College Expansion in China and Its Effect on Economic Outcomes

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Abstract

This study explores the determinants and consequences of higher education expansion in China from 1985 to 2012. We use the panel data of cities with detailed statistics on college construction. We find that college expansion is more likely to occur in larger cities with larger population, larger GDP per capita, and higher share of service industry. College construction is found to be unevenly spread across regions of China, with more colleges being built in Eastern Region and urban cores of prefectures. The primary results suggest the positive effect of college expansion on regional earnings and GDP per capita.

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1. Introduction

The past decades have seen a massive expansion of the demand for higher education in developing countries, especially in China. China's market-oriented reforms of the late 1970s resurrected the higher education system, which had been destroyed during the Cultural Revolution that occurred from 1966 to 1976. The numbers of college graduates and number of colleges have significantly risen in China. The increase is the result of the implementation of China's college expansion policy made in 1999 after realizing how important the human capital is to the development of China's economy. Human capital plays a major role in explaining differences in productivity. Human capital is productive because of its effect on raising the skills of those who invest in it. As China enters world markets, it has access to newer forms of technology and organizational arrangements, which may require more educated workers (Heckman, 2005). The Chinese government began mass investment on higher education in 1999. From the human capital theory point of view, increasing higher education will raise skill levels of workers, thereby creating a positive contribution to productivity. These improvements in human capital may gradually stimulate China's economic growth. This study is important because it estimates the relationship between college expansion and China's economic growth.

The purpose of this research is to discover the determinants and consequences of college expansion in China. In this research, two questions will be answered. First: what determined the increased number of colleges in China? Second: Did college expansion in China result in economic growth and increase in labor earnings? If the economic gains from college expansion are positive, we can say that the college expansion in China was worthwhile.

This study is different from previous studies because it is a new topic, and it uses new datasets. Also, this study estimates the long-term effects on the labor market. The previous literature has never used this kind of datasets and has not examined the determinants of college expansion in China in 1999. The relative literature analyzes the features of college expansion and provides a solid background for my study.

The key contribution of our study is the estimation of college expansion determinants and quantifying the scale of college expansion in China using the China College Database. The estimation suggests that the college expansion is more likely to occur in municipalities with higher population density and larger GDP per capita. It is interesting that municipalities with the higher share of the primary and secondary industries tend to open technical colleges rather than humanities or comprehensive colleges. However, larger municipalities tend to open colleges in the field of humanities, economics, and law. Our estimation of the effect of college expansion on the labor market outcomes shows that the number of campuses has a positive effect on the regional average wage and real GDP per capita for prefecture cities and all cities.

Our paper is structured as follows. In the next section, we show the previous related literature. Section 3 discusses the data that used in our study. In Section 4, we provide the main features of college expansion in China by analyzing the summary statistics for each municipality in China. Section 5 shows the theoretical and Section 6 shows the empirical strategy used in this study. Section 7 presents the estimation results for our research questions. Section 8 concludes the study results and lists the future concerns.

2. Literature Review

Carnoy, *et al*. (2013) provides a useful foundation to begin understanding the basic structure for the changes in China's higher education. They point out that both the market reform in the late 1970s enabling greater government investment and the large increases in per capita income have supported the expansion. One feature of the college expansion in China is that the share of three-year degrees and private four-year higher education institutions have increased rapidly, while the enrollment rate of higher education institutions under the central government's control is seriously controlled to low to ensure the quality of nurturing "world-class" universities. There is a trend of decentralization in the higher education system in China after 1999. As Figure 4 indicates, the share of private colleges is increasing. However, the share of colleges controlled by local governments is relatively decreasing. At the same time, the Chinese government also changed the way it financed higher education. Since the implementation of the expansion policy, students who attend public or private colleges in China start paying tuition in the late 1990s, which is called cost sharing. Cost sharing was introduced not only to support the higher education expansion, but also to spur the spending of the large amount of savings accumulated by families in the late 1980s and 1990s.

Wan (2006) analyzed the factors that have led to the enrollment expansion and its outcomes. Four major reasons were considered after studying the Mr. Lanqing Li's book[1]: 1) the need for more talented personnel to sustain the rapid development of Chinese economy; 2) the public demand for higher education is increasing and the government has

[1] Mr. Lanqing Li was a vice premier in charge of education at the time when the college expansion decision was made.

the obligation to meet their demand; 3) enrollment expansion can postpone employment of high school graduates and increase educational consumption, which could spur Chinese economy out of stagnation after Asian Crisis; 4) enrollment expansion can reduce the pressure on high schools, discouraging test-oriented teaching and learning and promoting all-around education in elementary and secondary schools. In addition, some complementary evidence could be found in Wang and Liu (2011)'s study. In their study, the primary purpose of the 1999 expansion policy in China is to stimulate consumption after Asian Financial Crisis in 1997. They believe that the higher education expansion could create a demand in infrastructure construction and students' consumption of educational resources, spur China's economic growth, and bring the economy out of stagnation in the short term.

There are studies of school expansion in other counties. For example, Duflo (2000) estimated the economic returns to education for the large school construction in Indonesia from 1973 to 1978, in which nearly 61,000 primary schools were built. This paper answered the questions of whether investments in infrastructure can cause an increase in educational attainment, and whether an increase in educational attainment causes an increase in earnings. The author used a large cross-section of men born between 1950 and 1972 from the 1995 survey of Indonesia. These estimates suggest that each new school constructed per 1000 children was associated with an increase of 0.12 to 0.19 in years of education and 1.5 to 2.7 percent in earnings for the first cohort fully exposed to the program. The result implied estimates of economic returns to education ranging from 6.8 to 10.6 percent. Duflo's study demonstrates the primary school's expansion has great impact on the educational attainment and earning.

Whalley and Xing (2011) described the transformations of China's higher education and analyzed its impact on the unemployment of college graduates. Three kinds of transformations in higher education in China were studied in their research: scale expansion, abolishment of heavy subsidies (rise in tuitions), and changes in the matching mechanism between college graduates and potential employers. The scale expansion shows that the number of universities increased significantly from 1978. In 1980, only 675 regular higher education institutions existed and around 1 million students enrolled into higher education. While by the end of 2013, more than 2400 regular higher education institutions absorbed more than 240 million students in that year. With fewer and fewer universities being controlled by the central government and the private universities becoming allowed, the government funding per student was reducing and the tuition was rising. From 1995 to 2004, the tuition fee, on average, increased from 800 RMB per person each year to 5000 RMB per person each year (Yang, 2006). Also, in the past, college graduates' jobs were assigned by the colleges and local government jointly. However, the Chinese government gradually canceled the planning system for allocating college graduates to work positions so that college graduates could participate within the competitive job market. Their study gives a better understanding about the institutional background.

Another major part of their study is the effect of college expansion on the educational opportunity and unemployment rate of college expansion. They apply the cohort-based difference-in-difference method to the China Census data. The results show that cohorts graduated from high schools during the expansion period have a higher probability of going to college, but also face higher unemployment rate after finishing

college. It turns out that the unemployment rate of young college graduates increased by a larger extent in non-coastal regions rather than in large coastal cities, which is true for both male and female- with males experiencing a larger increase in unemployment across the country. Therefore, the expansion policy has a positive effect on improving the opportunity of high school graduates to acquire higher education, but it also increased the unemployment rate of college graduates. A potential major problem in this paper is that they have only estimated the short-term effect on labor market, so more evidence may be needed to conclude the long-term effect, which is the focus of the current study.

3. Data

This study's data sources can be categorized into two broad types. The first type of the data source is the China College Database (created by Dr. Peter) based on the lists of colleges published by the Ministry of Education of People's Republic of China. Based on the web search, the database has information on the founding and closing dates, type of universities (undergraduate/junior college), ownership (public/private), location (city name), field (10 categories, e.g., engineering, pedagogy, medicine, etc.), branches, and other information. Based on the China College Database, we calculated the total number of campuses, number of private universities, number of undergraduate level universities, number of colleges by field for each municipality and different years from 1985 to 2012. In total, we have 34,335 municipality-year observations from 1985 to 1999 (before expansion) and 29,757 municipality-year observations from 2000 to 2012 (after expansion).

The second type of data source is the China Knowledge Resource Integrated Database (CNKI). This study used China City Statistics Yearbooks from CNKI to obtain

nominal GDP, population, total wage, average wage, employment, etc. China City Statistical Yearbooks cover all prefecture- and some county- level cities from 1985 to 2011. The second data source is linked to the first one using city name. This new linked dataset has never been used in the literature. We list the main variables that are used in the empirical section and their source and long definitions in Table 1.

In the descriptive section of college expansion (Section 4), we use all municipalities, including rural counties. In the model estimation, we only use cities for which economic data are available in CNKI. The coverage of municipalities in the yearbook database changes over time. For example, yearbooks from 1985 to 1996 contain information on both prefecture-level and county-level cities. But in 1997-2012, the data are limited to prefecture-level cities. The number of cities also increases over time, as former rural counties become urbanized. As a result, the sample is unbalanced, but it covers all provinces except Taiwan, Hong Kong and Macao in China. The sample period for the descriptive analysis of college expansion includes all years from 1985 to 2012. However, the model estimation uses a shorter period, 1988-2011, because of including 3-year growth rates and the lack of yearbook data for 2012.

China City Statistical Yearbooks report statistics of both urban core and prefecture-level cities. Urban core only covers so called urban districts. The prefecture area covers the whole geographic area of the prefecture, including the urban core, rural counties, and county-level cities.

In the next section, we highlight main features of college expansion in China using the descriptive analysis of our data. We also provide summary statistics of key variables used in the model.

