males and females of the third generation of landlord and rich-peasant families.

1.6 Discussion

In this section, first I will discuss the magnitude of the rebound effect on the educational attainment of the offspring of landlord and rich-peasant class. I will focus on the "psychological rebound" discussed in the previous section.

First, I want to take up the same method used by Sato and Li (2007). In China, it is very common for many families in a village to share the same ancestry and thus the same surname. Based on this fact, I divide all the villages into the following two groups.

(1) **Non-multisurname villages**, villages where families with the most commonly occurring surnames comprise more than half of the total number of families.

(2) **Multisurname villages**, villages where families with the most commonly occurring surnames comprise less than half of the total number of families.

Based on the above classification, there are 479 multisurname villages and 156 non-multisurname

villages in my sample. The assumption behind this classification is that class-based discrimination could be mitigated where a strong kinship relationship exists between landlord and rich-peasant families and other families (Li and Sato, 2007). If my assumption is true, comparing the magnitude of the "psychological rebound" in non-multisurname villages with that in multisurname villages can give us some insight into the relation between the strength of rebound and the degree of discrimination. Table 1.7 shows the results of regressions of son's education on father's education and family class origin by village type. The results support our assumption that kinship relationship could mitigate class-based discrimination. The negative effect of landlord/rich peasant origin is stronger in multisurname villages for both the mid- and late-Maoist cohort. And for the post-reform cohort, landlord/rich peasant origin has a stronger positive effect in multisurname villages. Therefore, the strength of rebound is positively correlated with the degree of discrimination.

Second, I want to use a dataset developed by Walder and Su (2003) to get information about degree of discrimination and violence across regions during the Cultural Revolution. Walder and Su (2003) built a county-level dataset digitized from regional gazetteers published during the late-1980s. Among other information, the dataset contained the number of reported deaths caused by violent struggle in each county during the Cultural Revolution. I do not have access to the specific numbers of deaths in each county; I only have the information on average reported deaths per county for each province. Figure 1.6 shows the variation in number of deaths across province. Based on the average number of deaths per county, I divide provinces into the following two groups.

(1) **High-violence provinces**, provinces with more than 80 average reported deaths per county.

(2) **Low-violence provinces**, provinces with less than 20 average reported deaths per county.

High-violence provinces include Shaanxi, Liaoning, Hunan, Guangdong, Guangxi and Yunan. Low-violence provinces include Anhui, Hubei, Guizhou, Zhejiang and Shandong. Table 1.8 shows the results of regressions of son's education on father's education and family class origin by province type. It is clear that landlord/rich-peasant origin has a much stronger negative effect for the late-Maoist cohort in high-violence provinces. However, in the postreform cohort, the positive effect of landlord/rich-peasant origin in high-violence provinces is comparable to the effect in low-violence provinces. Again, the regression results suggest that the strength of rebound positively correlates with degree of discrimination. It seems that the "Proportional Effect Hypothesis" has been justified, and the "Family Resignation Hypothesis" rejected.

Last but not least, I want to discuss the effect of family class origin on educational attainment in the current young generation, people who were born after 1984 and were younger than 25 years old when the survey was conducted. We can call this the extensive-long-term effect of family class origin. Table 1.9 shows the results of regressions of the education of sons born between 1985 and 1990 on father's education and family class origin. The dependent variable of equation (1) is son's years of schooling, and the dependent variables of equation (2), (3), (4), and (5) are dummy variables for different levels of educational attainment. To avoid bias caused by county fixed effect, I use a linear probability model instead of a probit or logit model. The results show that most of the coefficients of family class origins are insignificant. The offspring of former rich-peasant families and middle-peasant families still have some advantage over the offspring of poor-peasant families, but the effect of family class origin is much smaller. The large-scale expansion of the educational system in rural China in the 1990s might be a reasonable explanation for this. I believe that social origin will come to matter less and less for educational attainment as the Chinese educational system continues expanding. Finally, it was policies promoting educational expansion to all groups and across all groups, and not policies favoring one social group over another that ultimately had the greatest impact on increased equality of educational opportunity (Deng and Treiman, 1997).

1.7 Conclusion

In this paper, I investigate the effect of family class origin—a legacy of the Maoist era—on educational attainment in rural China. In contrast to the conventional belief that, beginning with the Cultural Revolution, the educational attainment of Chinese people became highly egalitarian with respect to social origins, this paper argues that family class origin had a significant effect on educational achievements both during and after the Maoist era. Because of classbased discrimination and violence against them, the members of landlord and rich-peasant families had significantly lower educational attainment during the Maoist era than the members of poor-peasant and middle-peasant families. However, although the Maoist era destroyed considerable economic and social capital, the children of landlords and rich-peasant families rebounded, successfully finishing more years of education than the children of poor-peasant and middle-peasant families. This paper finds evidence of a positive correlation between the degree of hostility and discrimination towards rich-peasant families and the strength of their recovery.

During the Maoist era, the CCP regime made the most drastic attempt the world has yet seen to reduce the intergenerational transmission of advantage, at the cost of enormous human suffering and economic recession. However, particularly strong multigenerational effects of education in landlord and rich-peasant families made this attempt a major failure. I attribute the rebound in educational attainment of the landlord and rich-peasant class to a class-specific family culture, in which people value education and are willing to invest in their children's future. As China's educational system expanded in the 1990s, I find a tendency for family class origin to become less important for educational attainment among the current young generation. It is ironic that the CCP regime made a similar attempt to expand the educational system during the Maoist era. Without the discriminatory policies, China might have succeeded in eliminating the class differences in educational achievement long before.



Figure 1.1: Sampling of China Family Panel Studies

Figure 1.2: Sampling of China Family Panel Studies

Non-Markovian Hypothesis





Figure 1.3: Sampling of China Family Panel Studies



Figure 1.4: Trend of Years of Schooling by Family Class Origin

Figure 1.5: Percentage of Males with Upper Secondary School Certificate by Family Class Origin





Figure 1.6: Average Reported Deaths Per County in the Cultural Revolution

		Family Clas	s Origin
	Landlord/Rich Peasant	Middle Peasant	Poor Peasant
Household	427(5.96%)	1376(19.21%)	5360(74.83%)
Generation 1	308	1052	3978
Genreation 2	977	3111	12431
Generation 3	466	1653	5417

Table 1.1: Distribution of Family Class Origins

Note:

The first row of the table reports the proportions of families belong to different family origins.

The frist, the second, the third, and the fourth row report the number of male household members in each generation of a given family class origin.

Birthyear	Year of 13th Birthday	Historical Events	Number of Male
			Household Heads
Pre-maoist Cohort			
Before 1940	Before 1953	The founding of PRC	417 (5.82%)
Mid-maoist Cohort			
1940-1954	1953-1967	1950-1953: The Land	1589 (22.16%)
		Reform	
		1958-1961: The Great	
		Leap Forward	
		1960-1962: The Anti-	
		rightist Movement	
		1963: Four Cleanups	
		Movement	
Late-maoist Cohort			
1955-1964	1968-1977	1967-1977: The Great	2008 (28.01%)
		Cultural Revolution	
Post-reform Cohort			
1965-1984	1978-1997	1977: The Ending of the	3516 (44.02%)
		Cultural Revolution	
		1978: Economic Reform	

Table 1.2: Historical Cohorts and Events

		Family Cla	ass Origin
Historical Cohort	Landlord/Rich Peasant	Middle Peasant	Poor Peasant
Pre-Maoist Cohort	327	1158	3623
Years of Schooling	4.80	3.08	2.05
Illiterate	48.93%	59.15%	71.38%
Elementary School	30.89%	27.81%	21.03%
Lower Secondary School	10.40%	7.17%	4.72%
Upper Secondary School	6.42%	4.15%	2.21%
University/College	3.36%	1.73%	0.66%
Mid-Maoist Cohort	396	1271	4177
Years of Schooling	4.71	5.47	4.63
Illiterate	35.35%	29.82%	39.69%
Elementary School	42.42%	37.77%	33.90%
Lower Secondary School	17.93%	24.47%	20.18%
Upper Secondary School	3.28%	6.37%	5.20%
University/College	1.01%	1.57%	1.03%
Late-Maoist Cohort	347	1266	4642
Years of Schooling	6.05	7.69	6.93
Illiterate	22.48%	14.86%	21.26%
Elementary School	29.68%	24.74%	25.33%
Lower Secondary School	35.45%	38.26%	35.07%
Upper Secondary School	11.24%	18.97%	16.63%
University/College	1.15%	3.16%	1.70%
Post-reform Cohort	766	2396	10431
Years of Schooling	7.94	7.90	7.00
Illiterate	15.60%	13.09%	18.05%
Elementary School	26.46%	24.77%	30.24%
Lower Secondary School	38.17%	44.05%	39.27%
Upper Secondary School	10.88%	10.21%	7.82%
University/College	8.89%	7.88%	4.62%

Table 1.3: Family Class Origin and Education Level of Male Household Members

Note:

The percentages in the table are the proportions of male household members with a certain level of education in a given cohort and a given family class origin.

Dependent Variable					Years of	Education C	ompleted			
	Pre-maoi	st Cohort	Mid-maoi	st Cohort	Late-mao	ist Cohort		Post-	reform Cohort	
	(1)	(2)	(3)	(4)	(5)	(9)	(7)	(8)	(6)	(10)
age	-0.110***	-0.106^{**}	-0.0152	0.013	-0.183***	-0.180***	-0.125***	-0.0661***	-0.112***	-0.0509***
	(0.029)	(0.043)	(0.015)	(0.019)	(0.015)	(0.018)	(0.004)	(0.017)	(0000)	(0.017)
Middle Peasant	1.490***	1.117^{**}	0.760***	0.694^{***}	0.749***	0.664***	0.781***	0.586***	0.236	-0.261
	(0.302)	(0.456)	(0.143)	(0.209)	(0.131)	(0.186)	(0.086)	(0.225)	(0.216)	(0.380)
Landlord/Rich Peasant	2.425***	1.485*	0.102	0.61	-0.835***	-1.161***	0.980***	0.205	1.130^{***}	1.469^{**}
	(0.468)	(0.865)	(0.230)	(0.401)	(0.231)	(0.429)	(0.143)	(0.403)	(0.349)	(0.591)
Father's Education		0.338***		0.163^{***}		0.115***		0.121***	0.203***	0.210^{***}
		(0.095)		(0.033)		(0.022)		(0.021)	(0.016)	(0.020)
Father's Education*		0.0522		-0.0483		-0.0504		0.0824^{**}	0.0459	0.0751*
Middle Peasant		(0.162)		(0.051)		(0.040)		(0.041)	(0.034)	(0.045)
Father's Education*		0.128		-0.216***		-0.0756		0.0647	0.000688	-0.0979
Landlord/rich Peasant		(0.187)		(0.071)		(0.065)		(0.063)	(0.060)	(0.079)
	(2.390)	(3.416)	(1.059)	(1.378)	(0.936)	(1.103)	(0.332)	(0.877)	(0.581)	(0.839)
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,091	634	4,456	2,766	5,862	4,096	12,645	3,447	4,815	2,374
Note: This table reports	the results or	f the regress	ions of son's	education o	n fathers' ed	ucation and f	amily class c	origin. Column	ns (1) and (2) re	port the results for
sons who belong to the j	pre-Maosit c	ohort. Colur	nn (4) report	the results f	or sons who	belong to the	e mid-Maosit	cohort and wl	hose fathers bel	ong the pre-Maoist
cohort. Column (6) repc	orts the result	s for sons w	ho belong to	the late-Ma	osit cohort a	nd whose fatl	hers belong t	o the pre-Mao	ist cohort. Colu	umns (8), (9), and
(10) report the results fc	or sons who b	elong to the	post-reform	cohort and v	whose father	s belong to th	ne pre-Maois	t cohort, the m	nid-Maoist coho	ort, and the
late-Maoist cohort, resp	ectively. Rob	oust standard	errors are in	n parentheses	s. *** Denot	es statisticall	y significant	at the 1% leve	il, ** at the 5%	level, $*$ at the 10%

Table 1.4: Two-generation OLS Regression of Male Household Members' Education by Historical Cohorts

Dependent Variable				With Upper :	Secondary Sch	1001 Certificate	(Dummy Vari	iable)		
	(1)	(2)	(3)	(4)	(5)	(9)	(7)	(8)	(6)	(10)
age	-0.000715	-0.000708	0.000305	0.00127	-0.00366**	-0.00399**	-0.0109***	-0.00400^{***}	-0.00929***	-0.00877***
	(0.00325)	(0.00328)	(0.00097)	(0.00131)	(0.00145)	(0.00179)	(0.00043)	(0.00151)	(0.00102)	(0.00210)
Middle Peasant	0.0241	0.0177	0.011	0.0119	0.0279**	0.0299	0.0426^{***}	0.0107	0.0114	-0.0816^{**}
	(0.025)	(0.026)	(6000)	(0.014)	(0.014)	(0.019)	(6000)	(0.018)	(0.021)	(0.040)
Landlord/Rich Peasant	0.0627	0.000321	-0.0331^{***}	-0.00381	-0.0758***	-0.0388	0.0599***	-0.038	0.0874^{**}	0.161^{**}
	(0.045)	(0.057)	(0.012)	(0.020)	(0.020)	(0.038)	(0.016)	(0.032)	(0.037)	(0.078)
Father's Education		0.0136*		**60900.0		0.00952***		0.00729***	0.0115***	0.0177^{***}
		(0.00762)		(0.00278)		(0.00241)		(0.00194)	(0.00166)	(0.00262)
Father's Education*		0.00512		-0.00633*		-0.00734*		0.00813*	0.00315	0.0137^{***}
Middle Peasant		(0.01400)		(0.00357)		(0.00425)		(0.00422)	(0.00354)	(0.00526)
Father's Education*		0.0206		-0.00691		-0.0141***		0.00839	-0.00446	-0.011
Landlord/rich peasant		(0.01610)		(0.00431)		(0.00531)		(0.00622)	(0.00698)	(0.01120)
County Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	634	634	4,456	2,766	5,862	4,096	12,645	3,447	4,815	2,374
		;				.	:			:

