November 09, 2017

A Generation "Lost": Education Interruptions by Great Leap Forward and Cultural Revolution

Xueyuan Liu[a]

Tian Meng[a]

James P Smith[b]

Yaohui Zhao[c]

[a] CCER, Peking University

[b] Chair in Labor Markets and Demographic Studies, The RAND Corporation

[b]Professor of Economics, CCER, Peking University

This research was supported by grants from the National Institute on Aging. The Natural Science Foundation of China, and China Scholarship Council

Abstract

This paper examines the effects of Great Leap Forward (GLF) and Cultural Revolution (CR) on education. We find they significantly reduced the education attainments of those who were of school age during GLF and CR. The reduction was greater for urban people than rural people. CR also weakened the parent-child education transmission between CR cohort and their parents. We also find that CR has no apparent effect on the parent-child education transmission between CR cohort and their children. Education of CR cohort's children recovered immediately since the negative correlation to their grandparents' education disappeared. We conclude that this massive government intervention to weaken intergenerational education correlation and increase the equality of educational opportunities like Cultural Revolution did not persist into younger generation.

I. Introduction

The Great Proletarian Cultural Revolution in China, commonly known as the Cultural Revolution, was a social-political movement that took place from 1966 through 1976. An explicit goal of the Great Cultural Revolution was to create a new system of education to eliminate differences between urban and rural, workers and peasants, and mental and manual labor. Therefore, the education system received priority. Starting from June 1966, examinations for university admissions were dropped, and many schools were closed. Authors, scholars, and political advocates (most of them were school teachers) were singled out for criticism. Party officials were divided into different lines which had no well-defined distinctions and attacked their opponents severely, and even lead to violent actions. Students in school during these time were intrigued and maneuvered into activists in a game they did not fully understand. China, especially the big cities, was thrown into turmoil. Although Mao failed in his quest eventually, his revolutionary efforts caused profound problems with which Chinese society has to cope for decades ("China", 2013).

In a short run, the instability in political policies and economic policies slowed down the country's economic growth and paralyzed the government's ability to organize and coordinate. The constant shifts in policy during the period instilled in officials at all levels a notion that those who aggressively implement new policies would bear the risk of being persecuted or purged, and therefore resulted in timidity in Chinese bureaucracy. This legacy of intimidation not only exists among officials and party members, but was also prevalent among common people who were afraid of expressing their opinions. Bold actions were taken to deal with those immediate problems, but the Cultural Revolution also left more serious, long-term legacies. The most critical and influential one would be that an entire generation of young adults had been denied an

education resulting in a severe talent shortage. A whole generation born between 1947-1960 (roughly 265 million people according to the 2010 census) had experienced education interruptions during their school age in one way or another. Some people resumed higher education after the Cultural Revolution, but a vast majority of them were deprived of the opportunities to receive a better education. Education deprivation may lead to even more severe consequence in later-life well being for those people. These people are now in their 50s and 60s, and growing into the largest aging population in the world. As a result of the damages by Cultural Revolution, they may suffer from lower income, worse mental and physical health, and even their children could be indirectly affected.

For these generations, their education stages were also under influence of other negative education events in China other than CR, that is, "The Great Leap Forward" (GLF) which was begun by Chairman Mao Zedong during 1958-1962 to bring the nation quickly into the forefront of economic development. At that time, the rural society was to keep pace with the dream by producing enough food to feed the country plus enough for export to help pay for industrialization. Mao proclaimed that China would overtake Britain in production of steel and other products within a few years[1]. In pursuit of these unrealistic goals, the government plunged the country into a deep debt by increasing spending on the development of heavy industry and prohibited private farming. By the spring of 1959, the grain reserves were exhausted and the "Great Famine" which resulted in tens of millions of death had begun. The direct impact on education was on the supply side: schools closed, teacher attendance declined, and students spent more time farming (Huang and Zhou, 2013). And in addition, there exist many indirect effects on

[1] At the beginning of the Great Leap Forward, Mao proclaimed that China would overtake Britain in production of steel and other products within 15 years. A year later, Mao radically revised the timeline for catching up to Britain had to be done in just one more year.

education due to “Great Famine”, for example, people suffered from hunger and could not attend or finish school. Therefore, some cohorts were not only affected by CR, but also by GLF. Therefore, we separate the influence of CR from that due to GLF when analyzing the education consequences.

In this paper, we ask the question what the education consequences of GLF and CR on China’s aging population were, and whether or not the education shock proved to be persistent across generations. There exists a small literature examining the impact of Cultural Revolution on education (Deng and Treiman, 1997; Li, et al, 2010; Meng and Gregory 2007), but to no research has been done from the aging perspective. This paper is divided into five sections. The next section describes the CHARLS data and the main variables that will be used in our analysis. Section 3 summarizes the implementation of the Cultural Revolution and its implications for educational attainment of the affected cohorts. Our main empirical findings are contained in section 4 and the final section highlights our main conclusions.

II. Data—CHARLS

The China Health and Longitudinal Study (CHARLS) is a nationally representative longitudinal survey of the middle-aged and elderly population (45+) in China along with their spouses, which includes an assessment of the social, economic, and health circumstances of community-residents. The purpose of CHARLS is to study the main health and economic adjustments to rapid population aging in China. The national baseline survey of CHARLS was conducted between June 2011 and March 2012 on 17,692 respondents. CHARLS respondents are followed every two years using a face-to-face CAPI interview. CHARLS has been

harmonized with leading international research studies in the Health and Retirement model (HRS) to ensure adoption of best practice and international comparability of results[2].

CHARLS baseline data include detailed education information of respondents and their living spouses. In the Demographic Background Module, CHARLS respondents and spouses were asked about 1) the highest level of education they obtained, 2) at what age they started formal schooling, 3) at what age they finished formal schooling, and 4) at which year they went to college. For those who dropped out of primary school, we know the highest grade they finished in primary school. For those who have finished primary school, we also know how many additional years have they completed after obtaining their highest degree. CHARLS baseline data also includes information about whether the respondents and spouses participated in adult education program, and if they did, how many years they spend on it, and the highest degree they obtained through adult education program.

