China's Lost Generation: Changes in Beliefs and their Intergenerational Transmission

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Abstract

Beliefs about whether effort pays off govern some of the most fundamental choices individual make. This paper uses China's *Cultural Revolution* to understand how these beliefs can be affected, how they impact behavior, and how they are transmitted across generations. During the *Cultural Revolution*, China's college admission system based on entrance exams was suspended for a decade until 1976, effectively depriving an entire generation of young people of the opportunity to access higher education (the "lost generation"). Using data from a nationally representative survey, we compare cohorts who graduated from high school just before and after the college entrance exam was resumed. We find that members of the "lost generation" who missed out on college because they were born just a year or two too early believe that effort pays off to a much lesser degree, even 40 years into their adulthood. However, they invested more in their children's education, and transmitted less of their changed beliefs to the next generation, suggesting attempts to safeguard their children from sharing their misfortunes.

Keywords: China, Cultural Revolution, Cultural change, Cultural transmission, Changes in beliefs

JEL Classification: Z1, I23, O53, P26, P48

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1 Introduction

Beliefs about whether effort pays off in life outcomes play an important role in the fundamental choices individuals make. They determine work-leisure choices and in general the intensity of effort individuals put in their professional activities (see e.g. Alesina, Glaeser, and Sacerdote (2005)). They affect parents' investment choices in their children's education (see e.g. Alesina and Angeletos (2005)), and they also determine the extent of support for redistributive policies (see e.g. Bowles and Gintis (2002), Corneo and Gruner (2002), Alesina and Glaeser (2005), Alesina and La Ferrara (2005), Alesina and Giuliano (2011)).

Where do these beliefs come from? Economists who have studied the endogenous formation of beliefs emphasize three main channels: *(i)* vertical transmission via parents (see e.g. Bisin and Verdier (2001)), *(ii)* horizontal transmission via peers, and *(iii)* learning and updating from personal experiences (Piketty, 1995).

A challenge in research on this topic, especially in relation to the third channel, is that it is empirically difficult to credibly identify causal factors that lead to changes in beliefs. Experiences that may shape people's beliefs are often chosen according to their prior beliefs, leading them to confirm these beliefs. Such concern is particularly relevant when trying to establish a causal relationship between beliefs on whether effort pays off and individuals' corresponding experiences. For example, one cannot infer that experiencing failure in school (e.g. receiving bad grades at exams) induces students to believe that effort does not pay off. Indeed, students who already believe that effort does not pay off are less likely to study hard than students who believe in the virtue of effort, and are therefore less likely to receive good grades in the first place. As in this example, we are typically faced with many self-fulfilling prophecies where particular actions and events are endogenously chosen on the basis of prior beliefs, which then become self-enforcing.

In this paper, we study a particularly interesting historical episode – the *Cultural Revolution* in China (1966-1976) – that has induced abrupt changes in the experiences of certain groups of individuals, which may have subsequently profoundly affected their beliefs on whether effort pays off. The *Cultural Revolution* suspended regular higher education for the entire decade, creating the so-called "lost generation" (or "delayed generation", e.g. Chen (2007)) that grew up during that period and was thus deprived of higher education opportunities at an age when youths would typically consider attending college. The universities reopened and a merit-based admission system resumed in 1977, immediately after the end of the *Cultural Revolution*. However, the decade-long disruption generated significant opportunity costs of going to college, especially for those who graduated from high school earlier. For example, many of the college-aspiring high school graduates would have to give up the jobs that they had already started in order to attend college. In other words, the *Cultural Revolution* induced an abrupt shock on high school graduating cohorts' opportunity costs of going to college for reasons largely outside of their control. Therefore, many who graduated before the end of the *Cultural Revolution* simply chose not to compete for

entering college. This shock allows us to examine whether differences in the opportunity cost of attending university (at a time when college degrees were considered a rare privilege) persistently shaped citizens' beliefs on whether effort pays off in determining success. Moreover, we investigate to what extent the changed beliefs may affect citizens' behavior, particularly their decisions to invest in their children's education and to transmit such beliefs to the next generation.

Using data from the China Family Panel Study (CFPS), we compare the beliefs and corresponding behavior of high school graduates who did not go on to obtain university degrees versus those who did, across the cohorts who graduated just before and just after the *Cultural Revolution* ended and college admission resumed. Specifically, the "lost generation" consists of those who would have gone to college (and hence becoming educated elites) but in reality could not since college admission was still abolished when they graduated from high school. Had they been born just a year or two afterwards, they would have graduated from high school just in time to compete in the college admission exam. In reality, many of them never even tried to compete for admission because they had already started jobs and it simply became too costly to go back to school.[1] When we zoom in to the narrow window of cohorts graduating from high school just before and just after the end of the *Cultural Revolution*, the exogenous loss of opportunities due to the suspension of higher education remains arguably the only difference between those who missed out on higher education and those who did not across the pre- and post-*Cultural Revolution* high school graduating cohorts, prior to their high school graduation.[2] This allows us to attribute differences in beliefs and behaviors that we observe among these individuals much later in their lives to the differences in higher education opportunities that they experienced at youth due to the suspension of higher education.

We find that high school graduates among the "lost generation" who have missed out on college education are significantly less likely to believe that effort pays off relative to luck, even well into their 60s. They hold persistent grudges against the government for these lost opportunities, as they report significantly higher mistrust of government compared to later cohorts. Interestingly, this is especially true among those who are unsatisfied with their current income. It is not surprising to observe such persistent changes in beliefs. Adolescence and early adulthood are often considered to be formative years (or, impressionable years) in an individual's life: experiences

[1] Although we do not know precisely who among the "lost generation" would have gone to college if the *Cultural Revolution* had not taken place, based on college attainment rates from the younger cohorts whose education schedule was uninterrupted by the *Cultural Revolution*, they might have constituted in the range of up to ten percent of the high school graduates.

[2] We decide to focus on the end of the *Cultural Revolution* rather than the beginning for several reasons. First, those who were admitted just before the beginning of the *Cultural Revolution* still had their regular college studies disrupted. Second, even those who finished college just before the beginning of the *Cultural Revolution* faced significant career disruption due to the decade-long chaos. Third, college admission system was disrupted at the beginning of the *Cultural Revolution* in a manner that was much more gradual comparing to how it was resumed after the *Cultural Revolution*. Hence, the discontinuity was not nearly as sharp. Fourth, focusing on early cohorts would significantly constrain the sample size in the surveys that elicit respondents' relevant beliefs.

during this period can induce effects that last for a lifetime.[3] The experience of lost access to university for millions of young Chinese adults due to the *Cultural Revolution* would thus likely have quite a transformative impact on their beliefs.

Interestingly, however, this does *not* readily imply that the impact of the *Cultural Revolution* persists to the next generation. In fact, we find suggestive evidence of systematic reversal across generations. High school graduates from the "lost generation" who missed out on college education spend more on their children's education expenditures compared to immediately younger cohorts. In addition, while their acquired larger mistrust towards the government has been passed down to their children, the "lost generation"'s changed beliefs on the role of effort versus luck are transmitted to the next generation to a much lesser degree. This pattern of intrageneratinal persistence and intergenerational reversal suggests that when we study the endogenous formation of people's beliefs and preferences, it is important to distinguish between those that persist over time and are transmitted across generations, and those that only have a transitory character (namely, that are determined only by direct personal experiences but are not transmitted across generations). Whether given events and experiences lead to a persistent or a transitory change across generations has critical implications for the dynamic evolution of the corresponding beliefs and preferences. We still know very little about which events and experiences lead to permanent or transitory changes in beliefs and values. In the conclusion, we will offer some speculative thoughts about this issue.

These findings contribute to a growing literature that investigates the endogenous formation of preferences, beliefs, and attitudes. A first strand of the literature focuses on how experiences affect beliefs and preferences of individuals. Many factors have been explored so far: for example, being raised during the Great Depression made people more risk-averse, less optimistic (Malmendier and Nagel, 2011) and more pro-redistribution (Giuliano and Spilimbergo, 2014); social mobility or property ownership makes people less favorable towards redistribution (Alesina and La Ferrara, 2005; Di Tella, Galiant, and Schargrodsky, 2007); experiences of living in democratic regimes may foster democratic support (Fuchs-Schündeln and Schündeln, 2015); experiences of civil war make people more violent (Miguel, Saiegh, and Satyanath, 2010); experience of violence affects people's risk preferences (Callen et al., 2014); trust increases with age (Guiso, Sapienza, and Zingales, 2008); slave trade persistently affected trust in Africa (Nunn and Wantchekon, 2011); living under the welfare state decreases incentives of parents to instill in their children the value of hard work (Lindbeck and Nyberg, 2006); and traumatic experiences of policy-induced famine persistently affected citizens' political trust and attitudes (Chen and Yang, 2015). We add to this literature by studying the formation of beliefs on whether effort pays off, one critical dimension of beliefs that has received relatively less attention so far. In addition, by simultaneously observing father-son

[3]For example, Krosnick and Alwin (1989) demonstrate that individuals are highly susceptible to attitude change during late adolescence and early adulthood. More recently, Giuliano and Spilimbergo (2014) find that individuals are much more likely to be affected by experiences of economic recessions if these downturns occurred during their formative years, as compared to those that happened later in life.

pairs, our paper explicitly examines the transmission of such beliefs across generations. Gong, Lu, and Xie (2015), in a paper closely related to ours, analyze how being sent to the countryside during the Cultural Revolution affected the non cognitive skills of the adolescents involved. Compared to the slightly older cohort that did not get sent to the countryside, those who did go developed less external locus of control, i.e. less belief in the importance of circumstances external to the individual in shaping success. They argue that the reason is that adolescents sent to the countryside had to work very hard in order to survive in the harsh environment they were placed.[4]

Our study also contributes to a second strand of the literature on the endogenous formation of preferences, beliefs, and attitudes that focuses on documenting their intergenerational transmission. For example, Dohmen et al. (2012) find strong evidence supporting the transmission of willingness to take risks and willingness to trust others from parents to children. Fernandez, Fogli, and Olivetti (2004) show that men who grew up in households where their mothers worked favor strong female labor force participation . More recently, Houser et al. (2015) find that parents tend to suppress their children's propensity to act dishonestly, but they do so significantly more with respect to daughters than to sons. While a majority of the literature documents persistence via intergenerational transmission of individuals preferences, beliefs, and attitudes, our findings provide one of the rare pieces of evidence showing that certain beliefs can persist within individuals' own life time, and reverse (potentially strategically so) across generations. These findings on intergenerational reversal in beliefs echo the theoretical work on strategic transmission of preferences and beliefs when parents are altruistic yet "imperfectly empathetic" towards their children (Bisin and Verdier, 2001).