Table 1.5: Linear Probability Regression of Son's Upper Secondary Schools Certificate

fathers belong to the pre-Maoist cohort. Columns (8), (9), and (10) report the results for sons who belong to the post-reform cohort and whose fathers belong to Note: This table reports the results of the linear probability regressions of son's upper secondary school certificate(dummy) on fathers' education and family mid-Maosit cohort and whose fathers belong the pre-Maoist cohort. Column (6) reports the results for sons who belong to the late-Maosit cohort and whose class origin. Columns (1) and (2) report the results for sons who belong to the pre-Maosit cohort. Column (4) report the results for sons who belong to the the pre-Maoist cohort, the mid-Maoist cohort, and the late-Maoist cohort, respectively. Robust standard errors are in parentheses. *** Denotes statistically significant at the 1% level, ** at the 5% level, * at the 10% level. Source: China Family Panel Studies (2010)

Dependent Variable			Years of Educ	cation Complete	d	
	Third	d Generation N	lales	Third	Generation Fe	emales
	(1)	(2)	(3)	(4)	(5)	(6)
age	-0.0712***	-0.0850***	-0.0634***	-0.130***	-0.155***	-0.0526**
	(0.007)	(0.016)	(0.022)	(0.007)	(0.016)	(0.023)
Middle Peasant	0.282	0.324	-0.328	0.304	0.756**	-0.901*
	(0.217)	(0.345)	(0.486)	(0.230)	(0.372)	(0.517)
Landlord/Rich Peasant	0.597	0.407	1.734*	0.632	-0.149	1.922**
	(0.386)	(0.631)	(0.897)	(0.404)	(0.681)	(0.964)
Grand Father's Education	0.0776***	0.107***	0.0956***	0.00532	0.0355	0.00175
	(0.019)	(0.041)	(0.033)	(0.020)	(0.044)	(0.036)
Grand Father's Education*	-0.0845**	-0.0529	-0.057	-0.035	-0.0397	0.0244
Middle Peasant	(0.033)	(0.061)	(0.060)	(0.034)	(0.062)	(0.067)
Grand Father's Education*	0.121**	0.144*	0.0772	0.219***	0.312***	0.0439
Landloard/Rich Peasant	(0.052)	(0.086)	(0.104)	(0.055)	(0.102)	(0.111)
Father's Education	0.211***	0.252***	0.210***	0.263***	0.321***	0.250***
	(0.015)	(0.030)	(0.026)	(0.016)	(0.032)	(0.029)
Father's Education*	0.0494*	0.00912	0.0734	0.0287	-0.0909	0.177***
Middle Peasant	(0.03)	(0.06)	(0.06)	(0.03)	(0.06)	(0.06)
Father's Education*	-0.0624	-0.00815	-0.202**	-0.0988*	-0.00167	-0.0678
Landloard/Rich Peasant	(0.054)	(0.099)	(0.094)	(0.057)	(0.108)	(0.109)
GDP Per Capital of County	0.0106	-0.00286	0.0229	-0.0456	-0.0523	-0.0796
(thousand dollars)	(0.028)	(0.057)	(0.052)	(0.030)	(0.058)	(0.056)
Family Wealth	0.000118	0.00108***	-0.000205*	0.000269***	0.00154***	0.000392***
(thousand dollars)	(0.0001)	(0.0004)	(0.0001)	(0.0001)	(0.0004)	(0.0001)
Constant	10.43***	11.46***	9.354***	10.38***	11.12***	8.809***
	(0.459)	(0.905)	(0.958)	(0.514)	(0.912)	(1.165)
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,004	1,813	1,495	4,166	1,513	1,261
Adjusted R-squared	0.23	0.24	0.249	0.376	0.38	0.376

Table 1.6: OLS Regression of the Education of the Third Generation

Note: This table reports the results of the regressions of grandchildren's education on father's education, grandfather's education and family class origin. Only the third-generation household members who belong to the post-reform cohort are used in regressions. Columns (1)-(3) are results for sons and columns (4)-(6) are results for daughters. Column (2) and (5) report the results for sons and daughters with fathers belonging to the mid-Maoist cohort and grandfathers belonging to the pre-Maoist cohort. Column(3) and (6) report the results for sons and daughters are in parentheses. *** Denotes statistically significant at the 1% level, ** at the 5% level, * at the 10% level.

Dependent Variable			Years of Educ	cation Compl	eted	
	Mid-Mac	oist Cohort	Late-Mao	ist Cohort	Post-refo	rm Cohort
	Multi	Non-multi	Multi	Non-multi	Multi	Non-multi
	(1)	(2)	(3)	(4)	(5)	(6)
age	-0.02	0.022	-0.153***	-0.193***	-0.0993***	-0.0919***
	(0.030)	(0.022)	(0.029)	(0.022)	(0.005)	(0.007)
Middle Peasant	1.045***	0.460**	0.998***	0.522***	0.690***	0.463***
	(0.279)	(0.228)	(0.222)	(0.186)	(0.116)	(0.139)
Landlord/Rich Peasant	-0.968**	-0.161	-2.019***	-1.267***	1.329***	0.511**
	(0.493)	(0.378)	(0.487)	(0.328)	(0.208)	(0.253)
Father's Education	0.150***	0.0599**	0.0724***	0.115***	0.187***	0.164***
	(0.040)	(0.029)	(0.027)	(0.021)	(0.011)	(0.015)
GDP Per Capital of County					0.000541	-0.000649
(thousand dollars)					(0.023)	(0.047)
Family wealth					1.71E-05	0.00121***
(thousand dollars)					(0.00005)	(0.00026)
Constant	1.242	1.356	16.34***	15.96***	11.40***	9.652***
	(1.836)	(1.534)	(2.576)	(1.238)	(0.368)	(2.132)
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,052	1,117	2,878	1,717	7,206	4,012
Adjusted R-squared	0.14	0.18	0.14	0.17	0.22	0.25

Table 1.7: OLS Regression of Son's Education by Multisurname and Non-multisurname Villages

Note: This table reports the results of OLS regressions of son's education on father's education and family class origin by the type of vaillages. Column (1)(3)(5) report the results of multisurname villages and column (2)(4)(6) report the results of non-multisurname villages. Robust standard errors are in parentheses.

*** Denotes statistically significant at the 1% level, ** at the 5% level, * at the 10% level.

Dependent Variable			Years of Edu	ucation Comp	pleted	
	Mid-N	Maoist	Late-I	Maoist	Post-re	eform
	Low-vio	High-vio	Low-vio	High-vio	Low-vio	High-vio
	(1)	(2)	(3)	(4)	(5)	(6)
age	-0.04	-0.00839	-0.279***	-0.123***	-0.121***	-0.0878***
	(0.041)	(0.032)	(0.041)	(0.031)	(0.011)	(0.008)
Middle Peasant	1.318***	0.901***	1.293***	0.408	0.983***	0.481***
	(0.380)	(0.346)	(0.320)	(0.268)	(0.226)	(0.169)
Landlord/Rich Peasant	0.49	0.782	0.303	-1.457***	0.849**	0.654**
	(0.547)	(0.510)	(0.710)	(0.430)	(0.386)	(0.318)
Father's Education	0.0149	0.0957**	0.0241	0.110***	0.194***	0.164***
	(0.053)	(0.038)	(0.044)	(0.027)	(0.023)	(0.016)
GDP Per Capital of					-0.0477	0.113***
County (thousand dollars)					(0.044)	(0.033)
Family wealth					0.000716***	0.0002490
(thousand dollars)					(0.00027)	(0.00024)
Constant	5.234*	0.537	20.28***	12.28***	11.93***	11.62***
	(2.667)	(2.044)	(2.083)	(1.596)	(0.529)	(2.137)
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	541	853	761	1,322	1,741	3,066
Adjusted R-squared	0.106	0.104	0.154	0.11	0.268	0.183

Table 1.8: OLS Regression of Son's Education by High-violence and Low-violence Proinvces

Note: This table reports the results of OLS regressions of son's education on father's education and family class origin by the type of provinces. Column (1)(3)(5) report the results of low-violence provinces and column (2)(4)(6) report the results of high-violence provinces. Robust standard errors are in parentheses.

*** Denotes statistically significant at the 1% level, ** at the 5% level, * at the 10% level.

Dependent Variable	Years of Schooling	Illiterate	Elemenrary	Lower Secondary	Upper Secondary
	(1)	(2)	(3)	(4)	(5)
age	-0.030	0.0023	0.0004	0.0174**	-0.0201***
	(0.048)	(0.003)	(0.006)	(0.007)	(0.006)
Middle Peasant	0.241	-0.0044	-0.0821***	0.0966***	-0.0101
	(0.219)	(0.013)	(0.022)	(0.032)	(0.030)
Landlord/Rich Peasant	0.456	0.0211	-0.107***	0.0254	0.0603
	(0.403)	(0.026)	(0.035)	(0.058)	(0.056)
Father's Education	0.268***	-0.0126***	-0.0165***	0.00606**	0.0231***
	(0.024)	(0.002)	(0.002)	(0.003)	(0.003)
GDP Per Capital of County	0.161***	-0.00469**	-0.00908***	-0.0039	0.0177***
(thousand dollars)	(0.039)	(0.002)	(0.003)	(0.004)	(0.005)
Family wealth	0.00034	-0.00001	-0.00003	-0.00001	0.00005
(thousand dollars)	(0.000258)	(0.000006)	(0.000017)	(0.000022)	(0.000035)
County FE	Yes	Yes	Yes	Yes	Yes
Observations	1,698	1,698	1,698	1,698	1,698
Adjusted R-squared	0.111	0.059	0.046	0.009	0.062

Table 1.9: Regressions of Son's (born between 1985-1990) Education on Family Class Origin

Note: This table reports the results of regressions of son's education on family class origin and father's education. Only sons born between 1985-1990 were used in the regressions. Regressions (2), (3), (4), and (5) are linear probability models. Observations with above upper secondary education are also included in regression (5). Robust standard errors are in parentheses.

*** Denotes statistically significant at the 1% level, ** at the 5% level, * at the 10% level.

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CHAPTER 2

Medical Insurance and Consumption: Case of China

2.1 Introduction

The relationship between insurance, consumption and saving is an important topic. One of the pioneering works is Hamermesh (1982), which discussed the effect of unemployment insurance on consumption under a permanent-income hypothesis framework. Hubbard et al. (1995) later introduced uncertainty into the literature and argued that precautionary saving motives largely account for heterogeneity in saving.¹ To my knowledge, the most recent development is Somerville (2004), which discussed the optimal insurance-consumption-saving decision in terms of continuous time instead of discrete time.

In addition to its theoretical importance, the politics implication of medical health insurance is of great concern as well. China, the largest and the most populous developing country, is seeking economic transition from an export-oriented economy to a consumption-oriented economy. It is also trying to build up a "harmonious society" which aims to reduce inequality and improve national welfare. However, both processes are hampered by the problem of the "expensiveness and difficulty in obtaining medical service" (*Kan Bing Gui, Kan Bing Nan*). This partially explains the high saving rate in China.² As a result, by increasing the coverage of medical insurance or setting up a national social medical insurance scheme, people are willing to take their savings out of the bank. Actually, previous research does provide some evidence on the positive effect of the insurance upon the economy (Outreville, 1990; 1996; Ward and Zurbruegg, 2000).

Despite its importance, empirical research on medical insurance is sparse, especially among

¹Two more improvements include Dynan et al. (2002), which considers the role of bequests, and Ryan and Vaithianathan (2003), which replaces the expected utility form with a rank dependent utility form to overcome some unsatisfactory properties of the expected utility theory.

²Chamon and Prasad (2010) showed that the patterns "are best explained by the rising private burden of expenditures on housing, education, and health care."

developing countries. In developed world, studies on the correlation between consumption and insurance include Ariizumi (2008), Dynarski and Sheffrin (1987)³ and Guariglia and Rossi (2004). Guariglia and Rossi's research is the most similar to our work. Examining the opposite effect of insurance on savings, they tested whether private medical insurance⁴ leads to a "crowding out" of private savings in Britain. They observed this effect only in regions where people feel that the quality of medical facilities is poor. Prior similar works include Gruber and Yelowitz (1999) and Chou et al. (2003), which studied the United States case and the Taiwanese case, respectively.

This paper is devoted to one branch of this expansive literature - medical insurance and consumption. Our conceptual framework follows the logic of "health shock - precautionary saving - consumption" Health shocks bring income uncertainties. These uncertainties make it optimal to reserve precautionary savings for an emergency, which could otherwise be spent on consumption. Because medical insurance acts as a "buffer" against health shocks, it would ultimately lower the optimal level of saving and stimulate consumption. A more detailed illustration will be provided in Section 3.

Unlike Guariglia and Rossi (2004), we carry out a direct test of whether medical insurance increases consumption. Moreover, several unique features of developing countries can make the pattern of the relationship differ from that in the developed world. First, developing countries generally lack a universal national medical insurance system, which implies that access to insurance is not equally distributed across people. Thus, medical insurance largely reflects a person's welfare status or "rent" especially when the insurance is provided by a state-owned enterprise (SOE). Second, the vast rural-urban discrepancy in China also causes its insurance scheme to differ greatly across regions. In urban areas, medical insurance is mainly composed of urban employee medical insurance and free medical insurance, whereas in rural areas, most individuals are insured through cooperative medical schemes. Thus, variation in the "quality" of medical insurance can be greater in developing countries. Third, public health care system is generally poorly equipped (Eggleston et al., 2008), and medical service is distributed unequally

³Ariizumi's paper selected long-term care as the variable of interest and found that it had a stimulative effect on consumption. A similar correlation with consumption is also observed for unemployment insurance (Dynarski and Sheffrin, 1987).

