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Migration of Higher Educated Graduates and the Consequences of China's 1999 Expansion of

Higher Education Admission

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Migration of Higher Educated Graduates and the Consequences of China's 1999 Expansion of Higher Education Admission

1. Introduction

With the development of China's higher education, its scale of investment has significantly expanded. Especially since 1999, when a major reform occurred, the number of post-secondary institutions and the post-secondary admissions rate of each province has increased sharply, more than ever before. The expansion of admission to higher education since 1999 has largely changed the original state of China's higher education. My research question is, although almost all provinces in China strongly reacted to this reform, whether provinces have kept educated graduates within their province after investing physical and human capital in expanding admissions.

To answer that question, I try to find the relationship between the number of post-secondary institutions, admissions, and university or college educated employees in each province by using various Chinese official databases, including, China Education Yearbook, China Labour Yearbook, National Bureau of Statistics of China. I find that across all provinces, on average, when increasing admission to higher education by one student, provinces keep one educated graduate within their province. However, the story is more complex when I look at a scatter plot relating employees with completed higher education to the province's post-secondary admissions. In reality, China's five richest provinces are attracting many of the new university graduates, while the other 26 provinces keep only an average of 0.57 educated employees for each new admission after the 1999 reform. So the

five provinces were the winners of the reform in this sense.

I begin my paper with a literature review, where I study several journal papers about the use by governments of some developing and undeveloped countries of interventions to increase enrollment rates and years of schooling. In the following section, I provide details about the background of higher education in China. Information about the definition of higher education in China and the history of Chinese higher education admission can explain why the 1999 admission expansion reform is the most important in the Chinese higher education system, and what Chinese government interventions did after the 1999 admission expansion. Finally, I explain my data sources and regression specifications and present and discuss my results. I end the paper with a brief conclusion.

2. Literature Review:

2.1 College Gap

2.1.1 Relationship between higher education supply and return to college

Card and Lemieux (2001) point that while in the United States the earnings gap between college and high school attainment for young men doubled in the previous 30 years, the gap for older men remained almost constant. In the UK and Canada, the pay gap between university and high school educated workers also widened among young men. The model they used combines imperfect substitution between workers of similar education in different age groups. They believe that this structural change can be largely explained by the combination of the relative supply of specific groups of the labor force within university education with a steady increase in the relative productivity of university workers. Under this framework, the salary

gap favoring graduates of higher education institutions increased 20 years ago due to the steady growth of relative demand for graduates and the sharp slowdown in the growth rate of university or college educated workers' relative supply. This very simple model provides a unified explanation for changes in college wage premiums in the three countries.

2.1.2 College wage premium and higher education policy

In some parts of America, the policy of supporting higher education may have a favorable impact on the supply of young higher educated graduates, thus putting pressure on the widening wage gap between college and high school educated workers. However, the link is much weaker in places with high enrolment rates at private universities, high graduate mobility or strong interstate commerce. The within-state estimates of the relative supply effect of the cohort present the extent to which the US labor market can be defined as a single national market or a collection of state-specific labor markets. They stress that interstate migration is an important mechanism for weakening the link between college enrollment and relative labor supply shocks at the state level. (Fortin, 2006)

2.2 Migration:

2.2.1 Some reasons for higher-educated workers to migrate

The potential mobility of skilled workers means that the relative number of degrees awarded in a US state has little effect on the relative number of university workers in that state. States also appear to have limited power to affect human capital in their labor force by investing in higher education qualifications. However, for graduates who want to work in the production of goods and services, there is a positive link between the production and use of university

workers. The production of vastly greater numbers of university graduates in a state can result in higher employment of university - educated workers if industries intensively grow the production of goods and services that use college-trained workers. (Bound, Groen, Kézdi, and Turner, 2004)

Gottlieb and Joseph models of university-to-job migration decisions for technical graduates and doctoral students in the United States. They use immigration-related personal characteristics and details of the current metropolitan origin and destination. They found that technology graduates preferred to migrate to places where people have with higher educated. Ph.D. graduates pay more attention to living facilities than other graduates; and international students from specific immigrant groups move to areas where these groups are concentrated. (Gottlieb and Joseph, 2006)

Self-selected immigrants offer a potential explanation for why, despite the high mobility of American workers, the return on a university education in the local labor market is very different. The role of comparative advantage in population mobility decisions is confirmed by an empirical study using 1990 census data from the United States. The results show that in states with high education returns, self-selection of people with high education level usually results in an upward bias in estimation of education returns in a specific state labor market. Although the initial university education return estimates vary widely, the correction does not narrow the range of returns across states. This finding is consistent with the different return rates to education in universities across the United States. In the United States, the relative migration flows between states of people who have received education from universities and

those who have only a high school education strongly respond to the differences between states in education returns and facilities. (Dahl, 2002)

2.2.2 Some outcomes of strategies for keeping higher-educated graduates

Groen (2004) points out the moderate link between going to college in a state and working in the state. While the estimated effect of college enrollment is statistically significant, the impact is relatively small, especially given the upward bias. This can be seen in state fundraising programs that fund in-state attendance to encourage college graduates to work in the state. Suppose a \$1,000 scholarship causes another 100 students to attend college in the state rather than out of it. The results show that fewer than 10 of them will continue to work in the state 10 to 15 years after graduation. Since one role of the labor market is to match students in different states after graduation, the proportion of extra students who work in the state to extra college graduates is far less than 1:1. Thus, the mobility of university graduates in each state limits the effectiveness of scholarship programs.