4. College Expansion in China: Main Features

The fifteenth National People's Congress (NPC) of the Chinese Communist Party proposed a blueprint for development of Chinese education to face the 21st Century's challenge.[2] For higher education, they made two goals in general. First is the short-term goal: actively and steadily develop higher education, raising the enrollment rate to 11% by 2000. The second goal is a long-term goal: enlarge the scale of higher education, raising the enrollment rate to 15% by 2010. In addition to the general plan, they also proposed to develop world-class universities to improve the quality of higher education. To achieve that goal, the government launched a project called the 985 Project, which is set to improve the global standing of a select group of Chinese universities. According to the World Bank database, in 1999 higher education enrollment was about 7%, and in 2000 the enrollment increased to 8%. However, in 2010 the enrollment reached 27%. Figure 1 shows the detailed trends of the enrollment rate from 1985 to 2012 for tertiary education in China.

The government made great contribution in enlarging the construction of campuses. Figure 2 and Table 2 show a significant increase in the average number of campuses from 1985 to 2012. In 2012, the average number of campuses for municipalities that have at least one campus is 5.32, comparing with 3.51 in 1985, which is reflected in Table 2.

However, many municipalities do not have any college; although the share of such municipalities has been steadily declining from 87 percent to 80 percent (see Table 2). For example, in 1999, out of 2,289 municipalities in China, 1,953 do not have any universities.

[2] See more policy details here:
http://www.gmw.cn/01gmrb/1999-02/25/GB/17978%5EGM3-2505.HTM

During 1999 to 2009, 106 municipalities opened at least one campus, which is about 5.43%. Even if we add municipalities with no campuses, the average number of colleges of all types has increased significantly after 1999 (Table 3). The growth was especially profound for junior colleges and private colleges.

We find that the rate of college opening was not even across various parts of China. We classify six geographic regions according to the Guobiao codes: North (Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia), Northeast (Liaoning, Jilin, Heilongjiang), East (Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong), South Central (Henan, Hubei, Hunan, Guangdong, Guangxi, Hainan), Southwest (Sichuan, Guizhou, Yunan, Chongqing), and Northwest (Shaanxi, Gansu, Ningxia, Xinjiang). The share of municipalities that did not have a campus in 1999 and opened at least one campus during the ten-year period was 4.26% in North area, 7.14% in Northeast area, 9.95% in East area, 4.59% in South Central area, 4.14% in Southwest area, and 2.79% in Northwest area. Therefore, the college construction rate is above the national level in Northeast and East, but significantly below the national level in Northwest. In addition, Table 4 shows that the number of colleges of all types increased mostly in East of China, while in Northwest, it increased slightly after 1999.

Table 5 provides statistics on the change in the number of campuses in total and by categories in cities of various sizes. Specifically, we divide all cities into four types by population size: small cities (<200,000 persons), middle cities (200,000-500,000 persons), large cities (500,000-10,000,000 persons) and super large cities (>10,000,000 persons). The increase in the number of campuses occurred in all types of cities, but the largest increase is observed in super large cities.

In the implementation of the plan, Chinese policy-makers also emphasized the curriculum reform to strengthen the nation's technical and scientific capabilities. Figure 3 shows that the largest numbers of colleges train students in engineering and other technical fields (51.2 percent in 2011), and the share of technical colleges has an upward trend. On the contrary, the share of comprehensive colleges has been declining steadily (36.4 percent in 2011). The share of pedagogical colleges and humanity colleges is small (14.1 percent in 2011).

Figure 4 shows that the share of private colleges increased rapidly, especially after 1999. Private college education plays more important role over time, although the share of private colleges remains very small (18.7 percent in 2011). Most of Chinese higher education is still provided by the government. Among public universities, the quality varies, with high quality universities being under the supervision of the Ministry of Education of China. From Figure 4, we see that the share of ministry-supervised universities did not change over the considered period.

We also categorize higher education in China into two types: undergraduate universities/colleges and junior colleges. In general, undergraduate universities/colleges have higher quality than junior colleges. Students in undergraduate universities/colleges receive a bachelor degree with about 4 or 5 years of study. Junior colleges have a shorter study period, which is about 2 or 3 years without awarding a bachelor degree, but they still belong to the higher education system in China. Figure 5 shows that the share of junior colleges has increased, especially after 1999, compared to a declining share of 4-year colleges and universities.

The descriptive analysis shows tremendous, though uneven, growth in the number of colleges and significant changes in the composition of colleges over time.

5. Theoretical Framework

The first research question is what factors determine college expansion. Because of education decentralization, the local government would be a primary agent for making the decision to open a college. They evaluate the social benefits and social costs of opening universities. Private investors, including enterprise investors, would be another agent. Private investors are assumed to maximize private gains from opening colleges.

For local governments, they will open a new university/campus if their social welfare gains from opening a public university for local community net of costs is positive, which is: $U^* > 0$, where U^* is the social welfare gains net of costs. Some potential gains may include economic growth, attraction of foreign investment, and more job opportunities resulting in higher local earnings. The costs involve building and operating colleges.

For private investors, they will decide to open a new university if the private gains net of costs are positive, which is $\pi^* > 0$, where π^* is the net private gains.

6. Empirical Section

The empirical model is based on the research questions. For the first research question, I use the college expansion as a function of determinants.

$$N_{c,t} = \beta X_{c,\tilde{t}} + \varphi(t) + \mu_c + \varepsilon_{c,t}, \quad (1)$$

where $N_{c,t}$ is measured by the number of campuses in city *c* at the end of period *t*. Alternatively, we use a binary variable indicating whether a campus exists in city *c* at the end period *t*.

$\varphi(t)$ is year dummies;

μ_c is city fixed effects;

$\varepsilon_{c,\,t}$ is unobserved time-varying factors and a pure noise;

$X_{c,\tilde{t}}$ is observed city-level determinants of college expansion with varying lags, which include:

- Log of population in year *t-1*
- 3-year population growth between *t-2* and *t*
- Log of real GDP per capita in 2010 prices in year *t-1*
- 3-year real economic growth between *t-2* and *t*
- The percent share of GDP in primary and secondary industries in year *t-1*
- Log of foreign direct investment per capita in year *t-1*
- Share of secondary school students in regional population in year *t-1*

In specification with the number of campuses as a dependent variable, we use both OLS and FE estimators. In specification with a binary variable, we use the probit estimation method. In addition, we also perform the OLS and FE estimation of determinants influencing the share of universities in technical, humanities, pedagogy, and comprehensive fields.

The second equation estimates the effect of college expansion on real GDP per capita, earnings, and wage growth.

$$Y_{c,\tilde{t}} = \beta N_{c,t} + \gamma X_{c,t} + \varphi(t) + \mu_c + \epsilon_{c,\,t} \quad (2)$$

$Y_{c,\tilde{t}}$ is city-level outcome of college expansion with varying leads:

- Log of real GDP per capita in 2010 prices in year *t+3*;
- Log of real annual earnings in 2010 prices in year *t+3*;
- 3-year real earnings growth between *t+1* and *t+3*;

$X_{c,t}$ includes:

- Log of real GDP per capita in 2010 prices in year t
- The percent share of GDP in primary and secondary industries in year t
- Share of secondary school students in population in year t
- Foreign direct investment per capita in year t

Other control variables include:

- Share of technical colleges
- Share of humanities colleges
- Share of pedagogy colleges
- Share of private colleges
- Share of undergraduate universities
- Share of universities under the supervision of ministry level

7. Results

A. Summary Statistics Analysis

Our analysis of the number of campuses suggests a strong increasing trend during the expansion period, as it illustrated in Table 2. However, higher education expansion in China has different trends for different fields of universities (Figure 3). The proportion of technical colleges has been increasing rapidly, while the share of others either does not change or even decreases in case of comprehensive colleges. Table 3 and Figure 3 also show that technical colleges comprise the largest share of all colleges from 1985 to 2012. Table 4 indicates large regional differences in the degree of higher education expansion in China. Different regions have different expansion rates. College expansion was the most prominent in the East of China, the region where real GDP per capita, FDI per capita and real earnings are also seen the largest increase (Table 7). The summary of key college variables by city size shows the largest increase is in the super large cities, which is defined by population that is greater than 10,000,000 (Table 5). Therefore we could conclude that most college expansion was happened in super large cities. However, Table 8 shows that the largest increase in real GDP per capita was in small cities.

B. Determinants of College Expansion

Prefecture Level: Because of the structure selection problem in the China City Statistical Yearbook, we use the inverse probability weighting and generated $\widehat{P}$ used in OLS estimation to solve it. $\widehat{P}$ is used to measure the probability of a given city to be selected into the China City Statistical Yearbooks city lists. We begin with the OLS estimation of college expansion determinants without city fixed effects. The estimation results in Table 9 suggest

that the number of campuses is increasing with the population size of prefecture, 3-year population growth rate, real GDP per capita, and decreasing with the share of GDP in the primary and secondary industries, and the share of secondary students in the regional population. For example, a one percent increase in the end-year population in a given prefecture in the previous year tends to increase the number of campuses by 6, ceteris paribus. However, an increase in the share of secondary students in the regional population by one percentage point decreases the number of campuses by 0.573, ceteris paribus.

After including the city fixed effects, the estimation results reported in Table 10 suggest that the number of campuses is responsive to changes in real GDP per capita, 3-year real GDP per capita growth rate, foreign direct investment per capita, and the share of GDP in the secondary industry. A one-percent increase in real GDP per capita in the previous year and foreign direct investment per capita in the previous year would result into 3.221 and 0.239 increase in the number of campuses, respectively. An increase in 3-year GDP per capita growth rate by one percentage point decreases the number of campuses by 9.4. Therefore the higher real GDP per capita and foreign direct investment per capita, the more number of campuses built in prefecture level cities.