In addition, CHARLS respondents are asked about the educational accomplishments of their parents and their children. In the Family Module, respondents are asked "What is the highest level of education your father/mother/father-in-law/mother-in-law has completed", the answer is recorded in a categorical variable of 11 options: 1) no formal education, 2) did not finish primary school but capable of reading or writing, 3) sishu/home school, 4) Elementary school, 5) middle school, 6) high school, 7) vocational school, 8) two/three-year college/association degree, 9) four-year college/bachelor degree, 10) post-graduate/ master degress, 11) post-graduate/Ph.D. In the same module, respondents were asked whether their child is still in school now, and what level of schooling and grade this child is currently enrolled in. If they are not in school now,

[2] For a detailed description of the CHARLS survey, see "Cohort Profile: The China Health and Retirement Longitudinal Study International Journal of Epidemiology, 2012, 43(1): 61-68.

what is the highest level of education the child completed, and how many years of schooling did the child receive after the highest level of education completed.

The main adult outcome variables include key adult health and SES outcomes. Adult health includes self-reported general health status, doctor diagnoses of chronic illnesses, depression, word recall, numerical abilities, activities of daily living (ADLs), and instrumental activities of daily living (IADLs). It is worth noting that some health variables, such as hypertension, weight and height, are obtained from health measurements conducted in the field.

III. The Cultural Revolution and the Disruption of Education

Twelve years after the establishment of the new People's Republic of China, Chairman Mao became increasingly concerned by the weakening of ideological focus and revolutionary fervor, and along with it the decentralization of his power. Therefore, he decided to launch a socialist education movement starting in1962, with the intention to "restore ideological purity, re-infuse revolutionary fervor in the party and government bureaucracies and intensify class struggle"[3]. Oppositions from moderates like Liu Shaoqi and Deng Xiaoping did not stop Mao's determination, if not inflaming it.

Many measures were taken to make the education system less elitist. A thorough reform of the school system went into effect. The reform was intended to "accommodate the work schedule of communes and factories" (Meng and Gregory, 2007). On the one hand, "intellectuals and scholars"[4] were re-educated by their own participation in manual labor so that they would not regard their specialized field as superior to the goals of the party. On the other hand, because

3 A Country Study：China, Library of Congress Call Number DS706. C489 1988, http://lcweb2.loc.gov/frd/cs/cntoc.html

4 The term "intellectuals" was actually used in the broadest sense to refer to recently graduated middle school students.

school schedules have been adjusted to the needs of agricultural production and other manual works, children from average families were able to attend school at a lower cost.

Table 1. Education Interruptions Enforced by the Cultural Revolution

Education category	Main effect	Second Effect	Third Effect	Forth Effect
Primary school 0-6 years	1966-1968 Extremely irregular classes without normal curriculum	1968-1972 Semi-regular classes emphasis on political debate	1972 Primary school return to normalcy	
Middle School 7-9 Years	1966-1968 All middle schools closed	1969 Middle school graduates sent down to country side	1969-1972 Irregular classes Not allowed to continue to high school	1972 Middle School return to normalcy
High School 10-12 Years	1966-1968 All high schools closed	1969 High school graduates sent down to country side	1969-1972 Irregular classes without normal curriculum	1972 High School return to normalcy
College 12-16 Years	1966-1971 All colleges closed	1972-1977 Political approved students can attend not merit based	1977-1978 Heavy merit based competition	1979-1980 Gradual return to normalcy
Graduate School 17+ Years	1966-1977 All graduate school closed	1977 Graduate school reopened	1981 Graduate degree awarded	1982 Gradual return to normalcy

Table 1 highlights our summary of the impacts of the Cultural Revolution on the education system in China. The precise effects of the Cultural Revolution on education were complex, and depended in large part on where students were in the educational system when the Cultural Revolution started. Thus, our summary in Table 1 is divided into the rows by the principal levels

of schooling in China which actually closely parallel the system in the United States- primary (grades 0-6), middle school (grades 7-9), high school (grades 10-12), college (grades 13-16) and graduate school (grades 16 or more). For each of these levels of schooling, we list in the columns in Table 1 the main disruptions caused by the Cultural Revolution, organized by our assessment of their relative importance which we separate in- main, secondary, third, and forth.

The effects can be divided into quantitative effects and qualitative effects. Quantitatively, schools closed down reduced the length of schooling, or delayed the entrance to the higher level of schooling. Qualitatively, formal curriculums were replaced by the study of politics and vocational training. Examinations of the traditional type were abolished, and stress was placed upon ideological study. Even for the remaining part of formal classes, science and engineering education had been emphasized, where art and humanity subjects were almost completed ignored. Only the arts that served the revolution purposes were kept.