Another analysis used difference-in-difference methods and data from the US 2000 census and subsequent annual ACS microdata, and focused on the Florida Bright Futures Scholarship Program to determine how performance-based state aid programs increase the likelihood that the state will retain its brightest young students after completing their studies. The study compared people based on the year they were most likely to graduate from a high school in Florida. The results showed that the program had a significantly positive impact on the likelihood that people with college degrees would still be living in Florida at the time of the survey. It is estimated that people with college degrees are about 3 to 4 percent more likely

to be in Florida, due to the program, and this estimate may be an underestimate for some reasons discussed in the paper. (Hickman, 2009)

Education mobility programs can have an important influence on students' behavior in labor market mobility decision-making, since opportunities to attract top graduates are opportunities to communicate with students. Attractive universities and scholarship programs can bring in students, some of whom will continue to be qualified workers in the future. It has been found that studying abroad in the ERASMUS program increases a person's chances of working abroad by about 15 percent. ERASMUS has successfully promoted the development of an integrated European labor market through a student mobility programme. (Parey and Waldinger, 2010)

2.2.3 More educated people have a stronger preference for migration

Malamud and Wozniak (2012) identified a causal relationship of education on migration through variation in college achievement due to draft-evasion actions during the Vietnam War. They used national and state-level risk of being drafted as an instrument for both college achievement and veteran status for men observed in the 1980 Census. 2SLS estimates show that an extra year of college increases men likelihood of living outside the state of birth by 0.03 to 0.09 percentage points. Most of their 2SLS estimates show a causal effect of college attainment on migration with a larger magnitude but not big a difference from the OLS estimates.

Two salient features of international labor movement are that migrants with higher education levels are more likely to emigrate (positive selection), and migrants with higher education levels are more likely to settle in countries with higher skills rewards (positive ranking).

Using data from the OECD at destination school level along with a list of migrants from countries of origin, one study finds that a simple income maximization model can explain both phenomena. The results on sorting indicate that the relative stock of more educated migrants in a destination increases in the absolute difference in earnings between high and low - skilled workers (Grogger and Hanson, 2011)

2.2.4 Interest divergence between public universities and state governments

Groen and White (2004) reveal that universities and the government have different interests in admission standards, both within and outside the state. States are interested in attracting and retaining high-quality talent through universities because they pay higher government taxes and contribute more to economic development. On the other hand, universities are interested in the success of graduates, but not in where their students come from or after graduation. They find that universities have an incentive to level the playing field for both marginal and out-of-state students in the state.

3. Background

3.1 The definition of higher education and higher education institutions

In the law on higher education of the People's Republic of China enacted in 1998, post-secondary education is called "higher education." Institutions that implement post-secondary education are either higher education institutions or other educational institutions. Higher education institutions can be divided into regular higher education institutions and adult higher education institutions. The Chinese higher education entrance examination is of two types: the entrance examination for regular higher education institutions and the entrance examination for

adult higher education. Regular higher education institutions include universities, branches of universities, private universities, and colleges. Adult higher education institutions are to recruit people who have graduated from high school or have equivalent professional qualifications through the entrance examination for adult higher education. Training is the primary target of adult higher education, using the various forms of correspondence, part-time and full-time higher professional qualification education institutions. Private higher education institutions exist but are subject to examination and approval by the province, autonomous region or municipality directly under the education administrative department, that issues school licenses. They do not qualify to issue professional certifications or offer undergraduate courses for regular higher education and adult higher education.

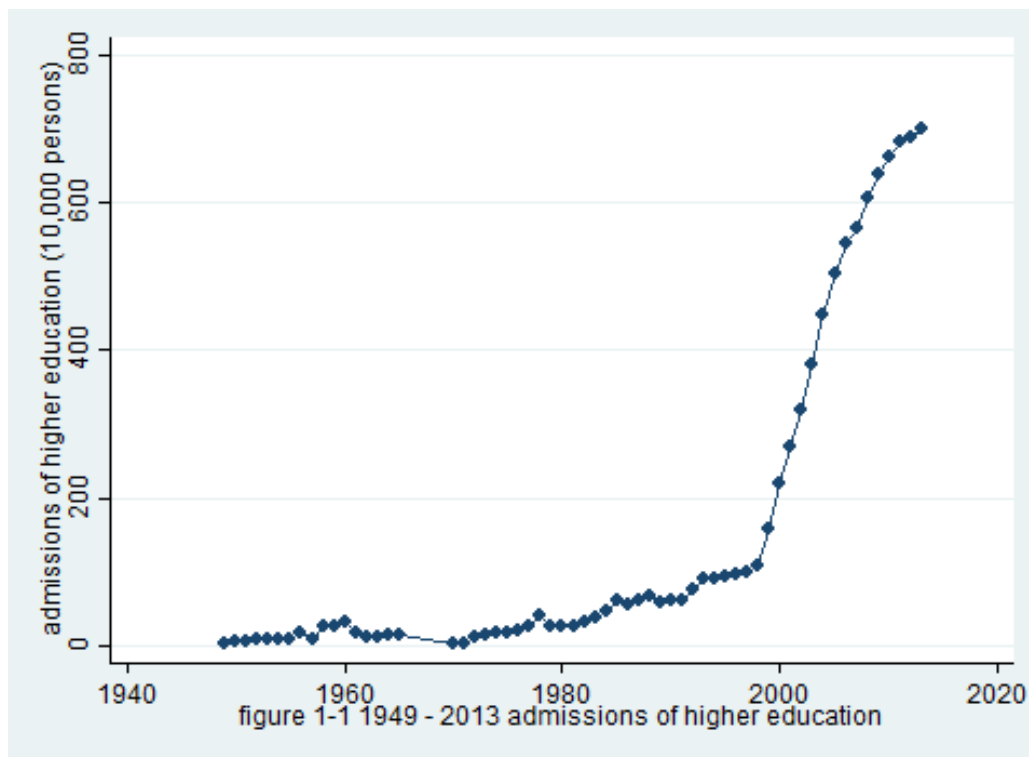
This paper focuses on university admission expansion, and so I concentrate on the increasing admissions to regular higher education institutions. Higher education institutions providing non-academic education are not included in the analysis. Therefore, private schools are excluded from the scope of analysis.