We also use the probit model for the probability of opening a new campus in all cities and urban core. The marginal effects from the probit model are reported in Table 11. The results suggest that the likelihood of campus opening is greater in larger cities and more developed regions with higher real GDP per capita. The probability of opening a campus is lower in prefectures with the higher share of primary and secondary industries. We do not find statistically significant effect of FDI per capita on college opening.

All cities and urban core We also use the same methods for the sample of county-level cities and urban cores. The estimated effects are similar, with the exception of FDI per capita which is found to have a positive and statistically significant effect on the number of campuses. The results are reported in Tables 12, 13, and 14.

C. Determinants of the College Composition by Field

We are interested in understanding the structural changes in the composition of colleges during the considered period. We estimate the model in equation (1) using the share of colleges of a given type as a dependent variable. Our OLS estimation without city fixed effects in Table 9 shows that the share of technical colleges is positively associated with the level of economic development (measured as real GDP per capita) and with the share of GDP in agriculture and manufacturing in prefectures. Prefectures with large real GDP per capita and substantial manufacturing may need more high-skilled workers in engineering, science, architecture, etc. Besides, higher economic development could motivate workers to invest into human capital and raise their skill level. Therefore, cities with better economic conditions have a higher likelihood to build more technical field colleges.

Our estimation suggests that the share of humanities and pedagogy colleges is strongly correlated with the size of population, rather than with the level of economic development, as illustrated in Tables 9 and 12. The larger the population is in the prefecture level and county-level cities, the higher the share of humanities and pedagogy colleges. For example, large cities such as Beijing give college graduates more chances to

engage in political and cultural environment. Therefore the increasing of the share of humanities and pedagogy colleges should attribute to the increasing of population.

Comprehensive colleges which train students in both humanities and technical fields are another interesting case. The estimation results in Table 9 suggest that the share of comprehensive colleges is larger in cities with high population growth rate and real GDP per capita growth rate, located in East and South East.

D. Economic outcomes

In the second equation, we estimate how college expansion affects labor market earnings, GDP per capita and 3-year real wage growth rate. In prefecture level cities and all cities, the number of campuses has a statistically significant positive effect on future real earnings. In both prefecture level cities and all cities, an addition of one campus would result into about 0.4 percent increase in the real earnings in three years since campus opening (see Tables 15 and 16). Other factors such as the real GDP per capita and foreign direct investment per capita also play very important roles in determining the future earnings. Our analysis in Tables 15 and 16 suggests that a new campus in a city is associated with a one-percent increase in GDP per capita three years after campus opening in the prefecture level cities and 0.8 percent increase in GDP per capita in county level cities and urban core. However, we do not find a statistically significant effect of college expansion on wage growth in prefectures. Furthermore, we find a negative wage growth following the campus opening in county-level cities and urban cores, perhaps reflecting the downward supply effects of college expansion.

8. Conclusion

China's higher education had a large-scale expansion in terms of the number of students enrolled and the number of campuses in the late 1990s. Our analysis suggests that the growing economy has made a great contribution to the college construction. Larger cities with higher GDP per capita are more likely to open a new campus in the area. Besides, the better the economic condition a city has, the higher increase in the share of technical colleges, especially a city with higher share of GDP in the secondary industry. The college expansion in China resulted in increasing labor earnings (but not growth rate) and real GDP per capita. The study is important because it shows that college expansion brings economic benefits in terms of increasing regional earnings and real GDP per capita, which enhances future economic development.

The methodological concern is that estimation may suffer from some endogeneity problems, such as omitted variable bias. For example, other factors such as government funding may affect number of campuses. There could be time-varying unobservables correlated with the number of campuses in the outcome equations (e.g., time-varying institutional/financial characteristics or the quality of bureaucracy). Unfortunately, due to the data constraints, we did not address the issue of college quality.

An important policy concern is that college expansion promotes widening the regional income gap, as most college expansion happens in already developed regions, in east coastal areas. The Chinese government needs to consider opening colleges in other regions and cities that did not have a campus before.

Table 1: Description of Key Variables

Term	*Definition*
College	College education includes junior colleges (2-3 years) and undergraduate universities (4-5 years).
Campus	A campus refers to all buildings of the same college in one municipality; see above for the definition of municipality. Each college has a main campus; some colleges may have campuses located in other municipalities.
Private college	Owned, operated, and financed by non-government organizations and individuals; private colleges require accreditation by the Ministry of Education to grant degrees.
Undergraduate university	Offers bachelor degrees or above; the usual study period is 4 to 5 years
Junior college	2-3 years of post-secondary education; does not offer a bachelor degree
College in technical fields	Primary fields of training are engineering, science, technology, and industry-specific production (e.g., construction, agriculture, forestry, mining, etc.)
College in humanities	Primary fields of training are humanities, economics, governance, and law
College in pedagogy and medicine	Primary fields of training are medicine, pedagogy, and sports
Comprehensive college	No clearly defined primary field of training; often provide education in both engineering and humanities
Ministry-level college	High-quality institutions of higher education under the direct supervision and special funding of the Ministry of Education of the People's Republic of China.
985 Project college	Universities sponsored through the special government program "Project 985" that was introduced in 1998 to build world-class universities
Founding year	The year that starts to recruit students
Municipality	Municipality in China is defined by Chinese "State Bureau of Technological Supervision" in Beijing, are unique identification numbers assigned to the administrative divisions in the People's Republic of China (PRC). For municipality, this study uses Guobiao codes (GB codes). The GB Codes are arranged hierarchically to distinguish three major levels of administrative regions. In this study, the county level (AMD3) is applied. The county level includes counties, autonomous counties, districts (are included into urban core in this study), banners, and municipalities

	under the direct control of the prefectural government.
Total population	Refers to the total number of people alive at a certain point of time within a given area. The annual statistics on total population is taken at midnight, the 3lst of December, not including residents in Taiwan province, Hong Kong SAR and Macao SAR and Chinese national residing abroad. Measured in 10,000 persons;
Gross Domestic Product (GDP)	Refers to the final products at market prices produced by all resident units in a country (or a region) during a certain period of time. Gross domestic product is expressed in three different perspectives, namely value, income, and products respectively. GDP in its value perspective refers to the total value of all goods and services produced by all resident units during a certain period of time, minus the total value of input of goods and services of the nature of non-fixed assets; in other words, it is the sum of the value-added of all resident units. GDP from the perspective of income includes the primary income created by all resident units and distributed to resident and non-resident units. GDP from the perspective of products refers to the value of all goods and services for final demand by all resident units minus the imports of goods and services during a given period of time. In the practice of national accounting, gross domestic product is calculated from three approaches, namely production approach, income approach and expenditure approach, which reflect gross domestic product and its composition from different angles. Measured in 100 million Yuan;
Three Strata of Industry	In China economic activities are categorized into the following three strata of industry: Primary industry refers to agriculture, forestry, animal husbandry and fishery and services in support of these industries; Secondary industry refers to mining and quarrying, manufacturing, production and supply of electricity, water and gas, and construction; Tertiary industry refers to all other economic activities not included in the primary or secondary industries.
Consumer Price Index (CPI)	Reflect the trend and degree of changes in prices of consumer goods and services purchased by urban and rural households during a given period. They are obtained by combining Consumer Price Indices of Urban Household and Consumer Price

	Indices of Rural Household. The Indices enable the observation and analysis of the degree of impact of the changes in the prices of retailed goods and services on the actual living expenses of urban and rural residents.
Foreign Direct Investment (FDI)	Refers to the investments inside China by foreign enterprises and economic organizations or individuals (including overseas Chinese, compatriots from Hong Kong, Macao and Taiwan, and Chinese enterprises registered abroad), following the relevant policies and laws of China, for the establishment of ventures exclusively with foreign own investment, Sino-foreign joint ventures and cooperative enterprises or for co-operative exploration of resources with enterprises or economic organizations in China. It includes the re- investment of the foreign entrepreneurs with the profits gained from the investment and the funds that enterprises borrow from abroad in the total investment of projects, which are approved by the relevant department of the government. Measured in 10,000 US Dollars;
Employed Staff and Workers	Refer to persons who work in, and receive wages from their working units, including persons who have their work posts but are temporarily absent from work for reasons of study or on sick, injury or maternal leave and still receive wages from their working units. Measured in 10,000 persons;
Total Wage Bill	Refers to the total remuneration payment to staff and workers in various units during a certain period of time. The calculation of total wage bill is based on the total remuneration payment to the staff and workers. Therefore, all the wages and salaries and other payments to staff and workers are included in the total wage bill regardless of sources, reckoning the cost of production or not, category, listing as items of premium taxation or not, and forms, paying in cash or in kind. Measured in 100 million Yuan;
Average Wage	Refers to the average wage in money terms per person during a certain period of time for staff and workers in enterprises, institutions, and government agencies, which reflects the general level of wage income during a certain period of time and is calculated as follows: $Average\ Wage = \frac{Total\ Wage\ Bill\ of\ Staff\ and\ Workers\ at\ Reference\ Time}{Average\ Number\ of\ Staff\ and\ Workers\ at\ Reference\ time}$

	Measured in Yuan;
Regular Institutions of Higher Education	Refer to educational establishments set up according to the government evaluation and approval procedures, recruiting graduates from senior secondary schools as the main target by National Matriculation TEST. They include full-time universities, colleges, institutions of higher professional education, institutions of higher vocational education and others (non-university tertiary, branch schools and undergraduate classes). Universities and colleges primarily provide undergraduate courses; institutions of higher professional education and institutions of higher vocational education primarily provide professional trainings; and others refer to educational establishments, which are responsible for enrolling higher education students under the State Plan but not enumerated in the total number of schools, including: branch schools of universities and colleges, and universities and colleges that have been approved and under plan for construction. Non-university tertiary refers to the regular undergraduate branch college, which is running in new mechanism and mode, excluding the branch schools and other similar branches of educational institutions.