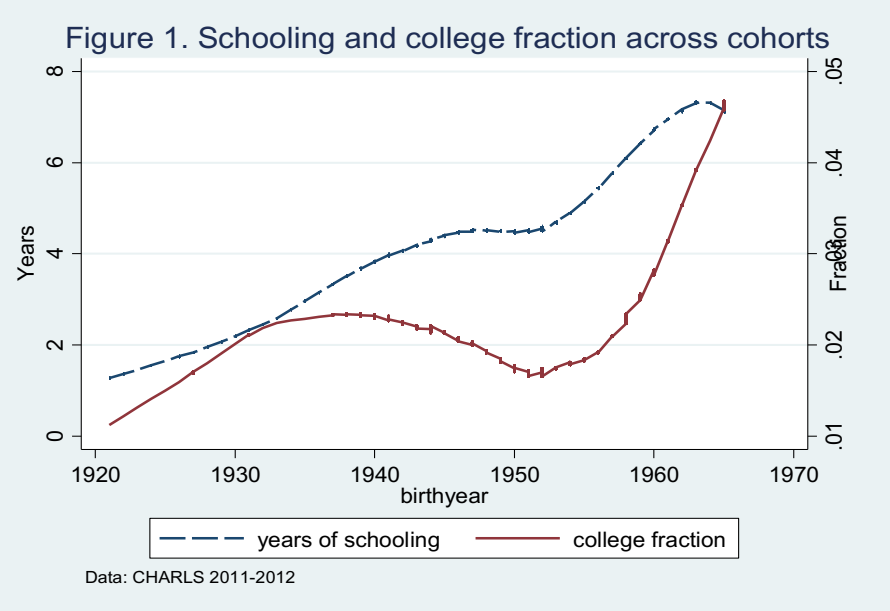

Figure 1 provides a more concrete idea about the education interruptions by Cultural Revolution. If there was no Cultural Revolution or any other exogenous shock, years of schooling of people and fraction who finished college should have a consistent upward trend along birth cohorts as social and economic developments promote education. In Figure 1, however, we observe a distinctive drop in years of schooling among 1947-1960 cohorts, and a more notable dip in fraction finished college among 1943-1960 cohorts, which are consistent with our previous analysis about the timelines of Cultural Revolution. The Cultural Revolution education movement peaked with the initiation of "Great Proletarian Cultural Revolution" from the spring of 1966 to the winter of 1968, when every middle school, high school and college was closed. Primary schools however stayed open during this period, but no longer had the regular school curriculum until 1972. Instead, students would learn farming and manual work, and spend a lot of time participating in local political events.

In December, 1968, Mao started the "Down to the Countryside" movement. Young middle school and high school graduates living in cities were ordered to go to the countryside to engage in rigorous manual labors, and stayed there until the late 1970s when they were finally allowed to return to their home cities. Middle schools and high schools were reopened in the spring of 1969. Those who have finished primary school during 1968-1969 were allowed to continue into middle schools, and middle school graduates were not allowed to proceed to high school until 1972. It was also not until 1972 that middle school and high school curriculum were able to gradually restore some of its regular scholastic contents.

There are two aspects of the education effects of the Cultural Revolution: macro effects and actual effects. The biggest macro effect of the Cultural Revolution was clearly on Universities.

Universities were closed between 1966-1971 during which no one was recruited and no teaching was permitted. A few students with the "politically correct" backgrounds (eg. children of the poorest peasants' and workers') were admitted into college during 1972-1977, and they were called "worker-peasant-soldier students". Because the selection process was politically oriented instead of merit-based, and since the curriculum during the period were heavily tinted by "ideological purity" and "class struggle", many of the college graduates during this period were not qualified as college students given normal Chinese standards.

Table 2. Education Level of Cohort 1947-1960 (compared to neighboring cohort)

	1937-1946			1947-1960			1961-1968		
	Agricultural hukou	Non-Agricultural hukou	Total	Agricultural hukou	Non-Agricultural hukou	Total	Agricultural hukou	Non-Agricultural hukou	Total
1 No formal education	38.48	9.05	34.64	28.93	6.63	26.04	13.13	2.56	11.72
2 Did not finish prim	18.28	12.14	17.48	21.91	7.89	20.09	13.83	2.75	12.35
3 Sishu	0.93	0.71	0.90	0.13	0.09	0.13			
4 Elementary school	25.72	25.24	25.65	21.94	16.85	21.27	24.48	6.41	22.06
5 Middle school	10.69	24.05	12.44	17.73	34.05	19.85	35.54	31.50	35.00
6 High school	1.54	6.43	2.18	7.16	19.53	8.77	9.66	35.53	13.11
7 Vocational school	2.97	12.62	4.23	1.30	6.99	2.04	1.24	7.14	2.03
8 Two/Three Year Coll	0.72	5.00	1.27	0.67	5.91	1.35	1.55	8.79	2.52
9 Four Year College	0.68	4.76	1.21	0.21	1.88	0.43	0.54	5.31	1.17
10 Post-graduate, Mas				0.01	0.18	0.03	0.03		0.02
Total	2,796	420	3,216	7,472	1,116	8,588	3,542	546	4,088

Note: Hukou type has been adjusted to hukou type during cultural revolution

As shown in Table 2, the fraction of people who completed a 4-year college dropped to 2% for urban people and 0.18% for rural people born between 1947 to 1960 who experienced Cultural Revolution during school age, compared to nearly 5.5% for urban people and 0.47% for rural people born between 1937 to 1946 who experienced Second World War and civil war. Given the small fraction of the population affected (the fraction who enter college is very small even without Cultural Revolution), the actual population affected by college interruption was not as

large as the number of people who were affected at primary level and secondary level which consisted of more than half of the population. It is difficult to tell which interruption is worse because interruption at college level means a huge gap in high skilled labors and professionals (teachers and scientists, for example) who are essential for the country's development, and interruption at primary and secondary level leads to a general reduction of the country's human capital quality.

The "Cultural Revolution" lasted 12 years and affected several hundred million people. The education effects of "Cultural Revolution" were complicated as the disruption happened in various ways. Some cohorts should have the chance to enter college in the late 1960s if "Cultural Revolution" had not happened. In the winter of 1977, competitive university entrance exams restarted. 5.7 million (6.1 million in 1978, 9.15 million in 2012) students walked into the examination room. Some of them were new high school graduates with young faces, but a larger number of them have left school for a long time. Some of them took the exam in 1977 or 1978, but most didn't, because they may have been already settled with a fairly good job or had a family to care for. Even among those who took the exam, it was difficult for them to retrieve the missing decade and compete with new young high school graduates. Some cohorts missed their entire years in middle school and/or high school, either due to school closing or a non-academic school curriculum. It was also very hard for them to make up the best years for study, and compete with those young and well-taught, or even with those older ones who have well completed their secondary education. Some cohorts dropped out from primary school during the peak of education chaos, and thus lost their chance to take the college entrance exam even if they so desired.

Cultural Revolution was primarily an urban political phenomenon, and thus it had an uneven effect on urban and rural residents. Some rural areas, especially those near major cities, were also caught in the turmoil. But since most high schools and universities were located in urban area, the education of rural people were also affected to some extent, although not as severe as those of urban residents.

IV. Empirical Results

A. Education Interruptions

Education attainment can be affected by many things. To name just a few, gender, social economics status, culture, early academic performance, peer effects, market return and opportunity costs of education. In addition, in our case, Cultural Revolution as an exogenous shock interrupted the Cultural Revolution cohorts' education process. Similarly, the period in China of the "Great Leap Forward" (GLF) may also has affected educational accomplishments. As we have discussed above although the entire generation between 1947-1960 were educationally affected, they were affected in different ways and to a different extent.