Lastly, we contribute to a growing empirical literature examining the consequences of government policies in China on its citizens. For example, Li, Rosenzweig, and Zhang (2010) show that the "Mass Sent-Down Movement" during the *Cultural Revolution* triggered the revelation of favoritism and guilt within households, and affected intra-household transfers. Cantoni et al. (2017) show that the "moral and politics" curriculum effectively shapes contemporary high school students' political and economic ideology, making them more aligned with the state's agenda. Perhaps more closely related in theme, Bai and Jia (2016) show that abolishing the civil service exam in late Qing Dynasty led the would-be educational elites to revolt against the imperial regime. Our study examines a historical episode that similarly terminated (temporarily in the case of *Cultural Revolution*) the mobility channel via higher education, and the grudges that we identify among the "lost generation" echo the anger and even desperation caused by the abolition of the imperial exam system in the early 20th century.

The rest of the paper proceeds as follows: in Section 2, we describe the disruption of higher education during the *Cultural Revolution*; in Section 3, we present a simple model to help frame thoughts on various forces at play in the empirical context we study; in Section 4, we describe our empirical strategy and discuss the threats to identification; in Section 5, we present results;

[4]Interestingly, they use the same data on beliefs that we are using but interpret them as non cognitive skills instead.

in Section 6, we test the robustness and discuss various aspects of our results; and finally we conclude in Section 7, discussing what we can learn from these results.

2 The *Cultural Revolution* (1966-1976) and the disruption of higher education

2.1 Massive socio-political movement

The *Cultural Revolution* in China was a nationwide mass movement launched by Mao Zedong in 1966.[5] Having been partly sidelined inside the party after the disastrous policy of the *Great Leap Forward*, Mao called on the "masses" to revolt against the "bourgeois" headquarters and the bureaucrats inside the Chinese Communist Party (CCP) as well as against the government officials who had abandoned the "pure" revolutionary ideology and adapted bourgeois thinking and behavior. Mao encouraged the Red Guards, militias formed among students and young people, to go all over the country to spread the Cultural Revolution. The whole country was supposed to "remodel their world view" and abandon non-revolutionary ideas and practices.

All this led to a decade-long chaos in the country. Parts of the government and the CCP were paralyzed, millions of cadres were demoted and denounced in mass trials. Competing groups of Red Guards fought each other. Although scholars disagree on the exact estimates, few would oppose the fact that hundreds of thousands of individuals died during the *Cultural Revolution* because of the violence and mayhem it has caused (see, among others, Harding (1987)). Economic development was brought to a halt due to the chaos and disruption. Ancient Chinese culture was denounced as counterrevolutionary and Red Guards destroyed large parts of the rich Chinese cultural patrimony: monuments, paintings, books, etc.

2.2 Disruption of higher education

Higher education was disrupted because it was suspected of transmitting bourgeois values. Universities closed down since the beginning of the *Cultural Revolution*. While some gradually reopened starting from 1970, many remained closed until the end of the *Cultural Revolution*. Among those universities that were open during the *Cultural Revolution*, no regular college degrees were granted during that period. The *Gaokao*, the meritocratic entrance exam to universities was abolished in 1966. Entrance to universities was reserved to working class children upon grassroots recommendation, i.e. was reserved to those who had shown activism in the *Cultural Revolution* and were of the right "class origin." Education was disrupted as the professors had been demoted and sent to the countryside to be "reeducated." Most traditional classes were replaced by "revolutionary" classes. For example, traditional medicine was considered bourgeois and was abandoned

[5] Formally, the movement is named the "Great Proletarian Cultural Revolution."

in universities. Doctors were replaced by "barefoot doctors" with minimum education performing traditional Chinese medicine based on acupuncture. Figure 1 shows that there was a sharp drop of university students between 1966 and 1970. The number started picking up again during the last years of the *Cultural Revolution*, as the universities gradually started to operate again (although merit-based admission system remained absent).

2.3 Resumption of college admission in 1977

The *Cultural Revolution* ended abruptly with the death of Mao Zedong in October 1976. The Gang of Four (it included Jiang Qing, Mao's wife) who had led the CCP during that period were immediately arrested after Mao's death. Among the first policies that were enacted immediately following the end of the *Cultural Revolution*, was the college entrance exam (*Gaokao*) that was reintroduced in 1977 after a ten year interruption.

Considering the timing of high school graduation and college admission, which cohorts were affected by the disruption of regular higher education due to the *Cultural Revolution*? The first cohort affected was the 1948 birth cohort supposed to enter university in 1966. The last cohort affected was the 1958 birth cohort of age to enter university in 1976. The resumption of the *Gaokao* in 1977 set the path to undo the disruptions brought to higher education by the *Cultural Revolution*, and the cohorts born in 1959 and after were hence able to experience the regular educational schedule without any delay. Those born between 1948 and 1958 who would have gone to university immediately after they graduated from high school (if they wished to) were thus negatively affected by the *Cultural Revolution*, due to the increased opportunity cost. In fact, it has been argued that many of the misfortunes this generation experienced during the later parts of their lives can be attributed to their lost opportunities for higher education (Chen, 2007).

It is important to note that older high school graduating cohorts were allowed to take the exam after 1977. Hence, while the opportunity cost to attend college dramatically increased, it was not infinite. Figure 2 shows the admission rate of each year's *Gaokao* since its resumption in 1977. One can see that the 1977 *Gaokao* was particularly competitive, largely due to the fact that test-takers during that year not only came from the 1977 high school graduating cohorts, but also partly from previous cohorts who were determined enough to try to go back to school. In fact, many of the older cohorts did not attend the *Gaokao* at all, as it had been too many years since they had finished high school. They may have become discouraged or had lost too much of the knowledge acquired in high school to become competitive in the *Gaokao*.[6] In addition, and arguably more critically, many had a job, or even had already started a family, so that going back to college became unfeasible as they could not afford to lose their income for a number of years.

[6]There, however, are no exact figures on the number of members of older cohorts who successfully passed the *Gaokao*.

3 Conceptual framework

In this section, we build a very simple model of college admission in China that incorporates the main features we are interested in for our empirical analysis. In particular, the model captures the effect on various cohorts of suspending and then restarting the college admission exam. Having such a model clarifies the discussion for our empirical strategy to analyze how the experience of the "lost generation" affected their posterior beliefs on whether effort pays off. We start by analyzing the optimization choice of individual students in preparing for college admission, as a function of their ability, prior beliefs on whether effort pays off, the years lost after high school and the competition for admission.

3.1 Setup

The model is comprised of the following key elements:

- Call R the expected return from going to college. It can be seen as the expected net present value of all future income. Since our paper is not about returns to education, we keep that part of the model as simple as possible.
- Call p the perceived probability of successfully passing the *Gaokao*. Assume that this probability, and accordingly the expected gross return from preparing for the exam, depends on three key factors, denoted e, b and γ. First, the probability of success depends positively on effort provided e, which is the choice variable of the individual. We assume that $p(e, b, \gamma)$ is a concave function of effort. Effort here should be understood broadly. It is not just the time and investment spent on preparing the *Gaokao*, but includes all choices made by the individual that affect the probability of being admitted. Second, we assume that the perceived probability of success depends positively on the *prior* belief in effort versus luck, b. We assume in particular that $\frac{\partial^2 p}{\partial e \partial b} > 0$. In other words, when an individual holds a higher prior belief that effort pays off (higher b), the higher is her effort's (e) perceived marginal impact on the probability of successful admission. This aspect of our model is important to understand the effect of selection on prior beliefs in the admission process, a key feature in the empirical analysis. Third, we assume that p depends on the level of competition for admission, called γ. This is important because the first years after the college admission exam was resumed, the competition became more severe (as is evident in Figure 2). In particular, students eligible that year had to compete with people from previous cohorts who were willing to take the exam but had been prevented from doing so. We assume that $\frac{\partial^2 p}{\partial e \partial \gamma} < 0$. i.e. holding everything else equal, higher competition reduces the marginal impact of effort.[7]

[7] We assume individuals to be atomistic so that the degree of competition for college admission appears exogenous to their individual choices. This is a realistic assumption given the size of China.

- Call c the cost of effort. Assume that $c(e, a, \theta)$ is convex, where a is ability and θ is the delay in being eligible to take the *Gaokao*. We assume that $\frac{\partial^2 c}{\partial e \partial a} < 0$, namely, the cost of effort for a given level of effort decreases with ability. This is a reasonable assumption since higher ability people have more facility with studying, and thus face a lower cost of effort. We assume that c increases with θ and also that $\frac{\partial^2 c}{\partial e \partial \theta} > 0$,. In other words, those born before 1959 face a much higher marginal cost of effort in preparing for the *Gaokao*. This is also very reasonable. Stopping to study for a number of years makes it harder to start again. Moreover, many people from those cohorts already had jobs, some had started families and had children to take care of. Accordingly, the cost of effort in preparing for the *Gaokao* was much higher for those cohorts. In addition, we assume that a and b are distributed independently, which seems to be the most natural assumption to make.

3.2 Equilibrium choice of effort and comparative statics

High school student i eligible for the *Gaokao* thus faces the following maximization problem:

$$\max_e p(e, b, \gamma)R - c(e, a, \theta)$$

The optimal choice of effort e^* for student i thus solves the following first order condition:

$$\frac{\partial p(e, b, \gamma)}{\partial e} R = \frac{\partial c(e, a, \theta)}{\partial e}$$

Given that p is concave in e, and c is convex in e, we know a maximum will exist and satisfy the above first order condition.

Before doing some comparative statics, note first that it might be optimal not to put any effort in the *Gaokao*, and thus not to participate. This will be the case if at the optimum level of effort $e^* \geq 0$, $p(e, b, \gamma)R - c(e, a, \theta) \leq 0$. In particular, suppose that for each student i, $s(e, a, b, \gamma, \theta, R)$ is the indicator regarding whether he decides to skip the *Gaokao* and not participate at all. We hence have $\frac{\partial \sum s_i}{\partial \theta} > 0$. This means that the proportion of students who would decide not to participate in the *Gaokao* at all increases if these students experienced longer delay in being eligible to take the *Gaokao*.

