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Social origin and educational attainment in China: a historical analysis of 70 birth cohorts



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Abstract

The impact of social origin on educational attainment is conditioned on the social context in which people live. In recent decades, with changes in the Chinese society, how has the impact of social origin on educational inequality changed? Based on an analysis of 70 birth cohorts, this study details the effect of social origin on educational inequality and its trends over the past 70 years. The results of this study also indicate that the historical stages hypothesis (HSH) and model-shift hypothesis (MSH) emphasized in previous studies cannot fully describe the historical changes in educational inequality. In addition to macrosocial processes, there may exist other structural factors that also affect educational inequality but are neglected. The social context and its transformation, which shaped the relationship between social origin and educational inequality, need to be examined in more detail.

Keywords: Educational attainment, Social origin, Ascribed factors, Historical change, Educational inequality

Introduction

The increasing importance of education and social mobility is seen as a reflection of the openness of social structure. Education is usually seen as an achieved factor, but its attainment is unavoidably affected by people's social origins or ascribed factors. Blau and Duncan's (1967) landmark research shows that, in modern industrial society, the educational level of fathers will affect the educational attainment of the offspring, thus influencing the offspring's occupational status. The influence of ascribed factors on educational attainment is a crucial mediating mechanism in class reproduction. Some scholars even claim that education is the most important hidden mechanism in the reproduction of social inequality (Bourdieu and Passeron 1977). Even in the process of educational expansion, education contributes to sustaining social inequality (Lucas 2001; Raftery and Hout 1993). Therefore, paying attention to the effects of ascribed factors is the starting point to understand educational inequality.

Contemporary Chinese society has experienced rapid resolution in terms of both social-economic structure and educational development. In this process, how has the

educational attachment process changed in China? How has the effect of ascribed factors on educational attainment changed in response to societal changes? Although this topic has received some attention from existing research, there are unanswered issues. First, previous studies have generally assumed that the effect of ascribed factors on educational attainment is unchangeable during a specific historical stage, and the number of historical stages is limited in those studies (the history of China since 1949 was divided into several stages). Second, recent research into educational inequality lacks a long-time horizon and usually focuses on educational inequality since China's reform and opening-up or since the expansion of higher education starting in the mid-1990s. Different from previous studies, we assume that the effect of ascribed factors on educational attainment not only varies across different historical stages but is also unfixed even within a short period. Using a large dataset, this article analyzes 70 different birth cohorts starting from 1920 and examines how the effect of ascribed factors on educational attainment changes with societal development.

Literature review and research design

The Coleman Report (Coleman et al. 1966) and the Plowden Report (Peaker 1971) triggered a heated discussion of the relationship between family background and educational inequality. Different from these two studies, which focused on developed countries, research on developing countries has not reached a consensus. Some studies point out the weak link between social origin and educational attainment in developing countries (Heyneman 1976; Heyneman and Loxley 1983), whereas others show similarities between developing and developed countries (Buchmann and Hannum 2001).

Numerous studies on China have emphasized that China's institutional arrangement weakened the relationship between family background and educational attainment in a specific historical period. The state has played an important role in education in China since 1949, and the development of education has mainly been determined by national policies that are frequently changing (Tsang 2000). The process of educational development shaped by national policies has important influences on educational stratification. According to Hannum (1999), the political agenda for education in China after 1949 can be summarized by the socialist egalitarian model and the liberal competitive model. In the 1950s, the dominant model was the socialist egalitarian model. Education was taken as an important way to eliminate class differences; urban-rural differences in education tended to be reduced with this model, and the model reached its peak during the Cultural Revolution (Hannum 1999). Deng and Treiman's (1997) analysis of the census data from 1982 revealed that the advantages of children of intellectuals and cadres in educational attainment dropped to its lowest point during the Cultural Revolution, and the weakening of the link between a son's educational attainment and a father's socioeconomic status was precisely the result of state intervention. A historical study by Liang et al. (2012) also showed that since 1949, there had been a revolution in China's higher education field. The status quo in which children of the upper class dominate elite education has been broken, and the children of the lower classes, such as workers and peasants, gradually occupy a considerable proportion of the higher education system. They have successfully maintained their proportion until the end

of the twentieth century. Despite scattered challenges¹, egalitarianism (except gender inequality²) had been the dominant trend in education from the establishment of the People's Republic of China (PRC) to the end of the 1970s, which has become a scholarly consensus.

After China's reform and opening-up starting at the end of the 1970s, educational inequality is usually seen as the result of liberal competition. Under the liberal competitive model, the gaps between urban and rural and between classes have been widening. The correlation between social origin and educational attainment has increased. For example, Hao's (2007) analysis of the Chinese General Social Survey 2003 data shows that before the reform and opening-up, policy interventions had decreased educational inequality to some extent. However, after reform and opening-up, policy interventions were either eliminated or had little effect. Li's (2006) analysis of the same data also shows that after the 1977 resumption of the college entrance exam, the effect of socioeconomic background on educational inequality began to appear, and after 1992 with the development of the market economy and its impact on the educational system, the effect of family socioeconomic status on education was more prominent. The conclusion that educational inequality has been growing since 1978 and that educational acquisition is determined by family background to a large extent is supported by many studies (Li 2003; Gao 2008; Wang 2013; Guo and Wu 2008). Recently, more research has focused on educational expansion, especially the expansion of higher education, and its consequence of inequality. Many of those studies show that education expansion has not weakened educational inequality, and family background still has a direct influence on educational attainment (Wu 2010), especially the opportunity to obtain high-quality education resources (Li 2007; Wu 2016; Ye and Wu 2011).

In sum, it can be found that China's educational inequality has gone through two historical stages and has undergone a transformation from the socialist egalitarian model to the liberal competition model. This finding is called the model-shift hypothesis (MSH) in the rest of this article.

MSH involves educational inequality in the two historical periods before and after China's reform and opening-up. However, some studies divide Chinese history since 1949 into several stages according to major social events, such as the Great Leap Forward, the Cultural Revolution, the reform and opening-up, and the higher education expansion. They focus on educational inequality at one or more stages. For example, Li (2006) compared the differences in educational inequality in three historical stages: the period of the Cultural Revolution, the period of the restoration of the College Entrance Exam, and the period of the industrialization of education.³ Chunling Li's six stages (2003) and five stages (2014) division of the historical development of educational inequality also indirectly makes historical stages based on major social events. A similar staging method is used in Hao (2007) as well. Some related studies used people's birth year or the year of school enrollment for staging (Sato and Li 2007; Wu 2011; Zhou

¹As Liu's research points out, people's educational opportunities and educational attainment were still influenced by institutional and cultural factors, and intergenerational reproduction of education still dominated during the Cultural Revolution (Liu 1999).

²A study by Bauer et al. (1992) shows that despite the Chinese government engaging in eliminating gender inequality, gender stratification in education persisted and even strengthened from 1949 to 1988.