Therefore, we divide the cultural revolution cohorts into four groups in table 3: 1) cohort 1947-1949 (17-19 in 1966), those people were in high school when cultural revolution began. They were forced to stay in high school until 1968 when they were given their high school diploma. Some of them were then sent down to the countryside in 1969, and some took jobs locally. Their high school education was qualitatively damaged, and these people had to wait for 10-12 years until 1978 for the reopening of college entrance exam even if they wanted to resume their education. 2) cohort 1950-1952 (14-16 in 1966), these people were in middle school when

Cultural Revolution started, and their middle school education were affected. They had no chance to enter high school and were sent down or took jobs after middle school. Their chance to enter college was delayed for 7-9 years, and they were severely disadvantaged by the lack of secondary education. These first two groups were considered as the most affected group amongst the Cultural Revolution cohorts, and are called the "*old three classes*". 3) cohort 1953-1958(8-13 in 1966), they were in primary school when Cultural Revolution started, and their primary school term were prolonged. Their entrance to middle school and high school were delayed for a few years, but they did get the chance to go. 4) cohort 1959-1966(0-7 in 1966), they were affected by Cultural Revolution when in primary school, and graduated from primary school after the middle school reopened. Therefore, their middle school and high school

Table 3. Exposure to Negative Events on Education for Different Cohorts

Birth Year		Have any schooling	Primary	Middle	High	College
	1940-	NO	NO	NO	NO	NO
1940	1941	NO	NO	NO	0-3 years Leap	0-3 years Leap
1942	1946	NO	One year Leap	1-3 years Leap	0-3 years Leap	0-1 years Leap & 1-4 years CR
1947	1949	NO	3-5 years Leap	0-2 years Leap	1-3 years CR	4 years CR
1950	1952	Leap	3-5 years Leap	1-3 years CR	3 years CR	4 years CR
1953	1958	Leap and CR	0-2 years Leap	3 years CR	3 years CR	0-4 years CR
1959	1966	CR	3-5 years CR	0-3 years CR	0-1 years CR	NO

Note: Great Leap Forward (1958-1962); CR (1966-76)

educations were not quantitatively affected, but as we have mentioned several times, they didn't have the regular class.

Besides CR, "Great Leap Forward" could also affect respondents' education stages. For example, respondents who were born between 1947-49 ought to be in primary school during GLF and in high school during CR so that they might be affected by both of them. We listed the length of time they were influenced by GLF and CR for each educational outcome in table 3.

Table 4. The effects of education interruptions on having any formal education

	Whether have any schooling					
	Total		Urban Hukou		Rural Hukou	
	Coef.	T-value	Coef.	T-value	Coef.	T-value
Cohorts (Born before 1940 as reference group)						
1940-1941(25-26 in 1966)	0.12***	5.97	0.13***	3.57	0.12***	5.31
1942-1946(20-24 in 1966)	0.23***	16.57	0.13***	4.25	0.25***	16.17
1947-1949(17-19 in 1966)	0.27***	18.69	0.12***	3.91	0.29***	18.50
1950-1952(14-16 in 1966)	0.21***	14.69	0.11***	3.76	0.23***	14.30
1953-1958(8-13 in 1966)	0.27***	21.82	0.17***	7.23	0.28***	20.75
1959-1966(0-7 in 1966)	0.40***	34.81	0.19***	8.03	0.43***	33.98
Male	0.28***	49.04	0.07***	6.61	0.31***	49.57
Married	0.08***	7.60	0.05**	2.22	0.09***	7.45
Rural Hukou	-0.21***	-30.15				
Constant	0.45***	35.54	0.70***	24.66	0.20***	16.66
Observations	17,636		2,344		15,292	
R-squared	0.21		0.08		0.21	

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at household level. Hukou type has been adjusted to hukou type during cultural revolution and we control for respondents' gender, marital status, hukou type.

Table 4 presents the simple OLS regression results of GLF's and CR's effects on whether a respondent has any schooling. In all our regressions, we control for respondents' gender, marital status, hukou type and use these born before 1940 cohorts as the reference group. We also provide the cohorts born between 1940-1941 and 1959-1966 as benchmarks for before cohorts and after cohorts. We see in table 4 not surprisingly that the male dummy is positive and

significant indicating a significant gender gap in education. Respondents who lived in rural areas during Cultural Revolution have 0.21 percentage point lower probabilities of going to school, reflecting the large rural-urban disparity in education. Married respondents had 0.08 points percentage higher possibilities of attending school, which is consistent with facts about China: elderly unmarried had lower socioeconomic status.

Compared with cohorts aged 25-26 in 1966 (who were not affected in term of having any schooling), the tendency to attend schools of those who were born between 1947-1949 to have schooling increased 0.11 points but decreased among those aged 14-16 in 1966. The decline in chances to have formal education mainly shows the effects of GLF as they reached school age at that time. Moreover, this pattern primarily comes from the rural sample. In urban areas, CR cohorts experienced neither growth nor reduction. The conditional shortage in attending school of rural respondents who reached school age between 1957-1962 mainly reflects the tragedy of GLF.

The effects of CR on having formal education are shown as the coefficients of those aged 0-7 in 1966 (1956-66 cohorts), for respondents reached age of primary school (aged 8-13 in 1966), they were not negatively affected like *"Great Leap Forward"* cohorts. This is consistent with our previous introduction in table 1, primary schools were never totally closed during CR so that they still have chances to begin school. The low quality of primary schools they attend is not reflected in table 4. However, younger cohorts aged 0-7 in 1966 have 0.13 points higher probabilities compared with aged 8-13 in 1966, implying the growth of have schooling accelerated after primary school systems returned to normalcy in 1972.

To ascertain what effects persecution had on education, we divide education into its

different stages: finishing primary school, finishing middle school, finishing high school, finishing college and above. In table 5, we compare effects at each schooling stage both conditional on finishing the earlier education stages and unconditional effects. As before, we also find that male and married respondents have education advantages, and rural respondents' disadvantages in finishing each education stages.