Proposition 1: Call $\tilde{b}$, $\tilde{\gamma}$, $\tilde{a}$ and $\tilde{\theta}$, the values of b, γ, a, θ at which $p(e, b, \gamma)R = c(e, a, \theta)$ at $e^* \geq 0$. Everything else equal, those with $b \leq \tilde{b}$, $a \leq \tilde{a}$, $\gamma \geq \tilde{\gamma}$, $\theta \geq \tilde{\theta}$, will not participate in the *gaokao*.

These conditions are quite intuitive. Note that these are sufficient conditions. Indeed, at $p(e, b, \gamma)R = c(e, a, \theta)$ at $e^* \geq 0$, there are tradeoffs between beliefs, ability, competition and delay.

For those who decide to participate in the *gaokao* and for which $e^* > 0$, several simple comparative statics results follow.

- First, given that $\frac{\partial^2 c}{\partial e \partial a} < 0$, e^* increases monotonically with ability. The marginal cost of effort will be higher for people of lower ability, thus leading to a lower equilibrium effort for the less able. If ability is normally distributed, there will be a higher proportion of students admitted among the more able, thus leading to a higher mean level of ability among those admitted compared to those who were not admitted. Formally, $\frac{de^*}{da} > 0$. At the optimum, for the marginal cost to be unchanged, a change in e^* and a must satisfy $\frac{\partial^2 c}{\partial e \partial a} da + \frac{\partial^2 c}{\partial^2 e} de^* = 0$. We thus have $\frac{de^*}{da} = \frac{-\frac{\partial^2 c}{\partial e \partial a}}{\frac{\partial^2 c}{\partial^2 e}}$, which is positive because of our assumptions on the cost function.

- Second, given that $\frac{\partial^2 p}{\partial e \partial b} > 0$, a higher b will lead to a higher $\frac{\partial p(e,b,\gamma)}{\partial e}$. This must be matched by an increase in $\frac{\partial c(e,a,\theta)}{\partial e}$. This means that a higher equilibrium level of effort is chosen. Indeed, people with a higher b will think there is a higher probability of return on effort for a similar effort level, and will thus choose a higher e^*. Formally, varying e and b at the first order condition, we have $\frac{\partial^2 p}{\partial e \partial b} R db + \frac{\partial^2 p}{\partial^2 e} R de^* = \frac{\partial^2 c}{\partial^2 e} de^*$. We thus have $\frac{de^*}{db} = \frac{\frac{\partial^2 p}{\partial e \partial b} R}{\frac{\partial^2 c}{\partial^2 e} - \frac{\partial^2 p}{\partial^2 e} R}$ This expression is positive since the numerator is assumed positive and the denominator is also positive by convexity of $c(e, a, \theta)$ and concavity of $p(e, b, \gamma)$ with respect to e. An immediate but important implication follows from this. Since those with a higher b will choose a higher level of effort, this will increase their chance of being admitted. The mean level of *prior* belief b will thus be higher among those admitted than among those non admitted. Remember that we assume that a and b are distributed independently. Calling $E(b_A)$ the expected level of b for those admitted, and $E(b_{NA})$ the expected level of b for those non admitted, we have $E(b_A) > E(b_{NA})$.

- Third, an individual with a higher θ will choose a lower level of equilibrium effort compared to somebody of similar ability with a lower θ or with $\theta = 0$ (those who suffer no delay in admission). Formally, $\frac{de^*}{d\theta} = \frac{\frac{\partial^2 c}{\partial e \partial \theta}}{\frac{\partial^2 p}{\partial^2 e} R - \frac{\partial^2 c}{\partial^2 e}}$, which is negative given our assumptions. Those with a higher θ who are admitted must thus have a higher mean level of ability and prior beliefs than those with a lower θ. Therefore the pool of admitted among those with a higher θ must be of higher mean ability (or higher prior beliefs). $E(a_A)$ and $E(b_A)$ thus increase with θ. Since ability and θ are independent, a higher mean ability for those admitted means that less of those with a high θ are admitted compared with those of lower θ. There are thus high ability individuals with a higher θ who are left out compared to those with a similar ability and with a lower θ. The mean level of ability for those left out is thus also higher for those with a high θ than for those with a lower θ. The same reasoning holds for *prior* beliefs. Those admitted with a higher θ will have a higher mean level of b. Importantly, this implies thus also that the mean level of b among those left out will be higher for those with a higher θ.

- Fourth, an increase in γ will lead to a lower level of e^* for all levels of a and b, which will reinforce the selection on ability and prior beliefs for those with a higher θ.

- Finally, given our discussion, call $F_{\theta A}(a)$ and $G_{\theta A}(b)$ the c.d.f. of those admitted as a function of a and b, respectively, for a given level of θ. Remember that these two are assumed to be independently distributed. Then it follows that for all $\theta'' < \theta'$, $F_{\theta'' A}(a)$ and $G_{\theta'' A}(b)$ stochastically dominate $F_{\theta' A}(a)$ and $G_{\theta' A}(b)$. Calling $P_{\theta A}$ the proportion of admitted in cohort θ, it also follows that $P_{\theta'' A} > P_{\theta' A}$.

This discussion can be summarized by the following proposition:

Proposition 2: *(i)* Equilibrium effort e^* in preparation for admission increases with a and b and decreases with θ and γ; *(ii)* $E(b_A) > E(b_{NA})$ and $E(a_A) > E(a_{NA})$, and given that the distribution of ability and beliefs are assumed to be the independent of θ, $E(a_{NA})$ and $E(b_{NA})$ increase with θ; *(iii)* for all $\theta'' < \theta'$, $F_{\theta'' A}(a) \leq F_{\theta' A}(a)$, $G_{\theta'' A}(b) \leq G_{\theta' A}(b)$, and $P_{\theta'' A} > P_{\theta' A}$.

Selection into college based on prior beliefs Importantly, the result that $E(b_{NA})$ increases with θ will be particularly useful for our empirical analysis. Since the members of the "lost generation" experience delay in entering college (θ) compared to later cohorts by definition, the model implies that those among the "lost generation" who chose not to go to college or did not get admitted to college have a higher $E(b_{NA})$. The basic intuition is that a higher θ increases the cost of effort. This can only be compensated by a combination of higher ability and a higher level of prior beliefs. Given that ability and prior beliefs are assumed to be the same across cohorts, i.e. to be independent of θ, it means that those admitted, who are less numerous are selected on a and b. *Mutatis mutandis*, the mean level of a and b among those not admitted is also higher. In other words, both $E(a_{NA})$ and $E(b_{NA})$ increase with θ. This suggests that if we find that members of the lost generation who were not admitted to college have lower average beliefs in the payoff of effort, it cannot be due to a selection effect of *prior* beliefs (b) and the corresponding equilibrium probability of admission into college (p), since the selection effect goes in the other direction. It is hence likely due to changes in *posterior* beliefs, and this is what we examine next.

3.3 Posterior belief on whether effort pays off

Next, we examine how people may adapt their (posterior) beliefs based on their college admission experience.[8] Assume that people adapt their beliefs on whether effort pays off or not as a function of the *actual* outcomes of their college education attainment, and the *expected* outcome that they would consider as "fair." Specifically, in the context of the *Cultural Revolution* and the "lost generation," we consider a *fair* expected outcome given a certain level of effort to be the counterfactual probability of getting into college if the cohorts had faced no disruption in the higher education schedule.

[8]Note that we are *not* modeling explicitly the process of Bayesian belief updating on the payoff function of effort.

Assume that changes in beliefs depend on the following function F that compares actual outcome with the expected fair outcome:[9]

$$\Delta b = F(y - \widetilde{y})$$

where y is an observed experienced outcome and $\widetilde{y}$ is an expected outcome.

In particular, we assume the expected "fair" outcome $\widetilde{y}$ is the equilibrium expected probability of getting into college when perceived $\widetilde{\theta}$ and $\widetilde{\gamma}$ are under "fair" conditions – when there is no delay ($\theta = 0$) and when admission competition is at the level of normal years.

If y is close or equal to $\widetilde{y}$, then the outcome will be perceived to be fair to the effort, and hence *posterior* beliefs on whether effort pays off or not will not change from the *prior* beliefs: $\Delta b = 0$. If y is larger than $\widetilde{y}$, then $\Delta b > 0$, as people adjust their beliefs upward, relatively more likely to think that effort pays off (than what is previously expected). On the contrary, if y is smaller than $\widetilde{y}$, then $\Delta b < 0$, since people observe an outcome level lower than what they have previously expected (in equilibrium).

If we adapt this framework to our model, then we can consider the perception of an individual eligible for the admission exam with ability a. Under "fair" (or normal) circumstances, there is no perceived delay, i.e. $\widetilde{\theta} = 0$ and competition is at the corresponding expected level $\widetilde{\gamma}$. Assuming that that individual knows his ability a and prior beliefs b, he can estimate his level of effort input as $\widetilde{e}^*$ as a function of $\widetilde{\theta} = 0$ and $\widetilde{\gamma}$. This would lead to an estimate of the "fair" return of effort, namely, the probability of college admission $\widetilde{p} = \widetilde{p}(\widetilde{e}^*, b, \widetilde{\gamma})$.

In reality, a member in the "lost generation" faced $\theta > 0$ and $\gamma > \widetilde{\gamma}$. He would hence choose $e^* = e(a, b, \gamma, \theta) < \widetilde{e}^*$, and experience the *actual* college admission with lower likelihood ($p < \widetilde{p}$). Given our assumptions on belief adaptation, this leads to $\Delta b = F(p - \widetilde{p}) < 0$. We thus have the following proposition:

Proposition 3: An increase in θ above $\theta = 0$ and an increase in γ above $\widetilde{\gamma}$ lead to $\Delta b < 0$.

This result is quite straightforward but goes in the opposite direction of the selection on beliefs among non-admitted students discussed above. We will thus see in the empirical analysis to what extent it is relevant.

4 Empirical strategy

In this section, we first describe our data sources. We then introduce our empirical strategy, and discuss the identification assumption and threats to identification.

[9] This follows the same structure on the perception of fairness as in, for example, Fehr and Schmidt (2003), and Alesina and Angeletos (2005).