⁴It is noteworthy that private medical insurance matters in Britain despite the existence of the National Health System. Due to the long wait-time under the NHS, private insurance is regarded as a better safeguard against illness.

in developing countries. This implies even if all people owned the same type of insurance, its ability to buffer health shocks might vary due to the varying costs of access to medical services. Finally, the economic environment is unstable in the developing world, which causes people to engage in precautionary savings for purposes other than health shocks.

In this paper, we first establish a simple conceptual framework and then exploit a rich panel data (China Health and Nutrition Survey, CHNS henceforth) for empirical study. In the empirical analysis, we proxy general consumption with electrical appliance consumption. This proxy has three advantages compared to daily consumption (like food).

- Electrical appliances are not necessities of daily life, so their income elasticity is expected to be larger. This indicates that given a rise in disposable income (equivalently, a fall in precautionary savings), it is easier to observe an increase in expenditure on electrical appliances.
- 2. Households do not usually purchase many appliances in one year. The high-price and low-quantity features of appliance purchases make it easier for people to recall their total expenditure in the survey, which helps to reduce the measurement error.
- 3. The consumption of electrical appliances is more exogenous than food consumption because it is less likely to be correlated to health status. Eating habits can affect health, and a health shock can reshape one's diet in return. Electrical appliance consumption is less affected by these defects, if not at all.

In addition to the relationship between medical insurance and consumption, we are also interested in understanding the mechanism, and what determines the magnitude of the effect. The remainder of this paper proceeds as follows. Section 2 provides a brief review over the reform history of the Chinese medical scheme. Section 3 presents the conceptual framework. Section 4 describes the data and presents the summary statistics. Section 5 shows the basic pattern of the relationship, and Section 6 offers a more detailed discussion. Section 7 concludes with policy implications.

2.2 Background

Since 1949 the Chinese social medical insurance regime has roughly gone through three phases:

The first phase began in 1951 when the country was recovering from the civil war. Under this scheme, virtually all urban residents were covered by some kind of medical insurance.⁵ S-ince residents normally do not need to pay anything to receive medical treatment, this scheme is known as "free medical scheme" (*gong fei yi liao*). At the same time, about 90% of agricultural workers were covered by the old commune-based cooperative medical scheme (CMS).

However, the substantial burden posed by government expenditure on medical insurance projects and the upcoming moral hazard problems in 1951 regime caused the medical insurance reform in the late 1980s and early 1990s. In urban areas, a simultaneous increase in premiums and decrease in the ceiling were implemented.⁶ This is typically known as "worker medical insurance" (*zhi gong yi liao bao xian*). Additionally, the coverage rate also fell dramatically. By 1998, almost half of the urban population was not covered and the rate would have fallen below 40% in 2003 if private insurance use had not increased at that time (Wagstaff, 2008). In rural areas, the decrease in coverage over the period was even greater because the CMS almost collapsed during market-oriented reform.

Despite the improved efficiency in medical system, people found it more and more expensive and more difficult to receive medical service. The government soon realized the problem and two major reforms (in urban and rural areas, respectively) were launched to restore the coverage of medical insurance. In rural areas, the central government made efforts to promote the new cooperative medical scheme (NCMS)⁷ (*xin nong he*) since 2003.⁸ As of September 2007, around 80% of the whole rural population of China had signed up (about 685 million people). Although the program was subsidized by the central government, the "high-deductibles,

⁵Specifically, workers in state-owned enterprises were covered by a Labor Insurance Scheme and government workers were covered by a Government Insurance Scheme.

⁶The medical expenses of individual SOE workers were paid from a fund that was equivalent to 8% of each worker's wage. Of each worker's total fund, 25% was deducted from the worker's wages and the remainder was paid by the enterprise.

⁷While cooperative medical insurance is mostly composed of NCMS in recent years, it is worth mentioning that they are not the same, especially before the implementation of NCMS in 2003. Moreover, after the widespread of NCMS, the scheme is no longer limited to rural residents in recent years.

⁸The new scheme differs from the old one in the following two aspects: first, the new regime is voluntary, and second, the new regime operates at the county level instead of the village or township level (Wagstaff et al., 2009).

low-ceilings" ⁹ features of the scheme mean that rural residents still fell behind their urban counterparts in insuring against illness. In general, the economic achievements of this reform were substantial, but regional differences in medical insurance remained large. In 2007, the government started the experiment of urban resident basic medical insurance, whose target was mainly non-worker urban residents. This could be viewed as a supplement to urban worker medical insurance. However, the amount raised for the insurance, despite subsidized by the government, was limited. The urban resident basic medical insurance was generally regarded as an inferior insurance type compared to worker medical insurance.

2.3 Conceptual Framework

In this section, we set up a simple theoretical model to show how medical insurance can affect consumption. The model is composed of two stages without discount and interest rate. In the first stage, family purchases insurance and makes saving decision. Health shock is realized only in the second stage. Specifically, household's utility function is $\log c_1 + E(\log c_2)$ and household has income y in both stages. In stage one, household consumes c_1 , pays premium f, and saves s. In the second stage if there is a shock, household suffers a loss D < y with probability π , and it will be compensated with ρD ($0 \le \rho \le 1$) if covered by insurance. It is worth noting that the decision is made solely in the first stage. To simplify the analysis we assume fair insurance (therefore insurance does not affect household's permanent income), that is, $f = \pi \rho D$. Then the household's problem can be written as,

 $\max_{c_1, c_{2a}, c_{2b}, s} \log c_1 + \pi \log c_{2a} + (1 - \pi) \log c_{2b}$ s.t. $c_1 + \pi \rho D + s \leq y$ $c_{2a} \leq y + s - D + \rho D$ $c_{2b} \leq y + s$

With some calculation we can obtain following three equations fromm budget constraints

⁹At its inception in 2003, the minimum personal contribution requirement was 10 RMB, with an additional 10 RMB in subsidies from the central government and 10 RMB from the local government (in the affluent eastern area, local governments were responsible for all 20 RMB from the government). (Ministry of Health et al. 2003).

and first-order conditions,

$$c_{2b} = c_{2a} + (1 - \rho)D$$

$$c_1 + c_{2b} = 2y - \pi\rho D$$

$$\frac{1}{c_1} = \frac{\pi}{c_{2a}} + \frac{1 - \pi}{c_{2b}}$$

With these equations we can solve for three unknown, $c_1^{\rho}(\pi, y)$, $c_{2a}^{\rho}(\pi, y)$, $c_{2b}^{\rho}(\pi, y)$. Specifically, if $\rho = 1$, we obtain $c_{2b}^1 = c_{2a}^1$, thus

$$c_1^1 = c_{2b}^1 = c_{2a}^1 = y - \pi D/2, s^1 = -\pi D/2$$

that is, people smooth consumption perfectly. Notice utility is maximized given lifetime income when $\rho = 1$. More generally, $c_1^{\rho}(\pi, y)$ can be pinned down by following equation,

$$\frac{1}{c_1} = \frac{\pi}{(1-\rho)D - 2y + \pi\rho D + c_1} + \frac{1-\pi}{2y - \pi\rho D - c_1}$$

The consumption at the first stage is of interest here¹⁰, the effect of insurance could be expressed by,

$$g\left(\boldsymbol{\rho},\boldsymbol{\pi},\boldsymbol{y}\right)=c_{1}^{\boldsymbol{\rho}}\left(\boldsymbol{\pi},\boldsymbol{y}\right)-c_{1}^{0}\left(\boldsymbol{\pi},\boldsymbol{y}\right)$$

We have the following two propositions, the proof is straight forward. Figure 2.1 and Figure 2.2 illustrates the simulation results graphically.

Proposition 1. $g(\rho, \pi, y)$ is positive if $\rho > 0$ and it is an increasing function of ρ .

The economic intuition of this proposition is clear. Even if actuarially fair insurance does not have an effect on an individual's permanent income level, it grants individuals greater flexibility in smoothing their consumption. In reality, except commercial insurance, most insurance is subsidized by the government, which implies the insurance will increase permanent income as well. This will put consumption further upward.

Proposition 2. $g(\rho, \pi, y)$ is an increasing function with respect to π and decreasing function with respect to y.

¹⁰Consumption at second stage is more like spending everything before one dies. That is, there is no economic decision.

The intuition of this propositions is that the stimulation effect of medical insurance largely depends on the consequence of illness if without insurance. For people with higher income or lower health risks, the shock will less likely to affect their consumption pattern. Therefore, medical insurance has a smaller effect upon smoothing their consumption. This proposition will be discussed in greated detail in Section 6.

It is not difficult to show what will happen if the insurance is subsidized by the government. In addition to the risk-insuring effect, the medical insurance also increases household's permanent income and it is trivial to show the greater the subsidize the greater the effect upon consumption.

2.4 Data Description and Summary Statistics

We utilize the CHNS (China Health and Nutrition Survey)¹¹ dataset, which is an ongoing panel household survey, to test the above framework. The survey is conducted in nine Chinese provinces: Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Liaoning, and Shandong and is currently composed of eight waves, from 1989, 1991, 1993, 1997, 2000, 2004, 2006 and 2009. In each province, a multi-stage random clustering process is used to draw sample counties that were stratified by income (low, middle, and high) when sampling. We exclude the first wave because its questionnaires and sampling differ from those of the other stages. The dataset suits my analysis because it contains extensive information on medical insurance. In addition, the panel nature enables me to carry out some dynamic analysis. The survey sample is typically composed of about 4,400 households that include 19,000 individuals in each wave. In total, we have 88,822 person-year and 27,497 household-year observations for subsequent analysis after excluding top 1% and bottom 1% in household income to avoid outliers. Moreover, we adjust household income and consumption according to the CPI index.

The first column in Table 2.1 shows that the sample has an average age of 36.8 years, half are male and most people are married. As is a well-known fact in developing countries, urban¹² residents differ from rural residents in almost every aspect. On average, urban residents receive 1.5 more years of education than their rural counterparts and are nearly three times more likely

¹¹The dataset is open source. See http://www.cpc.unc.edu/projects/china for details of the survey. The Stata do-files for the empirical part of this paper are available upon request.

¹²In this paper, urban/rural is defined by *hukou* status.

to work in state-owned enterprises, which offer the best welfare treatment to their employees. As a result, rural people earn much less.

With respect to the medical insurance, there are four major types: commercial medical insurance, free medical insurance, worker medical insurance and cooperative medical insurance. From the background part, we can tell for sure that free medical insurance is of best quality. Followed by worker medical insurance, which is transformed from free medical insurance during the 1990's reform. Although partially paid by workers themselves, the government still covers most medical expenditure. It is hard to tell whether commercial medical insurance or cooperative medical insurance is more effective in stimulating consumption. Although the latter is subsidized by the government, it plays a limited role in insuring against possible disease. Table 2.2 shows the development of the composition of medical insurance in China.

In general, more urban residents are covered by some kind of medical insurance than rural residents until the introduction of NCMS. The coverage rate drops slightly from 52.4% in 1991 to 50.2% in 2006 for urban residents. In contrast, the coverage rate nearly tripled in rural areas during the same period. However, a further look at the composition tells us that this increase in the coverage rate was caused by the increase in cooperative medical insurance, thanks to the 2003 reform that expanded the New Cooperative Medical Scheme. As mentioned earlier, this kind of insurance has a low ceiling and thus is not as protective against diseases as other kinds of insurance. In urban areas, we observe a tremendous drop in the coverage of free medical insurance, and some urban individuals have transferred their insurance to worker medical insurance.¹³ This is in accordance with the government's effort to ease fiscal burdens in the 1990s. As discussed in Section 2, unlike free medical insurance, workers have to pay to be covered, but it is still regarded as a better quality insurance than the cooperative medical insurance.

Before heading on to consumption, it is noteworthy that consumption is usually measured at household level. Therefore we need to collapse the individual level data to generate family level data. We measure insurance status both by whether at least one household member owns insurance and how many household members are covered by medical insurance. Other household level control variables include average age of household members, *hukou* status,

¹³See the notes in Table 2.2 for what is included as "worker medical insurance."

household structure¹⁴, how many members work in SOEs and the education status.¹⁵

To proxy consumption, we calculate the total value of ten kinds of appliances¹⁶ owned by each household. The goods are chosen based on the following rules. First, appliances used for specific production purpose should be excluded, such as pump which is mostly used for agricultural work. Second, the appliances should be included in all seven waves of the survey, so items such as computers, which only appear recently, are also excluded. Third, items with obvious better substitutions are excluded. Because the aim of the paper is to test the relationship between insurance and consumption. However, these items, instead of consumption, act more like saving because people do not spend money on their better substitutes. A typical example is black-white television. Because the electronics expenditure in the last 12 months is not available in most waves, the dependent variable is defined as the total value of ten kinds of items owned by the household. One concern here is that consumption is considered as a flow, but total value is conceived as a stock. However, because the included items are durable goods, greater stock requires more frequent replacement and thus more consumption. Therefore, the value owned simply reflects the history of consumption. Moreover, we can tell from the data whether the family purchased some kind of appliance in the past 12 months. This will partially represent the flow of the consumption and we will test it in greater detail in Table 2.6.

Figure 2.3 depicts the univariate correlation between medical insurance and the total value of the items using the locally weighted polynomial regression (Lowess). We combine waves to generate three periods. From the figure, it is observed that in all income-levels and in all three periods, individuals with medical insurance consume more than their uninsured counterparts, which is consistent with my model.