For those who attended primary school, we see that respondents who were born between 1942-1946 experienced initial growth of 0.1 points probabilities to finish primary school. These cohorts ought to attend primary school at age 8 (1950-1954) and finish at age 13 (1955-1959). For cohorts who were born between 1947-1949 (their primary school terminated in 1959-61), they experienced 0.04 probabilities growth of finishing primary school. The probabilities of cohorts who began school at the end of "Great Leap Forward" (1960-62) and finished at the beginning of CR (1965-67) to finish primary school have recovered 0.04 points. However, it is still 0.04 points lower than older cohorts who were born between 1942-1946 (finished primary school in the first year of "Great Leap Forward"). This pattern illustrates that CR has negative effects on primary school, although it is not as big as "Great Leap Forward" and "Great Famine".

In terms of middle school (conditional on respondents who finished primary school), the most severe reduction in probabilities of finishing middle school comes from cohorts who were born between 1943-1949. They ought to have begun middle school in 1957-1963 and finished in 1960-1966, and were negatively affected by "Great Leap Forward" and "Great Famine". However, respondents who ended middle school during 1965-1967 (born between 1950-1952) were affected by large-scale middle school shut-down during CR. Their chances of finishing middle school recovered but still only 0.02 points higher compared with the cohorts who were

Table 5. The effects of education interruptions on education levels

	Conditional[5]				Unconditional			
	Primary School	Middle School	High School	College and above	Primary school	Middle school	High school	College and above
Cohorts (Born before 1940 as reference group)								
1940-1941(25-26 in 1966)	0.13***	0.09***	0.07*	0.01	-0.12***	0.13***	0.12***	0.07***
	(6.12)	(3.06)	(1.95)	(0.09)	(-5.97)	(6.12)	(5.72)	(4.33)
1942-1946(20-24 in 1966)	0.23***	0.15***	0.05**	-0.08**	-0.23***	0.23***	0.23***	0.11***
	(16.60)	(7.80)	(2.13)	(-2.14)	(-16.57)	(16.60)	(15.93)	(9.49)
1947-1949(17-19 in 1966)	0.27***	0.08***	-0.02	-0.15***	-0.27***	0.27***	0.20***	0.06***
	(18.80)	(3.96)	(-0.71)	(-3.84)	(-18.69)	(18.80)	(13.26)	(5.43)
1950-1952(14-16 in 1966)	0.21***	0.08***	0.10***	-0.19***	-0.21***	0.21***	0.17***	0.11***
	(14.90)	(4.06)	(4.12)	(-5.06)	(-14.69)	(14.90)	(11.69)	(9.71)
1953-1958(8-13 in 1966)	0.27***	0.15***	0.26***	-0.06*	-0.27***	0.27***	0.25***	0.24***
	(21.87)	(8.43)	(11.63)	(-1.88)	(-21.82)	(21.87)	(20.21)	(22.45)
1959-1966(0-7 in 1966)	0.40***	0.28***	0.34***	-0.05	-0.40***	0.40***	0.46***	0.42***
	(34.97)	(16.86)	(15.62)	(-1.63)	(-34.81)	(34.97)	(38.38)	(39.35)
Male	0.28***	0.12***	0.08***	0.04***	-0.28***	0.28***	0.27***	0.19***
	(48.99)	(16.08)	(9.00)	(3.41)	(-49.04)	(48.99)	(45.17)	(32.56)
Married	0.08***	0.06***	0.05***	0.05*	-0.08***	0.08***	0.08***	0.05***
	(7.75)	(4.11)	(2.64)	(1.79)	(-7.60)	(7.75)	(7.49)	(5.46)
Rural Hukou	-0.21***	-0.20***	-0.27***	-0.26***	0.21***	-0.21***	-0.32***	-0.38***
	(-29.56)	(-25.90)	(-25.48)	(-16.97)	(30.15)	(-29.56)	(-35.28)	(-35.85)
Constant	0.45***	0.64***	0.53***	0.57***	0.55***	0.45***	0.36***	0.32***
	(34.85)	(33.65)	(21.36)	(15.53)	(43.14)	(34.85)	(27.20)	(24.98)
Observations	17,636	12,816	9,684	5,883	17,636	17,636	17,636	17,636
R-squared	0.21	0.08	0.12	0.06	0.21	0.21	0.22	0.22

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at household level. Hukou type has been adjusted to hukou type during cultural revolution and we control for respondents' gender, marital status, hukou type.

[5] "Conditional" means finishing previous stage of education. For primary school, it means conditional on those who are able to read and write. For middle school, it means conditional on those finished primary school, as to high school, conditional sample means those who finished middle school, and for college, it means conditional on those finished high school.

not affected by “Great Leap Forward” (born between 1940-1942). The growth accelerated among younger respondents who did not experience large-scale shut down of middle schools during CR. So we conclude that middle school shut-down during CR slowed down the growth of graduation from middle school, although the effects are smaller than “Great Leap Forward”.

As we discussed above, the high school graduation of respondents who were born between 1940-1946 reflects the effects of “Great Leap Forward” and “Great Famine” (left panel in table 5). Because those who were born between 1943-1946 have longer exposure to “Great Leap Forward”, they were more severely affected. For those aged 11-19 in 1966, their high school experiences were affected by CR, and we see that respondents aged 14-16 in 1966 were about to attend high school when large-scale high-schools were closed down in 1966-1968, so they had lower probabilities of finishing high school. For college, among those who finished high school, we see that the coefficient for cohort 1940-1942 shows the negative effects of “Great Leap Forward”, respondents who were born after 1943 reflects effects of CR.

Unlike the uneven negative effects on high school and middle school, CR tended to have greater impact on college education. As we stated above, the biggest macro effect of the CR was clearly on universities since it led to the closing of China's national entrance exam that had for hundreds of years been the pathway for students to enter colleges and universities and it was not restarted until 1977. The recovery appeared among the youngest cohorts who ought to have started college after 1980 when the system gradually returned to normalcy. The right panel in table 5 shows cumulative unconditional effects. We see that GLF and CR lowered respondents’ probabilities to finish primary, middle and high school. The effects on finishing college lasted longer and college fraction only recovered among the youngest cohorts who started universities after CR (born between 1961-1966).