4.1 China Family Panel Study (CFPS)

For the main analyses of this paper, we use data from the China Family Panel Study (CFPS). Key demographic characteristics are measured in the baseline wave conducted in 2010, and the 2nd wave in 2012 elicits various beliefs of interest, such as whether effort pays off as well as trustworthiness of the local government.

Overview of CFPS CFPS is a large-scale, almost nationally representative panel survey project conducted by the Institute of Social Science Survey at Peking University.[10] The 25 provinces of China covered by CFPS represent about 95% of the Chinese population in mainland China, with only Inner Mongolia, Xinjiang, Tibet, Hainan, Ningxia, and Qinghai excluded from the overall sample. Through a multistage probability sampling procedure, CFPS completed interviews with a total of 14,798 sampled households and all individuals living in these households, amounting to 36,000 completed adult observations. Crucially, parents and co-resident children are independently surveyed, making it possible to observe the beliefs and attitudes of both parents and children elicited in the same physical environment around the same time.

Baseline sample restrictions For our baseline estimations, we restrict the sample to individuals who have completed at least high school, and were born between 1957 and 1960. These restrictions allow us to focus on individuals who were eligible to apply for college (or, take the *Gaokao)*, and graduated from high school up to two years before the resumption of the college admission exam in 1977, or two years after. This is our preferred sample frame because the two year window width ensures that the abrupt changes in college admission policy in 1977 occurred *during* students' course of study at high school. In other words, the two year window width rules out the possibility that students could foresee the changes in college admission opportunities, and adjust their high school attendance decisions accordingly.[11] Overall, we have 509 observations: 21 pre-1959 cohorts with college degree or above, 238 without; and 30 post-1959 cohorts with college degree or above, and 220 without. This is not a large number of observations, but if we find significant effects with that relatively small sample, this should be indicative of significant belief changes for the "lost generation".

Key outcome of interest The CFPS elicits citizens' belief on the payoff of effort in the following way: "On a scale of 1-5, to what extent do you agree that 'effort and hard work pays off'," where 1 indicates strong agreement and 5 strong disagreement.

[10] Detailed information about the CFPS project can be found at `www.isss.edu.cn/cfps`.

[11] We test the sensitivity of this empirical design with a variety of sample window width in Section 4.4.

4.2 Pseudo regression discontinuity design

In order to identify the impact of the *Cultural Revolution* and its suspension of higher education on the beliefs and behaviors among the "lost generation," we compare individuals born just before 1959 who missed out on college (but were eligible) with those born in 1959 and just after, whose college education schedule was uninterrupted since they graduated from high school in or after 1977.

Specifically, we estimate the following pseudo-regression discontinuity model:

$$\begin{aligned} y_{ic} =& \alpha\, NoCollege_i + \beta\, BirthYear_c + \delta\, Pre1959Cohort_c \\ &+ \gamma\, Pre1959Cohort_c \times NoCollege_i + \epsilon_{ic} \end{aligned}$$

where y_{ic} is the dependent variable (individual beliefs and corresponding behaviors) (i stands for individual and c for cohort); $NoCollege_i$: is a dummy variable taking a value of 1 for those who did not attend college. We control for linear cohort trend ($BirthYear_c$), and introduce a fixed effect for the two cohorts born before 1959 ($Pre1959Cohort_c$).

The parameter of interest for our estimation is γ, which captures the differential effect from the lack of college education, among pre-1959 cohorts that were eligible for college (compared to post-1959 cohorts). It is important to note that the $Pre1959Cohort_c \times NoCollege_i$ indicator includes high school graduates who would have chosen to go to college if they were able to take college admission exam right after high school graduation, but in reality could not due to the *Cultural Revolution*. Since the $Pre1959Cohort_c \times NoCollege_i$ indicator also includes individuals who would not have gone to college *even* if they graduated after the *Cultural Revolution*,[12] if we find that γ is significantly different from zero, this suggests that the effect among those who were actually hurt by the *Cultural Revolution* is quite strong.

Note that the education attainment indicator itself does not distinguish between those individuals who started college during the *Cultural Revolution* when admission was not meritocratic but politicized and those who started afterwards. Nevertheless, this would only downwardly bias our estimate, since our model suggests that the college admission exam positively selects students who have higher prior beliefs on the payoff of effort. In other words, we have a type-II error where we "mistakenly" identify some people with low prior beliefs (and who attended college not through the merit-based exam) as individuals who exert effort and pass the exam. As a result of that type-II error, the sample of those that did not attend college may have on average higher *prior* beliefs in the payoff of effort relative to those that did attend.

Features of the pseudo-RD design By focusing on the cohorts graduating from high school close to the 1977 cutoff (namely, birth cohorts close to the 1959 cutoff), we eliminate many potential

[12] This is because only a minority (roughly 10 percent) of high school graduates choose to take the college admission exam in any given year.

confounding factors that are affecting the "lost generation" other than the suspension of higher education (see the following section for detailed discussions). In particular, our empirical design exploits variation in *birth* cohorts almost two decades prior to the end of *Cultural Revolution*, which assuages concerns that other profound changes in the political, economic, and social landscape of China at the end of the *Cultural Revolution* may be correlated with the identified effects.

In addition, the narrow window of comparison brings three advantages to our identification. First, it allows us to focus on cohorts for whom having been born in the "right" or "wrong" years with respect to college admission opportunities was highly salient (arguably a lifetime experience). The "lost generation" faced an exogenously imposed sharp shock in the prospect of higher education, which they would have avoided if they were born just a year or two later. Second, while the pre-1959 birth cohorts could choose to go back to college by taking the 1977 college admission exam, the narrow window comparison enables us to hold fixed the college entrance exam competitiveness (conditional on taking the exam), since all the relevant cohorts took either the 1977 or 1978 exam to enter college after the *Cultural Revolution*. This means that differences in competitiveness of the admission exam after 1977-78 will not affect our estimates. Third, as we briefly discussed previously, *all* 4 cohorts of students entered high school without the expectation that by the time they graduated, they could enter college via a merit-based exam. In other words, there is no differential selection due to expected prospect post graduation among those who decided to attend high school.[13]

4.3 Identification assumption and threats to identification

Our identification via the pseudo-RD design relies on the standard RD assumption that all relevant factors besides "treatment" must vary smoothly at the cutoff boundary. More specifically, the empirical identity strategy assumes that among 1957 to 1960 birth cohorts, the ability to take college admission exam right after high school graduation is the *only* relevant abrupt change that occurred to the post-1959 cohorts of high school graduates, due to the resumption of the exam in 1977.

Our pseudo-RD design readily rules out several confounding factors that might drive the results. First, differences in beliefs between the "lost generation" that missed out on college education and the younger cohorts may be due to gradual changes in broad socioeconomic conditions over time, such as for example economic development and political changes. Our comparison of cohorts born very closely around the 1959 cutoff year rules out such concerns. Second, factors that may affect beliefs but are *not* cohort-specific cannot drive the results, because our empirical design identifies the abrupt break in cohort trend around the 1959 cutoff. Third, factors that are cohort-specific but orthogonal to higher education attainment cannot drive our results, as we make it explicit in the empirical design that the abrupt change in 1959 birth year cutoff is also particularly

[13] However, this also indicates that these might not be the "regular" high school students that one may expect after the college admission exam was resumed.

related to higher education opportunities.

Our identification would be threatened by additional abrupt changes at the level of $Pre1959$ $Cohort_c \times NoCollege_i$ that are *not* the resumption of the college admission exam in 1977. To the best of our knowledge, there is no other known major historical episodes that affected particularly the pre-1959 cohorts who missed out on college education. In particular, note that by restricting our sample to high school graduates, we effectively focus on the urban population during the period of the *Cultural Revolution*, that remained largely unaffected by the fatal *Great Chinese Famine* (1959-1961) that was prevalent among the rural population, which indeed represented a major disruption for the rural population. We next go on to demonstrate that a wide range of observable characteristics are "balanced" at the level of $Pre1959Cohort_c \times NoCollege_i$.

4.4 Balance checks

In order to make sure there were no trend-breaking shocks around the 1959 birth year cutoff that did not attend college, we check the balance of characteristics across that cutoff year.

We first examine whether high school graduates born before 1959 and after 1959 significantly differ in terms of a range of background characteristics. In Table 1, columns 1 and 2, we present the mean level of personal characteristics (such as gender, ethnicity, biological traits) and family characteristics (such as geographic location, parental educational attainment, and parental political status) for cohorts born before 1959 and those born after 1959, respectively. Column 3 shows the p-values for a t-test of differences in these means, one characteristic at a time. We do not see evidence of high school graduates before and after 1959 exhibiting significantly differences in terms of most of the characteristics examined here.

Next, we investigate to what extent this pattern of no-difference across the 1959-cutoff year is sensitive to our choice of preferred window width (2 years before 1959, and 2 years after 1959). We extend the sample frame on both ends of the window one cohort at a time, and we test whether the previously examined background characteristics significantly differ before and after the 1959 cutoff among high school graduates born between the new cohort frames. In column 4, we show the p-values, testing for differences in means for cohorts born between 1956 and 1960 (hence extending the sample by one cohort to the left). In columns 5, 6, 7, and 8, we show the corresponding p-values for cohorts born between 1957 and 1961, between 1956 and 1961, between 1955 and 1962, and between 1954 and 1963, respectively. One can see that overall, the pattern of no abrupt change around 1959 cutoff year is *not* sensitive to differences in sample window widths. However, as we widen the window of cohorts to include in the sample, certain variables (e.g. total number of siblings) do become marginally significantly different across the cutoff.

Finally, we check whether these observable characteristics differ at the level of $Pre1959Cohort_c \times NoCollege_i$, which is the main source of threat to our identification. Table 2, columns 1 and 2, presents the overall mean and standard deviation of the background characteristics of interest among high school graduates born between 1957 and 1960, the preferred sample window width.

Columns 3 and 4 present the mean of these characteristics for individuals born before 1959, without and with college degree, respectively. Similarly, columns 5 and 6 present the mean levels for individuals born after 1959, without and with college degree, respectively. Column 7 presents the difference in the mean of characteristics between those without and with college degrees, across cohorts born before and after 1959, and column 8 shows the p-values for a test of whether this difference in differences is significantly different from zero.