2.5 Basic Results

In this section, the insurance-consumption relationship will be analyzed in a multivariate framework. Consumption in the same community can be correlated because the individuals share a

¹⁴Including how many household members being male, household size, how many members being young (age < 16) or old (age > 60).

¹⁵Including the highest education level in the family being primary/junior high/senior high or above and the average years of education.

¹⁶These are: video cassette recorder (VCR), color television, washing machine, refrigerator, air conditioner, electric fan, camera, microwave oven, electric rice cooker and pressure cooker.

similar infrastructure and culture. To overcome the possible correlation bias, we apply a robust standard error that is clustered at community level throughout the analysis.¹⁷

Column (1) in Table 2.3 Panel A shows that medical insurance is highly correlated with household consumption. Table 2.4 is a continuation of Table 2.3, so the following discussions are based on both tables. Conditional on household income and other demographic variables, household with any member owning at least one kind of medical insurance consume 39.7%¹⁸ more than those without any form of medical insurance. The coefficient is a bit larger for rural households than urban households, as is shown in Columns (2) and (3). Despite similar coefficients, the implications for each region can differ because we know from Table 2.2 that the types of insurance owned by people are not identical. We will delve into this issue in greater detail in the following section. The last three columns exploit the time trend of the effect of insurance. It is clear that the correlation decreases in recent decades. In 1991 and 1993, the coefficient of insurance is 0.471, and it gradually falls to 0.324 in 1997 and 2000, and 0.130 in 2004, 2006 and 2009. The underlying explanation for this observation can be complicated, and we will return to it in the following section.

In Panel B of Table 2.4, we apply a different measure of medical insurance coverage - total number of members covered with insurance. Notice that Panel B only reports the coefficients of medical insurance. With this change of specification the coefficient drops to 0.105 but remains significant at 1% level. The difference makes sense because conditional on at least one member covered with insurance, on average 2.26 members own some kind of insurance. $0.144 \times 2.26 \approx 0.325$, which is very close to the coefficient in Panel A. However, just the opposite to the dummy indicator, Panel B implies a larger per-insurance effect for urban family, as suggested in Column (2) and (3). The cross-region family structure difference can partially account for this fact. Rural residents generally work together on the familand and the insurance they usually own (such as cooperative insurance) covers the whole family. Therefore for rural people "whether being covered" is more important than "how many being covered" in contrast, urban residents usually work as individuals so the number is important as well. Column (4)-(6) in Panel B shows a similar cross region and cross time pattern. In Panel C, we run an individual demographic information to generate household level control variables. In Panel C, we try the

¹⁷Even when clustering occurs at the household level, most of my findings still hold.

 $^{^{18}}e^{0.334} - 1 \approx 0.396$

reverse - we split the consumption equally among members and control personal demographic variables. In general, this specification confirms the positive correlation between consumption and insurance. Because it is more natural to measure consumption at household level, we carry out the analysis with household aggregate data.

The coefficients of other variables in Table 2.3 also show some interesting patterns. One such pattern is that the coefficient of age is negative. One explanation for this is that saving is regarded as meritorious in traditional Chinese culture, which has a greater influence on the consumption behaviour of the elderly. The variable "percentage being male" also shows a negative sign, which indicates that females have a larger propensity to consume given the same income level. We also observe education and work unit type play important roles in determining consumption. Notice that higher income of better-educated people and SOE workers cannot explain this since household income has already been controlled. However, the theoretical model can give some insight into the observation, from which we can easily tell either larger π (probability of falling ill) or *D* (loss because of illness) will lead to a decrease in consumption. Assume that more educated people have more knowledge on how to deal with diseases, which leads to lower values of both π and *D*. Moreover, educated people are more likely to find work with better welfare benefits, which brings them additional unearned income that is not reflected in the survey. Most of above explanations can be applied to stated-owned enterprise worker case as well.

The second explanation, however, also raise the concern of endogeneity. So far the discussion is restricted in the correlation. Can we step further to announce it is causality? What if medical insurance is simply a part of welfare treatment, which indicates more unobserved unearned income? Luckily, we can address the concern to some extent by applying family fixed effects, which can effectively control for the unobserved characteristics that do not vary across time. Table 2.5 shows the result. Although the fixed effects tend to reduce the coefficient to zero if the dependent variable is measured with error (Angrist and Pischke, 2008), which is obviously the case for consumption, the coefficients of insurance measured in both ways remain statistically significant.

We can tell from Table 2.3, Table 2.4, and Table 2.5 that there is a strong correlation between household consumption and medical insurance. But in these tables consumption is defined as the total value of a "bundle" Will the result sensitive to the composition of the bundle? In

Column (1) of Table 2.6, we separately present probit model of whether the family purchases each included item in the past twelve months. Notice that insurance increases the probability of purchasing almost all the items. In Column (2), we split the total value of consumption into each category and run Tobit regression, which take into account that the value is left-truncated at zero. Again, households with medical insurance tend to own a greater value of almost all these appliances. This further confirms the result is robust to possible changes to the bundle.

2.6 Discussion

The previous section shows that medical insurance is highly correlated with consumption and that it is robust to alternative specifications and a comprehensive set of controls. In this section, we will discuss the determinants of the magnitude of such stimulation effects. Because greater stimulation also indicates greater efficiency in reducing health shocks, this discussion will answer two questions that have important political implications: what kind of insurance has the greatest effect, and what kind of people does insurance affect most?

We first discuss the different stimulation effects of different kinds of insurance. The first column in Table 2.7 examines the effect of the four main types of medical insurance (all of the remaining types are categorized as "others"): commercial medical insurance, free medical insurance, worker medical insurance and cooperative medical insurance. As discussed in background section, free medical insurance and worker insurance are the most heavily subsidized insurance types, and their ceilings in general are very high. The regression result confirms my expectation. Free medical insurance and worker medical insurance are endowed with the greatest stimulation effect, no matter measured by whether owned or total number owned. Cooperative medical insurance seems to be very effective at first glance. In the last column in Table 2.7, however, we notice after the expansion of New Cooperative Medical Scheme, it has virtually no effect on consumption, which indicates that it plays a very limited role in insuring against possible health shocks. Commercial insurance, on the other hand, is playing a more and more important role in recent years. Although at best actuarially fair, commercial insurance features a high insurance amount. In contrast, although subsidized by the government, the ceiling of NCMS is unlikely to be high because both residents' premiums and government subsidies are small. It is interesting to note that almost all types of insurance have a greater

effect in rural areas, which is consistent with the fact that rural residents have lower income levels and are more vulnerable to diseases because of worse sanitary conditions.

The second question pertains to the kind of people that insurance has the greatest effect upon. In Propositions 2, we showed that the effect is stronger for people who are more vulnerable to diseases and have lower income. This part is devoted to testing the proposition.

We first delve into the role of health. It is easy to see the risk of health shock not only affects the effect of insurance but directly affects the consumption as well. In Table 2.8, we measure the risk of health shock in three ways. The first is the accessibility to health facilities. Obviously, if households have easy access to qualified health facilities, they will be less affected by health shocks because they are more likely to receive timely treatment. We measure it by the distance to nearest medical facility and whether the facility is a beyond county-level hospital, taking into account both accessibility and quality of the facility. The second is household structure, because the young and the old are more vulnerable to diseases in general. Households with larger percentages of old or young members are more likely to suffer from a health shock. The third measure is the most direct one—self-rated health¹⁹ and the number of household members having difficulty in daily life due to illness. In CHNS, self-rated health is a categorical variable with the values 1=Excellent, 2=Good, 3=Fair, and 4=Poor.

It is natural to run a difference-in-difference estimation in this scenario. If the hypothesis is correct, the consumption difference between insured and uninsured households expects to be larger for the group of people who are more vulnerable to health shocks. According to the theory, the coefficient of the indicator of health risk should be negative whereas its interaction term with insurance status should be positive. To avoid possible multicollinearity, we run three regressions separately, as shown in Table 2.8. The hypothesis works quite well. Households with better hospitals nearby consume more and those with more members being young or self-reporting in poor heath consume less. Also, we obtain the expected sign of the interaction terms - the effect of insurance is larger for households living far away from medical facility (or the nearest facility is not well qualified) and those with more young children. In general, the probability of health shock largely determines the magnitude of the effect of medical insurance.

Next I examine the role of income. We separate the household into four income groups²⁰.

¹⁹There is solid evidence supporting self-rated health as a strong predictor of mortality in adults (Idler and Angel, 1990; Idler and Kasl, 1995; Idler and Benyamini, 1997).

 $^{^{20}}$ We divide the groups within urban or rural residents in each province for every year.

Following a similar approach as analyzing health shock, we carry out a difference-in-difference regression. The theoretical model predicts more income leads to more consumption, which is trivial to prove, and medical insurance is less important for richer people because the loss caused by health shocks account for a less proportion of their life income. In one word, they are more able to get "self-insured". Table 2.9 presents the outcome. As expected, compared to the control group (1st quartile), households in a higher income level consume more and medical insurance also turns out to be less effective.

So far, we have uncovered several important determinants of the magnitude of the medical insurance. With it we can also partially explain why the effect of insurance has decreased substantially since the 1990s, as is shown in Table 2.2. The primary reason is that the composition of insurance has changed significantly. The share of free medical insurance, which is regarded as a more generous type of insurance, keeps falling. Many people have recently been covered by NCMS, which was shown in Table 6 to be of little effect due to the low ceiling, especially in the recent years. Moreover, the development of the Chinese economy also partially accounts for the decrease in insurance. If development makes people wealthier and gives them a better expectation of future health (due to the improved medical system), according to the result in Table 2.8 and Table 2.9, the stimulative effects of medical insurance expect to decrease as well. Therefore, the decreasing trend may not be of major political concern.

2.7 Conclusion

In this paper, we mainly discuss whether medical insurance has a positive effect on consumption. The logic is that potential health shocks provide an incentive to engage in precautionary savings and that medical insurance can reduce these savings by insuring people against possible diseases. We set up a theoretical model and proved that medical insurance is important in mitigating the effect of health shocks. Further, insurance is more important for people with low income or who are more likely to suffer from health shocks.

We utilize the China Health and Nutrition Survey, which provides seven-wave panel survey data for our empirical analysis. Ordinary least square regressions show that the coefficients of insurance are significantly positive. This result is robust to several specification tests and changes in the package of variables included as "consumption". Although the correlation has a noticeable decreasing trend, we showed that this is mainly attributable to the change in the composition of types of insurance caused by a series of reforms since the 1990s, citizens' higher income levels, and improved health status due to economic development. When examining the effects across different types of insurance, we noticed that cooperative medical insurance, especially recently launched NCMS, has a limited effect on consumption. This is mainly due to its low ceiling, and thus, it is not that effective in reducing possible health shocks.

The policy implications of this paper are clear. First, medical insurance acts as an effective tool to increase aggregate demand, in addition to its direct effect on welfare. Thus, it is worthwhile for the government to invest in establishing a nation-wide medical health system. Second, the government should consider increasing subsidies to cooperative insurance because it will have a minimal effect unless a higher ceiling can be created. Finally, the government should be more concerned with low-income and unhealthy individuals when designing policies because these groups benefit more than others from the same insurance.


Figure 2.1: Postive Effect of Insurance Upon Consumption

Figure 2.2: Postive Effect of Insurance Upon Consumption



Figure 2.3: Raw Relationship between Insurance and Value of Appliances



Source: China Health and Nutrition Survey, 1991,1993,1997,2000,2004,2006,2009 Notes: Period 1-1991,1993; Period 2-1997,2000; Period 3-2004,2006,2009; bandwidth=0.8

Variables	All	Urban	Rural
Demographic Information			
Age	36.84	40.27	34.86***
1=Male	0.50	0.50	0.49
1=Currently Married	0.65	0.68	0.63***
Household Size	4.18	3.76	4.41***
Education and Work Unit Information			
Years of Education Received	6.56	8.03	5.73***
1=Illiterate or Did Not Finish Primary School	0.29	0.20	0.33***
1=Graduate of Primary School	0.23	0.16	0.27***
1=Graduate of Junior High School	0.30	0.29	0.31***
1=Graduate of Senior High School or Above	0.19	0.35	0.09***
1=Currently at Work	0.68	0.54	0.77***
1=Work in State Owned Enterprise/Institute ^a	0.18	0.49	0.04***
1=Work in Collective Unit	0.09	0.16	0.07***
1=Work in Private Owned Enterprise	0.28	0.26	0.30***
1=Work in Units of Other Types	0.44	0.10	0.60***
Household Income Per Capita (yuan)	5193.22	6999.74	4154.57***
Health Status, Health Behaviors and Access to Medical Services			
1=Self-Rated Health Excellent ^b	0.14	0.15	0.14***
1=Self-Rated Health Good	0.51	0.50	0.52***
1=Self-Rated Health Fair	0.29	0.29	0.29
1=Self-Rated Health Poor	0.06	0.06	0.06
Distance (km) to the Nearest Often-Visited Medical Facility ^c	0.37	0.35	0.38***
1=The Facility is a beyond County-Level Hospital	0.33	0.41	0.28***
Observations	88943	32531	56412

Table 2.1: Summary Statistics

Notes: * indicates regional difference significant at 10%; ** significant at 5%; *** significant at 1%. Missing variables not imputed in this table. Urban and rural is defined by hukou status. Source: China Health and Nutrition Survey, 1991, 1993, 1997, 2000, 2004, 2006, and 2009.

a. Defined among people who currently employed. b. Self-rated health is available only since 1997. Wave 2009 is not included as well because it uses a different scale. c. The two variables are defined at the community level.