Table 2: Average Number of Colleges in Municipality by Year

Year	*Mean*	*Std. Dev.*	*Freq.*
1985	3.51	6.24	298
1986	3.53	6.29	300
1987	3.54	6.31	301
1988	3.55	6.33	303
1989	3.57	6.34	304
1990	3.55	6.32	306
1991	3.56	6.33	308
1992	3.61	6.50	309
1993	3.66	6.58	311
1994	3.72	6.70	311
1995	3.76	6.87	313
1996	3.76	6.88	315
1997	3.78	6.93	316
1998	3.82	7.02	322
1999	3.96	7.41	336
2000	4.09	7.66	349
2001	4.36	8.15	363
2002	4.56	8.62	382
2003	4.80	9.14	398
2004	5.03	9.71	410
2005	5.09	9.94	419
2006	5.16	10.14	423
2007	5.17	10.21	429
2008	5.21	10.32	435
2009	5.22	10.40	441
2010	5.22	10.45	451
2011	5.27	10.59	459
2012	5.32	10.71	462
Total	4.38	8.51	10,074

***Notes*:** This table displays the average number of campuses in each year from 1985 to 2012 for municipalities that have at least one campus.

Source: China College Database

Table 3: Summary Statistics of College Variables by Period

	Pre-expansion 1985-1999	*Expansion 2000-2012*	*Comparison t-test (p-value)*
N of municipality-year observations	34,335	29,757	.
Share of municipalities with at least one campus	13.55%	18.22%	
Average N of colleges, total	0.496	0.909	0.000
	(2.739)	(4.609)	.
Average N of undergraduate colleges	0.287	0.440	0.000
	(1.873)	(2.624)	.
Average N of junior colleges	0.209	0.468	0.000
	(1.032)	(2.163)	.
Average N of private colleges	0.029	0.127	0.000
	(0.279)	(0.797)	.
Average N of colleges in technical fields	0.208	0.431	0.000
	(1.161)	(2.116)	.
Average N of colleges in humanities, business, and law	0.076	0.161	0.000
	(0.680)	(1.175)	.
Average N of colleges in pedagogy, medicine, and sports	0.068	0.100	0.000
	(0.388)	(0.530)	.
Average N of comprehensive colleges	0.143	0.218	0.000
	(0.745)	(1.075)	.
Average N of colleges under project 985	0.000	0.015	0.000
	(0.019)	(0.204)	.
Average N of colleges under supervision of national Ministries	0.039	0.057	0.001
	(0.663)	(0.803)	.

Notes: The sample consists of all municipalities, including those that do not have a campus. The sample is split into two periods (pre-expansion and post-expansion). The comparison t-test was used to see if the expansion is statistically significant. This table shows that number of colleges of all types increased significantly after 1999. Standard error is in parentheses.

Source: China College Database

Table 4: Change in the Average Number of Colleges between 1985-1999 and 2000-2012 by Geographic Region

	North	*Northeast*	*East*	*South Central*	*Southwest*	*Northwest*
ΔN of colleges, total	0.407	0.426	0.699	0.471	0.214	0.179
	(0.099)	(0.107)	(0.069)	(0.065)	(0.044)	(0.064)
ΔN of undergraduate colleges	0.141	0.170	0.242	0.176	0.090	0.074
	(0.069)	(0.071)	(0.040)	(0.032)	(0.023)	(0.040)
ΔN of junior colleges	0.266	0.252	0.457	0.292	0.123	0.104
	(0.036)	(0.040)	(0.032)	(0.034)	(0.022)	(0.025)
ΔN of private colleges	0.065	0.110	0.186	0.117	0.045	0.039
	(0.010)	(0.018)	(0.013)	(0.010)	(0.006)	(0.014)
ΔN of colleges in technical fields	0.205	0.216	0.382	0.276	0.097	0.107
	(0.039)	(0.048)	(0.032)	(0.033)	(0.018)	(0.029)
ΔN of colleges in humanities, business, and law	0.114	0.105	0.126	0.084	0.052	0.026
	(0.030)	(0.027)	(0.016)	(0.015)	(0.012)	(0.011)
ΔN of colleges in pedagogy, medicine, and sports	0.038	0.041	0.053	0.026	0.019	0.012
	(0.011)	(0.019)	(0.008)	(0.008)	(0.006)	(0.006)
ΔN of comprehensive colleges	0.049	0.064	0.138	0.086	0.046	0.034
	(0.022)	(0.021)	(0.019)	(0.013)	(0.010)	(0.022)
ΔN of colleges under Project 985	0.024	0.019	0.020	0.011	0.006	0.010
	(0.005)	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)
ΔN of colleges under supervision of national ministries	0.017	0.010	0.025	0.029	0.011	0.009
	(0.032)	(0.010)	(0.011)	(0.008)	(0.003)	(0.008)

Notes: The sample consists of all municipalities, including those that do not have a campus. The sample is split into two periods (pre-expansion and post-expansion). Number of observations is displayed in Table 2. Standard error is in parentheses.

Source: China College Database

Table 5: Change in the Average Number of Colleges between 1985-1999 and 2000-2012 by City Type

	Small	*Middle*	*Large*	*Super Large*
ΔN of colleges, total	0.023	0.156	0.434	2.587
	(0.005)	(0.010)	(0.026)	(0.297)
ΔN of undergraduate colleges	0.004	0.054	0.148	1.021
	(0.002)	(0.005)	(0.013)	(0.184)
ΔN of junior colleges	0.018	0.103	0.284	1.559
	(0.003)	(0.006)	(0.015)	(0.128)
ΔN of private colleges	0.004	0.037	0.096	0.635
	(0.001)	(0.002)	(0.006)	(0.045)
ΔN of colleges in technical fields	0.015	0.083	0.254	1.342
	(0.002)	(0.005)	(0.015)	(0.130)
ΔN of colleges in humanities, business, and law	0.000	0.024	0.073	0.621
	(0.001)	(0.002)	(0.005)	(0.078)
ΔN of colleges in pedagogy, medicine, and sports	0.001	0.014	0.028	0.203
	(0.002)	(0.003)	(0.005)	(0.033)
ΔN of comprehensive colleges	0.007	0.036	0.078	0.422
	(0.002)	(0.004)	(0.008)	(0.070)
ΔN of colleges under project 985	0.000	0.000	0.002	0.157
	(0.000)	(0.000)	(0.001)	(0.012)
ΔN of colleges under supervision of national ministries	0.000	0.008	0.010	0.144
	(0.000)	(0.001)	(0.002)	(0.063)

Notes: The sample consists of all municipalities, including those that do not have a campus. The sample is split into two periods (pre-expansion and post-expansion). Number of observations is displayed in Table 2. Standard error is in parentheses. City type is defined based on city population: a city with lower than 200,000 persons is classified as small city, 200,000 – 500,000 persons as middle city, 500,000-10,000,000 persons as large city, over 10,000,000 as super large city.

Source: China College Database

Table 6: Summary Statistics for GDP and FDI

	Pre-expansion 1985-1999	***Expansion 2000-2012***	***Comparison T-test***
Number of observations	12,593	21,720	
Real GDP per capita in prefecture area, Yuan	7875.167	19555.347	0.000
	(6510.756)	(19142.128)	
Real GDP per capita in urban core and cities, Yuan	12663.892	30932.745	0.000
	(9580.676)	(25213.892)	
FDI per capita in prefecture area,USD	20.157	60.390	0.000
	(72.868)	(137.825)	
FDI per capita in urban core and cities, USD	42.267	105.807	0.000
	(113.101)	(210.367)	
Real annual earnings in prefecture area, Yuan	6331.829	20060.066	0.000
	(2071.381)	(10710.236)	
Real annual earnings in all cities and urban core, Yuan	6648.162	21790.459	0.000
	(2013.224)	(9429.159)	
3-year real GDP per capita growth rate in prefecture areas, Yuan	0.032	0.030	0.000
	(0.023)	(0.015)	
3-year real GDP per capita growth rate in all cities and urban core, Yuan	0.027	0.028	0.423
	(0.027)	(0.017)	
3-year population growth rate in prefecture area	0.030	0.023	0.000
	(0.074)	(0.030)	
3-year population growth rate in all cities and urban core	0.000	0.000	0.000
	0.068	0.068	

Source: China City Statistical Yearbook

Table 7: Change in GDP, FDI, and Earnings between 1985-1999 and 2000-2012 by Geographic Region

	North	*Northeast*	*East*	*South Central*	*Southwest*	*Northwest*
Real GDP per capita in prefecture area, Yuan	13469.071	14080.935	15608.283	9232.862	6997.686	8288.969
	(462.307)	(446.966)	(363.465)	(368.277)	(263.846)	(535.343)
Real GDP per capita in urban core and cities, Yuan	19958.823	21434.211	22981.223	16713.164	13202.543	10050.241
	(588.206)	(688.324)	(437.239)	(392.340)	(510.282)	(512.067)
FDI per capita in prefecture area, USD	32.607	58.539	80.817	21.955	19.537	6.149
	(2.685)	(4.416)	(2.760)	(2.739)	(1.693)	(0.969)
FDI per capita in urban core and cities, USD	42.955	100.229	118.126	47.129	31.646	5.759
	(3.113)	(6.344)	(3.666)	(4.205)	(2.647)	(1.033)
Real annual earnings in prefecture area, Yuan	13897.245	12958.476	14718.675	12533.125	13848.449	13978.153
	(211.927)	(197.829)	(157.446)	(234.822)	(203.260)	(279.997)
Real annual earnings in all cities and urban core, Yuan	15261.716	15065.827	16410.222	14070.872	15135.818	13888.206
	(204.065)	(197.286)	(147.847)	(129.489)	(203.520)	(237.307)