As one can see, among the basic demographic characteristics examined here, there is no significant difference in gender or being of *Han* ethnicity. In addition, we examine (self-reported) weight and height as measures of general health, since one may be concerned that the various cohorts we are looking at were at a young age at the time of the Great Leap Forward and the ensuing Great Chinese Famine(1958-1961), and this might have left some effects on particular cohorts.[14] We see that those who did not go to college have a significant lower weight, but there are no cohort effects. There is no significant difference in height. For a variety of household and parental characteristics, again we do not see evidence of the difference at the level of $Pre1959Cohort_c \times NoCollege_i$. For example, individuals with college degrees are much more likely to be residing in urban areas (at the time of the survey, 2010), compared to their counterparts without college degrees. However, this gap is *not* significantly different between cohorts born before and after the 1959 cutoff year.[15]

Overall, we see that there is a fairly strong balance between the group of interest and other groups. If we do see significant differences in beliefs for that group, it is highly plausible that this is related to their experience of missing out on college.

5 Results

We now present results that identify the impact of higher education disruption due to the *Cultural Revolution* on citizens' beliefs and corresponding behavior.

5.1 Beliefs on whether effort pays off

Our main results can be summarized in Figure 3, where we plot the mean levels of the main outcome of interest – the belief that hard working does *not* payoff (thick solid line) – for each of the 4 cohorts in the sample. We standardize the belief variable so that it has a mean of 0 and a standard deviation of 1. One can see that relative to the 1959 and 1960 cohorts that did not experience interruptions in their college opportunities, the "lost generation" cohorts (1957 and 1958) exhibit a significantly higher belief that effort does *not* pay off in achieving success. In particular, there is an abrupt jump in this belief across the 1958 and 1959 cohorts, reflecting the

[14] As we restrict our sample to high school graduates only, we have effectively excluded many individuals (e.g. lowly educated rural residents) who were most vulnerable to the adverse effects of the famine.

[15] We do find that individuals with college degrees are less likely to be from coastal provinces among pre-1959 cohorts but more likely to be from coastal provinces among post-1959 cohorts (different at the 10% level).

sudden resumption of college admission exam in 1977. Importantly, we plot the average z-score index (weighted by inverse standard deviation as proposed by Anderson (2011)) for each of the corresponding cohorts, shown in the thin dotted line, and we do not see abrupt changes on either side of the 1959 cutoff.

More formally, we estimate the pseudo-RD regression described previously. The estimation results are shown in Table 3. The belief that hard work does not pay off takes values between 1 and 5. We see clearly that this belief is stronger among the pre-1959 cohorts who did not go to college. Note that due to the narrow window of cohorts in our main specification, the linear cohort trend does *not* play a significant role in the estimation — the estimated coefficient remain unchanged if we do not include the linear time trend.

To be clear, the relevant people we are interested in are those among cohorts who would have been admitted to college in normal times, but were not because of the suspension of higher education during the *Cultural Revolution*. We do not know who these people are, but it is clear that they are included in those from the pre-1959 cohorts that did not go to college. They do not form more than 10 percent of that group, probably less. As we can see in all three specifications of Table 3 (without and with personal or parental characteristics), the coefficient is significantly positive.

The effect is not only statistically significant, but also substantial in magnitude. The estimated effect of $Pre1959Cohort_c \times NoCollege_i$ on citizens' beliefs is in the size of 80% of a standard deviation. It is difficult to think that this effect is present *only* among those who realistically would have gone to college. Quite plausibly, many respondents in the sample think that they are part of the "lost generation" and attribute their failures in life to the fact that they were adversely affected by the *Cultural Revolution* (particularly in the dimension of missing out on college). As we will see below, the difference in belief is concentrated among those who perceive their income as low. Nonetheless, it is worth noting that given the rate of college admission, the vast majority of the members of the "lost generation" would never have been able to go to college anyway, even if they were born a few years later. We are here in presence of a typical attribution error: people attribute their failures to the external environment and not to themselves, whereas people tend to attribute their success to themselves and not to circumstances they face (see, among others, Ross, Bierbrauer, and Hoffman (1976)).[16]

5.2 Grudges against the government

We also see in Table 4 that the pre-1959 cohorts that did not go to college have a significantly higher distrust in local government. Distrust in local government is measured by CFPS on a scale of 1 to 10 where 10 indicates strong distrust, and 1 indicates strong trust.

Note that both people who did not go to college and people from the pre-1959 cohorts have

[16]Note interestingly that those who did not go to college, among all cohorts, are more likely to think that hard work pays off. It is thus not the case that those with lower education generally believe less that effort pays off – in fact, the opposite is the case for people grown up during 1950-1970s in China.

in general less distrust towards local government. One thus clearly sees here evidence of grudges from the relevant members of the lost generation towards local government. As we can see in column (4) of Table 4, this distrust is purely political. If asked about distrust towards strangers, which is orthogonal to the issue at hand and can be seen as a placebo in this case, we see that there are no significant differences for the group of the lost generation.

The results of Tables 3 and 4 thus suggest patterns of persistent grudges from members of the "lost generation." Those who expected under normal circumstances to be able to go to college, but were born in the "wrong years" understood clearly that they were deprived of higher education opportunities due to political reasons, completely outside their control. It is thus no surprise that they blamed the government for their fate. This result echoes with that of Chen and Yang (2015), which shows that those who suffered from the Great Chinese Famine during the Great Leap Forward have a significantly higher distrust of government, and are less likely to have married someone who worked for government.

To make our point clearer, in Table 5, we see that lower beliefs in the payoffs of hard work and higher distrust in local government is only significant among those who perceive that they have a relatively lower level of income. The coefficients are also larger in magnitudes, suggesting that one reason that members of the "lost generation" hold persistent grudges and different beliefs about effort versus luck is their dissatisfaction with various life outcomes.[17]

5.3 Intergenerational transmission

The evidence so far shows clearly the grudges held by the lost generation. A natural question is whether they transmitted their beliefs to their children. To answer that question, we estimate the following model of intergenerational elasticity of beliefs:

$$\begin{aligned} y_{ic} =& \beta\, y_{ic}^{F} + \gamma\, y_{ic}^{F} \cdot Pre1959Cohort_c \times NoCollege_{ic}^{F} \\ &+ \delta\, Pre1959Cohort_c \times NoCollege_{ic}^{F} + \epsilon_{ic} \end{aligned}$$

where y_{ic} are the beliefs of children (asked independently to the children, with the exact same wording as the question asked to the parents), y_{ic}^{F} are the beliefs of the father, and $NoCollege_{ic}^{F}$ is a dummy variable for whether the father did not go to college. The results can be seen in Table 6.

As we see, the father's beliefs, be it on the role of effort or on distrust towards local government are transmitted to their children. The coefficients of the effect of the father's beliefs on the children's beliefs are in general all significant and positive, thus showing that there is in general a significant component of intergenerational transmission. But what about the lost generation?

[17] We are unable to distinguish whether the changes in beliefs and increase in distrust towards the government took place at the time of college admission (the time when the "lost generation" experienced failure in achieving higher education), or took place much later during their adult life.

How much of their changes in beliefs were transmitted to their children? To see this, we look at the coefficient on the father's beliefs interacted with the pre-1959 cohort not attending college. Here, we see a significant negative effect on beliefs in hard work and no significant effect on distrust towards local government. These results are interesting because they suggest that, while intergenerational transmission of beliefs are clearly present, not all changes in beliefs experienced during somebody's lifetime are necessarily transmitted to one's offspring. The negative coefficient on beliefs on effort clearly suggest some kind of reversion to the mean.

This reversion in the children's beliefs might be related to the fact that their parents, who were deprived from access to higher education, made special efforts to give their children what they had not received. In Table 7, we look at annual education spending by parents on their children's education (PPP-adjusted) in the year prior to the CFPS survey. We see that, while parents with no college education, spend less on the education of their children, those from the pre-1959 cohorts with no college education spend significantly more. This clearly suggests an intergenerational altruistic act motivated by one's personal misfortunes. Again, since only a minority in this category includes those who would have gone to college, had they had the opportunity, this spending effect on children's education is presumably quite large. It is also consistent with the reversion in belief transmission observed among the children. Indeed, if parents invest a lot in the education of their children, they want to inculcate beliefs that will lead them to work hard on their education. As a placebo, we looked at annual medical spending. Not surprisingly, we find no significant effect among the pre-1959 cohorts that did not attend college.

6 Discussion

We now present results for several placebo tests in order to demonstrate the validity of our empirical design, and we discuss evidence that our results are not confounded by changes in intellectual traits accumulated through education and labor market outcomes.

6.1 Placebo tests

We perform two placebo tests, one assessing the particularity of the cutoff year we exploit in our identitification (1959 cohort, the first cohort to benefit the resumption of college admission after the *Cultural Revolution*), and one assessing the particularity of the lost higher education opportunities (as opposed to education opportunities at other schooling levels) for the pre-1959 cohorts.

Fake cutoff years To test the robustness of our results, we repeat the estimation of our baseline specification while replacing the cutoff years. While we know that 1959 is the *true* cutoff of interest due to the resumption of college admission exam in 1977, we assume other years around the 1959 as the cutoffs for the placebo tests. We redraw a window of 4 cohorts around these fake cutoff birth years, and re-estimate our key coefficient of interest: $PreCutoffCohort_c \times NoCollege_i$.

The results from these placebo exercises can be seen in Figures 4 and 5. We see clearly that the coefficient is only significant for the 1959 cutoff. If we take the 1960 cutoff, this means that we compare cohorts of 1958 and 1959 to cohorts of 1960 and 1961. In effect, only the cohort of 1958 was delayed in its ability to access the *Gaokao*, not the cohort of 1959. We see that the coefficient is lower, but not significant.

Overall, only the 1959 cutoff yields significant coefficients for beliefs and distrust, suggesting that the competition effect present in our model did not lead to significant effects.

Lack of high school opportunities While the *Cultural Revolution* abruptly halted college education, the secondary education system was not affected nearly as dramatically. In particular, there are no sharp changes in the opportunity to access secondary education across neighboring cohorts, as we see in the case of higher education with the centralized admission exam system. This allows us to perform a second placebo test, where we replicate our main specification on the sample who have completed elementary school. Some of them went on to complete secondary school, and some did not. We test, for each of the outcome variables of interest, whether we see significant differences between those who have completed high school degrees and those who did not, across the pre-1959 and post-1959 cohorts. Note that while the outcomes of senior high school and college attainment are correlated, this placebo exercise investigates whether the *differential* education attainment around the 1957 birth cohort cutoff generates significant impact among students.

