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The expansion of higher education admissions and the gender equalization of higher education opportunity: an empirical study based on Chinese General Social Survey (CGSS2008) data

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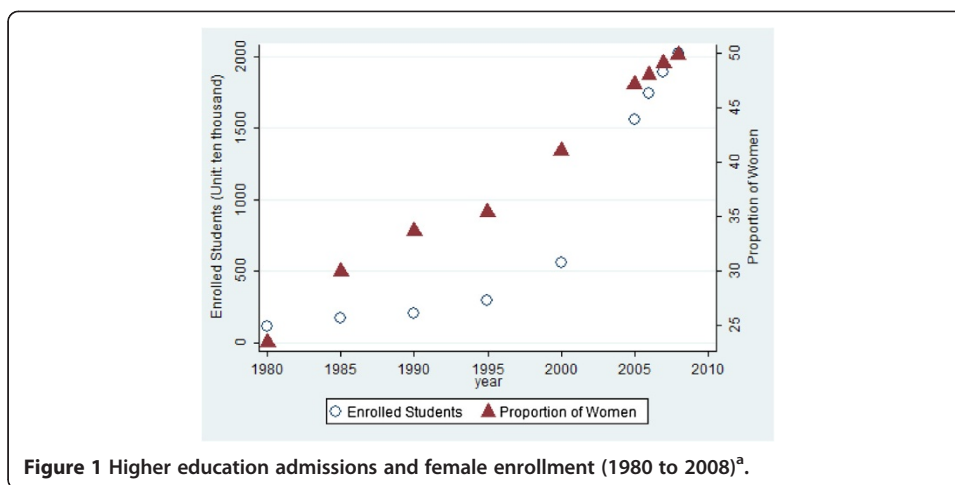
Abstract

After the expansion of higher education admissions (hereafter 'The Expansion') beginning in 1999, the distribution of higher education opportunities has gradually become equalized between genders. Utilizing data from the Chinese General Social Survey (CGSS 2008), this study investigates 'how the expansion of college admission induced gender equality in higher education opportunities.' By focusing on how newly emerging educational opportunities are allocated between genders, this study also seeks to identify the factors that contribute most to gender equalization. The results suggest that, overall, The Expansion modified the opportunity structure between genders. Two major changes that occurred are as follows: first, women whose parents are at the middle education level (the 'sublow cultural level' group) received more opportunities to receive higher education, thus contributing to gender equality; second, due to The Expansion, women from rural areas are less disadvantaged in obtaining higher educational opportunity, and the difference in distribution between genders is thus reduced. Compared with the trend before the expansion of higher education admissions, the process of gender equality has moved from groups with a higher parental educational level to groups with a lower parental educational level, and from urban to rural areas.

Keywords: The Expansion; Higher education opportunity; Gender equality; Logit model

Background

Between the restoration of the College Entrance Exam (*Gaokao*) in 1978 and the expansion of higher education admissions in 1999 (hereafter 'The Expansion'), the scale of Chinese higher education remained relatively stable with slight growth. During this period, not only was admission to higher education extremely limited, but the structure of higher education was also obviously imbalanced between genders. Although the proportion of female students constantly increased over the years from 1978 to 1999, the figure never reached 40% (see Figure 1). However, since the implementation of The Expansion in 1999, the situation has changed radically. Figure 1 shows that the gender structure has undergone a significant change, with female enrollment at around 50% in 2010. At the same time, the opportunity gap in receiving



higher education between men and women also decreased to such a degree that it can be disregarded (Hao 2010, p. 59; Liu 2006). In this sense, women were the primary beneficiaries of The Expansion (Jin 2006; An 2002; Yang 2009). The substantial and sustained increase of resources as a whole provided more opportunities for women, thus making gender equality in the field of higher education a reality.

However, sociological insights require us to do more than observe the absolute scale of higher education and the change of gender structure after The Expansion, or establish a direct causal relationship between The Expansion and gender equality in enrollments simply because of the conditions aforementioned. The Expansion and gender equality in educational opportunity are two mutually independent processes; the former does not necessarily lead to the latter (Mare 1980; Wu 2009). In theory, without specific institutional bias, the new educational opportunities from the expanding scale of higher education are not necessarily beneficial to the female population. In other words, the link between The Expansion and gender equality in opportunity still calls for further investigation, namely how The Expansion leads to this equality. Specifically, how are the new educational opportunities, which are leading to a higher degree of gender equality, allocated between genders after The Expansion? What are the factors that contribute most to the gender equality process?

Gender equality issues in higher education depend directly on the allocation of educational opportunities. Previous studies on higher education opportunity focus on three important factors. The first is the expansion of the scale of higher education. This increases the total amount of educational resources, bringing more opportunities to be distributed and thus changing the existing distribution structure and equality of status. Second is family background, especially families' socioeconomic conditions and parental educational level, which are considered to be the most crucial factors that restrict access to higher education. Third is the factor with the strongest Chinese characteristics, the household registration system. The policies of 'Different Ruling Systems in Cities and the Countryside' and 'One Country, Two Policies' contain in themselves or directly influence the unequal distribution of educational opportunities. Many research works in sociology and sociology of education have focused on these three factors and

their relation to the equality of educational opportunity. The findings have formed three fields of discussion on higher education opportunity, and many studies fall into these three frameworks.

The expansion of education and educational opportunity

Whether in industrialized countries or those still in progress, more and better education determines whether people rise to the top of the social hierarchy (Deng and Treiman 1997). In a study on status attainment patterns and intergenerational mobility, Blau and Duncan (1967) used empirical data to test this correlation and confirmed that education significantly influences both an individual's initial and present occupation. Chinese scholars used China's local data to refit the model and found the impact of education on initial jobs to be strikingly consistent in both China and the USA (Bian et al. 2006). In other words, higher education largely determines the socioeconomic status of individuals and improves social structure as well. Therefore, after World War II, many countries implemented expanding policies to increase their citizens' opportunities to receive higher education. The policies' design can popularize higher education and, to a certain extent, decrease the effect of external factors, such as socioeconomic conditions, on restraining access to higher education while expanding the impact of personal endeavor, talent, and so on.