³In the 1990s, the Chinese government promoted education as an industry.

et al. 1998; Gao 2008; Hou 2015; Wu 2012, 2013), but when discussing the macrosocial context for educational inequality, they often directly or indirectly come back to the historical stages that have been broadly used.

Almost all of those studies that have covered several historical stages emphasize the differences in the mechanism of educational inequality at different historical stages, explicitly or implicitly assuming that the mechanism of educational inequality in a specific historical stage is fixed, or in other words, is unchangeable. We use the historical stages hypothesis (HSH) to summarize this kind of study. In fact, the MSH is a particular example of HSH in which Chinese history since 1949 is divided into two stages. Whether multistage studies or two-stage studies, the inner logic is similar: the generative mechanism of inequality is constrained by macrosocial processes, which is why the historical stages were divided according to major social events.

Scholars use historical staging or age/generation groupings as the primary method to understand changes in educational inequality. They use by-group regression and then either compare regression coefficients across groups or include groups as dummy variables to explore interaction effect with other factors. The method is helpful for us to understand the effects of different factors on educational inequality in different historical periods or age cohorts. However, the method often uses a limited number of groups (historical stages or age cohorts), and the rationale for group division depends on the researcher's judgment on the possible influence of macro institutions and social structural factors (e.g., the aforementioned major social events) on educational inequality at different times. In other words, according to this method, understanding of historical changes in educational inequality is based on the researcher's logical judgment to some extent.⁴ In addition, by-group regression assumes that the effects of explanatory variables on education are fixed. This assumption is also an approximation. As we will show, the effects of some factors on education fluctuate even in a fixed historical period.

Both the model-shift hypothesis and historical stages hypothesis need to be further tested. The core question addressed in this article is how the effect of ascribed factors on educational attainment has changed over time since 1920. By investigating the historical process in this change, this article seeks to reflect on the model-shift hypothesis and the historical stages hypothesis. This study differs from existing works in two main aspects. First, although we assume that the effect of ascribed factors on educational inequality varies with time, we do not assume historical staging for this variation. In other words, our "staging" is not based on time periods; we treat each year as a "period". Our approach essentially treats the generative mechanism of educational inequality and its change as a continuum in history, rather than observing its change according to a limited number of historical stages. Second, we borrow the basic idea of multilevel modeling: group the research subjects based on their year of birth and assume that intergroup variation exists in the effect of family background on educational attainment. As such, intergroup differences can be understood as to how the effect of family background varies with changes in the year of birth.

⁴The limited number of groups is often due to a limited sample size and the need to ensure the regression for each group has a large enough sample.

Data, variables, and method

Data

The data used in this article come from the China General Social Survey (CGSS) conducted by the Renmin University of China.⁵ We choose data covering seven years: 2003, 2005, 2006, 2008, 2010, and 2012.⁶ Because this study examines the effect of ascribed factors on eventual educational attainment, we drop all observations in which respondents are students, or the family information is missing when respondents are 14 or 18 years old. The final sample contains 35,400 individual observations.

This study differs from previous research in that we group respondents based on their year of birth. Because of the small sample size of respondents born before 1924, we group those born before 1924 into the 1924 group. Similarly, we group those born after 1993 into the 1993 group. We have 70 groups born between 1924 and 1993, with the smallest group containing 32 observations.

Variables

This study focuses on the effect of social origin on educational attainment. Our dependent variable is the level of the respondents' education, which is measured by years of education of the respondent (*eduy*). We also use a dummy variable to indicate whether or not the respondent has attended higher education (*hedu*).

We follow previous research on educational inequality and use ascribed factors, such as household registration, gender, parents' education, and parents' socioeconomic status, as explanatory variables. Our treatment of each variable is described below.

1) Household registration (*urban*)

This is a dummy variable that has a value of 1 for urban *hukou* (non-agriculture household registration) and 0 for rural *hukou* (agriculture household registration). With this variable, we are investigating the effect of the respondent's initial *hukou* status (when the respondent is young) on their educational attainment. Considering some respondents changed their *hukou* status through education when they grew up (that is, *hukou* becomes the result of, not the reason for, education), we use the respondent's *hukou* status at birth for this variable. To be clear, if a respondent is registered as a rural *hukou* at birth but moved to an urban *hukou* later in life, we use her/his *hukou* status as rural *Hukou*.⁷

2) The educational level of the respondent's parents (*fmedu*)

We use the larger value of years of education of the two parents when the respondent is 14 or 18 years old.⁸ In the statistical analysis, we center this value by its group mean instead of the grand mean. The variable, after centering, is called *fmedu*. We use the

⁵For a detailed introduction of this program, please refer to <http://cgss.ruc.edu.cn>.

⁶The 2011 data are not selected because of its lack of information about respondents' parents when the respondent was young (14–18 years old).

⁷More recent waves of the survey contain information about "residential *hukou*." We decide which value to use based on *hukou* information before obtaining "residential *hukou*" provided in the raw measurement.

⁸Some waves of the survey use parents' information when respondents are 14, and others collect that information when respondents are 18.

group mean to make sure the value is comparable across respondents. For example, suppose there are two respondents, one born in the 1940s and another in the 1990s, and their fathers have the same educational level of high school. Because of credential inflation, the two fathers cannot be seen as having the same educational attainment. For the respondent born in the 1940s, her father's educational level is higher than that of his peers. The same cannot be said for the respondent born in the 1990s.

3) Socioeconomic status of the respondent's parents (*fmisei*)

We calculate the occupational status (ISEI) of the two parents when the respondent is 14 or 18 years old. We transform the information on parents' occupation in the original survey into the occupational status index and average the scores of the two parents for this variable. We also center this variable by the group mean for the reasons stated above and create the variable *fmisei*.

4) Gender (*male*)

This variable is a dummy variable that has a value of 1 for men and 0 for women.

Table 1 shows the descriptive statistics of all variables used.

Method

As stated above, this article differs from previous studies in that we use multilevel modeling instead of group regression or time dummies. Grouping is a concern in multilevel modeling as well. To circumvent limited groups that confronted existing research, we group respondents by their year of birth to have enough groups for the second level of the multilevel model.