The results are shown in Table 8. It is evident that the $NoHighSchool \times Pre1959Cohort$ are not significantly different from zero, when we examine the outcomes of belief in whether hardworking doesn't pay off, the level of distrust towards the local government or annual educational spending. In other words, our main empirical specification captures a pattern unique to college education among the "lost generation," and such a pattern is no longer visible in secondary education, as one might expect.

6.2 Changes in intellectual traits and labor market outcomes

One naturally wonders to what extent the changes in beliefs that we identified previously are confounded by the changes in individuals' intellectual traits and labor market outcomes as a result of the changing opportunities in higher education. We now examine these factors explicitly.

We first check for proxies of intelligence and abilities acquired through education, in Table 9. The CFPS conducted a word test (via recognition of Chinese vocabulary) and math test (via accuracy in performing calculations), with test versions adjusted according to respondents' actual educational attainment. The test questions are formulated based on junior to senior high school level of difficulty, and the final scores are standardized. In addition, the CFPS implemented a memory ability test (via recall of a word list verbally presented) that aims to capture both "short" term (immediate recall) and "long" term (recall after two minutes) memory capacity. These scores are also standardized. Here also, we see no difference for the pre1959 cohorts who did not attend

college. The only difference is that those who did not go to college do in general less well on the word test. They do slightly better on the math test, but that is significant only at the 10 percent level.

Similarly, we use the same baseline specification to investigate whether the "lost generation", that graduated from high school right before the college admission resumed and subsequently missed out on higher education, exhibit systematic disadvantageous labor market outcomes. In Table 10, columns 1-4, we present the results on employment status. One sees that while lack of college is strongly associated with unemployment at the time of the survey, there is no significant difference in this pattern across the pre- and post-1959 cohorts. Columns 5 and 6 present the coefficient estimates on the outcome of the rank of total income (including salary, capital gain, pension, etc.) among subjects in the sample. Again, lack of college education predicts lower rank in total income. However, $NoCollege \times Pre1959Cohort$ is not significantly different from zero, indicating that such difference is not particularly larger (or smaller) among the "lost generation." The "lost generation" thus does not seem to have suffered particularly relative to other cohorts on the job market. This reinforces our conclusion that the changes in beliefs we identified are related to the lost opportunity to access college directly after high school.

7 Conclusion

People form an important part of their beliefs, preferences, and attitudes through the experiences they have gone through, particularly during late adolescence and early adulthood. Such beliefs, preferences, and attitudes then can shape their lifetime beliefs, which may even be transmitted to their offspring and across generations.

In this paper, we look at the effect of the adverse experiences of China's "lost generation" on belief formation. For the decade between 1966 and 1976, most higher education institutions were shut down, and admission exams to college were suspended due to the *Cultural Revolution*. While we do not know who would have gone to college if given the opportunity during those years, we do find that among those cohorts that suffered from the lost opportunities caused by the *Cultural Revolution*, *ex post* beliefs in the payoff of effort were much lower, compared to the beliefs of those who were born afterwards and were not deprived of a normal educational path. They also have a significantly higher distrust of government. Interestingly, we found that the changes in beliefs on whether effort pays off were, to a certain extent at least, not transmitted to their children.

Pondering these results, we realize we still know very little about which changes in beliefs experienced during a generation are transmitted to next generations, which are not, and why. The seminal work of Bisin and Verdier (2000) argues that the intergenerational transmission of preferences, beliefs and attitudes is strategic, and parents decide to transmit certain aspects of their preferences, beliefs and values to their children out of two primary motives: *(i)* they transmit preferences, beliefs and attitudes that would be instrumentally valuable to their children (evaluated

based on "imperfect empathy"); and *(ii)* they transmit preferences, beliefs and attitudes that are intrinsically valuable (in particularly when the intrinsic value outweighs the direct cost of possessing such preferences, beliefs and attitudes), a prominent example of which is identity (Akerlof and Kranton, 2010).[18] In the context of our study, the "lost generation"'s beliefs that effort does not pay off seem to be largely driven by grudges and dissatisfaction. Such beliefs seem not to be instrumentally valuable – in fact, they are likely to be harmful to the offspring who live and compete in a completely different era in contemporary China, nor do they seem to be intrinsically fundamental to the parents' identity. The low instrumental value and low intrinsic value suggest that parents would be less motivated to transmit such beliefs to the next generation, as our empirical analysis shows.

[18]These two motives can obviously co-exist, complementing each other. In certain cases, however, they might crowd each other out.

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Figures and Tables

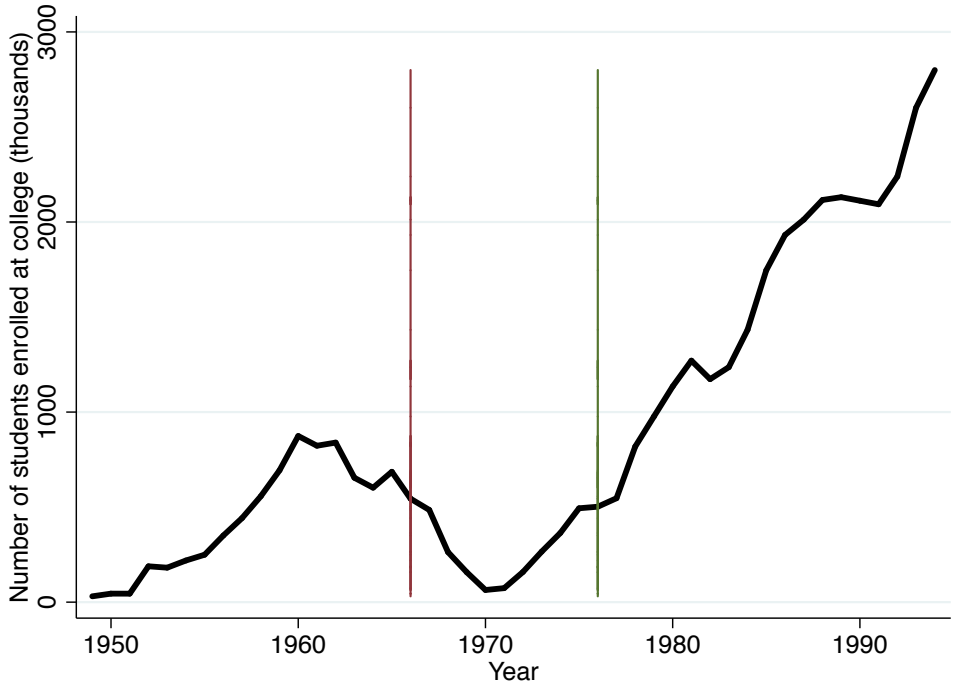

Figure 1: Number of students enrolled in universities by cohort. Data source: *Compilation of China Statistics Yearbooks* (1949 to 2008).

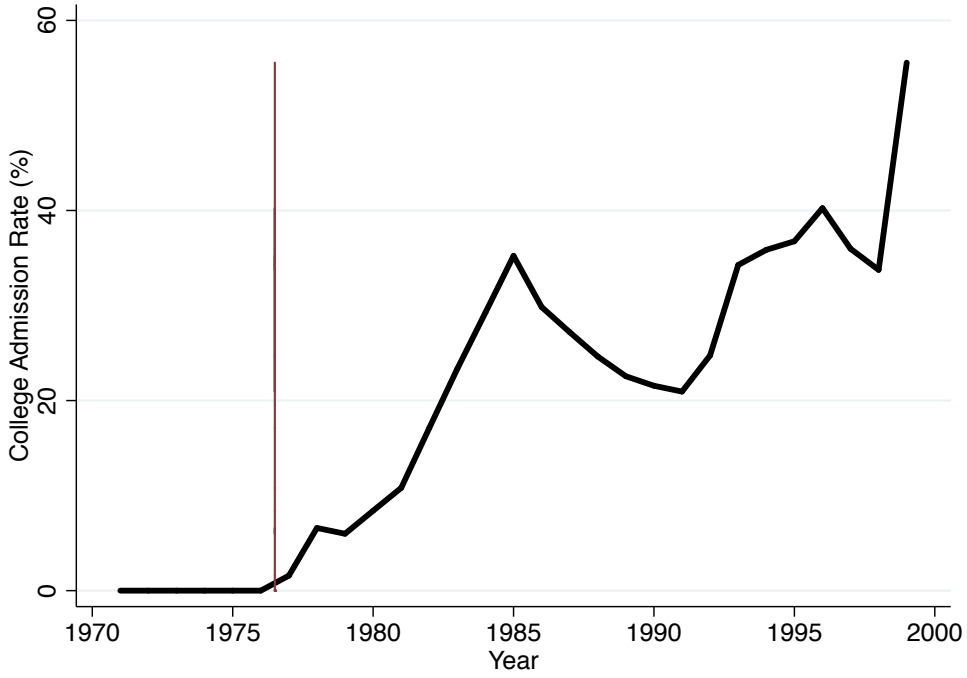

Figure 2: College entrance exam admission rate by exam year. Admission rate equals total students admitted into college divided by total students who took the exam. Admission rate for 1977 exam is adjusted for the pre-screening process implemented in many provinces before the college entrance exam.