Source: China City Statistical Yearbooks

Table 8: Change in GDP, FDI, and Earnings between 1985-1999 and 2000-2012 by City Type

	Small city	*Middle city*	*Large city*	*Super large city*
Real GDP per capita in prefecture area, Yuan	15239.823	9805.811	11187.169	15619.082
	(2375.876)	(218.545)	(290.968)	(391.701)
Real GDP per capita in urban core and cities, Yuan	25405.405	16412.424	17814.894	21197.928
	(2034.447)	(305.723)	(351.424)	(463.414)
FDI per capita in prefecture area, USD	56.720	24.402	36.517	74.169
	(9.349)	(1.619)	(2.098)	(3.189)
FDI per capita in urban core and cities, USD	56.284	40.885	62.748	106.180
	(5.679)	(2.973)	(2.643)	(4.308)
Real annual earnings in prefecture area, Yuan	14273.408	13226.378	13664.767	14751.031
	(627.745)	(120.567)	(177.083)	(171.794)
Real annual earnings in all cities and urban core, Yuan	15385.843	14681.912	14930.118	16321.292
	(396.466)	(113.812)	(116.710)	(165.862)

Source: China City Statistical Yearbooks

Table 9: College Expansion Determinants using Weighted OLS Model Excluding City Fixed Effects, Prefecture Level

	Number of campuses	*Share of technical colleges*	*Share of humanities colleges*	*Share of pedagogy colleges*	*Share of comprehensive colleges*
Log of population in year t-1	6.027***	-0.331	5.166***	3.799***	3.260***
	(0.179)	(0.720)	(0.275)	(0.306)	(0.595)
3-year population growth rate	5.276***	-11.302	2.631	-8.967	15.549**
	(1.774)	(9.092)	(2.849)	(5.533)	(6.795)
Log of real GDP per capita in year t-1	5.729***	8.146***	4.208***	-3.152***	1.065
	(0.327)	(1.426)	(0.383)	(0.629)	(1.076)
3-year real GDP pre capita growth rate	-8.235	16.054	-10.459	-8.498	51.603*
	(6.310)	(37.411)	(10.652)	(19.951)	(30.431)
Log of foreign direct investment per capita in year t-1	-0.021	-0.893	0.320**	-1.016***	0.981**
	(0.088)	(0.626)	(0.151)	(0.237)	(0.458)
Share of GDP in primary industry	-0.573***	0.523***	-0.506***	-0.175***	0.032
	(0.019)	(0.088)	(0.026)	(0.044)	(0.073)
Share of GDP in secondary industry	-0.450***	0.930***	-0.423***	-0.230***	-0.384***
	(0.020)	(0.071)	(0.022)	(0.036)	(0.058)
Share of secondary students in population	-0.538***	-1.499***	-0.062	0.051	0.851**
	(0.088)	(0.416)	(0.125)	(0.204)	(0.366)
Northeast	-0.668	1.234	-2.481***	3.283***	0.086
	(0.407)	(1.997)	(0.506)	(1.140)	(1.666)
East	-2.168***	4.229***	-2.637***	-0.872	4.991***
	(0.424)	(1.582)	(0.513)	(0.854)	(1.402)
South Central	-1.479***	6.650***	-0.956*	-4.446***	3.413**
	(0.429)	(1.658)	(0.561)	(0.876)	(1.447)
Southwest	0.405	3.340	3.592***	-3.207**	-7.962***
	(0.438)	(2.186)	(0.758)	(1.284)	(1.679)
Northwest	4.464***	8.194***	5.826***	-2.179**	-2.064
	(0.429)	(2.870)	(0.989)	(1.055)	(1.744)
Constant	9.086***	-17.509	10.368***	10.943**	17.643*
	(1.973)	(10.775)	(3.596)	(4.947)	(9.726)
Observations	5,990	5,990	5,990	5,990	5,990
R-squared	0.542	0.120	0.220	0.083	0.075
Year FE	YES	YES	YES	YES	YES
Missing Value Dummies	YES	YES	YES	YES	YES

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. North region is omitted. This table is the estimation result for equation (1) with details discussed in the sections 7B and 7C.

Table 10: College Expansion Determinants using Weighted FE Model with City Fixed Effects, Prefecture Level

	Number of campuses	*Share of technical colleges*	*Share of humanities colleges*	*Share of pedagogy colleges*	*Share of comprehensive colleges*
Log of population in year t-1	0.758	-1.047	0.371	-1.367	-3.015
	(0.610)	(3.312)	(0.799)	(1.526)	(3.162)
3-year population growth rate	1.413	4.543	2.358	-5.068*	-3.509
	(1.280)	(5.356)	(2.161)	(3.044)	(5.462)
Log of real GDP per capita in year t-1	3.221***	0.932	0.634	0.289	-3.142
	(0.656)	(2.796)	(0.730)	(0.817)	(2.243)
3-year real GDP pre capita growth rate	-9.430**	26.632	-29.331**	-2.908	42.527*
	(4.740)	(40.413)	(11.678)	(13.225)	(23.576)
Log of FDI per capita in year t-1	0.239**	-1.139*	0.207	0.064	-0.145
	(0.114)	(0.661)	(0.196)	(0.161)	(0.473)
Share of GDP in primary industry	-0.036	0.214	-0.027	0.088	0.187
	(0.034)	(0.287)	(0.052)	(0.099)	(0.229)
Share of GDP in secondary industry	-0.166***	0.434**	-0.007	-0.011	0.051
	(0.038)	(0.185)	(0.040)	(0.073)	(0.125)
Share of secondary students in population	-0.025	0.856	0.020	-0.026	-0.604
	(0.106)	(0.693)	(0.201)	(0.140)	(0.444)
Constant	7.474*	14.600	0.114	17.056**	40.244**
	(4.097)	(19.278)	(5.158)	(8.154)	(16.919)
Observations	5,990	5,990	5,990	5,990	5,990
R-squared	0.345	0.148	0.029	0.011	0.020
Number of city ID	308	308	308	308	308
Year FE	YES	YES	YES	YES	YES
Missing Value Dummies	YES	YES	YES	YES	YES
City FE	YES	YES	YES	YES	YES

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. This table is the estimation result for equation (1) with details discussed in the sections 7B and 7C.

Table 11: Determinants of College Opening using Weighted Probit Model without City Fixed Effects, Prefecture Level

	Campus=1	*Technical college=1*	*Humanities college=1*	*Pedagogy college=1*	*Comprehensive college=1*
Log of population in year t-1	0.125***	0.173***	0.191***	0.282***	0.242***
	(0.007)	(0.009)	(0.006)	(0.007)	(0.008)
3-year population growth rate	0.056	0.096	0.065	0.156	0.267***
	(0.072)	(0.100)	(0.082)	(0.102)	(0.103)
Log of real GDP per capita in year t-1	0.143***	0.202***	0.092***	0.004	0.049***
	(0.015)	(0.019)	(0.013)	(0.009)	(0.012)
3-year real GDP pre capita growth rate	-0.158	-0.786*	-0.136	-0.061	-0.110
	(0.311)	(0.413)	(0.305)	(0.365)	(0.395)
Log of FDI per capita in year t-1	0.000	-0.021***	0.016***	-0.011**	0.020***
	(0.005)	(0.007)	(0.004)	(0.005)	(0.006)
Share of GDP in primary industry	-0.004***	-0.008***	-0.019***	-0.022***	-0.019***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Share of GDP in secondary industry	-0.003***	0.001	-0.015***	-0.016***	-0.015***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Share of secondary students in population	-0.006	-0.012**	-0.007*	-0.000	0.007
	(0.004)	(0.005)	(0.004)	(0.005)	(0.006)
Northeast	0.016	0.026	-0.077***	0.073***	0.024
	(0.017)	(0.024)	(0.016)	(0.022)	(0.023)
East	0.061***	0.096***	-0.061***	0.000	0.065***
	(0.015)	(0.021)	(0.015)	(0.019)	(0.021)
South Central	0.033**	0.033	-0.072***	-0.060***	0.038*
	(0.016)	(0.022)	(0.015)	(0.020)	(0.021)
Southwest	-0.017	0.073***	0.092***	-0.022	-0.083***
	(0.023)	(0.028)	(0.022)	(0.025)	(0.027)
Northwest	0.096***	0.132***	0.160***	0.086***	0.026
	(0.017)	(0.027)	(0.022)	(0.025)	(0.026)
Observations	5,990	5,990	5,990	5,990	5,990
Year FE	YES	YES	YES	YES	YES
Missing Value Dummies	YES	YES	YES	YES	YES

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. North region is omitted. This table shows the marginal effects. This table is the estimation result for equation (1) with details discussed in the sections 7B and 7C.