Education is divided into full-time and non-full-time higher education, and the means of enrollment is also divided into the regular higher education entrance examination, adult higher education entrance examination, and self-study examination. Those who participate in the entrance examination for adult higher education or who have obtained a higher education degree through the self-study examination are also not considered to be within the scope of the expansion of college enrollment. So in this paper, higher education institutions are defined explicitly as regular higher education institutions including two categories, which are university

and college.

3.2 The history of Chinese higher education admission

Data from “New China in 65 Years” Yearbook show that when the People's Republic of China was founded in 1949, there were 31,000 admissions to higher education. By the year 2013, the number of admissions for higher education was 6.998 million. (figure 1-1). Especially starting in 1999 there has been massive growth in admissions to the regular institutions of higher education. In 1999, admissions to higher education steeply increased by 500,000 students compared to 1998, with the number of admissions rising to 1,597,000 students. Starting in this year, admissions of higher education entered a sustained period of rapid expansion. In 2000, 2002, 2004 and 2005, admissions to higher education exceeded 2 million, 3 million, 4 million and 5 million respectively. As of 2013 admissions to higher education were close to 7 million.



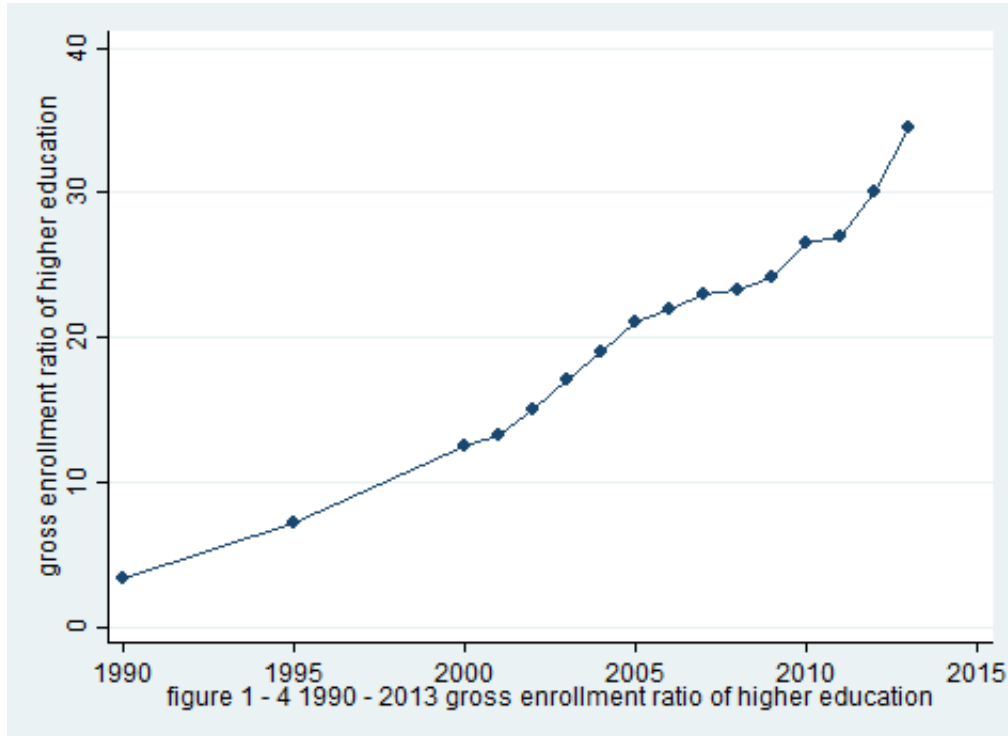
3.3 University admission expansion in 1999

In 1999, the third national education working meeting on the development of higher education policy made a critical decision called "Decision of the state council of the CPC central committee on deepening the reform of education and comprehensively promoting the quality of education." The policy proposed to expand the scale of higher education through various approaches in order to actively develop higher education. By 2010, the gross enrollment ration in higher education as a share of China's population of age 18 individuals was expected to increase from 9 to 15 percent. This conference and China's "Education Revitalization Action Plan for The 21st Century" have contributed to the massive expansion of college enrollment in China since the end of the 20th century.

The extent and continuity of the expansion of higher education are greater since 1999 than in the past. From 1999 to 2010, the average annual admissions growth rate reached 17%. This circumstance has not happened since the founding of new China and the resumption of the college entrance examination. Two other episodes of massively increased admissions in 1950 and 1978 were related to the recent resumption of the university entrance examination. For example, the number of admissions in 1977 was 272,500, but due to the previous ten years of "cultural revolution," many youths could not obtain higher education. Therefore, restoration of the examination led to growth in admissions to 402,000 in 1978, but the next year it was back to 275,000. Similarly, in 1992 and 1993, the fast expansion of higher education lasted only two years, and in 1994, there was negative growth of 2.6%. These episodes are not comparable with the expansion of higher education since 1999 regarding their scale and continuity. Since 1999 the

expansion of higher education admissions has mostly changed the original state of higher education in China, which had been highly competitive. From 1990 to 1998, the percentage of senior high school graduates entering higher education increased from 20% to 50%. (figure 1-3). During that period, the proportion of high school graduates accepted into higher education was still less than 50%, and the competition between high school graduates for higher education places was still at a high level. Since 1999, the percentage of senior secondary graduates entering higher education has soared to well above 50 percent. From 1999 to 2013, the rate increased from 63.8% to 87.6%, which means that out of five high school graduates, more than four can enter higher education. In another word, the competition between high school graduates to enter higher education has been significantly reduced.