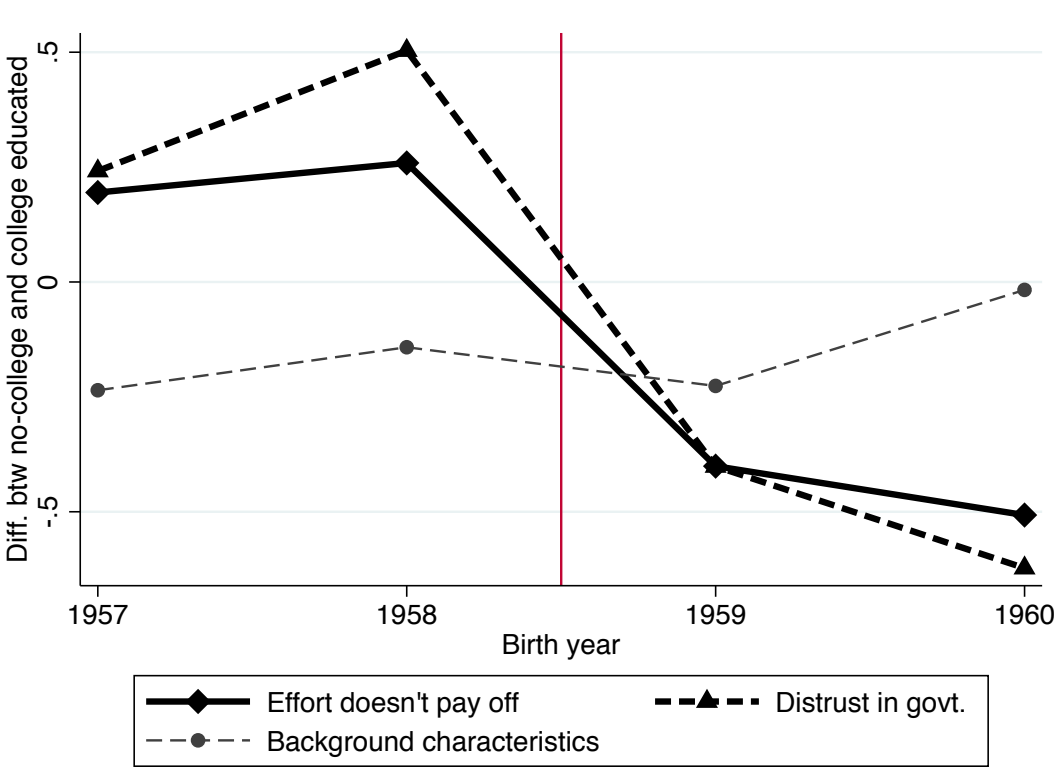

Figure 3: Differences in means across birth cohorts. ″Beliefs in effort vs. luck″ and ″distrust in government″ are standardized. ″Background characteristics″ is an Anderson z-score index of the characteristics listed in Table 2.

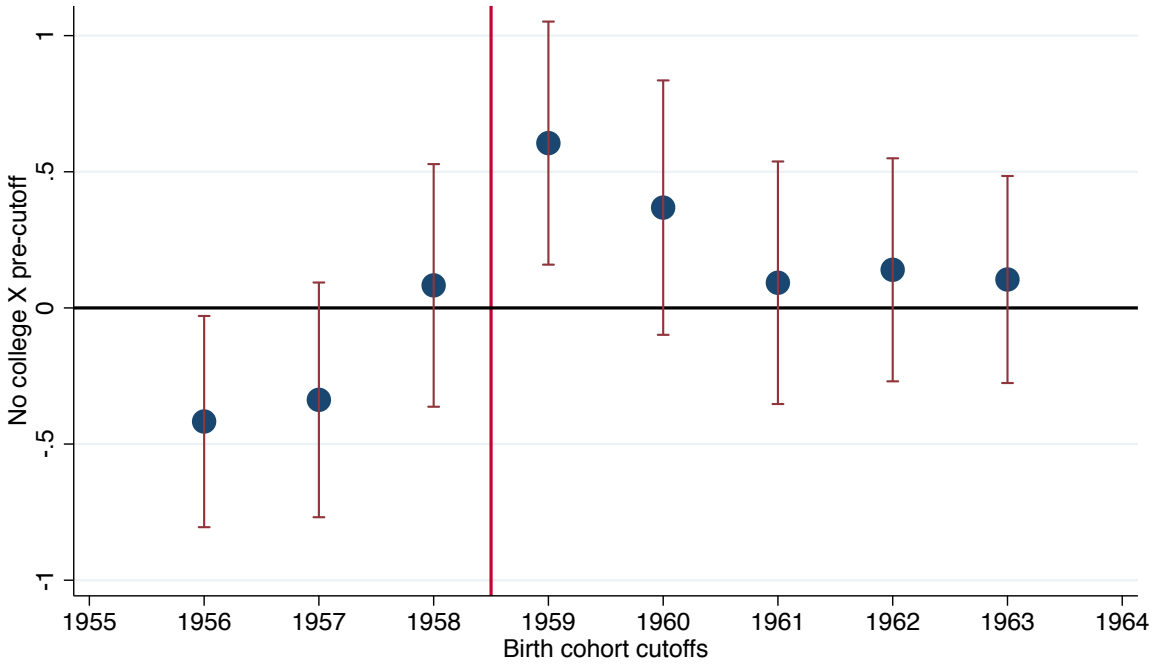

Figure 4: Placebo test of pseudo-RD design on the outcome of beliefs that effort does not pay off. For each birth cohort cutoff year, we draw 2 cohorts before and 2 cohorts after the cutoff, and re-estimate our baseline specification. Only the NoCollege×PreCutoff coefficient estimates are shown.

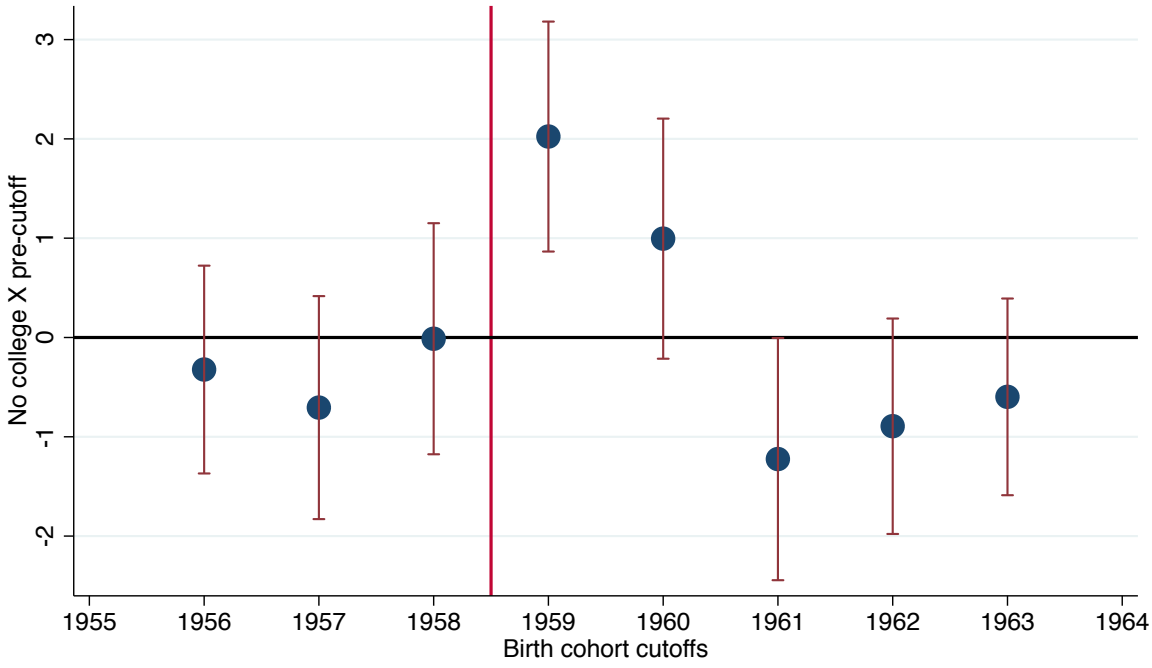

Figure 5: Placebo test of pseudo-RD design on the outcome of distrust in local government. For each birth cohort cutoff year, we draw 2 cohorts before and 2 cohorts after the cutoff, and re-estimate our baseline specification. Only the NoCollege×PreCutoff coefficient estimates are shown.

Table 1: High school graduates born before and after 1959

Born between:	1957 - 1960			1956 - 1960	1957 - 1961	1956 - 1961	1955 - 1962	1954 - 1963
	Mean (before 1959)	Mean (after 1959)	p-value	p-value	p-value	p-value	p-value	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Male	0.590	0.612	0.614	0.688	0.553	0.622	0.607	0.078
Han	0.960	0.958	0.889	0.881	0.997	0.994	0.500	0.706
Weight	127.4	128.6	0.540	0.907	0.415	0.760	0.706	0.953
Height	165.0	165.6	0.380	0.815	0.204	0.525	0.813	0.411
BMI	23.33	23.44	0.711	0.863	0.772	0.941	0.462	0.498
Urban	0.672	0.624	0.259	0.400	0.168	0.272	0.546	0.947
Coastal provinces	0.466	0.419	0.287	0.681	0.186	0.521	0.138	0.022
Migrated at age 3	0.028	0.023	0.730	0.679	0.521	0.458	0.661	0.640
Number of siblings	3.682	3.449	0.151	0.058	0.180	0.067	0.084	0.080
Father illiterate	0.513	0.506	0.878	0.740	0.706	0.900	0.907	0.111
Mother illiterate	0.748	0.794	0.227	0.133	0.227	0.124	0.997	0.411
Father CCP member	0.247	0.276	0.469	0.398	0.452	0.374	0.336	0.137
Mother CCP member	0.079	0.043	0.101	0.117	0.335	0.395	0.129	0.060
Landlord class	0.016	0.042	0.078	0.355	0.125	0.530	0.281	0.098
No college degree	0.880	0.919	0.144	0.119	0.306	0.266	0.113	0.043
# of obs.	251	260	511	611	603	703	955	1207

Column 3 reports the p-value for a t-test of differences in means between pre-1959 cohorts and post-1959 cohorts. Column 4-8 report p-values for t-tests of differences in means, using alternative sample of cohorts.

Table 2: Summary statistics and balance check

	All		Born before 1959		Born after 1959			
			No college	College	No college	College		
	Mean	Std.Dev.	Mean	Mean	Mean	Mean	Diff-in-diffs	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Male	0.601	0.490	0.577	0.700	0.597	0.760	0.043	0.772
Han	0.959	0.199	0.959	0.967	0.958	0.952	-0.013	0.826
Weight	128.0	21.04	125.9	138.0	127.6	138.8	-0.902	0.885
Height	165.3	7.418	164.7	167.3	165.3	168.1	0.123	0.956
BMI	23.39	3.233	23.14	24.61	23.34	24.55	-0.248	0.797
Urban	0.648	0.478	0.653	0.800	0.610	0.810	0.052	0.714
Coastal provinces	0.442	0.497	0.482	0.333	0.412	0.524	0.261	0.080
Migrated at age 3	0.025	0.158	0.027	0.033	0.021	0.048	0.021	0.665
Number of siblings	3.563	1.808	3.693	3.621	3.496	2.905	-0.519	0.343
Father illiterate	0.510	0.500	0.515	0.480	0.513	0.421	-0.057	0.721
Mother illiterate	0.771	0.420	0.751	0.714	0.787	0.857	0.107	0.404
Father CCP member	0.262	0.440	0.237	0.333	0.272	0.333	-0.035	0.798
Mother CCP member	0.060	0.238	0.070	0.138	0.047	0.000	-0.115	0.110
Landlord class	0.029	0.169	0.018	0.000	0.038	0.095	0.076	0.136

Total number of observations: 509 (born before 1959 without college degree: 220; born before 1959 with college degree: 30; born after 1959 without college degree: 238; born after 1959 with college degree: 21).