Table 12: College Expansion Determinants using Weighted OLS Model Excluding City Fixed Effects, Cities and Urban Core

	Number of campuses	*Share of technical colleges*	*Share of humanities colleges*	*Share of pedagogy colleges*	*Share of comprehensive colleges*
Log of population in year t-1	5.688***	4.515***	4.334***	0.917***	0.932**
	(0.180)	(0.439)	(0.159)	(0.250)	(0.454)
3-year population growth rate	8.347***	3.577	8.001***	6.030	7.998
	(2.367)	(7.275)	(2.052)	(3.909)	(6.107)
Log of real GDP per capita in year t-1	3.650***	1.706*	3.638***	-3.953***	-2.721***
	(0.209)	(1.031)	(0.310)	(0.528)	(0.875)
3-year real GDP pre capita growth rate	-11.043***	-23.522	8.627	-24.268**	-38.172*
	(2.783)	(19.730)	(7.645)	(10.348)	(20.722)
Log of FDI per capita in year t-1	0.183***	0.460	0.463***	-0.441**	1.225***
	(0.045)	(0.396)	(0.122)	(0.174)	(0.317)
Share of GDP in primary industry	-0.241***	-0.037	-0.204***	-0.491***	-0.478***
	(0.008)	(0.047)	(0.015)	(0.031)	(0.045)
Share of GDP in secondary industry	-0.241***	0.575***	-0.214***	-0.281***	-0.418***
	(0.009)	(0.043)	(0.011)	(0.027)	(0.037)
Share of secondary students in population	-0.334***	0.120	0.069	-0.082	1.121***
	(0.040)	(0.246)	(0.076)	(0.136)	(0.235)
Northeast	-2.398***	0.281	-3.066***	3.392***	0.160
	(0.294)	(1.448)	(0.363)	(0.903)	(1.358)
East	-3.045***	1.894	-2.841***	2.409***	6.940***
	(0.308)	(1.194)	(0.395)	(0.637)	(1.196)
South Central	-2.487***	5.002***	-1.503***	-0.541	4.661***
	(0.299)	(1.218)	(0.418)	(0.610)	(1.183)
Southwest	-2.073***	3.213**	2.176***	7.173***	-0.265
	(0.350)	(1.618)	(0.650)	(1.337)	(1.387)
Northwest	1.869***	8.153***	2.194***	-1.193	-2.735*
	(0.297)	(1.932)	(0.566)	(0.886)	(1.553)
Constant	1.955*	-31.550***	3.314*	30.277***	29.611***
	(1.140)	(6.744)	(1.832)	(5.772)	(5.928)
Observations	8,707	8,707	8,707	8,707	8,707
R-squared	0.533	0.234	0.177	0.077	0.070
Year FE	YES	YES	YES	YES	YES
Missing Value Dummies	YES	YES	YES	YES	YES

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 North region is omitted. This table is the estimation result for equation (1). The sample includes county-level cities and urban core of prefectures. More details are provided in Sections 7B and 7C.

Table 13: College Expansion Determinants using Weighted FE Model with City Fixed Effects, Cities and Urban Core

	Number of campuses	*Share of technical colleges*	*Share of humanities colleges*	*Share of pedagogy colleges*	*Share of comprehensive colleges*
Log of population in year t-1	1.757***	0.919	1.029	-2.356*	-1.991
	(0.507)	(3.827)	(1.553)	(1.238)	(3.912)
3-year population growth rate	0.391	-2.036	-0.805	0.608	-2.530
	(2.308)	(5.650)	(1.872)	(2.255)	(3.395)
Log of real GDP per capita in year t-1	1.607***	0.156	0.457	-1.011	0.741
	(0.330)	(2.054)	(0.407)	(0.734)	(1.489)
3-year real GDP pre capita growth rate	-4.457**	-3.467	-5.869	3.748	12.062
	(2.165)	(18.151)	(5.068)	(7.564)	(12.163)
Log of FDI per capita in year t-1	0.120**	0.108	-0.026	-0.356*	-0.180
	(0.055)	(0.465)	(0.162)	(0.211)	(0.325)
Share of GDP in primary industry	0.013	-0.192	0.035	-0.093	0.106
	(0.013)	(0.158)	(0.030)	(0.070)	(0.124)
Share of GDP in secondary industry	-0.067***	0.113	0.016	-0.012	-0.022
	(0.014)	(0.087)	(0.020)	(0.046)	(0.065)
Share of secondary students in population	-0.122**	0.695*	-0.017	0.136	-0.556*
	(0.049)	(0.394)	(0.146)	(0.104)	(0.291)
Constant	-1.173	16.857	-2.218	21.039***	33.215**
	(2.123)	(15.249)	(6.633)	(6.194)	(16.295)
Observations	8,707	8,707	8,707	8,707	8,707
R-squared	0.295	0.163	0.026	0.017	0.015
Number of city ID	640	640	640	640	640
Year FE	YES	YES	YES	YES	YES
Missing Value Dummies	YES	YES	YES	YES	YES
City FE	YES	YES	YES	YES	YES

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. This table is the estimation result for equation (1). The sample includes county-level cities and urban core of prefectures. More details are provided in Sections 7B and 7C.

Table 14: Determinants of College Opening using Weighted Probit Model without City Fixed Effects, Cities and Urban Core

VARIABLES	(1) Campus=1	(2) A technical college=1	(3) A humanities college=1	(4) A pedagogy college=1	(5) A comprehensive college=1
Log of population in year t-1	0.136***	0.193***	0.136***	0.174***	0.180***
	(0.008)	(0.008)	(0.004)	(0.005)	(0.007)
3-year population growth rate	0.560***	0.273***	0.128***	0.230***	0.275***
	(0.100)	(0.089)	(0.047)	(0.074)	(0.097)
Log of real GDP per capita in year t-1	0.056***	0.065***	0.051***	-0.018	0.051***
	(0.013)	(0.013)	(0.008)	(0.011)	(0.013)
3-year real GDP pre capita growth rate	-1.031***	-0.880***	0.367*	-0.386*	-0.926***
	(0.199)	(0.223)	(0.203)	(0.217)	(0.250)
Log of FDI per capita in year t-1	0.020***	0.005	0.017***	-0.001	0.014***
	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)
Share of GDP in primary industry	-0.010***	-0.009***	-0.009***	-0.016***	-0.016***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Share of GDP in secondary industry	-0.006***	-0.000	-0.006***	-0.009***	-0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Share of secondary students in population	0.007**	0.003	-0.004*	-0.003	0.012***
	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
Northeast	-0.023	-0.055***	-0.092***	-0.015	-0.051***
	(0.016)	(0.017)	(0.012)	(0.015)	(0.018)
East	0.048***	0.034**	-0.055***	0.035**	0.071***
	(0.014)	(0.015)	(0.012)	(0.014)	(0.017)
South Central	0.042***	0.007	-0.063***	-0.024*	0.042***
	(0.014)	(0.015)	(0.012)	(0.014)	(0.016)
Southwest	0.080***	0.036*	0.044**	0.065***	-0.022
	(0.020)	(0.020)	(0.018)	(0.020)	(0.021)
Northwest	0.067***	0.084***	0.070***	0.029*	-0.011
	(0.018)	(0.019)	(0.015)	(0.017)	(0.021)
Observations	8,707	8,707	8,707	8,707	8,707
Year FE	YES	YES	YES	YES	YES
Missing Value Dummies	YES	YES	YES	YES	YES

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; North region is omitted; this table shows the marginal effects. This table is the estimation result for equation (1). The sample includes county-level cities and urban core of prefectures. More details are provided in Sections 7B and 7C.

Table 15: Effects of College Expansion on the Economic Outcomes, Prefecture Level

VARIABLES	(1) Future 3-year log of real average wage	(2) Future 3-year log of real GDP per capita	(3) 3-year average wage growth rate
Number of campuses	0.004***	0.010***	-0.001
	(0.001)	(0.002)	(0.001)
Log of real GDP per capita in year t-1	0.097***		-0.037**
	(0.027)		(0.017)
Log of FDI per capita	0.016***	0.051***	0.004
	(0.005)	(0.009)	(0.003)
Share of GDP in primary industry	-0.001	-0.005*	-0.001
	(0.001)	(0.002)	(0.001)
Share of GDP in secondary industry	-0.001	0.010***	0.002**
	(0.001)	(0.003)	(0.001)
Share of secondary students in population	-0.005	-0.007	-0.007**
	(0.005)	(0.008)	(0.003)
Share of technical colleges	0.000	-0.002**	0.000
	(0.000)	(0.001)	(0.000)
Share of humanities colleges	-0.000	-0.002**	0.000
	(0.001)	(0.001)	(0.000)
Share of pedagogy colleges	-0.000	-0.001	-0.000
	(0.001)	(0.001)	(0.000)
Share of undergraduate universities	-0.016	-0.190**	0.005
	(0.036)	(0.091)	(0.023)
Share of private colleges	-0.112*	0.149	-0.027
	(0.058)	(0.128)	(0.045)
Share of universities under the supervision of ministry level	0.001	-0.002	0.001
	(0.001)	(0.002)	(0.001)
Constant	8.047***	8.850***	0.456***
	(0.262)	(0.203)	(0.167)
Observations	4,329	4,474	4,714
R-squared	0.971	0.930	0.528
Number of cityid	278	278	281
Year FE	YES	YES	YES
Missing Value Dummies	YES	YES	YES
City FE	YES	YES	YES