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	Region	1991	1993	1997	2000	2004	2006	2009
Have some kind of medical insurance	Urban	52.35%	50.96%	38.87%	37.60%	41.52%	50.16%	82.88%
	Rural	17.50%	8.67%	14.31%	9.66%	15.07%	45.34%	93.49%
Free medical insurance ^a	Urban	25.17%	29.63%	20.26%	19.08%	14.82%	7.80%	7.93%
	Rural	5.86%	1.07%	0.84%	0.59%	0.43%	0.30%	0.32%
Worker medical insurance ^b	Urban	15.23%	15.17%	11.01%	10.27%	18.17%	29.64%	37.65%
	Rural	4.01%	3.60%	0.73%	0.49%	0.53%	1.69%	1.20%
Cooperative medical insurance ^c	Urban	3.79%	1.14%	3.76%	3.89%	2.66%	7.67%	10.83%
	Rural	3.78%	0.20%	11.21%	5.69%	10.68%	41.19%	89.01%
Otherther types of medical insurance ^d	Urban	3.53%	1.02%	1.94%	1.13%	1.76%	2.25%	25.32%
	Rural	3.28%	3.35%	1.52%	1.14%	1.05%	0.65%	3.31%

Notes: Urban and rural is defined by hukou status. Commerical insurance is not include in the questionaire before 2000. Source: China Health and Nutrition Survey, 1991, 1993, 1997, 2000, 2004, 2006, and 2009.

(passway model, block model and catastrophic disease insurance). c. Including both rural cooperative medical insurance and compensation insurance (before 2006), unified planning insurance and three kinds of urban employee medical insurance urban cooperative medical insurance. d. Including health insurance for women and children, EPI (expanded program of immunization) insurance for children and "other insurance" in the questionaire. In 2009 it additionally include urban government employees, student or faculty in state-owned school/research facility and veterans. b. Including workers' a. Free medical insurance refers to free medical service provided to government supported staff, typically including resident basic medical insurance.

	All	By Huk	ou Type		By Perio	bd
		Urban	Rural	1991,1993	1997,2000	2004,2006,2009
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A - Basic Regression						
Household income (log)	0.263***	0.268***	0.270***	0.448***	0.331***	0.226***
	(0.016)	(0.023)	(0.020)	(0.036)	(0.031)	(0.016)
Some member owning medical	0.334***	0.253***	0.282***	0.471***	0.324***	0.130***
insurance	(0.040)	(0.044)	(0.060)	(0.070)	(0.072)	(0.045)
Average household age	-0.002*	-0.003**	-0.002	0.001	0.002	-0.004***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
With urban hukou	0.656***			0.635***	0.942***	0.539***
	(0.049)			(0.070)	(0.075)	(0.050)
Percentage of being male	-0.290***	-0.246***	-0.306***	-0.203*	-0.309***	-0.291***
	(0.050)	(0.067)	(0.064)	(0.107)	(0.098)	(0.050)
Household size	0.101***	0.052***	0.117***	0.020	0.114***	0.102***
	(0.012)	(0.016)	(0.015)	(0.023)	(0.023)	(0.013)
#Household member greater	-0.015	0.045***	-0.029*	0.039	-0.019	0.002
than 60or younger than 16	(0.011)	(0.016)	(0.015)	(0.025)	(0.022)	(0.014)
Some household member	0.197***	0.163***	0.365***	0.326***	0.069	0.034
work in SOE	(0.035)	(0.038)	(0.060)	(0.065)	(0.058)	(0.037)
Highest education level	-0.027	-0.006	-0.085	-0.128	-0.021	0.037
-primary school	(0.050)	(0.089)	(0.057)	(0.107)	(0.101)	(0.056)
Highest education level	0.057	0.046	-0.038	-0.062	0.083	0.123**
-junior high	(0.054)	(0.093)	(0.068)	(0.114)	(0.109)	(0.060)
Highest education level	0.160**	0.140	0.099	0.160	0.190	0.205***
-senior high or above	(0.066)	(0.104)	(0.082)	(0.130)	(0.130)	(0.073)
Household average years of	0.076***	0.073***	0.103***	0.093***	0.087***	0.073***
education	(0.008)	(0.008)	(0.012)	(0.012)	(0.013)	(0.008)
Observations	23,735	9,903	13,832	5,322	6,244	12,169
R-Square	0.346	0.283	0.251	0.381	0.346	0.348

Table 2.3: Basic Regression Outcomes (Dependent Variable: log-total value of the 13 items owned by the household)

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors clustered at the community level are indicated in the parentheses. Wave dummies and province dummies are included in the regression but not reported. Source: China Health and Nutrition Survey, 1991, 1993, 1997, 2000, 2004, 2006, and 2009.

	All	By Hukou Type			By Peri	iod
		Urban	Rural	1991,1993	1997,2000	2004,2006,2009
	(1)	(2)	(3)	(4)	(5)	(6)
Panel B ^a - # of members own	ing some in	surance				
# of members owning some	0.144***	0.148***	0.105***	0.222***	0.119***	0.050***
kind of insurance	(0.014)	(0.016)	(0.019)	(0.024)	(0.027)	(0.014)
Observations	23,735	9,903	13,832	5,322	6,244	12,169
R-Square	0.352	0.294	0.252	0.394	0.347	0.348
Panel C ^b - individual level re	gression					
Owning some kind of medical	0.390***	0.280***	0.338***	0.665***	0.356***	0.098**
insurance	(0.044)	(0.040)	(0.069)	(0.080)	(0.082)	(0.044)
Observations	48,155	18,460	29,695	12,718	14,112	21,325
R-Square	0.323	0.218	0.223	0.372	0.310	0.292

Table 2.4: Basic Regression Outcomes (Dependent Variable: log-total value of the 13 items owned by the household)(Continuation of Table 2.3)

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors clustered at the community level are indicated in the parentheses. Wave dummies and province dummies are included in the regression but not reported. Source: China Health and Nutrition Survey, 1991, 1993, 1997, 2000, 2004, 2006, and 2009. a. Panel B - Other control variables are the same as those in Panel A. b. Panel C - Regressed at individual level. Sample restricted to age 16 60. Dependent variable is log consumption per capita. Control variables including (log) hh income per capita, having insurance or not, age, age squared, hukou type, gender, houshold size, works in SOE or not, education status. Dependent variable is (log) household value of included items per capita.

Measure of Insurance Status	Medical insurance status	Medical insurance status
	whether owned	# owned
	(1)	(2)
Household income (log)	0.094***	0.091***
	(0.010)	(0.010)
Medical insurance Status	0.134***	0.068***
	(0.020)	(0.007)
Average household age	-0.007***	-0.006***
	(0.001)	(0.001)
With urban hukou	-0.043	-0.036
	(0.028)	(0.028)
Percentage of being male	-0.078	-0.090
	(0.059)	(0.059)
Household size	0.175***	0.165***
	(0.011)	(0.011)
#Household member greater	-0.100***	-0.104***
than 60or younger than 16	(0.011)	(0.011)
Some household member	0.093***	0.082***
work in SOE	(0.028)	(0.027)
Highest education level	0.026	0.020
-primary school	(0.048)	(0.048)
Highest education level	0.069	0.056
-junior high	(0.053)	(0.053)
Highest education level	0.044	0.026
-senior high or above	(0.062)	(0.062)
Household average years of	-0.001	0.000
education	(0.007)	(0.007)
Observations	23,735	23,735
R-Square	0.170	0.172
# of Households	6,322	6,322

Table 2.5: Fixed Effect Estimation

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors clustered at the community level are indicated in the parentheses. Wave dummies and province dummies are included in the regression but not reported. Source: China Health and Nutrition Survey, 1991, 1993, 1997, 2000, 2004, 2006, and 2009.

	Probit model of whether the family purchase the	Tobit model of the total value of the appliances in
	12 months	the household
Items	(1)	(2)
Video cassette recorder	0.153*	690.288***
	(0.089)	(188.164)
Color television	0.119***	558.345***
	(0.038)	(66.836)
Washing machine	0.107**	158.029***
	(0.043)	(26.624)
Refrigerator	0.146***	531.450***
	(0.043)	(65.909)
Air conditioner	0.152**	656.425***
	(0.070)	(242.215)
Electric fan	0.016	32.448***
	(0.038)	(7.263)
Camera	0.201***	348.471***
	(0.078)	(72.004)
Microwave oven	0.309***	198.619***
	(0.081)	(47.505)
Electric rice cooker	0.120***	46.205***
	(0.042)	(14.355)
Pressure cooker	0.046	73.488**
	(0.048)	(29.536)

Table 2.6: The Robustness of the Items Included in the Consumption Bundle

Notes: Coefficients of whether some household member owning medical insurance is reported. The control variables are the same as Panel A in Table 3. * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors clustered at the community level are indicated in the parentheses. Source: China Health and Nutrition Survey, 1991, 1993, 1997, 2000, 2004, 2006, and 2009.

	All	By Huk	ou Type		By Peri	od
		Urban	Rural	1991,1993	1997,2000	2004,2006,2009
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A - Whether some hh mer	nber own t	hat kind of	insurance			
Commercial medical insurance	0.049	-0.015	0.164**		-0.121*	0.111***
	(0.041)	(0.040)	(0.065)		(0.067)	(0.042)
Free medical insurance	0.339***	0.234***	0.461***	0.396***	0.195***	0.167***
	(0.040)	(0.037)	(0.090)	(0.070)	(0.070)	(0.041)
Worker medical insurance	0.258***	0.187***	0.579***	0.472***	0.490***	0.191***
	(0.048)	(0.044)	(0.087)	(0.076)	(0.084)	(0.043)
Cooperative medical insurance	0.280***	0.088	0.104	0.370***	0.370***	0.051
	(0.054)	(0.065)	(0.071)	(0.124)	(0.135)	(0.053)
Other kinds of medical insurance	0.075*	0.068	0.232***	0.245***	0.208**	0.008
	(0.040)	(0.048)	(0.062)	(0.085)	(0.095)	(0.047)
Observations	23,735	9,903	13,832	5,322	6,244	12,169
R-Square	0.348	0.283	0.258	0.383	0.350	0.350
Panel B - # hh member owning	that kind of	finsurance				
Commercial medical insurance	0.038	0.005	0.096**		-0.042	0.108***
	(0.025)	(0.023)	(0.041)		(0.033)	(0.032)
Free medical insurance	0.246***	0.194***	0.341***	0.235***	0.120***	0.133***
	(0.020)	(0.020)	(0.049)	(0.032)	(0.036)	(0.029)
Worker medical insurance	0.189***	0.154***	0.334***	0.267***	0.245***	0.118***
	(0.023)	(0.022)	(0.044)	(0.032)	(0.035)	(0.025)
Cooperative medical insurance	0.095***	0.069**	0.038**	0.164***	0.096**	0.027*
	(0.016)	(0.032)	(0.018)	(0.043)	(0.043)	(0.016)
Other kinds of medical insurance	0.051**	0.064**	0.133***	0.136***	0.132**	0.004
	(0.024)	(0.030)	(0.039)	(0.042)	(0.062)	(0.032)
Observations	23,735	9,903	13,832	5,322	6,244	12,169
R-Square	0.353	0.294	0.262	0.393	0.349	0.351

Table 2.7: The Stimulation Effect of Different Types of Medical Insurance (Dependent Variable: log-total value of the 13 items owned by the household)

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors clustered at the community level are indicated in the parentheses. Wave dummies and province dummies are included in the regression but not reported. The other control variables are the same as Panel A in Table 3 (excluding whether having medical insurance). Source: China Health and Nutrition Survey, 1991, 1993, 1997, 2000, 2004, 2006, and 2009.

Tal	ble 2.8: F	kisk Factors and the Magr	nitude to St	imulation Effect	
Risk factors:	(1)		(2)		(3)
Distance to the nearest	-0.050	# member younger than 16	-0.138***	<pre># member self-rated health</pre>	-0.052***
medical facility	(0.032)		(0.023)	being fair or poor	(0.018)
- interact with insurance	0.070*	- interact with insurance	0.104^{***}	- interact with insurance	-0.004
	(0.036)		(0.029)		(0.025)
The nearest medical facility is	0.117^{**}	# member older than 60	0.042	# member have difficulty in	-0.051
beyond county-level hospital	(0.056)		(0.032)	daily activity due to illness	(0.047)
- interact with insurance	-0.122*	- interact with insurance	0.050	- interact with insurance	-0.020
	(0.072)		(0.032)		(0.056)
Observations	18,055		23,735		14,254
R-Square	0.338		0.349		0.332
Notes: Column (1) excludes we	ave 2009 a	nd Column (3) excludes 1991,	, 1993 and 20	009 because required informatic	on not available
or in different format in these w	vaves. * si	gnificant at 10%; ** significan	ıt at 5%; ***	significant at 1%. Robust stand	lard errors
clustered at the community leve	el are indic	ated in the parentheses. Wave	dumnies ar	d province dummies are includ	ed in the
regression but not reported. The	e other con	ntrol variables are the same as	Panel A in T	able 3. Source: China Health an	nd Nutrition
Survey, 1991, 1993, 1997, 2000	0, 2004, 20	06, and 2009.			

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	All	By	Hukou Type
		Urban	Rural
	(1)	(2)	(3)
2nd quartile	0.302***	0.381***	0.260***
	(0.048)	(0.091)	(0.054)
3rd quartile	0.581***	0.567***	0.554***
	(0.060)	(0.091)	(0.068)
4th quartile	0.886***	0.874***	0.857***
	(0.076)	(0.098)	(0.090)
2nd quartile interact with insurance	-0.245***	-0.325***	-0.192***
	(0.057)	(0.101)	(0.065)
3rd quartile interact with insurance	-0.313***	-0.307***	-0.239***
	(0.068)	(0.104)	(0.071)
4th quartile interact with insurance	-0.437***	-0.385***	-0.274***
	(0.079)	(0.100)	(0.096)
Household income (log)	0.152***	0.146***	0.158***
	(0.013)	(0.022)	(0.017)
Some member owning medical	0.549***	0.487***	0.426***
insurance	(0.061)	(0.086)	(0.074)
Observations	23,735	9,903	13,832
R-Square	0.366	0.305	0.275

Table 2.9: Household Income Level and the Magnitude to Stimulation Effect

Notes: Income quartiles are calculated based on average household income per capita across available waves. * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors clustered at the community level are indicated in the parentheses. Wave dummies and province dummies are included in the regression but not reported. The other control variables are the same as Panel A in Table 3 (excluding insurance and household income). Source: China Health and Nutrition Survey, 1991, 1993, 1997, 2000, 2004, 2006, and 2009.