Table 3: "Lost generation" and beliefs on effort vs. luck

Dependent variables:	Hardworking *doesn't* pay off			
	(1)	(2)	(3)	(4)
NoCollege	-0.412***	-0.410***	-0.432**	-0.435**
	[0.202]	[0.204]	[0.214]	[0.216]
BirthYear	-0.031	-0.020	0.019	0.028
	[0.080]	[0.080]	[0.085]	[0.086]
Pre1959Cohort	-0.520*	-0.496	-0.452	-0.431
	[0.305]	[0.307]	[0.329]	[0.331]
NoCollege ×	0.605**	0.608**	0.616**	0.615**
Pre1959Cohort	[0.266]	[0.267]	[0.287]	[0.288]
Personal chara.	No	Yes	No	Yes
Parental chara.	No	No	Yes	Yes
Observations	504	501	449	446
Mean	2.287	2.287	2.287	2.287
Std.Dev.	0.887	0.887	0.887	0.887

*: Significant at 10%; **: 5%; ***: 1%. Robust standard errors in brackets. Personal characteristics include: gender, han ethnicity indicator, weight, and height. Parental and household characteristics include father literacy, father CCP membership, mother literacy, mother CCP membership, landlord class during the Land Reform, total number of siblings, and indicator whether one was sent down to countryside during the Cultural Revolution.

Table 4: "Lost generation" and distrust in government

Dependent variables:	Distrust in local government				Distrust in strangers *(placebo)*
	(1)	(2)	(3)	(4)	(5)
NoCollege	-1.226**	-1.095**	-1.307**	-1.131**	0.085
	[0.520]	[0.519]	[0.536]	[0.534]	[0.476]
BirthYear	0.089	0.116	0.251	0.266	0.024
	[0.205]	[0.205]	[0.213]	[0.212]	[0.188]
Pre1959Cohort	-1.966**	-1.880**	-1.851**	-1.694**	-0.275
	[0.790]	[0.785]	[0.824]	[0.815]	[0.724]
NoCollege ×	2.023***	2.055**	1.945***	1.875***	0.295
Pre1959Cohort	[0.689]	[0.683]	[0.719]	[0.712]	[0.631]
Personal chara.	No	Yes	No	Yes	No
Parental chara.	No	No	Yes	Yes	No
Observations	498	495	448	445	496
Mean	5.280	5.280	5.280	5.280	7.845
Std.Dev.	2.296	2.296	2.296	2.296	2.083

*: Significant at 10%; **: 5%; ***: 1%. Robust standard errors in brackets. Personal characteristics include: gender, han ethnicity indicator, weight, and height. Parental and household characteristics include father literacy, father CCP membership, mother literacy, mother CCP membership, landlord class during the Land Reform, total number of siblings, and indicator whether one was sent down to countryside during the Cultural Revolution.

Table 5: Heterogeneity by income satisfaction

Dependent variables:	Hardworking doesn't pay off		Distrust in local govt.	
Subjective income evaluation	High	Low	High	Low
	(1)	(2)	(3)	(4)
NoCollege	0.506*	-0.306	-0.695	-2.011**
	[0.260]	[0.318]	[0.705]	[0.781]
BirthYear	-0.065	-0.000	0.097	0.035
	[0.110]	[0.115]	[0.302]	[0.282]
Pre1959Cohort	-0.535	-0.699	-1.272	-3.072**
	[0.373]	[0.544]	[1.018]	[1.338]
NoCollege ×	0.519	0.883*	1.181	3.176***
Pre1959Cohort	[0.325]	[0.480]	[0.890]	[1.180]
Observations	241	263	236	262

*: Significant at 10%; **: 5%; ***: 1%. Robust standard errors in brackets.

Table 6: Intergenerational elasticity of beliefs

Child's beliefs:	Hardworking doesn't pay off		Distrust in local govt.	
	(1)	(2)	(3)	(4)
Father's corresponding beliefs	0.283***	0.363***	0.241***	0.303***
	[0.071]	[0.079]	[0.049]	[0.067]
Father's corresponding beliefs		-0.123**		-0.001
× Pre1959NoCollege		[0.055]		[0.052]
Observations	243	242	248	242

*: Significant at 10%; **: 5%; ***: 1%. Robust standard errors in brackets.

Table 7: Spending on children's education

Dependent variables:	Annual educational spendings *(PPP-adjusted)*			Annual medical spendings *(placebo)*
	(1)	(2)	(3)	(4)
NoCollege	-6,430***	-6,330***	-6,327***	-3,871
	[2,131]	[2,146]	[2,120]	[3,113]
BirthYear	700	843	381	-2,542**
	[839]	[848]	[840]	[1,201]
Pre1959Cohort	-5,120	-4,856	-6,592	-8,486*
	[3,234]	[3,247]	[3,214]	[4,673]
NoCollege ×	6,736**	6,816**	6,855**	1,932
Pre1959Cohort	[2,823]	[2,826]	[2,804]	[4,060]
Personal chara.	No	Yes	No	No
Child chara.	No	No	Yes	No
Observations	500	496	500	499
Mean	4,604	4,604	4,604	4,646
Std.Dev.	9,394	9,394	9,394	13,379

*: Significant at 10%; **: 5%; ***: 1%. Robust standard errors in brackets. Personal characteristics include: gender, han ethnicity indicator, weight, and height. Parental and household characteristics include father literacy, father CCP membership, mother literacy, mother CCP membership, landlord class during the Land Reform, total number of siblings, and indicator whether one was sent down to countryside during the Cultural Revolution.

Table 8: Placebo tests – no high school education

Dependent variables:	Hardworking *doesn't* pay off		Distrust in local government		Annual educational spendings	
	(1)	(2)	(3)	(4)	(5)	(6)
NoHighSchool	-0.081	-0.042	-0.276	-0.057	-940.4	-614.5
	[0.067]	[0.071]	[0.208]	[0.216]	[1113]	[1265]
BirthYear	-0.029	0.002	0.053	0.028	381.7	278.6
	[0.045]	[0.048]	[0.139]	[0.145]	[745.6]	[851.3]
Pre1959Cohort	0.025	0.057	-0.219	-0.468	395.8	575.2
	[0.118]	[0.126]	[0.366]	[0.381]	[1960]	[2241]
NoHighSchool ×	-0.172	-0.186*	0.052	0.197	-1031	-1348
Pre1959Cohort	[0.093]	[0.099]	[0.288]	[0.299]	[1547]	[1758]
Personal chara.	No	Yes	No	Yes	No	Yes
Parental chara.	No	Yes	No	Yes	No	Yes
Observations	1300	1122	1296	1137	1322	1143
Mean	2.208	2.208	5.237	5.237	4637	4637
Std.Dev.	0.840	0.840	2.438	2.438	9709	9709

*: Significant at 10%; **: 5%; ***: 1%. Robust standard errors in brackets. Personal characteristics include: gender, han ethnicity indicator, weight, and height. Parental and household characteristics include father literacy, father CCP membership, mother literacy, mother CCP membership, landlord class during the Land Reform, total number of siblings, and indicator whether one was sent down to countryside during the Cultural Revolution.

Table 9: Intellectural traits – intelligence and ability

Dependent variables:	Word test	Math test	Long-term memory	Short-term memory
	(1)	(2)	(3)	(4)
NoCollege	-3.417***	0.063*	-2.927	-4.503
	[0.868]	[0.221]	[6.343]	[6.165]
BirthYear	-0.064	0.045	1.234	1.518
	[0.339]	[0.086]	[2.539]	[2.457]
Pre1959Cohort	-0.006	0.535	0.914	1.414
	[1.311]	[0.333]	[9.665]	[9.383]
NoCollege ×	0.545	-0.317	2.502	2.780
Pre1959Cohort	[1.142]	[0.290]	[8.402]	[8.165]
Observations	509	509	483	488
Mean	24.560	18.230	60.514	59.784
Std.Dev.	3.93	0.970	27.783	26.903

*: Significant at 10%; **: 5%; ***: 1%. Robust standard errors in brackets.

Table 10: "Lost generation" and labor market outcomes

Dependent variables:	Currently employed				Total income (*rank*)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NoCollege	-0.301***	-0.286***	-0.270**	-0.240**	-160.1***	-148.1***	-137.6***	-124.2***
	[0.112]	[0.106]	[0.118]	[0.112]	[31.71]	[31.20]	[33.79]	[33.25]
BirthYear	0.058	0.049	0.069	0.049	17.46	10.62	11.57	3.89
	[0.044]	[0.042]	[0.047]	[0.045]	[12.43]	[12.30]	[13.38]	[13.20]
Pre1959Cohort	0.117	0.118	0.224	0.227	22.18	10.81	17.35	12.62
	[0.169]	[0.160]	[0.181]	[0.172]	[48.07]	[47.17]	[51.88]	[50.81]
NoCollege ×	0.016	0.001	-0.021	-0.072	25.05	22.13	19.24	6.79
Pre1959Cohort	[0.147]	[0.139]	[0.158]	[0.150]	[41.99]	[41.08]	[45.32]	[44.34]
Personal chara.	No	Yes	No	Yes	No	Yes	No	Yes
Parental chara.	No	No	Yes	Yes	No	No	Yes	Yes
Observations	509	505	454	450	505	501	453	449
Mean	0.540	0.540	0.540	0.540	254.0	254.0	254.0	254.0
Std.Dev.	0.499	0.499	0.499	0.499	145.9	145.9	145.9	145.9

*: Significant at 10%; **: 5%; ***: 1%. Robust standard errors in brackets. Personal characteristics include: gender, han ethnicity indicator, weight, and height. Parental and household characteristics include father literacy, father CCP membership, mother literacy, mother CCP membership, landlord class during the Land Reform, total number of siblings, and indicator whether one was sent down to countryside during the Cultural Revolution.