To further investigate education interruptions caused by CR, we explore years of schooling in table 6. As mentioned above, being male and married have longer years of schooling while respondents in rural areas have 3.36 less years of schooling. The overall trend of CR cohorts' years of schooling is similar to what we find in table 5. Compared with before CR cohorts (born between 1940-1942), the initial increase of cohorts' years of schooling is 0.46 years but it went down right after that. The most severe reduction is from those aged 14-16 in 1966, their primary school experiences were greatly affected by "Great Leap Forward" while middle, high school and college were under the influence of CR. The cohorts who were similarly affected by "Great Leap Forward" are those born between 1947-1949. As we stated in table 5, "Great Leap Forward" and "Great Famine" had bigger negative effects on primary, middle school than CR. After CR cohorts (born in 1961-1966) have nearly 1.5 more years of schooling compared with youngest CR cohorts (born in 1956-1960). For the urban sample, CR cohorts experienced no rise but severe reduction in years of schooling (nearly 0.5 years). Moreover, it did not recover until those who born after 1953. In rural areas, there exists a growth of 0.6 years of schooling among oldest CR cohorts, which went down among *"old three class"* cohorts, and finally came back among younger CR cohorts.

Table 6. The effects of education interruptions on years of schooling (unconditional)

	Years of schooling					
	Total		Urban Hukou		Rural Hukou	
	Coef.	T-value	Coef.	T-value	Coef.	T-value
Cohorts (Born before 1940 as reference group)						
1940-1941(25-26 in 1966)	1.04***	6.07	1.36**	2.54	0.98***	5.46
1942-1946(20-24 in 1966)	1.90***	15.88	1.48***	3.64	1.94***	15.90
1947-1949(17-19 in 1966)	1.64***	13.90	1.30***	3.20	1.68***	13.94
1950-1952(14-16 in 1966)	1.40***	12.01	1.13***	3.00	1.43***	11.94
1953-1958(8-13 in 1966)	2.37***	22.29	2.42***	7.25	2.35***	21.46
1959-1966(0-7 in 1966)	4.39***	42.05	3.96***	12.25	4.44***	41.15
Male	2.52***	52.67	0.89***	6.11	2.77***	54.52
Married	0.74***	8.45	0.83***	2.98	0.76***	8.41
Rural Hukou	-3.79***	-40.23				
Constant	4.36***	35.25	5.32***	16.54	0.42***	5.08
Observations	17,606		2,335		15,271	
R-squared	0.30		0.14		0.25	

Note: *** p<0.01, ** p<0.05, * p<0.1.Standard errors clustered at household level. Hukou type has been adjusted to hukou type during cultural revolution and we control for respondents' gender, marital status, hukou type.

We can infer from table 2 that no schooling is a common outcome since more than a quarter of CR cohorts have no formal schooling. Therefore, we illustrate the damage caused by CR by providing the results under conditional constraints in table 7. It shows that male and married sample have more years of schooling but rural sample have 2.52 less years of schooling.

We see bigger conditional effects of CR on years of schooling compared with unconditional effects we find in table 6. That is, conditional on the people who have had some schooling, CR cohorts' actual years of schooling never increased but decreased nearly 0.6 years from before CR cohorts'1.01 to "*old three class*" cohorts' 0.39, although it came back for those who were born after 1953.

Table 7. The effects of education interruptions on years of schooling (conditional)

	Actual years in school conditional on having some schooling					
	Total		Urban Hukou		Rural Hukou	
	Coef.	T-value	Coef.	T-value	Coef.	T-value
Cohorts (Born before 1940 as reference group)						
1940-1941(25-26 in 1966)	0.63***	3.04	0.35	0.70	0.71***	3.18
1942-1946(20-24 in 1966)	0.91***	6.47	0.48	1.33	1.00***	6.61
1947-1949(17-19 in 1966)	0.29**	2.12	0.34	0.96	0.31**	2.08
1950-1952(14-16 in 1966)	0.38***	2.72	0.24	0.73	0.41***	2.76
1953-1958(8-13 in 1966)	1.23***	9.60	1.04***	3.46	1.28***	9.14
1959-1966(0-7 in 1966)	2.56***	20.59	2.46***	8.45	2.60***	19.14
Male	1.00***	19.97	0.27**	2.06	1.15***	20.89
Married	0.50***	5.22	0.46**	1.99	0.55***	5.28
Rural Hukou	-2.75***	-33.93				
Constant	7.21***	50.27	7.75***	25.65	4.28***	30.85
Observations	12,812		2,139		10,673	
R-squared	0.18		0.09		0.12	

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at household level. Hukou type has been adjusted to hukou type during cultural revolution and we control for respondents' gender, marital status, hukou type.

For rural sample, the pattern is nearly the same as that in overall sample, years of schooling of after CR cohorts grow about 0.6 years. But in urban areas, the initial reduction is more severe (nearly 0.7 years) while after CR cohorts' years of schooling increased nearly 1 year compared with the youngest CR cohorts, and the trend of recovery is similar to rural and overall sample.

Figure 2. Delay

From figure 2, we see that the starting age for college increased dramatically among cohorts who were born after 1947 (reached age of college after CR), those who were born between 1947-1956 were delayed about ten years for college, we also conclude that other education stages including primary, middle and high school were not as severely delayed as college. This is consistent with what we document in historical background, "old three class" who were born between 1947-1952 should be

delayed 7-12 years for college due to CR closed down college. We find that years spent on college also very long for cohorts who were born between 1947-1956 (we define years spent on each stage as age finish this stage minus age finish earlier stage). But when we define years spent on each stage as as as age finish this stage minus age start this stage, we do not see longer years spent on college, this is consistent with what we discussed above, most of CR's effect on college is that it delayed respondents' entrance rather than interruption. For primary, middle and high school, we do not find similar delay patterns for some cohorts but the trend is that younger cohorts begin each stage at younger age, implying that the educational systems changed over time in China.