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CHAPTER 3

The Impact of China Urban Health Insurance Reform on Insurance Coverage and Out-of-pocket Medical Payment

3.1 Introduction

A well-organized public health insurance system has been a very important part of the social security system in many developed countries, to help people reduce the risk of large expenditures brought about by unexpected illness and to smooth consumption between healthy and unhealthy periods of lifetime. However, in the developing world, due to the low rates of health insurance, the unexpected illness has always been a significant economic risk (Gertler and Gruber, 2002). The lack of formal tools to smooth consumption not only reduces welfare directly, but also gives rise to informal risk management strategies which harm the productivity (Paxson, 1993; Townsend, 1994). Therefore, the expansion of health insurance has been considered as a public policy priority in many developing countries. From 1990s to 2010s, health insurance reforms were launched in developing countries including Colombia (Trujillo et al., 2005), Turkey (Agartan, 2005), Vietnam (Wagstaff, 2007), and China (Wagstaff, 2009).

This article focuses on the health insurance reform of urban employees in China. At the end of 1998, the Chinese government began a healthcare reform to expand the health insurance to the whole urban employed population. Before the reform, the public health insurance system in China was fragmented. Government employees were covered by a uniform insurance program funded by the central government; employees of state-owned enterprises¹ (SOEs) were covered by insurance programs funded by individual firms; employees of private enterprises were not covered by any kind of public insurance before the reform. This reform is similar in spirit to the reforms in other developing countries in the sense that its main goal is to increase the coverage of the population that is not properly covered by the existing public health system (Barros,

¹In the following part of the paper, I use SOE to represent state-owned enterprises.

2011). However, there is a key difference between the reform in China and the reforms in other countries. The reform in China did not simply include the private enterprises in the existing system, or provided a new program to the population who had not been covered before. Instead, it tried to put the whole urban employed population into a new public insurance scheme called Urban Employee Health Insurance (UEHI), no matter what kind of insurance an individual had before the reform. In the new scheme, the premiums are shared by employers and employees.

Economists are interested in healthcare reform, and there are a large number of papers studying healthcare reform, especially health insurance reforms in both developing and developed countries.² The reason is that reforms can be employed as exogenous policy changes to study the effect of insurance on medical payment, medical service utilization, health status, and other related variables, including household portfolios³ (Miller, 2009) and labor market outcomes (Perez, 2011). Another important focus is ex post moral hazard (Newhouse et al., 1993). This paper focuses on the direct effect of health insurance expansion to see the impact of the reform on health insurance coverage and out-of-pocket health expenditures. Besides, this paper studies the impact of reform on labor market. There are two channels through which the reform may affect the labor market. First, as the effect of mandated benefits discussed in Summers (1989), insurance premium imposes additional cost on employers which reduces the labor demand, while labor supply increases if employees regard insurance as something with positive value. As a result, the wages will decrease. Second, health insurance may make the positions in private enterprises more attractive, which may induce excellent young people, who might have entered SOEs without the reform, to work in private enterprises. I discuss the second channel in the paper.

The new UEHI scheme was rolled out in different working units at different paces, so that I can employ a difference-in-difference methodology to make use of the variation in enrollment over time and across working units to identify the impact of the reform. Employees of enterprises, including both private enterprises and SOEs were the first group of employees to become eligible for the UEHI. Employees of state-owned institutions, such as hospitals, schools, and research institutions, and employees of government fell far behind on the reform timetable. In

²See Abel-Smith (1992), Dow et al. (1997); Bixby (2003), Gakidou et al. (2006), Odonnel et al. (2008) for more studies of traditional health insurance program in developing countries.

³Miller (2009) studied the effect of Colombia's health insurance reform on the composition of household assets, human capital investments, or household consumption.

fact, the government employees of some provinces are still covered by the traditional insurance scheme. Therefore, the employees of government and state-owned institutions form the control group. There are two treatment groups. One is the employees of the private enterprises, and the other is the employees of SOEs. The design of two treatment groups enables me to study the effects of different reform intensities. For employees of private enterprises, the change was from no risk pooling capacity to some level of risk pooling capacity. For employees of SOEs, the change was from poor risk pooling capacity (individual-firm level) to better risk pooling capacity (city-level).

The paper finds that the reform substantially increased the probability of being covered by health insurance and decreased the out-of-pocket medical expenditures of the employees of private enterprises. The reform effects on insurance coverage and out-of-pocket payment are not significant for the employees of SOEs. However, the reform significantly reduced the risk of exposure to catastrophic medical expenditures for the employees of both private enterprises and SOEs. However, the paper points out that we should be cautious if we want to interpret the treatment effect as a pure effect of health insurance, since there is evidence that the reform induced some composition changes in the treatment group.

The rest of the paper is structured as follows. Section 2 briefly reviews the related literature. Section 3 describes the background and main features of the reform. Section 4 describes the data and methodology used in this paper. Section 5 estimates the reform effect on insurance coverage and out-of-pocket health expenditure. Section 6 concludes.

3.2 Literature Review

There are a large number of studies about the health insurance reform in different countries. In the developing world, the reform most similar to the one in China is Mexico healthcare reform, in which Mexico government introduced a new program called Segura Popular(SP) to cover the people working in the informal sector. Barros (2011) employed a triple-difference strategy and used the variation of program penetration intensity over time and across different geographic areas to identify the effect of the reform. King et al. (2009) employed an experimental method to estimate the short-term effect on out-of-pocket expenditures and medical services utilization of households. Both of the studies found out that health insurance substantially reduced

out-of-pocket medical expenditures and to some extent increased medical service utilization. Perez (2011) used panel data and exploited a correlated random effect approach to find that the introduction of SP program induced workers to transfer from formal sector to informal sector, and the program decreased the wage level in informal sector as suggested in Summers (1989).

Studies about the 1998 reform in China are still limited. Liu and Zhao (2006) used data collected from the pilot program of UEHI in Zhenjiang to conduct an event study and concluded that health insurance led to the increase in utilization and decrease in out-of-pocket payment. There are some other studies in China about the effect of health insurance on utilization and medical expenditures (Gao et al., 2007); Zhang, 2007; Hu et al., 1999; Bogg et al., 1996; Wagstaff and Lindelow, 2008), most of which do not deal with the endogeneity of health insurance and find ambiguous effect of insurance on out-of-pocket payment.

3.3 Background

3.3.1 The Health Insurance System in Urban China before the Reform

Before the health insurance expansion in 1998, urban employed populations in China got their basic medical services through two public health insurance programs: Government Insurance Program (GIP) and Labor Insurance Program (LIP). GIP covered government officials, their dependents, veterans, college faculty, and students. LIP covered the employees and their dependents of SOEs with more than 100 employees (Yip and Hsiao (1997)). Before 1978, the Chinese economy was a planned economy under command-and-control policies. Both the GIP and LIP were financed by government budgets. There were very few private enterprises in China before 1978, and the unemployment rate was very low. Therefore, GIP and LIP provided a near-universal health insurance coverage for the urban population (over 80%). GIP and LIP beneficiaries sought medical services from public hospitals, and they were reimbursed on a feefor-service basis. In order to make medical services affordable to most of the population, both GIP and LIP were designed as third-party insurance with little demand-side cost sharing. The near-universal health insurance and the little cost sharing scheme meant that the out-of-pocket payments were minimal before 1978.

A series of market-driven reforms initiated from 1978 changed the Chinese economic struc-

ture dramatically, as well as the public health care system. The introduction of "open-door policy" and SOE reform were the two events with most striking and profound impact. The "open-door policy" allowed foreign enterprises to run their business in China. The SOEs were granted substantial financial autonomy after the SOE reform. Before the reform, it was the central government that fully absorbed the profits and deficits created by SOEs. Besides, after the reform, SOEs have the right to fire their employees. Economic reforms imposed two main impacts on the health insurance coverage in urban China. First, economic reforms had an negative effect on the health insurance status of SOE employees. The competition with strong foreign companies brought many SOEs into financial difficulties, while the centrial government was no longer responsible for covering financial deficit for them. A great many SOE employees became unemployed (Cai et al., 2008), and lost their insurance. Meanwhile, many SOEs failed to reimburse the health care bills of those who stayed in the LIP. Due to the financial autonomy, the LIP became an insurance program with risk pooling in each firm instead of across the country (Wagstaff et al., 2009), and many SOEs could not afford the health care cost of their employees due to financial difficulties. Second, there was a big boom of private enterprises in late 1990s and at the beginning of the new century. Only 7% of the employees of these private enterprises had health insurance (Du, 2009).

3.3.2 The Urban Employees Health Insurance Reform

Confronted with the problems of GIP and LIP and the negative impact brought by the economy reform, Chinese government launched a series of mandated initiatives to reform the urban health insurance system. They initiated pilot experiments in two cities, Zhenjiang and Jiujiang in December of 1994. The decision of establishing a new health insurance scheme, the Basic Urban Employee Health Insurance, for all urban employees and some basic characteristics of the new scheme were officially announced by the central government in the December of 1998. In 1999, the central government made another official announcement of the operation details of the new scheme, after which provincial governments began to set up timetables for the reform and to put the new scheme into practice. Based on the official documents, local governments adjusted certain policies regarding reimbursement schemes, lists of drugs and services to be reimbursed, and other related items. The autonomy of local governments to make their own reform timetables gives me the opportunity to conduct this study. Although the new scheme is a compulsory insurance plan for all urban employees, local governments put different working units in different places on the reform timetable. The employees of enterprises, including both SOEs and private enterprises, were the first group to take part in the new scheme. The employees of public schools, public hospitals, and other state-owned institutions were put in the second place on the timetable. The reform of government employees health insurance was put in the last place on the timetable, and there are seven provinces whose government employees still stay in the GIP. The main reason for this may be that government officials are not willing to give up the generosity of the traditional GIP scheme. GIP scheme covers a wider range of services and drugs, requires lower demand-side cost sharing and covers dependents. Table 3.1 shows the time of entering the new scheme for enterprise and government employees of the eleven sample provinces of the data used in this paper.⁴

UEHI requires employers and employees to share the responsibility of paying premiums. The total monthly premiums for one employee are equivalent to 8 percent of this employee's monthly payroll. The employee contributes 2 percent of the monthly payroll as premiums, while his employer is required to cover the remaining 6 percent. The premiums are divided to be deposited into two different insurance accounts, the individual account and the social pooling account. The fund in individual accounts is made up of the premiums paid by employees and part of the premiums paid by employers; the remaining part of the employers' contribution is deposited into the social pooling account. Social pooling accounts are managed by municipal public insurance administration offices, which means risk of healthcare expenditures is pooled at the city level in UEHI. Individual accounts and social pooling accounts function differently in the reimbursement of medical expenditures of enrollees. In most cities, outpatient expenses, emergency services and drug costs are covered by individual accounts; inpatient costs within a pre-defined band are covered by social pooling accounts. The pre-defined band is above the deductible line and below the ceiling. The deductible for social pooling accounts is about ten percent of the local average payroll and the ceiling is set at about four times the local average payroll. The specific deductible and ceiling value may vary across cities. Figure 3.1 shows the finance system of UEHI. The enrollment ratio of UEHI rose from 5 percent in 1998 to 64.6 percent (180 million of people) in 2007 (Dong, 2009).

⁴I obtained the information in the table by searching government documents. However, the official record of Yunan Province is not publically available. I called the local administrative office to ask for the information about the reform time.

3.4 Data and Method

The data used in this paper are from the China Household Income Project (CHIP),⁵ a repeated cross-section survey conducted by Chinese Academy of Social Sciences. CHIP survey has been conducted four times in 1988, 1995, 2002 and 2007. The first three waves of data are available for using, and the data from 1995 and 2002 are used in this paper. One major strength of the CHIP data is that it contains detailed information of individuals working places, which enables me to classify every observation precisely into one of the three working units, government (including state-owned institutions), private enterprises, and SOEs. In this paper, I only use the observations of urban employed individuals, which means I drop the observations of unemployed, retired, and labor market inactive individuals. In the 1995 sample, there are 2323, 1226 and 3522 observations classified into government, private enterprises, and SOEs, respectively; in the 2002 sample, there are 3153, 2935 and 3031 observations classified into government, private enterprises, and SOEs, respectively. CHIP contains detailed information about health insurance and medical expenditures. There are two questions about medical expenditures in the survey. First, "How much was your out-of-pocket medical expenditures in the past year?" Second, "If the medical treatment was NOT entirely self-fianced, what percentage was supposed to be absorbed by the member himself/herself?" Therefore, with the income data, I can not only get the out-of-pocket payment information, but also construct another two important indices of medical expenditures, the ratio of out-of-pocket payment to income and the ratio of out-of-payment to total medical payment. However, CHIP data does not contain information of medical service utilization or health status.⁶

Table 3.2 shows the mean value of some key variables by working unit. The most noticeable facts are: first, the health insurance coverage of private enterprise employees rose from 29 percent to 44 percent while both SOEs and government employees experienced a slight decrease; second, the mean out-of-pocket medical expenditures of the employees of private enterprise decreased substantially from \$33.99 to \$22.65 (both adjusted by 1995 price index), while the employees of both SOEs and government experienced a small increase.⁷ Another fact worth

⁵China Health and Nutrition Survey is another dataset often used in the research of health-related topics in China. However, because of CHNS's short of observations of employees of government or state-owned enterprises, CHIP is a better data source for my study.