Specifically, we divide individual observations into 70 groups from 1924 to 1993, with those born in the same year belonging to the same group. Our analytical model has two levels. For the analysis that uses years of education as the independent variable, the first-level function is very similar to an ordinary OLS regression function, as shown by Function 1. The difference is that, because each group has different regression coefficients, these coefficients (β) change with different groups (subscript $j = 1924, 1925, 1926, \dots, 1993$). As such, we further disintegrate Function 1's coefficients at the second level, with the intercept term (γ) and the error term (U),⁹ as shown in Function 2. K has a value between 0 and 4 corresponding to each of the five coefficients in Function 1. Using the influence of parents' education on children's education as an example, we can understand the following logic: in the j th group, the influence of parents' education on children's educational attainment is disintegrated into two parts: $\beta_j = \gamma_0 + U_j$, in which γ_0 is understood as the average effect of 70 groups and U_j the deviation of group j from this average effect. Because we assign groups based on year, $\gamma_0 + U_j$ can be seen

⁹According to multilevel modeling, it is the equivalent of taking regression coefficients from the 70 groups calculated in Function 1 as the explanatory variable to expand the extent of its variation (slopes as outcomes). For related cases and a description, see Gelman and Hill (2007). It must be noted that if intergroup variation exists, the effect of consecutive groups may have correlate (and this correlation is associated with the continuity of social circumstances or policies). Because this paper does not seek to explain the changes between groups (at the second level, there is no explanatory variable), we do not need to pay specific attention to intergroup correlations.

Table 1 Descriptive statistics for all variables ($N = 35,400$)

Variable (abbreviation in models)	Mean	sd	Min.	Max.
Years of education (<i>eduy</i>)	8.78	4.48	.00	20.00
Whether respondents attended higher education (<i>hedu</i>)	.15	.36	.00	1.00
Birth cohort (<i>birth cohort</i>)	1963.20	14.56	1924.00	1993.00
Gender (<i>male</i>)	.48	.50	.00	1.00
Hukou (<i>urban</i>)	.35	.48	.00	1.00
Parents' education (<i>fmedu</i>)	.00	4.05	- 9.47	16.97
Parents' ISEI (<i>fmisei</i>)	.00	11.47	- 16.88	63.09

as the effect of parents' education on correspondents born in year j , with γ_0 indicating the average effect of the 70 years and U_j indicating the extent to which the effect of year j departs from the average.

Function 1:

$$eduy_{ij} = \beta_{0j} + \beta_{1j} \times male + \beta_{2j} \times urban + \beta_{3j} \times fmedu + \beta_{4j} \times fmisei + \varepsilon_{ij}$$

Function 2:

$$\beta_{kj} = \gamma_{k0} + U_{kj}$$

As for higher education, the effect of individual-level factors on higher education attainment is shown in Function 3, where π_{ij} is the probability that the i th individual born in the j th year attends higher education. Similarly, we assume that individual-level factors influence educational opportunities in ways that change in response to group (year). As such, regression coefficients in Function 3 are also disintegrated into a group average effect (γ) and the deviation of each group (year) from the average (U). The equation for Function 4 is not shown as it is the same as Function 2.

Function 3:

$$\text{logit}(\pi_{ij}) = \ln \left[\frac{\pi_{ij}}{1 - \pi_{ij}} \right] = \beta_{0j} + \beta_{1j} \times male + \beta_{2j} \times urban + \beta_{3j} \times fmedu + \beta_{4j} \times fmisei + \varepsilon_{ij}$$

Function 4 (omitted)

Results

The effect of ascribed factors on educational level and its historical change

Table 2 shows the analysis that uses the educational level as the independent variable. The model is fitted with a restricted maximum likelihood estimation. Model 1 is the null model with no predictive variable. Essentially, this model deconstructs respondents' years of education into three parts $eduy_{ij} = \gamma_{00} + U_{0j} + \varepsilon_{ij}$, where γ_{00} is respondents' average years of education, ε_{ij} is the error term at the individual level, and U_{0j} is the group's deviation. Because group assignment is based on year of birth, U_{0j} can also be understood as the difference between the educational level of respondents born in year j and the (intergroup) average level of education. In other words, U_{0j} reflects how the level of education varies with the group (year of birth). ε_{ij} reflects individual-level variation. According to the variance component, respondents born in different years have different educational levels between groups (year of birth).

Table 2 Multilevel linear regression on respondents' years of education

	Model 1	Model 2	model 3
	Coef. (std.error)	Coef. (std.error)	Coef. (std.error)
Intercept (γ_{00})	8.0114(.3354)***	6.9298 (.3339)***	6.7571 (.3966)***
Male (γ_{10})		1.5114 (.0368)***	1.7998 (.1341)***
Urban (γ_{20})		1.0924 (.0411)***	1.1599 (.0584)***
Fmedu (γ_{30})		.2947 (.0055)***	.3126 (.0087)***
Fmisei (γ_{40})		.0612 (.0020)***	.0645 (.0021)***
	Variance component	Variance component	Variance component
Intercept (σ^2_{u0})	7.8028***	7.7127***	.1091***
Male (σ^2_{u1})			1.1482***
Urban (σ^2_{u2})			.0982***
Fmedu (σ^2_{u3})			.0026***
Fmisei (σ^2_{u4})			.0001***
Error variance (σ^2_e)	16.1416	11.8731	1.1673
AIC	199293.5	188474.6	1880.7.6
BIC	199318.9	188534.0	188215.6
– log likelihood	99643.7	94230.3	93997.8
Individual observations	35400	35400	35400
Group observations	70	70	70

AIC Akaike information criterion, BIC Bayesian information criterion
 *** $p < 0.001$

Model 2 in Table 2 is a variable-intercept model that includes ascribed factors as explanatory variables. However, we assume that the effect of these factors on educational attainment does not change with year, and we only allow the intercept to vary from year to year. From this model, we can see that the ascribed factors, on average, have significant explanatory power for educational attainment. For ease of explanation, we only center parents' educational level and parents' occupational status, but not gender and household registration status. As such, the intercept term is, in fact, the average educational level for all rural females. In other words, the average educational level of all rural women born from 1924 to 1993 is 6.9298 years. The variance component reflects the extent to which the educational level of rural women born in each year deviates from this average value, $\sigma^2_{u0} = 7.7127$, which means the average educational level of rural women varies a lot with their year of birth.

Model 3 in Table 2 is a variable-coefficient model, which means both the intercept term and regression coefficients of all variables can vary. As shown in Model 3, when the intergroup variation is not considered, the average level of education for rural women is 6.7571 years. The average for men is 1.7998 years higher than this value. The average for urban *hukou* is 1.1599 years higher. A 1-year increase in parents' education translates to an additional 0.3126 years of education for the child. When parents' occupational status increases by one point, the child receives an additional 0.0645 year of education. The variance component of model 3 shows that the influence of all factors changes from year to year (group to group). In other words, as we hypothesized, ascribed factors have a constant effect on educational attainment, but this effect varies with the year of birth (group). Because of space limitations, Table 3 does not list the deviation of each group ($U_j, j = 1924$ to 1993) but only shows the variation (σ^2_u). In the