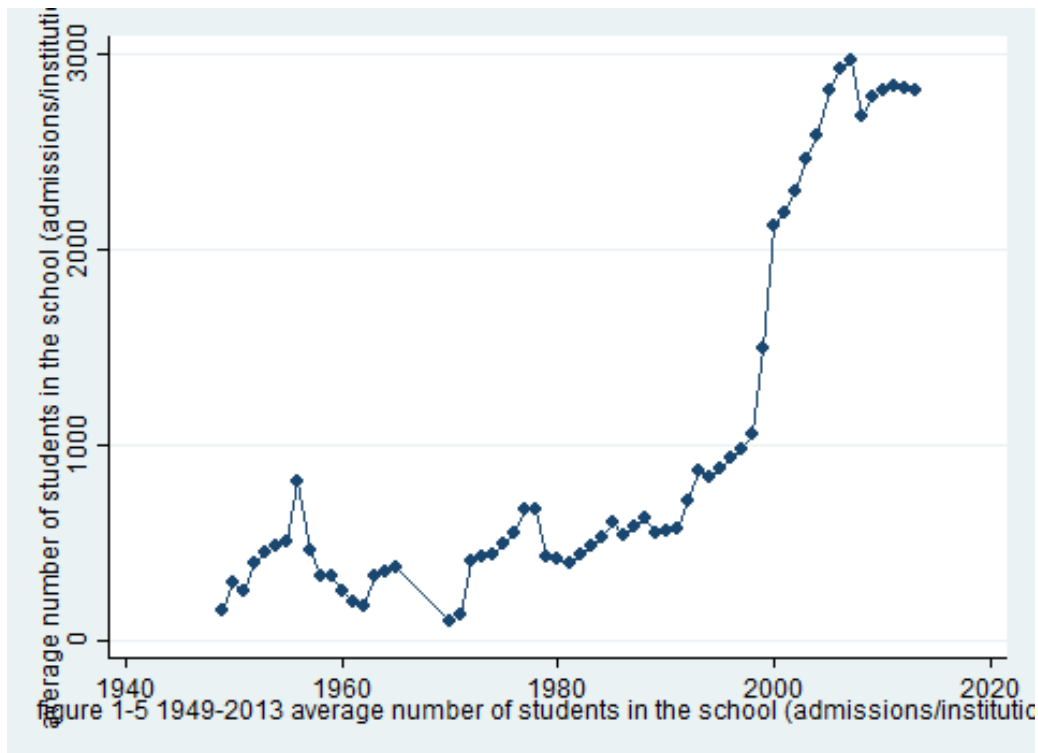
Meanwhile, since 1999, (figure 1-4) the gross enrollment rate of higher education has also increased rapidly. (Higher education gross enrollment rate refers to the ratio of the number of higher education students to the number of people between the ages of 18 and 22.) The number increased from 3.4% to 7.2% from 1990-1995. In 2002, China's higher education gross enrollment rate reached 15%. Martin Trow (1973) called the "stage of popular education" when gross enrollment rate reaches 15%~50%. In China, this rate further rose to 34.5% in 2013. Therefore, the expansion of college enrollment has brought China's higher education from "elite" education to "popular" education.

3.4 The process of admission expansion in 1999

Since 1999, the expansion of college admissions has demonstrated remarkable characteristics in the following aspects:

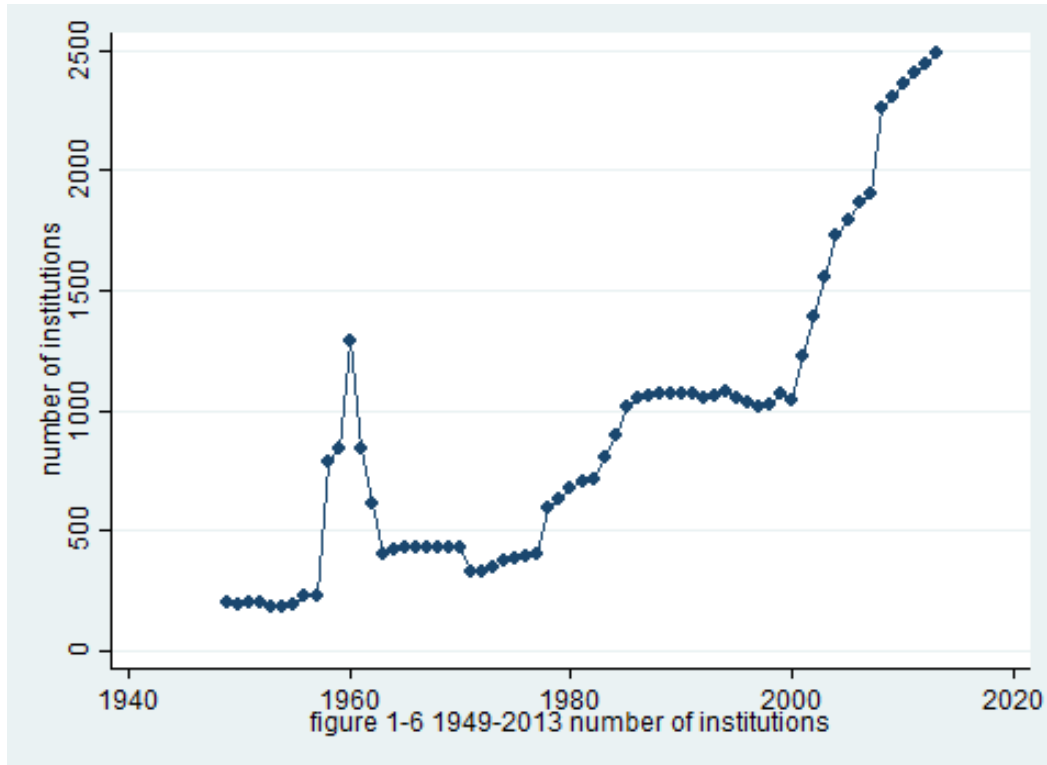
- (1) The scale of universities was expanded

Before 1999, (figure 1-5) the average number of students per school in Chinese universities was generally below 1,000. During the period of enormous expansion starting in 1999, this began to expand substantially. The average number of students in Chinese universities was 2,119 per institutions in 2000, and in 2013 there were more than 2,809 students per institution.