Nevertheless, these policies' intended effects are rarely supported by empirical evidence; the reality turns out to be precisely the opposite. In many industrialized countries, with the expansion of education, the impact of family background on educational opportunity is not reduced but remains at the original pace. In a study comparing 13 countries, Shavit and Blossfeld (1993) found that in most countries, despite the effort put into expanding higher education, equality of educational opportunity was not promoted but in fact the gap in enrollments between the dominant and nondominant class widened. Many Chinese scholars also found that the process of expansion expanded the dominant class' comparative advantage in higher education (Liu 2006). For example, Yu Li's study found that the managing stratum increased their advantages while the advantages of other nonlabor classes remained unchanged (Li 2006). Xiaogang Wu's studies showed that in 2000, the relative educational opportunity for disadvantaged groups was less than a decade ago (Wu 2009). In this sense, the expansion of higher education did not have an obvious impact on achieving equality as expected.

The above studies reveal a special relationship between the expansion of education and educational opportunity. They also reflect the paradox between the intention of policies and the actual results. This phenomenon has been dubbed the 'Maximally Maintained Inequality Hypothesis' (abbreviated as 'MMI Hypothesis'), indicating that an increase in educational opportunity will always benefit the dominant class first rather than the nondominant class; only after the fulfillment of the dominant class' educational needs at a particular stage will educational opportunities flow to the nondominant class (Raftery and Hout 1993). Using the MMI Hypothesis, Chinese scholars have focused mainly on explaining the distribution of opportunity when investigating the impact of The Expansion, e.g., (Liu 2004, 2005, 2006; Li 2006; Wu 2009; Hao 2010). Dahai Hao used data from CGSS2003 to examine the educational conversion ratio at various educational stages between 1949 and 2003. The results showed that China

already reflects the characteristics of the MMI Hypothesis: in high school and college, the dominant class has a stable advantage, while compensatory policy targeting the middle and lower classes has not achieved satisfactory results (Hao 2010, p. 64). Using the same data, Yu Li found that since 1992, the effect of family educational background on years of education is on the decline, but educational inequality due to class division is on the rise. This is in line with the MMI Hypothesis and even exceeds its expectations (Li 2006). Jingming Liu's study found that the influence of parental class on their children's schooling opportunities showed an opposite change: in survival-level education, the offspring of the dominant class experienced a clear decrease in comparative advantage, while for education leading to a rise in status, the relative advantage of the dominant class displayed an upward trend (Liu 2006).

Family background and educational opportunity

The family incorporates economic, cultural, and social capital in one unit and controls for the total capital. Its ability and intention to invest in education significantly influences the children's educational opportunities. Specifically, families from the dominant class can use their dominant position to gain more educational opportunities and are also able to make use of their own capital to compete for various types of high-quality educational resources. Thus, the hierarchy of capital advantage can transform into educational advantage for the next generation. For those families from the nondominant class, many obstacles to educational opportunities exist. Ascribed family background can thus be transmitted across generations. Bourdieu found that the sons of senior staff have a much better opportunity to enter college compared with those of agricultural and skilled workers (Bourdieu and Passeron 2002, p. 6). A more specific study in China shows that if the father's monthly income is higher than 2,000 RMB (about 330 USD), his children will have a better chance of entering a university or college for further study (Li 2010). Specifically, two paths are shown to transfer family background into educational opportunity: the 'Resource Conversion Mode' and the 'Cultural Reproduction Mode' (Li 2006).

The Resource Conversion Mode refers to the point at which, while transferring the family's social economic capital into educational opportunities for their children, two exclusion mechanisms (direct exclusion and indirect exclusion) are imbedded in the process, leading to the intergenerational transmission of class inequality in the field of education. The first exclusion mechanism is the educational investment capacity of families. A strong economic background allows children from the higher class who are not able to fulfill admission requirements to access the next level of education or better educational environment by paying 'sponsor fees' or other means. Children from lower class backgrounds are thus excluded from formal education due to inability to pay tuition and sponsor fees (Li 2006). A study of ten cities in China showed a strong disparity across different classes where educational cost occupies a distinctively different proportion of income: an urban manual worker can barely afford one child's college education, whereas a manager can afford that of three (Liu 2005, pp. 237-238). The second exclusion mechanism is the family's intention to provide further education for their children. In considering the investment and reward of education, some individuals may voluntarily withdraw from academic competition (Li 2006). Willis found that in a boys' school in Britain, working-class boys tended to give up on study and voluntarily engage in manual work. Selling their labor in nontechnical work is an

easy way to support their families (Hao 2010, p. 42). In the USA, a tuition fluctuation of 10% will affect 6.2% of students in deciding whether to continue their education by entering college (Cheng 2002, p. 123).

The Cultural Reproduction Mode refers to the influence of families' cultural capital on their children's learning motivation, interest, and performance at school, all of which determines the ability to acquire educational opportunity (Li 2006). People from different cultural backgrounds inherit different quantities and types of cultural capital. Just as with economic capital, it is able to create, nurture, and be passed on to the next generation and has a cumulative impact on education as well as socialization, thus affecting the obtaining of socioeconomic status and opportunities for upward mobility (Li and Lv 2008, pp. 193-194). As the Coleman Report and the Plowden Report pointed out, 'it is not the quality of the school but the child's social background that has a more significant impact on their academic achievement' (Liu 2005, p. 43). Many scholars empirically confirm this transformation by measuring specific social capital indicators of families (Blau and Duncan 1967; Hao 2010).