Table 3 Multilevel logistic regression on *higher education*

	Model 1	Model 2	Model 3
	Coef. (std.error)	Coef. (std.error)	Coef. (std.error)
Intercept (γ_{00})	- 2.0297(.1109)***	- 2.7717(.1273)***	- 2.7697(.1282)***
Male (γ_{10})		.4324 (.0344)***	.5438 (.0489)***
Urban (γ_{20})		.5720 (.0366)***	.4813 (.0528)***
Fmedu (γ_{30})		.1557 (.0052)***	.1506 (.0067)***
Fmisei (γ_{40})		.0354 (.0015)***	.0372 (.0019)***
	Variance component	Variance component	Variance component
Intercept (σ^2_{u0})	.8037***	1.0180***	1.0270***
Male (σ^2_{u1})			7.108e-02***
Urban (σ^2_{u2})			8.291e-02***
fmedu (σ^2_{u3})			1.130e-03***
fmisei (σ^2_{u4})			3.518e-05***
Error variance (σ^2_e)	0.8655	.7856	0.7808
AIC	2787.6	22872.2	22751.1
BIC	27887.5	2293.0	22920.5
- log likelihood	13933.3	1143.0	11355.5
Individual observation	35400	35400	35400
Group observation	70	70	70

AIC Akaike information criterion, BIC Bayesian information criterion
 *** $p < 0.001$

following, to be more intuitive, we will be showing the effect of each family background factor on educational attainment for each year of the birth group with figures.

Figure 1 illustrates the yearly variation in the intercept term in Model 3 in Table 2. Based on centering the variables, the intercept term is, in fact, the change in the average educational level of rural women. As shown in Fig. 1, women born in rural areas have generally increased in their average level of education by year of birth. Model 3 shows positive coefficients for both the gender variable and the *hukou* variable. Therefore, the average educational levels of men and women in both urban and rural areas all increase with the year of birth. Supposing that people on average finish their education at the age of 20, we can infer that between the 1940s (1924 + 20 = 1944) and

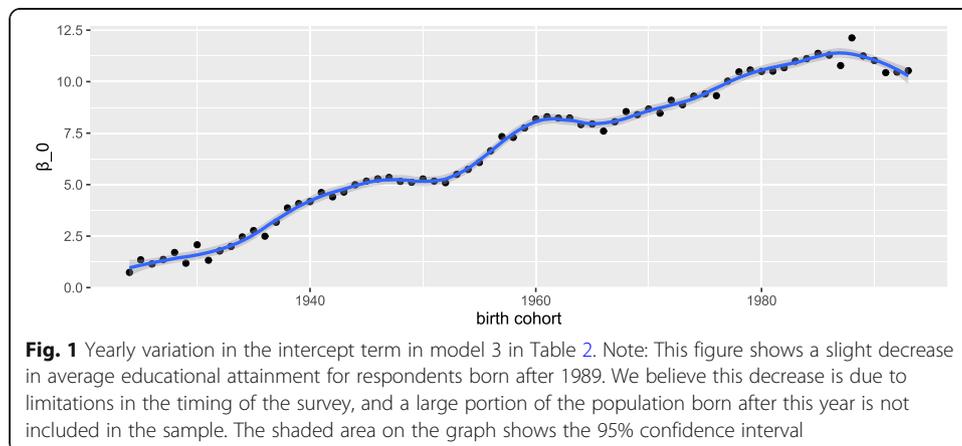


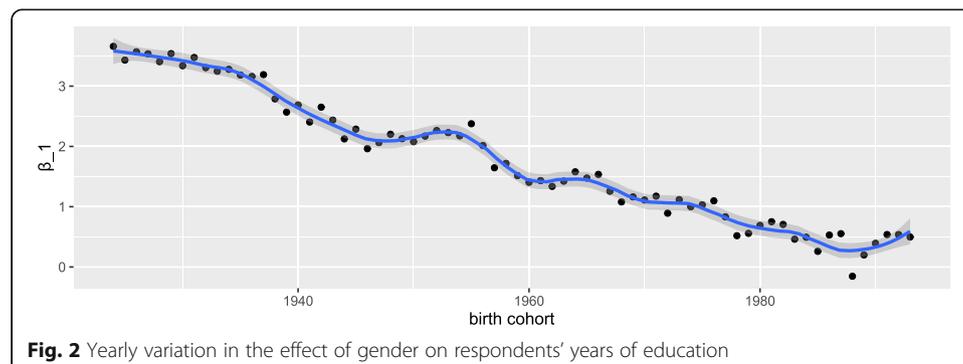
Fig. 1 Yearly variation in the intercept term in model 3 in Table 2. Note: This figure shows a slight decrease in average educational attainment for respondents born after 1989. We believe this decrease is due to limitations in the timing of the survey, and a large portion of the population born after this year is not included in the sample. The shaded area on the graph shows the 95% confidence interval

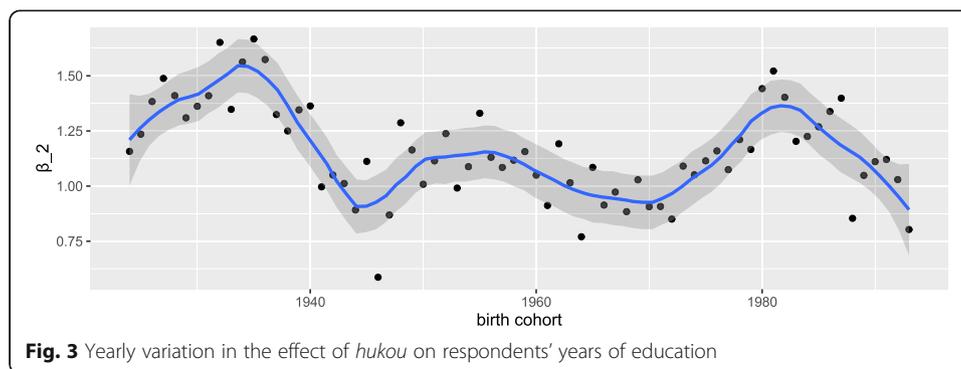
2010s (1993 + 20 = 2013), the average educational level of the Chinese population experiences a general increase. This conclusion is consistent with previous research.

However, Fig. 1 also shows the fluctuation in the average level of education by year. Such fluctuation reflects the characteristics of the impacts of *hukou* and gender on educational attainment over specific periods. For example, respondents born between 1945 and 1952 do not see an increase in the average level of education, but a small decrease. This finding might be associated with radical political and social reform that these respondents experienced when they were school age (for example, the Great Famine). Similar features are observed in the responses between 1960 and 1966. These respondents experienced the Cultural Revolution in an early stage of their educational journey and the economic reform at the end of their schooling (the economic reform brought more job opportunities for older youths).

Figure 2 shows the yearly change in the effect of gender on educational attainment. A general trend observed here shows the decline of the relative advantage that men hold over women. To be sure, this decline is not completely linear, with multiple fluctuations in this duration. Unobserved institutional or structural factors may have caused these fluctuations. Of course, some fluctuations can be explained by widely known macrosocial events. For example, the slight increase in gender inequality in education for respondents born between 1946 and 1955 may have something to do with their early-life experiences of the Great Famine and their experience of the Cultural Revolution during their school years.