(2) The increase in the number of institutions

Between 1949 and 1984, (figure 1-6) the number of institutions fluctuated up and down, while from 1985 to 2002, the number of institutions stayed at a relatively stable level. However, after 2003, the number of institutions rapidly increased to 1,396, and by 2013, institutions were further expanded to 2,491.



3.5 Provincial variation

After 1999 there was a dramatic increase in admissions in each province, but according to Figure 2-1 and Figure 2-2, the 1999 admission reform has affected provinces differently.

In absolute terms, the most eastern of China reacted more strongly than the western region of China. For example, in 1998, admission to higher education in Guangdong was 60,976 students, compared with Tibet where admissions were 1,385 students. In 2016, the admission of higher education in Guangdong increased to 539,813. However, in Tibet, admissions increased to 10,143 in 2016. Also, figure 2-2 shows what percentage of the total provincial population not only school-age was admitted to higher education. For example, in Shandong in 1992, the percentage of admissions to higher education was 0.067% (admissions/population). After the reform of admission to higher education in 1999; the admissions rate increased to 0.56% in 2016.

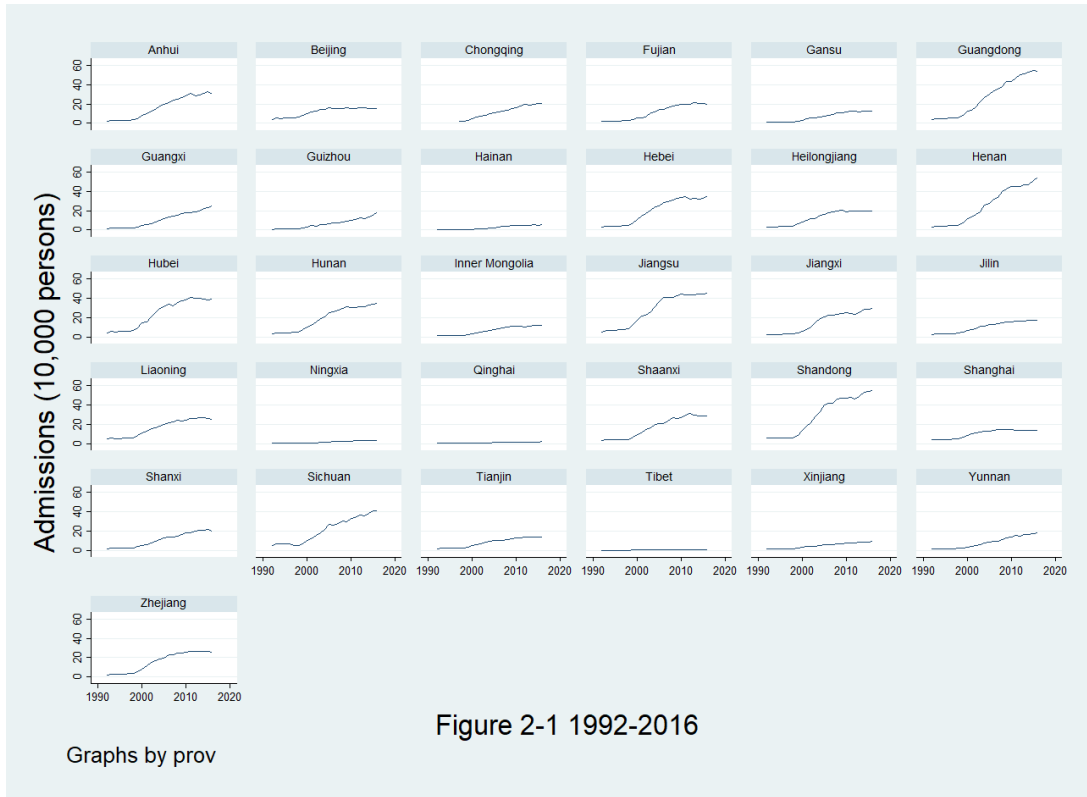


Figure 2-3 and 2-4 show that between 1992 and 2016, the number of institutions changed differently across provinces after the 1999 reform of admission to higher education. As noted earlier the spatial distribution of these new institutions is likely to be an important determinant of the regional heterogeneity in admission expansion of higher education. In table 1, we show the results of a province-level OLS regression of total admissions between 2001 and 2010 on the number of existing and new built between 2001 and 2010 universities. We can see that controlling for the number of institutions in 2001, increasing by one new institution from 2001 to 2010, admissions of higher education increased by 22,848 students. Also when keeping new institutions from 2001 to 2010 constant, a province with one more existing institution in 2001 increased admissions by 27,187. They are both statistically significant at the 1% level which means expanding the of old institutions in 2001, and building new institutions between 2001 and 2010 both seem to have influenced the expansion of admissions into higher education.

Table 1

VARIABLES	admissions between 2001 and 2010
institutions in 2001	27,187*** (5,797)
institutions from 2001 to 2010	22,848*** (4,913)
Constant	-314,657*** (92,680)
Observations	31
R-squared	0.918

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1



4. Data, specifications and results

I now compare the changes in the number of higher education students admitted in different regions to the subsequent changes in the number of degree-holders in the local workforce. This paper is interested in the idea that there may be a gap between the employment location of college students and the student's location of receiving higher education. After the expansion of higher education admission, were students more likely to concentrate in developed areas, or did they stay where they received higher education?