Urban-rural differences and educational opportunity

The split between urban and rural areas due to the urban and rural household registration systems profoundly impacts the inequality in China. The urban-rural gap in higher education opportunity is an important manifestation of this inequality. This gap has drawn great concern in both politics and academia. Numerous studies (Zhao 2000; Yang 2006; Wang 2011; Liu 2005; Qiao 2008; Li 2010) have found that since The Reform and Opening Up, whether after the restoration of the College Entrance Exam or The Expansion in 1999, the gap in higher education opportunity between urban and rural areas did not improve and even deteriorated. For example, the declining proportion of rural students seriously worsened (Cao 2012). Using 1% of the 2005 census data, Chunling Li found that the urban population born in the period 1975 to 1979 had a 3.4 times higher chance of getting into college compared to its rural counterpart, while the urban population born in the period 1980 to 1985 had a 5.5 times higher chance (Li 2010). Another longitudinal study on educational inequality trends between 1981 and 2006 found that inequality between urban and rural areas in educational opportunity increased by 33.6% after The Expansion (Guo 2008). More importantly, this urban-rural gap is not a regional but a national trend across China. Even in developed regions like Shanghai, Beijing, and Jiangsu, the gap between urban and rural years of education is approximately 2 years, while in underdeveloped regions like Guangxi, Guizhou, and Shaanxi, the gap was between 3 and 4 years of difference. In higher education, this difference in years of education results in an extremely disproportionate ratio between urban and rural college students in the total population. Data show that 8.5% of the total urban population has a college degree or above, while in rural areas, this proportion is only 0.6% (Zhang and Wu 2008, p.88).

Another trend in inequality of opportunities is the more significant urban-rural gap in high-quality higher education. Inequality in status-oriented higher education (mainly college and graduate studies) exhibits a wider gap than survival-based higher education (mainly adult education and junior college education). The coefficient of the former is 0.752, while that of the latter is 0.566 (Liu 2005, p. 269). Chunling Li further found that the urban-rural gap in college education is greater than in junior college education.

Moreover, after The Expansion, this gap widened more in college education than in junior college education. The opportunity for urban residents to receive junior college education is 4.9 times higher than rural residents and 6.3 times higher for college education (Li 2010). In order to get the same quality of education, students from rural areas need to make much more effort than urban students (e.g., spending one or several more years in high school) (Wang 2011). Generally speaking, the higher the quality of educational resources, the larger the urban-rural gap in distribution of opportunity. Data show that the proportion of rural students enrolled in key national universities has reached a record low. In recent years, the proportion of rural students admitted into Peking University, Tsinghua University, and other prestigious universities is less than 20%; there has clearly been a serious setback compared with the 1980s (Cao 2012; Qiao 2008).

Continuous study of the three factors that influence higher education opportunity laid the foundation for further investigation into the inequality in higher education in China. However, simply applying the above findings to interpreting the distribution of higher education opportunity between genders and its equalization process produces a series of new questions, such as why didn't the advantaged and disadvantaged status of men and women prior to The Expansion remain unchanged, and whether gender differences exist in the Resource Conversion Mode and Cultural Reproduction Mode. If differences do exist, what are their specific manifestations? Did they change over the course of The Expansion? Also, does the urban-rural gap have different implications for the two genders? These new questions do not imply that previous studies on higher education opportunity neglected the issue of gender. In fact, issues related to gender differences have always been one of the important concerns in almost every research work (Liu 2004; Li 2006; Zheng and Li 2009; Wu 2009; Hao 2010; Lu 2004; Li 2009; Ye and Wu 2011; Wu 2012), but most of the studies treated gender analytically and methodologically as an independent variable in the distribution process. Thus, gender distribution is often presented as an independent aspect of educational opportunity distribution, and these works lack interactive analysis between gender and factors such as The Expansion, family background, and urban and rural differences.^b That is, there is a lack of specialized study on gender distribution of higher education opportunity that incorporates a variety of dimensions.

Treating the gender gap as an independent aspect of the distribution of educational opportunity is obviously inadequate. Gender affects the aforementioned factors, and men and women are influenced by these factors differently (Li 2009; Wu 2012; Ye and Wu 2011). This requires further investigation on how different factors influence gender distribution respectively as well as how they influenced the equalization process after The Expansion. By looking at the interactive effect between gender and other factorial variables, this study investigates whether factors that influence the distribution of educational opportunities have a significantly different impact on men and women. In this study, gender interacts specifically with family economic conditions, parental educational level, household registration type, and other factors and compares how educational opportunities distribute between genders prior to and after The Expansion^c. This comparison identifies the factors that contribute most to the gender equality process.

The first interaction term is family economic conditions and gender (i.e., family economic conditions \times gender). This interaction term analyzes how family economic conditions influence gender distribution of educational opportunities differently between men and women. Numerous studies have demonstrated the positive correlation between family economic conditions and higher education opportunity (Liu 2000, 2004, 2005, 2006; Li 2006; Wu 2009; Ye and Wu 2011; Li 2005, 2010). Better economic conditions can lead to greater ability to support children's education and gaining greater opportunity in higher education for the children; if the converse situation, the opportunity is smaller. After the restoration of the College Entrance Exam in 1977, women's opportunities to access higher education have long been lower than those of men. Interacting gender with family economic conditions may introduce new influence from economic disparity or expand the existing inequality. Better family economic condition can decrease the number of students forced to give up further studies due to the cost of education. This is undoubtedly beneficial for girls, who are traditionally disadvantaged in this distribution. When the economic conditions become restrictive, the patriarchal tradition tends to sacrifice girls' opportunities for higher education, leading to their early entry into the labor market. Thus, *Hypothesis 1: The gender gap in higher education opportunity negatively correlates with family economic conditions. In particular, groups from families with better economic conditions face a narrower gender gap than those from families with poorer economic conditions.*