Figure 3 shows the effect of *hukou* on education for respondents born in different years. Consistent with existing research, urban-rural inequality in education has always existed. However, it can be seen in Fig. 3 that the effect of *hukou* does not show a continuous downward trend with time, which is not entirely consistent with the previous research that used the reform and opening-up as a historical demarcation. For those born before 1927, the educational advantage of urban residents increased over time. For those born between 1935 and 1946, the education gap between urban and rural youth decreased perhaps because the PRC was newly established when they reached school age. Those born between the later 1940s and the 1970s experienced fluctuations in the urban-rural education gap around a slightly upward-bending trend. Finally, respondents born after the 1970s see a rise in the education gap. These results show that the urban-rural education gap has always existed since the founding of the PRC but oscillated around a relatively stable level until the late 1980s (the 1970s generation entered school at the end of the 1970s and the beginning of the 1980s and finished



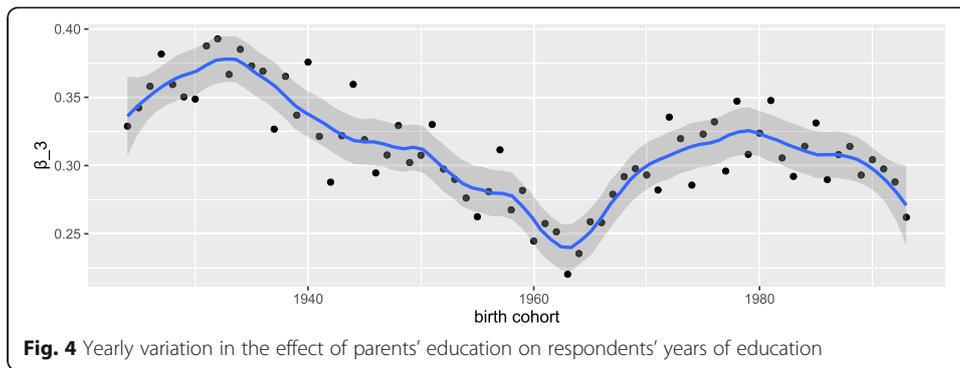


school in and after the late 1980s). The effect of *hukou* strengthens after the 1980s. This finding differs from both the egalitarian model and the liberal competitive model. The liberal competitive model is most prominent in the late 1980s, not at the beginning of the economic reform. What is noticeable is the general decrease in the urban-rural gap for those born after 1981, as shown in Fig. 3. A potential interpretation is that the urban-rural education gap measured by years of education has shrunk since the 1990s (those born after 1981 entered school at the end of the 1980s and the beginning of the 1990s and finished school in and after the late 1990s).

Figure 4 shows the effect of parents' education on respondents' education and its annual changes, and the trajectory of the change is an M-curve. The three turning points on the M-curve are 1932, 1963, and 1981. The first rise and the first decline on the M-curve are basically consistent with the findings of previous studies. That is, from the beginning of the founding of the PRC to the mid-to-late 1970s,¹⁰ the effect of parents' education on children's education gradually decreases and then begins to rise. The historical trend of the effect of parents' education conforms with the assumptions of the egalitarian and liberal competitive models. It should be noted, however, that for those born after 1981, the effect of parents' education decreases over time. This finding is not only different from the liberal competitive model but also contradicts previous studies that use the reform and opening-up as a historical dividing line. A possible explanation is that educational inequality (based on parents' level of education) measured by years of education has weakened, but as will be shown later, educational inequality measured by the quality of education has increased, which fits better into the liberal competitive model.

The effect of parents' occupational status (ISEI) and its yearly variation is presented in Fig. 5. This effect, as shown in Fig. 5, has always existed, but does not exhibit any historical stage characteristics observed by previous research (that the effect is relatively low before the economic reform and strengthens afterward). In contrast, looking at the entire 70 years, the effect of parents' occupational status on children's educational attainment shows a general decrease. To be more specific, for those born in or before 1956 (those who finished schooling in the late 1970s), the effect of their parents' occupational status on their education level fluctuates around a relatively stable level. After this period, this effect generally decreases with children's year of birth. Therefore, it can be said that since the mid-to-late 1970s, the effect of parental occupational status exhibits a general decrease, not increase. Zhou et al. (1998) also found that this effect is

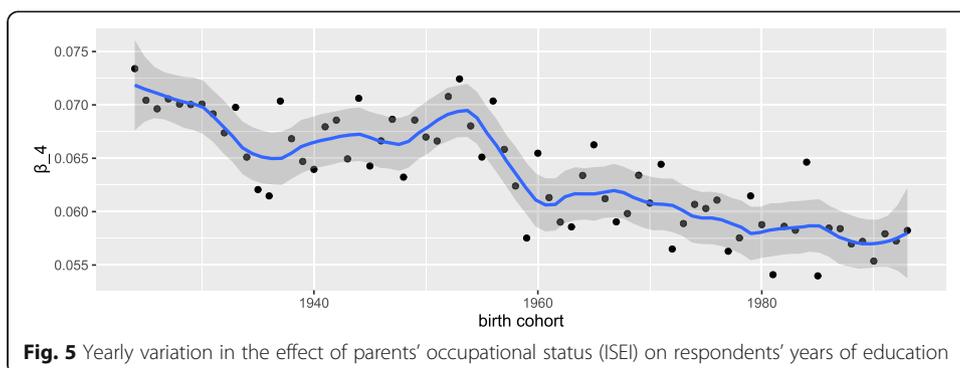
¹⁰Those born in and after 1964 finish schooling in and after the late 1970s.



insignificant in certain periods. What we find here shows the need for more in-depth future research and the need to reflect on the effectiveness of measuring Chinese occupational status by international standards. Certainly, this finding could be summarized as follows: With the development of education, educational inequality (caused by differences in parents' occupational status) measured by years of education has weakened, but if measured by the quality of education, educational inequality (caused by differences in parents' occupational status) may have increased.