4.1 Data sources

Most data is from the National Bureau of Statistics of China, which provides annual information by province. I consider only admissions and institutions in the category of “education in undergraduate or specialized courses in institutions of higher education.” The population is based on the resident population (in units of 10000 persons) in China’s 31 provinces. The number of employees having post-secondary diplomas comes from adding four different categories of employees by province (urban units employment by region, employment in state-owned units by region, employment in urban collective-owned units by region, and employment in other ownership units by region) and then multiplying the total by the educational attainment composition of employment by region which is measured as a percentage share of employees with post-secondary diplomas. Information on educational attainment of employees is from China Labor Statistical Yearbook in 2016 and 2006.

For my regressions, I use the difference between the number of employees with post-secondary diplomas between 2005 and 2015 as a dependent variable, which is the difference

between the stocks of employees over that period in each province. I also add together the flow of admissions for all years between 2001 and 2010, since students registered in September 2000 would be recorded in 2001 surveys, and four years later those students holding a degree of higher education would be measured by China Labor Statistical Yearbook as employees if they were in jobs. Adding all 31 provinces' admissions to higher education from 2001 to 2010 yields 49,436,800 students, and adding 31 all provinces' number of employees with post-secondary diplomas and taking the difference between 2015 and 2005 gives 49,726,331. Compared to one another, those two numbers are almost one to one despite the use of different sources, the two variables I have calculated which means are considered reliable.

4.2 Regression Specifications

The research question is whether students would stay where they finished their higher education or not. If local provinces constructed more new institutions and/or expanded new institutions after the 1999 reform, would this lead to obtaining more higher educated employees staying in their province?

$$(1) EA_i = \alpha + \beta A_i + \varepsilon_i$$

The first specification includes the change in the stock of educated employees from 2005 to 2015 (EA_i) as a dependent variable in the left-hand side of the equation, and the sum of admissions between 2001 and 2010 (A_i) as an independent variable in the righthand side of the equation. The hypothesis of H_0 will be $\beta = 1$, H_1 will be $\beta \neq 1$. If we cannot reject H_0 this means on average students will stay where they finished their higher education.

(2) $S_i = \alpha + \beta_1 O_i + \varepsilon_i$

The second specification has the share of new institutions, that is institutions added between 2001 and 2010 divided by institutions in 2001 (S_i) as a dependent variable in the left-hand side, and existing institutions in 2001 (O_i) on the right-hand side of the equation. I want to show the relationship between the share of new institutions and old institutions in 2001 to answer the question: did provinces with already many institutions increase these more than provinces with fewer?

(3) $A_i = \alpha + \beta_1 O_i + \beta_2 N_i + \varepsilon_i$

The third specification, which I have already estimated above, considers whether the number of existing and new post-secondary institutions influence the admissions expansion of higher education, so I add both institutions in 2001 (O_i) and newly built institutions between 2001 and 2010 (N_i) to on the right-hand side of the equation and put total admissions between 2001 and 2010 (A_i) on the left-hand side.

(4) $EA_i = \alpha + \beta_1 O_i + \beta_2 N_i + \varepsilon_i$

The fourth specification is about the effects of the stock of new institutions between 2001 and 2010 (N_i) and expansion of old institutions (O_i) on the change in the stock on educated employees between 2005 and 2015 (EA_i).

I also draw a scatter plot with the two variables in equation (1) to see information on heterogeneity that cannot be discovered directly in that regression, which gives only average effects. Then I withdraw some key outliers, rerun the specifications and compare to the old results.

4.3 Results and Description:

Table 2

VARIABLES	(1) share of new institutions	(2) share of new institutions
institutions in 2001	0.000154 (0.00324)	-0.00368 (0.00368)
Constant	0.917*** (0.143)	1.102*** (0.163)
Observations	31	26
R-squared	0.000	0.040

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

I first run the regression of share of new institutions on institutions in 2001, which is the second equation $S_i = \alpha + \beta_1 O_i + \varepsilon_i$. The result in the first column in table 2 shows that increasing 1 institution in 2001 is associated with a slightly higher in share of new institutions, however, both in column (1) and (2) we cannot conclude that provinces with already many institutions increased their number more than provinces with fewer; i.e. institutions in 2001 will not effect the share of new institutions.

In results from the first equation, which is $EA_i = \alpha + \beta A_i + \varepsilon_i$ in the first column in table 3 show that on average, increasing one admission between 2001 and 2010, the number of university educated employees in a province will increase by 0.974. This is close to 1, so it means that when provinces add one admission, they will receive one higher education employee in their province on average. Doing the F test for the coefficient on admission from 2001 and

2010 with $H_0: \beta=1$ and $H_1: \beta \neq 1$, the p-value is 0.9113, which is bigger than the 10% significance level, so we cannot reject $H_0=1$ at the 10% level. It is confirmation that on average, a province increasing one admission will receive an educated employee in their province.