The second interaction term is parental educational level and gender (i.e., parental educational level \times gender). This interaction term analyzes how parental educational level influences gender distribution of educational opportunities differently between men and women. The Cultural Reproduction Mode has noted that the higher the educational level of parents, the greater the opportunity for children to receive higher education, and if the converse, the opportunity is lower. Introducing gender into the question can investigate whether parents' educational level has a different impact on men and women in accessing higher education. Typically, the higher the parents' education level, the more likely they will accept the ideology of gender equality and the gender gap in educational investment will be smaller; the lower the parents' educational level, the more likely they will accept the patriarchal concept, which will reduce women's opportunity in higher education. Thus, *Hypothesis 2: The gender gap in higher education opportunity negatively correlates with parents' educational level; in particular, people with parents who have a higher educational level have a smaller gender gap than those with parents who have a lower educational level.*

The third interaction term is differences between urban and rural and gender (i.e., urban-rural differences \times gender). The purpose of creating this interaction term is to analyze how urban-rural differences influence gender distribution of educational opportunities differently between men and women. According to the aforementioned discussions on urban-rural differences and educational opportunity, higher education opportunity differs drastically between urban and rural areas. Adding gender into the picture will likely produce the following characteristics: rural households are disadvantaged in economic conditions, gender ideology, and educational level, and the number of children is larger than in urban households. This will obviously restrain women's access to higher education, and thus, the gender gap in higher education opportunity is relatively large. In contrast, for urban households, economic conditions, gender ideology, educational level, and the number of

children will not necessarily constrain female access to higher education; thus, the gender gap in higher education opportunity is relatively small. In other words, gender inequality is more serious in rural areas. Thus, *Hypothesis 3: The gender gap in higher education opportunity is narrower in urban areas than in rural areas.*

The three interaction terms and the corresponding research hypotheses are only the foundation for investigating The Expansion and gender equality in higher education opportunity. In order to further investigate how the new educational opportunities are allocated between genders, The Expansion needs to be introduced as a variable as well. To be specific, three interaction terms need to be viewed separately prior to and after The Expansion in different regression models. By comparing them, it will be possible to observe whether the impacts from the three interaction terms changed due to The Expansion. In other words, what changed after The Expansion in the influence of family economic conditions, parents' educational level, and urban-rural differences on gender distribution of higher education opportunity? According to hypotheses 1, 2, and 3, the gender gap in higher education is already relatively small for advantaged groups; it is more important to track the change in disadvantaged groups. Thus, it is more important to observe the gender gap change in groups with lower economic conditions, lower parental educational level, and living in rural areas prior to and after The Expansion, and determine whether it is the fact that women in these groups become the beneficiaries that contributes to the gender equalization process in higher education. We therefore propose the following:

Hypothesis 4: After The Expansion, the gender gap in higher education opportunity narrowed more in groups with lower family economic conditions.

Hypothesis 5: After The Expansion, the gender gap in higher education opportunity narrowed more in groups with lower parents' educational level.

Hypothesis 6: After The Expansion, the gender gap in higher education opportunity narrowed more in rural areas than urban areas.

Methods

The data are drawn from the Chinese General Social Survey (CGSS2008),^d collected by the China Survey and Data Center at Renmin University of China from cities and rural areas of 28 provinces nationwide. The specific models were run by statistical software Stata11.0.

Before running the model, we cleaned up the data by excluding 'worker-peasant-soldier students (WPSS)' who entered higher education through 'recommendations' or 'political pass' during the Cultural Revolution; only those who were admitted by taking the college entrance exam after the Cultural Revolution were retained. If we had included the former group, they could influence the results due to other related political factors. We set 1978^e as the starting point and calculated year of birth by eliminating 'age entering primary school' plus 'length of primary school and high school'. Between 1960 and 1970, the qualifying age for entering primary school in some regions had changed from 7 to 6 years old (Hao 2010). There were two lengths of schooling during the Cultural Revolution: 5 years of primary school, 3 years of junior high, and 2 years of senior high, totaling 10 years; 5 years of primary school, 2 years of junior high, and 2 years of senior high, or 5 years of primary school and 4 years of high school, both totaling 9 years (Liu 1991). In order to eliminate the maximum amount of WPSS, we used

6 years as the age of entering primary school and 9 years to calculate the year of birth. The result is that people born after 1963 would have to take the entrance exam to be admitted to higher education^f.

The dependent variable in this study is higher education opportunity, measured by whether respondents received higher education^g. Higher education includes continuing adult education and full-time junior college, college (undergraduate) education, graduate education, and beyond. Since the dependent variable is dichotomous (binary variable) rather than an interval variable, it violates the ordinary least square (OLS) assumptions such as homoscedasticity; if applying traditional OLS, the results would no longer be best linear unbiased estimators (BLUE). However, if given a logit link function between the dependent and independent variables, the dependent variable can be converted into a linear combination with the independent variables. This binary logit model can be expressed as follows:

$$\text{Logit}(p_i) = \log(p_i/1-p_i) = b_0 + b_1x_1 + b_2x_2 + \dots + b_ex_e + e$$

The logit model depends on maximum likelihood (ML) rather than OLS. In this model, p_i is the probability of receiving higher education for person i , x_i is the independent variable, and b_i is the coefficient, which indicates the change in dependent variable due to the change in independent variable x_i when other variables are controlled.

The independent variables in this study include respondent's gender, whether the respondent experienced The Expansion, family economic conditions, parental educational level, urban-rural differences, and their interaction terms. The measurements of the variables are as follows:

Gender: This is the key variable in this study; 1 = male and 0 = female.

The Expansion: Using the age upon entering primary school and length of schooling after 1978, it can be calculated that the first population who took the entrance exam after The Expansion was born in 1980. Thus, we treat The Expansion as a binary variable: 1 = The Expansion started when the respondent's age was 18 and 0 = The Expansion had not started when the respondent was 18.

Family economic conditions: Most studies on the stratification of education use paternal occupation when the respondent was 14 years old as the measurement. Because in CGSS2008 there are too many missing values to this question, this study uses another measurement as a substitute. It asks about the family's economic conditions at the time that the respondent was 14. Respondents could choose a number from 1 to 10 to indicate the level of their family's economic conditions.