The effect of ascribed factors on higher education and its historical change

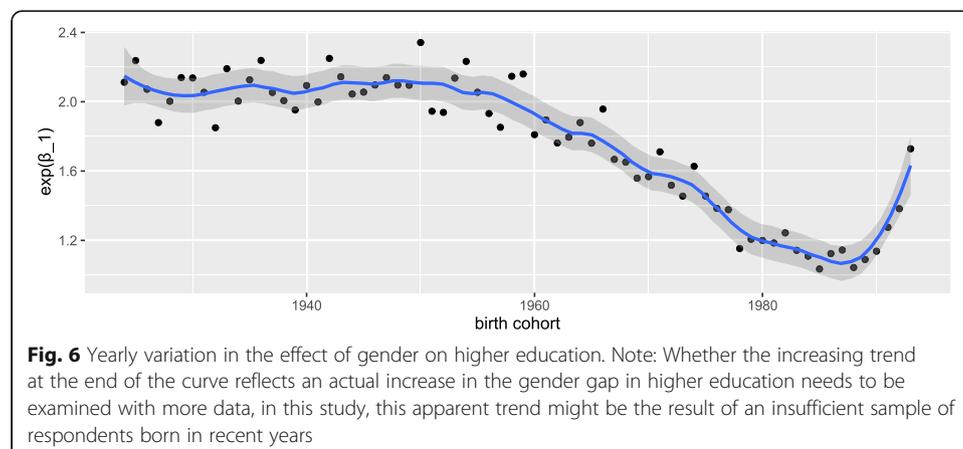
Table 3 presents the analytical results on the effect of ascribed factors on higher education. Model 1 is the null model, U_{0j} reflects the group variation in higher education, and $\sigma^2_{u0} = 0.8037$ shows that people born in different years have different chances of attending higher education. Model 2 deconstructs the intercept item, with the assumption that the effects of ascribed factors on education are fixed across years of birth. As model 2 shows, when historical variation in the effects of ascribed factors is disregarded, all of these factors have significant effects on higher education. However, variance components in model 3 illustrate the varying effects these factors have on higher education, which is consistent with our initial presumption. The γ value in model 3 reflects the average effect (in 70 years) of ascribed factors on higher education. As shown, men born between 1924 and 1993 are 1.72 times more likely than women to attend higher education ($e^{0.5438} = 1.72$). Urban *hukou* holders are 1.62 times more likely than rural *hukou* holders to attend higher education ($e^{0.4813} = 1.62$). A 1-year advantage in parents' years of

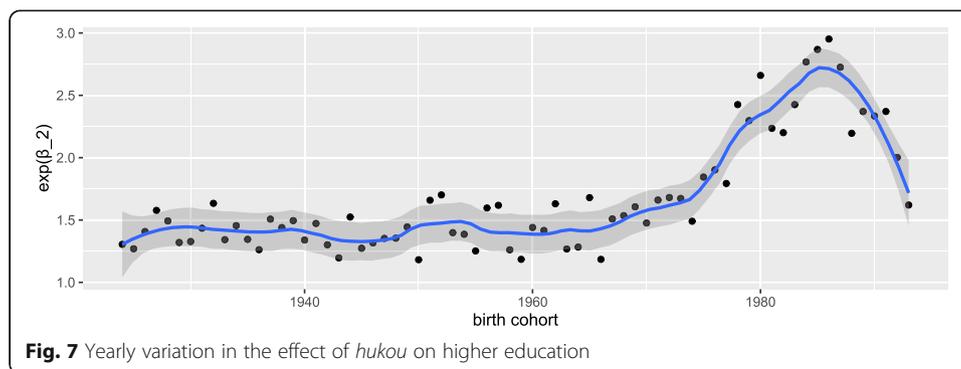


education translates to a 16% increase in children's chance of attending higher education ($e^{0.1506} = 1.16$). A one-point advantage in parents' occupation translates to a 3.8% increase in children's chance of attending higher education ($e^{0.0372} = 1.038$). The variance components in model 3 in Table 3 show the extent to which the effects of ascribed factors vary from the aforementioned average level in each year (group). Due to space limitations, Table 3 does not list the variance for every year ($U_j, j = 1924$ to 1993). Figures 6, 7, 8 and 9 intuitively illustrate yearly (group) effects of family background factors.

Figure 6 shows the effect of gender on higher education and its yearly variation. For those born between the 1920s and the 1950s, the male advantage in attending higher education has been over 1.8 times that of women. Supposing people on average finish schooling at the age of 20, then between the 1940s and the 1970s, men's chance to attend higher education is 1.8 times that of women (despite some fluctuations). In other words, even though gender inequality in education measured by years of education has been decreasing since the founding of the PRC, as shown in previous texts, gender differences in higher education have remained relatively high for quite a while. This gap has been gradually shrinking for those born in or after the mid-1950s, and almost disappeared at the end of the 1980s. In other words, the gender gap in higher education has a distinct turning point in the late 1970s, after which it gradually shrinks. This finding may have to do with the economic reform and the one-child policy, which brought more higher education opportunities for women.

Figure 7 presents the effect of *hukou* on the opportunity for higher education. The urban-rural gap in higher education has always existed and oscillated around a relatively low and stable level for those born between the 1920s and the 1960s. For school ages, this finding shows that since the founding of the PRC through the 1980s, the urban-rural gap in higher education, although always present, was quite small. However, respondents born in and after the late 1960s saw rapid increases in the urban-rural gap, with those born in the late 1980s experiencing the peak of it. In other words, the urban-rural difference in higher education started to show in the late 1980s and has been growing rapidly since 2000. The effect of *hukou* status on higher education has changed from the socialist egalitarian model to the liberal competitive model. Nevertheless, different from the conclusions of the existing research, the turning point occurs in the late 1980s, not the reform and opening-up at the end of the 1970s or the





higher education expansion period in the mid-1990s. Besides, it is worth noticing that respondents born at the end of the 1980s (who gradually entered higher education after 2000) have seen a decrease in the urban-rural gap in higher education, which may have to do with the higher education expansion starting at the end of the 1990s.

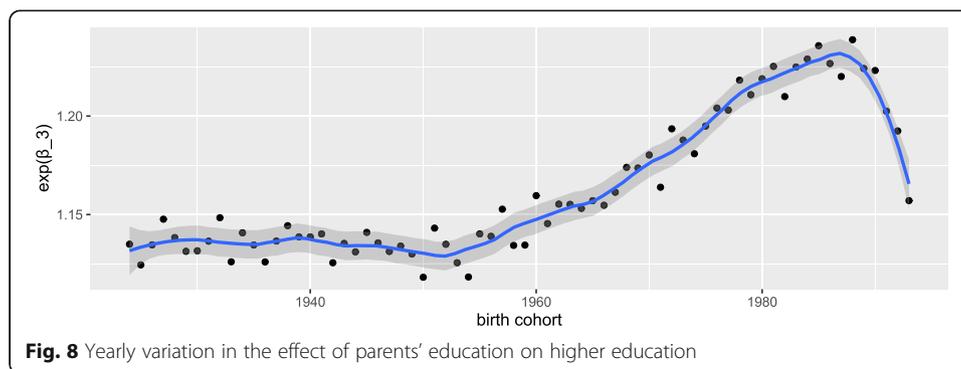
The effect of parents' education on children's higher education and its variation are shown in Fig. 8. This effect has always existed, but for those born before the end of the 1950s, it was relatively stable with small fluctuations. However, for those born after the end of the 1950s, parents' education has had increasing importance in children's higher education. In other words, since the end of the 1970s, the effect of parents' education has increased, which is consistent with the assumptions of a transformation from the egalitarian model to the liberal competitive model, and the turning point is also generally consistent with previous research. It is worth noticing that, as shown in Fig. 8, for those born after 1990, this effect seems to be weakening. This finding might be caused by higher education expansion at the end of the 1990s, which has increased the chance of attaining higher education for people of all classes.¹¹