Table 3

VARIABLES	the stock of educated employees from 2005 to 2015	the stock of educated employees from 2005 to 2015
	(1)	(2)
admissions between 2001 and 2010	0.974***	0.573***
	(0.233)	(0.0565)
Constant	51,099	165,591
	(295,727)	(108,246)
Observations	31	26
R-squared	0.399	0.744

Robust standard errors in parentheses

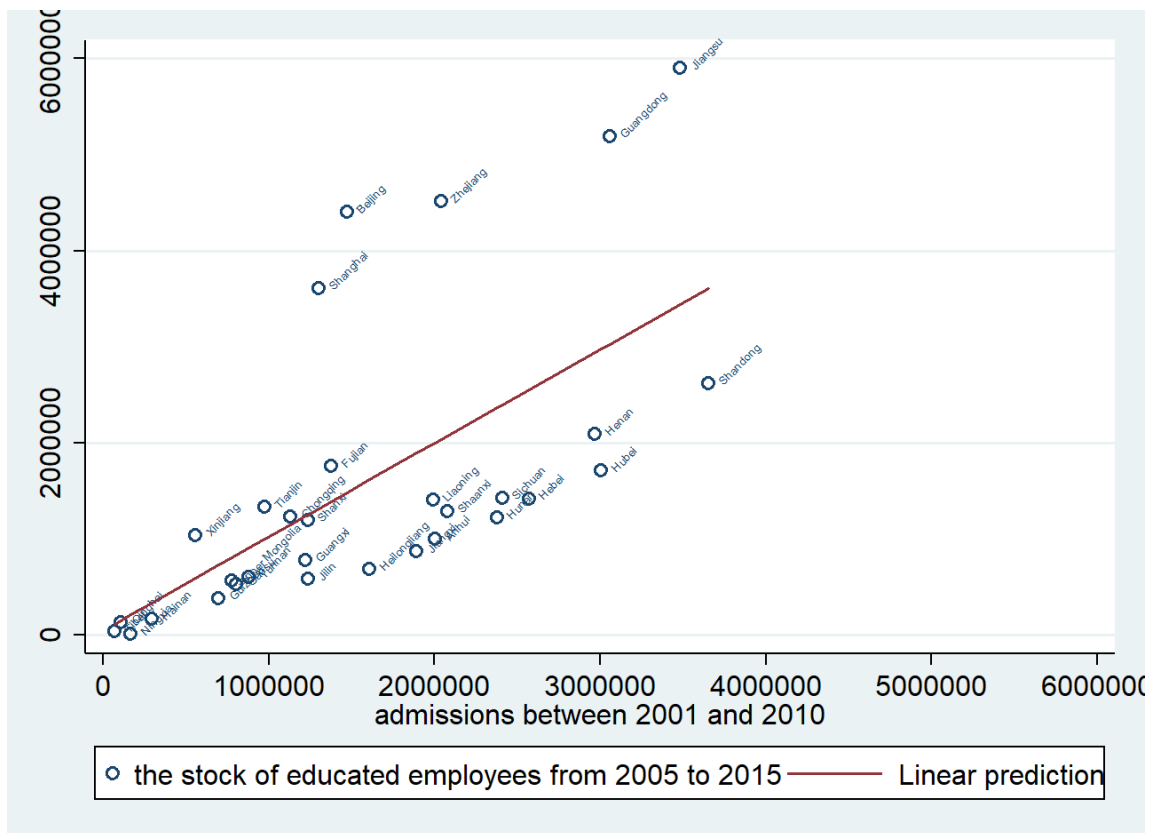
*** p<0.01, ** p<0.05, * p<0.1

However, according to figure 2-5, a scatter plot with a 45% line, plotting attainment of employees and admissions across provinces tells a more complex story as the average is “hiding” important heterogeneity. Some provinces have dramatically increased admission to higher education, but they could not keep all students in their province, for example, Shandong, Hubei, Hebei, Liaoning, Heilongjiang, etc. (compare with figure 2-3). Students who completed higher education in those provinces have tended to migrate to another provinces, especially Beijing, Shanghai, Guangdong, Jiangsu, Zhejiang.

I should give some background about these five provinces to explain why students graduating from the university might migrate to those provinces. Beijing, Shanghai, Jiangsu,

Zhejiang, and Guangdong are the most developed provinces in China. Two indicators can illustrate this: per capita gross regional product (yuan/person) and household consumption expenditure (yuan). In 2016, Beijing (118,198 yuan/person), Shanghai (116,562 yuan/person), Jiangsu (96,887 yuan/person), Zhejiang (84,961 yuan/person), and Guangdong (74,016 yuan/person) ranked first, second, fourth, fifth and seventh respectively for per capita gross regional product. And by rank of household consumption expenditure first is Shanghai (49,617 yuan), second is Beijing(48,883 yuan), fourth is Jiangsu (35,875 yuan), fifth is Zhejiang (30,743 yuan), and sixth is Guangdong (28,495 yuan).