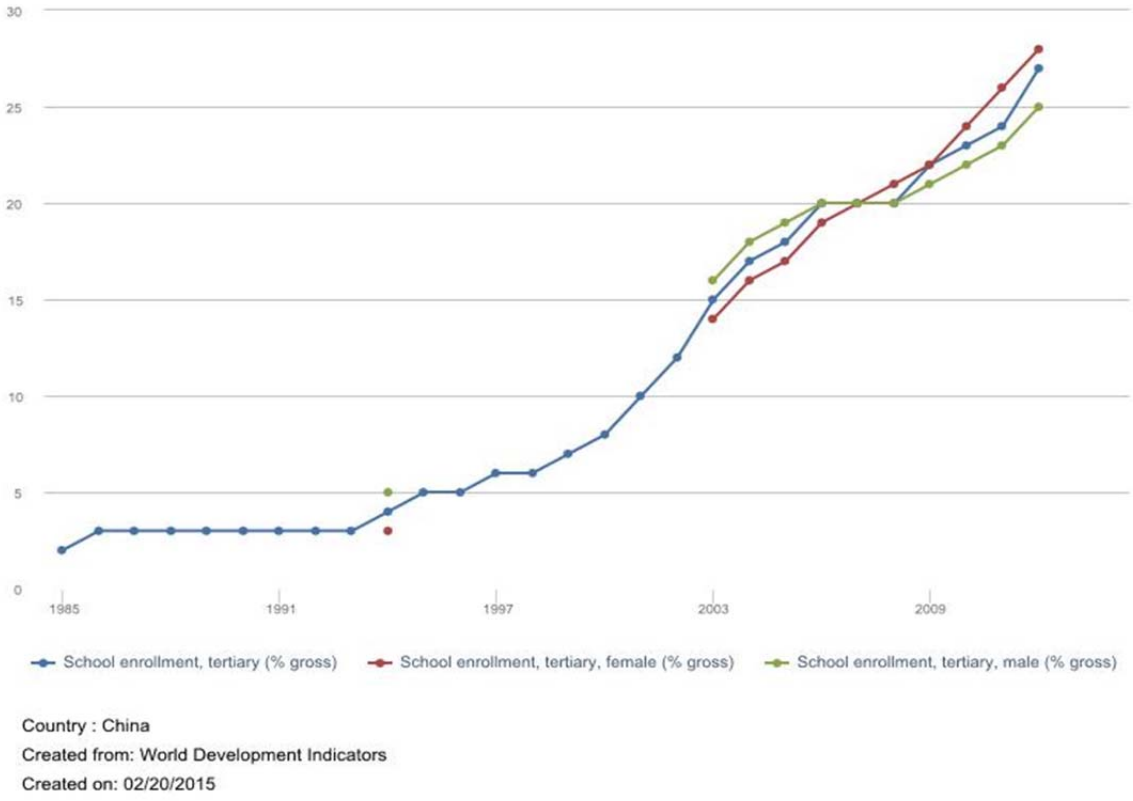
Notes: Robust standard errors in parentheses;*** p<0.01, ** p<0.05, * p<0.1. This table shows the estimation results for equation (2). More details are provided in Section 7D.

Table 16: Effects of College Expansion on the Economic Outcomes, Cities and Urban Core:

	Future 3-year log of real average wage	*Future 3-year log of real GDP per capita*	*3-year average wage growth rate*
Number of campuses	0.004***	0.008***	-0.002**
	(0.001)	(0.002)	(0.001)
Log of real GDP per capita in year t-1	0.070***		0.000
	(0.020)		(0.014)
Log of FDI per capita	0.009***	0.035***	0.002
	(0.003)	(0.007)	(0.002)
Share of GDP in primary industry	0.001	-0.007***	-0.000
	(0.001)	(0.002)	(0.001)
Share of GDP in secondary industry	0.000	0.005***	0.000
	(0.001)	(0.001)	(0.000)
Share of secondary students in population	0.003	0.018***	0.003
	(0.003)	(0.006)	(0.002)
Share of technical colleges	-0.000	-0.003***	0.000
	(0.000)	(0.001)	(0.000)
Share of humanities colleges	0.000	-0.002	0.000
	(0.001)	(0.001)	(0.001)
Share of pedagogy colleges	-0.001	-0.001	-0.000
	(0.001)	(0.001)	(0.000)
Share of undergraduate universities	-0.012	-0.230***	0.004
	(0.040)	(0.079)	(0.053)
Share of private colleges	-0.163***	0.092	-0.102*
	(0.055)	(0.120)	(0.054)
Share of universities under the supervision of ministry level	0.001	-0.000	0.001
	(0.001)	(0.001)	(0.001)
Constant	8.197***	9.277***	0.144
	(0.203)	(0.136)	(0.180)
Observations	4,894	5,095	5,382
R-squared	0.965	0.895	0.457
Number of cityid	309	309	320
Year FE	YES	YES	YES
Missing Value Dummies	YES	YES	YES
City FE	YES	YES	YES

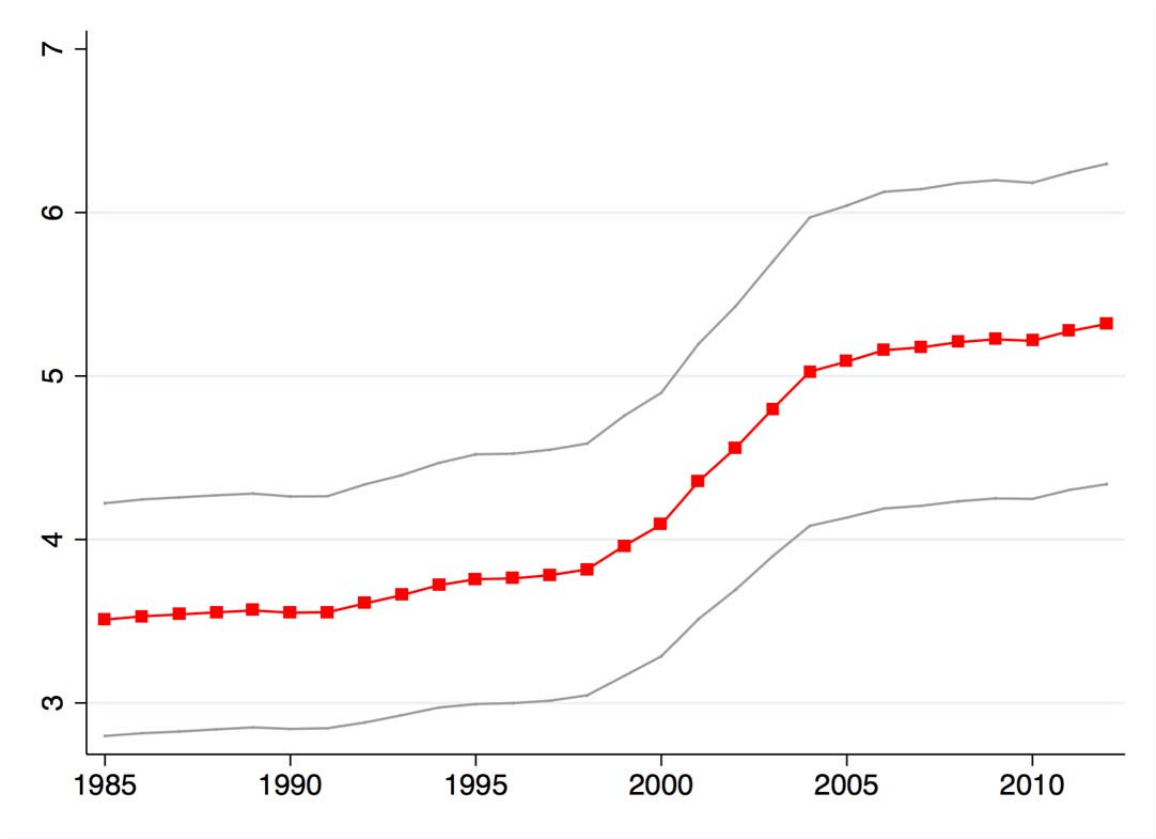
Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. This table shows the estimation results for equation (2). More details are discussed in Section 7D.

Figure 1: School Enrollment Rate, Tertiary



Source: World Bank Database

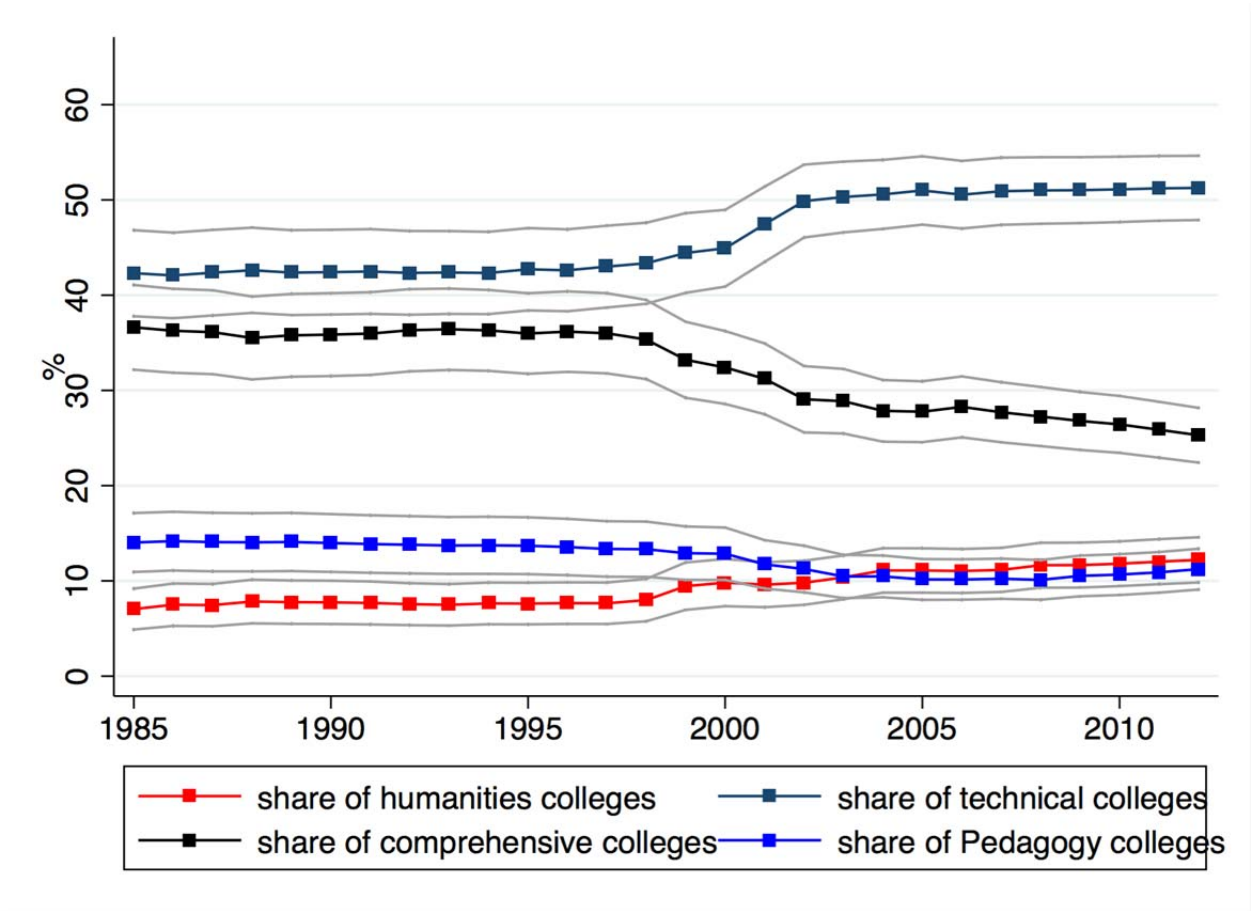
Figure 2: Trends in the Average Number of Campuses per Municipality