As for the effect of parents' occupation on children's higher education and its variation, Fig. 9 shows no consistent pattern of change by year (group), or any significant historical stages corresponding to the reform and opening-up at the end of 1970s or higher education expansion in the late 1990s. Instead, repeated fluctuations are exhibited. Roughly five stages are present in this process, Up-Down-Up-Down-Up, with oscillations between successive years. A close observation shows that for those born in the late 1960s and at the beginning of the 1970s, the effect of parents' occupation on higher education is relatively low. Afterward, however, the effect generally increases. In other words, in the late 1980s, the effect of parents' occupation on higher education decreases to its lowest point and then increases again with fluctuations.

Conclusion and discussion

This article examines the effects of ascribed factors on educational attainment and its historical changes in China. The analysis covers 70 birth cohorts born between 1924 and 1993. If we suppose that people, on average, finish schooling at the age of 20, this research covers the educational attainment process for Chinese people during the 70 years since the 1940s. The result shows that ascribed factors have consistent effects on

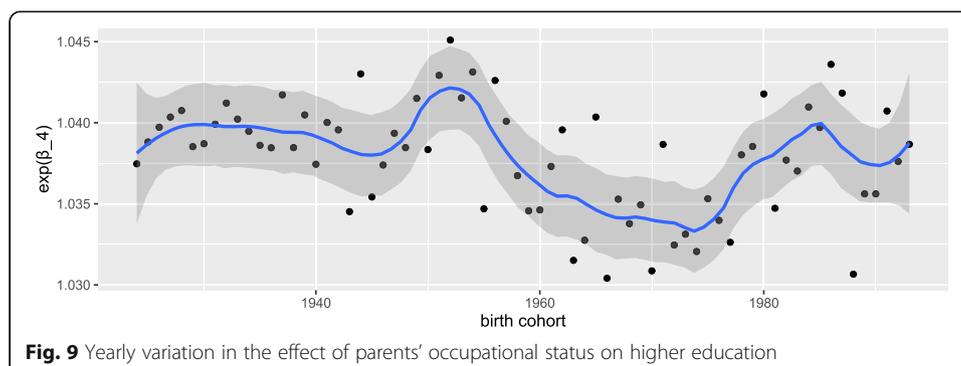
¹¹To be sure, this change could be caused by insufficient sample coverage after 1990. Further research is needed to examine this question in detail.



educational attainment for every generation of people born since the 1920s. However, the effects of these factors on educational attainment are not fixed, even in a relatively short historical period. This study partly supports the HSH assumption made in previous research. That is, the effects of ascribed factors on educational attainment show specific characteristics of the historical stage (for example, the historical stages of the Cultural Revolution, the reform and opening-up, and the higher education expansion as critical events). Additionally, our analysis captures some historical changes in educational inequality that are different from the HSH assumption made in previous research and provides new findings for the MSH. Specifically, we make four major findings.

First, we find that gender inequality in education decreases in general. From the late 1970s, the gender difference in higher education has turned, which is generally consistent with existing research—the gender difference in higher education results from the significant effects of the historical stage. However, before the turning point in the late 1970s, the gender gap had remained at a relatively high level. In addition, the weakening of the gender gap in education is not completely linear, with certain historical periods seeing a plateau or even a slight increase in the gender gap. This finding might be related to macrosocial events (such as the Great Famine and the Cultural Revolution).

Second, regarding the effect of *hukou* on education, we do not see consistent patterns of change corresponding to time. For quite a while after the founding of the PRC, the urban-rural education gap has been fluctuating around a relatively stable level. Since the late 1980s (rather than since the reform and opening-up), the effect of *hukou* has been decreasing after a short period of increase. The trend after the late 1980s may be



explained by the liberal competitive model, i.e., that competition exacerbates educational inequality. This inequality is suppressed by education expansion. Since the founding of the PRC through the mid-1980s, the urban-rural higher education gap had existed at a relatively low level, and it grew rapidly afterward. This process generally fits well with the transition from the egalitarian model to the liberal competitive model. Different from existing research, however, is that this turning point occurs in the late 1980s, not at the beginning of the economic reform in the late 1970s or the higher education expansion in the 1990s.

Third, the effect of parents' education on children's educational attainment changes with time in an M-shaped pattern. This process is consistent with the transition from the egalitarian model to the liberal competitive model. However, the trend after the 1990s contradicts the liberal competitive model and the observations that use the reform and opening-up as the juncture for staging. A possible explanation is that educational inequality (based on parents' level of education) measured by years of education has weakened since the 1990s, but if measured by the quality of education, educational inequality may have increased, fitting better into the liberal competitive model. The effect of parents' education on higher education has been constant, but it strengthens rapidly since the end of the 1970s, i.e., at the beginning of the economic reform.

Fourth, the effect of parents' occupational status (ISEI) on children's education does not have a coherent pattern of change or any specific characteristics of historical stages. The general trend of its historical development can be summarized as "oscillating around a high level-drop-oscillate around a low level." Looking at the entire 70 years, parents' occupational status generally decreases with the year of birth if we ignore fluctuations in between. No significant upward trend is found after the reform and opening-up. The effect of parents' occupational status on children's higher education attendance is also inconsistent. Ever since the end of the 1980s, a general increase is observed, which, to a certain extent, is consistent with the assumption of the liberal competitive model.

As stated in previous texts, we categorize existing research as either MSH (a hypothesis about the transition from the egalitarian model to the liberal competitive model) or HSH (a critical event "historical stage" hypothesis). The two hypotheses have the same logical starting point. That is, macrolevel institutional and structural changes shape the generative process of microlevel inequality. This study takes the same assumption. With that assumption, the effects of ascribed factors on individual educational attainment are not fixed but vary with changing circumstances in institutions and social structures. An investigation into the historical changes of effects of ascribed factors shows that the MSH has but limited value. The effects of different ascribed factors do not completely show the characteristics of model transition throughout history. Historical fluctuation and complications are important parts of the process.

In addition, this article shows that changes in micro-mechanisms that generate educational inequality can, to an extent, be explained by critical social events and transformations and certain institutional and structural circumstances characteristic to certain historical periods. Different from HSH, this article does not manually divide history into multiple stages. Instead, we use the year as the analytical unit to examine how the effects of ascribed factors change with time. By doing so, we seek to avoid inappropriate theoretical assumptions and potentially mistakenly constructed facts.