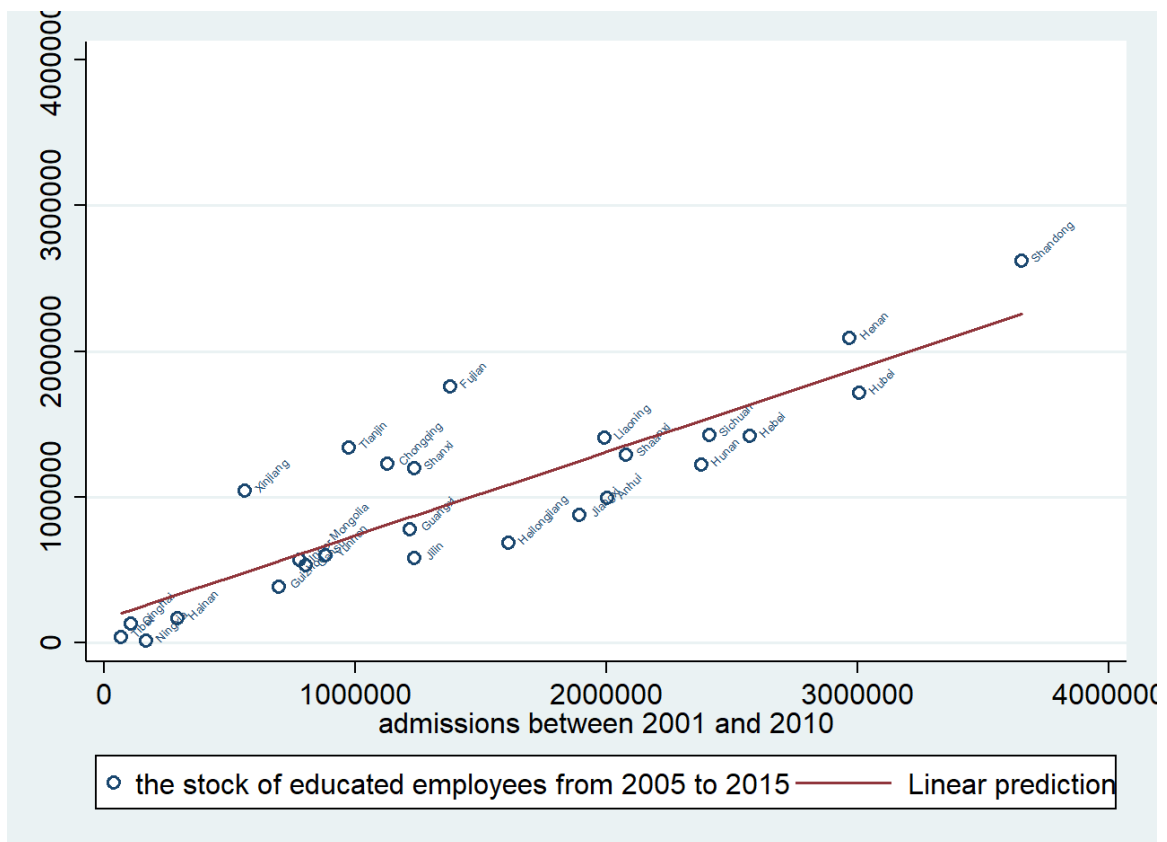
Figure 2-5 scatter plot of the change in employees with a higher education degree and total admissions of 31 provinces



Also, those five provinces have the most advanced public services and obtain more resources than other provinces from the central government. As well, those five provinces have a long history of migration within China. This suggests that many other provinces which admitted more students after the 1999 reform are losing in relative terms from the admissions revolution.

Although they have spent to cultivate higher education students, they cannot keep all of those knowledgeable students in their provinces to contribute their knowledge to develop the provinces. Let's drop these five richest provinces and see what the average return to the admission expansion of higher education has been for the rest of the provinces.

Figure 2-6 scatter plot of the change in employees with the a higher education degree and total admissions of 26 provinces



Column (2) of table two is the result of estimating the first specification for these 26 provinces, so increasing one admission leads the stock of educated of employees to increase by 0.573 on average. Comparing column (1) and column (2), the results of column (2) are almost half as large as those of column (1), which reflects the results of the scatter plot in figure 2-6. For these 26 provinces, doing the F test for the coefficient of the admission from 2001 and 2010 with $H_0: \beta=1$ and $H_1: \beta \neq 1$, gives a p-value is 0.000, which is smaller than the 1% significance level, so we can reject $H_0=1$ at the 1% level. This means that on average, a province increasing by one admission will receive less than one educated employee in their province. So the richest five provinces absorb more knowledgeable students than the rest of the provinces and are the biggest winners from the 1999 reform of admissions to higher education.

Now we pay attention to table 4, where I still use the third specification but withdraw the richest five provinces. New institutions from 2001 to 2010 are statistically significant at the 5% level, so controlling for institutions existing in 2001, increasing by one new institution between 2001 and 2010 leads to increase in admissions of higher education by 17,056. Also, expanding the scale of existing institutions as of 2001 is significant at the 1% level, so keeping new institutions between 2001 and 2010 constant, provinces with one more existing institution increase admissions to higher education by an additional 32,961. As a result, we can still conclude that both expanding the scale of old institutions and constructing new institutions have enhanced admissions to higher education even in the sample dropping off the five richest provinces in China.

Table 4

VARIABLES	admissions between 2001 and 2010
institutions in 2001	32,961*** (7,449)
institutions from 2001 to 2010	17,056** (6,845)
Constant	-308,479*** (109,435)
Observations	26
R-squared	0.911

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5

VARIABLES	the stock of educated employees from 2005 to 2015	the stock of educated employees from 2005 to 2015
	(1)	(2)
institutions in 2001	35,033 (24,593)	16,970** (8,094)
institutions from 2001 to 2010	19,085 (25,390)	12,056 (8,941)
Constant	-477,835 (324,135)	-18,909 (125,243)
Observations	31	26
R-squared	0.450	0.691

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5 is about the specification $EA_i = \alpha + \beta_1 O_i + \beta_2 N_i + \varepsilon_i$ which directly relates expansion of existing institutions and increases in new institutions to the attainment of employees across

provinces between 2005 and 2015. The estimates in this table are imprecise so that we can't conclude that most of the results are statistically significant. However, the point estimates reinforce the story above: although these 26 provinces admit about the same number of students per institution as the five richest provinces, they keep fewer students for each institution they built or expanded.

5. Conclusion

According to the regression results, the number of employees with higher education in Chinese provinces have increased by 0.974 for each post-secondary admission from 2001 to 2010, which means that when a province increases by one admission, they will hold one person in their province after graduation on average. But in reality, there is much variation: some provinces have dramatically increased their admissions in higher education, but cannot keep more than half of these students in their provinces. Students who complete advanced education in these provinces instead tend to move to the richest provinces. The reality is that the five richest provinces were the winners of the higher education admission reform in 1999.

This suggests that the gap between provinces has never been improved by the expansion of admission, and the richest provinces have benefited from the revolution even if they did not react to it more strongly than other provinces. So some provinces may need to consider a relative reduction in large-scale investment expansion of admissions by investing this money in more effective economic activities for the local economy and leveraging the advantages of their provinces rather than blindly paying for the costly expansion of admission to higher education.

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