Parental educational level: Influenced by Blau and Duncan, studies frequently use paternal educational level to measure household cultural capital. This study measures it differently: by considering both mother and father, we use the highest parental educational level (i.e., parental educational level) rather than depending solely on paternal educational level to measure this concept. Family educational background influences the next generation through parental guidance regarding educational expectations, family's educational environment, and parental guidance on homework (Li 2006). Passing down advantages via these three methods does not depend only on the educational level of the father. This is why this study uses the comparatively higher educational level from both parents to measure educational background. Parental

educational level is divided into four categories: 1 = primary school education and lower, 2 = junior high school, 3 = senior high school/technical high school,^h and 4 = junior college/college (undergraduate) and beyond.

Urban-rural differences: In CGSS2008, respondents were asked about where they lived before age 14, choosing from 'village, town, county, city, provincial capital (including Chongqing municipality), Beijing-Tianjin-Shanghai, outside of China, other.' In this study, we eliminated 'outside of China' and 'other' and created a binary variable to indicate urban-rural differences: 0 = lived in rural areas before age 14 and 1 = lived in nonrural areas before age 14, including town, county, city, provincial capital (including Chongqing), and Beijing-Tianjin-Shanghai area. Two things need to be clarified: first, rural and nonrural were not divided strictly according to household registration, but more as a division of living environment. The fast pace of urbanization is blurring the standards set by the household registration system, and quite often, the real differences do not match the systematic division. Second, though there are urban-rural differences within the Beijing-Tianjin-Shanghai area, the restrictions of the survey and the fact that this area is generally developed, especially in regard to receiving higher education opportunities, justify treating this area as nonrural as a whole.

Ethnicity: Although the number of minority ethnicities is small in this sample, this study still created a variable to control for ethnic influence on higher education in which 1 = Han ethnicity and 0 = minority ethnicity (non-Han ethnicity).

Table 1 presents the frequency distribution of independent and dependent variables (gender ratios are shown in the brackets). CGSS2008 also asked for the number of siblings; this study created 'number of respondent's siblings and gender ratio' as background data.

In order to observe the gender difference and change after The Expansion, this study compared gender trends in receiving higher education before running the models. The results are shown in Table 2.

Two obvious trends are revealed in Table 2. First, The Expansion increased the proportion of people enrolled in higher education in the general population. Prior to The Expansion, the proportion was less than 20% for both genders and increased to around 35% after The Expansion; second, this increase in proportion was faster in the female population than for males. The gender gap narrowed, which confirms our preliminary observation from the statistics yearbook. After The Expansion, the proportion of males enrolled in higher education almost doubled, increasing from 18.38% to 37.52%. The female proportion almost tripled, increasing from 12.79% to 34.71%. Gender differences in enrollment decreased from 6% to 3% compared to prior to The Expansion. This narrowing process is presented using regression models in the next section.

Results and Discussion

In accordance with the study design, this study first analyzed hypotheses 1, 2, and 3, respectively, investigating how family economic conditions, parental educational level, and urban-rural differences interact with gender in affecting access to opportunities. Table 3 displays the logit estimators of factors influencing enrollment opportunity, including a baseline model and interactive models (model 1, model 2, and model 3) that test hypotheses 1, 2, and 3.

Table 1 Descriptive statistics of variables in relation to the total sample and whether respondents experienced The Expansion

	Total sample	Did not experience The Expansion	Experienced The Expansion	Note
Did or did not receive advanced education				Binary variables
Yes	755 (1.09)	374 (1.23)	381 (0.97)	1
No	2,737 (0.81)	2,061 (0.80)	676 (0.86)	0
Gender				Binary variables
Male	1,622	1,121	501	1
Female	1,870	1,314	556	0
Residence before age 14				Binary variables
Nonrural area	1,507	952	555	1
Rural area	1,985	1,483	502	0
Economic conditions of family				Ordinal variables, ranging from 1 to 10; centered when interacted with gender variable
Minimum	-2.812	-2.812	-2.182	
Maximum	6.188	6.188	6.188	
Mean	-0.016	-0.261	0.551	
Parental educational level				Ordinal variables
Primary school or lower	1,781	1,501	280	1
Junior high school	875	520	355	2
Senior high school/ technical school	614	270	344	3
College or higher	222	144	78	4
Ethnic group				Binary variables
Han	3,231	2,255	976	1
Other minority ethnic groups	261	180	81	0
Did or did not experience The Expansion				Binary variables
Yes	1,057			1
No	2,435			0
Number of respondent's siblings and gender ratio				Background information
Only child (gender ratio)	458 (1.28)	118 (1.88)	340 (1.13)	
Two (gender ratio)	756 (1.06)	383 (1.10)	373 (1.02)	
Three (gender ratio)	866 (0.80)	651 (0.84)	215 (0.71)	
Four (gender ratio)	561 (0.75)	495 (0.77)	66 (0.65)	
Five (gender ratio)	393 (0.64)	360 (0.69)	33 (0.27)	
Six or more (gender ratio)	458 (0.74)	428 (0.75)	30 (0.58)	

The baseline model shows that all variables have significant positive associations with the dependent variable except for ethnicity. Males are 25% ($e^{0.222}-1$) more likely than females to enroll in higher education. This means that after controlling for other factors, gender inequality persists after the restoration of the college entrance examⁱ. Compared with prior to The Expansion, higher education odds almost doubled ($e^{0.683}-1$). At the same time, urban-rural differences have a strong influence on higher education

Table 2 Total amount of male and female respondents who received higher education before and after The Expansion, with percentages

	Sample distribution	Before The Expansion	After The Expansion	Total
Males	Number of respondents who received higher education	206	188	394
	Total	1,121	501	1,622
	Percentage of respondents who received higher education	18.38	37.52	24.29
Females	Number of respondents who received higher education	168	193	361
	Total	1,314	556	1,870
	Percentage of respondents who received higher education	12.79	34.71	19.30