This study illustrates significant characteristics of “critical event historical stages” for the effects of certain ascribed factors on education (which further speaks to the influence of macroinstitutional and policy processes on the micro-mechanisms that generate inequality). In conclusion, this study reveals the need for further, more in-depth reexaminations of the effects of critical events on educational inequality. It also demonstrates the possibility that structural factors previously ignored may also work to generate social inequality.

Finally, we must admit that the effects of ascribed factors on educational inequality presented in this study need further examination with new data. For example, the decrease in the effect of parents’ education has two alternative explanations. First, as previously stated, due to the limitations of the timing of data collection, this study meets the problem of insufficient sample size for those born after 1993. Second, higher education expansion may have increased the educational opportunities for children from all kinds of families and thereby curbs educational inequality measured by years of education. However, as some studies have already noticed, the gap in quality of education (such as high-quality higher education) has become a new form of expression of educational inequality (Wang 2013; Wu 2016; Ye and Ding 2015).

Abbreviations

CGSS: China General Social Survey; HSH: Historical stages hypothesis; MSH: Model-shift hypothesis; PRC: The People’s Republic of China

Acknowledgments

N/A

Authors’ contributions

Changchun Fang conducted statistic analyzing and wrote the manuscript. Xiaotian Feng revised the manuscript, and both of them were responsible for the design of the study. Both authors read and approved the final manuscript.

Funding

The authors declare no founding support.

Availability of data and materials

We used CGSS data for 2003, 2005, 2006, 2008, 2010, and 2012, which can be accessed at <http://cgss.ruc.edu.cn>.

Competing interests

The authors declare they have no competing interests.

Received: 15 July 2020 Accepted: 3 September 2020

Published online: 23 October 2020

References

- Bauer, J., W. Feng, N.E. Riley, and Z. Xiaohua. 1992. Gender inequality in urban China: education and employment. *Modern China* 18 (3): 333–370.
- Blau, P.M., and O.D. Duncan. 1967. *The American occupational structure*. New York: Wiley.
- Bourdieu, Pierre, and Jean-Claude Passeron. 1977. *Reproduction in education, society and culture*. London: Sage.
- Buchmann, C., and E. Hannum. 2001. Education and stratification in developing countries: a review of theories and research. *Annual Review of Sociology* 27 (1): 77–102.
- Coleman, J.S., E.Q. Campbell, C.J. Hobson, J. McPartland, A.M. Mood, F.D. Weinfeld, and R.L. York. 1966. *Equality of educational opportunity*. National Center for Educational Statistics (DHEW), Report Number: OE-38001.
- Deng, Z., and Donald J. Treiman. 1997. The impact of the cultural revolution on trends in educational attainment in the People’s Republic of China. *American Journal of Sociology* 103 (2): 391–428.
- Gao, Yong. 2008. An investigation of educational inequality in urban China. *Academic Research* 4: 64–70 [In Chinese].
- Gelman, A., and J. Hill. 2007. *Data analysis using regression and multilevel/hierarchical models*. UK Cambridge: Cambridge University Press.
- Hannum, E. 1999. Political change and the urban-rural gap in basic education in China, 1949–1990. *Comparative Education Review* 43 (2): 193–211.
- Hao, Dahai. 2007. A study of educational disparity in urban China (1949–2003). *Social Sciences in China* 6: 94–107 [In Chinese].
- Heyneman, S.P. 1976. Influences on academic achievement: a comparison of results from Uganda and more industrialized societies. *Sociology of Education* 49 (3): 200–211.
- Heyneman, S.P., and W.A. Loxley. 1983. The effect of primary-school quality on academic achievement across twenty-nine high- and low-income countries. *American Journal of Sociology* 88 (6): 1162–1194.

- Hou, Liming. 2015. The relative risk aversion or the credential decline aversion? A reconsideration of the generation mechanism of China's educational inequality (1978–2006). *Sociological Studies* 2: 192–213 [In Chinese].
- Li, Wenli. 2007. Family background, financial constraints and higher education attendance in China. *Economics of Education Review* 26 (6): 724–734.
- Li, Yu. 2006. Institutional change and educational inequality: mechanisms in educational stratification in urban China (1966–2003). *Social Sciences in China* 6: 97–109 [In Chinese].
- Liang, Chen, James Lee, Hao Zhang, L.I. Lan, Yuan Dangqing, Kang Wenlin, and Shanghua Yang. 2012. A silent revolution: research on family backgrounds of students of Peking University and Soochow University (1952–2002). *Social Sciences in China* 1: 91–118 [In Chinese].
- Liu, Jingming. 1999. The influence of the Cultural Revolution on the admission model. *Sociological Studies* 6 (19): 36 [In Chinese].
- Lucas, S.R. 2001. Effectively maintained inequality: education transitions, track mobility, and social background effects. *American Journal of Sociology* 106 (6): 1642–1690.
- Peaker, G.F. 1971. *The Plowden Children Four Years Later*. London: National Foundation for Educational Research in England and Wales.
- Raftery, A.E., and Michael Hout. 1993. Maximally maintained inequality: expansion, reform, and opportunity in Irish education, 1921–75. *Sociology of Education* 66 (1): 41–62.
- Tsang, M.C. 2000. Education and national development in China since 1949: oscillating policies and enduring dilemmas. *China Review* 2000: 579–618.
- Wang, Weiyi. 2013. Analyzing class differences on obtaining high-quality resources in higher education from 1982 to 2010—based on the empirical survey in 7 key universities in China. *Educational Research* 402 (7): 61–67 [In Chinese].
- Wu, Xiaogang. 2010. Economic transition, school expansion and educational inequality in China, 1990–2000. *Research in Social Stratification and Mobility* 28 (1): 91–108.
- Wu, Xiaogang. 2011. The household registration system and rural-urban educational inequality in contemporary China. *Chinese Sociological Review* 44 (2): 31–51.
- Wu, Xiaogang. 2016. Higher education, elite formation and social stratification in contemporary China. *Chinese Journal of Sociology* 36 (3): 1–31 [In Chinese].
- Wu, Yuxiao. 2012. Gender gap in educational attainment in urban and rural China. *Chinese Journal of Sociology* 32 (4): 112–137 [In Chinese].
- Wu, Yuxiao. 2013. The keypoint school system, tracking, and educational stratification in China, 1978–2008. *Sociological Studies* 4: 179–202 [In Chinese].
- Ye, Hua, and Xiaogang Wu. 2011. Fertility decline and the trend in educational gender inequality in China. *Sociological Studies* 5: 153–117 [In Chinese].
- Ye, Xiaoyang, and Yanqing Ding. 2015. Expanding Chinese higher education: quality and social stratification. *Chinese Journal of Sociology* 35 (3): 193–220 [In Chinese].
- Zhou, X., P. Moen, and N.B. Tuma. 1998. Educational stratification in urban China: 1949–94. *Sociology of Education* 71 (3): 199–222.

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