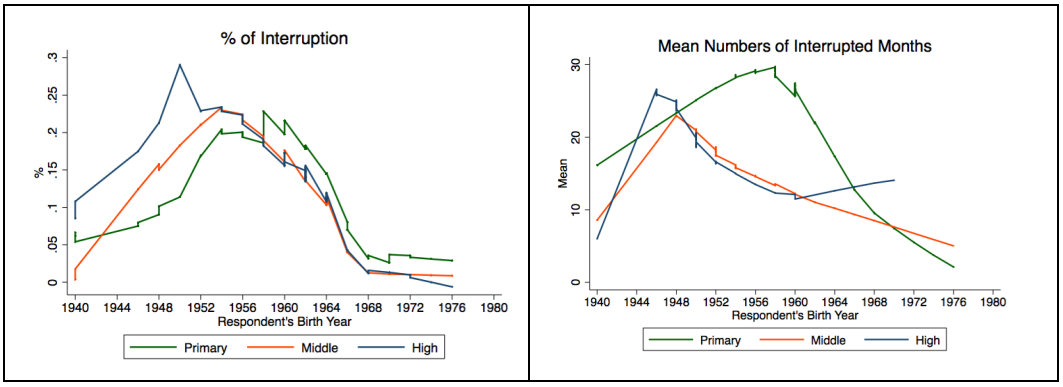

Figure 3. Interruptions

Figure 3 plots interruptions on each stages caused by CR, we find that conditional on attending primary school, for the most negatively affected cohorts who were born between 1954-1960 (they were at age of primary school in 1966), the percentage of interrupted during primary school is about 20%. For respondents who ever attended middle school, we see that experiencing educational interruptions during middle school peaks among cohorts born 1952-1956 (they were at age of middle school in

1966) and the percentage is also about 20%. Conditional on those attended high school, it shows that the interruption peaks among cohorts who were born between 1947-1949 (they were at age of high school in 1966) and the percentage is about 25%. However, interruptions on college are not as common as other stages since we illustrate in figure 2 that most of CR's effect on college lies in that it delayed respondents' entrance of universities rather than interruption. Therefore, we do not plot the interruption on college in figure 3 as the observations are less than 10. When we further investigates the interrupted months conditional on interrupted on each stage, we find that those who reached age 2-13 in 1966 experienced longest months of primary school interruption (about 30 months), those who aged 14-16 in 1966 experienced longest months of middle school interruption (about 20 months), aged 17-19 in 1966 had longest high school interruption (about 22 months),. The reason why interruptions are not as long as delayed years in figure 2 maybe those who were denied opportunities to attend schools during CR ended up having less years of schooling, as we find in table 6 and 7. For those who continued their schooling after CR, CR effects were mostly reflected on years delayed rather than years interrupted.

Table 8 shed some lights on the biggest effect of the Cultural Revolution was on universities. Although we have a very small presence of people who actually have a college degree (407 people), we still manage to find a salient increase in the college entrance age which fits our theoretical prediction in the beginning of this section, especially for those reached age of college during Cultural Revolution (17-19 in 1966).

Table 8. The effects of education interruptions on age entering college

	Age enter college conditional on having college degree					
	Total		Urban Hukou		Rural Hukou	
	Coef.	T-value	Coef.	T-value	Coef.	T-value
Cohorts (Born before 1940 as reference group)						
1940-1941(25-26 in 1966)	-1.26	-0.45	-3.58***	-2.61	2.91	0.45
1942-1946(20-24 in 1966)	3.64*	1.94	2.88	1.08	4.21	1.56
1947-1949(17-19 in 1966)	11.87***	6.97	12.63***	5.76	11.03***	4.42
1950-1952(14-16 in 1966)	9.88***	5.47	10.10***	4.61	9.84***	3.31
1953-1958(8-13 in 1966)	8.96***	6.16	8.53***	4.79	9.26***	3.96
1959-1966(0-7 in 1966)	4.20***	3.44	5.27***	3.63	3.16	1.57
Male	0.19	0.21	-0.36	-0.30	1.41	0.90
Married	-2.91	-1.27	-3.63	-1.33	-3.19	-0.78
Rural Hukou	1.25	1.40				
Constant	25.26***	9.86	26.02***	7.96	26.03***	6.60
Observations	407		222		185	
R-squared	0.15		0.18		0.13	

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at household level. Hukou type has been adjusted to hukou type during cultural revolution and we control for respondents' gender, marital status, hukou type.

B. Education Transmissions and Social Mobility

It is customary to assume a strong correlation between one's schooling attainment and household background variables, especially parents' education. As pointed out by Cameron and Heckman (2001), father's and mother's education are by far the most important family background variables (they accounted for as much as 83% percent of explained variations). The positive correlation between individual schooling attainments and parents' education is well established in literature (Kane, 1994;

Cameron and Heckman 1998, 2001; Eckstein and Wolpin, 1999). One common goal of the Cultural Revolution was to equalize education by severing the education correlation between parents and children. Educated youth (middle school/high school graduates) who were more likely to pursue higher education were forced to go to the countryside, or to factories to engage in rigorous labor activities. In contrast, children of peasants, workers, and soldiers were enrolled into colleges because of their political standing, although courses cannot be always carried on because of the poorer knowledge base of these students. This education equalization was realized at the expense of a uniform reduction of education level and quality for the entire country.