Table 3 Logit models on the factors affecting higher education opportunity in China

Variable	Baseline model	Model 1	Model 2	Model 3
Gender	0.222** (0.092)	0.258*** (0.096)	0.828*** (0.180)	0.833*** (0.156)
The Expansion	0.683*** (0.097)	0.686*** (0.097)	0.688*** (0.098)	0.685*** (0.098)
Nonrural area	1.055*** (0.101)	1.054*** (0.101)	1.056*** (0.101)	1.545*** (0.146)
Family economic conditions	0.092*** (0.023)	0.124*** (0.0316)	0.088*** (0.023)	0.090*** (0.023)
Parental educational level (junior high school) ^a	0.822*** (0.122)	0.816*** (0.122)	1.286*** (0.182)	0.828*** (0.123)
Parental educational level (senior high school)	1.397*** (0.129)	1.394*** (0.129)	1.849*** (0.192)	1.420*** (0.129)
Parental educational level (college or higher)	1.701*** (0.170)	1.695*** (0.170)	2.207*** (0.252)	1.700*** (0.170)
Ethnicity	0.308 (0.200)	0.312 (0.200)	0.318 (0.200)	0.307 (0.201)
Gender × family economic conditions		-0.0651 (0.044)		
Gender × junior high school			-0.852*** (0.243)	
Gender × senior high school			-0.806*** (0.248)	
Gender × college or higher			-0.904*** (0.334)	
Gender × nonrural area				-0.952*** (.194)
Intercept	-3.256*** (0.216)	-3.278*** (0.217)	-3.616*** (0.241)	-3.578*** (0.231)
Number of respondents	3,492	3,492	3,492	3,492
Pseudo R ²	0.186	0.187	0.191	0.193

^aThe reference group is 'primary school or lower.' Numbers in parentheses are standard errors. ** $p < 0.05$, *** $p < 0.01$.

opportunity. The nonrural population has 1.87 times ($e^{1.055}-1$) higher odds than the rural population, which confirms previous findings. Family economic conditions do have a positive but slight association with higher education opportunity. One unit of increase in family economic conditions only increases the odds of higher education attainment by 9.62% ($e^{0.0919}-1$). Parental educational level greatly influences higher education opportunity. Parents with a junior high education level have 1.28 times ($e^{0.822}-1$) higher odds than those with primary school education or below. If parents received a high school/technical school education, the odds increases by 3.04 times ($e^{1.397}-1$), and if parents received college education or beyond, the odds increases by 4.48 times ($e^{1.701}-1$). A lack of significance in ethnicity does not necessarily mean that there is no ethnic inequality; it may be the result of biased sampling. Minority ethnic groups compose only 7.5% of the sample.

The baseline model confirmed the positive association between family economic conditions and higher education opportunity. Model 1 further tests whether this influence has gender differences. The coefficient of the interaction term between family economic conditions and gender is not significant, indicating that an increase in family economic conditions leads to an increase of 1.13 times ($e^{0.124}$) for both genders. Hypothesis 1 is not supported.

As for parental educational level, model 2 indicates that for parents with an educational level of primary school or below, males have 1.29 times ($e^{0.828}-1$) more odds to get into higher education than females. As parental educational level increases, the coefficients become negative, indicating a decrease in gender inequality. Specifically, for parents with a junior high school education, the odds ratio between male and female is 0.976 ($e^{0.828-0.852}$); for parents with a senior high school/technical school education, the odds ratio between male and female is 1.022 ($e^{0.828-0.806}$); and for parents with college education or beyond, the odds ratio between male and female is 0.927 ($e^{0.828-0.904}$). This means that when parental educational level reaches junior high school, the gender gap in higher education opportunity becomes extremely small. This can be demonstrated using more precise statistical analysis: a post hoc test on coefficients of 'gender \times junior high school education level,' 'gender \times senior high school/technical school education level,' and 'gender \times college and beyond' indicates no difference. In other words, once parental educational level reaches junior high school, the gender gap becomes extremely small and will not change with further increase in parental educational level. Hypothesis 2 is partially supported.

The coefficients of model 3 are significant, indicating that urban-rural differences have a significant influence on higher education opportunity. Specifically, in rural areas, males have 1.3 times ($e^{0.833}-1$) more odds than females to receive higher education; in nonrural areas, the odds for males is actually 11.22% lower ($1 - e^{0.833-0.952}$) than for females. It can thus be speculated that the gender gap in the baseline model comes mainly from gender inequality in rural areas. Hypothesis 3 is supported.

In the next step, the three interaction terms are regressed on models prior to and after The Expansion to analyze how the influence of family economic conditions, parental educational level, and urban-rural differences changed after The Expansion. The results are shown in Table 4.

First, model 4a and model 4b compared how the influence of family economic conditions on gender distribution of higher education opportunity changed. Prior to The