⁶The 2002 survey did contain a question about subjective health, but there was no such question in 1995 survey.

⁷The out-of-pocket medical expenditures in 2002 have been adjusted by the provincial medical service price

mentioning is that the proportion of employees with tenure position⁸ dropped by about 10 percent in both SOEs and government sectors, which means government and SOEs hired more short-term contractual employees in 2002. This might explain the slight decrease in insurance coverage in these two sectors, since employers are not required to provide health insurance to short-term workers. Generally speaking, the employees of private enterprises are younger, less likely to be married and receive less years of education than the employees of the other two working units.

The empirical method employed in this paper is the difference-in-difference approach. The employees of government (including state-owned institutions) form the control group. There are two treatment groups, the employees of private enterprises and the employees of SOEs. There are two advantages with this design of two treatment groups. First, I can study the effect of different reform intensities. As I mentioned in the introduction, for the employees of private enterprises, the change was from no risk pooling capacity to some level of risk pooling capacity. For the employees of SOEs, the change was from poor risk pooling capacity (individual-firm level) to better risk pooling capacity (city-level). The employees of SOEs, who benefited most from the insurance reform, were the employees of SOEs which experienced financial difficulties and could not commit to the traditional LIP. Second, the estimations of different pairs of treatment and control group can provide additional evidence to each other. The two underlying identification assumptions to justify this difference-in-difference design are: first, the treatment groups and control group should have parallel pre-reform trends in dependent variables, which are insurance coverage and out-of-pocket medical expenditures in this study; second, there was no other event that affected the treatment groups and control group differently at the time of 1998 health insurance reform. Testing the identification assumptions directly is impossible. The best substitution is to check the pre-reform trends of key dependent variables of treatment groups and control group. However, this kind of test can not be done, for I only have two waves of data.9 The second best thing I can do is to do some "placebo difference-in-difference regressions" to see whether treatment groups and control group have differences in changes of some variables which should not have been affected by the reform before and after the reform. Table

index from the China Annual Statistical Book.

⁸Employees with tenure position can not be fired by companies, while employees with contractual position can be fired by companies. In this paper, I consider employees with long-term contract as employees with tenure position.

⁹There were very few private enterprises in China in 1988, so the 1988 wave is not appropriate to be used here.

3.3 reports the result of this "placebo test". I check five dependent variables,¹⁰ and only one of them has significant difference-in-difference estimators. This kind of "placebo test" sometimes could be not very convincing in the sense that some of the variables should be not affected by any event.

3.5 The Effect of the Reform on Insurance Coverage and Out-of-pocket

Medical Expenditures

In this section, I will discuss two direct effects of the health insurance reform: the effect on insurance coverage and the effect on out-of-pocket medical expenditures. The basic regression model can be written as

$$y_{it} = \beta_0 + \beta_1 * after_t + \beta_2 * treatment_i + \beta_3 * after_t * treatment_i + \beta_4 * control_{ii} + e_{it}$$
.

*After*_{*i*} is a dummy variable indicating whether the observation is before or after the 1998 reform (=1 if the observation belongs to the 2002 sample). *Treatment*_{*i*} is a dummy variable indicating whether the observation belongs to the control group or the treatment groups. *Treatment*_{*i*} = 1 if *i* belongs to the private enterprises when I am studying the impact of reform on private enterprises; *Treatment*_{*i*} = 1 if *i* belongs to the SOEs when I am studying the impact of reform on SOEs. *After*_{*i*} **treatment*_{*i*} is an interaction term of *after*_{*i*} and *treatment*_{*i*}. *Control*_{*it*} are other control variables which might affect the dependent variables. *E*_{*it*} is the error term. β_1 captures the national time trend of the dependent variables. β_2 captures the time invariant group fixed effect. β_3 is the difference-in-difference estimator we are interested in. I add indicator of male, indicator of tenure, ¹¹ age, the square of age, years of education, and the annual income adjusted by the 1995 price index as important control variables to the econometric model. Another important control variable included in the model is the index¹² of the intensity of the provincial open-door policy, for according to some recent studies (Akin et al., 2004; Du, 2009), the health insurance benefits are different across regions with different open-door policies.

 $^{^{10}}$ The question corresponding to the regressions in column (5) and (6) is "Had the members ever been sent as educated youth to the countryside?" During the culture revolution in 1960s and 1970s, well-educated young people in China were forced to live in the countryside and become farmers. They are usually called "educated youth" in the Chinese history.

¹¹Indicator of tenure equals to 1 if the individual holds a tenure position or a long-term contract; 0 otherwise.

¹²I construct this index following the method derived by Woo et al. (2002).

First, let us focus on the effect on health insurance coverage. For the employees of private enterprises, the effect should be unambiguously positive. For the employees of SOEs, I do not expect a significant effect, since most of them were covered by LIP before the reform. I employ the linear probability model¹³ to estimate this effect. To deal with the heteroscedasticity brought about by the specification of linear probability model, I use the specification of White Robust Standard Errors. Column (1) and (2) in Table 3.4 report the estimation results of the impact of reform on the employees of private enterprises and the estimation results of the impact on the employees of SOEs are reported in column (5) and (6). Province fixed effects are included in regressions in column (2) and (6). As we expected, the reform has an significant positive effect on the insurance coverage of the employees of private enterprises. The probability of being covered by health insurance increased by about 15 percent on average (with province fixed effects) after reform.¹⁴ The impact of reform on the insurance coverage of the second treatment group is not statistically significant. Meanwhile, job tenure, years of education and income¹⁵ all have significant positive effects on the probability of being covered by health insurance.

Then, we turn to the impact of reform on out-of-pocket medical expenditures.¹⁶ I expect the reform to reduce the out-of-pocket payment of private enterprises employees. The expected reform effect on the out-of-pocket medical payment of SOEs employees can be ambiguous, since most of them were covered by LIP before the reform. However, we can expect the reform to reduce the risk of exposure to unexpected huge medical expenditures. Since the bad fiancial status and poor risk pooling capacity at the individual firm level made it difficult for many SOEs to cover large medical expenditures of their employees, and the ceiling of reimbursement was very low for LIP before the reform (Akin et al., 2004). A better risk pooling capacity at city-level may improve this situation. I use the indicators of catastrophic medical expenditures to capture the risk of exposure to large out-of-pocket medical payment. I construct two indicators: *disaster*1 which equals to 1 if the ratio of out-of-pocket medical payment to annual

¹³I also fit the data with logit and probit models, and get very similar results with linear probability model. The results are not reported here.

¹⁴Commercial insurance may be one of the confounding effect. But the coverage of commercial insurance in China has been staying at a very low level (Du, 2009), which may not cause such a significant change.

¹⁵CHIP include question about the annual income in the past four years. I also run regressions with last year income as instruments and see no significant difference in the coefficients.

¹⁶The out-of-pocket medical payment here is defined as the payment for medical services and drugs. Insurance premiums are not counted as part of out-of-pocket expenditures.

income exceeds 30%, and *disaster2* which equals to 1 if that ratio exceeds 50%. Column (3)and (4) in Table 3.4 report the estimation results of the impact of reform on the employees of private enterprises and the estimations of the impact on the employees of SOEs are reported in column (7) and (8).¹⁷ Province fixed effects are included in regressions in column (4) and (8). The mean out-of-pocket payment of the employees of private enterprises drops by \$12.54 (with province fixed effect), about 37% of the mean out-of-pocket payment in 1995, relative to the change of the control group after the reform. This average treatment effect is statistically significant at 1% level. The result shows no significant effect on the employees of SOEs. Meanwhile, male employees spend about \$7.23 less on out-of-pocket medical payment than female employees do on average in one year. Employees with tenure position spend less on medical services. Employees with higher income and younger employees make greater out-of-pocket medical payment.¹⁸ Years of education does not have significant effect on out-of-pocket medical payment and the effect of open-door policy is ambiguous. Table 3.5 reports the results of difference-in-difference regressions of the ratio of out-of-pocket payment to total medical payment, the ratio of out-of-pocket payment to annual income, and two indicators of catastrophic expenditures. The estimated treatment effects on two ratios are very similar to that on out-ofpocket payment, effect is significantly negative for the first treatment group but insignificant for the second one. However, the difference-in-difference estimators of regressions of indicators of catastrophic expenditures are significantly negative for both treatment groups, which means that the reform reduces the risk of exposure to large medical expenditures for the employees of both treatment groups, just as we expected. This result replicates the result of Finkelstein and Mcknight (2008), in which they studied the effect of the introduction of Medicare and found that Medicare had no effect on mean household out-of-pocket medical expenditures but substantially reduced the risk of large medical expenditures.

However, the difference-in-difference estimators of medical expenditures and related variables can be interpreted as the pure treatment effect of the health insurance only if I make the assumption that there is no composition difference in treatment groups before and after the reform. As we can see in Table 3.6, the reform may attract better-educated people to work in private enterprises. The impact of reform on two education related variables, years of educa-

¹⁷The observations with top 1/1000 out-of-pocket payment are dropped in these four regressions.

¹⁸I only use the observations of employed employees, so the large medical expenditures of retired employees are not taken into account.

tion and the indicator of college degree, are both highly significant for the employees of private enterprises, and insignificant for the employees of SOEs. Although years of education does not have significant effect on out-of-pocket medical payment (Table 4), we can not overlook the potential composition change in the employees of private enterprises. The reform not only caused changes in insurance coverage, but also caused changes in the composition of labor force by attracting well-educated people to work in private sector. Therefore, the differencein-difference estimators in this section are the overall effect of the insurance reform, not the pure treatment effect of health insurance. We need dig deep into the job selection mechanism to disentangle this two effects.

3.6 Conclusion

In 1998, Chinese government launched a reform of health insurance system, and aimed at covering all urban employees by a uniform insurance scheme, Urban Employee Health Insurance. Local governments are granted the autonomy to make up their own timetables of the reform. Since government officials are not willing to give up the generosity of the traditional GIP program, the employees of government and state-owned institutions are placed in the later place on the timetable, far behind the employees of the enterprises. This variation of enrollment across working units and over time enables me to employ a difference-in-difference strategy to study the impact of reform on insurance coverage and out-of-pocket medical payment. There are two main findings of this paper. First, the reform substantially increased the probability of being covered by health insurance and decreased the out-of-pocket medical expenditures for the employees of private enterprises. Second, the effects on the insurance coverage and out-ofpocket payment of the employees of SOEs are not statistically significant, but the reform does significantly reduce the risk of exposure to large medical expenditures.

For the following reasons, the results of this paper should be interpreted with caution. First, due to the characteristics of the dataset, the effects estimated in this paper are short term effects which may be different from the long term effect. Second, the reform took place in 1998, but the pre-reform sample used by this paper was collected in 1995. Lack of information between 1995 and 1998 reduces the credibility of the results. Third, the dataset does not contain information about health status, which is very important element to decide the medical services demand

and medical expenditures. Fourth, the effect of the reform on supply side is not considered in this study. The general equilibrium effect caused by the health insurance expansion may bias the estimators in this paper. Finally, as mentioned in the final part of section 5, the reform not only caused changes in insurance coverage, but also caused changes in the composition of the labor force by inducing well-educated people to work in private enterprises. Therefore, the difference-in-difference estimators in section 5 are the overall effect of the insurance reform, not the pure treatment effect of health insurance. To disentangle the effect of health insurance and the composition effect, I need to estimate a selection model of working units which requires further research.



Figure 3.1: The Finance of Urban Employee Health Insurance

	Enterprises	Public Institutions	Government
Beijing	1999	Not yet	Not yet
Shanxi	1999	2005	2009
Liaoning	2000	2005	2009
Jiangsu	1999	2008	2008
Anhui	2000	2006	Not yet
Henan	1999	2007	2007
Hubei	1999	2008	Not yet
Guangdong	1999	Not yet	Not yet
Sichuan	1999	2009	2009
Yunan	1999	2008	2008
Gansu	2000	2008	2008

Table 3.1: Time of Reform by Working Unit

Note:

Sources: Government documents and telephone inquiries of provincial public insurance administration offices.

Statistics
Summary
3.2:
Table

		995			2002	
VARIABLES	Government	PE	SOE	Government	PE	SOE
1=insurance	0.81	0.29	0.80	0.79	0.44	0.76
OOP payment (RMB)	187.17	282.44	171.09	201.76	188.23	191.26
Age	40.03	34.62	39.58	41.10	38.76	41.35
1=marriage	0.92	0.69	06.0	06.0	0.84	06.0
1=tenure	0.98	0.63	0.98	0.89	0.61	0.89
1=male	0.52	0.48	0.52	0.55	0.54	0.62
Years of education	12.18	9.76	10.40	12.72	10.66	11.14
Obeservations	2323	1226	3522	3153	2935	3031
Note: Statistics reporte	ed in the table ar	e the mea	an values	of variables in t	the corresp	onding
working unit and year.	Out-of-pocket]	payment i	in 2002 a	re adjusted by tl	he 1995 pr	ovincial
price index (from Chin	ia annual statisti	cal book)	. Only th	e information o	f urban em	ployeed
individuals are used to	make this table					

Sources: China Household Income Project (CHIP) 1995 and 2002 Data.