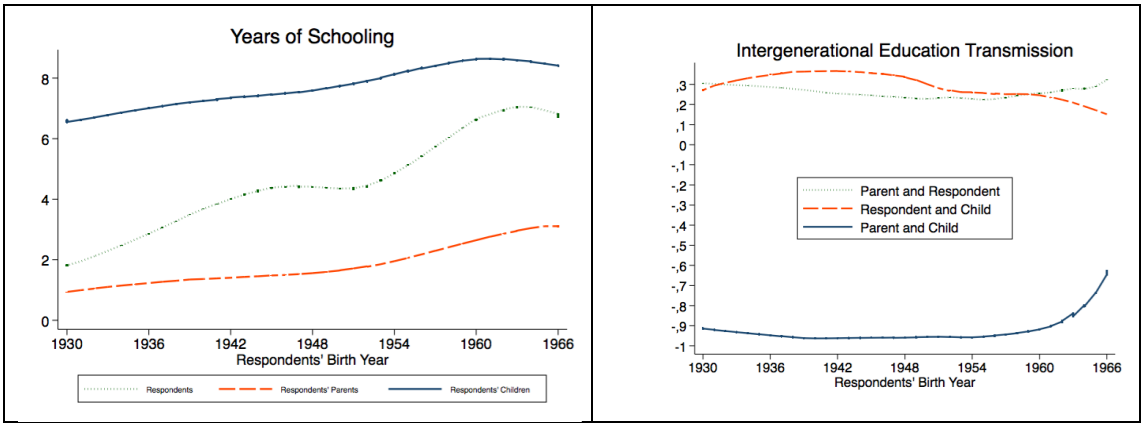

Figure 4. Intergenerational Education Transmission

The left panel in figure 4 plots three generations' years of schooling by respondents' birth year: parents of respondents, respondents and children of respondents. As discussed above, respondents whose education stages were affected by CR or GLF have less years of schooling. However, their children apparently did not fully inherit the "generation loss" from those respondents who were in school

during that period of turmoil. Parents of respondents' have relatively less education and younger respondents' parents have slightly more years of schooling.

The right panel in figure 2 shows a significant dip in the intergenerational education correlation between CHARLS respondents and their parents around the cohorts who experienced Cultural Revolution during school age. In the short run, the goal to eliminate elitism is somewhat full-filled. As a starting point, the strong intergenerational education correlation may be best illustrated by simple OLS estimates of the effects of parent's education on children's schooling of CHARLS respondents. These are presented in Table 9.

In these models, we controlled respondents' birth cohorts to capture the education development along time. Then we introduced into the model a set of interaction terms of education and birth cohort to indicate the effects of being educationally affected (intention to treat). As always, we also controlled for gender, marital status and rural/urban division of respondents. Table 9 shows that the parent-child education association was reduced by 0.21-0.42 point during among Cultural Revolution cohorts in urban area, the reduction is also significant in rural areas. The results also show a stronger parent-child education association among the Cultural Revolution cohorts and their children, but no significantly strong effect of Cultural Revolution on grandparent-grandchild education correlation. The disturbance of Cultural Revolution on education transmission didn't persist, and the education equalizing effect of Cultural Revolution only existed in the short run of a single generation.

Table 9. Intergeneration correlation of education attainments

	CHARLS Respondent's Year of Schooling			CHARLS Children's Year of Schooling			CHARLS Children's Year of Schooling		
	Total	Respondent urban hukou	Respondent rural hukou	Total	Respondent urban hukou	Respondent rural hukou	Total	Respondent urban hukou	Respondent rural hukou
Years of schooling parent	0.72***	0.75***	0.67***	0.32***	0.28***	0.31***			
Years of schooling grandparent							0.57***	0.55***	0.52***
Respondent Born before 1940 as reference									
1940-1941(25-26 in 1966)	0.65**	1.10	0.50	-0.50	0.66	-0.52	-0.02	1.42**	-0.36
1942-1946(20-24 in 1966)	2.03***	1.89***	1.96***	-1.18** *	-1.70**	-1.19***	0.25	-0.35	0.28
1947-1949(17-19 in 1966)	1.94***	2.08***	1.80***	0.06	-2.28***	0.34	0.98***	0.24	1.01***
1950-1952(14-16 in 1966)	1.52***	1.37**	1.45***	0.46*	-0.17	0.58**	0.83***	0.66	0.79***
1953-1958(8-13 in 1966)	2.50***	2.81***	2.40***	1.66***	-0.30	1.79***	2.09***	1.05**	2.12***
1959-1966(0-7 in 1966)	4.37***	3.73***	4.34***	1.37***	-0.89	1.40***	2.43***	0.10	2.54***
Max Parent edu * birth cohort									
Max*1940-1941(25-26 in 1966)	0.16	0.06	0.22	0.06	-0.03	0.07	0.06	-0.41**	0.24
Max*1942-1946(20-24 in 1966)	-0.13	-0.22	-0.06	0.16***	0.17***	0.18***	-0.01	0.05	0.03
Max*1947-1949(17-19 in 1966)	-0.25**	-0.41*	-0.15	0.09***	0.29***	0.07**	-0.21**	-0.15	-0.16
Max*1950-1952(14-16 in 1966)	-0.16*	-0.18	-0.11	0.06*	0.11	0.06	-0.02	-0.07	0.05
Max*1953-1958(8-13 in 1966)	-0.23***	-0.34*	-0.17*	0.01	0.12*	0.03	-0.25***	-0.23*	-0.19**
Max*1959-1966(0-7 in 1966)	-0.24***	-0.25	-0.18*	0.03	0.12	0.06*	-0.37***	-0.22*	-0.30***
Male	2.50***	0.94***	2.73***	1.85***	0.59**	2.10***	0.92***	-0.24*	1.10***
Married	0.73***	0.73***	0.76***	0.07***	0.08**	0.07***	0.07***	0.10**	0.06***
Urban Hukou	3.37***			2.09***			2.94***		
Constant	-0.45***	3.91***	-0.52***	4.09***	7.53***	3.87***	4.24***	8.31***	4.12***
Observations	17,079	2,222	14,831	22,883	2,925	19,958	22,524	2,852	19,672
R-squared	0.33	0.19	0.28	0.28	0.21	0.24	0.19	0.10	0.15

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at household level. Hukou type has been adjusted to hukou type during cultural revolution and we control for respondents' gender, marital status, hukou type.

V. Conclusions

In this paper, we examined GLF's and CR's effects on education with detail and precision, we also explored the intergenerational education transmission. We find that GLF and Cultural Revolution significantly reduced the education attainments of those who were of school age during those periods. The reduction was greater for urban

people than rural people. And CR also weakened the parent-child education transmission between CR cohort and their parents. CR has no apparent effect on the parent-child education transmission between CR cohort and their children. Education of CR cohort's children do not have strong negative correlation to their grandparents' education like their parents. The subsequent cohorts recover from CR immediately. From those findings, we conclude that a massive government intervention like Cultural Revolution cannot function as a proper tool to address problems in society. The problem of education equality in China, for example, has been dealt with by a massive school expansion which has a better outcome with less cost.

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