Table 4 Comparative models of prior to and after The Expansion

Variable	Model 4a	Model 4b	Model 5a	Model 5b	Model 6a	Model 6b
Gender	0.418*** (0.125)	0.0309 (0.153)	0.845*** (0.209)	0.814** (0.357)	1.120*** (0.211)	0.442* (0.237)
Nonrural area	0.946*** (0.134)	1.176*** (0.153)	0.947*** (0.134)	1.178*** (0.153)	1.580*** (0.205)	1.504*** (0.213)
Family economic conditions	0.156*** (0.040)	0.0603 (0.053)	0.117*** (0.029)	0.0367 (0.039)	0.118*** (0.029)	0.0413 (0.038)
Parental educational level (junior high school) ^a	0.910*** (0.152)	0.679*** (0.212)	1.251*** (0.228)	1.284*** (0.322)	0.928*** (0.153)	0.682*** (0.212)
Parental educational level (senior high school)	1.449*** (0.170)	1.305*** (0.210)	1.947*** (0.256)	1.731*** (0.322)	1.479*** (0.171)	1.320*** (0.210)
Parental educational level (college or higher)	1.674*** (0.207)	1.786*** (0.312)	2.127*** (0.308)	2.406*** (0.464)	1.673*** (0.206)	1.793*** (0.312)
Ethnic group	.103 (0.257)	.608** (0.310)	.102 (0.257)	.607* (0.310)	.130 (0.258)	.587* (0.312)
Gender × economic conditions of family	-0.0714 (0.056)	-0.0343 (0.074)				
Gender × junior high school			-0.587* (0.306)	-1.155*** (0.430)		
Gender × senior high school			-0.869*** (0.337)	-0.774* (0.422)		
Gender × university or higher			-0.777* (0.406)	-1.138* (0.612)		
Gender × nonrural area					-1.148*** (0.260)	-0.680** (0.296)
Intercept	-3.144*** (0.272)	-2.721*** (0.347)	-3.400*** (0.296)	-3.146*** (0.406)	-3.574*** (0.301)	-2.896*** (0.360)
Number of respondents	2,435	1,057	2,435	1,057	2,435	1,057
Pseudo R^2	0.151	0.144	0.154	0.149	0.160	0.147

^aThe reference group is 'primary school or lower.' Numbers in parentheses are standard errors. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Expansion, males from economically worse families^j had 52% ($e^{0.418}-1$) more odds than females; after The Expansion, the odds ratio changed to 0.97 ($e^{-0.0309}$). Since it is no longer significant, it can be assumed that gender inequality in this group diminished. In other words, The Expansion narrowed the gender gap among families with worse economic conditions. The interaction term of model 4a is not significant, indicating that prior to The Expansion, gender gaps were the same between better-off families and economically worse families, or 52% ($e^{0.418}-1$) more odds for males. The interaction term in model 4b is not significant, indicating that after The Expansion, the gender gaps are still the same between better-off families and economically worse families. This means that The Expansion narrowed the gender gap in the former group. Since families with different economic conditions became more equal between genders, family economic conditions are no longer a divisional factor after The Expansion. This confirms model 1 in Table 3, where with every unit of increase in economic conditions, female opportunity increases on the same level as males' (interaction term not significant). Hypothesis 4 is not supported.

Second, by comparing model 5a and model 5b, it is shown that if parental educational level is primary school or lower, then higher education odds is 1.33 times ($e^{0.845}-1$) higher for males than females before The Expansion; this value becomes 1.26 ($e^{0.814}-1$) after The Expansion. This is a slight decrease, indicating that The Expansion did not help significantly in groups with low parental educational level. For those with junior high school educational level, the odds ratio of gender was 1.29 ($e^{0.845-0.587}$), and the value drops to 0.71 ($e^{0.814-1.155}$) after The Expansion. That is, the gender gap in higher education opportunity reversed due to The Expansion, which contributed to the gender equalization process. For those with parents who are senior high school/technical school graduates, the odds ratio between males and females was 97.63% ($e^{0.845-0.869}$) prior to The Expansion and 1.04 times ($e^{0.814-0.774}$) more than for females afterward, which is basically the same.

However, there is a confusing phenomenon: prior to The Expansion, for those with parents whose education level was college level or beyond, the odds ratio between male and female was 1.07 ($e^{0.845-0.777}$) but decreased to 72.33% ($e^{0.814-1.138}$) afterward. This major drop could be a result of a lack of samples (only 78 in this sample; see Table 1). In general, though model 5a and model 5b did not fully support hypothesis 5, it can be found that one major contributor to the gender equalization process is the group whose parental educational level is junior high, the 'semi-low educational level' group. Thus, hypothesis 5 is partially supported.

Lastly, comparing model 6a and model 6b shows that in rural areas, male odds was 2.06 times ($e^{1.120}-1$) higher than female odds and dropped to 57% ($e^{0.442}-1$) higher after The Expansion. The Expansion improved the situation greatly. In nonrural areas, males were 97.24% ($e^{1.120-1.148}$) as likely as females to get into higher education; after The Expansion, males were 78.82% ($e^{0.442-0.680}$) as likely as females to get into higher education. The difference increased. Thus, whether in rural or nonrural areas, The Expansion did narrow the gender gap, with a more drastic effect in rural areas. Hypothesis 6 is supported.

For better observation, we list the advantage odds of key factors in Table 5, where the influence of The Expansion on the diminishing gender gap is clearly displayed.

Conclusion

Based on the data analysis of CGSS 2008, we examined how The Expansion leads to gender equalization of higher education opportunity and tested how the new educational opportunities produced by The Expansion were distributed between genders, which

Table 5 Odds ratio of men to women with regard to higher education opportunities before and after the Expansion

	Family economic conditions		Degree				Area	
	Bad	Good	Primary school or lower	Junior high school	Senior high school	College or higher	Rural	Nonrural
Before The Expansion	1.52	1.52	2.33	1.29	0.98	1.07	3.06	0.97
After The Expansion	1 ^a	1 ^a	2.26	0.71	1.04	0.73	1.57	0.79

^a'1' indicates no significant difference of higher education opportunities exists between men and women before or after the Expansion.

contributed to the equalization of higher education opportunities between males and females. Our findings are summarized below.

First, family economic conditions, though significantly influential on the distribution of higher education opportunity, generated no gender difference with regard to this distribution after the restoration of the College Entrance Exam (*Gaokao*). Distribution did not vary in accordance with different family economic conditions; in other words, the economic conditions of the family exert the same influence on both men and women with regard to their access to higher education opportunity. In the comparative models of the period before The Expansion and after, we found that The Expansion narrows the gender gap of higher education opportunity between families with better economic conditions and those with worse economic conditions. After The Expansion, the economic condition of families no longer serves as a transformation mechanism between difference of gender and inequality of opportunity.