	Communi	st Party=1	Mino	rity=1	Eduyo	outh=1	Divor	ce=1	Wide	w=1
VARIABLES	(1)	(2)	(3)	(4)	(5)	(9)	(7)	(8)	(6)	(10)
After	0.00109	-8.32e-05	0.00161	0.00201	-0.0598***	-0.0588***	0.00201	0.00175	-0.00206	-0.00248*
	(0.0113)	(0.0113)	(0.00510)	(0.00488)	(0.00886)	(0.00884)	(0.00177)	(0.00178)	(0.00150)	(0.00150)
PE	-0.173***	-0.171***	-0.0111	0.00532	-0.0378**	-0.0430***	-0.00135	0.00291	-0.000615	0.000259
	(0.0152)	(0.0158)	(0.0111)	(0.0104)	(0.0160)	(0.0161)	(0.00578)	(0.00573)	(0.00478)	(0.00497)
After*PE	-0.00567	-0.00113	0.000181	-0.00460	0.0580***	0.0550***	-0.00120	-0.00372	0.00146	0.00219
	(0.0178)	(0.0182)	(0.0121)	(0.0112)	(0.0177)	(0.0178)	(0.00628)	(0.00623)	(0.00514)	(0.00518)
Province Fixed Effect	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	10,056	10,056	10,122	10,122	10,064	10,064	10,123	10,123	10,123	10,123
Panel B Diference-in-	Difference F	kegression be	etween SOF	and Gover	nment Emple	yees				
After	-0.000638	-0.00245	0.00221	0.00229	-0.0665***	-0.0657***	0.00349**	0.00334^{*}	-0.00235	-0.00253*
	(0.0113)	(0.0113)	(0.00512)	(0.00488)	(0.00879)	(0.00877)	(0.00175)	(0.00176)	(0.00149)	(0.00149)
SOE	-0.130***	-0.124***	-0.00538	-5.90e-05	0.0479***	0.0406***	-0.00244**	-0.00229*	-0.00107	-0.000585
	(0.00931)	(0.00934)	(0.00449)	(0.00437)	(0.00837)	(0.00837)	(0.00120)	(0.00120)	(0.00125)	(0.00125)
After*SOE	-0.00128	-0.000723	-0.0125*	-0.0102	-5.60e-05	0.00267	-0.00287	-0.00260	0.000365	0.000283
	(0.0144)	(0.0144)	(0.00660)	(0.00636)	(0.0124)	(0.0123)	(0.00248)	(0.00248)	(0.00212)	(0.00212)
Province Fixed Effect	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	15,624	15,624	15,691	15,691	15,568	15,568	15,691	15,691	15,691	15,691
Note: All regressions in	n the table us	se linear prob	ability mode	l with White	e Robust Stand	lard Errors. In	panel A, the	treatment gro	up is the em	ployees
of private enterprises, v	vhile in pane	I B, the treat	nent group i	s the employ	ees of State-c	wned enterpri	ses. Other cor	ntrol variable	s include age	, square
of age, gender, marriag	e status, and	years of edue	cation.							
Sources: China Housel	nold Income	Project (CHI	P) 1995 and	2002 Data.	* significant a	t 10%; ** sigi	ificant at 5%;	*** significe	unt at 1%. Ro	bust

standard errors are in parentheses.

Table 3.3: Placebo Test of Difference-in-Difference Regression

	Panel A Effect on Private Enterprises				Panel B Effect on State-owned Enterprises				
	Insura	ince=1	OOP Medie	cal Expense	Insura	nce=1	OOP Medic	al Expense	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
After	-0.0801***	-0.0952***	-19.96	36.22*	-0.0726***	-0.0550***	-2.932	14.75	
	(0.0117)	(0.0166)	(13.51)	(19.10)	(0.0108)	(0.0145)	(12.22)	(15.94)	
PE	-0.344***	-0.339***	95.16***	103.2***					
	(0.0251)	(0.0252)	(29.79)	(29.83)					
PE*After	0.159***	0.150***	-98.87***	-104.1***					
	(0.0266)	(0.0268)	(30.88)	(31.05)					
SOE					0.0146*	0.00741	-8.195	-5.800	
					(0.00841)	(0.00776)	(10.80)	(10.81)	
SOE*After					-0.000741	-0.000519	7.844	6.830	
					(0.0129)	(0.0126)	(14.50)	(14.53)	
Gender	0.000798	0.00594	-63.34***	-61.90***	0.00370	0.0128**	-53.67***	-51.75***	
	(0.00845)	(0.00815)	(9.114)	(9.103)	(0.00655)	(0.00627)	(7.497)	(7.499)	
Marriage	-0.0688***	-0.0230	19.69	24.89	-0.0603***	-0.0219	29.76*	33.45**	
	(0.0174)	(0.0171)	(17.97)	(18.08)	(0.0144)	(0.0139)	(16.06)	(16.12)	
Party	0.0316***	0.0342***	24.95**	22.16**	-0.0123*	-0.0112	25.46***	22.78***	
	(0.00933)	(0.00887)	(10.46)	(10.43)	(0.00716)	(0.00683)	(8.327)	(8.325)	
Minority	0.0258	-0.0573***	14.32	-17.30	0.0464***	-0.0212	15.92	-12.03	
	(0.0186)	(0.0186)	(20.92)	(21.84)	(0.0138)	(0.0139)	(17.34)	(18.00)	
Tenure	0.250***	0.263***	-27.60**	-22.01*	0.308***	0.333***	-32.20**	-29.60*	
	(0.0140)	(0.0140)	(12.72)	(12.82)	(0.0175)	(0.0174)	(15.27)	(15.37)	
Education	0.0205***	0.0187***	-0.418	0.417	0.0140***	0.0118***	-0.244	0.307	
	(0.00151)	(0.00145)	(1.623)	(1.633)	(0.00115)	(0.00112)	(1.337)	(1.344)	
Age	0.0127***	0.00275	-2.350	-3.819	0.0162***	0.00731***	-6.407*	-7.837**	
	(0.00331)	(0.00335)	(3.659)	(3.670)	(0.00283)	(0.00274)	(3.284)	(3.294)	
Square of age	-9.21e-05**	1.16e-05	0.0774*	0.0975**	-0.000150***	-5.78e-05*	0.123***	0.141***	
	(3.87e-05)	(3.93e-05)	(0.0435)	(0.0436)	(3.28e-05)	(3.21e-05)	(0.0388)	(0.0389)	
Income	9.16e-06***	8.65e-06***	0.00244***	0.00184***	1.03e-05***	9.29e-06***	0.00171***	0.00138**	
	(9.54e-07)	(9.54e-07)	(0.000658)	(0.000687)	(7.61e-07)	(7.81e-07)	(0.000630)	(0.000664)	
Opendoor	0.00159	0.0177*	13.57**	-25.05**	-2.30e-05	-0.00566	3.575	-6.833	
	(0.00559)	(0.00920)	(6.182)	(11.66)	(0.00385)	(0.00735)	(4.470)	(8.572)	
Province	No	Yes	No	Yes	No	Yes	No	Yes	
Fixed Effect									
Observations	9,943	9,943	8,509	8,509	15,439	15,439	11,832	11,832	

Table 3.4: Reform Effect on Insurance Coverage and Out-of-pocket Medical Expenditures

Note: Regressions in column(1), (2), (5), and (6) are estimated with linear probabilibty model with White Robust Standard Errors. Income and medical expense data in 2002 are adjusted with the 1995 provincial price index. The observations with top 1/1000 out-of-pocket medical payment are dropped while estimating regressions (3),(4), (7), and (8). Sources: China Household Income Project (CHIP) 1995 and 2002 Data. * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are in parentheses.

	Medic	alratio	Incon	neratio	Disa	ster1	Dis	aster2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A Diffe	rence-in-Dif	ference Reg	ression betw	veen PE and	Government	Employees		
After	37.40***	26.68***	1.767***	3.584***	-0.349***	-0.381***	-0.342***	-0.373***
	(1.039)	(1.392)	(0.588)	(0.834)	(0.0104)	(0.0145)	(0.0106)	(0.0149)
PE	33.38***	31.64***	2.368*	2.436*	0.0621**	0.0600**	0.0539**	0.0514*
	(1.931)	(1.854)	(1.299)	(1.305)	(0.0272)	(0.0271)	(0.0273)	(0.0272)
After*PE	-26.20***	-22.17***	-2.627*	-2.759**	-0.0706***	-0.0735***	-0.0600**	-0.0621**
	(2.071)	(1.998)	(1.346)	(1.358)	(0.0270)	(0.0270)	(0.0272)	(0.0271)
Gender	-0.760	-1.057	-1.504***	-1.439***	0.0292***	0.0272***	0.0256***	0.0239***
	(0.729)	(0.699)	(0.397)	(0.397)	(0.00657)	(0.00655)	(0.00680)	(0.00679)
Tenure	-11.70***	-13.37***	-2.264***	-1.983***	0.0170**	0.0118*	0.00902	0.00464
	(1.049)	(1.015)	(0.554)	(0.560)	(0.00681)	(0.00698)	(0.00781)	(0.00797)
Province	No	Yes	No	Yes	No	Yes	No	Yes
Fixed Effect								
Observations	8,600	8,600	8,509	8,509	9,943	9,943	9,943	9,943
Panel B Diference-in-Difference Regression between SOE and Government Employees								
After	39.81***	26.81***	2.603***	3.896***	-0.336***	-0.355***	-0.330***	-0.346***
	(1.046)	(1.329)	(0.791)	(1.034)	(0.00973)	(0.0118)	(0.00992)	(0.0122)
SOE	0.192	1.256	1.089	1.196*	0.0354***	0.0289***	0.0344***	0.0280***
	(0.832)	(0.794)	(0.699)	(0.702)	(0.0105)	(0.0103)	(0.0105)	(0.0104)
After*SOE	1.077	2.121*	-1.606*	-1.765*	-0.0507***	-0.0508***	-0.0506***	-0.0510***
	(1.262)	(1.204)	(0.938)	(0.942)	(0.0107)	(0.0107)	(0.0110)	(0.0110)
Gender	-0.00853	-0.599	-1.220**	-1.121**	0.0611***	0.0570***	0.0598***	0.0558***
	(0.632)	(0.602)	(0.485)	(0.486)	(0.00644)	(0.00641)	(0.00651)	(0.00649)
Tenure	-15.40***	-17.84***	-1.950**	-1.720*	0.0170*	0.00901	0.0135	0.00613
	(1.378)	(1.322)	(0.988)	(0.997)	(0.00985)	(0.0101)	(0.0106)	(0.0109)
Province	No	Yes	No	Yes	No	Yes	No	Yes
Fixed Effect								
Observations	13,125	13,125	11,832	11,832	15,439	15,439	15,439	15,439

Table 3.5: Reform Effect on Various Indexes of Out-of-pocket Medical Expenditures

Note: Regressions in column (5), (6), (7), and (8) are estimated with linear probabilibty model with White Robust Standard Errors. Dependent variables in column (1) and (2) are Medical ratio=(oop payment/total payment)*100, in column (3) and (4) are Incomeratio=(oop payment/total payment)*100, in column (5) and (6) are disaster1, which equals to 1 if incomeratio>50, in column (7) and (8) are disaster2, which equals to 1 if incomeratio>30. Other control variables include age, square of age, marriage status, years of education, minority, opendoor, income, and party.

Sources: China Household Income Project (CHIP) 1995 and 2002 Data. * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are in parentheses.

	Panel	A Effect on 1	Private Ente	erprises	Panel B Effect on State-owned Enterprises					
	Years of	education	Colle	ege=1	Years of	education	Coll	ege=1		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
After	0.557***	0.566***	0.0278**	0.0285**	0.636***	0.784***	0.0549***	0.0533***		
	(0.0692)	(0.0688)	(0.0112)	(0.0112)	(0.0737)	(0.0947)	(0.0122)	(0.0160)		
PE	-2.382***	-2.251***	-0.446***	-0.424***						
	(0.151)	(0.153)	(0.0210)	(0.0212)						
After*PE	0.518***	0.374**	0.101***	0.0837***						
	(0.166)	(0.167)	(0.0237)	(0.0238)						
SOE					-1.577***	-1.606***	-0.312***	-0.315***		
					(0.0589)	(0.0589)	(0.0100)	(0.0100)		
After*SOE					0.142	0.128	0.0257*	0.0291*		
					(0.0912)	(0.0910)	(0.0153)	(0.0153)		
Gender	0.283***	0.292***	0.00847	0.0101	0.179***	0.173***	0.00644	0.00739		
	(0.0578)	(0.0575)	(0.00930)	(0.00928)	(0.0455)	(0.0453)	(0.00766)	(0.00765)		
Minority	-0.00281	0.0175	0.00475	-0.0161	-0.129	-0.0320	0.00278	-0.0151		
	(0.137)	(0.143)	(0.0213)	(0.0225)	(0.110)	(0.113)	(0.0178)	(0.0185)		
Marriage	-1.382***	-1.336***	-0.201***	-0.204***	-1.035***	-1.014***	-0.147***	-0.150***		
	(0.0873)	(0.0873)	(0.0142)	(0.0142)	(0.0713)	(0.0710)	(0.0123)	(0.0123)		
Party	1.028***	1.007***	0.174***	0.172***	0.987***	0.988***	0.178***	0.177***		
	(0.0643)	(0.0640)	(0.0106)	(0.0106)	(0.0501)	(0.0500)	(0.00864)	(0.00864)		
Province	No	Yes	No	Yes	No	Yes	No	Yes		
Fixed Effect										
Observations	10,055	10,055	10,117	10,117	15,624	15,624	15,599	15,599		

Table 3.6: Reform Effect on Education

Note :Regressions in column (3), (4), (7), and (8) are estimated with linear probabilibty model with White Robust Standard Errors. The dependent variable for regressions in column (1), (2), (5), and (6) is the years of education, and the dependent variables for regressions in column (3), (4), (7), and (8) is the indicator variable of college degree. Sources: China Household Income Project (CHIP) 1995 and 2002 Data. * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are in parentheses.

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