Notes: The confidence interval in this figure is 90%. The figure shows the average number of campuses in municipalities with at least one campus.

Source: China College Database

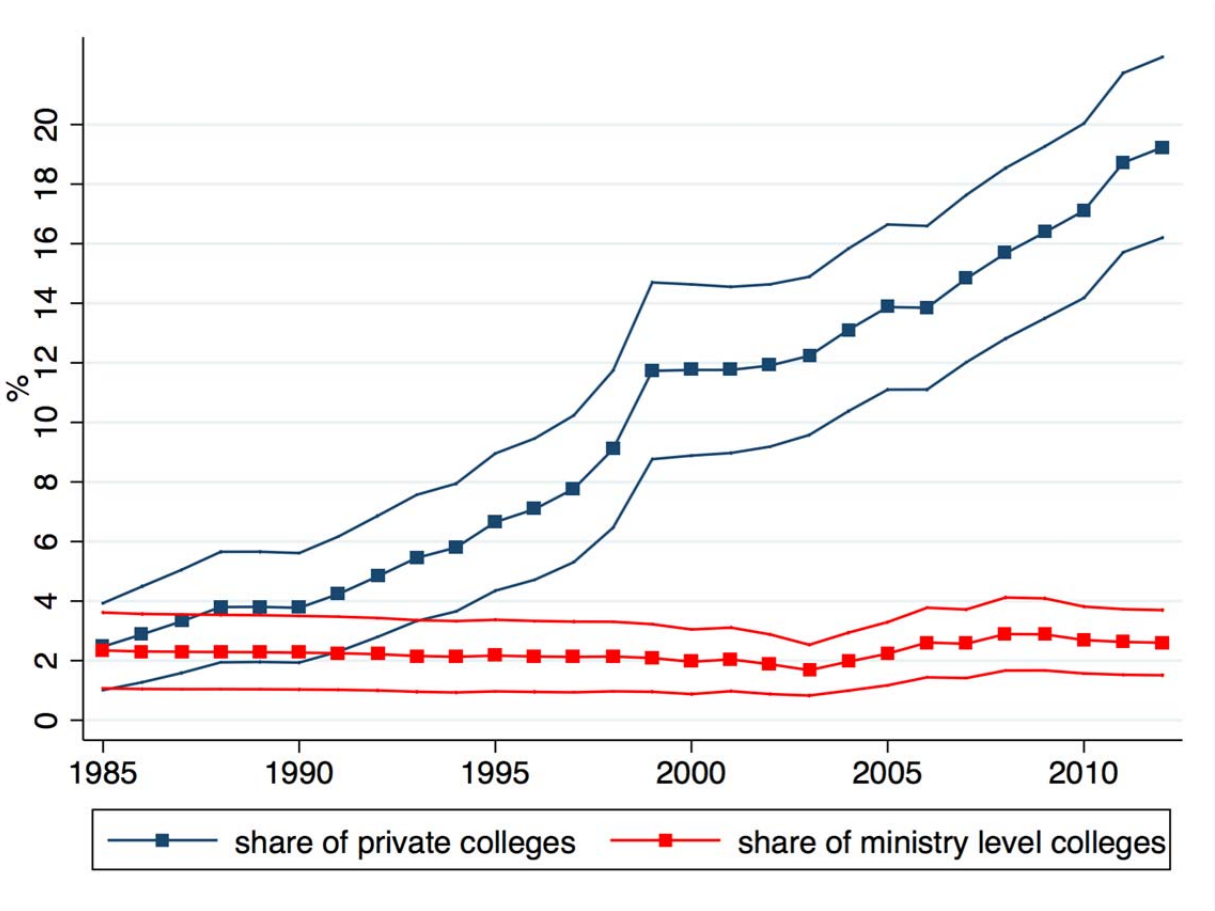
Figure 3: Trends in College Composition



Notes: This figure shows the composition of colleges by field of study in percent. Comprehensive colleges do not have a clear focus of specialization.

Source: China College Database

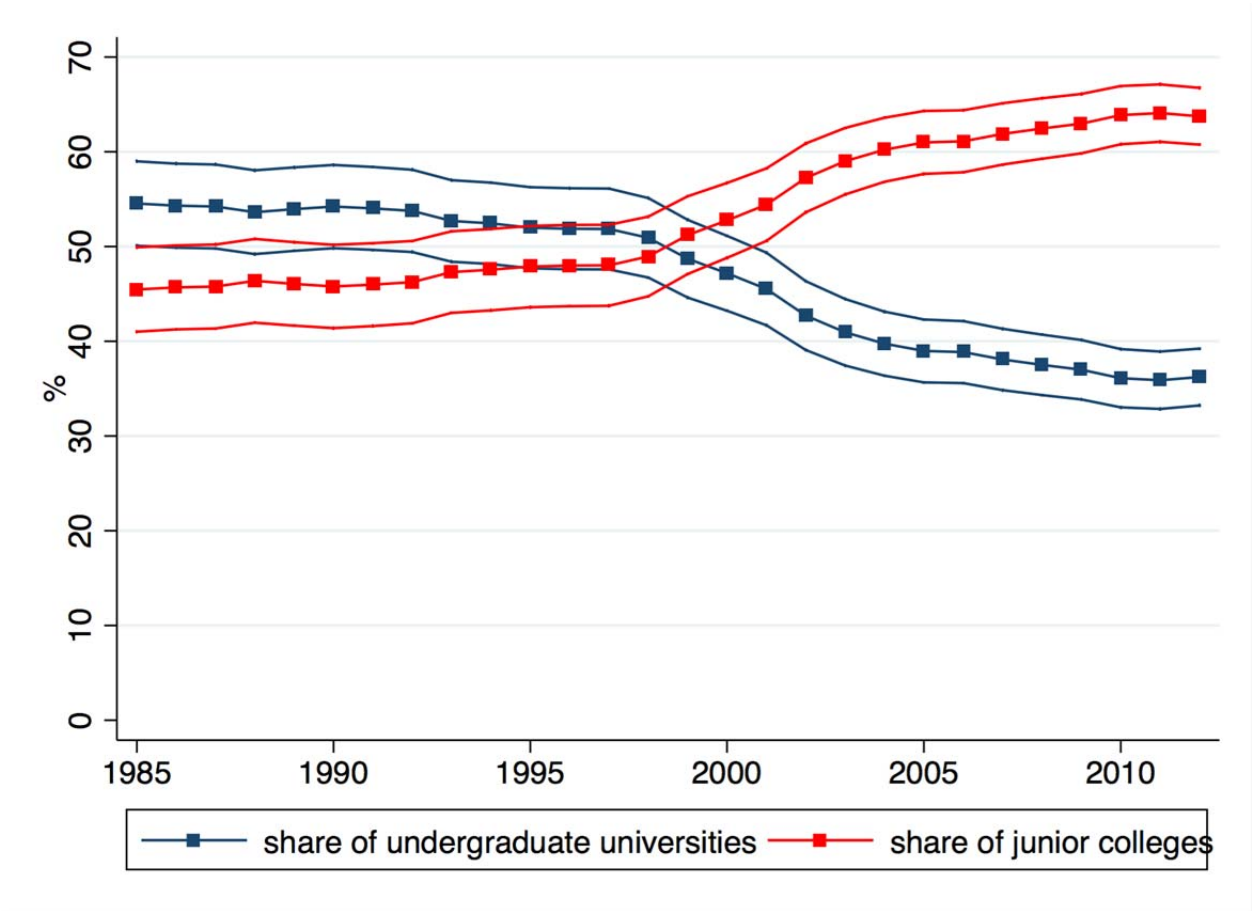
Figure 4: Trend in the Share of Private Colleges and Ministry-Supervised Colleges



Notes: This figure shows the percent share of private colleges and colleges under the supervision of the Ministry of Education.

Source: China College Database

Figure 5: Trend in the Share of Undergraduate and Junior Colleges



Notes: This figure shows the percent share of junior colleges (2-3 years of study) and undergraduate universities (4-5 years of study).

Source: China College Database

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