Second, the higher the educational level of the parents, the more likely the children will have higher education opportunities. Yet the influence of the former on the latter varies significantly between genders. Taking the time after the restoration of the College Entrance Exam as a whole, among those whose parents are on the lowest educational level ('primary school or lower'), men significantly have more advantage in receiving higher education in comparison with women. This inequality gradually disappears with the elevation of parental educational level. Men's advantage in the distribution of higher education opportunities barely exists as long as the parental educational level reaches junior high school or higher; this situation remains even if the parental educational level is much higher. In the comparative models between the time before The Expansion and after, we found that the group of people whose parental educational level is primary school or lower and those whose parental educational level is junior high school both enjoyed better higher education opportunity before The Expansion. However, after The Expansion, the two groups differ in this respect: gender inequality of higher education opportunity remains unchanged among those whose parental educational level is primary school or lower, whereas this inequality is fundamentally inverted among those whose parental educational level is junior high school as women enjoy significantly better higher education opportunity than men. Further observation reveals that if the parental educational level is senior high school or higher, men do not have an advantage in receiving higher education opportunity prior to or after The Expansion. In sum, before The Expansion, the gender inequality of higher education opportunity significantly existed when the parental educational level was relatively low ('primary school or lower' and 'junior high school'); after The Expansion, this inequality significantly exists only when the parental educational degree is the lowest level ('primary school or lower').

Third, the urban-rural difference significantly influences higher education opportunities in that the rural population is significantly disadvantaged. With regard to gender difference, taking the time after the restoration of the College Entrance Exam as whole, rural men have better opportunity than women, but nonrural men's opportunity is worse than that of nonrural women. A specific observation shows that this phenomenon remained fundamentally unchanged after the Expansion, yet the odds ratio between men and women with regard to higher education opportunities decreases after The Expansion in both rural and nonrural areas with a higher rate of decrease in the former than in the latter.

We can see from the above observations that the reason why The Expansion leads to gender equalization of higher education opportunity is that the new education opportunities

generated by The Expansion have generally changed the structure of opportunity between men and women, including factors such as families with different parental educational levels and residence in rural or nonrural areas. In regard to the rate of change, two contributions to this equalization are most important. The first contribution originates from the group of people whose parental educational level is junior high school, the second lowest educational level. The Expansion provides opportunities to women of this group and thereby contributes to the gender equalization of higher education opportunity. It is noteworthy that with regard to parental educational level, the threshold of gender equality of higher education opportunity has moved from senior high school, as it was before The Expansion, to junior high school as it is after The Expansion. This move indicates the extension of gender equalization of higher education opportunity from groups with a relatively higher parental educational level to those with a relatively lower level. After The Expansion, despite the remaining gender disadvantage with regard to access to higher education of groups whose parental educational level is the lowest (primary school or lower), this disadvantage would finally be eliminated through the elevation of the general educational level of the whole population affected by the implementation of the 9-year Compulsory Education policy. The second contribution originates from rural women. In regard to the distribution of newly generated higher education opportunities, the rural women's disadvantageous condition has been considerably improved and hence their opportunity gap with men narrowed. Such improvement also indicates the extension of gender equalization of higher education opportunities from nonrural to rural areas. After The Expansion, despite the remaining female disadvantage with regard to access to higher education opportunities in rural areas, this disadvantage has been reduced and would be eliminated with the continuous progress of urbanization and urban-rural integration.

Endnotes

^aData were comprehensively collected from 'China Statistical Yearbook 2001,' 'China Education Statistics Yearbook 2005,' and 'China Education Statistics Yearbook 2008.'

^bOf course, not all research on higher educational opportunity treat gender as an independent variable. In fact, some scholars have noted and found a difference between gender's direct impact on educational opportunity and its interactive effect with other variables on educational opportunity. For example, Chunling Li found that women are more susceptible than men to the impact of family background on gaining educational status. Yuxiao Wu's study showed that household type, father's occupational status, and parents' level of education affect educational outcomes differently between genders (Wu 2012). Hua Ye and Xiaogang Wu found that the number of siblings influences men and women differently regarding their years of education: women suffer more than men as the number of siblings increases (Ye and Wu 2011; Wu, 2012).

^cIt should be noted that The Expansion itself also affects the distribution of higher educational opportunities. In this study, the data analysis introduces The Expansion as a general regressor into the regression model as well as a component of the comparative framework for other interaction terms.

^dMore details about the shared database of Chinese General Social Survey (CGSS) can be found on the official Web site of the National Survey Research Center (<http://www.chinagss.org>).

^eDespite the fact that a tentative College Entrance Exam had already been held during the second half of 1977, in this article, we take the first formal exam in 1978 as the beginning of our calculation because (1) the 1977 exam varied considerably in content from place to place, and (2) due to political considerations and standards involved in the exam, grades were not taken as the only standard of selection.

^fSome scholars take 1960 as the starting point for their statistics, yet according to the standard length of primary and middle school education, the group of worker-peasant-soldier students, whose existence distorts the outcome of the present analysis, cannot be excluded from the overall group of students who entered school before 1963.

^gSome scholars suggest the ratio of conversion of high school graduates to advanced institution students as the measuring standard of 'advanced education opportunity.' The difference between our choice and their suggestion originates from different understandings of the equality of advanced education. In fact, this equality manifests itself in and only in the distribution of advanced education opportunities among the whole population; taking high school graduates as the subject of study will leave out the portion of the population at a lower educational level.

^hDue to the similar length of their education, high school graduates and technical school graduates are classified in the same category.

ⁱThis does not contradict gender equalization in higher education opportunity - the topic of this article - since such equalization took place only recently and, in general, higher education opportunity remains unequal.

^jHere we again centered the variable of family economic conditions. The value of 0 after being centered equals to the value of 4 in the original data, which means people with a score of 0 are from families with a lower economic level. We use this transformation to avoid the dilemma that explaining the variable of gender is meaningless when the value of family economic conditions is fixed at 0.

Competing interests

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Authors' contributions

ZZ carried out the main part of writing. QC carried out the design of the study, performed the statistical analysis and carried out part of writing. Both authors read and approved the final manuscript.

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